ATTACHMENTS

Development and Infrastructure Services Committee Meeting

11 July 2018

6.00pm

City of Albany Council Chambers

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PROPOSED LOCAL STRUCTURE PLAN No 9

LOT 660 La PEROUSE ROAD, GOODE BEACH

Prepared by

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Project Job Code: 00069
Identification No: ALBA/2016/____-1
Date: 04 September 2017 (FINAL)

Prepared for

DR CHERRY MARTIN

ENDORSEMENT PAGE

This Local Structure Plan is prepared under the provisions of the City of Albany Local Planning Scheme No.1.

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON:

_____

Signed for and on behalf of the Western Australian Planning Commission:

_____

an officer of the Commission duly authorised by the Commission pursuant to section 16 of the *Planning and Development Act 2005* for that purpose, in the presence of:

_____ Witness

_____ Date

_____ Date of Expiry

TABLE OF AMENDMENTS

Amendment No.	Summary of Amendment	Amendment Type	Date Approved by WAPC

Executive Summary

This Structure Plan has been prepared to guide the development of land contained within Lot 660 La Perouse Road, Goode Beach ('the land'), within the City of Albany. The landowner seeks to develop a unique, high quality tourist resort on land already identified to comprise tourist related land uses and related complementary land uses within the City of Albany Local Planning Scheme No. 9.

The Structure Plan area comprises 7.7107 hectares and is located immediately north of the Goode Beach coastal townsite. The intent of the Structure Plan is to consider all matters relative to the land and to guide subsequent lodgement of a detailed development application with the City of Albany. The Structure Plan details the land use precincts and generally identifies other related development parameters to guide future land use and development. It has been prepared in accordance with the relevant structure planning framework to facilitate and guide the future development assessment of the land.

The consultant project team involved in the preparation of this Structure Plan included the following:

- PGPM Pty Ltd – Project Manager;
- AholaPlanning – Town Planning & Design;
- Wood & Grieve Engineers – Civil Engineering Report;
- Grounds Kent Architects – Conceptual Design;
- Aurora Environmental Albany – Environmental Assessment Reports;
- MP Rogers & Associates Pty Ltd – Coastal Hazard Assessment & Risk Management Strategy;
- Eco Logical Australia in association with Bio Diverse Solutions Albany – Bushfire Management Plan.

Upon determination of the Structure Plan, a standard scheme amendment will be prepared making reference to the Structure Plan and detailing suggested modifications to the land use and development provisions applicable to developing a tourist resort.

Structure Plan Summary Table

Item	Data		Structure Plan Ref (Section No.)
Total area covered by the structure plan	7.7107 hectares		1.2.2 & Figure 2
Area of each land use proposed: • Holiday Accommodation • Development Buffer • Remnant Vegetation	Hectares/m^2 2.1ha Included in the above 5.6107ha	Lot Yield 1 n/a n/a	3.1, 3.2 & Figure 5
Total estimated lot yield	1		3.2
Estimated number of tourist accommodation units	51 (to provide 61 beds)		
Estimated population (at full occupancy) + Employees	122		
Estimated percentage of natural area (existing vegetation to be retained within the lot)	5.6107 Hectares 72.76 %		1.2, 2.1, 3.1 & Figures 4 & 5

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Appendix 5 - Environmental Assessment - (Aurora Environmental)
Appendix 6 - Targeted Survey for Western Ringtail Possum, Main's Assassin Spider and Black Cockatoo (Aurora Environmental)
Appendix 7 - Bushfire Management Plan (Eco Logical Australia in association with Biodiverse Solutions)
Appendix 8 - Civil Engineering Report (Wood & Grieve Engineers)
Appendix 9 - Vancouver Beach Resort Concept Plan (Grounds Kent Architects)
Appendix 10 - Draft Scheme Amendment Provisions to be inserted under Schedule 4 Special Use Zone of the Scheme under SU1

PART ONE – IMPLEMENTATION

1.0 Structure Plan Area

The Structure Plan area for Lot 660 La Perouse Road, Goode Beach consists of all land contained within the inner edge of the line denoting the Structure Plan Application Boundary on Local Structure Plan No.9 (Map).

The Structure Plan Area comprises an individual lot as set out in Table 1below:

Table 1 – Land Details

Lot Number	Plan Number	Street Address	Area
660	36832	40 La Perouse Court, Goode Beach	7.7107 hectares

2.0 Operation

The date the Structure Plan comes into effect is the date the Structure Plan is approved by the Western Australian Planning Commission.

3.0 Staging

Staging of the structure plan area is not envisaged.

4.0 Development Requirements

Specific land use and development requirements for Local Structure Plan No.1 are to be set out in the 'Special Use' zone scheme provisions provided in Schedule 4 of the City of Albany Local Planning Scheme No.1.

5.0 Local Structure Plan – No.9 (Map)

The Local Structure Plan No.9 (Map) is provided on the next page.

0 20 40 60 80m

NOTE: Base Data supplied by Landgate / Water Corp.
Aerial Photo dated 12 May 2016
Areas and dimensions are subject to final survey calculations.

Revision	Date	Item
A	4/9/17	Updated Issue
A	31/7/17	Initial Issue

LEGEND

- STRUCTURE PLAN BOUNDARY
- 6m WIDE INTERNAL ENTRY/EXIT ROAD
- 6m WIDE EMERGENCY ACCESSWAY
- PEDESTRIAN ACCESS LINK
- ENTRY / EXIT
- 2066 EROSION HAZARD LINE
- EXISTING CONSTRUCTED BATTLEAXE DRIVEWAY
- INTERNAL ROAD LINK (INDICATIVE)
- EXISTING SPECIAL USE ZONE
- EXTENT OF LOW WOODLAND
- 100m OFFSET FROM LAKE

PRECINCTS

- HOLIDAY ACCOMMODATION
- DEVELOPMENT BUFFER
- REMNANT VEGETATION

LOCAL STRUCTURE PLAN - No. 9 (MAP)

Lot 660 La Perouse Road, GOODE BEACH

Cherry Martin	:	CLIENT
A3@1:2,000	:	SCALE
4 September 2017	:	DATE
V-OC-0001	:	PLAN No
A	:	REVISION
G.A	:	PLANNER
B.L	:	DRAWN

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PART 2 – EXPLANATORY REPORT

1.0 Planning Background

1.1 Introduction and Purpose

This Structure Plan has been prepared in accordance with the Department of Planning Structure Plan Framework (August 2015). It seeks to provide a comprehensive framework to guide future land use and development of Lot 660 La Perouse Road, Goode Beach ('the land') as a unique, high quality tourist resort. The Structure Plan design has considered and incorporated relevant state planning policies, City of Albany Local Planning Strategy, Tourist Accommodation Strategy, Local planning scheme No.1 and related policies.

Through preliminary discussions between the proponent, City of Albany and Department of Planning, it was agreed that a structure plan will be prepared for the land based on the *Deemed Provisions for Local Planning Schemes – Schedule 2 Part 4 of the Planning and Development (Local Planning Schemes) Regulations 2015.* It was noted that, in this instance and despite a structure plan being defined as a "*plan for the co-ordination of future subdivision and zoning of an area of land*" (clause 14 of Part 4, Schedule 2 of the Regulations), the City of Albany and the Department of Planning have determined that Clause 15(a)(ii) and Clause 15 (c) of the Regulations applies.

It was further agreed that, following consideration and determination of the Structure Plan, a standard scheme amendment to the City of Albany Local Planning Scheme No.1 will be prepared. The scheme amendment will make reference details of the development to be addressed in preparing a Structure Plan and incorporate modifications to the provisions related to the future land use and development of the land.

This proposal is also informed by a number of technical site investigations (ie bushfire management, environmental, servicing and traffic impact assessment, coastal hazard and risk assessment, architectural concept design) prepared by the appointed project consultant team. A summary of each investigation is included within Part 2, with completed reports provided at Part 4 (Appendices Section).

1.2 Land Description

1.2.1 Location

The land is situated approximately 8 kilometres south-south east of the Albany city centre and abuts the northern edge of the coastal town of Goode Beach. Frenchman Bay Road is the key priority road (as referenced on the City of Albany's Local Planning Scheme No.1Map) providing connection between the City of Albany and surrounding regions to the natural tourist and recreational sites within the Torndirrup National Park and other man-made attractions (such as the Albany Historic Whaling Station) (refer to **Figure 1**).

Figure 1 – Location Plan

The land has frontage to, and can be accessed by La Perouse Road and La Perouse Court at the south western and south eastern sections of the property. La Perouse Road traverses southwards from the property through the coastal town of Goode Beach and thereafter connecting on to Vancouver Road and Frenchman Bay Road. The land is irregular in shape noting that it curves around Lot 8244 (Reserve 48916 and vested 'Reserve for Recreation') which contains Lake Vancouver. The land configuration can be viewed on the Site Context Plan at **Figure 2** below and on approved Deposited Plan No. 36832 which was approved on 20 May 2004 (refer to **Appendix 1**).

Figure 2 – Site Context Plan

The land is bounded by Lot 8245 (being a pedestrian access way) and Lot 8246 (Reserve for Foreshore Management and Recreation) and Special Residential zoned lots (that form part of the Goode Beach coastal townsite) to the south, Lot 7763 (Reserve 28111) to the east - which is a 30m wide foreshore reserve that fronts onto the beach and Lot 8168 (Reserve 25295) which comprises 338.18 hectares of native vegetation, strategic firebreaks and access to coastal areas (managed by the City of Albany for the purpose of Recreation) to the north and west. Lot 300 (Reserve 49672) abuts the property's western boundary, with Special Use (SU2) and Special Residential zoned lots are located close to the south western portion of the land.

1.2.2 Area and Land Use

The land comprises a total area of 7.7107 hectares. The property is currently undeveloped and contains remnant vegetation over the majority of the site. Vehicle access tracks meander through

the property and link on to La Perouse Road and La Perouse Court. These driveways/tracks link to Lot 8168 (Reserve 25925) to the north and traverse close to the 30m wide foreshore reserve identified as Lot 7763 (Reserve 28111) immediately to the east of the land.

1.2.3 Legal Description and Ownership

The land is legally described as Lot 660 La Perouse Court, Goode Beach. **Table 2** below outlines the relevant ownership information associated with the land. The Certificate of Title is contained at **Appendix 2**.

Landowner	Lot No.	Plan/Diagram No.	Certificate of Title	Street Address	Easements/ Encumbrances
Cherry Joan Martin, Andrea Ursula Whiting, and Tinko Pty Ltd	660	36832	Volume 2564 Folio 194	40 La Perouse Court, Goode Beach	A Notification under Section 136C of the Transfer of Land Act being an easement for 'Right of Carriageway' is provided for the benefit of adjoining Lot 653 over Lot 660.

Table 2 – Legal Description and Ownership

1.3 Planning Framework

1.3.1 Zoning and Reservations

1.3.1.1 City of Albany Local Planning Scheme No.1

The City of Albany Local Planning Scheme No.1 ('the Scheme') was gazetted on 28 April 2014 and provides the statutory basis for town planning in the City of Albany.

The Scheme identifies the Structure Plan area to be zoned in part 'Special Use' and Reserve for 'Parks and Recreation' as shown in **Figure 3**. The 'Special Use' zoned portion of the land is also referenced within Special Use Area (SU1).

Land use and Development is guided by specific provisions set out against portion of the land zoned 'Special Use' and relate to Special Use Area (SU1) in Schedule 4 of the Scheme. These provisions are provided at **Appendix 3**.

Condition 1 listed under Special Use Area (SU1) states the following:

1. *Prior to commencement of development of the special uses on the site, the owner/developer shall submit an overall Development Guide Plan to the Local Government for endorsement.*

Agreement has been reached with the City of Albany and Department of Planning that reference in Schedule 4 to the preparation of a Development Guide Plan now means a Structure Plan pursuant to *Schedule 2 Part 4* of the *Planning and Development Regulations 2015 Deemed provisions for local planning schemes ('the Regulations')*. In other words, and notwithstanding the provisions set out under Clause 5.9.1.4 of the Scheme (with regard to the preparation of Structure Plans), it has been agreed by Council and Department of Planning that Clause 15(a)(ii) and Clause 15 (c) of the Regulations apply in this instance. These read as follows:

15. A structure plan in respect of an area of land in the Scheme area may be prepared if –

(a) the area is –

(ii) identified in this Scheme as an area requiring a structure plan to be prepared before any future subdivision or development is undertaken;

Or

(c) the Commission considers that a structure plan for the area is required for the purposes of orderly and proper planning.

The Regulations then outline, in Clause 16(1), the structure plan preparation requirements and in Clause 18, the manner in which the public consultation process will be undertaken.

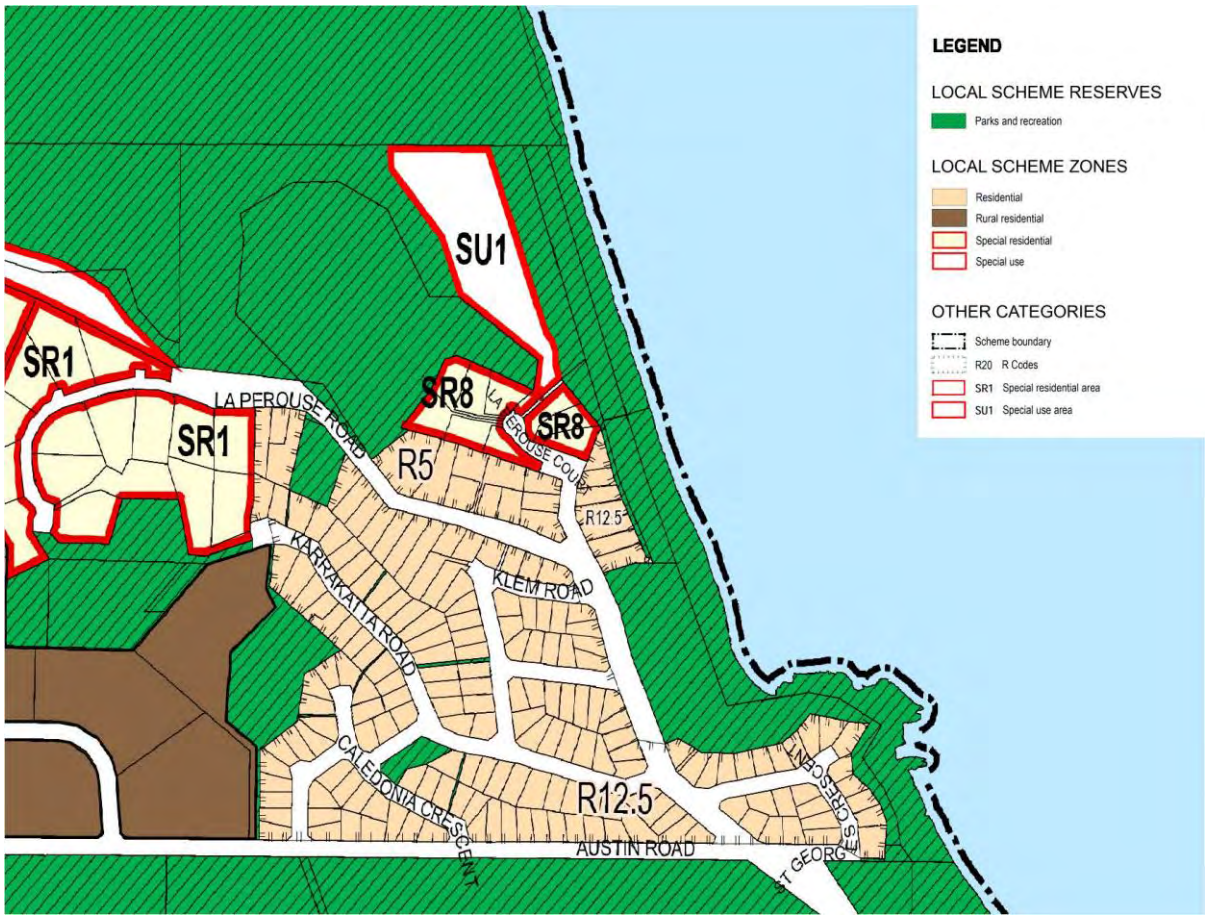


Figure 3 – Existing Zoning (Extract)

The existing Special Use Area (SU1) allows for consideration of Holiday Accommodation (Chalets/Cottage Units) that achieves a development outcome commensurate with the fragile coastal nature of the area. The proposed Structure Plan has taken due consideration of, and addresses the conditions currently identified for the land (such as siting/clustering, design colours and materials, assessment of coastal processes, servicing and fire management) as part of its investigation and preparation of the Structure Plan.

It was further agreed that, following consideration and determination of the Structure Plan, a standard scheme amendment to the City of Albany Local Planning Scheme No.1 will be prepared. The scheme amendment will make reference to the endorsed Structure Plan and incorporate

modifications to the provisions related to the future land use and development of the land. The draft Scheme Amendment text is provided at **Appendix 10** for information purposes.

1.3.2 Planning Strategies

1.3.2.1 City of Albany Local Planning Strategy (June 2010)

The City of Albany Local Planning Strategy (LPS) provides the framework that supports its Local Planning Scheme No. 1 and for future precinct and structure planning. It will also define the land use and development requirements for the City of Albany over the next 20 years.

The LPS recognises that Albany and its surrounds have many tourist destinations that exhibit outstanding cultural and natural beauty. It references the coastline of the Torndirrup National Park as an example and also identifies Frenchman Bay as a tourism accommodation node/centre on its Strategic Plan.

The LPS considers it to be essential that planning strategies, the Scheme, policies and procedures encourage and guide the development of attractive and sustainable tourism related projects which add value to the City's tourism infrastructure. It goes further by stating '*A key requirement is the availability of land located and zoned appropriately for major tourism projects, particularly the development of quality accommodation. There is a need to introduce greater zoning flexibility throughout the district to encourage future tourism projects by avoiding lengthy and expensive rezoning processes.*' (LPS 2010: Pp90)

The LPS details the following 'Actions' considered relevant to the preparation of this Structure Plan that will facilitate and promote the development of a sustainable and high quality tourism development:

- '*Ensure that new tourism development and related land uses do not threaten the natural and cultural heritage values which make the City uniquely desirable as a tourist destination. This includes ensuring that tourism and residential coastal developments do not put adverse pressure on foreshore areas;*' (LPS 2010: Pp91)

- '*Encourage the development of sustainable tourism uses and proposals that integrate with the City's unique natural and man-made landscape and heritage values;* (LPS 2010: Pp 157)

- *Put in place in the LPS1 necessary mechanisms to accommodate contemporary tourism development proposals.*' (LPS 2010: Pp 157)

The proposed Structure Plan has been prepared having due consideration to the above recognised planning Actions in the LPS. It also provides a framework for future tourist development on portion of the land that is already suitably zoned 'Special Use', while allowing for appropriate provisions to be sleeved into the Scheme. The provisions have been guided by this Structure plan to ensure all land use and development matters are suitably addressed at the development application stage in support for a unique, high quality tourist resort to be realised.

1.3.2.3 City of Albany Tourism Accommodation Planning Strategy

The City of Albany Tourism Accommodation Planning Strategy ('the Strategy') was adopted by Council at its Ordinary Meeting of 20 July 2010 and thereafter included into Part 5.4 of the Council's Local Planning Strategy and adopted in April 2011. The Strategy outlined that it '*seeks to establish the*

requirements for tourism accommodation to the year 2020, however the land use decision-making should be reviewed within five (5) years of adoption of this strategy to ensure the relevance of the information contained in the strategy and to adjust the strategy to reflect changing market expectations.'

The Strategy identified the land as 'Suitable Tourism Site' and referenced portion of property as '*Site 32 – Goode Beach – Lot 660 La Perouse Road, Goode Beach*'. A site evaluation for the land which is detailed at **Table 3** below:

No	Site	Proposed Tourist Use	Currently Used for Tourism	Appropriate Zoning	Competitive Advantage	Community Benefit	Suggested Status
32	Goode Beach	Hotel/ Apartments	YES	YES	YES	NO	Prime

Table 3 – Site Evaluation Summary (City of Albany Tourism Accommodation Planning Strategy: June 2010: Pp24)

The above table identifies the land as a 'Prime Tourist Site' noting its potential to offer a quality tourism experience and, in noting that the site will require further detailed planning, is recognised as being important to Albany's local tourism accommodation supply.

Notwithstanding the above, the Strategy also identifies the land to be a 'Suitable Tourism Site' which would '*support and contribute to the overall capacity of tourism and tourist accommodation in Albany*' (City of Albany Tourism Accommodation Planning Strategy: June 2010: Pp25). It further identifies the land to fall within the 'Remote Tourism Sites' category described as follows:

'*A stand alone site at Goode Beach has been recognised as it forms part of a previous amendment decision and an indication from the then Minister for Planning and Infrastructure that some tourism potential may exist; the issues associated with servicing and environmental constraints are equally valid for that site.*' (City of Albany Tourism Accommodation Planning Strategy: June 2010: Pp26)

The Strategy recognises that 'Suitable Tourist Sites' '*remain an important component of the City's tourism product or they provide the land bank for future projects*'. (City of Albany Tourism Accommodation Planning Strategy: June 2010: Pp27) Consistent with the report's recommendation, portion of the land has been appropriately zoned to make provision for tourist accommodation as a suitable land use/development.

The individual site evaluation for the land by the Strategy included the following assessments/conclusions based on a boutique chalet development (12 chalets):

"Local Planning Context

- *The lot has ready access to the sealed urban road system, storm water and effluent is required to be disposed of on-site, a reticulated water main services the site and electricity and telecommunication infrastructure is available.*

- The land is *'Located within 500m of the Southern Ocean, any development must also acknowledge SPP 2.6 and Western Australian Planning Commission policy DC6.1.*

- *Being located close to the existing Goode Beach settlement, located 20km from Albanys CBD. Pressure exists for other uses, such as permanent residential, to be considered as part of any future development of the lot, however the Minister has previously discounted alternate land use options.*

- *The site is located in close proximity to the settlement of Goode Beach and to an attractive swimming beach. The area available for development on the lot is limited and it will require a unique design solution, considerable environmental justification and the resultant development is likely to be a boutique "eco village" style development supplying accommodation to the upper end of the market. No similar development site exists within close proximity to the CBD.*

Development Opportunity

- *The lot is located in a unique location, close to King George Sound and a substantial natural wetland. It is located in close proximity to Goode Beach and Whaleworld with its tourism infrastructure, industrial heritage, aquaculture and boat launching ramps. The lot has access to the scenery, walking trails and ecological values of the Torndirrup National Park and has unique site characteristics which could enhance the tourism experience for future patrons.*

- *The lot is approximately 20km from the CBD and adjacent to King George Sound. There are numerous sites that have the potential to be in competition for a chalet development, however few provide the amenity that can be created from the site's environmental characteristics. The lot will not support a large scale development project.*

- The site is considered to have a special setting *provided the necessary environmental constraints can be reconciled.*

- *The lot is isolated from local shopping and restaurant facilities, but its remoteness from commercial infrastructure is also its advantage. The lot is within walking distance of environmental areas that complement and extend the values that can be achieved on-site.*

- *Any units developed on the lot would need to be self-catering. Innovative energy and water management on-site would also add to consumer appeal of a proposed development."* (City of Albany Tourism Accommodation Planning Strategy: June 2010: Pp143-144)

The Site Assessment concluded that:

1. the land contains a competitive advantage noting that the amenity and environmental attributes offered by this lot is not replicated elsewhere within the City;

2. the land is not considered so remote as to be a major disadvantage for visitors to locate;

3. the environmental values constraining development of the site could be a major marketing advantage, supplemented by the lot's relationship to the significant cultural heritage, the coast and the Torndirrup National Park; and

4. A range of ancillary services will need to be supplied on-site to supplement the limited commercial facilities within the locality.

The Structure Plan sets the framework to develop portion of the land to accommodate a unique, high quality resort that has duly investigated servicing, coastal hazard assessment and risk, planning context, environmental and fire management characteristics of the land. The investigations also reinforce and demonstrate that the matters raised in Council's Strategy above have been addressed to suitability develop the land as proposed. The investigations undertaken are discussed in more detail under Section 2 and 3 of this report.

1.3.3 Planning Policies

1.3.3.1 WAPC State Planning Policy 2.6 – State Coastal Planning

The planning process requires the Structure Plan to address the coastal processes affecting the land as set out under WAPC State Planning Policy 2.6 – State Coastal Planning (SPP 2.6). SPP 2.6 provides guidance on the assessment of coastal hazard risks for assets or infrastructure located in close proximity to the coast.

Specialist coastal and port engineers M P Rogers & Associates Pty Ltd were commissioned to complete a Coastal Hazard Assessment & Risk Management Strategy (CHARMS) to inform the Structure Plan proposal. The CHARMS has been prepared in accordance with the requirements of SPP 2.6 and includes the following components:

- Detailing site context;
- Coastal hazard identification;
- Risk analysis & evaluation;
- Risk management & adaptation strategy; and
- Monitoring

The CHARMS has assessed the coastal hazards and related risks in context with future proposed development within the Structure Plan area. It has identified coastal risks that are required to be managed for the future protection of the land. The CHARMS report is provided at **Appendix 4**, and summarized further in Section 2.6.

1.3.3.2 City of Albany Local Planning Policy – Significant Tourist Accommodation Sites

In line with the recommendations set out in the City of Albany Tourism Accommodation Strategy and the Local Planning Policy, the City of Albany 'Significant Tourist Accommodation Sites' Policy ('the Local Planning Policy') identifies the land to have a site classification of 'Suitable'.

The Local Planning Policy aims to guide and coordinate sustainable development from a land use planning perspective in recognition of the important role that tourism plays in the City of Albany. It outlines that the land is required to be subject to detailed structure planning. The Local Planning Policy informed the future zoning allocated for the land - being rezoned from 'Rural' to 'Special Use' and reserve for 'Parks and Recreation' in the Scheme. Notwithstanding that portion of the land is already zoned 'Special Use' to support tourist accommodation land uses, the Local Planning Policy recommends:

- A boutique Chalet/Eco-tourist Facility with no permanent residential component (except for a Single House);
- The considerable environmental imperatives are to be understood and suitably addressed, and
- A small scale, consolidated tourist development with a small building footprint.

The Local Planning Policy defines an Eco-tourist facility as

'a form of tourist accommodation that is designed, constructed, operated and of a scale so as not to destroy the natural resources and qualities that attract tourists to the location. The development should utilise

sustainable power, have a low energy demand through incorporation of passive solar design, provide for low water consumption, ecologically sensitive waste processing and disposal with no pollutant product.'

1.3.3.3 WAPC Planning Bulletin – No. 83 Planning for Tourism

In July 2013, the WAPC released the revised Planning Bulletin 83 to set out its policy position on tourism development within the State and to guide decision making – including development and scheme amendment proposals for tourism purposes.

Consistent with one of the key objectives set out in Planning Bulletin 83, a flexible approach is proposed through the Structure Plan and associated scheme amendment. This will encourage/support the development of a unique, high quality tourist resort on the land that is economically, environmentally and socially sustainable.

The Structure Plan and subsequent scheme amendment provisions are consistent with Planning Bulletin 83 by reason that it enables for suitable provisions to be included into the City of Albany's Local Planning Scheme based on detailed preliminary assessment undertaken as part of this process.

1.3.3.4 Draft Government Sewerage Policy (November 2016 – for Consultation)

In November 2016, the Department of Planning released the Draft Government Sewerage Policy (Draft GSP) for public comment. Once finalised, the Draft GSP will provide direction on the provision of sewage disposal for future strategic planning, subdivision and development in Western Australia.

The Draft GSP includes Policy measures (or exemptions) to develop sites which are not able to be connected to reticulated sewerage. These exemptions provide discretion to the City of Albany to approve development in circumstances where it is satisfied that the proposal is capable of accommodating on-site sewage disposal without endangering public health, the amenity or the environment and the minimum site requirements for on-site sewage disposal systems satisfy the following policy measures:

- Separation to groundwater where the discharge point for on-site sewage disposal system to be at least 1.2 to 1.5 metres, depending on soil type – noting the site is designated as a 'sewage sensitive area';
- 30m setback to any private bore used for household/drinking water purposes;
- 100m setback from any waterway or wetland;
- Should not be located within any area subject to inundation and/or flooding;
- Development intensification proposals that require provision of on-site sewage disposal systems will be assessed on a case by case basis and be approved by the Department of Health;
- Type of on-site sewerage system should be determined in response to the site and soil conditions, vulnerability of the receiving environment and nature of the proposal;
- Where on-site sewage disposal is to be provided by a secondary treatment system, the WAPC will require notifications on title pursuant to s.70A of the Transfer of Land Act

advising that an on-site secondary treatment sewage disposal system and unencumbered area to which treated sewage is to be distributed are required, and

- In the absence of a reticulated sewerage system, the WAPC may require notifications on title pursuant to s.70A of the Transfer of Land Act advising that no reticulated sewerage is provided and as a consequence, on-site sewage disposal will be required.

The suitability and capability of the land for the proposed development under the Draft GSP is demonstrated and discussed further in Section 3.6.2 of this report. It takes into consideration the detailed Environmental Assessment report prepared by Aurora Environmental (refer to **Appendix 5**) and the Wastewater Treatment Plant Preliminary Investigation set out in the Civil Engineering Report prepared by Wood & Grieve Engineers (refer to **Appendix 8**).

1.3.4 Pre-Lodgement Consultation

A number of key stakeholders were involved in the reports and studies informing the development of the Structure Plan. Key stakeholders are regarded as those with significant influence in the manner that the land will be developed taking into consideration the recommendations set out from the Structure Plan and subsequent provisions to be included in to the Scheme.

A summary of key stakeholder involvement is provided at Table 4

AGENCY	DATE OF CONSULTATION	CONSULTED BY:	METHOD OF CONSULTATION	SUMMARY OF OUTCOME
City of Albany	April 2015 - Ongoing	PGPM Pty Ltd, Grounds Kent Architects, Ahola Planning and Wood & Grieve Engineers	+ Meetings + Phone + Emails + Site meeting (November 2016)	Confirmation of process and input into Structure Plan and scheme amendment
Department of Planning	November 2015 (office meetings) - Ongoing	PGPM Pty Ltd, Grounds Kent Architects, Aurora Environmental (State Government Sewerage Policy), MP Rogers & Associates	+ Meetings + Phone + Emails + Site meeting (November 2016)	Confirmation of process and input into Structure Plan and scheme amendment Status/use of 2016 Draft Government Sewerage Policy
Western Power	2016	Wood & Grieve Engineers	+ Phone + Site inspection	Input into technical studies
Telstra	2016	Wood & Grieve Engineers	+ Site inspection + Dial before You Dig	Input into technical studies
Public Transport authority	2016 - ongoing	Wood & Grieve Engineers	+ Phone + Emails	Traffic volumes and Input into technical studies
Department of Parks and Wildlife	January – March 2017	Aurora Environmental	+ Meetings + Phone + Emails	Input into technical studies and discussion of management of impacts, including

				for Lake Vancouver
Western Australian Museum	January – March 2017	Aurora Environmental	+ Meetings + Phone + Emails	Advice regarding sampling of Main's Assassin Spider
Department of Water	December 2016	Aurora Environmental	+ Phone + Emails	Regarding baseline information for Lake Vancouver
Department of Health	January 2017	Aurora Environmental	+ Phone	Advice regarding on site effluent disposal
Department of Fire and Emergency Services	July 2017	Eco Logical Australia in association with Bio Diverse Solutions Albany	+ Contacted by Phone and email	No feedback provided Not able to forward proposals unless referred via an approving agency

Table 4 - Pre-Lodgement Consultation Summary

2.0 Site Conditions and Constraints

2.1 Biodiversity and Natural Area Assets

Aurora Environmental prepared a detailed Environmental Assessment for the land to inform the Structure Plan. The vegetation, flora and fauna assessment components of the report were prepared to:

I. Provide an understanding of the vegetation, flora and fauna values of the Structure Plan area; and

II. Consider any potential constraints which may impact the development of a proposed tourism resort within the area identified on the Structure Plan.

The Environmental Assessment report is provided at **Appendix 5** with key findings being summarised in Section 2.1.1 below.

2.1.1 Vegetation and Flora

The vegetation and flora desktop assessment and site investigation concluded that:

- The vegetation type comprises *Agonis flexuosa* (Peppermint) and *Adenanthos sericeus* (Albany Wooly Bush) is well represented both within the proposed development area on the Structure Plan and further afield;
- The vegetation present within the proposed development footprint within the Structure Plan comprises AfAs – *Agonis flexuosa/Adenanthos sericeus* Closed Scrub which is in excellent condition (Keighery, 1994) or Type 1 Residual (Thackway and Lesslie, 2006) with little to no evidence of weeds or other disturbance;
- The development footprint shown on the Structure Plan is not considered to be high risk to the integrity of the Beard vegetation type or Albany Regional Vegetation Survey (ARVS) vegetation unit due to the relatively small area proposed to be cleared and the fact that a significant area is secured in conservation and crown land;
- The development area identified on the Structure Plan will not disturb vegetation associated with the fringes of Lake Vancouver;
- Previous flora survey undertaken for the coastal heath portion of the site and Department of Parks and Wildlife (DPaW) database did not indicate the presence of Threatened or Priority Flora in the area;
- No threatened or priority ecological communities under State or Commonwealth legislation have been mapped in the vicinity of, or on the land identified within the Structure Plan;
- No Threatened or Priority species listed under Schedule 1 of the Western Australian *Wildlife Conservation Act 1950* or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded within the Structure Plan area; and

- No species listed DPaW Threatened and Priority Flora Database, the WA Herbarium database (WAHerb) and the Threatened and Priority Flora Species List have been recorded on site.

2.1.2 Fauna

The Environmental Assessment report also includes a desktop fauna assessment and site investigation. It found that a historic fauna survey of Lake Vancouver and the surrounding area undertaken in 1990 as cited by CALM correspondence (1990) confirmed that none of the species identified are Threatened.

Preparation of a separate, targeted Level 1 assessment was also undertaken to determine the status of habitat and presence of Western Ringtail Possum, three species of Black Cockatoo and Main's Assassin Spider. The targeted survey report is provided at **Appendix 6** with Key findings summarised as follows:

- The area to be cleared to accommodate development within the Structure Plan does not contain suitable foraging, nesting or roosting habitat for black cockatoos;
- One (1) Western Ringtail Possum was recorded in vegetation west of Lake Vancouver;
- Site sampling of 26 locations within the proposed development footprint shown on the Structure Plan failed to locate Mains's Assassin Spider;
- Mains Assassin Spider's favoured habitat was relatively sparse and is unlikely that the spider is present within the area to be cleared within the development footprint as shown on the Structure Plan; and
- The area proposed to be cleared within the development footprint as shown on the Structure Plan comprises habitat for Western Ringtail Possum. It is recommended that the proposal be referred to the Department of Environment and Energy at the scheme amendment stage to determine if the activity constitutes a controlled action under the EPBC Act;

2.1.3 Environmentally Sensitive Areas

The nearest environmentally sensitive area (ESA) to the development footprint shown on the Structure Plan is Lake Vancouver. In noting that the development footprint is to be located outside the 50m footprint of Lake Vancouver (including all buildings to be setback at least 100m from the lakes edge), and management actions will be undertaken to ensure that there are no deleterious impacts on the lake and associated groundwater, development is unlikely to impact on the ESA.

2.2 Landform and Soils

2.2.1 Topography

The land sits adjacent to Goode Beach which comprises a sandy coastline backing onto a low dune system with a height of approximately 1m AHD. This area then links on to a relatively steep second dune rising to between 4 and 6m AHD. Between these dunes and Lake Vancouver (portion of which is the area subject to future development as identified on the Structure Plan) there is a

complex series of parabolic dunes that create a landform of depressions bounded by east-west oriented sand ridges ranging in height from 2m to 11m AHD.

2.2.2 Geology and Soils

The environmental geology for the eastern portion of the land (which contains the development site shown on the Structure Plan) is described as limesand - being white medium to coarse grained, moderately well sorted quartz and shell debris. This geology type contains the physical properties of high permeability, no shrink swell potential or cohesion, unsuitable for foundation, suitable for effluent disposal and neutralizing acids.

Soil sampling excavation test pits were undertaken across the development site shown on the Structure Plan with their locations shown on mapping provided in the Environmental Assessment report at **Appendix 5**. The results reinforced the geological physical properties listed above and provided the following observations and recommendations:

- The phosphorous buffering index for the development site shown on the Structure Plan to be 'extremely to exceedingly low'. Hence nutrient discharge needs to be minimised through secondary treatment and nutrient removal from waste water and that soil amendment will need to be implemented to minimise nutrient discharge to the environment;

- Permeability results indicate that the soils are well drained and adequate to reduce the risk of ponding and runoff related to irrigation and infiltration of treated wastewater and stormwater; and

- Wood and Grieve Engineers advise that the site permeability results indicate that the site is capable of infiltrating in excess of the 1 in 100 year ARI storm event.

2.2.3 Acid Sulfate Soils

The Environmental Assessment report concluded that the sandy soils associated with the development site shown on the Structure Plan are likely to have no or low risk of Acid Sulfate Soils occurring generally at depths more than 3 metres.

The nature of the proposed development is highly unlikely to require excavation deeper than 2 metres. As a result it is unlikely that a more detailed Acid Sulfate Soils Assessment will be required. Notwithstanding the above, should excavation of dewatering need to occur in association with organic rich soil low in the profile, then appropriate assessment and management will be undertaken at the development stage.

2.3 Groundwater and Surface Water

2.3.1 Groundwater

Groundwater assessment of the development site shown on the Structure Plan comprises a review of historic groundwater investigations undertaken in Spring (September 1986) by Rockwater Pty Ltd (1986) and more recent testing results undertaken by Aurora Environmental undertaken during November and December 2016 (results provided at **Appendix 5**).

The following observations are provided with regard to the presence of groundwater in context with the proposed development site on the Structure Plan:

- The 1986 groundwater investigation concluded that groundwater was flowing east towards Frenchman Bay;

- The 1986 groundwater investigation concluded that groundwater in the vicinity of the proposed development site shown on the Structure Plan was measured at 0.57m AHD which is 3.43m below ground level where the ground surface is at approximately 4m AHD;

- The site testing results of November and December 2016 confirm that the groundwater levels are between 1.25m to 2.28m AHD below ground level.

2.3.2 Surface Water and Wetlands

The development site shown on the Structure Plan does not contain any surface water areas or wetlands. As a result of the soils types being well drained, Wood and Grieve Engineers confirm that the site is capable of infiltrating in excess of the 1 in 100 year ARI storm event.

Lake Vancouver is located on adjoining Lot 8244 (Reserve 48916 and vested 'Reserve for Recreation') and is categorized as a conservation wetland. The risk of impacts from the development of a tourist resort is reduced as result of groundwater generally moving eastwards from Lake Vancouver to the coast. In addition, management of treated waste water and storm water will be undertaken at the development stage so as to prevent impacts on Lake Vancouver and the groundwater. The waste water and stormwater management proposal is discussed further in Section 3.4 and 3.6 of this report.

2.4 Bushfire Hazard

The land falls within a designated bushfire prone area and therefore triggers bushfire planning requirements under *State Planning Policy 3.7 – Planning in Bushfire Prone Areas* (SPP 3.7; WAPC 2015). A Bushfire Management Plan (BMP) was prepared by Eco Logical Australia to reflect the final land uses proposed on the Structure Plan and to be referenced into the Scheme, and is attached at **Appendix 7.**

The purpose of the BMP is to provide guidance on how to plan for and manage bushfire risk to the proposed tourist development identified for the land through implementing a range of bushfire management measures in accordance with *Guidelines for Planning in Bushfire Prone Areas v1.1* (the Guidelines; WAPC 2017). A Bushfire Emergency Evacuation Plan has also been prepared to satisfy Policy Measure 6.6 of SPP 3.7 and is also located at **Appendix 7**. Both documents collectively aim to ensure that the intent of SPP 3.7 is achieved.

The BMP assessed vegetation classes (pre and post-development), topography and slope, bushfire attack level and minimum separation distance between buildings and bushland. It also demonstrates how the proposed development of a tourist resort will be in accordance with acceptable solutions that meet the relevant performance principles set out in SPP 3.7.

The scheme already includes a provision related to the land to implement a Fire Management Plan incorporating the existing fire access tracks within the area (refer to **Appendix 3**). However it is expected that the BMP recommendations of this report can be reinforced, as supported by the Structure Plan, via an enabling provision in the Scheme that is to include:

1. The development footprint on the Structure Plan falls within a bushfire prone area and development and use of the site shall comply with the provisions of an approved Bushfire Management Plan.

Key BMP recommendations are outlined under Section 3.5 of this report.

2.5 Heritage

An assessment of indigenous and European heritage places was undertaken by Aurora Environmental and is provided in their Environmental Assessment report at **Appendix 5**.

2.5.1 Indigenous Heritage

Aurora Environmental's review of the Department of Indigenous Affairs Heritage Inquiry System (AHIS) indicates that there are no registered aboriginal heritage sites or other heritage places recorded within the land.

A report undertaken by Brad Goode and Associates (2005) referred to a site comprising artefacts has been located 150m west of the western boundary of the land. However the records indicate that the site is considered unreliable due to its non-artefactual nature and the assemblage having no provenance as a result of earthworks.

Notwithstanding this, the Department of Aboriginal Affairs will be notified should the construction phase reveal the presence of artefacts.

2.5.2 European Heritage

Aurora's Environmental's review of various heritage listings did not show any sites located on the land. The closest listed sites include the former Frenchman Bay Whaling Station and Vancouver Spring located 1.2km east of the land.

2.6 Coast and Foreshores

The siting of the land and reference to future development as identified on the Structure requires the planning process to understand the potential risks to development by coastal processes. Specialist coastal and port engineers M P Rogers & Associates Pty Ltd were commissioned to complete a Coastal Hazard Assessment & Risk Management Strategy (CHARMS) to inform the Structure Plan proposal. The CHARMS is provided at **Appendix 4** and has been prepared in accordance with the requirements and framework of WAPC Statement of Planning Policy No. 2.6 (SPP 2.6) and includes the following components:

- Detailing site context;
- Coastal hazard identification;
- Risk analysis & evaluation;
- Risk management & adaptation strategy; and
- Monitoring

The CHARMS has assessed the coastal hazards and related risks in context with future proposed development within the Structure Plan area. It has identified coastal risks that are required to be

managed for the future protection of the land. The key findings and recommendations are summarized below:

- The potential inundation levels range from 2.04m (2016) to 2.94m (2116);
- The proposed Coastal Management Strategy has been based on a 50 year planning horizon taking into consideration the design life of structures built as part of the resort;
- So as to avoid risks of coastal hazards, proposed development of the tourist resort is to be located landward of the coastal hazard line for the 50 year planning horizon and for finished floor levels to be greater than 2.4m AHD;
- Given the conservatism that is inherent in the as assessment of the coastal hazard risk, M P Rogers & Associates Pty Ltd considers that development in this location would probably be unaffected by coastal hazards for a period longer than 50 years;
- The Structure Plan identifies the 2066 Erosion Hazard line and includes a notation that the development footprint (built form) is to be located behind the 2066 erosion hazard line;
- Beyond the initial 50 year planning horizon, replacement of the built form will provide an opportunity for a managed retreat whereby replacement infrastructure should be relocated to an area deemed to be safe for the ensuing planning horizon based on results of a coastal hazard assessment completed at that time;
- Ongoing coastal monitoring to be undertaken in accordance with the Coastal Management Strategy provided at **Appendix 4**;
- Provision being inserted into the scheme requiring a Section 70A Notification being placed on the Certificate of Title of Lot 660 La Perouse Road, Goode Beach advising the landowner and any prospective purchaser that the land is subject to management in accordance with the Coastal Management Strategy provided as an appendix to the endorsed Structure Plan report.

2.7 Context and Other Land Use Constraints and Opportunities

An Opportunities and Constraints analysis (provided at **Table 5** in association with **Figure 4)** was undertaken for the land to identify and inform the Structure Plan design process**.** It serves as a summary of relevant considerations that have been investigated by the project team in consultation with government agencies and related policies.

LAND USE

- L1 Provide for unique high quality tourist resort development opportunity
- L2 Locate buildings that incorporate Bushfire Management Plan measures to be applied on site
- L3 Leverage from proximity to areas of high amenity (eg Goode Beach)
- L4 Locate all proposed habitable buildings in areas subject to a BAL rating of BAL 29 or lower
- L5 Locate all asset protection zones (APZ) within the Structure Plan Area
- L6 Locate tourist accommodation and associated buildings within the existing Special Use Zone (SU1) identified for the land in the Scheme
- L7 Interface considerations to adjoining reserve boundaries
- L8 Consider Bushfire Management Plan requirements to achieve acceptable solutions/management measures

BUILT FORM

- B1 Cluster tourist accommodation buildings to minimise building footprint and vegetation clearing
- B2 Site buildings to utilise cleared degraded areas to minimise vegetation clearing
- B3 Resort buildings to be designed to incorporate proposed density, colours and materials sympathetic to its surrounding environment
- B4 Building height to accord Council's Scheme, consistent with that provided to balance Goode Beach townsite
- B5 All buildings to achieve a for finished floor levels to be greater than 2.4m AHD consistent with Coastal Hazard Assessment & Risk Management Strategy

MOVEMENT NETWORK

- M1 The property has dual frontage/ access to La Perouse Road and La Perouse Court
- M2 Traffic Impact Assessment confirms additional traffic from the proposed tourist development is considered negligible
- M3 All traffic generated by the proposed tourist resort to enter and exit via the existing access track alignment (to be formalized at the first stage of development) that connects on to La Perouse Road
- M4 Pedestrian and Emergency Access to connect the proposed tourist resort with La Perouse Court and adjoining PAW minimising traffic use and satisfying bushfire management plan access requirements
- M5 Internal access roads design to follow the existing access tracks to minimise clearing
- M6 Internal access road and emergency access road to satisfy bushfire management plan construction requirements
- M7 Access and Traffic considerations Requires Traffic Impact Assessment

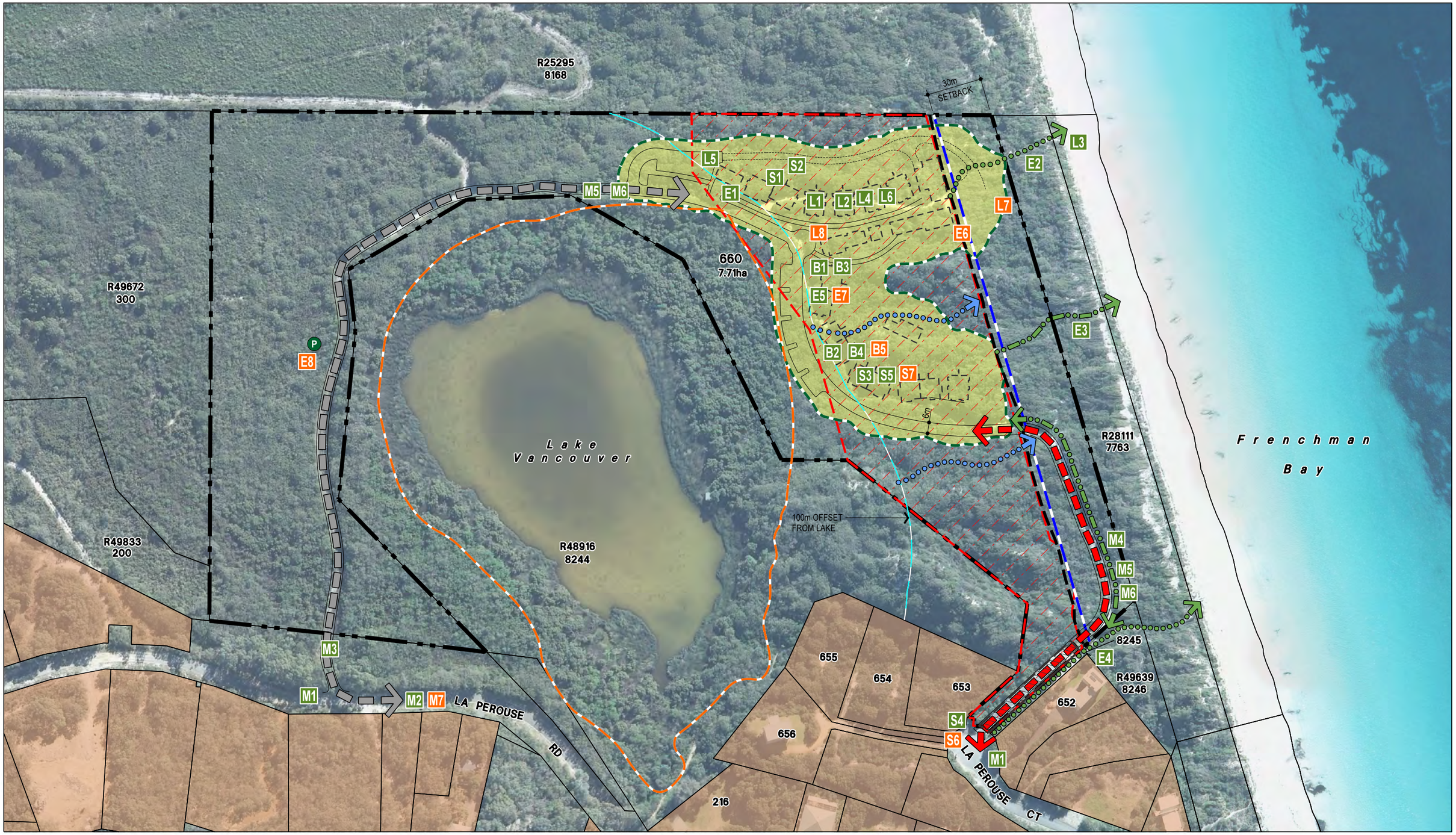
ENVIRONMENTAL I LANDSCAPE

- E1 Proposed tourist resort buildings to be located 100m from Lake Vancouver
- E2 Retain existing pedestrian path already located in the north- western portion of the land to provide a pedestrian link between the tourist resort and the beach
- E3 Locate pedestrian access links from the tourist resort through the foreshore reserve so as to minimise the impact on its conservation values
- E4 Linking pedestrian access between the tourist resort and the adjoining PAW (Lot 8245) where existing access has already been provided between La Perouse Court and the beach.
- E5 Consider Construction Management Plan requirements to manage Western Ringtail Possums that may be identified within areas on the Structure Plan to be cleared
- E6 Proposed tourist resort is to be located landward of the coastal hazard line for the 50 year planning horizon (or the 2066 Erosion Hazard line shown on the Structure Plan)
- E7 Building footprint site predominantly contains remnant vegetation – hence flora, vegetation and fauna analysis undertaken to inform the proposal
- E8 One (1) Western Ringtail Possum surveyed west of Vancouver Lake (approximately 190m from the development precincts identified on the Structure Plan)

SERVICING & INFRASTRUCTURE

- S1 Soils types at the proposed tourist resort are well drained, thereby confirming that the site is capable of infiltrating in excess of the 1 in 100 year ARI storm event
- S2 Impacts from the proposed tourist resort footprint is reduced as result of groundwater generally moving eastwards from Lake Vancouver to the coast
- S3 Consider management of treated waste water and storm water to be undertaken at the development stage so as to prevent impacts on Lake Vancouver and the groundwater
- S4 Capacity to be serviced by reticulated water, power and communications
- S5 Make provision for on-site Wastewater Treatment Plant incorporating a Secondary Treatment System and nutrient removal from waste water and implement soil amendment to minimise nutrient discharge to the environment
- S6 Connection to reticulated sewer not available
- S7 Phosphorous buffering index for the development site shown on the Structure Plan to be 'extremely to exceedingly low'

Table 5 - Opportunities and Constraints Analysis Plan Descriptions



0 20 40 60 80m

NOTE: Base Data supplied by Landgate / Water Corp.
Aerial Photo dated 12 May 2016
Areas and dimensions are subject to final survey calculations.

Revision	Date	Item
A	5/9/17	Updated Issue
A	31/7/17	Initial Issue

LEGEND

- STRUCTURE PLAN BOUNDARY
- EXTENT OF LOW WOODLAND
- EXISTING SPECIAL USE ZONE 'SU1' BOUNDARY (SoA LPS No.1)
- EXISTING CONSTRUCTED BATTLEAXE DRIVEWAY
- EXISTING ACCESS TRACKS (VEHICLE)
- EXISTING ACCESS TRACKS (PEDESTRIAN)
- EXISTING RESIDENTIAL (GOODE BEACH TOWNSITE)
- GROUNDWATER FLOW DIRECTION
- INDICATIVE BUILDING FOOTPRINT
- LOCATION OF WESTERN RINGTAIL POSSUM
- CONTROLLED PEDESTRIAN ACCESS LINKS
- FORMAL ACCESS TO RESORT SITE
- EMERGENCY ACCESS ONLY
- 2066 EROSION HAZARD LINE
- 2.1HA (APPROX.) TO BE CLEARED (RESORT DEVELOPMENT FOOTPRINT)
- E3 OPPORTUNITIES
- S6 CONSTRAINTS

FIGURE 4 - OPPORTUNITY AND CONSTRAINTS PLAN

Lot 660 La Perouse Road, GOODE BEACH

Cherry Martin	:	CLIENT
A3@1:2,000	:	SCALE
5 September 2017	:	DATE
V-OC-0001	:	PLAN No
A	:	REVISION
G.A	:	PLANNER
B.L	:	DRAWN

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3.0 Land Use and Development Requirements

3.1 Land Use

The Structure Plan has been prepared on a precinct-based approach to land use and development. Three precincts are identified based on grouping areas with similar land use and function. The three precincts aim to define the resort development footprint in context with how it sensitively interfaces with the surrounding natural environment, the coastal public areas (such as Goode Beach), and the existing coastal residential land use/development – of which the land forms its northern edge.

The Structure Plan also includes relevant development requirements such as setbacks, vehicle, pedestrian and emergency access systems and other development standards. The three precincts include:

- Holiday Accommodation
- Development Buffer
- Remnant Vegetation

The precincts are discussed further below and are shown on the Structure Plan at **Figure 5**.

3.1.1 Holiday Accommodation Precinct

The Tourist Accommodation Precinct aims to incorporate high value and high quality short stay tourist accommodation. The Precinct will also contain other complementary land uses that include a function centre, café/dining/restaurant for guests and the manager's residence.

The precinct aims to cluster development toward the north-east portion of the land, thereby leveraging from nearby areas offering high tourism amenity (eg proximity to Goode Beach). Its location also takes into consideration the findings of the technical investigations undertaken (ie coastal risk assessment, environmental assessment, servicing and fire management). The Holiday Accommodation and associated buildings will be located behind the 2066 erosion hazard line as recommended in Coastal Hazard Assessment & Risk Management Strategy. Development will comprise a range of tourist accommodation options including self- contained 1 and 2 bedroom villas, single bedroom studios and duplex rooms.

The precinct provides flexibility to complete development in a clustered form so as to minimise the vegetation clearing required to construct buildings and implement the associated fire buffer. It also sites development to utilise the degraded/cleared access tracks where possible, which further assists in minimising clearing. The Holiday Accommodation Precinct falls wholly within the Special Use Zone (SUI) as identified for the land on the Scheme Map.

It will provide a visitor/pedestrian friendly environment whereby access to the holiday units will be via an integrated pedestrian footpath network.

0 20 40 60 80m

NOTE: Base Data supplied by Landgate / Water Corp.
Aerial Photo dated 12 May 2016
Areas and dimensions are subject to final survey calculations.

Revision	Date	Item
A	4/9/17	Updated Issue
A	31/7/17	Initial Issue

LEGEND

- STRUCTURE PLAN BOUNDARY
- 6m WIDE INTERNAL ENTRY/EXIT ROAD
- 6m WIDE EMERGENCY ACCESSWAY
- PEDESTRIAN ACCESS LINK
- ENTRY / EXIT
- 2066 EROSION HAZARD LINE
- EXISTING CONSTRUCTED BATTLEAXE DRIVEWAY
- INTERNAL ROAD LINK (INDICATIVE)
- EXISTING SPECIAL USE ZONE
- EXTENT OF LOW WOODLAND
- 100m OFFSET FROM LAKE

PRECINCTS

- HOLIDAY ACCOMMODATION
- DEVELOPMENT BUFFER
- REMNANT VEGETATION

FIGURE 5 - LOCAL STRUCTURE PLAN - No. 9 (MAP)

Lot 660 La Perouse Road, GOODE BEACH

Cherry Martin	:	CLIENT
A3@1:2,000	:	SCALE
4 September 2017	:	DATE
V-OC-0001	:	PLAN No
A	:	REVISION
G.A	:	PLANNER
B.L	:	DRAWN

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Permissible land uses recommended for the Tourist Accommodation Precinct include:

- Car Park
- Holiday Accommodation (Resort)
- Reception Centre (Function Centre)
- Restaurant
- Single House (Caretakers Dwelling)

It is expected that the provisions proposed via a scheme amendment will allow for these uses to be considered in line with the endorsed Structure Plan.

3.1.2 Development Buffer Precinct

The Development Buffer is characterised by, and comprises the following functions/land uses;

- Asset Protection Zone that is to be managed to reduce bushfire hazard to an acceptable level;
- low threat vegetation (ie lawn and related landscaping),
- constructed internal roads/emergency access way, parking, footpaths, swimming pool & change rooms, and
- the estimated 4,080m2 reticulation zone required for application of treated waste water (subsurface irrigation).

The Development Buffer boundary responds to the BAL Contour Plan provided in the Bushfire Management Plan so as to ensure that all habitable buildings in the Holiday Precinct achieve a BAL 29 contour rating. It also responds to the need to suitably locate the reticulation zone.

3.1.3 Remnant Vegetation Precinct

The Remnant Vegetation Precinct comprises the remaining land within the Structure Plan. It is expected that this precinct will retain the balance areas as remnant vegetation with the exception of the following:

- new internal entry/exit road to follow the existing access track,
- the emergency access way/pedestrian access link between the Development Buffer Precinct and La Perouse Court,
- other existing tracks that link on to adjoining Reserve 25925 on the northern boundary, and
- existing and proposed beach access pathways,

This Precinct ensures that there remains a substantial remnant vegetation buffer between the Development Buffer Precinct and Lake Vancouver as well as vegetation areas between the Development Buffer and the adjoining foreshore reserve (Reserve 28111).

It also ensures that the land reserved 'Parks and Recreation' in the Scheme will not contain any resort buildings.

3.2 Built Form

3.2.1 Existing Built Form

The unusual shape of the Structure Plan area is the result of a subdivision approval and subsequent creation of lots under Deposited Plan 36832 (refer to **Appendix 1**). The Deposited Plan created nine (9) 'Special Residential' zoned lots (with some lots now containing houses), a Reserve for Recreation (Lot 8244 (which comprises Lake Vancouver)), a Pedestrian Accessway (Lot 8245) and a Reserve for Foreshore Management & Recreation).

The Structure Plan area remains vacant land, with the majority containing remnant vegetation and comprising a number of informal access tracks throughout. The coastal stretch of Goode Beach represents the key point of attraction and amenity whereby an informal footpath access has been established at the north-eastern portion of the land.

3.2.2 Proposed Built Form

Council's Scheme permits housing development immediately south of the land to be constructed to 1st floor level - being a maximum 8.1m overall height or 6.6 m wall height to the top of the 1st floor. A combination of single and two storey development is envisaged for buildings within the Holiday Accommodation Precinct – which is consistent with the general height limitation offered in the Scheme and to residential development within the Goode Beach townsite.

All proposed tourist resort accommodation and associated buildings will be located within the Holiday Accommodation Precinct shown on the Structure Plan taking into consideration, and demonstrating the following:

a) All buildings to be integrated and clustered within portion of the site that will not adversely impact the site conditions (including environmental characteristics) investigated as part of this proposal. Clustering of building is achieved through grouping of accommodation units (which minimises potential for scattered clearing – such as circumstances where separate chalets are developed);

b) Siting of buildings and access roads will utilise existing degraded/cleared areas so as to minimise clearing required for servicing, visitor access and built form development;

c) Siting of buildings to be located behind the 2066 Erosion Hazard Line as recommended in the CHARMS provided at **Appendix 4** and listed as a key finding at Section 2.6 of this report;

d) Buildings and wastewater disposal systems being offset greater than 100m from Vancouver Lake to satisfy criteria set out in the *Draft Government Sewerage Policy 2016*;

e) Buildings being located outside vegetation comprising a *Melaleuca cuticularis/Banksia littoralis* low woodland with a low density of trees up to 6m tall over a 1m sedgeland;

f) Buildings to comprise a mixture of tourist accommodation types to cater for visitor needs and be designed to incorporate colours, textures and materials that are sympathetic with the site and the surrounding environment (as indicatively shown at **Figure 6**); and

g) All buildings to fall within the existing 'Special Use' Zone and 'SUI' Boundary as identified in the Scheme.

3.2.3 Indicative Concept Planning

Grounds Kent Architects were commissioned to undertake concept planning that would provide for an economically sustainable and viable high quality tourist resort on the land. Their aim is to create a high end 5-star boutique eco-resort that is self-contained (ie visitors don't need to leave) and would offer associated amenities (eg function centre, café/dining and swimming pool).

The proposed resort is designed to provide a central arrival point where visitors can park their vehicle and be conveyed to their unit accommodation via an integrated pedestrian footpath system. This arrangement reflects the operational procedures undertaken at other prominent high quality resorts – such as that offered at Bunker Bay Resort.

The proposed scale and siting of development took into consideration the findings of the technical investigations undertaken, the proximity to areas of high amenity (ie the beachfront), vehicle, emergency and pedestrian access requirements, building height and clustering of development so that it is sympathetic to the landscape/topography and surrounding environment. The concept plan prepared by Grounds Kent Architects is provided at **Appendix 9** with a perspective concept plan able to be viewed at **Figure 6** on the next page.

The concept plan has been designed to accommodate 51 holiday units comprising 61 beds, a manager's residence and associated restaurant, function centre and other amenities. The concept plan demonstrates a design that is also economically viable, noting it aims to operate as a 5-star boutique eco-resort.

In addition to the built form outcomes discussed at Section 3.2.2 above, the Vancouver Beach Resort Concept Plan also achieves the following design outcomes which are considered to be far superior to the outcomes that would be otherwise generated by a 10 chalet development proposal currently enabled by the Scheme:

- Permanent on-site central management. The resort manager (and associated employees) will be fully trained in emergency evacuation procedures, will manage guests at all times in terms of vehicle use, beach access, noise and activity.

  Permanent on-site management will ensure that all matters relating to the resort development (including visitor needs) are managed on-site and removes the potential of separate off-site management arrangements that could otherwise occur with a 10 chalet development;

- To be managed by a reputable operator and is not proposed to be strata titled - thereby avoiding the risk of multiple ownership and management of individual holiday units;

- Consolidated vehicle parking area for visitors. This will remove the need for individual vehicle access ways and parking to each individual unit (which often occurs where separate individual chalets are developed) which has the potential for more vegetation clearing to occur. Consolidated parking will facilitate an enhanced pedestrian environment within the resort, allowing visitors to walk through landscaped gardens within an attractive setting;

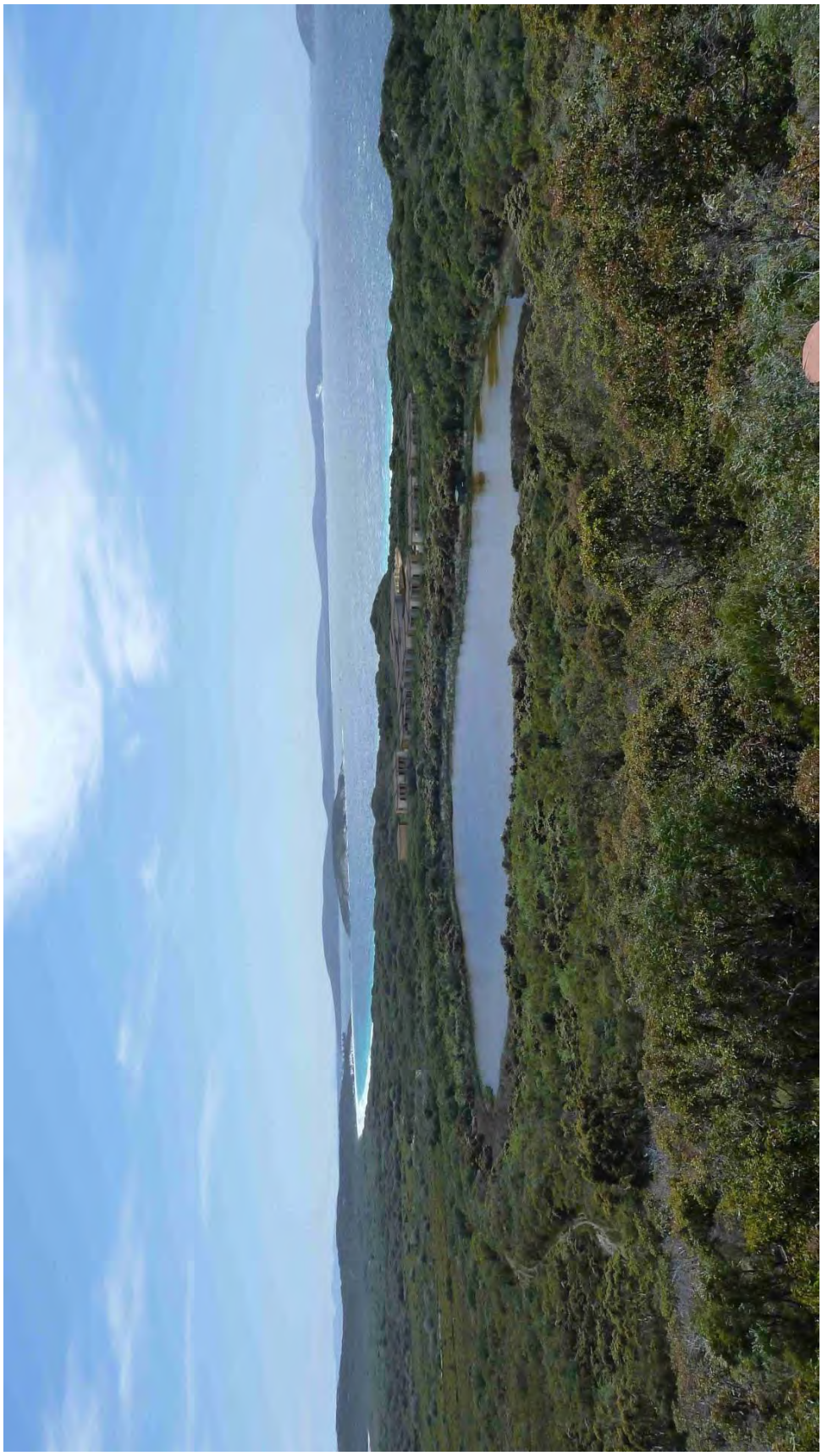


Figure 6 – Vancouver Beach Resort – Indicative Concept Perspective (View North East from Karrakatta Road)

- Incorporates a secondary treatment system which will ensure that all effluent is collected and suitably treated on-site in one consolidated process. The treated effluent will be thereafter used for reticulation of landscaping thereby minimising the requirement to use potable water. This represents a key sustainability objective of the project;

  Such an arrangement removes the potential of supplying individual effluent disposal systems per unit (as what could take place where 10 separate individual chalet units are constructed as currently provided for in Council's Scheme);

- Visitor access/egress to the resort will utilise the existing cleared internal access track from La Perouse Road. Emergency access will also be provided to La Perouse Court further utilising the cleared internal access track and providing a duplicate role of a pedestrian link to the existing pedestrian accessway linking from La Perouse Court and Goode Beach;

- The proposed land use and development is sited and accessed in manner that will provide minimal off-site consequences; and

- The siting of development will be complemented by the preparation of a Foreshore Management Plan (submitted with the Development Application) which, amongst other things will provide controlled access between the resort and the beach that is suitably fenced and rehabilitate the foreshore area. Such an approach will remove indiscriminant coastal access – which would inevitably occur from 10 individual chalets.

- The architectural themes will be sensitive to the amenity of the area. Single ownership and operation will ensure that maintenance is ongoing and the quality of resort experience is established to a high level. This is a far superior outcome than the alternative of 10 individually owned chalets that are likely to have direct vehicle access and individual effluent disposal systems.

The above design outcomes demonstrate that the nature and scale of development would achieve a low-key tourist accommodation development that is economically, environmentally and socially sustainable.

3.3 Movement Network

3.3.1 Existing Road Network

The Structure Plan area has frontage to, and can be accessed by La Perouse Road and La Perouse Court at the south western and south eastern sections of the property. Both roads have been constructed to a sealed bitumen standard. La Perouse Road provides the main access through the Goode Beach coastal townsite. As shown on **Figure 1** and **Figure 2**, the road turns into Vancouver Road before connecting on to Frenchman Bay Road further south, being the main connector through Torndirrup National Park and on towards Albany.

La Perouse Road

A Traffic Impact Assessment has been prepared by Wood & Grieve Engineers and forms part of their Civil Engineering Report provided at **Appendix 8** of this report. The Traffic Impact Assessment aims to address any concerns regarding the impact of increased traffic on the road system and also to residents in Goode Beach – particularly along La Perouse Road.

Wood & Grieve Engineers review of the traffic data count along La Perouse Road supplied by the City of Albany provided the following key findings:

- Traffic flow is relatively consistent throughout the day between 7am and 5pm – without any definable morning or afternoon period;
- A significant increase in daily traffic occurred between Karrakatta Road and St Georges Crescent) occurred between April 2008 (205vehicles per day (vpd)) to February 2015 (306vpd) however the reasoning is unknown;
- The one count recorded in 2012 near the proposed entrance road to the development recorded an average daily traffic volume of 48vpd;
- Due to the size of the catchment, La Perouse Road remains a relatively quiet street that is functioning at around 10% of its capacity;

La Perouse Court

La Perouse Court is a cul-de-sac that provides legal access to 17 residential lots and the subject land. The Structure Plan area gains access via a battle axe access leg that has been constructed to a sealed bitumen standard. An access track extends from the end of the battle axe driveway in a northerly direction toward the proposed Holiday Accommodation Precinct as shown on the Structure Plan.

Access from La Perouse Court is proposed to be used for emergency and pedestrian access only.

3.3.2 Existing Pedestrian Network

A four metre wide pedestrian access way (PAW) (referred to as Lot 8245) provides an access link between La Perouse Court and Lot 8246 (Reserve for Foreshore Management and Recreation). The PAW runs parallel to the battleaxe access leg and provides public access through to Goode Beach via an access track. Neither La Perouse Court nor La Perouse Road have constructed pedestrian footpaths.

Existing informal pedestrian access extends from the internal access track to Goode Beach in the north-western corner of the land.

3.3.3 Proposed Road Network

The Traffic Impact Assessment has been undertaken based on the resort development accommodating 51 units comprising 61 beds and 53 car parking bays. The key findings include:

- The proposed development is expected to increase the traffic on La Perouse Road by a maximum of 150 vpd, or an average of 128 vpd (assuming an 85% occupancy rate);
- Development as proposed is not expected to cause any congestion on La Perouse Road and is well within the functioning capacity of the road;
- The traffic increase from the proposed tourist resort development is expected to result in a decreased delay between vehicles travelling on La Perouse Road from approximately 2.4min to 1.7min between Karrakatta Road and St Georges Terrace, and 14.1 min to 4 min near the proposed entrance between 7am to 7pm;

- The increase in traffic as a result of the proposed tourist development is considered negligible – noting that it remains unlikely that more than one vehicle will be observed on the road at any one time – given the average time between vehicles is 1.7 minutes.

All traffic generated by the proposed development will enter and exit via the existing access track alignment (to be formalised at the first stage of development) that connects on to La Perouse Road. The internal access road and emergency access way will be constructed so as to satisfy bushfire management plan requirements.

3.3.4 Proposed Pedestrian Access

A key opportunity exists to include management of the interface between the proposed resort and Goode Beach for pedestrians/visitors. This is to consider:

- Retaining existing path already located in the north- eastern portion of the land to provide a link between the tourist resort and the beach;
- controlled access links from the tourist resort through the foreshore reserve so as to minimise the impact on its conservation values(ie along dune swales to avoid steep slopes, 2m in width fencing either side); and
- linking pedestrian access between the tourist resort and the adjoining PAW where existing access has already been provided between La Perouse Court and the beach. This access can utilise the emergency access way to be constructed along the existing internal access track.

3.3.5 Foreshore Management

A 30m wide foreshore reserve (referred to as Lot 7763 (Reserve 28111) abuts the full length of the lands eastern boundary. The foreshore reserve is wedged between the proposed tourist development site and the 20m Unallocated Crown Land that overlays Goode Beach. In noting that the proposed development will increase the use of the beach area (ie visitors in addition to local people), future management of the foreshore is proposed as referenced in the Environmental Assessment report provided at **Appendix 5**.

Preparation of a Foreshore Management Plan is therefore recommended to be submitted with the development application. Such a requirement can be included as a provision through the scheme amendment process and is to address, amongst other things:

- Existing public access and parking via La Perouse Court;
- Rehabilitation;
- Interpretation and signage; and
- Suitable fencing and controlled access.

3.4 Water Management

As outlined in Section 2.3.2 of this report, recent soil testing investigations undertaken by Aurora Environmental confirm that the proposed tourist resort site is free draining and well above the

assessed groundwater levels. Furthermore, the site permeability tests confirm that the site is capable of infiltrating in excess of the 1:100 year ARI storm event.

The Civil Engineering Report provided at **Appendix 8**) outlines a stormwater proposal that achieves the following:

- The proposed tourist development will be in compliance with the City of Albany's 'Development Guidelines' and Department of Water 'Stormwater Management Manual';
- All stormwater generated from impervious surfaces in relation to the tourist resort (buildings and pavement) will be contained on-site;
- Roof based stormwater runoff will be stored in rainwater tanks plumbed into each unit for reuse in toilets, washing facilities and the proposed swimming pool. Overflows from water tanks will be infiltrated at the point of discharge;
- Stormwater runoff from road pavements will be infiltrated at source through the use of vegetated swales;
- Stormwater will be directed to fully contained low points in the topography, in the unlikely event that flows occur in the vegetated swales;
- Stormwater management that incorporates the latest water sensitive urban design elements;

The civil engineering report includes an existing catchment plan that identifies catchment low points as well as potential major event flow path. A Stormwater Management Concept has thereafter been prepared that considers infiltration and/or conveyance and then infiltration of all storm events up to and including the 1:100 year ARI event. The Concept uses an indicative resort design concept (comprising building, road and parking pavement, pedestrian pathways that have been prepared in consideration of the opportunities and constraints of the land) to identify the estimated impervious areas, Stormwater volumes and events and pavement flows.

3.5 Bushfire Management

As referred to under Section 2.4 of this report a Bushfire Management Plan has been prepared to provide acceptable solutions that will manage bushfire risk to the proposed tourist resort development identified for the land. The following recommendations/actions (management measures/development response) have been considered/addressed in support of the Structure Plan:

- A Development Application is to locate all proposed habitable buildings in areas subject to a BAL rating of BAL 29 or lower which is consistent with the development footprint shown on the Structure Plan;
- Asset Protection Zones (APZ's) will be implemented prior to occupation of the resort and managed to ensure that the BAL ratings identified in the BMP do not increase over the course of time;
- APZ's are to be managed in a low-fuel state in perpetuity and may include internal roads, waterways, footpaths, non-habitable buildings, cultivated gardens/landscaping in an urban context;

- Provision of two different access routes are provided, both connecting to a public road network. One formal access/egress access route will be provided to La Perouse Road and constructed to a 6m wide trafficable surface. An emergency access way is to be provided to the south linking Vancouver Beach Resort to La Perouse Court to ensure access for fire services and emergency evacuation of residents and visitors is satisfactorily provided for. The emergency access way will be constructed to a 6m wide minimum trafficable surface and suitably sign posted;

- A Development Application for a tourist resort within the development footprint of the Structure Plan is to be provided with a reticulated water supply as is available;

- The internal access/egress road, in addition with the emergency access way, will also be constructed at the first stage of development;

- Compliance with the Bushfire Emergency Evacuation Plan (for proposed occupants) and risk management plan (for any flammable on-site hazards) for the proposed development prior to occupation; and

- Compliance with the City of Albany fire control order applicable to the land.

It is expected that the Bushfire Management Plan will be submitted with a development application for the proposed tourist resort in accordance with an appropriate provision included into Schedule 4 of the scheme relating to the land.

3.6 Infrastructure Coordination, Servicing and Staging

A Civil Engineering Report has been prepared by Wood & Grieve Engineers in support of the Structure Plan and is attached at **Appendix 8**. The report concludes that the future development of the land as proposed is capable of being serviced on-site (with regards to effluent disposal) and via reticulated water, power and communications to support the Structure Plan and associated scheme amendment. It further demonstrates that development is of a scale and nature able to provide appropriate servicing without any modification to existing infrastructure.

3.6.1 Power and Telecommunications

The proposed tourist resort will be connected to underground power. A preliminary load calculation suggests that the proposed development is likely to require approximately 150-250kva. Reticulated power supply is provided at the north western end of La Perouse Court and, as a result is not considered to be a constraint to develop the land as proposed.

Communications will be provided at the north western end of La Perouse Court and provision will be made for phone and data lines as required.

3.6.2 Effluent Disposal

In line with the *Draft Government Sewerage Policy 2016* (Government of Western Australia, 2016) (Draft GSP) the proposed tourist resort development on the land is exempt from being required to connect to a reticulated sewerage scheme by reason that the land:

- Is remote from an existing sewerage scheme and connect be realistically connected to reticulated sewerage;

- Proposes to utilise a secondary treatment system with nutrient level – noting that the land falls within a sewage sensitive area; and

- Can demonstrate that there is sufficient capacity to treat and dispose of sewerage (including buffers contained on-site), having considered the maximum hydraulic load able to be contain within the land and the potential impacts on waterways and wetlands.

The land further demonstrates its capability to treat and dispose of all sewage on-site by reason that it achieves the minimum requirements for on-site effluent disposal identified in the Draft GSP as follows:

- Achieves the 1.5m separation to groundwater criteria. Assessment undertaken by Aurora Environmental confirms that winter groundwater levels at the proposed development site is at a maximum of 0.56m leaving a separation of between 3.5m and 4.5 – noting the site ground level generally ranges between 4-6m AHD;

- There are no private bores within 30m of the Holiday Accommodation Precinct shown on the Structure Plan;

- The proposed site to accommodate on-site wastewater system is located greater than 100m from Lake Vancouver (which is defined as a waterway/wetland);

- The proposed Holiday Accommodation Precinct shown on the Structure Plan is not subject to flooding or inundation; and

- The proposed Holiday Accommodation Precinct shown of the Structure Plan does not fall within a Public Drinking Water Source Area.

The Environmental Assessment report provided at **Appendix 5** outlines that the proposed tourist development aims to incorporate a secondary treatment system with nutrient removal in order minimise the risks associated with wastewater treatment and disposal. The secondary treatment system is proposed to cater for a minimum of 180 people using 140L per person per day.

The Environmental Assessment report confirms that:

1. there are secondary systems approved by the Department of Health that can meet the treatment criteria set out in the 2016 Draft Government Sewerage Policy;

2. based on the occupancy, design load rating, soil type and secondary treatment, a 4,080m2 treatment area is required for the application of treated waste water (ie subsurface irrigation); and

3. such irrigation can appropriately use treated wastewater to be used in landscaped areas - thereby reducing the use of potable water for this purpose and reinforcing the sustainability initiative in this regard.

Wood & Grieve Engineers have undertaken a wastewater treatment plant preliminary investigation that forms part of its Civil Engineering report at **Appendix 8**. Their investigation confirms that

current wastewater technology can collect, treat and utilise (treated) wastewater in accordance with health, environmental and engineering requirements.

Wood & Grieve Engineers investigation proposes a secondary wastewater treatment system that consists of two wastewater treatment plants (WWTP). The main plant is to accommodate the short stay accommodation units and the minor plant to accommodate the kitchen/restaurant. The kitchen/restaurant is proposed to have its own separate dedicated WWTP so as to counteract consequences resulting from failure to maintain grease traps associated with these uses.

Details of the WWTP proposal (including a Waste Water Treatment Plant Concept Location Plan) are provided at **Appendix 8**.

The proposed Structure Plan has been prepared taking into consideration the investigation outcomes provided in the Environmental assessment report and Civil Engineering report. These investigations demonstrate that future development as shown on the Structure Plan is capable of accommodating on-site sewage disposal in a manner that does not affect public health or the environment. In this regard, the supporting Environmental Assessment report confirms that the minimum site requirements for on-site sewage disposal systems set out in the Draft GSP can be achieved noting the following characteristics:

- The Structure Plan area is remote from existing or proposed sewerage schemes and the proposed development cannot be connected to reticulated sewerage;
- The permeability results demonstrate that the tourist development site is adequate to reduce the risk of ponding and runoff related to irrigation and infiltration of treated waste water and stormwater;
- Nutrient discharge is to be minimised through secondary treatment and nutrient removal from waste water and that management such as soil amendment will need to be implemented to minimise nutrient discharge to the environment;
- The proposed tourist site identified on the Structure Plan has sufficient capacity to treat and dispose of sewage and contain associated buffers on-site;
- The proposed Tourist Development site identified on the Structure Plan will achieve groundwater separation requirements; and
- Sub-surface irrigation of treated wastewater will be located greater than the 100m setback criteria from Lake Vancouver

The effluent disposal method proposed demonstrate that a suitable wastewater treatment system can be implemented as part of future development of a high quality tourist resort while also ensuring that there will be no impact on the Lake Vancouver hydrology. Nonetheless, it is recommended that a suitable provision remains in the Scheme so that appropriate information is submitted with a development application.

3.6.3 Water Supply

The Goode beach townsite is serviced by a reticulated water system supplied by Water Corporation.

The Water Corporation has confirmed that that there is capacity in the 100PVC-12 water main (which runs along both La Perouse Road and La Perouse Court) to service the proposed tourist development based on an estimated demand of 21,000L/day (120 guests + 30 staff @ 140L/day).

3.6.4 Gas

There is no mains gas supply servicing the Goode Beach locality. Bottled LPG is readily available.

4.0 Technical Appendices

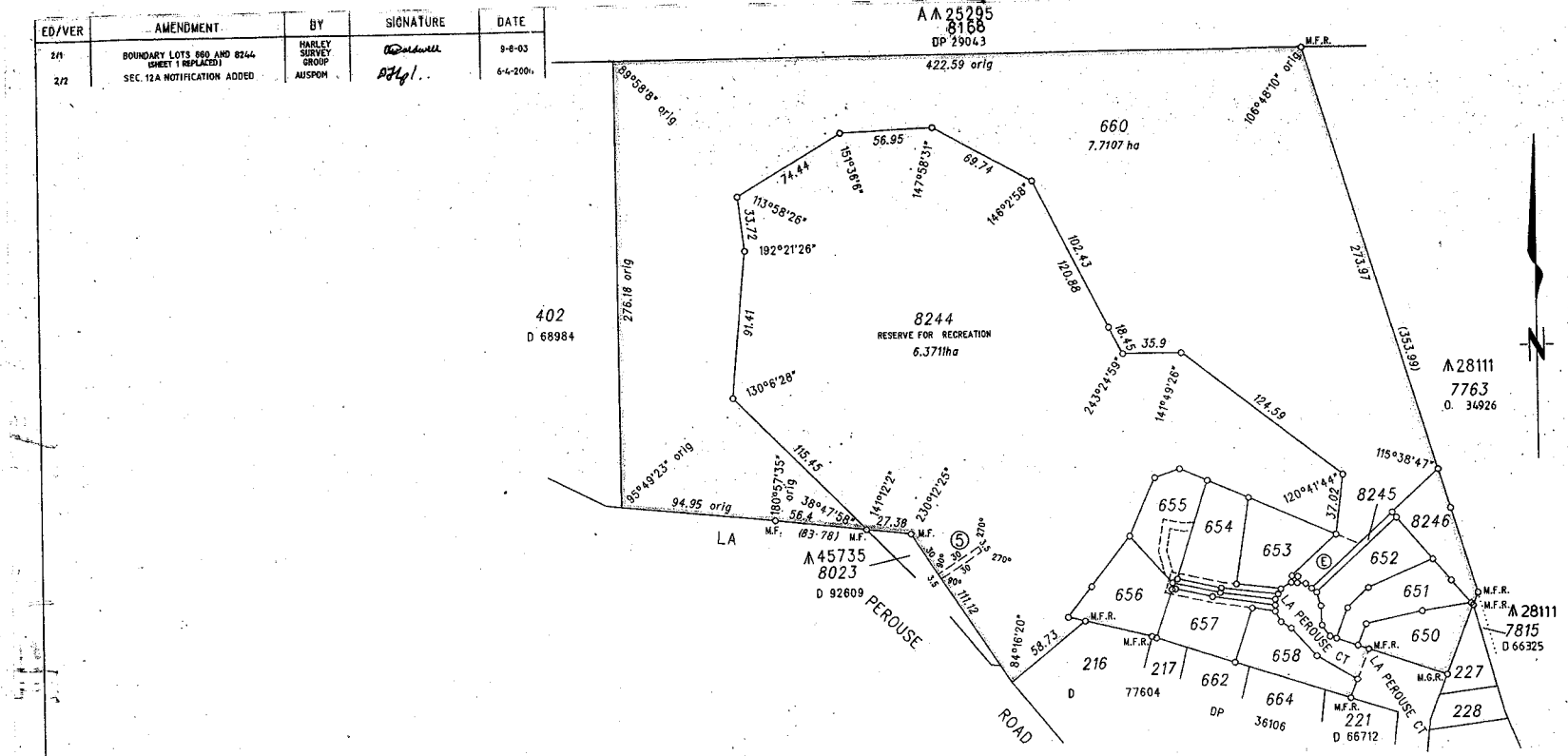
A range of technical assessments have been undertaken to consider the site opportunities and constraints and thereafter inform the preparation of the Structure Plan. The technical appendices have assisted in identifying the actions and recommendations to inform and link the Structure Plan with suitable provisions introduced into the scheme as the basis for the assessment of subsequent planning applications within the Structure Plan area.

The supporting Technical Documents are listed in the Table of Contents of this report and respectively appended.

APPENDIX I

Deposited Plan No.36832

ED/VER	AMENDMENT	BY	SIGNATURE	DATE
2/1	BOUNDARY LOTS 660 AND 8244 (SHEET 1 REPLACED)	HARLEY SURVEY GROUP		9-8-03
2/2	SEC. 12A NOTIFICATION ADDED	AUSPOM		6-4-2004



INTERESTS AND NOTIFICATIONS

SUBJECT	PURPOSE	STATUTORY REFERENCE	ORIGIN	LAND BURDENED	BENEFIT TO	COMMENTS
(5)	EASEMENT (DRAINAGE)	REG 5, SEC 27A OF THE T.P. & D. ACT	D 68983	LOT 8244	SHIRE OF ALBANY	
(A) SHEET 2	EASEMENT FOR (RIGHT OF CARRIAGEWAY, WATER SUPPLY, UNDERGROUND ELECTRICITY)	SEC 136C OF THE T.L.A.	THIS PLAN	LOT 654	LOTS 653, 655, 658, 657 & 656	
(B) SHEET 2	EASEMENT FOR (RIGHT OF CARRIAGEWAY, WATER SUPPLY, UNDERGROUND ELECTRICITY)	SEC 136C OF THE T.L.A.	THIS PLAN	LOT 655	LOTS 653, 654, 656, 657 & 656	
(C) SHEET 2	EASEMENT FOR (RIGHT OF CARRIAGEWAY, WATER SUPPLY, UNDERGROUND ELECTRICITY)	SEC 136C OF THE T.L.A.	THIS PLAN	LOT 656	LOTS 653, 654, 655, 657 & 658	
(D) SHEET 2	EASEMENT FOR (RIGHT OF CARRIAGEWAY, WATER SUPPLY, UNDERGROUND ELECTRICITY)	SEC 136C OF THE T.L.A.	THIS PLAN	LOT 657	LOTS 653, 654, 655, 656 & 658	
(E) SHEET 2	EASEMENT FOR (RIGHT OF CARRIAGEWAY)	SEC 136C OF THE T.L.A.	THIS PLAN	LOT 660	LOTS 653	
(F) SHEET 2	EASEMENT	SEC 136C OF THE T.L.A.	THIS PLAN DOC I 880190	LOT 654	LOTS 653, 655, 656, 657 & 658	
(G) SHEET 2	EASEMENT	SEC 136C OF THE T.L.A.	THIS PLAN DOC I 880191	LOT 655	LOTS 653, 654, 656, 657 & 658	
(H) SHEET 2	EASEMENT	SEC 136C OF THE T.L.A.	THIS PLAN DOC I 880192	LOT 656	LOTS 653, 654, 655, 657 & 658	
(J) SHEET 2	EASEMENT	SEC 136C OF THE T.L.A.	THIS PLAN DOC I 880193	LOT 657	LOTS 653, 654, 655, 656 & 658	
(K) SHEET 2	EASEMENT FOR (RIGHT OF CARRIAGEWAY)	SEC 136C OF THE T.L.A.	THIS PLAN	LOT 655	LOT 654	
LOT 8244	RESERVE FOR RECREATION	VESTS IN CROWN UNDER SECTION 20A OF THE T.P. & D. ACT				
LOT 8245	PEDESTRIAN ACCESSWAY	VESTS IN CROWN UNDER SECTION 20A OF THE T.P. & D. ACT				
LOT 8246	RESERVE FOR FORESHORE MANAGEMENT & RECREATION	VESTS IN CROWN UNDER SECTION 20A OF THE T.P. & D. ACT				
	NOTIFICATION	SEC.12A OF THE T.P.& D. ACT	DOC I 880189	LOTS 650-658 INC. & LOT 660	SEE DOCUMENT	

DP 36832 (01)

TYPE ..... FREEHOLD .....

PURPOSE ..... SUBDIVISION .....

PLAN OF

LOTS 650-658, 660, 8244-8246, ROAD AND EASEMENTS

DISTRICT ... PLANTAGENET ...

TOWNSITE .....

DOLA FILE .....

LOCAL AUTHORITY ..... CITY OF ALBANY ...

LOCALITY ... GOODE BEACH ...

SSA YES / NO

FORMER TENURE: LOT 401 ON D 68983 C/T 1731/870.

ON INDEX ... BK25 (10) 3.8 ... BK25 (2) 14.37 14.38 ...

FIELD BOOK: 89324-5 92303

SCALE 1 : 2000 — ALL DISTANCES ARE IN METRES — 0 20 40 60 80 100

SURVEYOR'S CERTIFICATE - Reg. 54

I A.W. CALDWELL ... hereby certify that this plan is a correct representation of the survey and/or calculations from measurements recorded in the field book lodged for the purposes of this plan and that it complies with the relevant written law(s) in relation to which it is lodged.

Licensed Surveyor ... 17/4/2003 Date

HARLEY SURVEY GROUP PTY LTD
CONSULTING LICENSED SURVEYORS
A.C.N. 009 101 786
ABN 77 503 764 248
116 SERPENTINE ROAD, ALBANY
Ph (08) 9841 7333 Fax (08) 9841 3643
ALSO AT BUNBURY AND BUSSELTON
DRAWN JB&S 12 DECEMBER 2002
10686 L1-01B

LODGED — DATE 22-04-03 — FEX PAID $613 — ASSESS No. 379489

TYPE OF VALIDATION — FULL AUDIT ..... LEGAL COMPONENT DWH ... DOCKET PLAN/DIAGRAM 27343 — CERTIFIED CORRECT ... 6/4/04 ... DELEGATED UNDER S.16 OF WAPC ACT 1985 — DATE 6/4/2004

APPROVED BY WESTERN AUSTRALIAN PLANNING COMMISSION — FILE 119946

IN ORDER FOR DEALINGS

SUBJECT TO
Sec.136C of the T.L.A.
Sec.20A of the T.P.&D. Act
Sec.12A of the T.P.&D. Act
Sec.235(5) of the L.G.A.

FOR INSPECTOR OF PLANS & SURVEYS/AUTHORIZED LAND OFFICER ... DATE 13.9.04

APPROVED

APPROVED ... 20.5.04 ...
FOR INSPECTOR OF PLANS & SURVEYS/AUTHORIZED LAND OFFICER ... DATE

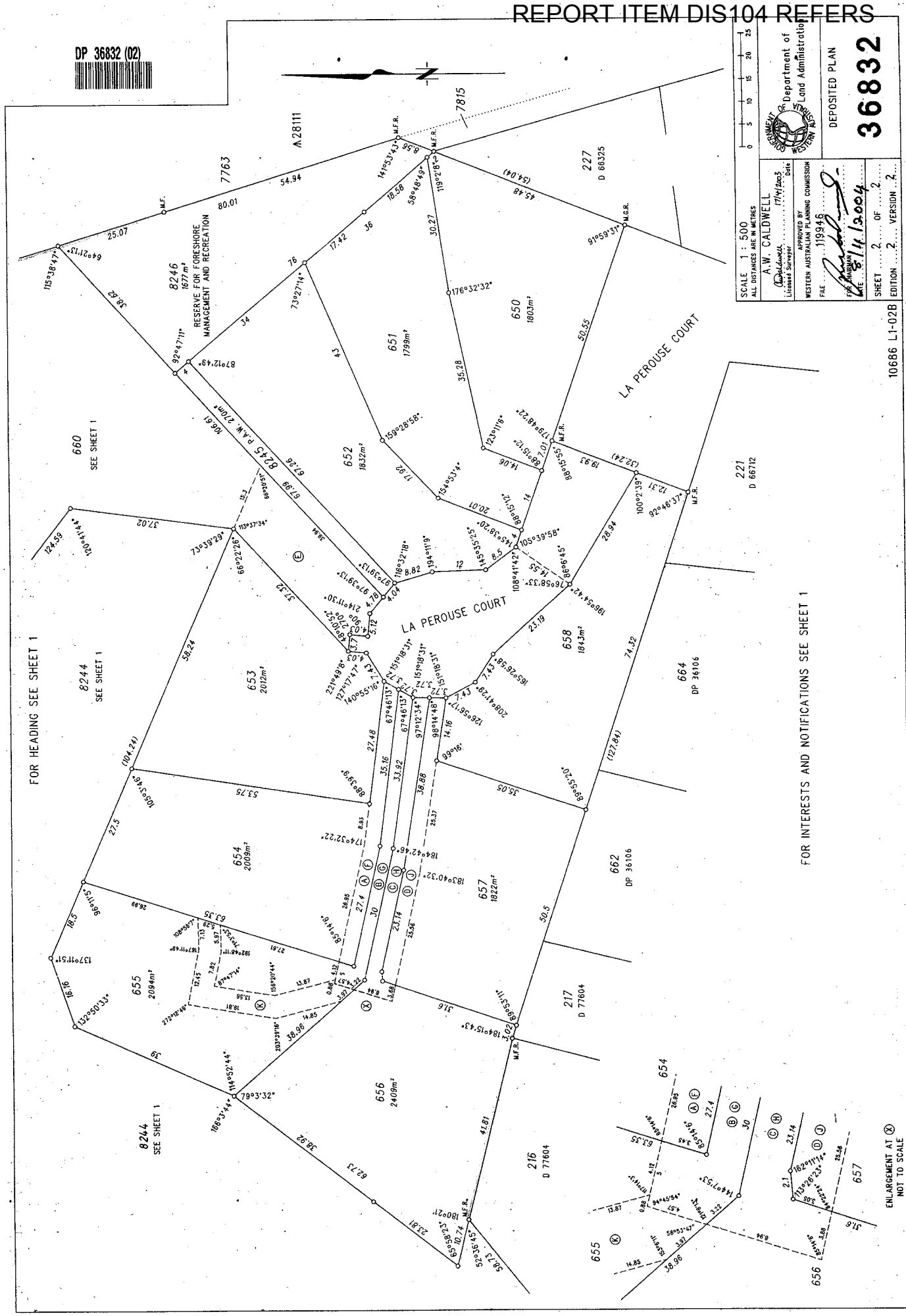
Department of Land Administration

DEPOSITED PLAN

36832

SHEET ... 1 ... OF ... 2 ...

EDITION ... 2 ... VERSION ... 2 ...



APPENDIX 2

Certificate of Title

WESTERN AUSTRALIA

REGISTER NUMBER	
660/DP36832	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
2	17/6/2013

VOLUME 2564 FOLIO 194

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

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

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 660 ON DEPOSITED PLAN 36832

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

CHERRY JOAN MARTIN
ANDREA URSULA WHITING
AS JOINT TENANTS IN 99/200 SHARE
CHERRY JOAN MARTIN
IN 99/200 SHARE
TINKO PTY LTD
IN 2/200 SHARE
ALL OF POST OFFICE BOX 7173, SHENTON PARK
AS TENANTS IN COMMON

(TP M236441) REGISTERED 10/4/2013

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

1. EASEMENT BURDEN - SEE DEPOSITED PLAN 36832
2. *I880189 MEMORIAL. TOWN PLANNING AND DEVELOPMENT ACT 1928. REGISTERED 20/5/2004.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

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

STATEMENTS:

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

SKETCH OF LAND:	DP36832
PREVIOUS TITLE:	1731-870
PROPERTY STREET ADDRESS:	40 LA PEROUSE CT, GOODE BEACH.
LOCAL GOVERNMENT AUTHORITY:	CITY OF ALBANY

APPENDIX 3

Special Use Area (SUI) Provisions – Schedule 4 of City of Albany Local Planning Scheme No. 1

Schedule 4 – Special Use Zones [cl.4.7]

No.	Description of Land	Special Use	Conditions
SU1	Pt. Lot 660 La Perouse Road, Goode Beach Plan 036832	Holiday Accommodation (Chalets)	1. Prior to commencement of development of the special uses on the site, the owner/developer shall submit an overall Development Guide Plan to the Local Government for endorsement. 2. The Development Guide Plan shall provide details on the development for the site including: (a) Achieving a low-key holiday accommodation development commensurate (maximum 10 Chalet/Cottage Units) with the fragile coastal nature of the area; (b) Buildings being clustered together; (c) Siting of buildings and access roads within degraded/cleared areas to minimise clearing required for servicing and built development; (d) The buildings to be sited away from the eastern boundary with the coastline to protect coastal processes and the significant sand dunes in this area; (e) Building density, design, colours and materials to blend the buildings within the site; (f) Coastal setbacks and Foreshore Management Plan; (g) On-site stormwater drainage, effluent disposal methods and impacts on Lake Vancouver hydrology; (h) Potable water supply; (i) Implementation of a Fire Management Plan incorporating the existing fire access tracks within the area; and (j) Any additional controls required to be implemented to ensure the proposal complies with the objective of providing low-key holiday accommodation on the site.
SU2	Lot 200 Hayn Road, Goode Beach Plan 049833	Caretaker's Dwelling Chalet/Cottage Units Home Occupation Recreation - Private Restaurant	1. All subdivision, development and land use shall be generally in accordance with the Development Guide Plan endorsed by the CEO. 2. There shall be a maximum of 12 Chalet/Cottage Units permitted to be developed.

APPENDIX 4

Coastal Hazard Assessment & Risk Management Strategy
(MP Rogers & Associates Pty Ltd)

m p rogers & associates pl ABN 14 062 681 252
creating better coasts and ports

R835 Rev 1

May 2017

Cherry Martin

Vancouver Beach Resort Coastal Hazard Assessment & Risk Management Strategy

marinas
boat harbours
canals
breakwaters
jetties
seawalls
dredging
reclamation
climate change
waves
currents
tides
flood levels
water quality
siltation
erosion
rivers
beaches
estuaries

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creating better coasts and ports

Suite 1, 128 Main Street, Osborne Park, WA 6017
p: +618 9254 6600
e: admin@coastsandports.com.au
w: www.coastsandports.com.au

K1379, Report R835 Rev 1
Record of Document Revisions

Rev	Purpose of Document	Prepared	Reviewed	Approved	Date
A	Draft for MRA & Client review	C Doak	T Hunt	C Doak	1/12/16
0	Issued to Client	C Doak	T Harding	C Doak	16/1/17
1	Updated and reissued	C Doak	T Hunt	C Doak	16/5/17

Form 035 18/06/2013

Limitations of this Document

This document has been prepared for use by the Client in accordance with the agreement between the Client and M P Rogers & Associates Pty Ltd. This agreement includes constraints on the scope, budget and time available for the services. The consulting services and this document have been completed with the degree of skill, care and diligence normally exercised by members of the engineering profession performing services of a similar nature. No other warranty, expressed or implied, is made as to the accuracy of the data and professional advice included. This document has not been prepared for use by parties other than the Client and its consulting advisers. It may not contain sufficient information for the purposes of other parties or for other uses.

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1. Introduction

Lot 660 La Perouse Court is located on the Vancouver Peninsula and is adjacent to Goode Beach in Frenchman Bay, Albany. The eastern boundary of Lot 660 is about 270 metres long and is around 30 metres from the seaward edge of the vegetation line. Reserve 28111 is crown land and is located between Lot 660 and Frenchman Bay. The general location of Lot 660 is shown on Figure 1.1.

Figure 1.1 Location Plan

Lot 660 is a freehold titled lot owned by Dr Cherry Martin. The Lot has long been earmarked for development of tourist accommodation. The current proposal is for the development of a resort – to be known as the Vancouver Beach Resort – that is sensitive to the natural environment.

Within Western Australia, State Planning Policy 2.6: State Coastal Planning Policy (SPP2.6; WAPC, 2013) provides guidance on the assessment of coastal hazard risks for assets or infrastructure located in close proximity to the coast. This guidance is provided in the form of a methodology to assess the potential extent of coastal hazard impacts, as well as for the development of appropriate coastal hazard risk mitigation and adaptation strategies.

The key requirement of SPP2.6 is to develop an adaptation framework for assets or infrastructure that could be at risk of impact by coastal hazards over the relevant planning timeframe. Importantly, the balance of these risks needs to be considered with reference to the expected lifetime of the asset/infrastructure. In this regard, the requirements for tourism development on the freehold titled Lot 660 will be different to that which would be required for the subdivision associated with freehold residential development, for example. This is reflective of both the less critical nature, and shorter planning horizon (or time to asset replacement) of the proposed tourist infrastructure.

To provide guidance regarding the risks posed by coastal hazards, Dr Cherry Martin engaged specialist coastal and port engineers, M P Rogers & Associates Pty Ltd (MRA), to prepare a coastal hazard assessment and to develop a coastal management and adaptation strategy. This report presents the outcomes of this assessment.

2. Site Setting

2.1 Location

Goode Beach is located on the eastern side of the Vancouver Peninsula and forms the western shoreline of Frenchman Bay. The presence of the Flinders Peninsula to its south provides protection to Goode Beach, with refracted and diffracted wave heights generally less than around 1 m at the shoreline (Short, 2006).

The Vancouver and Flinders Peninsulas are shown in Figure 2.1, which is an extract of the local nautical chart for the area. The outlook from Goode Beach, in front of the Vancouver Beach Resort site is shown in Figure 2.2. This photograph shows the extent of protection provided by the Flinders Peninsula and local islands.

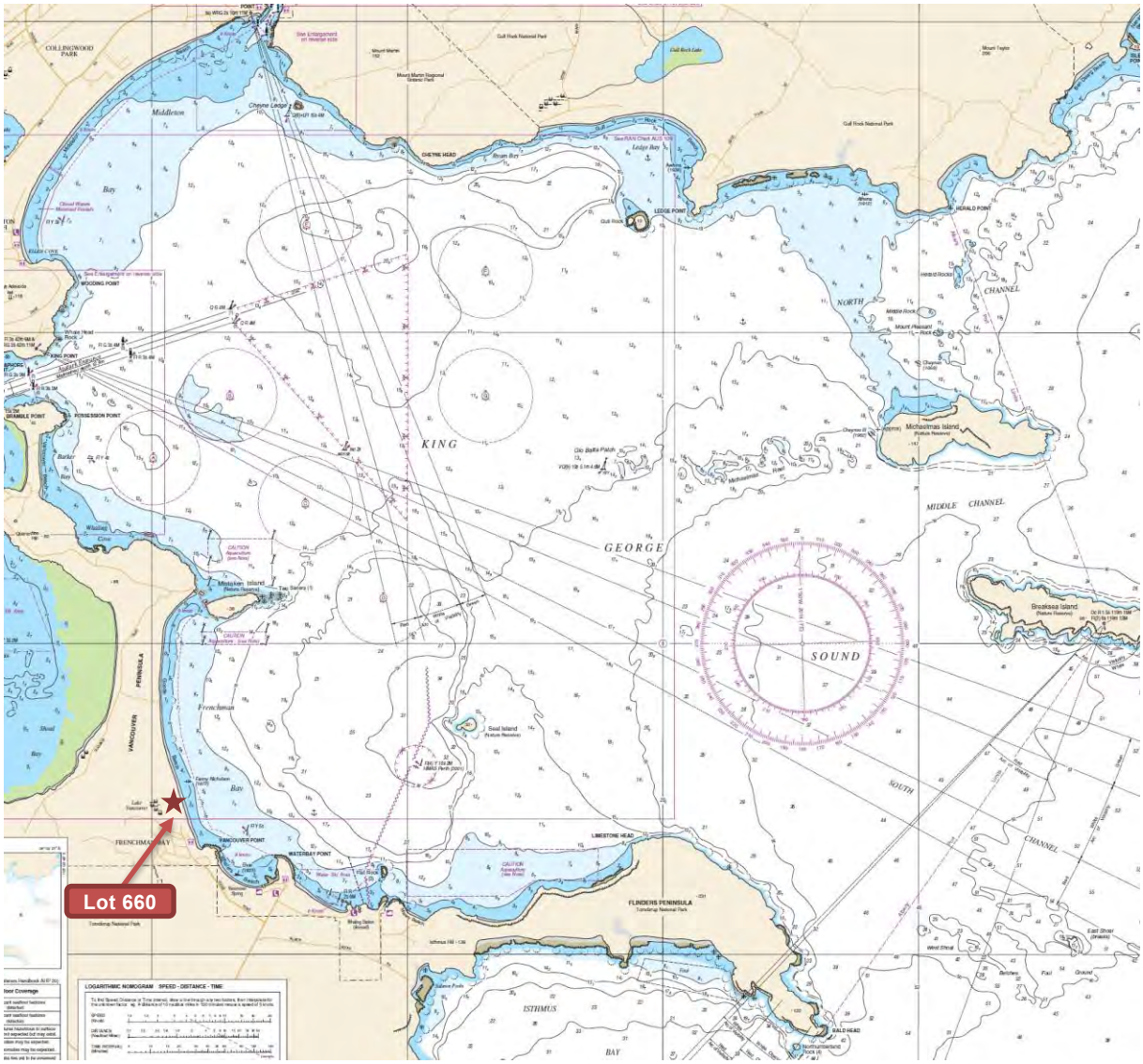


Figure 2.1 Extract from Local Nautical Chart (WA1083: DoT 2014)

Figure 2.2 Outlook East from the Vancouver Beach Resort Site Showing Sheltering from Flinders Peninsula and Local Islands

The Goode Beach shoreline consists of a steep reflective sandy beach backed by a substantial dune formation whose crests are generally between 5 and 8 metres above the Australian Height Datum (AHD). Photographs of the shoreline along Goode Beach are presented in Figure 2.1.

Figure 2.3 Photographs of Goode Beach

2.2 Metocean Conditions

Consideration of beach stability and coastal processes is enhanced by an understanding of the fundamental driving forces. Consequently, data on the magnitude and variation in the winds, waves, tides and currents is important in assessing the coastal processes.

2.2.1 Wind Regime

The seasonal weather patterns at Albany are largely controlled by the position of the so called Subtropical High Pressure Belt. This is a series of discrete anticyclones that encircle the earth at the mid-latitudes (latitudes of 20 degrees to 40 degrees). Throughout the year, these high pressure cells are continuously moving from west to east across the southern portion of the Australian continent. A notional line joining the centres of these cells is known as the High Pressure Ridge.

In winter, this ridge lies across Australia typically between 25 to 30 degrees south and is to the north of Albany which is located at around 35 degrees south. Consequently, the migrating low pressure systems which exist to the south of the High Pressure Ridge, are located sufficiently northward to bring a westerly wind regime to the southwest of Western Australia and the adjacent waters. Cold fronts associated with these low pressure systems pass over the Albany region. These can bring storm force winds with directions from northwest, through west, to southwest.

During summer, the High Pressure Ridge moves south of Albany and lies between 35 and 40 degrees south. Under these circumstances, the Albany region comes under the influence of the high pressure cells of the High Pressure Ridge. These cells cause anti-cyclonic winds that rotate anti-clockwise in the Southern Hemisphere. At Albany, these winds arrive from the southeast to east as the high pressure cell approaches from the west.

In addition to these synoptic scale effects which cause seasonal variations, the meso-scale phenomenon of a land / sea-breeze system is commonly experienced during summer at Albany and adjacent coastal regions.

The Bureau of Meteorology has recorded the wind speed and direction at Albany Airport since 1965 and have used this data to prepare seasonal wind roses. These are presented as Figures 2.4 and 2.5 for the expanded winter (May to September) and summer (October to April) periods. Figure 2.4 shows the predominance of winter winds from the northwest and southwest sectors. Often the wind speeds exceed 50 kph in the winter storms.

The wind roses for summer, Figure 2.5, shows the common wind directions in summer as southeast and southwest. The detailed wind records show the land sea-breeze effect with the summer morning winds typically from the east and southeast at 20 to 40 kph, while the afternoon winds in summer tend to be of slightly stronger and generally from the southeast to southwest.

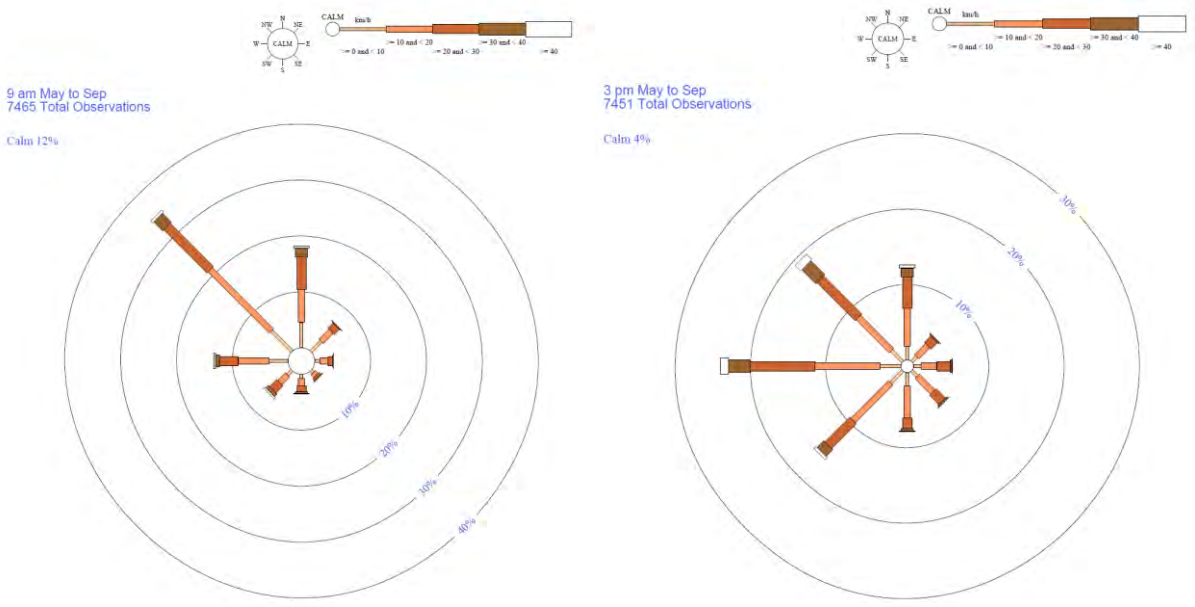


Figure 2.4 Albany Wind Roses for the Expanded Winter Period (BoM, 2014)

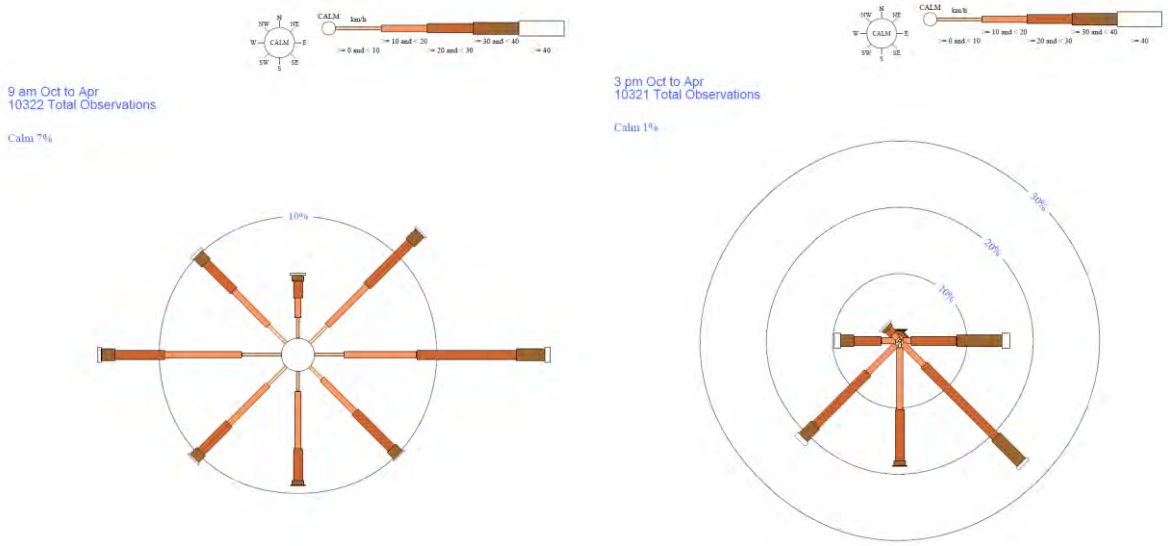


Figure 2.5 Albany Wind Roses for the Expanded Summer Period (BoM, 2014)

These records were taken at the Albany Airport which is about 20 km from the Vancouver Peninsula. Differences in the local topography are likely to cause changes in the wind speeds and local directions. Nevertheless, the records presented are believed to be fairly representative of the main wind patterns and the seasonal changes that are experienced at Frenchman Bay.

The wind regime influences coastal processes through the generation of waves and currents as well as feeding dune systems with windblown beach sand.

2.2.2 Wave Climate

The nearshore wave climate on Goode Beach in Frenchman Bay comprises two distinct sources. The first is that from the open ocean to the south on Albany, and the second are those waves that are generated by local winds across the short fetches of King George Sound.

This local generation of waves across King George Sound is caused by east to north easterly winds. However, as seen in the previous wind roses, strong winds from the east to north east are not overly persistent.

The deepwater wave climate to the south of Albany is quite severe. The Department of Transport record wave conditions in 60m of water south of Albany using a Waverider buoy. The location of the Waverider is shown in Figure 2.6. Wave measurements from this location are available since 2005.

Figure 2.6 Location of the DoT Waverider Buoy

The data recorded from the Albany Waverider is plotted in Figure 2.7. This figure shows both the time history of recorded wave heights as well as cross plots of the sea and swell wave heights verses their associated directions.

Figure 2.7 shows that the most common direction for these offshore waves is from the southwest, but they also approach King George Sound from the south and occasionally the southeast. The severity of the wave heights also mirrors the persistence, with the most severe waves from the south through west.

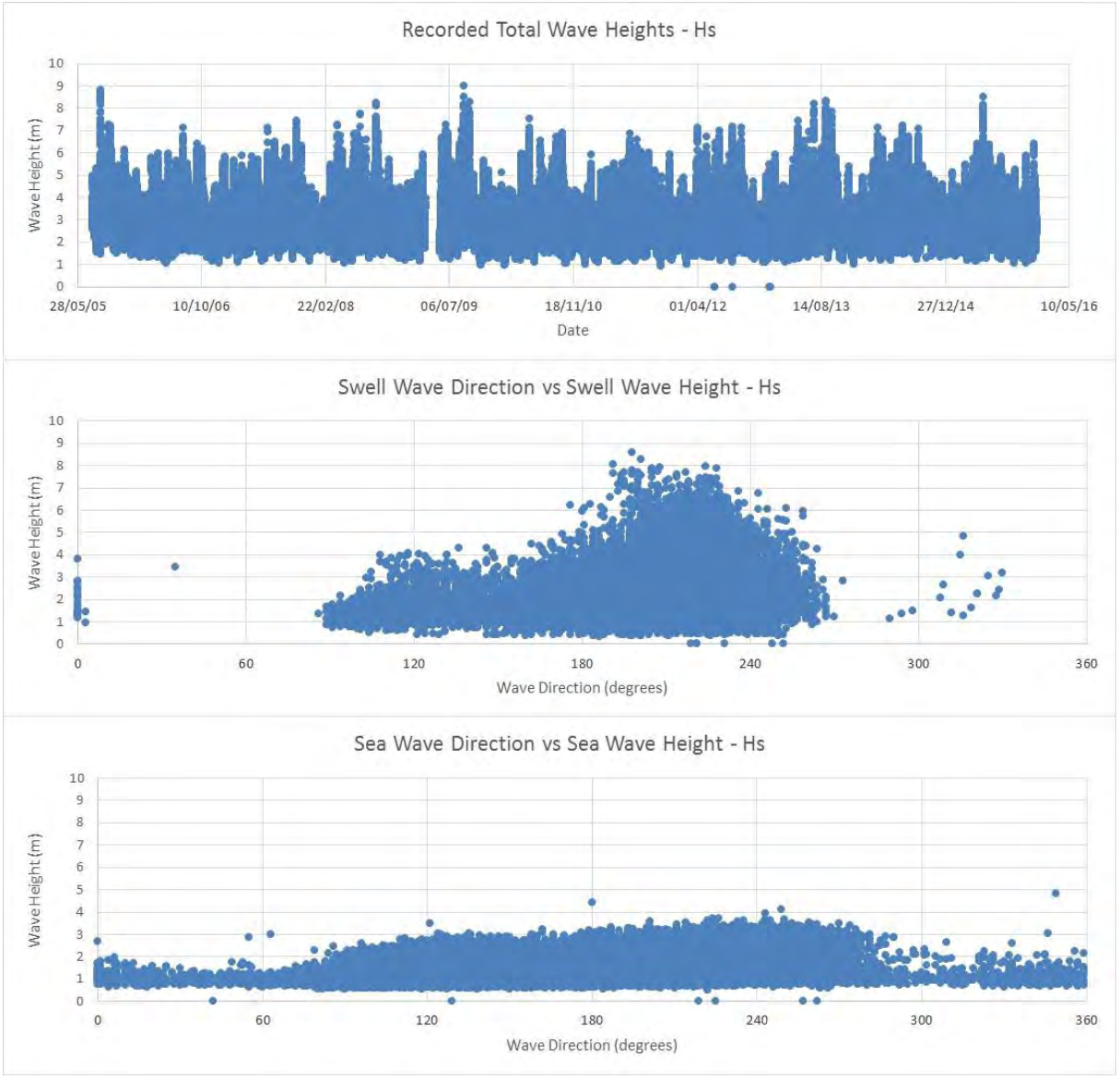


Figure 2.7 Wave Data Recorded from the Albany Waverider Buoy

The shape of King George Sound provides Frenchman Bay with excellent natural protection from these open ocean waves (refer to Figure 2.1). In particular, the extent and position of Flinders Peninsula limits the energy of ocean waves that reach Goode Beach in Frenchman Bay. The large ocean waves are greatly attenuated by the processes of refraction, diffraction, bottom friction and breaking as they travel from the open ocean to the sheltered shore.

Small to very small swell waves reach the shores of Frenchman Bay throughout the year. Because of the extensive refraction, the swell waves are bent around and arrive at the shore with crests parallel to the beach. These swell waves are important in building up the beach profile.

Given the location of Frenchman Bay, the most important fetches for locally generated waves are to the east and northeast. During the summer months there will be periods of easterly wind that generate local seas on King George Sound. These seas will often reach 1 metre in height with wave periods of about 4 seconds. During very extreme events of strong winds from the east, the local seas may reach 2 metres in Frenchman Bay.

The waves that break on the beach are believed to be very important in the transport of sand in the littoral zone.

2.2.3 Tides

The astronomical tides at Albany are predominantly diurnal (one tidal cycle each day) and relatively limited in range. The daily range is typically about 0.6 metres during spring tides and about 0.3 metres during neap tides.

Seasonal shifts in the sea level occur due to meteorological effects. Typically, the mean sea level at Albany rises 0.1 metre during winter and falls 0.1 metre during summer.

During storms events, barometric and wind effects can cause significant storm surges. In typical winter storms, the surge is often about 0.4 metre above the astronomical tide level. The storm surge can be in the order of 1 metre during a very rare winter storm.

Given the small astronomical tides, the level of the sea would generally have a secondary effect on the sand transport along the beaches, except during storm events when high water levels would enable the waves to attack the rear of the sandy beaches.

2.2.4 Nearshore Currents

As the tidal range is quite small, it is likely that the nearshore tidal currents in Frenchman Bay are also small. From work in Princess Royal Harbour (Environmental Protection Authority, 1990) it is expected that the largest currents in the nearshore area at Frenchman Bay would result from the action of the wind blowing over the water surface. These wind driven currents are generally less than 0.5 m/s.

The magnitude of these nearshore currents is such that they will have a minor effect on the movement of sand on the adjacent beaches.

2.3 Coastal Processes

Goode Beach is located within the Possession Point to Bald Head coastal compartment. This compartment is characterised by embayed beaches generally separated by granite outcrops that exhibit morphological control. Goode Beach itself is embayed between the granite outcrop at the base of the eastwards extension of the Flinders Peninsula (known as Vancouver Point) and the granite formation at the norther end of the Vancouver Peninsula, including Mistaken Island.

Figure 2.8 Extent of Coastal Sediment Cells

Using the above information on the various physical processes, the movement of sand on Goode Beach is believed to be dominated by wave induced processes.

The transport of sand along a coast is a fundamental mechanism in beach dynamics. A simplistic description of this mechanism is that in the surf zone of sandy beaches, the breaking waves agitate the sand and place it into suspension. If the waves are approaching the beach at an angle, then a longshore current can form and this can transport the suspended sand along the beach. The suspended load transport is accompanied by a bed load transport where sand is rolled over the bottom by the shear of the water motion.

At Goode Beach the swell waves approach normal to the shore and the summer easterly seas also approach normal to the beach. The area is well protected from other wave directions and consequently there is little potential to develop significant fluxes of longshore drift on this beach. This is evidenced by the alignment of the beach between Vancouver Point to the south and Mistaken Island to the north. The longshore drift on this beach appears to be fairly small and in reasonable balance. The net longshore drift is assessed to be of negligible proportions.

The other significant coastal process, would be the onshore / offshore movement of beach sand. During storm events the steep waves and high water levels would cause sand to be eroded from the beach and carried offshore. The long, low swell that persistently arrives at this coast between storm events would tend to move sand back onto the beach. This cyclical onshore / offshore movement of sand is believed to be the dominant process on Goode Beach.

3. Coastal Hazard Identification

An understanding of potential future coastal hazards and risks is critical for the assessment and determination of management and adaptation actions.

SPP2.6 provides guidance on the assessment criteria and methodology required to determine the potential extent of coastal hazard impacts, whilst incorporating an appropriate level of conservatism for coastal planning. This assessment methodology seeks to incorporate allowances for landform stability, natural variability and climate change over the proposed planning horizon. Specifically, the following items are considered in order to assess the appropriate allowances for coastal processes and climate change over the proposed planning timeframes.

- Severe storm erosion (S1 Allowance).
- Historical shoreline movement (S2 Allowance).
- Climate change induced sea level rise (S3 Allowance).
- Storm surge inundation (S4 Allowance).

These criteria are discussed in further detail in the following sections of this report. This coastal hazards assessment has been completed for a 100 year planning horizon in accordance with SPP2.6 requirements. Interim planning horizons of 25, 50 and 75 years have also been considered in order to assess the changes to coastal vulnerability over time.

3.1 Severe Storm Erosion (S1 Allowance)

SPP2.6 outlines that the S1 allowance should provide an adequate buffer to accommodate the potential erosion caused by a storm with an Annual Encounter Probability (AEP) of 1%. This is equivalent to a 100 year average recurrence interval (ARI) storm.

Estimation of the S1 allowance for the Vancouver Beach Resort site first requires selection of an appropriate storm event. This is particularly relevant given the level of sheltering that the shoreline receives. The selected storm will then be modelled to determine the potential extent of shoreline erosion that could result.

3.1.1 Storm Event

As outlined previously, the Vancouver Beach Resort site has an easterly aspect and is protected from the most severe wave energy from the south by the Flinders Peninsula. As a result, wave energy that arrives at the shoreline during the largest wave events (typically from the south to south west) is significantly attenuated due to the extent of diffraction required for the waves to reach the shoreline. For example, based on diffraction diagrams provided in Goda (2010) (refer Figure 3.2), even a wave coming directly from the south would be attenuated to less than 10% of its total offshore wave height by the time that it diffracted around Bald Head and made it to the nearshore area fronting the Resort site.

Given the above, storm events that are predominately from the west through south would be expected to have little impact on the shoreline fronting the resort. Events with the majority of the wave energy originating from the south through east would have a much greater impact on this section of shoreline since less wave diffraction would be required for the wave to reach the shoreline.

Wave records were therefore interrogated to assess only those events with severe waves arriving from the south through east. The assessed wave data included the information from the DoT Waverider Buoy as well as results from the WW3 global hindcast wave model (NOAA 2016), and other available hindcast modelling results completed by WNI (1996).

An extreme analysis was completed on the filtered wave events to show the average recurrence of wave heights from the south through east. Results of this extreme analysis are presented in Figure 3.1.

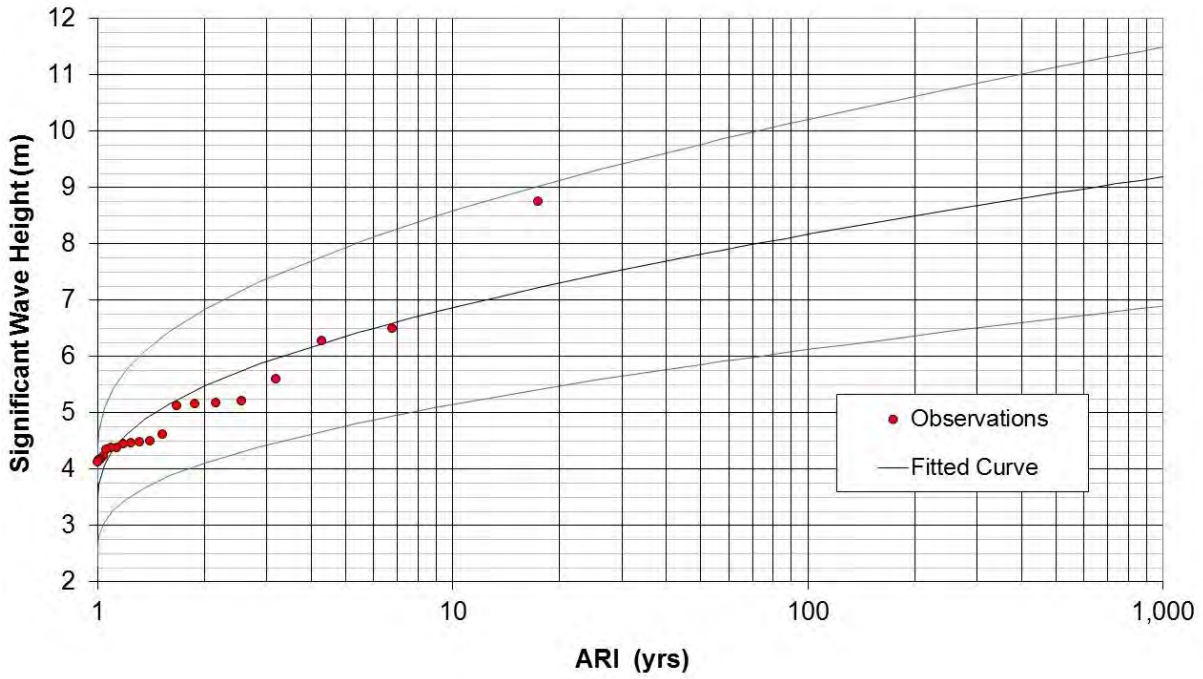


Figure 3.1 Extreme Wave Height Analysis for Waves from the South through East

The most notable feature of the extreme analysis is that there is one event that is significantly more severe than the over events. This event occurred between the 1st and 4th of August 1984 and resulted in significant erosion of beaches in the Albany area. Most notably, this storm resulted in up to around 30 m of erosion of Middleton Beach, which is by far the worst storm erosion on record for this area.

Figure 3.2 shows the impact of this storm event on Middleton Beach. The shoreline positions (depicted by the coastal vegetation lines) from 1981 (pre-storm) and 1986 (post-storm) are shown on the figure. A time history plot showing the change in shoreline position since 1943 is also provided. This information highlights the following two points.

1. The 1984 storm caused a significant amount of erosion along Middleton Beach, with the extent of erosion still obvious along some stretches of the beach due to the alignment of more prominent vegetation types, which indicate the extent of erosion.
2. The extent of erosion caused by the 1984 storm event is much greater than recorded during any other event over the period of record (between 1943 to present).

The fact that the 1984 event had the largest wave height from the south through east, and also caused an unmatched level of erosion along Middleton Beach, clearly demonstrates that this event is the most erosive event on record for the area within King George Sound.

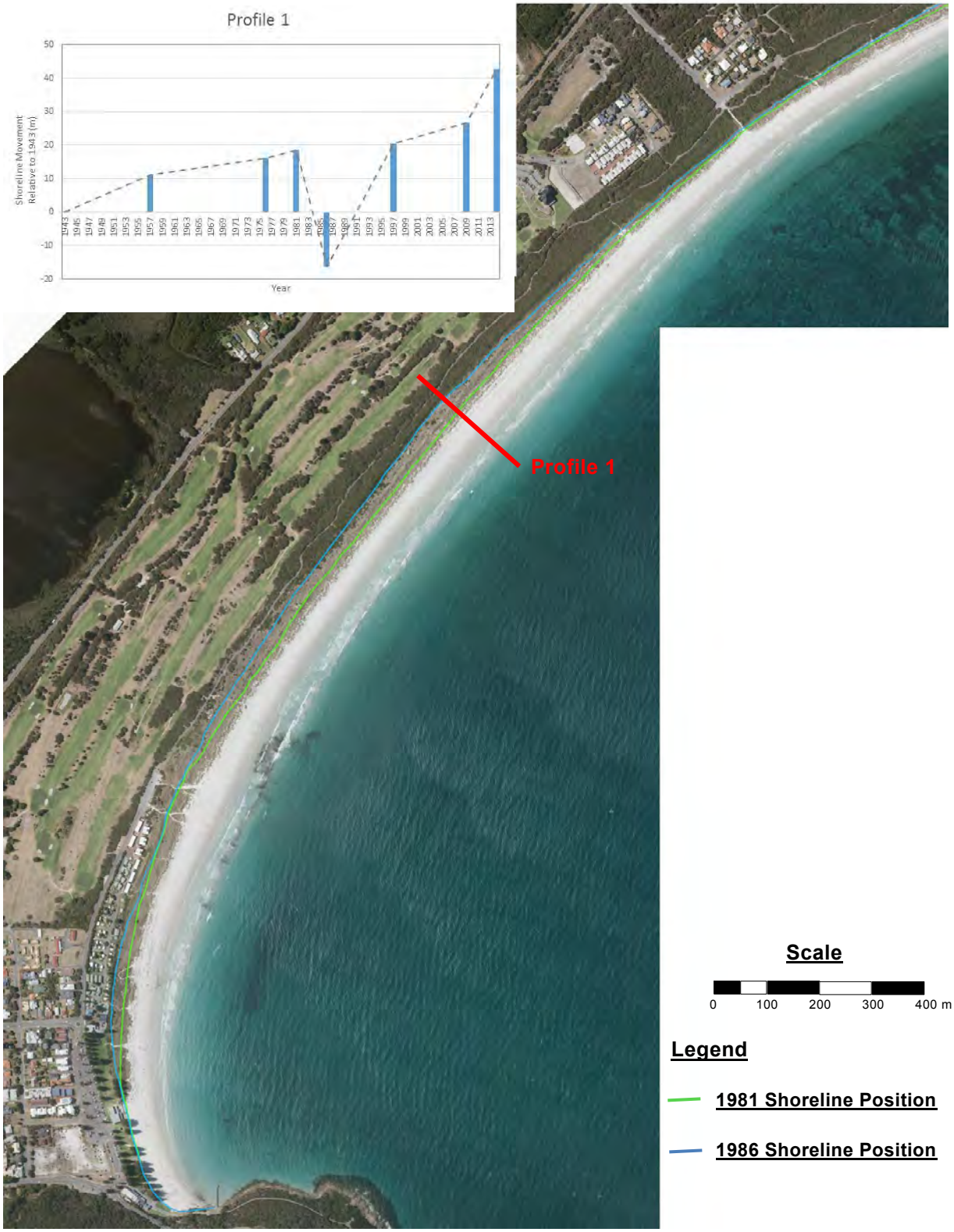


Figure 3.2 Extent of Erosion along Middleton Beach Caused by 1984 Storm

Unfortunately no recorded data is available for this 1984 event, however hindcast data was available from WNI (1996). This data provided information on both wave heights and directions during the event.

Even though this event was predominately from a south easterly direction, waves still need to diffract around Bald Head in order to reach the nearshore area adjacent to the Resort site. The hindcast wave conditions were therefore adjusted to account for the attenuation caused by this diffraction using the diffraction diagrams presented in Goda (2010) (refer Figure 3.3). Using this diffraction diagram, it was possible to estimate the wave conditions offshore from the Resort site. For clarity, two examples showing how the wave transformation was completed are shown in Figure 3.4.

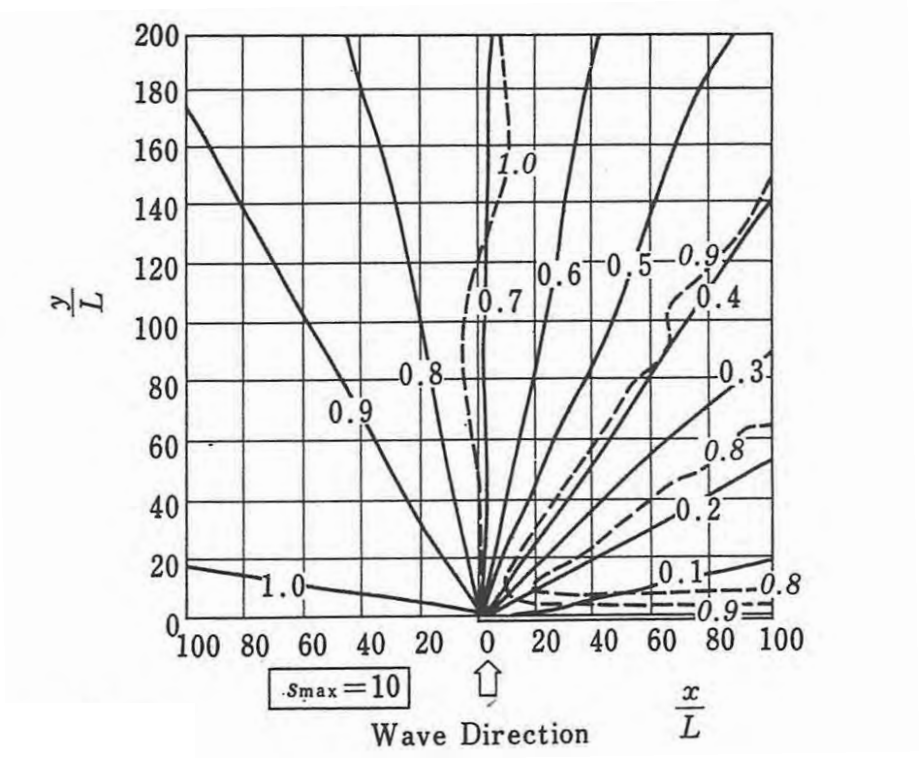


Figure 3.3 Diffraction Diagram from Goda (2010)

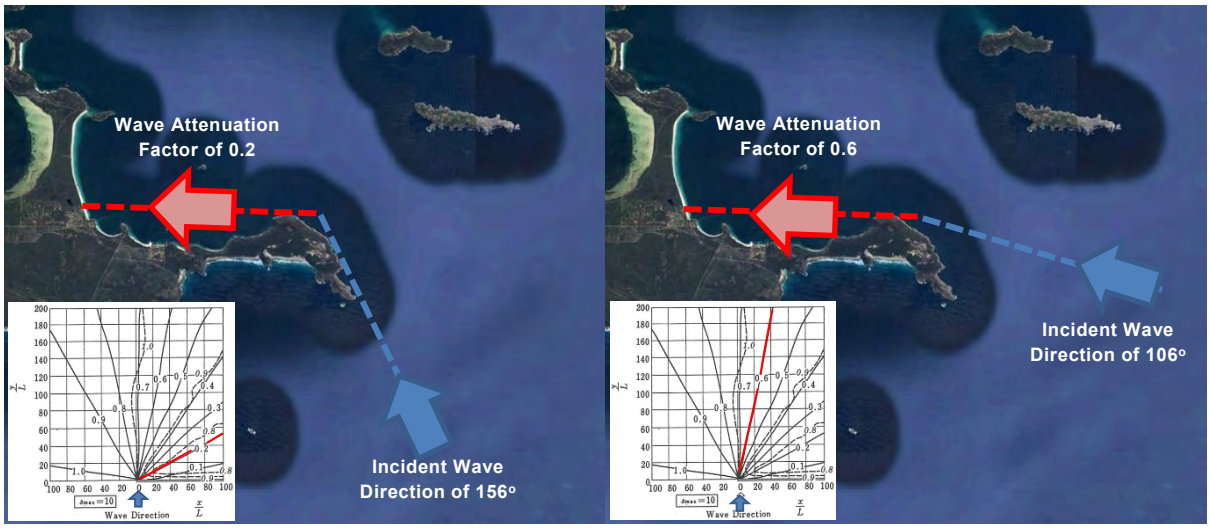


Figure 3.4 Examples of Wave Diffraction Attenuation Calculations

As with the wave conditions, no water level records are available for the period of the event. As a result, the predicted tidal level during this event was scaled to peak at the 10 year ARI water level.

This level was determined by an extreme analysis of the available water level records from Albany (for the period 1987 to 2015).

It is noted that scaling of the water level to peak at the 10 year ARI level is likely to be conservative for this event since the event was actually associated with the passage of a strong high pressure system. The high atmospheric pressure of this system is likely to have resulted in a set-down of water level over the general area, rather than a storm surge. However in the absence of more detailed information the 10 year ARI water level has been used to maintain conservatism within the assessment.

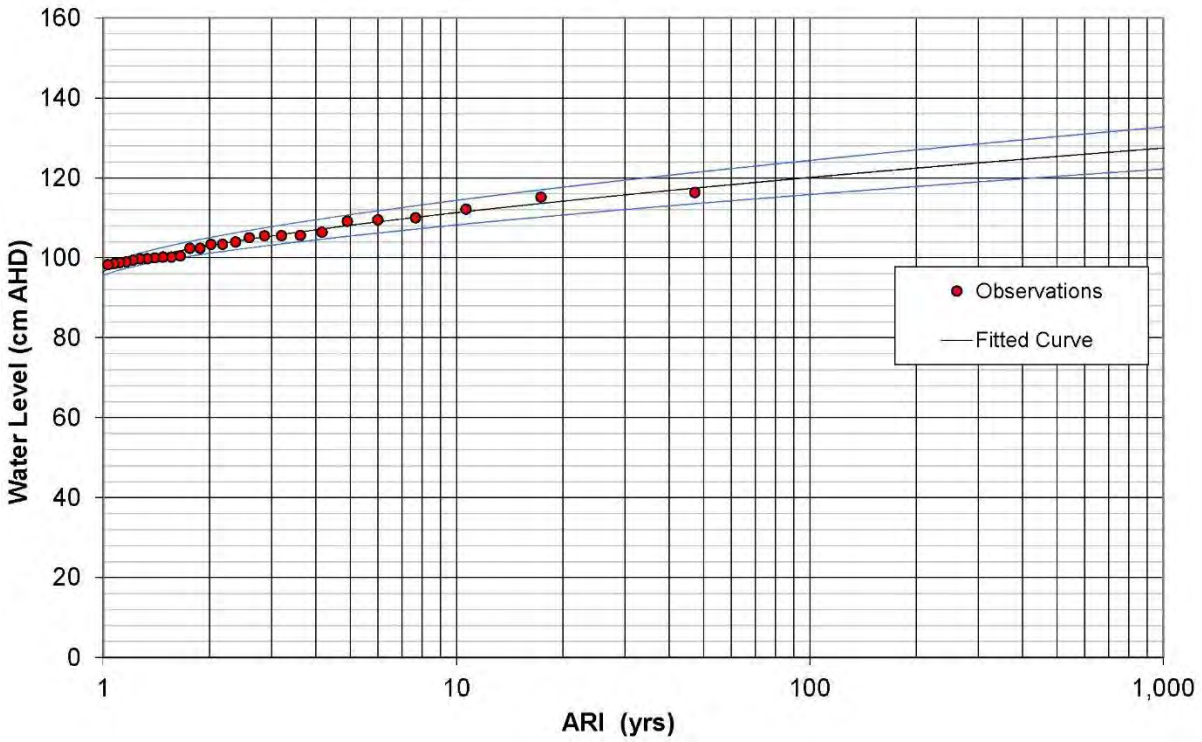


Figure 3.5 Albany Extreme Water Level Analysis

The August 1984 event had sustained waves from the south through east for a period of around 60 hours. The full duration of this event was therefore chosen as the storm for the modelling of the severe storm erosion impact. In accordance with the requirements of SPP2.6, three repeats of this event will be used to determine the potential extent of storm erosion for the Resort site. The wave heights and water level used in the modelling are presented in Figure 3.6.

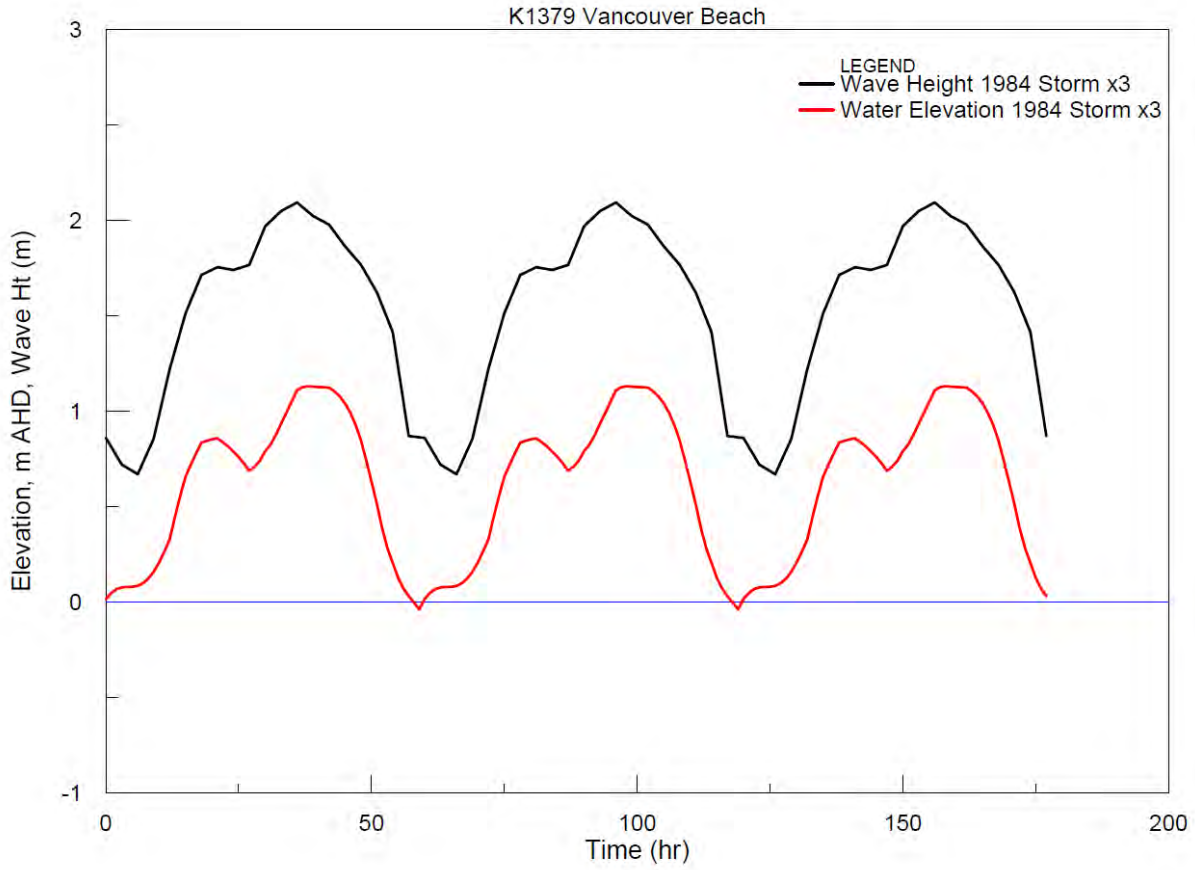


Figure 3.6 Storm Conditions for use in Storm Erosion Modelling (as determined for the area immediately offshore from the Resort site)

3.1.2 SBEACH Storm Modelling

The SBEACH computer model was developed by the Coastal Engineering Research Centre (CERC) to simulate beach profile evolution in response to storm events. It is described in detail by Larson & Kraus (1989). Since this time the model has been further developed, updated and verified based on field measurements (Wise et al 1996, Larson & Kraus 1998, Larson et al 2004).

MRA has validated SBEACH for use on sandy coasts in Western Australia (Rogers et al 2005). This validation has shown that SBEACH can provide useful and relevant predictions of the storm induced erosion, provided the inputs are correctly applied and care is taken to ensure that the model is accurately reproducing the recorded wave heights and water levels. Primary inputs include time histories of wave height, period and water elevation, as well as pre-storm beach profile and median sediment grain size.

The input beach profile used in the modelling were taken from a combination of topographic survey data, hydrographic survey information and local nautical charts. The approximate location and alignment of the profile is presented in Figure 3.7.

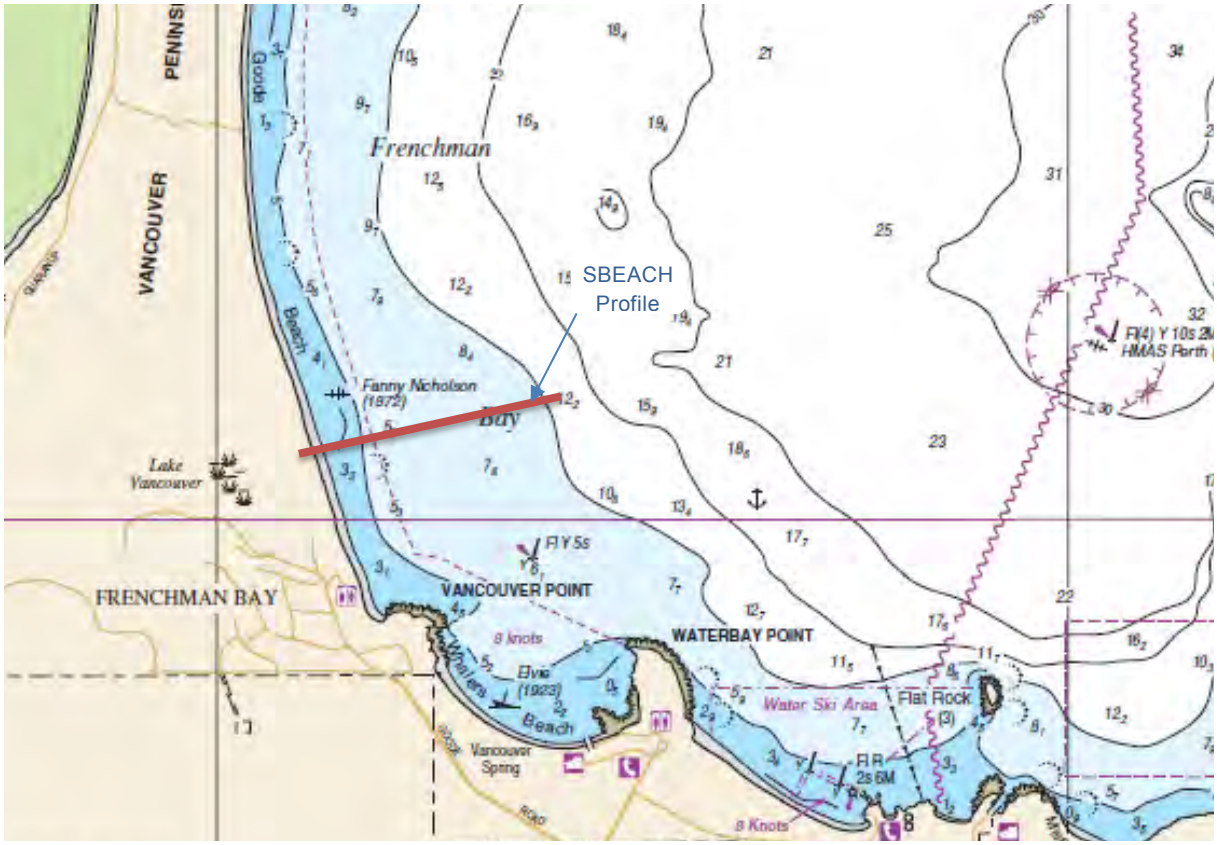


Figure 3.7 SBEACH Profile Location & Alignment

The results of the storm simulation are presented in Figure 3.8. This figure presents the pre- and post-storm beach profiles, the maximum water elevation and maximum wave height during the event. The output from the model, the SBEACH Report, has also been included in Appendix A.

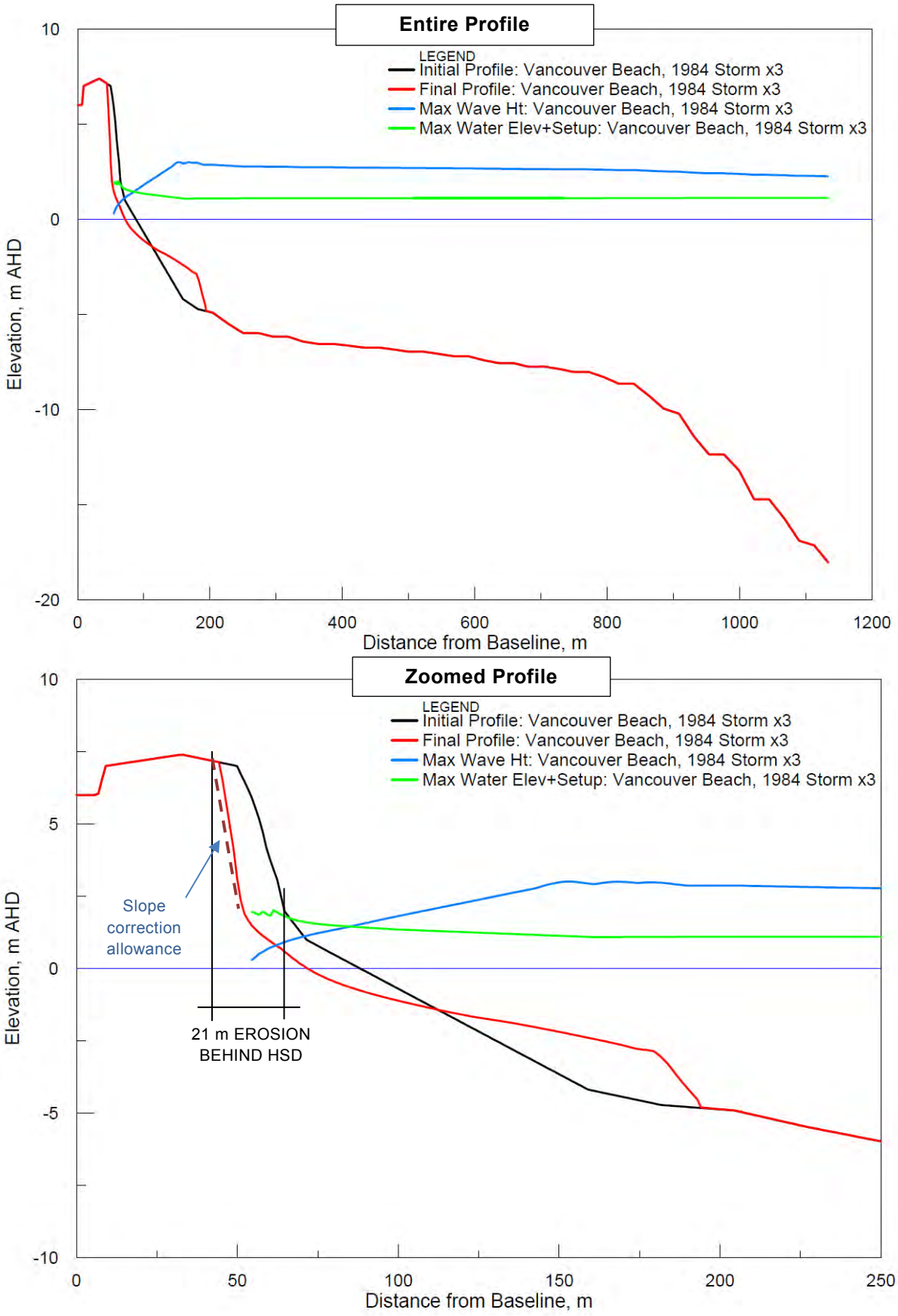


Figure 3.8 Severe Storm Erosion Modelling Results

The S1 allowance is determined as the maximum extent of erosion behind the Horizontal Shoreline Datum (HSD). The HSD corresponds to the seaward shoreline contour representing the peak steady water level of the modelled event. The HSD was calculated as the +2 mAHD contour.

The results of the modelling show that the severe storm erosion allowance for the redevelopment should be 21 m behind the HSD. This estimate includes an allowance for dune slope correction based on a maximum avalanching slope of 30° to the horizontal to ensure stability of the eroded dune face. It is noted that this correction is applied after the completion of the modelling, as changing the avalanching slope within the model itself results in erroneous results due to premature slumping of existing measured profiles.

3.1.3 Calculated S1 Allowance

The S1 allowance for each of the planning timeframes should be 21 m. Note that the same S1 allowance is required for each planning timeframe, as SPP2.6 requires a design storm with 1% AEP, regardless of the timeframe being considered.

The SPP2.6 requires consideration of longshore erosion in the severe storm event. This is typical of areas where there may be an obstacle reducing updrift longshore transport, or net gradients in longshore transport rates. As outlined in Section 2.3 this is not believed to be the case for this location. No additional allowance for a deficit in longshore transport has therefore been included.

3.2 Historical Shoreline Movement (S2 Allowance)

Historically, changes in shoreline positions occur on varying timescales from storm to post storm, seasonal and longer term (Short 1999). The severe storm erosion allowance accounts for the short term storm induced component of beach change. The long term trends allowed for in the Historical Shoreline Movement (S2) Allowance account for the movement of the shoreline that may occur within the planning timeframes. To estimate the S2 Allowance, long term historical shoreline movement trends are examined and likely future shoreline movements predicted.

3.2.1 Shoreline Movement

MRA mapped the position of the coastal vegetation line from aerial photography captured in 1961, 1993, 2001, 2007, 2011 and 2016. These early dates were the only times that historical aerial imagery was available for the site. Mapping of the coastal vegetation lines was completed in accordance with DoT's methodology and specification for mapping (DoT, 2009). The accuracy of the position of these vegetation lines is believed to be in the order of ±5 m, depending on the resolution of the aerial photographs and the rectification process. A shoreline movement plan presenting the mapped vegetation lines is presented in Appendix B.

Using the mapped vegetation lines, the position of the shoreline was determined at 100 m intervals across the Goode Beach embayment. The position of the shoreline relative to 1961 location was determined at each interval from the shoreline movement plan, with results presented in Figure 3.9.

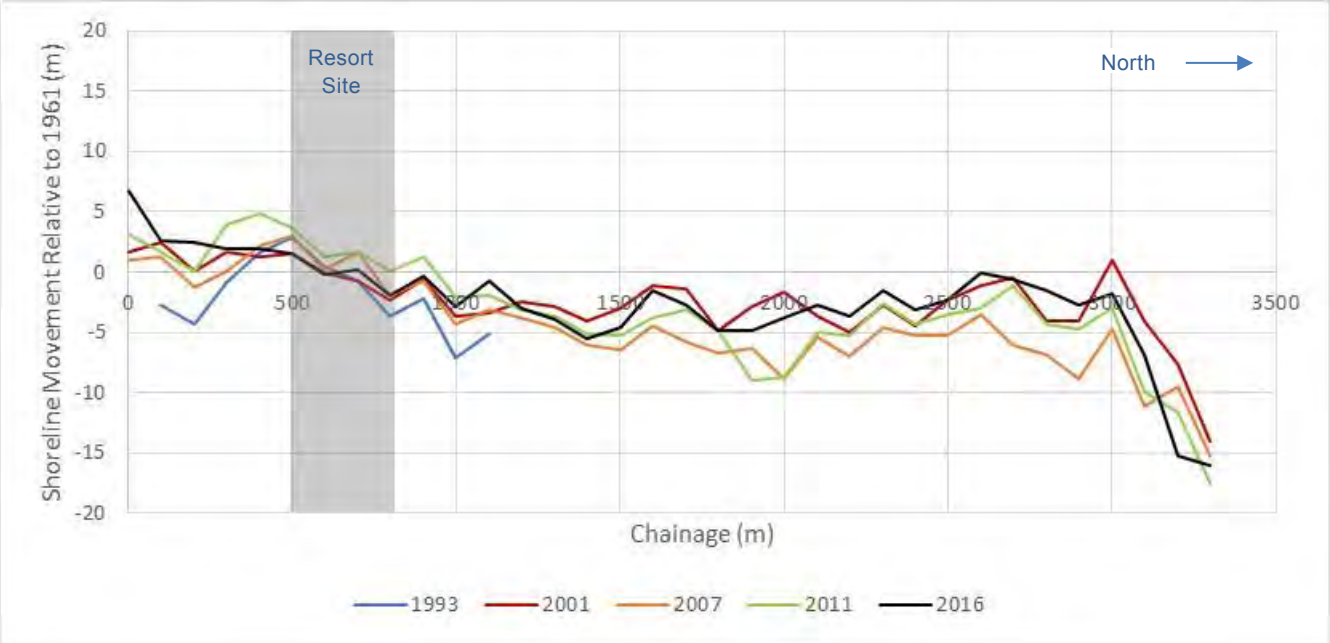


Figure 3.9 Historical Shoreline Movement Relative to 1961

The location of the Resort site is shown on the figure. Overall, the figure shows that the shoreline fronting the resort site has remained relatively stable over the past 55 years, with long term movements of less than 2 m and total fluctuations in shoreline position of less than around 4 m. The remainder of the embayment also shows very little movement of the shoreline over the period, with fluctuations generally less than 10 m. The exception to this is the very northern end of the embayment near mistaken island, where up to 15 m of erosion has occurred. This erosion is expected to have resulted from the fact that the northern portion of Goode Beach is less protected by the Flinders Peninsula and is therefore more exposed to wave action.

On the whole, the rates of shoreline movement for the entire stretch of Goode Beach show that the shoreline is quite stable, with no significant changes noted in the shoreline movement plan. This is despite the fact that the 1984 storm would have impacted the beach during the period of record. Therefore, whilst the frequency of the aerial imagery is not sufficient to determine the exact results of the 1984 storm, it can be concluded that the results were either quite small, or the shoreline rebounded from the storm impact within a reasonably short timeframe (sub-decadal). Either way, this provides confidence in the future stability of the shoreline.

Over the 55 year period approximately 2 m of shoreline erosion may have occurred at the northern end of the site. Therefore, it is reasonable to allow for such erosion to occur again in the future. An erosion rate of 2 m per 50 years will therefore be included for the S2 allowance.

The S2 Allowances for the different timeframes are presented in Table 3.1.

Table 3.1 S2 Shoreline Movement Allowances

Planning Timeframe	S2 Allowance (m)
Present Day (2016)	0
2041	1
2066	2
2091	3
2116	4

3.3 Sea Level Rise (S3 Allowance)

Climate change is believed to cause an increase in mean sea level as a result of two main processes:

- the melting of land based ice, increasing the volume and height of the ocean waters; and
- a decrease in ocean density through thermal expansion, which increases the volume and thus the ocean height (CSIRO 2007).

Observations of sea levels have been carried out for centuries, at some locations, allowing historical trends to be identified. The global mean sea level rose by between 0.12 to 0.22 m over the 20th century, which equates to an average of around 1.8 mm/yr (IPCC 2007).

Within Western Australia reliable water level data is available from Fremantle for the period from 1950. The Fremantle records indicate that between 1950 and 1991, there was a relatively slow rise in sea levels, however over the ensuing period there has been a more rapid sea level rise. Figure 3.10, shows a plot of sea level rise at Fremantle since 1950.

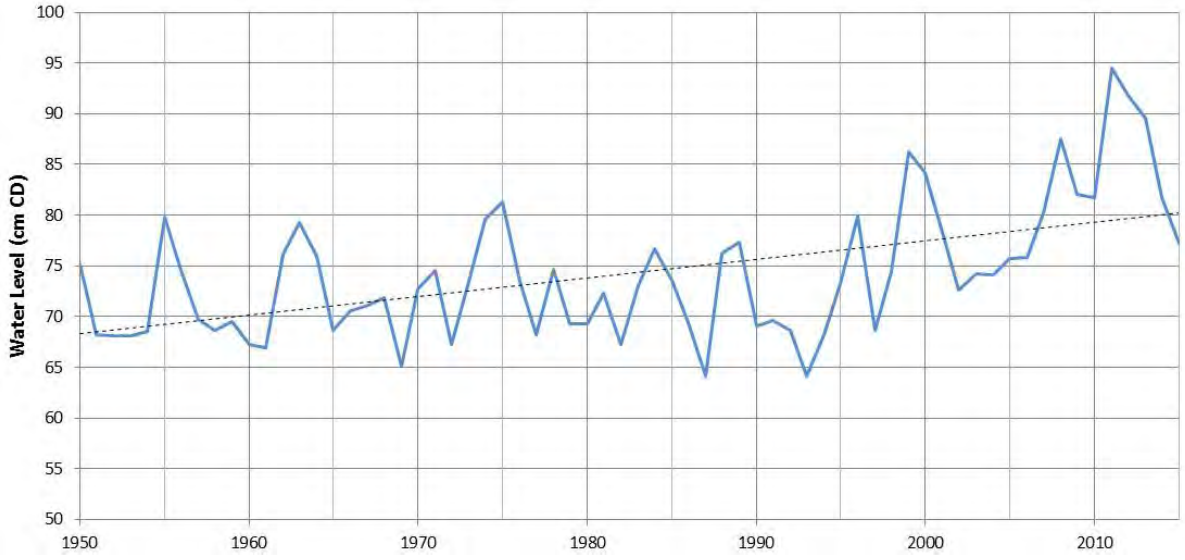


Figure 3.10 Fremantle Water Level 1950 to 2015

Through review of this and other data and research, DoT released recommendations on the appropriate allowances for future climate change and sea level rise to be used for coastal planning and development in Western Australia (DoT 2010). These recommendations were adopted by SPP2.6 and are presented in Figure 3.11.

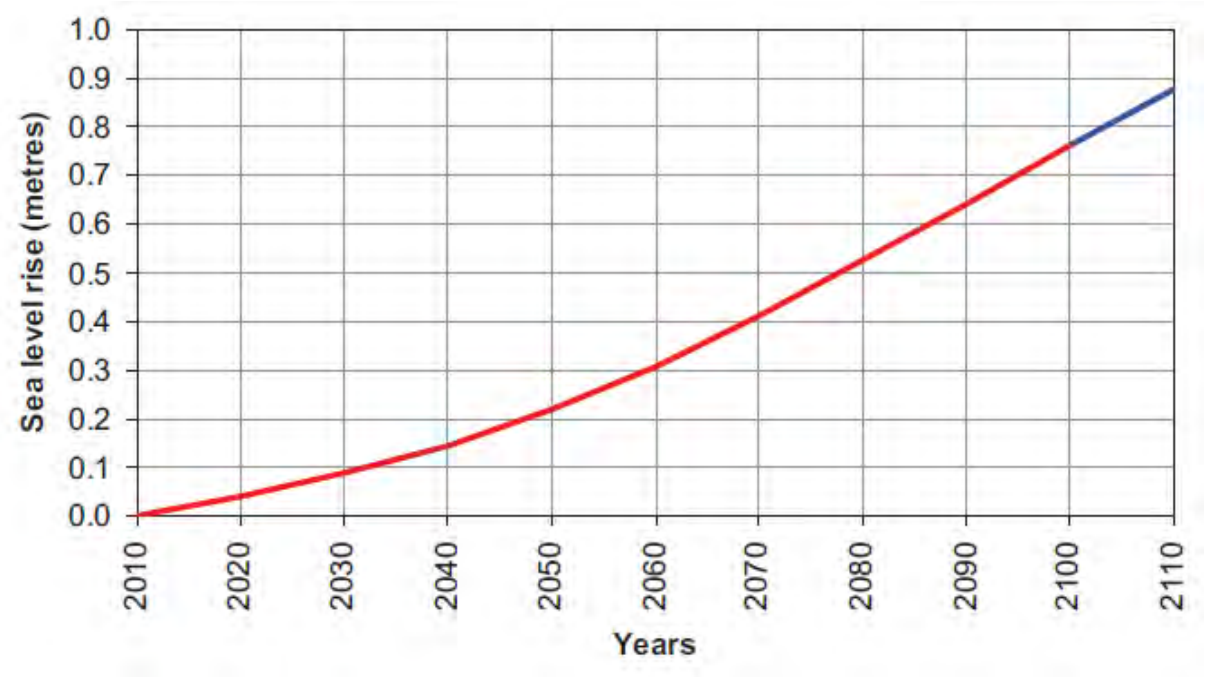


Figure 3.11 Recommended Allowance for Sea Level Rise (DoT 2010)

The recommended allowances for future sea level rise for each of the planning timeframes have been determined and are presented in Table 3.2. All of these increases in sea level are referenced to 2016.

Table 3.2 Sea Level Rise Allowances

Planning Timeframe	SLR Allowance (m)
Present Day (2016)	0.00
2041	0.13
2066	0.35
2091	0.63
2116	0.90

The effect of sea level rise on the coastline is difficult to predict. Komar (1998) provides a reasonable treatment for sandy shorelines, including examination of the Bruun Rule (Bruun 1962).

The Bruun Rule relates the recession of the shoreline to the sea level rise and slope of the nearshore sediment bed:

$$R = \frac{1}{\tan(\theta)} S$$

where: R = recession of the shore.

θ = average slope of the nearshore sediment bed.

S = sea level rise.

Komar (1998) suggests that the general range for a sandy shore is R = 50S – 100S. SPP2.6 recommends that for sandy shorelines the recession be taken as 100 times the estimated rise in sea level. Therefore, the recommended allowances for shoreline recession due to sea level rise are presented in Table 3.3.

Table 3.3 S3 Shoreline Recession Due to Sea Level Rise Allowances

Planning Timeframe	Sea Level Rise Allowance
Present day (2016)	0
2041	13
2066	35
2091	63
2116	90

It is noted that these allowances, whilst consistent with the requirements of SPP2.6, may be conservative in this location given that the water levels off the Western Australian coastline have risen by around 0.1 m since 1961 (refer Figure 3.8) however the shoreline fronting the site only eroded by around 2 m over this same period. Application of the Bruun Rule, as outlined above, would have suggested that the shoreline should have eroded by around 10 m during this time. Noting that this comparison can only be made given that the site is located within a relatively closed beach compartment and is not subject to significant longshore sediment transport, this discrepancy between the Bruun Rule prediction and the actual shoreline response highlights the potential conservatism in these future allowances as well as the apparent stability of the shoreline.

3.4 Summary of Coastal Erosion Allowances

The allowances for coastal processes determined in the previous sections are presented in Table 3.4. As required by SPP2.6, a 0.2 m/year allowance for uncertainty has been included. The total vulnerability allowances should be measured from the HSD.

Table 3.4 Summary of Allowances for Coastal Erosion Hazards

Timeframe	S1 (m)	S2 (m)	S3 (m)	Uncertainty (0.2 m/yr)	Total Allowance (m)
2016	21	0	0	0	**21**
2041	21	1	13	5	**40**
2066	21	2	35	10	**68**
2091	21	3	63	15	**102**
2116	21	4	90	20	**135**

The sum of each of the allowances outlined in the above table provides an indication of the areas that may be at risk from coastal erosion in the respective planning timeframes. These are presented on Coastal Hazard Maps included in Appendix C.

3.5 Storm Surge Inundation (S4 Allowance)

With respect to inundation, SPP2.6 requires that development consider the potential effects of an event with an AEP of 0.2% per year. This is equivalent to an inundation event with an ARI of 500 years.

Assessment of the inundation level requires consideration of peak storm surge, including wave setup. A storm surge occurs when a storm with high winds and low pressures approaches the coastline (refer Figure 3.12). The strong onshore winds and large waves push water against the coastline (wind and wave setup) and the barometric pressure difference creates a region of high water level. These factors acting in concert create the storm surge. The size of the storm surge is influenced by the following factors.

- Wind strength and direction.
- Pressure gradient.
- Seafloor bathymetry.
- Coastal topography.

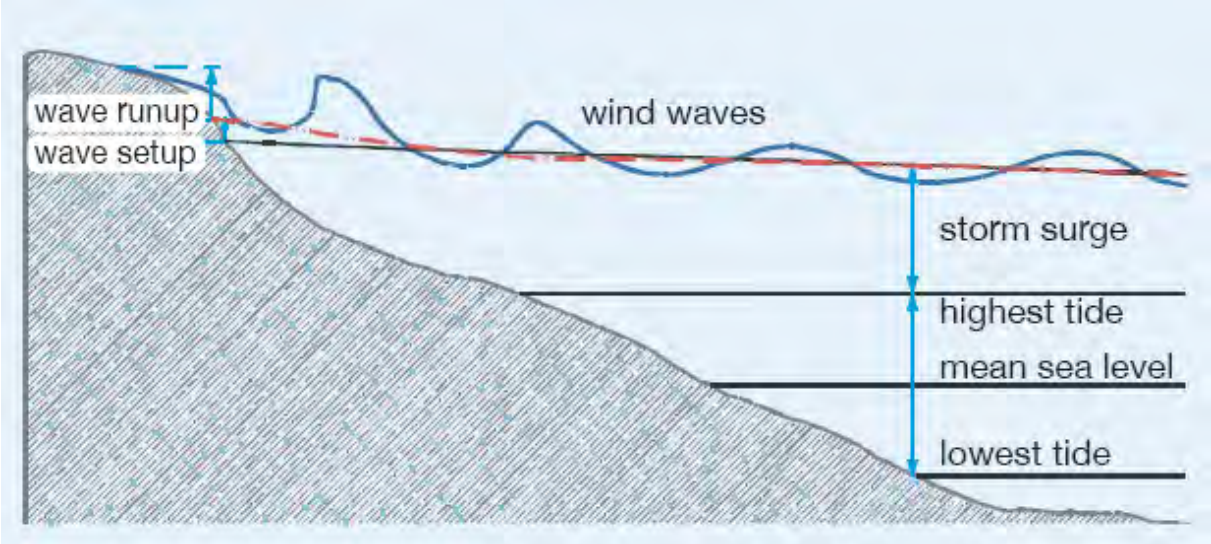


Figure 3.12 Storm Surge Components

The extreme analysis of the Albany water level record was presented in Section 3.1. This analysis showed that the estimated 500 year ARI water level at the tide gauge is approximately 1.24 mAHD.

As indicated in Figure 3.12, closer to the shore wave setup can increase the water levels. Dean and Walton (2008) provide a comprehensive review of wave setup on beaches, which confirms that the majority of setup occurs on the beach face. This is not entirely accounted for in the measurements at the Albany tide gauge and therefore needs to be determined.

The SBEACH model was setup and run for the 500 year ARI water level, to translate the water level from the nearshore area to the shoreline to estimate the additional wind and wave setup. It was estimated that an additional setup in the order of 0.8 metres could be expected at the site. This has been included in estimates of the appropriate inundation levels for the various planning timeframes, presented in Table 3.5.

Table 3.5 S4 Inundation Levels

Component	Planning Timeframe				
	2016	2041	2066	2091	2116
500 year ARI peak steady water level at tide gauge (mAHD)	1.24	1.24	1.24	1.24	1.24
Allowance for nearshore setup - wind and wave (m)	0.80	0.8	0.8	0.8	0.8
Allowance for sea level rise (m)	0.00	0.13	0.35	0.63	0.90
Total Inundation Level (mAHD)	**2.04**	**2.17**	**2.39**	**2.67**	**2.94**

These potential inundation levels should be considered in the planning for the resort site. In particular, the design should avoid the relevant inundation risk by ensuring that development is

completed on land that is above these levels. Such levels are likely to be achieved across the site either naturally, or through earthworks. It should be emphasised that the finished floor levels of the development should be above the necessary levels and should not rely on any barriers (ie dunes) for the prevention of inundation. This is significant as it is expected that the size of any dunes on site would not be sufficient to fully mitigate the inundation of adjacent low lying areas.

Further details regarding the management of inundation risk are provide in the coastal risk management and adaptation strategy.

4. Coastal Risk Management & Adaptation Strategy

SPP2.6 outlines a hierarchy of risk adaptation and mitigation options, where options that allow for a wide range of future strategies are considered more favourably. This hierarchy of options is reproduced in Figure 4.1.

Figure 4.1 Risk Management & Adaptation Hierarchy

These options are generally outlined below.

- Avoid – avoid new development within the area impacted by the coastal hazard.
- Retreat – the relocation or removal of assets within an area identified as likely to be subject to intolerable risk of damage from coastal hazards.
- Accommodation – measures which suitably address the identified risks.
- Protect – used to preserve the foreshore reserve, public access and public safety, property and infrastructure.

The assessment of options is generally done in a progressive manner, moving through the various options until an appropriate mitigation option is found.

4.1 Proposed Coastal Management Strategy

Being a tourist development that will have a finite timeframe until the facilities need to be replaced, the requirement for a coastal risk mitigation strategy for the Vancouver Beach Resort is informed by the design life of the infrastructure. The vision for the Resort is to provide luxury tourist accommodation in a similar mould to that provided at the Bunker Bay Resort in the Margaret River Region. The design of the Resort will therefore be sensitive to the natural environment with the intention of being as visually unobtrusive as possible from both the beach and surrounding land areas. To achieve this the Resort will be setback from the coastline behind the primary dune system.

Being a luxury resort and given the coastal nature of the infrastructure, it is envisaged that the design life of the structures will be limited to around 50 years. Therefore, the proposed coastal

management strategy should be focused on a 50 year planning horizon when considering the initial construction of the Resort.

For the initial construction of the Resort the intention is to **avoid** risks associated with coastal hazards. As a result the built form of the Resort will be located landward of the coastal erosion hazard line for the 50 year planning horizon. Similarly, the finished floor levels of the resort will be located at or above 2.4 mAHD to avoid risks associated with coastal inundation. This avoidance of the coastal hazard risk over the 50 year planning horizon means that there will be an almost insignificant chance of the development being impacted by erosion over this period. Further, it would be expected that, given the conservatism that is inherent in the assessment of the coastal hazard risk, development in this location would probably be unaffected by coastal hazards for a period longer than 50 years.

Given the approach outlined above, the initial concept layout plan for the resort has been prepared and is shown in Figure 4.2. This figure also shows the location of the coastal erosion hazard lines for the various planning horizons. As shown, all of the built form is located behind the 2066 erosion hazard line, therefore avoiding the risk of coastal erosion hazards over the design life of the structures. Nevertheless, whilst the proposed management strategy avoids the risk for the coming 50 years, SPP2.6 requires the development of an adaptation strategy that extends to a 100 year planning horizon. In this regard, further management actions are required.

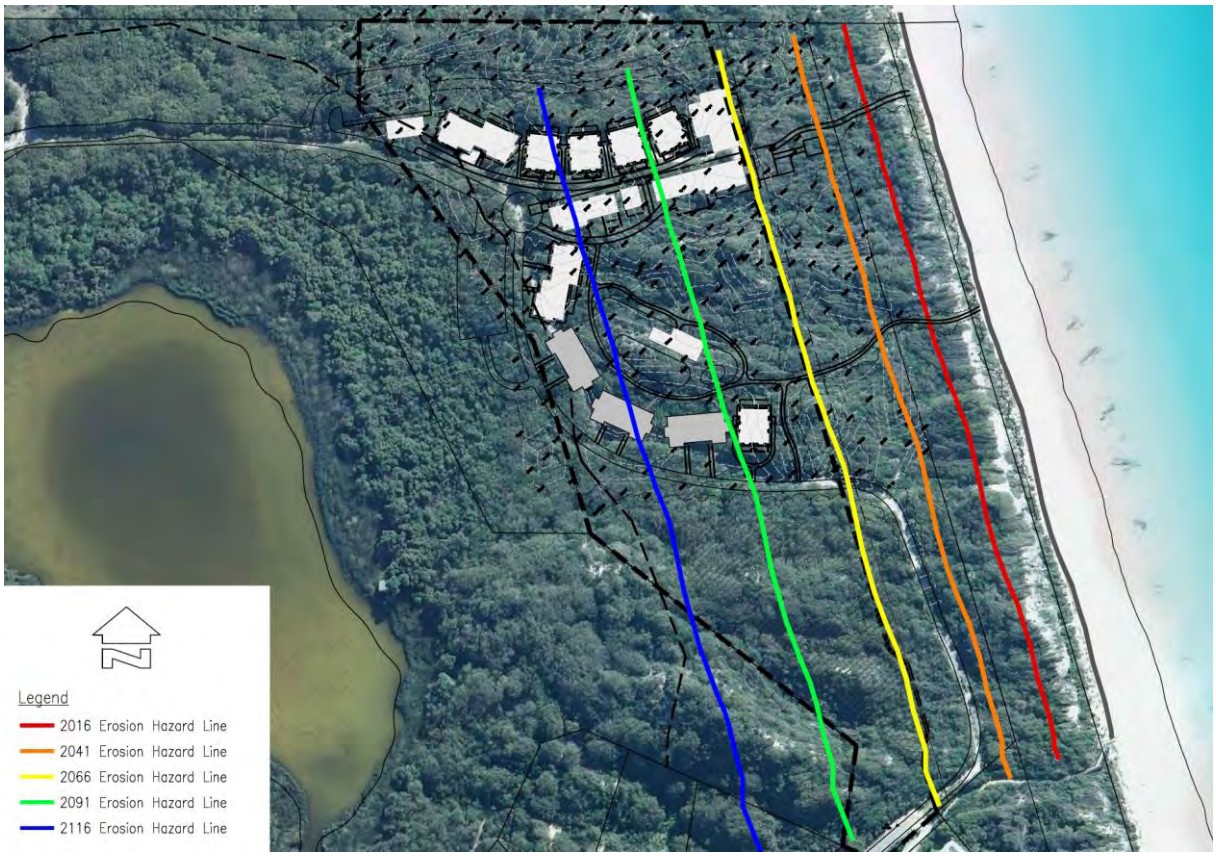


Figure 4.2 Initial Resort Concept Layout & Erosion Hazard Lines

Beyond the initial 50 year planning horizon it is likely that the built form will need to be replaced. This replacement of the built form will provide an opportunity for a **managed retreat** of the infrastructure. Under this scenario the replacement infrastructure should be relocated to an area that is deemed to be safe for the ensuing planning horizon based on the results of a coastal

hazard assessment completed at that time. The design of the new layout for the resort will therefore need to respond to the results of that coastal hazard assessment.

Similarly, as the behaviour of any coastline can be complex and subject to change, ongoing monitoring of the coastline should be completed in perpetuity. Details of the proposed monitoring are provided in Table 4.1.

Table 4.1 Proposed Coastal Monitoring

Type of Monitoring	Description	Requirement / Frequency
Visual Inspections	Visual inspection and monitoring of the beach to identity any significant changes in the shoreline. Changes would be evident through the erosion of the foredunes and presence of an erosion scarp with or without the loss of vegetation.	Ongoing as part of the operation of the Resort. The character of the beach will be constantly monitored as part of the operation of the resort.
Shoreline Mapping	Ortho-rectified aerial photographs will be purchased and the coastal vegetation line mapped to track the movement of the shoreline. This method will help to ascertain if there is any creep in shoreline position that is not being picked up through the visual inspections.	Every 5 years or when the visual inspections suggest a significant change in the beach.
Survey Cross Sections	Survey of the beach and dunes along four profiles fronting the resort site. The profiles would seek to capture the primary dune out to a water depth of approximately 5 m. These surveys would help to determine the extent of the change in the shoreline profile that is occurring.	This level of survey would only be required if the eroded shoreline came within a distance of approximately 36 m of the resort site (the S1 allowance plus 15m). If this were to occur then the survey cross sections should be completed every 1 to 2 years depending on the recommendations of a coastal engineer at that time.

This monitoring should be used to identify if the shoreline erodes to the extent that a trigger position is reached where the risk of coastal hazards becomes too great. If this were to occur, then the at risk infrastructure should be removed and relocated to an area that is considered safe based on the results of a coastal hazard assessment at that time. For this shoreline the trigger value should be the S1 allowance plus 5 m as a factor of safety. Therefore, if the shoreline (denoted by the coastal vegetation line or toe of an erosion scarp where present) recedes to the point that it comes within 26 m of the resort development, then the managed retreat of the infrastructure that is at risk should commence.

It is noted that all of the requirements outlined above are the full responsibility of the landowner, with the landowner ultimately responsible for all costs and any other requirements to enable the coastal adaptation strategy to be completed. Whilst this is acknowledged and accepted by the current land owner, it is important that this requirement is conveyed to any prospective future landowners. As a result it is recommended that a notification be placed on the title of Lot 660

advising that the subject land is at risk from coastal hazards and is subject to management in accordance with this coastal management strategy.

For clarity, a summary of the proposed coastal management strategy has been prepared and is presented in Figure 4.3.

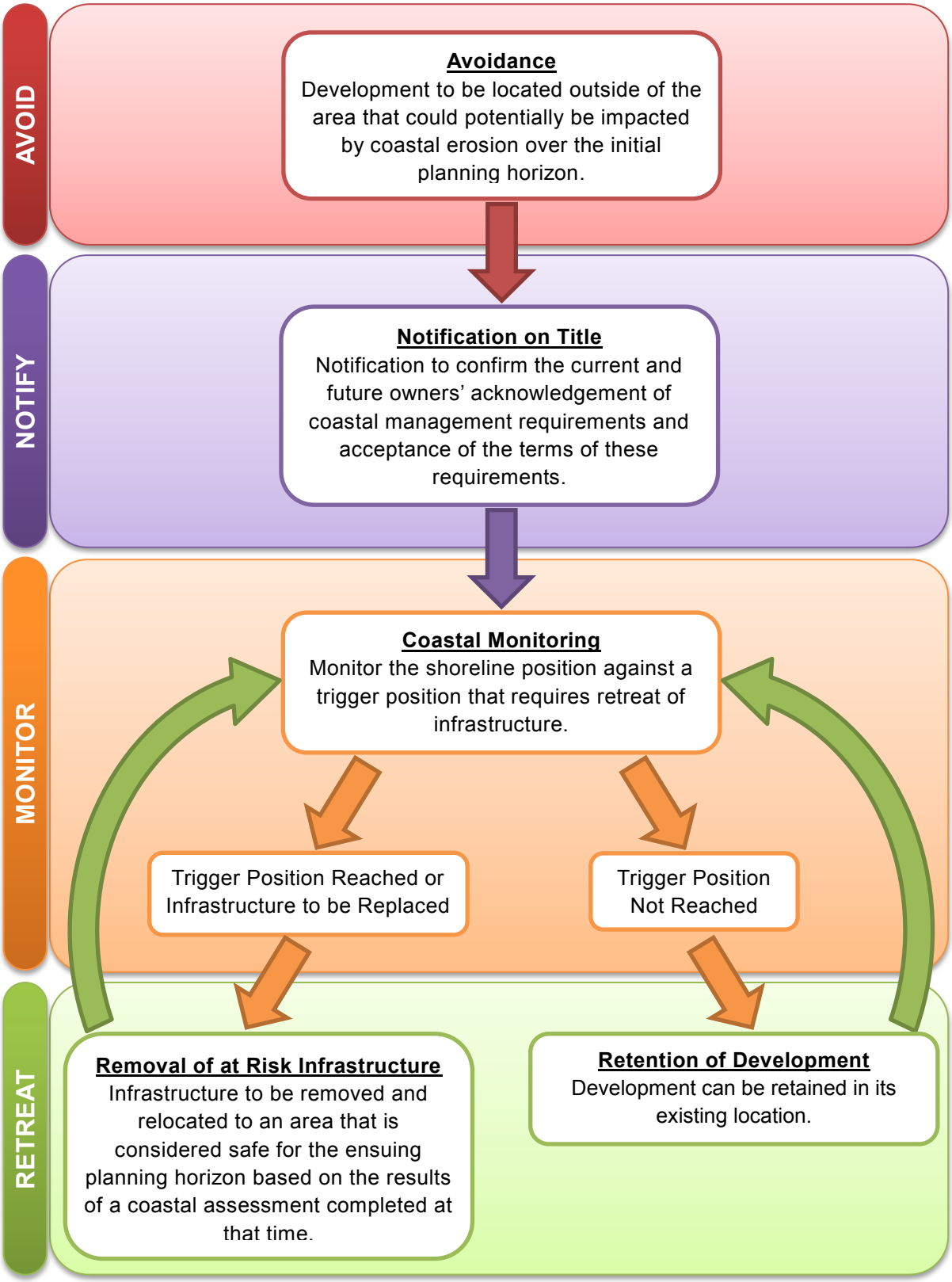


Figure 4.3 Summary of Coastal Management Strategy

5. Conclusions

Lot 660 La Perouse Court has long been earmarked for the development of a tourist resort site. The current owner of Lot 660, Dr Cherry Martin, proposes to develop the Vancouver Beach Resort on the site. The vision for the Resort is to provide luxury accommodation that is sensitive to the natural environment and local aesthetics.

An assessment of the potential future areas of impact caused by the action of coastal hazards was completed in accordance with the requirements of SPP2.6. The results of this assessment show that the shoreline fronting the site could be vulnerable to change caused by a combination of severe storm erosion and sea level rise. In this regard, it is prudent to consider the potential future shoreline changes and the possible impacts on the resort site in the context of future coastal adaptation and management requirements. It is noted however that an assessment of the historical movement of the shoreline fronting the site shows that the beach has experienced very little gross movement over the last half a century. In fact, the shoreline fronting the site has eroded by less than 2 m over the past 50 years, even despite there being around 0.1 m of sea level rise over this period. This demonstrates the apparent stability of the shoreline and highlights that the results of the coastal hazard assessment are likely to be conservative for this location.

A coastal management and adaptation strategy was presented within this report that outlines the proposed future management strategy. This strategy is based on an avoidance of risk over the design life of the built form structures, followed by a managed retreat of the structures should the shoreline erode, or at such time as the structures need to be replaced. The requirements of this coastal management and adaptation strategy are understood and accepted by the land owner. Furthermore, for the avoidance of doubt, it is noted that all costs associated with the requirements of this strategy will be borne by the landowner. To make any future prospective owners of this site aware of this requirement, it is suggested that a notification also be included on the title for the Lot.

Given the proposed management strategy, the Vancouver Beach Resort should appropriately respond to risks posed by coastal hazards in the short, medium and long term.

6. References

Australian Commonwealth Scientific and Research Organization (CSIRO). 2007, *Climate Change in Australia – Technical Report 2007*, Canberra, Australia.

Bruun, P. 1962, *Sea level rise as a cause of shore erosion*, Journal Waterways and Harbours Division, American Society of Civil Engineers. WWI, 88, pp. 117-130.

Dean, R G & Walton T L, 2008. *Wave Setup – a State of Art Review.* Beaches and Shores Research Centre, Institute of Science and Public Affairs, Florida State University.

Department of Transport 2009. *Coastal Demarcation Lines for Administrative & Engineering Purposes – Delineation Methodology & Specification.* Published by the Government of Western Australia, Perth.

Department of Transport, 2010. *Sea Level Change in Western Australia – Application to Coastal Planning*. Government of Western Australia.

Environmental Protection Authority, 1990. *Albany Harbours Environmental Study 1988 -1989, Bulletin 412,* prepared by the EPA, Perth, Western Australia.

Goda Y., 2010. *Random Seas and Design of Maritime Structures*. Word Scientific, Singapore.

IPCC. 2007, *Fourth Assessment Report - Climate Change 2007*. Published by the IPCC.

Komar, P D 1998. *Beach Processes and Sedimentation (2nd Edition).* Prentice Hall Inc, New Jersey, USA.

Larson, M. & Kraus, N. C. 1989. *SBEACH: Numerical Model for Simulating Storm-Induced Beach Change; Report 1 Empirical foundation and model development.* Technical Report CERC -89-9. Coastal Engineering Research Centre, Vicksburg, MS, USA.

Larson, M & Kraus, N C 1998. SBEACH: Numerical Model for Simulating Storm-Induced Brach Change. Report 5: Representation of Nonerodible (Hard) Bottoms. Technical Report CERC-89-9, Coastal Engineering Research Centre, Vicksburg, MS.

Larson M, Wise R A & Kraus N C 2004. *Coastal overwash, Part 2: Upgrade to SBEACH.* ERDC/CHL CHETN IV-XX. US Army Engineer Research and Development Centre, Vicksburg, MS.

NOAA, 2016. *Wavewatch III version 2.22 Hindcast Reanalysis*. Available from ftp://polar.ncep.noaa.gov/pub/history/waves

Rogers, M. P., Saunders, B. S. & Hunt, T. S. 2005. *Living on the Coast – But How Close is Safe?* Proceedings of the Coasts and Ports 2005 Conference, Adelaide, Australia.

Short, A. 2006, *Beaches of the Western Australian Coast: Eucla to Roebuck Bay. A guide to their nature, characteristics, surf and safety*, Sydney University Press.

WAPC 2013. *State Planning Policy No. 2.6 - State Coastal Planning Policy*. Western Australian Planning Commission, Perth.

WAPC 2014. *Coastal hazard risk management and adaptation planning guidelines*. Western Australian Planning Commission, Perth.

Wise, R. A., Smith, S. J. & Larson, M. 1996. *SBEACH: Numerical Model for Simulating Storm-Induced Beach Change; Report 4, Cross shore transport under random waves and model validation with SUPERTANK and field data*. Technical Report CERC-89-9 rept. 4. Coastal Engineering Research Centre, Vicksburg, MS.

WNI Science and Engineering, 1996. *1984 Waves off Albany.* Report DSD:RMR:1927:96188 prepared for M P Rogers & Associates Pty Ltd.

7. Appendices

Appendix A **SBEACH Report**

Appendix B **Shoreline Movement Plan**

Appendix C **Coastal Erosion Hazard Lines**

Appendix A SBEACH Report

K1379 Vancouver Beach

Reach: Vancouver Beach Storm: 1984 Storm x3

Report
Project: K1379 Vancouver Beach
Reach: Vancouver Beach
Storm: 1984 Storm x3
MODEL CONFIGURATION

INPUT UNITS (SI=1, AMERICAN CUST.=2): 1
NUMBER OF CALCULATION CELLS: 1000
GRID TYPE (CONSTANT=0, VARIABLE=1): 0
CONSTANT CELL WIDTH: 1.1
NUMBER OF TIME STEPS AND VALUE OF TIME STEP IN MINUTES: 2124, 5.0
TIME STEP(S) OF INTERMEDIATE OUTPUT 1: 200
TIME STEP(S) OF INTERMEDIATE OUTPUT 2: 400
NO COMPARSION WITH MEASURED PROFILE.
PROFILE ELEVATION CONTOUR 1: 5.00
PROFILE ELEVATION CONTOUR 2: 0.00
PROFILE ELEVATION CONTOUR 3: -5.00
PROFILE EROSION DEPTH 1: 0.50
PROFILE EROSION DEPTH 2: 1.00
PROFILE EROSION DEPTH 3: 1.50
REFERENCE ELEVATION: 0.00
TRANSPORT RATE COEFFICIENT (m^4/N): 1.75E-6
COEFFICIENT FOR SLOPE DEPENDENT TERM (m^2/s): 0.0020
TRANSPORT RATE DECAY COEFFICIENT MULTIPLIER: 0.50
WATER TEMPERATURE IN DEGREES C : 16.0

WAVE TYPE (MONOCHROMATIC=1, IRREGULAR=2): 2
WAVE HEIGHT AND PERIOD INPUT (CONSTANT=0, VARIABLE=1): 1
TIME STEP OF VARIABLE WAVE HEIGHT AND PERIOD INPUT IN MINUTES: 180.0
WAVE ANGLE INPUT (CONSTANT=0, VARIABLE=1): 0
CONSTANT WAVE ANGLE: 0.0
WATER DEPTH OF INPUT WAVES (DEEP WATER = 0.0): 10.0
SEED VALUE FOR WAVE HEIGHT RANDOMIZER AND % VARIABILITY: 4567, 20.0
TOTAL WATER ELEVATION INPUT (CONSTANT=0, VARIABLE=1): 1
TIME STEP OF VARIABLE TOTAL WATER ELEVATION INPUT IN MINUTES: 60.0
WIND SPEED AND ANGLE INPUT (CONSTANT=0, VARIABLE=1): 1
TIME STEP OF VARIABLE WIND SPEED AND ANGLE INPUT IN MINUTES: 180.0

TYPE OF INPUT PROFILE (ARBITRARY=1, SCHEMATIZED=2): 1
DEPTH CORRESPONDING TO LANDWARD END OF SURF ZONE: 0.30
EFFECTIVE GRAIN SIZE DIAMETER IN MILLIMETERS: 0.30
MAXIMUM PROFILE SLOPE PRIOR TO AVALANCHING IN DEGREES: 45.0

NO BEACH FILL IS PRESENT.

NO SEAWALL IS PRESENT.

NO HARD BOTTOM IS PRESENT.

COMPUTED RESULTS

DIFFERENCE IN TOTAL VOLUME BETWEEN FINAL AND INITIAL PROFILES:
0.0 m^3/m

MAXIMUM VALUE OF WATER ELEVATION + SETUP FOR SIMULATION
2.01 m

K1379 Vancouver Beach

Reach: Vancouver Beach Storm: 1984 Storm x3

TIME STEP AND POSITION ON PROFILE AT WHICH MAXIMUM VALUE
OF WATER ELEVATION + SETUP OCCURRED
462, 61.3 m
MAXIMUM ESTIMATED RUNUP ELEVATION: 5.50 m
(REFERENCED TO VERTICAL DATUM)

POSITION OF LANDWARD MOST OCCURRENCE OF A 0.50 m EROSION DEPTH:
45.4 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A 0.50 m EROSION DEPTH:
42.8 m

POSITION OF LANDWARD MOST OCCURRENCE OF A 1.00 m EROSION DEPTH:
46.5 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A 1.00 m EROSION DEPTH:
41.6 m

POSITION OF LANDWARD MOST OCCURRENCE OF A 1.50 m EROSION DEPTH:
47.7 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A 1.50 m EROSION DEPTH:
40.5 m

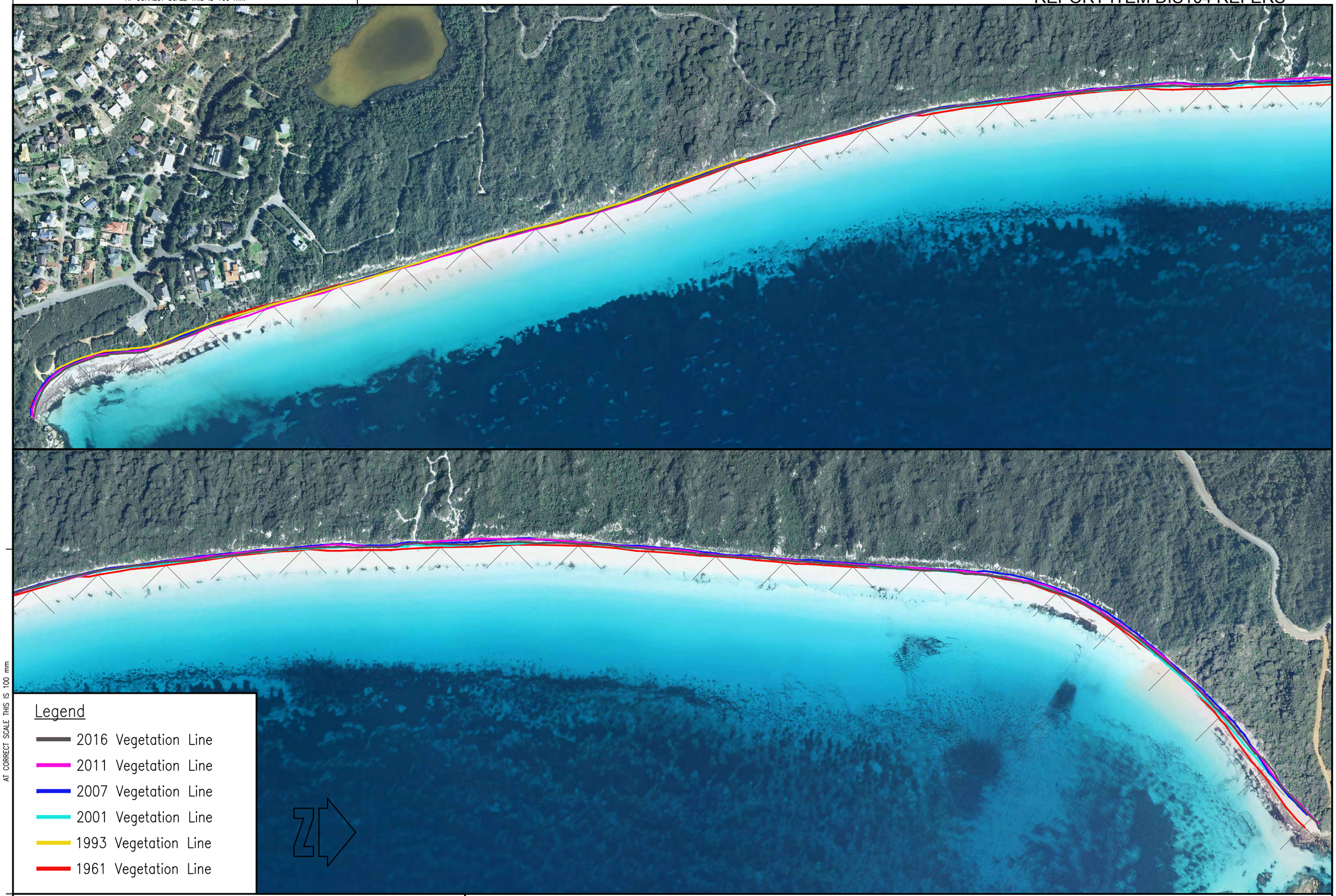
MAXIMUM RECESSION OF THE 5.00 m ELEVATION CONTOUR:
9.63 m

MAXIMUM RECESSION OF THE 0.00 m ELEVATION CONTOUR:
16.38 m

MAXIMUM RECESSION OF THE -5.00 m ELEVATION CONTOUR:
0.00 m

Appendix B Shoreline Movement Plan

AT CORRECT SCALE THIS IS 100 mm



AT CORRECT SCALE THIS IS 100 mm

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Shoreline Movement Plan

Vancouver Beach Resort

SCALE AT A3 1:5,000

November 2016

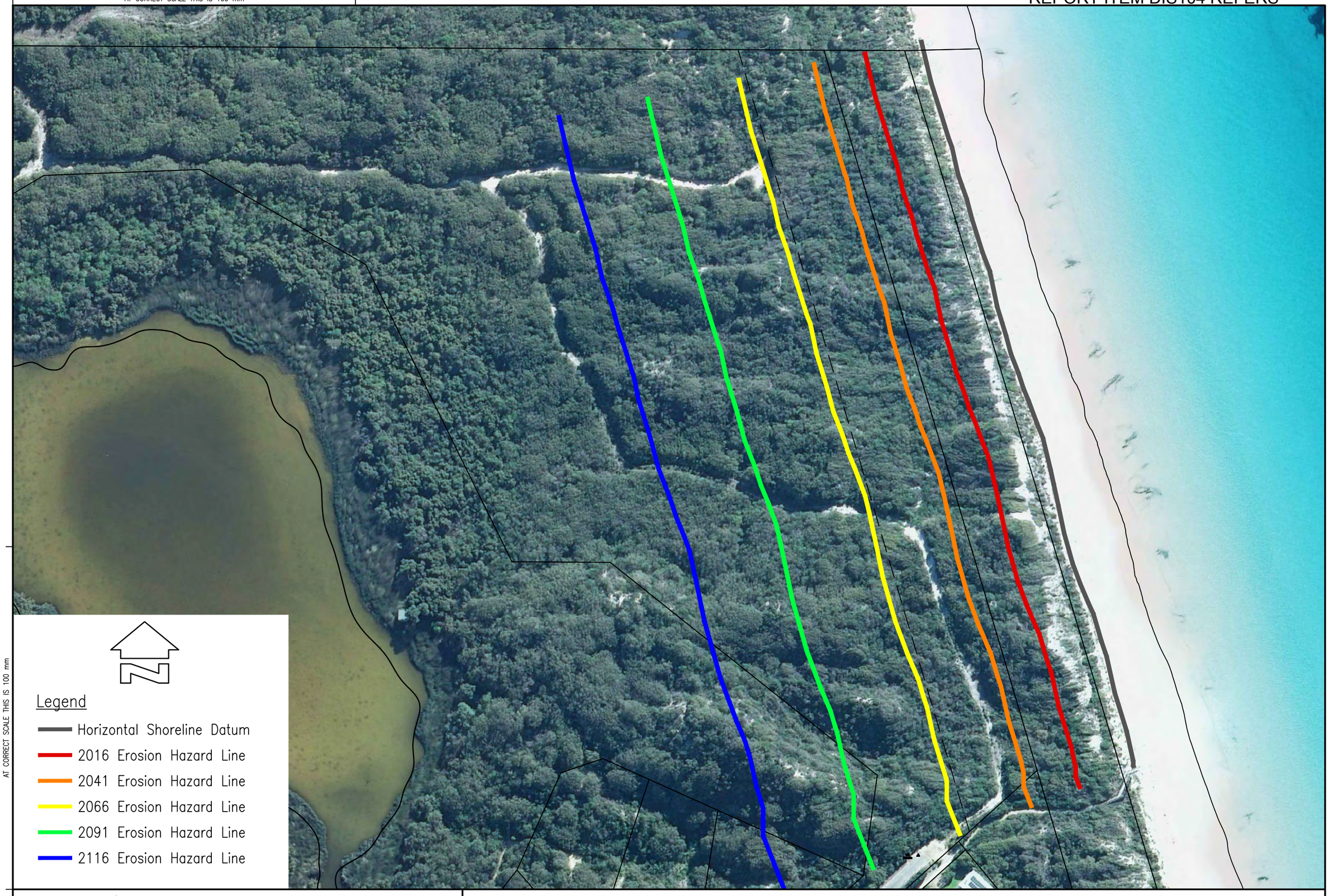
SK1379-20161101-01A

P:\MRA Paying Jobs\K1379 Vancouver Beach CHRMAP\5 MRA Dwgs\K1379 Shoreline Movement

Appendix C Coastal Erosion Hazard Lines

AT CORRECT SCALE THIS IS 100 mm

REPORT ITEM DIS104 REFERS



AT CORRECT SCALE THIS IS 100 mm

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Vancouver Beach Resort

Coastal Erosion Hazard Assessment

May 2017

SCALE AT A3 1:1,250

SK1379-161102-01C

P:\MRA Paying Jobs\K1379 Vancouver Beach CHRMAP\5 MRA Dwgs\SK1379-161102-01A

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APPENDIX 5

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LOT 660 (40) LA PEROUSE COURT, GOODE BEACH
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Prepared For:	Cherry Martin
	PO Box 7173 SHENTON PARK WA 6008
Report Number:	AA2016/18
Report Version:	V2
Report Date:	2 June 2017

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Report No: AA2016/18

Author:	Melanie Price Associate Environmental Scientist		2 June 2017
		Signature	Date
Reviewed by:	Paul Zuvela Manager - Environmental Impact Assessment		2 June 2017
		Signature	Date

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LIST OF ABBREVIATIONS

AEP	Annual exceedance probability
AHD	Australian Height Datum
ARVS	Albany Regional Vegetation Survey
ATU	Alternative/ Aerobic Treatment Unit
ASS	Acid Sulfate Soil
BAL	Bushfire Attack Level
BGL	Below ground level
BOD	Biological Oxygen Demand
BOM	Bureau of Meteorology
CALM	Department of Conservation and Land Management (now DPAW)
CER	Consultative Environmental Review
DEE	Department of Environment and Energy
DER	Department of Environment Regulation
DoH	Department of Health
DoW	Department of Water
DPAW	Department of Parks and Wildlife
EPA	Environmental Protection Authority
ESA	Environmentally sensitive area
FMP	Foreshore Management Plan
ha	Hectare
kg	Kilogram
km	Kilometre
m	Metre
mS/cm	Millisiemen per centimetre
L	Litre
PBI	Phosphorus Buffering Index
PDWSA	Public Drinking Water Source Area
SPP	State Planning Policy
TDS	Total dissolved solids
UCL	Unallocated Crown Land
WAPC	Western Australian Planning Commission
WA Herb	Western Australian Herbarium
WQPN	Water Quality Protection Note

EXECUTIVE SUMMARY

This assessment provides a summary of environmental factors considered in the development of a structure plan for Vancouver Beach Resort at Lot 660 (No. 40) La Perouse Court at Goode Beach in the City of Albany (Figures 1 and 2).

Environmental management assessment and related recommendations for the site include:

- Prevention of impacts on Lake Vancouver through management of drainage and secondary treatment of waste water produced on site.
- Establishment of coastal setback in line with State Planning Policy 2.6 State Coastal Planning to ensure that erosion risk for the development is minimised based on the design life of the structures (50 years), with appropriate notifications on the title.
- Flora, fauna and ecological community management through understanding of biota present, minimisation of clearing and associated site management.
- Effluent disposal on-site: Secondary treatment and nutrient removal systems to be installed with appropriate irrigation areas.
- Landscape protection and visual amenity: through use of appropriate design and material selection to minimise visual impacts.
- Groundwater management: Consideration and management of hydraulic loading and reduction of nutrient inputs.
- Stormwater: Management of water generated for design events. No direct discharge into Lake Vancouver.
- Overall water use management including capture of rainwater and reuse of treated waste water and installation of water efficient equipment.
- Fire risk management: Appropriate setbacks, building design, procedures and access to minimise risk.

1 INTRODUCTION

1.1 SUBJECT LAND AND PROPOSAL

Ms Cherry Martin (the landowner) commissioned Aurora Environmental to undertake an environmental assessment and provide advice relating to the establishment of holiday accommodation (Vancouver Beach Resort) on Lot 660 (No. 40) La Perouse Court at Goode Beach in the City of Albany (Figures 1 and 2).

The property is 8km southeast (20km by road) of the Albany central business district, on the south eastern side of Princess Royal Harbour and at the base of Vancouver Peninsula. The Lot has a 275m frontage to Frenchman Bay and Goode Beach. The subject land is separated from the beach by Reserve No. 28111 which is approximately 30m wide.

The subject land comprises 7.7107ha and is zoned in the City of Albany Local Planning Scheme No. 1 as 'Special Use Zone 1' for Holiday Accommodation (Figure 3) with associated provisions (Appendix 1). The landowner is proposing to develop low key tourist accommodation and associated facilities (restaurant and conference venue) on Lot 660. Business planning for the site indicated that the project requires approximately 60 rooms/ units to be viable. The total area proposed to be cleared for the development is 2.1 ha.

The City and Department of Planning has requested that the proposed development of the site be guided by an endorsed Structure Plan which will consider:

- The proximity of the coast and related issues;
- Clustering of development;
- The best location for access and egress to minimise environmental impacts on Lake Vancouver and its catchment;
- Minimising the clearing of native vegetation and the preferential use of degraded areas on the subject land;
- Siting buildings to take into account coastal processes and landform;
- Establishing coastal setbacks and prepare a Foreshore Management Plan (FMP);
- The use of on-site effluent disposal, drainage management and reducing impacts on Lake Vancouver;
- The provision of a potable water supply;
- Fire management planning; and
- Additional measures to reduce the impacts related to development.

In addition to the preparation of a structure plan, an amendment to the City of Albany Local Planning Scheme No. 1 is required.

1.2 PURPOSE AND SCOPE

The purpose of this document is to provide information to guide the preparation of a Structure Plan and to provide recommendations in relation to the management of potential environmental impacts associated with the development of the holiday accommodation on the subject land. Information has been collected for the site from investigations completed for previous development proposals, and where appropriate this information, has been updated and set in the context of current legislation, policies and guidelines.

The assessment has included review of existing documentation and databases, site inspections, targeted surveys and liaison with local and State government agencies. Agencies consulted include:

- City of Albany;
- Department of Planning; and
- Department of Parks and Wildlife.

Issues addressed in this document include:

- Impacts on Lake Vancouver;
- Coastal stability and coastal protection;
- Flora, fauna and ecological community management;
- Effluent disposal;
- Vegetation retention;
- Landscape protection and visual amenity;
- Groundwater management; and
- Fire risk management.

1.3 BACKGROUND

Lot 660 was historically part of Lot 401 La Perouse Court, which has been the subject of a range of development proposals, including a resort and rural residential subdivision. The subject land has been the subject of a formal assessment (Consultative Environmental Review; CER) in 1992 by the Western Australian Environmental Protection Authority (EPA) under the *Environmental Protection Act 1986*. The proposal being assessed at the time (EPA, 1993; Assessment No. 720) was for the rezoning and subsequent subdivision of Lot 401 (5.7ha) for 16 residential lots with the balance of the area reserved for conservation purposes. The EPA assessed the proposal and released Bulletin 672 (EPA, 1993) with recommendations. The proposal was conditionally approved by the Minister for the Environment on 10 August 1993 (Ministerial Statement 319).

The development did not proceed as initially approved, but 9 lots were created in the south eastern corner of the subject land and Reserve 48916 (6.3711ha) was established to protect Lake Vancouver and its surrounds. A 30m foreshore reserve was also created (Reserve 28111) to supplement the existing 20 m wide UCL (unallocated crown land).

2 EXISTING ENVIRONMENT

2.1 ADJACENT LAND USES

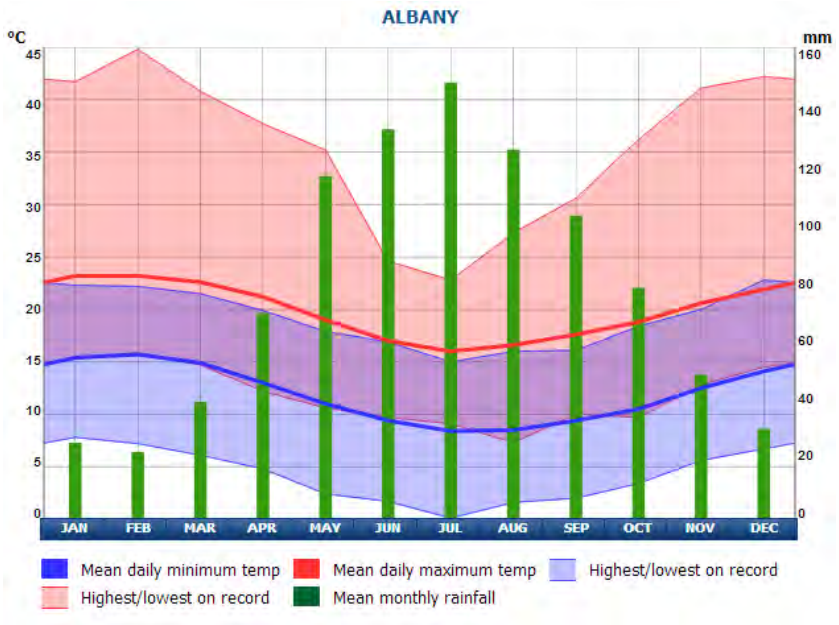
The subject land (Figure 2) is bounded to the north by Reserve 25295 which is managed by the City of Albany for the purpose of Recreation and comprises 338.18ha of native vegetation with strategic fire breaks and access to coastal areas. Lot 660 wraps around Reserve 49672 (5.6860ha) which contains Lake Vancouver, comprises native vegetation and is vested in the City of Albany for the purpose of Public Recreation. To the south west and south is privately owned, vegetated rural residential land with lot sizes ranging from 2,000m^2 to approximately 5,000m^2. Goode Beach also contains residential development to the boundary of Torndirrup National Park to the south. To the east the subject land is bounded by a vegetated foreshore reserve (30m wide, Reserve 28111) which is vested in the City of Albany and a 20m wide strip of UCL (to the high water mark). Lake Vancouver is incorporated into a reserve adjacent to the subject land and comprises a lens of fresh groundwater which is expressed at ground surface.

Due to the proximity of native vegetation and the presence of Lake Vancouver, careful planning will be undertaken to minimise impacts related to the development, including visual, ground and surface water management and fire risk management.

2.2 CLIMATE

Albany has a Mediterranean climate characterised by generally warm summers and cool, wet winters. The average annual temperature and rainfall information for the Albany airport (approximately 21km north of the site) is presented in Plate A. Areas closer to the coast, such as Goode Beach are likely to experience lower maximum and higher minimum temperatures due to proximity to the ocean and ocean breezes.

PLATE A: CLIMATE AVERAGES, ALBANY



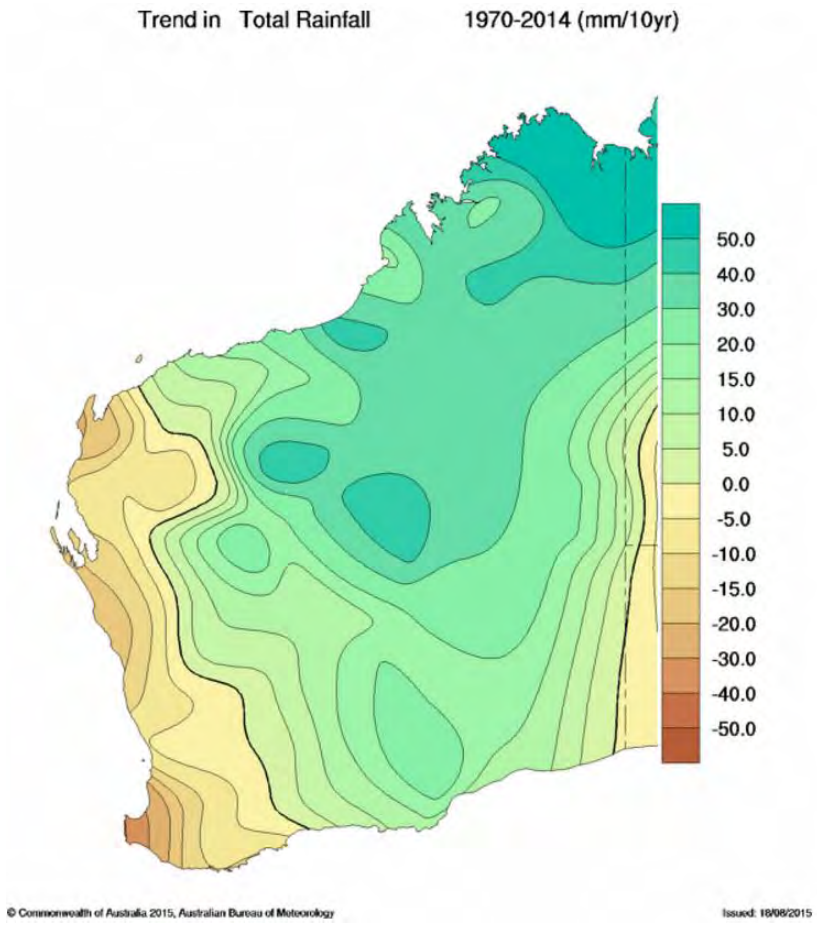
Source: WeatherZone, 2014; http://www.weatherzone.com.au/climate/station.jsp?lt=site&lc=9500

Albany has a significant number of cool cloudy days with drizzle or showers. As summarised by the Bureau of Meteorology, (BOM, 2011):

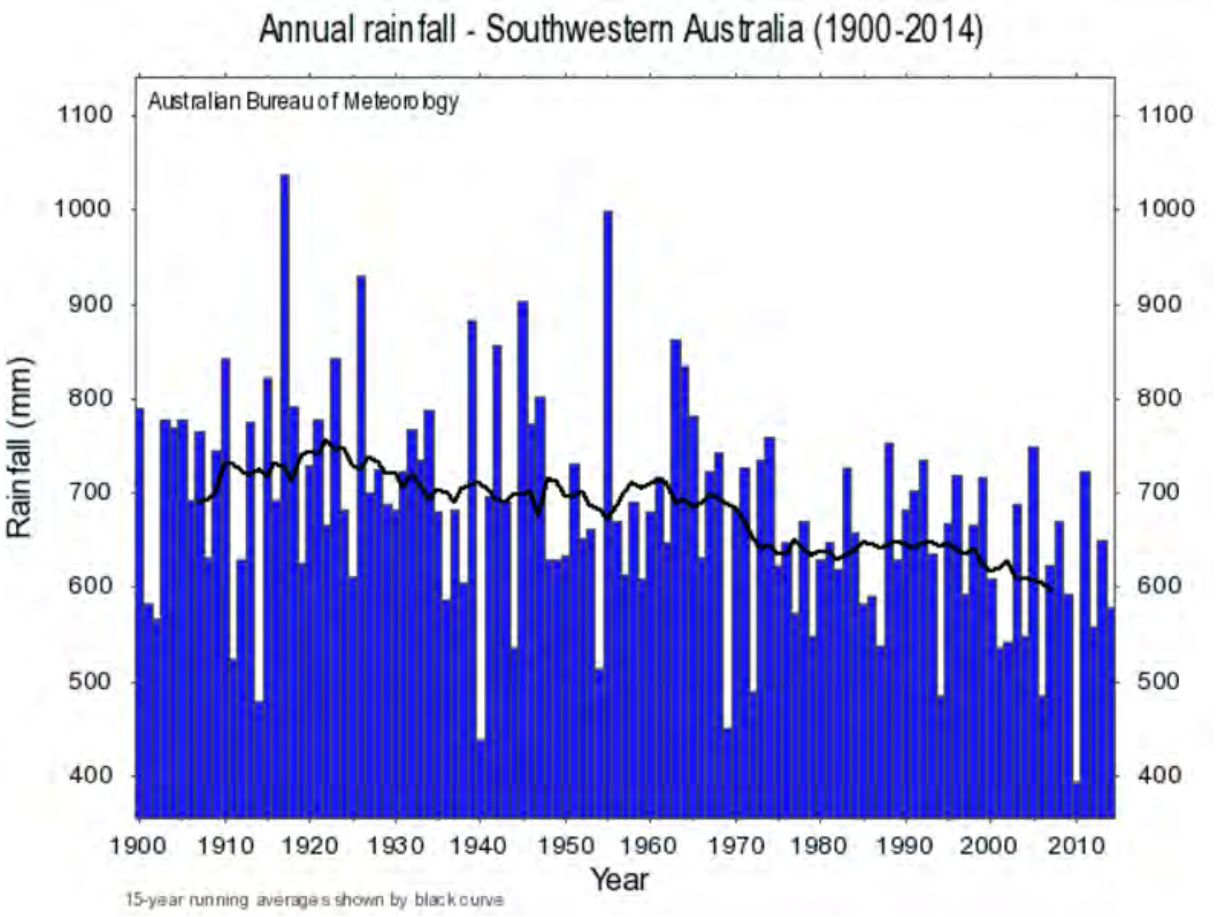
> *The Southern Ocean is a major factor influencing Albany's climate. The Southern Ocean imparts a moderating influence on Albany through sea breezes in the warmer months and through the effects of a relatively mild and moist air mass at any time of the year. Seasonal variations are mainly due to the north-south movement of sub-tropical ridge. An easterly broad scale flow prevails in summer when the ridge is south of the State. However, the movement of high pressure cells from west to east along this ridge brings a commonly repeated pattern of wind changes to South Coast locations.*

Annual rainfall in the south west of Western Australia has declined by about 10 - 20% since the mid-1970s, with a noticeable shift towards drier winter conditions as the number of winter storms decreases and those that do eventuate bringing less rain (CSIRO and Australian Bureau of Meteorology, 2007; Morgan *et al*., 2008). The reduction in rainfall in the south west is almost entirely due to a loss of rainfall in late autumn and early winter months. Plate B illustrates the trend of rainfall in Western Australia between 1970 and 2014 (BOM, 2015).

PLATE B: RAINFALL TREND IN WA – 1970 TO 2014



Source: BOM, 2015: http://www.bom.gov.au/climate/change/index.shtml#tabs=Tracker&tracker=trend-maps&tQ%5Bmap%5D=rain&tQ%5Barea%5D=wa&tQ%5Bseason%5D=0112&tQ%5Bperiod%5D=1970



Source: BOM, 2015
http://www.bom.gov.au/climate/change/index.shtml#tabs=Tracker&tracker=timeseries&tQ%5Bgraph%5D=rain&tQ%5Barea%5D=swaus&tQ%5Bseason%5D=0112&tQ%5Bave_yr%5D=30

The incidence of low rainfall is likely to increase in the south west of Western Australia as a result of projected temperature increases, associated increase in potential evaporation and projected changes in rainfall (Pittock, 2003).

Projections for changes in the annual rainfall in the south west lie in the range of -20% to +5% by 2030 and -60 to +10% by 2070 (Pittock, 2003). The range in the predicted changes in rainfall is relatively large. Natural variability in precipitation is comparable in magnitude to the changes projected by CSIRO and Australian Bureau of Meteorology (2007) and may therefore mask, or alternatively significantly enhance the changes (CSIRO and Australian Bureau of Meteorology, 2007). The implications of reduced rainfall for developments include the need to incorporate water sensitive design and water reuse systems.

2.3 WINDS

The prevailing wind pattern of the area is relevant to the development of the area due to the potential for soil erosion. While no wind data is specifically available for Goode Beach, data is available from the Albany Airport (BOM, 2014) which is approximately 21km to the north. Wind roses are shown in Appendix 2.

The Albany Airport experiences a varied wind climate with a bias toward an easterly wind component in summer and a westerly component in winter. On average, the windiest part of the day during winter is the morning and afternoon during summer. Spring and summer afternoon sea breezes are regularly experienced from directions from the south west through to the east. However, sea breezes from the south east or east are most common. Summer sea breezes are frequently quite fresh and sometimes reach 25 knots (46km/hour) or more. Late autumn, winter and early spring see regular north westerly morning winds due to a combination of the sub-tropical ridge being located to the north, with a high centre over the continent, and a land-breeze effect. Cold fronts with winter westerly winds regularly occur during this period and may bring strong to gale force winds.

Due to the strong winds likely to be experienced at the site, consideration will be given to management of disturbed soil during construction to minimise erosion and wind-blown sand.

2.4 TOPOGRAPHY AND GEOMORPHOLOGY

The subject land is adjacent to Goode Beach which comprises a sandy coastline, backed by a low dune system with a height of about 1mAHD, then a relatively steep second dune rising to between 4 and 6mAHD. Between these dunes and Lake Vancouver is a complex series of parabolic dunes creating a landform of depressions bounded by east-west oriented sand ridges which range from 8 to 15mAHD. Lake Vancouver itself is in a low depression between the primary and relict dune system.

Vancouver Peninsula consists of a series of granite hills linked by sand spits or bridges. The northern Bramble/Possession Point is linked by a bridge of Quindalup dune sands to Quarantine Hill. This in turn is linked by the main sand bridge to a massive granite complex located immediately to the south of the subject land. The bridges are the result of sand transport and deposition by wind and current action over the last 10,000 years (Alan Tingay and Associates, 1992).

The sand bridge of the Vancouver Peninsula comprises three geomorphological units, two of which are dune systems, while the third is a wetland near the boundary between the two types of dunes. On the eastern side of the peninsula there are parabolic dunes of the Quindalup Dune System while on the western side older relict fore dunes occur. The younger Quindalup Dunes may have overprinted the relict dunes on the western side. The subject land contains elements of these three geomorphic units (Alan Tingay and Associates, 1992).

The relict fore dunes on the west are linear and parallel the curvature of the Princess Royal Harbour foreshore and it is probable that these dunes were deposited as a result of sedimentary processes operating within the harbour. The younger Quindalup Dunes have resulted at least partially from the transport of sand from the ocean onto the beach. In the past these sands have migrated westwards over the older relict fore dunes, forming parabolic dunes which have since become vegetated (Alan Tingay and Associates, 1992).

Geomorphology associated with the area has been characterised by Gozzard (1989) (Figure 4) and includes:

- Lm: marsh/wetland of marine origin;
- Er: relict foredunes influenced by wind (eolian) to form ridges; and

- Ed: Parabolic and nested parabolic dunes, Quindalup dune system, influenced by wind (eolian) to form dunes.

2.5 GEOLOGY AND SOILS

The environmental geology of the area has been characterised by Gozzard (1989) (Table A; Figure 4) and includes:

- Sp1: Peaty sand – dark grey and black, medium grained quartz, variable organic content. Unconsolidated material
- S2: Limesand – white, medium to coarse grained, moderately well sorted, quartz and shell debris. Unconsolidated material.
- S13: Limesand – white, medium to coarse grained, rounded quartz and shell debris. Unconsolidated material.

The soils include dune systems and the bed and margins of Lake Vancouver (Figure 4). The primary dunes are made up of white beach and dune sands which are medium to fine grained, and consist of moderately well sorted quartz and shell debris. The relict dunes comprise white sand with rounded quartz grains and shell debris which is medium grained. The lake bed and its margins comprise a dark grey to black peaty sand with medium grained quartz and variable organic content.

TABLE A: ENVIRONMENTAL GEOLOGY AND SOILS

PHYSICAL PROPERTIES						
Map Unit	**Equivalent unit on geological maps**	**Permeability**	**Compaction**	**Shrink swell potential**	**Cohesion**	**Comment**
Sp1	Ql (lake and swamp deposits)	Low to medium	Medium	Low	Low to medium	Unsuitable for foundations and effluent disposal. High water table, prone to flooding, high organic matter.
S2	Qf (beach and dune sand)	High	Low	None	None	Limesand. Unsuitable for foundations. Suitable for effluent disposal. Susceptible to wind erosion. Suitable for neutralising acids.
S13		High	Low	None	None	Limesand. Suitable for foundations. High water table, constraints to effluent disposal.

Source: Gozzard, 1989.

Soil profiles have been characterised on the site through excavation of test pits to a depth of between 1m BGL and 2m BGL at CHE-005, CHE-006 and CHE-007 at locations shown on Figure 4 and described

in Appendix 3. Excavation was hindered due to the fine nature of the sand and in one location, shallow depth to ground water. The profile was characterised as follows:

- 0 – 10cm BGL: dark grey fine sand with organic matter, roots;
- 10 – 100cm BGL: grey sand, fine grained, grading to white, cream sand;
- 100 – 200cm BGL: cream to light brown sand with shell in paces.

2.6 LAND CAPABILITY

2.6.1 Phosphorus Buffering Indices

Phosphorus Buffering Index (PBI) provides a measure of the phosphorus holding capacity of soils. Phosphorus retention is important as it provides an indication of whether nutrients will be bound to soils and held in the soil profile or leached to the environment. High PBI scores indicate a high nutrient retention capability (levels above 100). PBI categories and associated ratings are shown in Table B.

TABLE B: PHOSPHORUS BUFFERING CATEGORIES

INDEX	PBI CATEGORY
< 5	Exceedingly low
≤5-10	Exceptionally low
≤10-15	Extremely low
≤15-35	Very very low
≤35-70	Very low
≤70-140	Low
≤140-280	Moderate
≤280-840	High

Source: DAFWA, 2015.

The results of the PBI sampling are provided in Table C, with a full copy of results provided in Appendix 4. Results of the sampling indicate that the PBI is 'extremely to exceedingly low' for the soils tested. This indicates that nutrient discharge needs to be minimised through secondary treatment and nutrient removal from waste water and that management such as soil amendment will need to be implemented to minimise nutrient discharge to the environment.

TABLE C: PHOSPHORUS BUFFERING INDEX

SAMPLE LOCATION	SAMPLE DEPTH (m)	PBI	CATEGORY
CHE-005A	0 - 0.1	14.8	Extremely low
CHE-005B	0 - 0.1	10.4	Extremely low
CHE-005C	0 - 0.1	4.9	Exceedingly Low
CHE-005D	0 - 0.1	<1	Exceedingly Low
CHE-006	0.7-1	11	Extremely low

SAMPLE LOCATION	SAMPLE DEPTH (m)	PBI	CATEGORY
CHE-007	0 - 0.1	3.5	Exceedingly Low

2.6.2 Soil Permeability

Soil permeability is a measure of the rate with which water flows through a soil profile, and is an important factor in managing irrigation and stormwater, as it provides an indication of whether water and nutrients will infiltrate immediately into the soil, or will remain on the surface and cause ponding and potentially surface runoff.

Soil permeability was measured at three locations on site (CHE-005, CHE006 and CHE-008; Figure 5) using the Australian/ New Zealand Standard AS1547:2000 approved Talsma-Hallam permeameter. This method is a constant head test, whereby water that runs out of an unlined test hole is replenished at the same rate from a reservoir, keeping the level of water in the hole constant (i.e. constant head). Field records are taken to measure the loss of water reservoir over time, which were then used to calculate the coefficient of permeability (Ksat) for the particular soil profile. The results of the field measurements are provided in full in Appendix 5, with results summarised in Table D.

TABLE D: SOIL PERMEABILITY AND CATEGORY CLASSIFICATION

TEST ID	SOIL PERMEABILITY (K_{SAT})	SOIL CATEGORY (AS 1547 2000)	SOIL TYPE	PERMEABILITY
CHE-005	14.05 m/day	1	Sands	Medium
CHE-006	5.22 m/day	2	Sandy Loam	Medium
CHE-008	6.64 m/day	2	Sandy Loam	Medium

Source: Soil category from Table M1 AS 1547:2012.

Permeability results indicate the soils are well drained ('medium' permeability) which is expected given the sandy nature of the soil profile. The permeability is adequate to reduce the risk of ponding and runoff related to irrigation and infiltration of treated waste water and stormwater.

2.7 ACID SULFATE SOILS

Acid sulfate soils (ASS) are wetland soils and unconsolidated sediments that contain iron sulfides which, when exposed to atmospheric oxygen in the presence of water, form sulfuric acid. ASS commonly occurs in low-lying coastal lands such as Holocene marine muds and sands. When disturbed, these soils may produce sulfuric acid which can mobilise iron, arsenic, aluminium, manganese and other heavy metals. The release of these reaction products can be detrimental to biota, human health and built infrastructure.

The Department of Environment Regulation (DER) (DEC, 2009a and 2009b) and the WAPC (2008) have released guidance notes on ASS, covering the requirement for assessing sites and the management of sites where ASS are identified. ASS investigations are commonly required as part of the conditions of subdivision or as a requirement for a dewatering licence application.

Available mapping indicates that the soils associated with Lake Vancouver are likely to have a 'high' risk of ASS (Australian Soil Resource information System, 2014). However, the sandy soils associated with the subject land are likely to have no or low risk of ASS occurring generally at depths of more than 3m (Landgate, 2016). Should excavation or dewatering need to occur in association with organic rich soil low in the profile, appropriate assessment will be undertaken and management undertaken.

2.8 GROUNDWATER & HYDROLOGY

Groundwater for the area has been broadly described by the Geological Survey of Western Australia as part of a sedimentary aquifer with intergranular porosity and major groundwater resources called the Plantagenet Group which comprises siltstone, spongolite, minor sandstone, peat and conglomerate and contains minor to major aquifers ranging from fresh to saline water (Smith, 1995).

The groundwater regime of the area has been characterised in more detail by Rockwater Pty Ltd (1986 and 1992) to consider the potential impacts on groundwater and Lake Vancouver from a proposed residential development. The Rockwater study is presented in Appendix 6 and is considered relevant to current site conditions.

The Rockwater study was based on information from a series of bores installed within, or in the vicinity of the subject land, which allowed the determination of:

- Thickness and nature of water bearing strata;
- Depth to bedrock;
- Position of the salt/freshwater interface; and
- Relationship between Lake Vancouver and groundwater.

The groundwater associated with the Vancouver Peninsula is contained in the unconsolidated sands which overlie granite bedrock at depth. This granite bedrock rises steeply to the south where it outcrops above the present settlement. The thickness of the unconsolidated sands and aquifer generally increases in a northerly direction along the peninsula.

The groundwater is generated and replenished by direct infiltration of rainfall from surface and subsurface runoff from large areas of granite to the south of the subject land. A considerable portion of this area has been developed for residential purposes.

Near the coastline, fresh groundwater overlies saline water through connectivity with the ocean. Saline water was intersected at a depth of 17m BGL in a bore close to Goode Beach. The interface between the saline and fresh water is steep and slopes westward with increasing depth. The westward slope is principally the result of the fresh water floating on the saline water because it is less dense.

During groundwater investigations in spring (September 1986) (Rockwater, 1986) the groundwater was flowing to the east towards Frenchman Bay (Figure 5). Groundwater in the vicinity of the proposed

resort was measured at 0.57 mAHD which is approximately 3.43 mBGL where the ground surface is at approximately 4 mAHD.

Groundwater level testing results are shown in Table E.

TABLE E: GROUNDWATER LEVELS

Location	Description	Coordinates (Degrees, Dec Minutes)	Date	Ground Level (m AHD) Estimated	SWL mAHD	SWL (mBGL)
CHE001	Monitoring Bore	35 04.9777 117 56.1717	14/11/2016	2.53	0.56	1.97
		35 04.9777 117 56.1717	28/11/2016	2.53	0.52	2.01
		35 04.9777 117 56.1717	6/12/2016	2.53	0.51	2.02
CHE005	Piezometer	35 05.076 117 56.223	28/11/2016	1.37	0.12	1.25
		35 05.076 117 56.223	6/12/2016	1.37	0.12	1.25
CHE006	Piezometer	35 05.036 11756.137	28/11/2016	1.70	0.45	1.25
		35 05.036 117 56.137	6/12/2016	1.70	0.45	1.25
CHE007	Piezometer	35 04.979 117 56.106	28/11/2016	2.30	0.06	2.24
		35 04.979 117 56.106	6/12/2016	2.30	0.02	2.28

Note: Locations shown in Figure 4

For the dates shown in Table F, the electrical conductivity of groundwater ranged between 1.14 mS/cm at CHE-001 and 2.71 mS/cm at CHE-007 which indicates that the groundwater falls within the fresh to brackish range (0 – 1.5 mS/cm and 1.5 – 15 mS/cm respectively). The lake water was brackish at 2.38 mS/cm on 28 November 2016 and 3.01 mS/cm on 6 December 2016.

TABLE F: GROUND AND SURFACE WATER QUALITY PARAMETERS

LOCATION	DESCRIPTION	DATE	PH	TDS PPT	ELECTRICAL CONDUCTIVITY mS/cm	TEMP ^{O}C
CHE001	Monitoring Bore	28/11/16	7.03	0.59	1.14	22.3
		6/12/16	7.34	0.6	1.2	18.3
CHE005	Piezometer	6/12/16	7.3	0.79	1.59	17.1
CHE006	Piezometer	6/12/16	7.65	1.16	2.31	17.9
CHE007	Piezometer	6/12/16	7.05	1.34	2.71	18
CHE010	Piezometer	6/12/16	7.52	0.93	1.87	16.3
CHE002	Lake	28/11/16	7.09	1.19	2.38	22.2
		6/12/16	7.42	1.41	3.01	19.6

Note: Locations shown in Figure 4.

2.9 WETLANDS

Lake Vancouver is categorised as a Conservation wetland, is part of the Good Beach Suite and called 'Goode Beach Wetland' in the South Coast Significant Wetland dataset (Landgate, 2016; DPAW, 2014). The lake is in a crown reserve which is surrounded by Lot 660 (Figure 2). Lake Vancouver is an expression of the groundwater table, where changes in the level of the groundwater are reflected in the lake's water level. Winter testing by Rockwater in September 2016 indicated that the water level of Lake Vancouver was at 1.0 m AHD and that there is a groundwater flow gradient created during winter from west to east. The seasonal fall in the groundwater table during summer, coupled with relatively high evaporation from the lake may temporarily cause the localised flow of groundwater toward the lake.

In September 1986, lake water had a salinity level of 1,700 milligrams per litre (mg/L) indicating that salts concentrate in the lake as a result of evaporation. The salinity of the groundwater near the lake was about 500 mg/L. The inflow of this relatively fresh groundwater is likely to be an important factor in moderating concentration of salts in the lake. DoW (2008) indicated that the water quality of the Lake was 'good' with salinity ranging from 'marginal' (1.4mS/cm) and brackish (2.7mS/cm). The same study indicated that nutrient concentrations were 'relatively low' with variability during the study period. Total Phosphorus and Soluble Reactive Phosphorus were below the recommended ANZECC & ARMCANZ (2002) water quality guidelines, while Total Nitrogen was around the recommended concentrations and Dissolved Inorganic Nitrogen above the guideline recommendations (DoW 2008).

DoW (2008) suggested that the ecological functional buffer of the wetland was 200m and that development within that area should be compatible with wetland values with management to ensure that acceptable environmental outcomes were achieved (including revegetation, weed control, fencing and installation of appropriate drainage compatible with Better Urban Water Management (WAPC, 2008)).

There are no Public Drinking Water Source Areas (PDWSA) associated with the subject land. However, it is noted that Lake Vancouver is a significant wetland and that ground and surface water will need to be managed to prevent impacts. The risk of impacts is reduced as groundwater generally moves from Lake Vancouver towards the coast. Management of treated waste water and storm water will be undertaken through the development process to prevent impacts on the Lake and groundwater.

2.10 VEGETATION AND FLORA

2.10.1 Vegetation

The Western Australian EPA Position Statement No. 2 Environmental Protection of Native Vegetation in WA (EPA, 2000) states that:

i) the 'threshold level' below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at a level of 30% of the pre-clearing extent of the vegetation type;

ii) a level of 10% of the original extent is regarded as being a level representing 'endangered'; and

iii) clearing which would put the threat level into the class below should be avoided.

Vegetation of the district has been characterised by Beard *et al.* (2013) in a Pre European vegetation dataset. The vegetation associated with the subject land is Vegetation Association 22: low woodland *Agonis flexuosa*. The State-wide Vegetation Statistics (DPAW, 2015; Table G) indicate that this vegetation type has a pre-European extent of 4,032.68 ha with 2,964.11 ha or 73.5% remaining. This suggests that this vegetation type is well represented and has 34.81% of the pre European extent reserved.

TABLE G: PRE EUROPEAN VEGETATION REPRESENTATION

DESCRIPTION	AREAS IN HA
Vegetation Association and Description	22 Low Woodland – *Agonis flexuosa*
Pre-European Extent	4,032.68
Current Extent	2,964.11
% Remaining	73.50
IUCN I - IV in Pre-European Extent^	1,403.57
IUCN I - IV in Current Extent	1,392.42
% Current Extent Protected (IUCN I - IV) for Conservation (proportion of Pre-European Extent)	34.53

TABLE G: PRE EUROPEAN VEGETATION REPRESENTATION

DESCRIPTION	AREAS IN HA
% Pre-European Extent in IUCN I - IV (proportion of Pre-European Extent)	34.81
% Current Extent in IUCN I - IV (proportion of Current Extent)	46.98
Pre-European Extent in All DPaW-Managed Land	1,511.07
Current Extent in All DPaW-Managed Land	1,499.92
% Pre-European Extent in All DPaW-Managed Land (proportion of Pre-European Extent)	37.47
% Current Extent in All DPaW-Managed Land (proportion of Current Extent)	50.60

Source: Beard *et al.* (2013) and DPAW 2015 State-wide Vegetation Statistics.

The subject land was not included in the Albany Regional Vegetation Survey (ARVS; Sandiford and Barrett, 2010). However, Aurora Environmental has inferred that the vegetation on the subject land aligns with a mosaic of ARVS Units 2, 3 and 5 which comprises Peppermint low forest, coastal heath and coastal limestone heath. These units are described in Appendix 7. DPaW have advised that the vegetation associated with the fringes of Lake Vancouver does not align with other ARVS vegetation units. However, as vegetation associated with Lake Vancouver will not be disturbed, this is not considered to be an issue.

The representation of these vegetation units in the ARVS study area is summarised in Table H and below:

- ARVS Unit 2 - Peppermint Low Forest comprises 1,232 ha or 2.8% of the ARVS survey area (44,093 ha). 281 ha or 22.8% is in IUCN conservation reserves, with an additional 619 ha or 39% in other crown reserves. 332 ha or 42% is in non-reserved land. This vegetation unit has a relatively small original extent, and has more than half in reserved land, including 22.8% in conservation areas.
- ARVS Unit 3 - Coastal Heath comprises 3,737 ha or 8.5% of the ARVS survey area (44,093 ha). 830 ha or 22.2% is in IUCN conservation reserves, with an additional 2,391 ha or 64% in other crown reserves. 517 ha or 13.8% is in non-reserved land. This vegetation unit has a relatively large original extent and has more than 86% in reserved land, including 22.2 in conservation areas.

TABLE H: ARVS VEGETATION UNITS – EXTENT AND RESERVATION STATUS

Veg code	Area and Vegetation unit	Current Extent Remnant		IUCN I-IV Reserves			Other Crown Reserves			Non Reserve		
		ha	% of ARVS	ha	%	Summary %	ha	%	Summary %	ha	%	Summary %
	Total remnant vegetation within ARVS Context area	71686	34.0									
	Total remnant vegetation within ARVS Survey area	44093	35.0	8574	19.0		17054	39		18464	42	
2	Peppermint Low Forest	1232	2.8	281	22.8	More than 10%	619	50.2	More than 10%, less than 70%	332	26.9	More than 10%, less than 70%
3	Coastal Heath	3737	8.5	830	22.2	More than 10%	2391	64.0	More than 10%, less than 70%	517	13.8	More than 10%, less than 70%
5	Limestone Coastal Heath	1849	4.2	740	40	More than 10%	782	42.3	More than 10%, less than 70%	326	17.6	More than 10%, less than 70%

ARVS Vegetation Unit		Regional and local representation criteria												Threats		
Vegetation unit code	Vegetation unit name	Restricted ARVS	Range limit in ARVS	Rarity <1500ha	Diversity (mean species / relevé)	TEC/PEC	DRF	Priority	Wetland/Dampland /Riparian/buffer	Wetland National significance	Estuarine	Coastal dune	Phytophthora dieback†	Hydrological change†	Fire sensitive*
2/3	Peppermint Low Forest & Coastal Heath: 1.5 ha to be cleared of Mosaic	No	+/-E	●	10/ 21.1	No	-/●	-	-	-	-	●	-	-	-

Source: Sandiford and Barrett (2010) Albany Regional Vegetation Survey. Notes: Regional and local representation criteria adapted from Molloy *et al*. (2007). **Key**: +/- = range limit within 10 km of survey area boundary, E = eastern, S = southern, W = western, U = unknown, † = observed during survey, * = identified according to criteria in Barrett *et al* (2009).

The vegetation units are well represented in the ARVS study area, but are also found beyond the the ARVS study area indicating that these units are well represented in the region. The Peppermint Low Forest unit has an extent of less than 1,500 ha which is considered by the ARVS project to be an indicator or rarity. However, Beard vegetation mapping indicates that the vegetation association is widespread outside the ARVS area. The Coastal heath unit may have Threatened flora associated with it. However, the previous flora survey and DPAW Threatened Flora database did not indicate the presence of Threatened or Priority flora in the area.

A site specific vegetation survey for the subject land identified five main vegetation zones, with distribution correlating with the underlying soil types of Quindalup dunes, relict dunes and peaty sand associated with Lake Vancouver (Alan Tingay and Associates, 1992; Figure 6). Vegetation is described as:

Foredunes (Quindalup)

The first dune system at the back of Goode Beach consists of a small foredune about 1m to 1.5m tall and 4m wide. The vegetation line closest to the beach, located at the base of the foredunes comprises *Cakile maritima*[1]* and *Arctotheca populifolia*.* On the top of the foredune strand species occur, dominated by *Euphorbia terracina** and *Spinifex hirsutus* with *Ficinia nodosa, Carpobrotus virescens* and *Cakile maritima*.*

Quindalup Dunes

The seaward-facing slope of the first tall Quindalup Dunes contains a stunted *Adenanthos sericeus* low heath about 1-1.5m tall which is very dense in places. These shrubs have been wind-pruned by the salt laden sea breezes. At the dune crest and further west over the remainder of the Quindalup dunes the native peppermint (*Agonis flexuosa*) becomes co-dominant with the *Adenanthos* in an *Agonis flexuosa*, *Adenanthos sericeus* closed scrub. *Acacia truncata* is also a common tall shrub species increasing in dominance away from the coast. This vegetation type is dense and impenetrable with the dominant shrubs 3-4m tall, with 80-90% foliage cover arising from many individual stems and multi-stemmed plants. There is very little sub stratum under the shrubs due to the lack of light penetrating the dense overstorey. However, the ground is covered densely by the sedge *Desmocladus flexuosus* and to a lesser extent *Lepidosperma gladiatum* and *Ficinia nodosa*.

Peaty Sands

There is a relatively sharp boundary between the vegetation of the Quindalup dunes and the vegetation of the peaty sands associated with Lake Vancouver with two vegetation types associated with the soil type. Surrounding the water's edge is a narrow band (up to 20m wide) of *Leptocarpus trisepalus* sedgeland which is likely to experience long periods of inundation by fresh water. The *Leptocarpus* stands are about 1.5m and is relatively dense, which precludes most other species.

Further away from the lake's edge but still in swampy soils the vegetation comprises a *Melaleuca cuticularis/Banksia littoralis* low woodland with a low density of trees up to 6m tall over a 1m sedgeland of *Chaetanthus aristatus*, *L. trisepalus* and *Lepidosperma gladiatum*. *Callistachys lanceolata* is a common tall shrub throughout this vegetation type.

Relict Dunes

To the west of the Lake Vancouver vegetation types and the young Quindalup dune vegetation is a low heath dominated by *Melaleuca thymoides* occurring on Relict Dunes. The low heath is approximately 0.5m tall, dense and contains a different suite of species from the lake and Quindalup dune vegetation.

In the south west corner of the subject land, the relict dune sands are mixed with colluvial sand derived from granite which is abundant immediately south of the lot boundary. In this area the low heath

[1] * Introduced species.

vegetation contains emergent trees of Jarrah *(Eucalyptus marginata)* and Peppermint (*Agonis flexuosa).*

Photographs of vegetation types are shown in Appendix 8.

2.10.2 Threatened and Priority Ecological Communities

No threatened or priority ecological communities under State or Commonwealth legislation have been mapped in the vicinity of the subject land (Landgate, 2014). Conservation Code definitions are included in Appendix 9.

Information from the DPAW database for *Threatened and Priority Ecological Community buffers* in WA was received on 6 December 2016. No threatened or priority ecological communities have been identified on the subject land. The closest community is a Priority 3 (Vulnerable) community comprising *Subtropical and Temperate Coastal Saltmarsh*, 1.2km to the west on Princess Royal Harbour.

2.10.3 Flora

A total of 56 native species were recorded during a flora survey carried out in June 1992 by Alan Tingay and Associates. The survey covered Lot 660, Reserve 48916 (Lake Vancouver) and Reserve 28111 (foreshore reserve). A list of species recorded is included in Appendix 10.

The species list has been checked for changes to nomenclature and compared to the most recent Threatened and Priority species listed under Schedule 1 of the Western Australian *Wildlife Conservation Act 1950.* No Threatened or Priority species were recorded on site. In addition, no species listed as Threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded.

Records from the DPAW Threatened and Priority Flora Database , the WA Herbarium database (WAHerb) and the Threatened and Priority Flora Species List for the area of interest are shown in Appendix 11. None of these species have been recorded on site and most require conditions not present in the proposed development footprint.

2.11 DIEBACK

Phytophthora dieback is an introduced plant pathogen which is classified as a water mould. It lives in soil and attacks the root systems of susceptible naïve species which causes plant death, making it a significant threat to biodiversity in Western Australia. The pathogen is known to occur throughout the south west of Western Australia from Eneabba to Esperance (Project Dieback, 2014). There is no effective cure for Phytophthora dieback but its spread can be reduced by implanting hygiene measures.

Information sourced from the Project Dieback Public Map (2017; Appendix 12) indicates that Phytophthora dieback is known to occur in Goode Beach and Torndirrup National Park (adjacent to the subject land) and the area is categorised as an 'infested high value hotspot'. This designation indicates an area with known infestations of Phythophthora dieback but which also includes or is adjacent to areas with Threatened Ecological Communities, Priority Ecological Communities, Declared Rare Flora and/or Priority Flora. This indicates that measures should be taken to reduce the risk of introduction

and/or spread of dieback at the subject land (e.g. through preparation and implementation of a hygiene program).

2.12 FAUNA

DoW (2008) reported that a fauna survey of Lake Vancouver and the surrounding area was undertaken in 1990 as cited in CALM correspondence (1990). Birds recorded during the survey included rock parrots (*Neophema petrophila*), western spinebills (*Acanthorhynchus superciliosus*), brown quail (*Coturnix australis*), white-browed scrub-wren (*Sericornis frontalis*), splendid fairy-wren (*Malurus splendens*), red-eared firetail (*Stagonopleura oculata*), New Holland honey-eater (*Phylidoniris novaehollandiae*), grey currawong (*Strepera versicolor*) and red wattle-bird (*Anthochaera carunculata*). Fresh diggings of quenda (*Isoodon obesulus fusciventer*) and scats of western grey kangaroos (*Macropus fuliginosus*) were also noted during the survey. DoW (2008) also reported that birds observed during a site visit in March 2010 included ducks (*Anas* spp.), cormorants (*Phalacrocorax* spp), honeyeaters (*Phylidoniris* spp.), brown quail (*C. australis*) and fairy wrens (*Malurus* spp.). Other fauna observed in the wetland during the 2010 site visit include Rosenbergs monitor (*Varanus Rosenbergi*) and mourning skink (*Lissolepis luctuosa*). Kangaroo scats and numerous diggings from quenda and potentially the southern bush rat (*Rattus fuscipes*) were also observed. None of these species are Threatened and they all have an IUCN status of 'least concern'.

A Level 1 fauna assessment has been undertaken for the subject land in order to identify the possible presence of conservation significant fauna. The following government and biological databases have been interrogated:

- Threatened and Priority Fauna Database (Department of Parks and Wildlife);
- NatureMap Database (Department of Parks and Wildlife / Western Australian Museum); and
- Protected Matters Search Tool (Commonwealth Department of the Environment; Appendix 13).

Results are shown in Table I and Appendix 13. Species are only included in Table I if they are likely to occur or rely on habitat proposed to be impacted by the development.

Initial consultation with DPAW indicates that due to the long unburnt nature of the vegetation in the area to be cleared, suitable habitat may be present for Main's Assassin Spider (*Zephyrarchaea mainae*) which is found in suspended leaf litter in low dense vegetation, especially in coastal *Agonis* heathland or wet eucalypt forest (Atlas of Living Australia, 2017). The species is listed as Endangered under Schedule 1 of the *Wildlife Conservation Act 1950*. Sampling reports indicate that the species is locally common where suitable habitat occurs although the distribution of the species is restricted. Reporting in *Terrestrial Invertebrates of the South Coast NRM Region, Western Australia* (2008) indicates that specimens have been found at 25 different sites between William Bay and Gull Rock National Parks.

A targeted survey for Main's assassin Spider was undertaken by Melanie Price of Aurora Environmental on 30 March 2017, with advice from Dr Mark Harvey of the Western Australian Museum. A total of 26 locations containing suitable habitat were sampled within the proposed development area (Appendix 14). No specimens of Main's Assassin Spider were recorded.

Targeted surveys for three species of Threatened Black Cockatoo, Western Ringtail Possum and Main's Assassin Spider have been undertaken (Appendix 14). These surveys indicated that the footprint of

the proposed development does not contain foraging, nesting or roosting habitat suitable for the three Threatened species of Black Cockatoo.

A Western Ringtail Possum was detected to the west of Lake Vancouver during a targeted fauna survey on 6 December 2016 (Appendix 14). This species is listed as Vulnerable under the federal *Environment Protection and Biodiversity Conservation Act 1999* and Critically Endangered under the *Western Australian Wildlife Conservation Act 1950*. *Significant Impact Guidelines for the Vulnerable Western Ringtail Possum (Pseudocheirus occidentalis) in the southern Swan Coastal Plan, Western Australia* (Department of the Environment, Water Heritage and the Arts, 2009) outlines that if more than 0.5 ha of habitat is proposed to be cleared, the action should be referred to the Department of Environment and Energy to determine if the clearing constitutes a controlled action. As this project necessitates the clearing of 2.1ha of habitat, referral is recommended.

TABLE I: DESKTOP FAUNA INVESTIGATION – CONSERVATION SIGNIFICANT FAUNA

Species	Status	Comment
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo	A & B Vulnerable 2: Potentially suitable habitat	Targeted survey: The proposed development area does not contain suitable foraging, nesting or roosting habitat for Black Cockatoos.
Calyptorhynchus baudinii Baudin's Black-Cockatoo	A Endangered B Vulnerable 2: Potentially suitable habitat	
Calyptorhynchus latirostris Carnaby's Black-Cockatoo	A & B Endangered 1: Recorded near subject land	
Dasyurus geoffroii Chuditch, Western Quoll	A & B Vulnerable	Nature Map records for this species in the Albany area are limited to two sightings including diggings at Mt Martin in 1982 and a dead animal recorded in 1995 (Nature Map, 2016). It is unlikely that this species occurs on the subject land, and no traces were observed during the targeted survey.
Pseudocheirus occidentalis Western Ringtail Possum	A Endangered B Vulnerable	Targeted survey: This species occurs on site and was recorded in vegetation west of Lake Vancouver.
Setonix brachyurus Quokka	A & B Vulnerable	While quokkas have been identified at Two Peoples Bay, there have not been any records of the species in Albany since 1905 (NatureMap, 2016). It is unlikely that this species occurs on the subject land, and no traces were observed during the targeted survey.
Pandion haliaetus Osprey	2 Migratory Wetland Species	This species is known to have a wide distribution. Therefore, the species may, on occasions be found within the subject land but is unlikely to rely on it.

Source:	Status:
1. Threatened and Priority Fauna Database (Department of Parks and Wildlife)	A. *Wildlife Conservation Act 1950* (Western Australia):
2. Protected Matters Search Tool (Commonwealth Department of the Environment)	B. EPBC Act Listing Status

2.13 ENVIRONMENTALLY SENSITIVE AREAS

Environmentally sensitive areas (ESA) are declared in *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, Government Gazette No. 55 and comprise:

- World Heritage properties;
- Areas included on the Register of the National Estate, because of its natural heritage value;
- Ramsar, nationally important and conservation category wetlands and the area within 50 metres of the wetland;
- the area covered by vegetation within 50 metres of Threatened flora;
- the area covered by a threatened ecological community;
- A Bush Forever site;
- A declared World Heritage property;
- An area that is included on the Register of the National Estate (natural heritage value)
- Areas covered by the *Environmental Protection (Gnangara Mound Crown Land) Policy 1992*;
- Areas covered by the *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002*;
- Areas covered by the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992;*
- Protected wetlands in the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998*.

The nearest ESA to the subject land is Lake Vancouver. Clearing for the footprint of the proposed development will occur outside the 50m footprint of Lake Vancouver and management actions will be undertaken to ensure that there are no deleterious impacts on the lake and associated groundwater. The development is unlikely to impact on an ESA.

2.14 COASTAL PROCESSES AND SETBACKS

Previous planning and subdivision has provided a 30m wide foreshore reserve (Reserve No. 28111) between the subject land and Goode Beach. State Planning Policy 2.6 (WAPC, 2013) recommends determining a horizontal setback from the coast, allowances are usually made for storm erosion (S1), historic shoreline movement trends (S2) and erosion from future sea level rise (S3). The time frame for these allowances is based on stability of the coastline (e.g. sandy or rocky), exposure to storms and swells and 0.9m sea level rise by 2110 based on 2010 sea levels. In the case of this development, infrastructure is expected to have a life expectancy of 40 – 50 years, which is also taken into consideration in determining a setback.

An assessment of the potential future areas of impact caused by the action of coastal hazards has been undertaken in accordance with the requirements of SPP2.6 by MP Rogers and Associates (2017). The

results of this assessment indicate that the shoreline has been stable (less than 2.0m erosion) for the last 50 years (where aerial photographs have been sourced from 1948) despite a sea level rise of around 0.1m. In addition, the Goode Beach area is not subjected to the large swells associated with the open ocean.

Based on the requirements of SPP 2.6 and modelling, a setback has been calculated which will avoid risk over the design life of the built form structures, allowing for a managed retreat of the structures should the shoreline erode. The proposed setback is shown in Appendix 15, with the 2066 hazard erosion line adopted for development setback. The setback comprises:

- S1 - Storm erosion: 21m
- S2 - Historic shoreline movement: 2m for 50 years (to 2066)
- S3 - Sea level rise: 35m (to 2066)
- Allowance for uncertainty: 10m (to 2066)
- Total: 68m from high water mark

The allowance for S4 – Storm surge inundation is 2.39m (vertical) indicates potential inundation levels for 1 in 500 year storms (0.2% annual exceedance probability (AEP)).

The requirements of this coastal setback and implications for the infrastructure beyond the 50 year timeframe are understood and accepted by the land owner who will add a notification regarding coastal foreshore setbacks to the title of the Lot.

2.15 EUROPEAN AND ABORIGINAL HERITAGE

Cultural heritage places in Western Australia are recorded under several different heritage listings which can be sourced via the Western Australian Heritage Council InHerit database. The categories in Table J were investigated to determine the status of the subject land. No heritage places are indicated to occur on Lot 660. The closest listed sites are the former Frenchman Bay Whaling Station and Vancouver Spring, which are located 1.2 km east of the subject land.

The Department of Aboriginal Affairs Aboriginal Heritage Inquiry System (AHIS) indicates that there are no registered Aboriginal sites or other heritage places known to occur on Lot 660 (Appendix 16). The nearest site is Site Id 4456 S02764 which is 150m west of the western boundary of Lot 660. The site comprises artefacts but records indicate that the site is considered unreliable due to its non-artefactual nature and the assemblage having no provenance as a result of earthworks (Brad Goode and Associates, 2005).

Should the construction phase reveal the presence of artefacts, the Department of Aboriginal Affairs will be notified.

TABLE J: HERITAGE LISTING SEARCH

STATUTORY LISTINGS			
TYPE	**ORGANISATION**	**LEGISLATION**	**WHAT IS LISTED**
State Register	Heritage Council (assisted by the State Heritage Office)	*Heritage of Western Australia Act 1990*	Places of State significance included in the State Register of Heritage Places
Conservation Order	Heritage Council (assisted by the State Heritage Office)	*Heritage of Western Australia Act 1990*	Places of State significance or potential State significance (special cases)
Heritage Agreement	Heritage Council (assisted by the State Heritage Office)	*Heritage of Western Australia Act 1990*	Places protected by long-term agreement between the parties
Heritage List	Local Governments	Planning & Development Act (2005); Local Planning Schemes	Places of local heritage significance
National Heritage List	Australian Heritage Council	*Environment Protection & Biodiversity Conservation Act (1999)*	Places of national significance
Local Government Inventory (Municipal Inventory)	Local Governments	Mandated under the *Heritage of Western Australia Act 1990* but controlled by Local Governments	Places of local significance
List of Classified Places	The National Trust of Australia (WA)	*The National Trust of Australia (WA) Act (1964)*	Places of local, state or national significance

Source: Heritage Council – State Heritage Office (2016) http://inherit.stateheritage.wa.gov.au/

3 ENVIRONMENTAL MANAGEMENT

3.1 VEGETATION AND HABITAT PROTECTION

Clearing of native vegetation will be minimised, with existing access alignments to be utilised for guest and emergency access. The footprint of the resort is approximately 2.1 ha, which includes accommodation, administration buildings, parking and associated facilities. The footprint has been designed to minimise the extent of clearing.

The vegetation type to be cleared comprises *Agonis flexuosa* (Peppermint) and *Adenanthos sericeus* (Albany Woolly Bush) closed scrub and is well represented within the ARVS area and further afield, including in the conservation estate (Section 2.10.1). The clearing is not considered to be a high risk to the integrity of the Beard vegetation type or ARVS vegetation unit due to the relatively small area proposed to be cleared and the fact that a significant area is secured in conservation and other crown land.

Western Ringtail Possums have been identified in the area and the location proposed to be cleared contains suitable habitat for this species (**AfAs** - *Agonis flexuosa*/*Adenanthos sericeus* Closed Scrub). As outlined in Section 2.12, referral to the DoEE under the EPBC Act is recommended, at the rezoning stage.

Measures will be taken to reduce the risk of wind erosion during clearing and subsequent construction of the resort, including wetting of cleared areas, hydro-mulching, brushing and other methods of stabilisation.

It is recommended that a dieback hygiene program be developed and implemented through a Construction Management Plan.

3.2 ACCESS

The main access point for vehicles to the Vancouver Beach Resort will be via an existing access track to the west of Lake Vancouver, which will be upgraded to a minimum 4m wide bitumen road (Figure 7) in a 6m wide access way. Vehicle and maintenance access within the Vancouver Beach Resort area will be via paved roads. In addition, pedestrian and emergency access will be provided along an existing sand track alignment which will be upgraded and stabilised with compacted limestone to form a 6m wide track with 4.5m vertical clearance.

3.3 WATER SUPPLY

Potable water for the development will be provided through the Water Corporation scheme system. The project will incorporate recycling and storage systems to allow for a 'fit for use' approach to water reuse. Rain water will be directed from roof tops to storage tanks for use in irrigation, emergency fire-fighting, washing machines and toilets. Stormwater from roads and carparks will be directed to biofiltration swales and basins or landscaped areas for infiltration. It is not proposed to abstract groundwater for use at the site. Rather, treated waste water will be used where it is fit for the purposes proposed (see Section 3.4).

3.4 EFFLUENT DISPOSAL

3.4.1 On-site Effluent Disposal

Goode Beach is not within an area proposed for connection to the reticulated sewerage scheme. The ability for a site to incorporate on-site effluent disposal is governed by the *Draft Country Sewerage Policy*, released by DoH in 2002 and amended 2003. However, recently the Western Australian Government has released *2016 Draft Government Sewerage Policy* (Government of Western Australia, 2016) for public submissions. These guidelines have been used to guide the determination of acceptability of on-site effluent disposal on the subject land as they take into account contemporary planning and treatment systems.

The proposed development is exempt from being required to connect with a reticulated sewerage scheme as the site is:

- Remote from an existing scheme and cannot realistically be connected;
- Will utilise a secondary treatment system with nutrient removal; and
- Can demonstrate that there is sufficient capacity to treat and dispose of sewerage (with incorporation of required buffers) at the site.

The proposed development site is designated as a 'sewage sensitive area' under the *Draft Government Sewerage Policy 2016*. In this case, this designation has been given because the site is:

- within 10km of Princess Royal Harbour. (However we note that the site is not within the surface or groundwater catchment for the harbour); and
- within 250m, down groundwater gradient of a significant wetland. Lake Vancouver is in a reserve immediately to the west of the proposed resort site.

The minimum requirements for on-site effluent disposal are summarised in Table K.

TABLE K: CRITERIA FOR ON-SITE EFFLUENT DISPOSAL

Environmental Parameter	Criteria	Comment
Separation from groundwater	1.5mBGL for sandy soil in a sewage sensitive area	The areas proposed to be used for subsurface irrigation of treated waste water will have a finished ground level of approximately 4-5m AHD. Winter groundwater in these areas is at a maximum of approximately 0.56 mAHD (Table E) with a separation of between 3.5 and 4.5m. The current ground level varies between 4 and 6mAHD. The site meets groundwater separation requirements.
Setback from private bore	30m	There are no private bores within 30m of the development.
Setback from waterway or wetland	100m	Subsurface irrigation areas will be more than 100m from Lake Vancouver (Figure 7).

Environmental Parameter	Criteria	Comment
Within an area subject to inundation and/or flooding	Risk of inundation and/or flooding in a 10% AEP rainfall event	The development area is not subject to flooding or inundation.
Within a Public Drinking Water Source Area	Priority 1, 2 or 3 area	The site is not in a PDWSA as defined under the *Country Areas Water Supply Act 1947*.

Source: Government of Western Australia (2016)

To minimise the risks associated with waste water treatment and disposal, it is proposed to incorporate a secondary treatment system with nutrient removal, which will cater for a minimum of 180 people using 140L per persons per day (based on resort guests, staff and restaurant use; Department of Health, DoH, 2015). A secondary treatment system, with appropriate servicing, can remove nutrients such as nitrogen and phosphorus, incorporate microbial digestion, physical settling, filtering and decomposition of sewage. The recommended output for a nutrient removing ATU (secondary treatment system) in the 2016 Draft Government Sewerage Policy is < 1mg/L Phosphorous and < 10mg/L Nitrogen. Systems can also reduce biological oxygen demand (BOD <= 20 mg/L) and suspended solids (SS <= 30 mg/L). There are systems approved by the DoH which can meet this treatment criteria.

The on-site sewage disposal system chosen for the site will meet these standards, as approved for use in Western Australia by the DoH (and approved by the City of Albany and/or Executive Director of Public Health). Treated waste water will be used for irrigating areas not used for recreation via sub-surface drippers, or similar as per requirements of the *2016 Draft Government Sewerage Policy*.

3.4.2 Hydraulic Load and Irrigation Area

Hydraulic load and the required irrigation area has been calculated based on *Schedule 3: Site Requirements for On-site Sewerage Disposal Systems* in *2016 Draft Government Sewerage Policy* and is shown in Table L. Based on the occupancy, design load rating, soil type and secondary treatment, 4,080m^2 is required for application of treated waste water (subsurface irrigation). Irrigation to landscaped areas will reduce the use of potable water and ensure appropriate reuse of treated waste water.

TABLE L: DETERMINATION OF LAND APPLICATION AREA (m^2) FOR DEVELOPMENT

Estimate of hydraulic load (L/day) = 20,400 L/day	Occupancy rate (persons) x design loading rate (L/person/day)	
	With peak occupancy of 180 people	Design loading rate of 140 L/person/ day (as per DoH, 2015)
Land application area (m^2) = **4,080m^2** required for land application/ subsurface irrigation	Hydraulic load (L/day) x conversion factor for sands (soil category 1) as per *AS/NZS 1547* On-site domestic wastewater management	
	Hydraulic load: **20,400 L/day**	0.2 (conversion factor for sands and secondary treatment)

Source: Government of Western Australia (2016)

3.4.3 Nutrient Input Management

The Western Australian Department of Water's *Water Quality Protection Note 22 – Irrigation with Nutrient Rich Wastewater* (July 2008) provides a framework for the permissible nutrient application rates for wastewater irrigation for different soil types and receiving environments. The framework allocates a risk category for a site depending on the potential for adverse environmental impacts to occur as a result of nutrient application through irrigation. Table M summarises the criteria for the risk category classifications.

TABLE M: SOIL AND RECEIVING ENVIRONMENT VULNERABILITY CATEGORIES

CHARACTERISTICS OF IRRIGATED SOILS	EUTROPHICATION RISK OF SURFACE WATERS WITHIN 500 METRES OF IRRIGATION SITE	RISK CATEGORY
Coarse grained soils e.g. sands and gravels	Significant	A
	Low	B
Fine grained soils (PBI above 100) e.g. loams, clays, clay	Significant	C
	Low	D

Source: Water Quality Protection Note 22 – Irrigation with Nutrient Rich Wastewater (DoW, July 2008)

Based on the risk category classification of a site, the DoW recommends a maximum nutrient application rate for nitrogen and phosphorus. These values are provided in Table N. Based on the soil characteristics of the proposed development site and the relative proximity to the Lake Vancouver and Goode Beach, the irrigation area falls into Category A. As such, the recommended loading rates in accordance with WQPN 22 would be 140 kg/ha of N and 10 kg/ha of phosphorus.

TABLE N: NUTRIENT APPLICATION RATES FOR SOIL/RECEIVING ENVIRONMENT RISK CATEGORIES

RISK CATEGORY	MAXIMUM INORGANIC NITROGEN (AS N) APPLICATION RATE (KG/HA/YR)	MAXIMUM REACTIVE PHOSPHORUS (AS P) APPLICATION RATE (KG/HA/YR)
A	140	10
B	180	20
C	300	50
D	480	120

Source: Water Quality Protection Note 22 – Irrigation with Nutrient Rich Wastewater (DoW, July 2008)

A secondary treatment system, with adequate servicing can remove nutrients such as nitrogen and phosphorus and reduce the nutrient load in treated waste water. The example output for an ATU which meets the specifications for sensitive areas is summarised in Table O. Table O indicates that the loading for nitrogen will be 9.6 kg/ha/year (below the DoW application rate of 140 kg/ha/year) when averaged across the subject land. In addition, loading for phosphorus will be 0.96 kg/ha/year (below the DoW application rate of 10 kg/ha/year).

TABLE O: NUTRIENT LOADING BASED ON SECONDARY TREATMENT & NUTRIENT REMOVAL

Waste Water Treatment Output Performance Criteria (secondary treatment system)	Volume treated L/day	Amount to be applied
Total Nitrogen <= 10 mg/L	20,400	0.204 kg/ day or 74.4 kg/ year Averaged over entire property (7.7 ha) , loading is 9.6 kg/ ha/ year of Nitrogen
Total Phosphorus <= 1 mg/L		0.02 kg/ day or 7.4 kg/ year Averaged over entire property (7.7ha), loading is 0.96 kg/ ha/ year of Phosphorus

3.5 STORMWATER MANAGEMENT AND DRAINAGE

Consideration has been given to the concepts for sustainable drainage management for the proposed development, in line with:

- Statement of Planning Policy 2.9 Water Resources;
- Better Urban Water Management (WAPC, 2008);
- Stormwater Management Manual for Western Australia (DoW, 2004 – 2007); and
- Decision Process for Stormwater Management (2009 and 2016 Draft for Consultation).

The approach to stormwater management will include:

- Mimicking natural hydrological processes:
  - maintain natural water bodies;
  - retain vegetation and plant where possible;
  - manage small rainfall event runoff at source;
  - minimise impervious surfaces;
  - provide overflow paths wherever practical; and
  - incorporate the forms and processes of natural systems into stormwater management.
- Integrate stormwater management in the land and water planning processes:

- The current planning stage (structure plan) allows for site and water assessment, determination of land required for water management, with detailed design to be undertaken at the rezoning / development application stage.

- Design stormwater management systems based on the local site parameters:
  - Baseline data has been collected regarding groundwater levels, soil types, permeability rates and phosphorous retention ability. The data collected indicates that stormwater management can be achieved with positive outcomes in terms of water reuse and water balance for the area.

Features to be incorporated into the design include:

- Installation of rain water tanks (plumbed in for re-use for all roof catchments).
- Flush kerbing of access roads for local infiltration.
- Infiltration swales to cater for minor rainfall events (first 15mm) from carparks.
- Catchment permeability exceeds 1% AEP intensity, so runoff and overland flow is unlikely.
- Appropriate treatments to prevent scouring, capture nutrients and hydrocarbons (e.g. armouring, use of materials such as limestone rubble and soil amendment).

Appendix 17 shows existing sub-catchments and conceptual treatments.

3.6 FORESHORE RESERVE

Lot 660 La Perouse Court has a boundary of 275m (Figure 7) which flanks a 30m wide foreshore reserve and an area of UCL (approximately 30m wide). The foreshore area was determined based on the need to balance a coastal setback and still allow for an adequate development exclusion area from Lake Vancouver (Alan Tingay and Associates, 1994).

A FMP was prepared for the subject land in 1994 as a condition of the CER in 1992 (Alan Tingay and Associates, 1992). As most of the lots were not created, only part of the FMP was implemented, including a pathway to Goode Beach from La Perouse Court. Parking is also incorporated into the cul de sac area.

The development of Vancouver Beach Resort will increase the use of the beach area, although use will most likely still be largely generated by local people, plus guests at the resort. Future management of the foreshore is proposed to be based on the coastal area experiencing mostly local use, emanating from the Vancouver Beach Resort. Treatments described below reflect the desire to keep the area as natural as possible, with low key infrastructure.

Foreshore management will comprise the following as shown in Figure 7 and Appendix 18:

- Pedestrian access from Lot 660;
- Existing public access and parking via La Perouse Court;
- Rehabilitation;
- Interpretation and signage.

3.6.1 Pedestrian Access via Lot 660

A key aspect of management of the interface between the Vancouver Beach Resort and Goode Beach is the provision of access through the foreshore reserve without compromising its conservation values. Formalising access will prevent degradation which could occur through the creation of multiple tracks. An existing path will be retained (northern area, Figure 7). Another path will be created along dune swales to avoid steep slopes and reduce the risk of erosion. Paths will be 2m wide and fenced on either side (Figure 7 and Appendix 18). Where soft sand is likely to create erosion risk, log chain steps, compacted limestone or a similar treatment will be used. To reduce wind scouring, the paths will enter the beach at an angle approximately 45^{o} to the prevailing summer and winter sea breezes (i.e. facing north east).

3.6.2 Existing Public Access and Parking – La Perouse Court

Pedestrian access to Goode Beach has been provided from La Perouse Court via a pathway (Figure 7). A small area adjacent to the path is suitable for parking. Access in this area will be improved by establishing a cul-de-sac head at the entry to Lot 660 (Figure 7).

3.6.3 Rehabilitation

Disturbed areas will be rehabilitated using local native species such as Peppermint (*Agonis flexuosa*) and Albany Woolly Bush (*Adenanthos sericeus*).

3.6.4 Signage

Signage consistent with the *National Aquatic and Recreational Signage Style Manual* (Ellis *et al.*, 2006) will be installed at entry points to the coast.

3.7 FIRE MANAGEMENT

Eco Logical Australia (ELA, 2017a) have prepared a Bushfire Management Plan (BMP) for the subject land, which his located in a designated bushfire prone area under the Western Australian State Map of Bush Fire Prone Areas and subject to planning requirements under State Planning Policy 3.7 Planning in Bushfire Prone Areas (WAPC, 2105) and reporting in accordance with the Guidelines for Planning in Bushfire Prone Areas V1.1 (WAPC, 2017).

Bio Diverse Solutions (BDS) has prepared a Bushfire Attack Level (BAL) contour map which depicts all buildings within the subject site as located in areas exposed to a BAL rating of BAL-29 or lower (Appendix 19). SPP 3.7 (Policy Measure 6.6) requires development applications for vulnerable land uses (such as tourist resorts) in areas between BAL-12.5 and BAL-29 to be accompanied by a BMP, an emergency evacuation plan for proposed occupants and/or a risk management plan for any flammable on-site hazards.

In response to the above requirements of SPP 3.7 and the Guidelines, bushfire management measures have been devised for the proposed development accordance with Guideline acceptable solutions to meet compliance with bushfire protection criteria. ‘Acceptable solutions’ have been used to meet all performance principles. The ‘acceptable solutions’ proposed meet the intent of each element of the bushfire protection criteria and include:

- Element 1 – Location: All proposed buildings will be located in areas subject to a BAL rating of BAL-29 or lower.
- Element 2 – Siting and design of development: An asset protection zone will be maintained between all proposed buildings and classified vegetation in the form of carparks, roads, as well as other non-vegetated and landscaped areas.
- Element 3 – Vehicular access: The proposed design meets the requirements relating to the need for two access routes, access to a public road, cul-de-sac requirements and provision of an emergency assess way.
- Element 4 – Water: Provision of reticulated water to the subject land.

The BMP also outlines requirements for implementation and enforcement which will be applied through the structure planning, rezoning and subsequent development application and building processes.

A Bushfire Emergency Evacuation Plan has been prepared for the proposed development (ELA, 2017b) in accordance with Policy Measure 6.6 of SPP 3.7.

3.8 MANAGEMENT DURING CONSTRUCTION

Clearing of vegetation and earthmoving activities in coastal environments need to be carefully managed to prevent sand erosion, dust generation and reduce noise. The timing of works and installation of control measures will have a major influence on how effective soil and water management is in reducing on-site erosion and dust during the construction process. Hygiene measures will also need to be put in place to prevent the introduction and spread of dieback. Prior to earthworks on site, a construction management plan will be prepared to demonstrate how risks relating to erosion, dust generation, noise and dieback will be minimised.

Fauna management will also be considered during construction, given the possible presence of WRP in the development footprint.

4 ACTIONS AND COMMITMENTS

The actions and commitments in Table P will be incorporated into the Structure Plan and guide more detailed planning for this project.

TABLE P: COMMITMENTS AND RESPONSIBILITIES

ISSUE	ACTION	TIMING	RESPONSIBILITY
Vegetation Protection	As part of a Construction Management Plan, delineation of vegetation to be protected and dieback management will be outlined for implementation. In addition, a Foreshore Management Plan will discuss reduction of risks related to introduction and spread of *Phythophthora* dieback disease.	Before site works commence	Proponent
Fauna	The area proposed to be cleared comprises habitat for Western Ringtail Possum. It is recommended that the proposal be referred to the DoEE under the EPBC Act.	During scheme amendment	Proponent
Aboriginal Heritage	Should the construction phase reveal the presence of artefacts, the Department of Aboriginal Affairs will be notified.	During earthworks, if applicable	Proponent and contractors
Coastal Processes and Setbacks	Requirements of SPP 2.6 will include setback of 68m from high water mark to incorporate S1, S2, S3, uncertainty and S4. Notification will be documented on the title regarding recognition of potential future coastline erosion.	Prior to finalisation of design stage. Title notification prior to completion of construction.	Proponent
Access	The main access will be via an existing track alignment to the west of Lake Vancouver. Emergency and pedestrian access will be via an existing track to the east of Lake Vancouver.	Construction phase	Proponent
On-site Effluent Disposal	Effluent treatment and on-site waste water disposal will be achieved with a secondary treatment ATU system with nutrient removing abilities. A 4,080m^2 subsurface irrigation area will be established in areas not frequented by guests.	Prior to installation and operation of systems	Proponent, with approval from the City of Albany

ISSUE	ACTION	TIMING	RESPONSIBILITY
Water Supply	While rain water will be captured for reuse, the Water Corporation reticulated system will provide potable water.	Construction phase	Proponent
Stormwater Management	Stormwater events (up to the first 15mm) will be captured and treated prior to infiltration. Larger events will be stored and infiltrated, with treatments to prevent erosion. No direct discharge will be directed to Lake Vancouver.	Construction phase	Proponent
Foreshore Reserve	Foreshore management will comprise establishment of two pedestrian access links to Goode Beach, formalization of parking in the La Perouse Court cul de sac, rehabilitation and stabilisation of cleared areas and installation of directional and interpretive signage.	Construction phase	Proponent, in consultation with the City of Albany
Fire Management	Implement Bushfire Management Plan and Bushfire Emergency Evacuation Plan	Construction and ongoing	Proponent
Construction	The risk of wind erosion and other degradation will be reduced through the preparation and implementation of a Construction Management Plan.	Preparation and approval of plan prior to site works commencing	Proponent and contractors

5 REFERENCES

Alan Tingay and Associates (1992) Residential Subdivision – Lot 401 Frenchman Bay, Albany. Consultative Environmental Review. Report No. 92/20. Prepared for L'Oire Nominees Pty Ltd.

Australian Soil Resource information System (2014) Sourced from: http://www.asris.csiro.au/index_ie.html# ASRIS

Beard, J.S. (1981) The vegetation of the Albany and Mt Barker Areas, Western Australia. Map and Explanatory Memoir. 1:250,000 Series. Vegetation Survey of Western Australia. Vegmap Publication. Second Edition.

Beard, J. S., Beeston, G.R., Harvey, J.M., Hopkins, A. J. M. and Shepherd, D. P. (2013) The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second edition. Conservation Science Western Australia 9: 1-152. Sourced at: http://map.beta.data.wa.gov.au/

Biodiverse Solutions (2017) AS 3959 Bushfire Attack Level (BAL) Contour Plan Report. Final 24 March 2017.

BOM, Bureau of Meteorology (2011) Sourced from: http://www.bom.gov.au/

BOM, Bureau of Meteorology (2014) Wind Roses sourced from: http://www.bom.gov.au/watl/wind/index.shtml

City of Albany (in preparation) City of Albany Local Planning Scheme No. 1. Albany, Western Australia.

DEC, Department of Environment and Conservation (2009a) Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes. Acid Sulfate Soil Guideline Series. Department of Environment and Conservation (DEC), Perth, WA.

DEC, Department of Environment and Conservation (2009b) (Draft) Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes. Acid Sulfate Soil Guideline Series. Department of Environment and Conservation (DEC), Perth, WA.

DoH, Department of Health (2015) Supplement to Regulation 29 and Schedule 9 – Wastewater System Loading Rates.

Eco Logical Australia (2017) Bushfire Management Plan. Vancouver Beach Resort, Albany. Prepared for Cherry Martin. Version 1.

Ellis, B. & Aquatic Signage Steering Committee (Australia) & Victoria. Dept. of Justice & Australian Water Safety Council & Surf Life Saving Australia et al. (2006) National aquatic and recreational signage style manual, 3rd ed, Dept. of Justice, Victoria.

Environmental Protection Authority (1993) Rezoning and Subdivision for Special Residential Development, Lot 401, La Perouse Court, Frenchman Bay. Report and Recommendations of the EPA. Bulletin 672.

Environmental Protection Authority (2000) Environmental Protection Of Native Vegetation In Western Australia. Clearing Of Native Vegetation, With Particular Reference To The Agricultural Area. Position Statement No. 2.

Gozzard, J.R. (1989) Albany Sheets. Environmental Geology Series, Geological Survey of Western Australia.

Landgate (2013) WA Atlas. Acid Sulfate Soil Risk. Sourced at: https://www2.landgate.wa.gov.au/bmvf/app/waatlas/

Landgate (2014) WA Atlas. Threatened Ecological Communities. DEC-020 (12-03-2014) Sourced 13 March 2014 at: https://www2.landgate.wa.gov.au/bmvf/app/waatlas/

Minister for Environment (1993) Rezoning and Subdivision for Special Residential Development Lot 401 La Perouse Court, Frenchman Bay, Albany. Proponent: L'oire Nominees Pty Ltd. Ministerial Statement 319.

MP Rogers and Associates (2017) Vancouver Beach Resort – Coastal Hazard Assessment and Risk Management Strategy. R835 Rev 0.

Rockwater Pty Ltd (1986) Groundwater Investigation of Lots 401 and 402 Vancouver Peninsula, Albany.

Rockwater Pty Ltd (1992) Groundwater Aspects of Residential Development, Frenchman Bay Albany.

Sandiford E.M. and Barrett, S. (2010) Albany Regional Vegetation Survey. Extent, Type and Status. Department of Environment and Conservation. Albany, Western Australia.

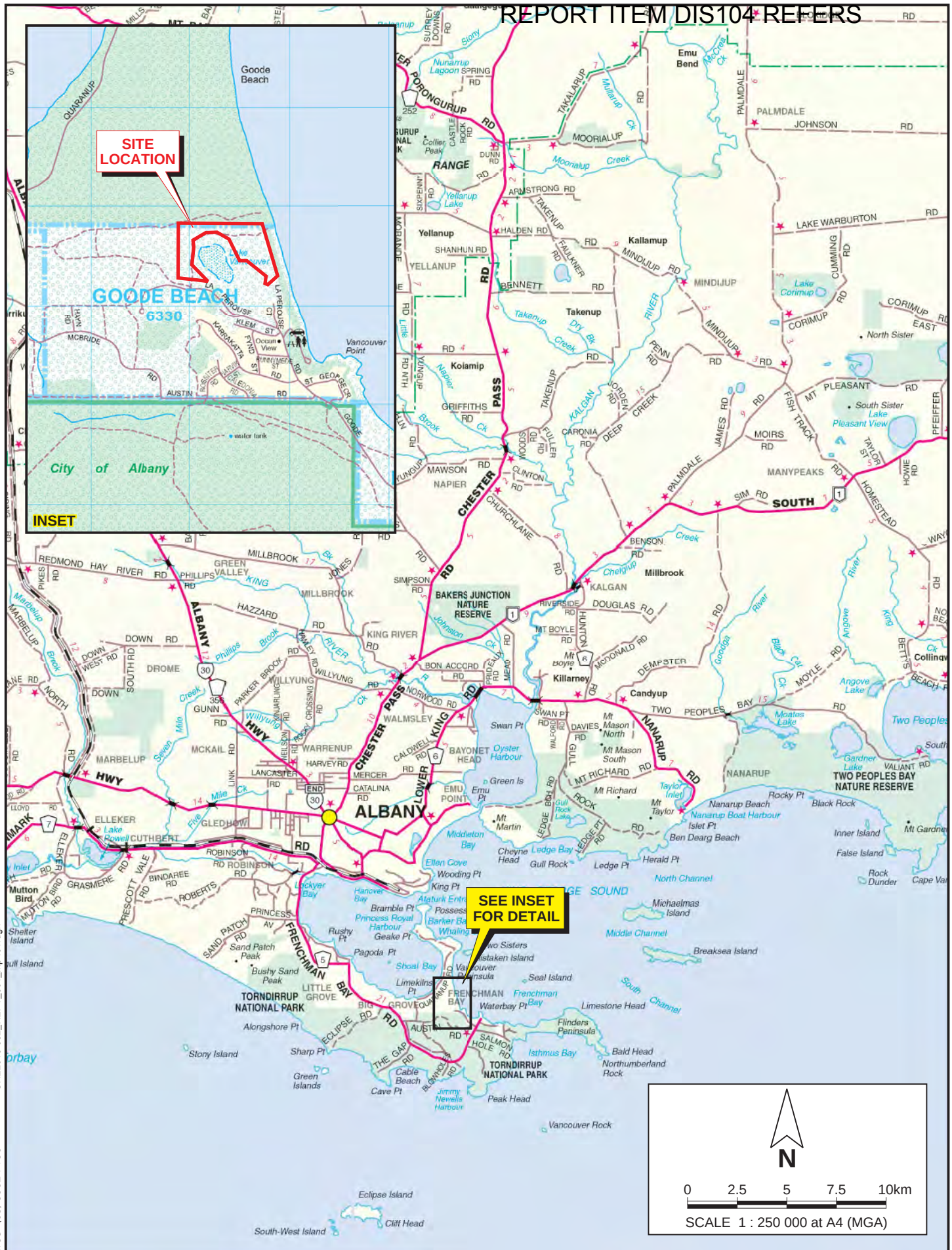
Smith, R.A. (1995) Mt Barker – Albany, WA. Western Australian Geological Survey, 1:250,000 Hydrogeological Series.

WAPC, Western Australian Planning Commission (2008) Planning Bulletin 64/2009. Acid Sulfate Soils. Perth, Western Australia.

WAPC, Western Australian Planning Commission (2013) State Planning Policy No. 2.6. State Coastal Planning Policy. *Planning and Development Act 2005*. Gazetted 30 July 2013.

WeatherZone (2014) Sourced on 23 January 2014 from: http://www.weatherzone.com.au/climate/station.jsp?lt=site&lc=9500

FIGURES



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PINPOINT CARTOGRAPHICS (08) 9562 7136

Aurora environmental

Cherry Martin
ENVIRONMENTAL ASSESSMENT - VANCOUVER BEACH RESORT
LOT 40 LA PEROUSE COURT - GOODE BEACH, CITY OF ALBANY, WA

Figure 1

REGIONAL LOCATION

Drawn: M. Price | Date: 7 Feb 2017 | Job: CHE2016-002

N

0 10 20 30 40 50m

SCALE 1 : 1 500 at A3 (MGA)

Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Topographic Contour
- Proposed Clearing Footprint

6 117 400mN

6 117 200mN

Lake Vancouver

LA PEROUSE ROAD

585 000mE

585 200mE

585 400mE

CADASTRAL SOURCE: Landgate, December 2016.
CONTOUR SOURCE: Alan Tingay & Associates, Figure 4.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown November 2016.

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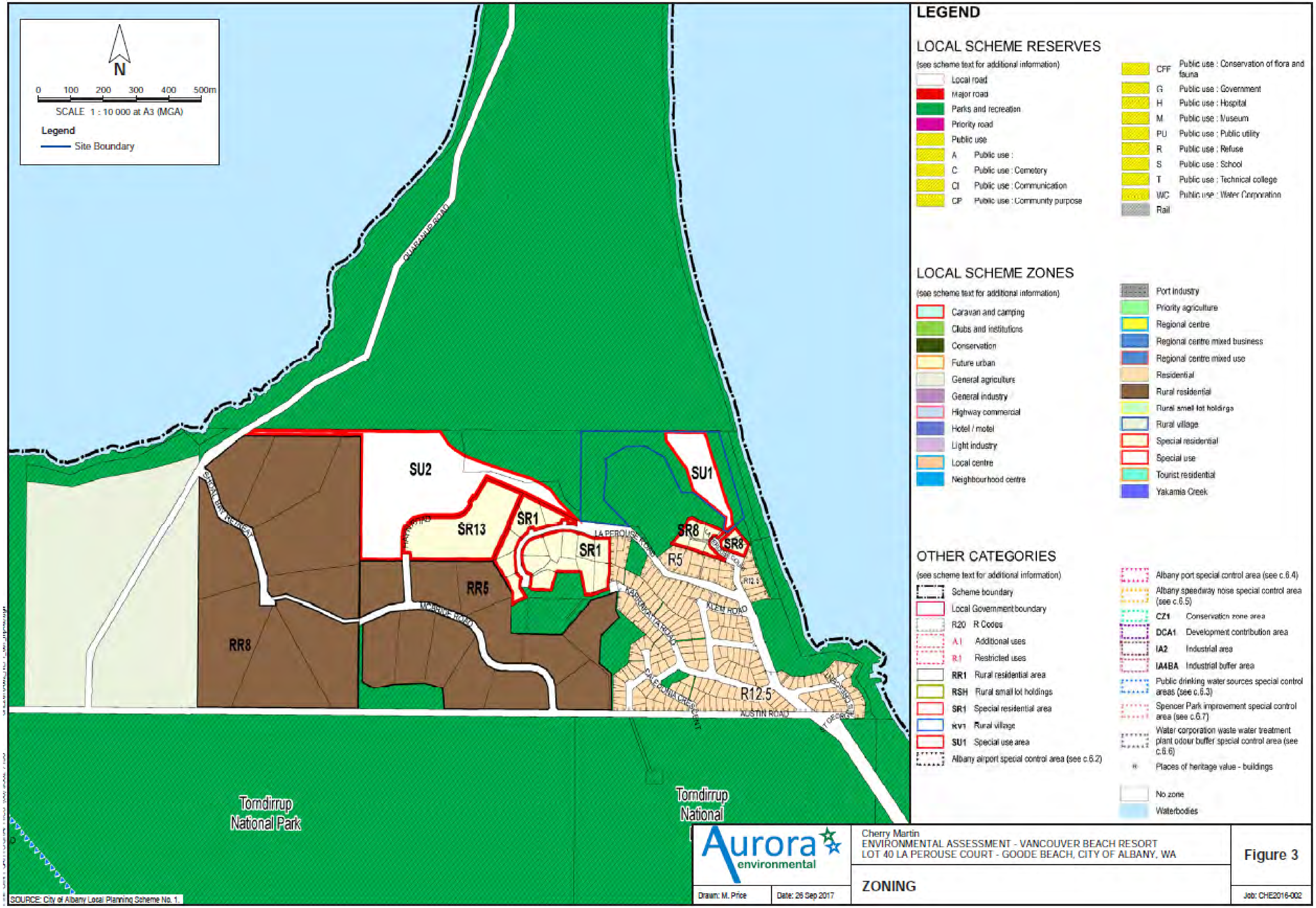
ENVIRONMENTAL ASSESSMENT - VANCOUVER BEACH RESORT
LOT 40 LA PEROUSE COURT - GOODE BEACH, CITY OF ALBANY, WA

Figure 2

SUBJECT LAND

Drawn: M. Price | Date: 11 May 2017 | Job: CHE2016-002

PINPOINT CARTOGRAPHICS (08) 9562 7136 CHE2016-002_REPT_001_mp-l02.dgn



N
0 100 200 300 400 500m
SCALE 1 : 10 000 at A3 (MGA)
Legend
Site Boundary
LEGEND
LOCAL SCHEME RESERVES
(see scheme text for additional information)
Local road
Major road
Parks and recreation
Priority road
Public use
A Public use :
C Public use : Cemetery
CI Public use : Communication
CP Public use : Community purpose
CFF Public use : Conservation of flora and fauna
G Public use : Government
H Public use : Hospital
M Public use : Museum
PU Public use : Public utility
R Public use : Refuse
S Public use : School
T Public use : Technical college
WC Public use : Water Corporation
Rail
LOCAL SCHEME ZONES
(see scheme text for additional information)
Caravan and camping
Clubs and institutions
Conservation
Future urban
General agriculture
General industry
Highway commercial
Hotel / motel
Light industry
Local centre
Neighbourhood centre
Port industry
Priority agriculture
Regional centre
Regional centre mixed business
Regional centre mixed use
Residential
Rural residential
Rural small lot holdings
Rural village
Special residential
Special use
Tourist residential
Yakamia Creek
OTHER CATEGORIES
(see scheme text for additional information)
Scheme boundary
Local Government boundary
R20 R Codes
A1 Additional uses
R1 Restricted uses
RR1 Rural residential area
RSH Rural small lot holdings
SR1 Special residential area
RV1 Rural village
SU1 Special use area
Albany airport special control area (see c.6.2)
Albany port special control area (see c.6.4)
Albany speedway noise special control area (see c.6.5)
CZ1 Conservation zone area
DCA1 Development contribution area
IA2 Industrial area
IA4BA Industrial buffer area
Public drinking water sources special control areas (see c.6.3)
Spencer Park improvement special control area (see c.6.7)
Water corporation waste water treatment plant odour buffer special control area (see c.6.6)
Places of heritage value - buildings
No zone
Waterbodies
QUARANTINE ROAD
SU2
SU1
SR13
SR1
SR1
SR8
SR8
RR5
RR8
R5
R12.5
LA PEROUSE ROAD
MCBRIDE ROAD
AUSTIN ROAD
Torndirrup National Park
Torndirrup National
SOURCE: City of Albany Local Planning Scheme No. 1.
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ENVIRONMENTAL ASSESSMENT - VANCOUVER BEACH RESORT
LOT 40 LA PEROUSE COURT - GOODE BEACH, CITY OF ALBANY, WA
Figure 3
ZONING
Drawn: M. Price
Date: 26 Sep 2017
Job: CHE2016-002

Map Unit	Equivalent unit on geological maps	Physical Properties			
		Permeability	Shrink swell potential	Cohesion	Comment
Sp1	Ql (lake and swamp deposits)	Low to medium	Low	Low to medium	Unsuitable for foundations and effluent disposal. High water table, prone to flooding, high organic matter.
S2	Qf (beach and dune sand)	High	None	None	Limesand. Unsuitable for foundations. Suitable for effluent disposal. Susceptible to wind erosion. Suitable for neutralising acids.
S13		High	None	None	Limesand. Suitable for foundations. High water table, constraints to effluent disposal.

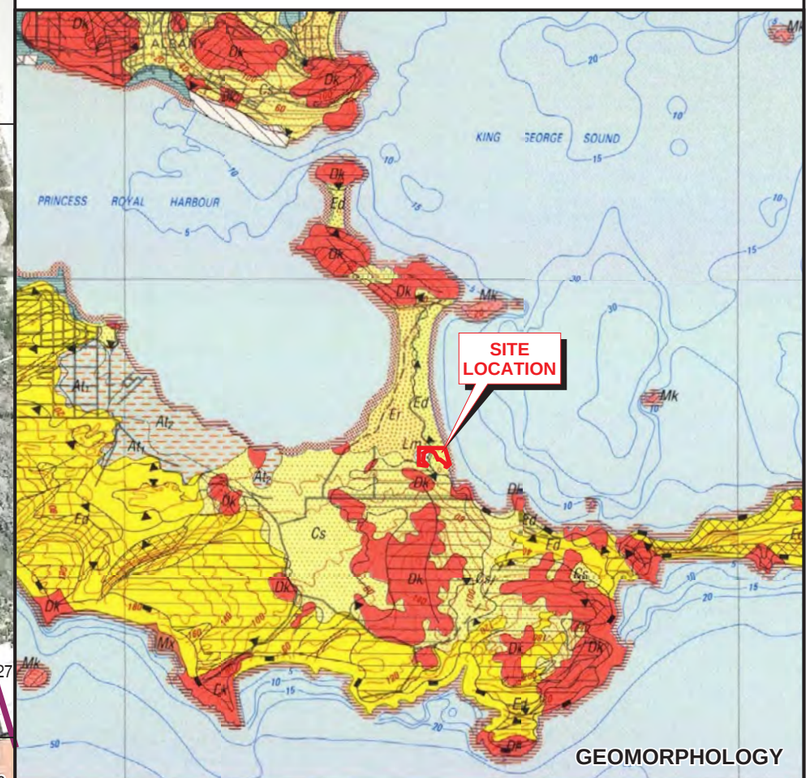
Geology Legend

SP1 PEATY SAND - dark grey and black, medium-grained quartz, variable organic content.

S2 SAND - white, medium to coarse-grained, moderately well sorted, quartz and shell debris.

S6 SAND - pale grey, fine to coarse, angular to sub-rounded quartz, loose, moderately sorted, occasional pebbles of laterite.

S13 SAND - white, medium-grained rounded quartz and shell debris.



GEOMORPHOLOGY

N

0 20 40 60 80 100m

SCALE 1 : 2 000 at A3 (MGA)

585 200mE

585 400mE

6 117 400mN

6 117 200mN

6 117 000mN

R 25295 8168

R 28111 7763

R 48916 8244

R 45735 8023

R 43527 8022

R 43527 7821

R 49639 8246

S13

S2

Sp1

S6

CHE007

CHE008

CHE006

CHE005D

CHE005C

CHE005B

CHE005A

CHE005

Lot 660

Lake Vancouver

LA PEROUSE

ROAD

Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Proposed Clearing Footprint
- Geology Boundary
- S2 Geology Type
- Sampling Location

CADASTRAL SOURCE: Landgate, December 2016.
CONTOUR SOURCE: Alan Tingay & Associates, Figure 4.
AERIAL PHOTOGRAPH SOURCE: Landgate, flown November 2016.
GEOLOGY SOURCE: Geological Survey of WA, 1:50 000 Environmental Geology.

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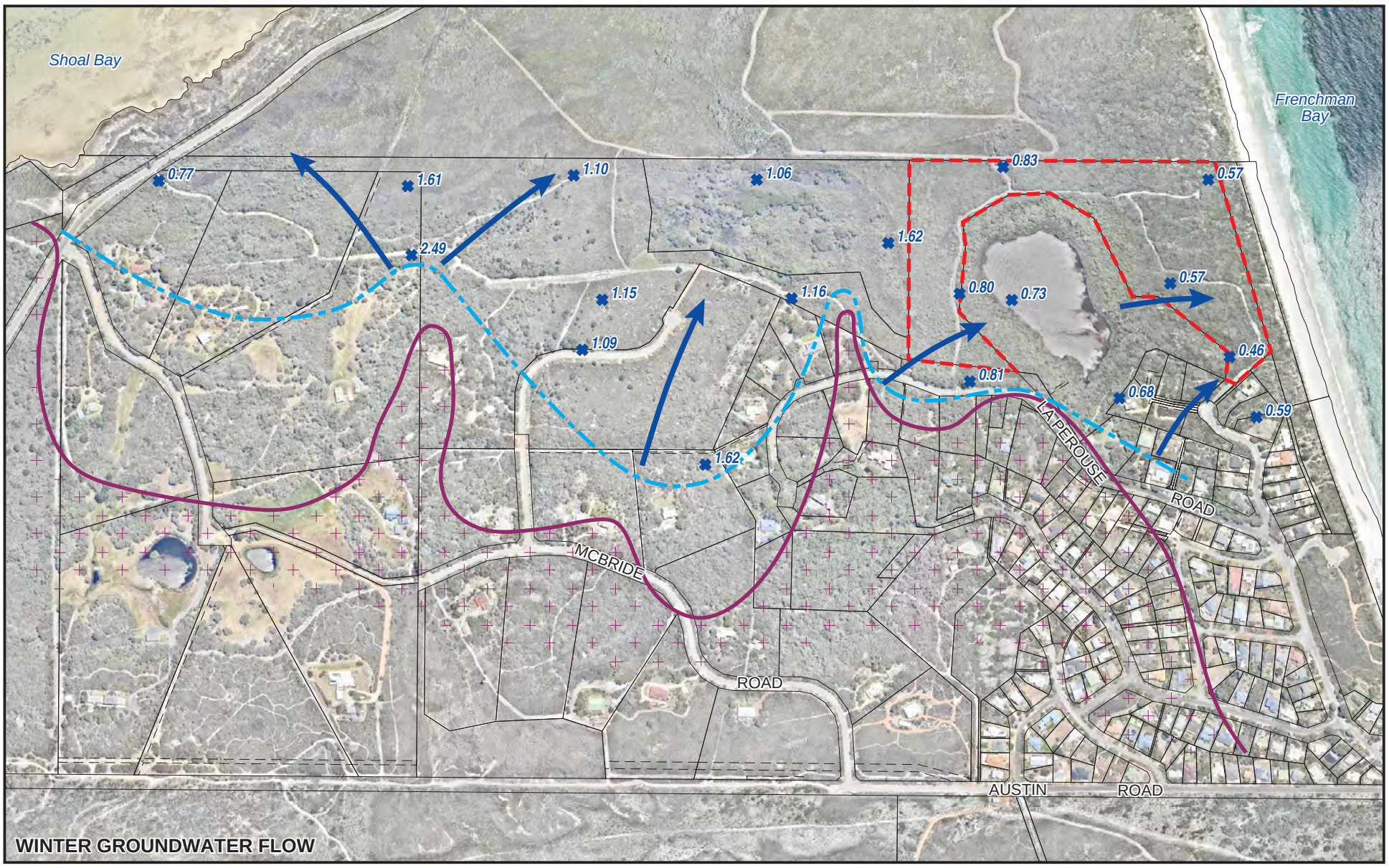
ENVIRONMENTAL ASSESSMENT - VANCOUVER BEACH RESORT
LOT 40 LA PEROUSE COURT - GOODE BEACH, CITY OF ALBANY, WA

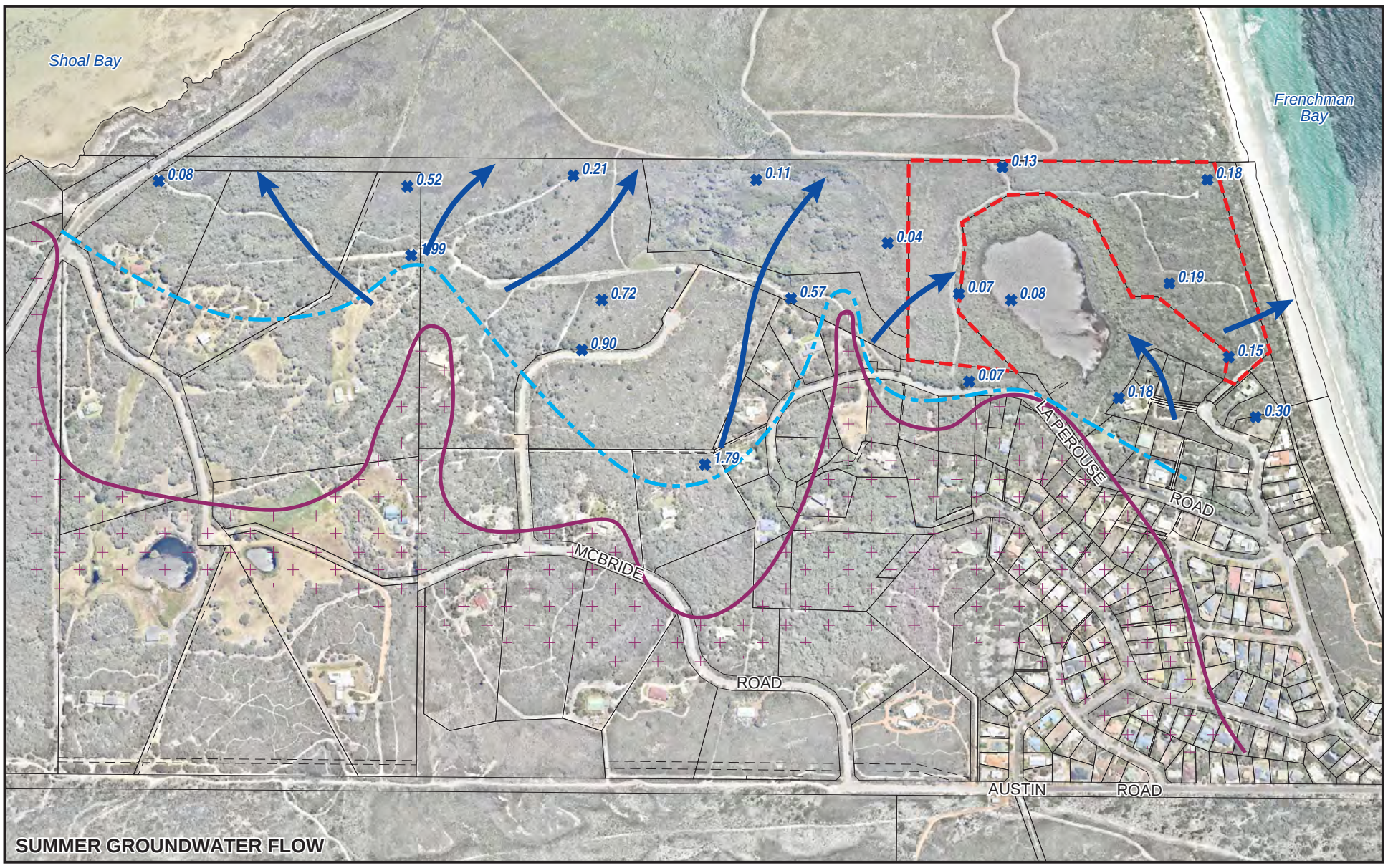
GEOMORPHOLOGY AND ENVIRONMENTAL GEOLOGY

Figure 4

Drawn: M. Price | Date: 11 May 2017 | Job: CHE2016-002

PINPOINT CARTOGRAPHICS (08) 9562 7136 CHE2016-002_REPT_001_mp-f04.dgn





Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Direction of Groundwater Flow
- Inferred Subsurface Contact Between Water Table of Granite Bedrock
- Approximate Boundary of Outcropping Granite
- 1.79 Water Level in Shallow Observation Bore Measured 02-09-86, mAHD

N

0 50 100 150 200 250m

SCALE 1 : 7 500 at A3 (MGA)

CADASTRAL SOURCE: Landgate, December 2016.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown November 2016.
GROUNDWATER FLOW SOURCE: Alan Tingay & Associates, Figure 6 & 7, 1992.

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ENVIRONMENTAL ASSESSMENT - VANCOUVER BEACH RESORT
LOT 40 LA PEROUSE COURT - GOODE BEACH, CITY OF ALBANY, WA

Figure 5

GROUNDWATER FLOW

Drawn: M. Price | Date: 7 Feb 2017 | Job: CHE2016-002

585 000mE
585 200mE
585 400mE
6 117 400mN
6 117 200mN

N
0 10 20 30 40 50m
SCALE 1 : 1 500 at A3 (MGA)

Mt
Af
AfAs
Le
McBl
AfEMt
Et
Lake Vancouver
Water
LA PEROUSE ROAD

Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Proposed Clearing Footprint
- Proposed Road/Path
- Proposed Building/Structure
- Vegetation Type Boundary
- AfAs Vegetation Type

Vegetation Types

Et - *Euphorbia tarrecina* Herbland
AfAs - *Agonis flexuosa*/*Adenanthos sericeus* Closed Scrub
Af - *Agonis flexuosa* Closed Scrub
AfEMt - *Agonis flexuosa*/*Eucalyptus* spp Woodland over *Melaleuca thymoides* Low Heath
Mt - *Melaleuca thymoides* Low Heath
McBl - *Melaleuca cuticularis*/*Banksia littoralia* Low Woodland
Le - *Leptocarpus elegans* Sedgeland

CADASTRAL SOURCE: Landgate, December 2016.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown November 2016.
DEVELOPMENT SOURCE: GKA, Dwg No. 1503-SK100, Rev A, 24-11-16.

PINPOINT CARTOGRAPHICS (08) 9562 7136
CHE2016-002_REPT_001_mp-f06.dgn

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Cherry Martin
ENVIRONMENTAL ASSESSMENT - VANCOUVER BEACH RESORT
LOT 40 LA PEROUSE COURT - GOODE BEACH, CITY OF ALBANY, WA

Figure 6

VEGETATION TYPES

Drawn: M. Price | Date: 11 May 2017 | Job: CHE2016-002

585 000mE
585 200mE
585 400mE
6 117 400mN
6 117 200mN

New Entry Road (6.0m Wide)
Car Park
Existing Path to Beach
Beach Access
PROPOSED RESORT
Pool
Car Park
Beach Access
Pedestrian, Maintenance and Emergency Access (Paved with Compacted Limestone)
Reticulation Zone (4000m²)
3.5m Wide Fire Truck Access Road
100m Offset from Lake
Lake Vancouver
Resort Main Entry Road
Access Control Gate
Existing Path to Beach
Install Cul De Sac Head
Existing Parking
LA PEROUSE ROAD

N

0 10 20 30 40 50m

SCALE 1 : 1 500 at A3 (MGA)

Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Proposed Road/Path
- Proposed Building/Structure
- Proposed Clearing Footprint

CADASTRAL SOURCE: Landgate, December 2016.
CONTOUR SOURCE: Alan Tingay & Associates, Figure 4.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown November 2016.
DEVELOPMENT SOURCE: GKA, Dwg No. 1503-SK101, Rev A, 20-04-17.

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ENVIRONMENTAL ASSESSMENT - VANCOUVER BEACH RESORT
LOT 40 LA PEROUSE COURT - GOODE BEACH, CITY OF ALBANY, WA

Figure 7

DEVELOPMENT AND MANAGEMENT TREATMENTS

Drawn: M. Price | Date: 11 May 2017 | Job: CHE2016-002

CHE2016-002_REPT_001_mp-f07.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136

APPENDIX 1

Zone Provisions - Local Planning Scheme No. 1

Schedule 4 – Special Use Zones [cl.4.7]

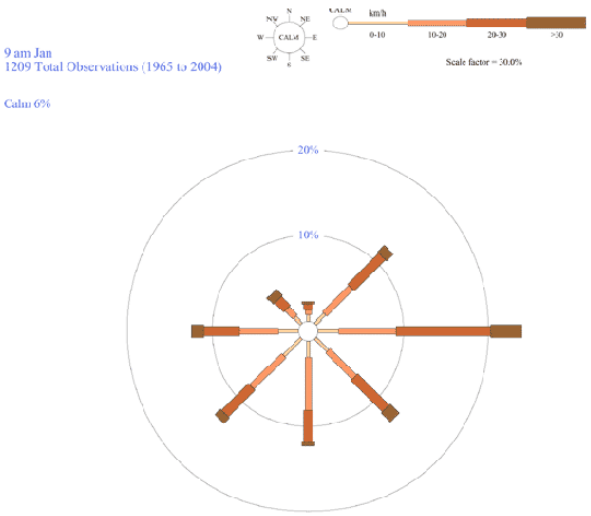
No.	Description of Land	Special Use	Conditions
SU1	Pt. Lot 660 La Perouse Road, Goode Beach Plan 036832	Holiday Accommodation (Chalets)	1. Prior to commencement of development of the special uses on the site, the owner/developer shall submit an overall Development Guide Plan to the Local Government for endorsement. 2. The Development Guide Plan shall provide details on the development for the site including: (a) Achieving a low-key holiday accommodation development commensurate (maximum 10 Chalet/Cottage Units) with the fragile coastal nature of the area; (b) Buildings being clustered together; (c) Siting of buildings and access roads within degraded/cleared areas to minimise clearing required for servicing and built development; (d) The buildings to be sited away from the eastern boundary with the coastline to protect coastal processes and the significant sand dunes in this area; (e) Building density, design, colours and materials to blend the buildings within the site; (f) Coastal setbacks and Foreshore Management Plan; (g) On-site stormwater drainage, effluent disposal methods and impacts on Lake Vancouver hydrology; (h) Potable water supply; (i) Implementation of a Fire Management Plan incorporating the existing fire access tracks within the area; and (j) Any additional controls required to be implemented to ensure the proposal complies with the objective of providing low-key holiday accommodation on the site.
SU2	Lot 200 Hayn Road, Goode Beach Plan 049833	Caretaker's Dwelling Chalet/Cottage Units Home Occupation Recreation - Private Restaurant	1. All subdivision, development and land use shall be generally in accordance with the Development Guide Plan endorsed by the CEO. 2. There shall be a maximum of 12 Chalet/Cottage Units permitted to be developed.

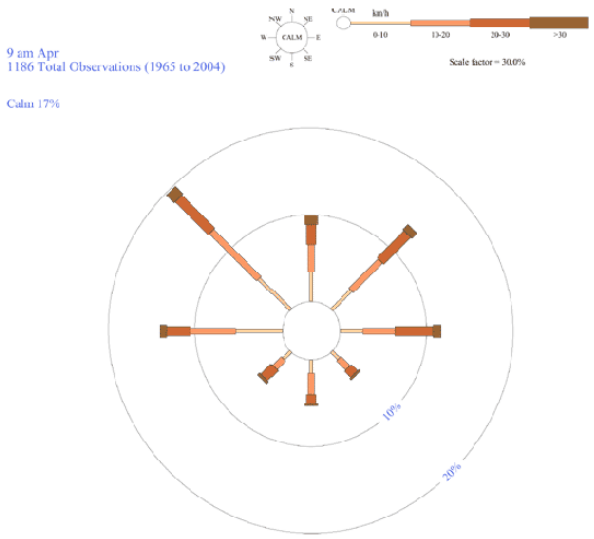
APPENDIX 2

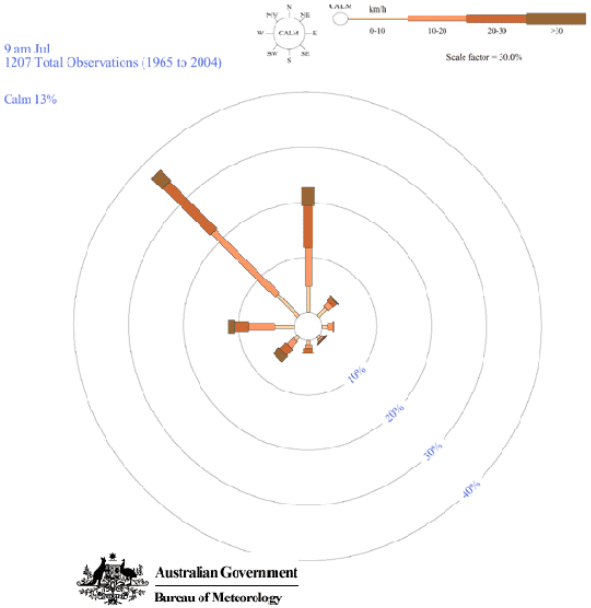
Wind Roses – Albany

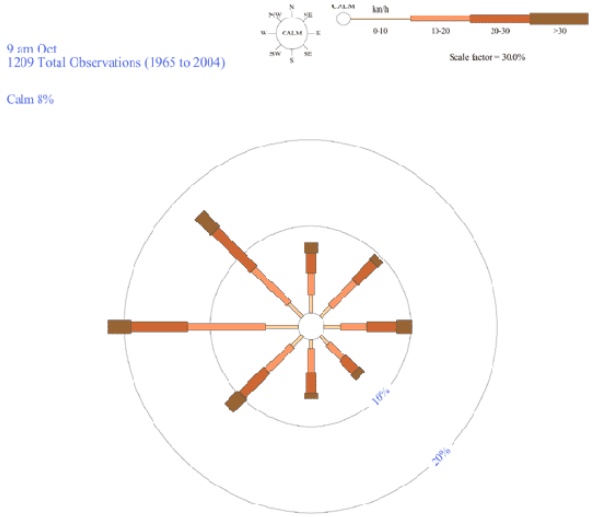
Appendix 2: Albany Wind Roses

Wind Roses for Albany Airport at 9am

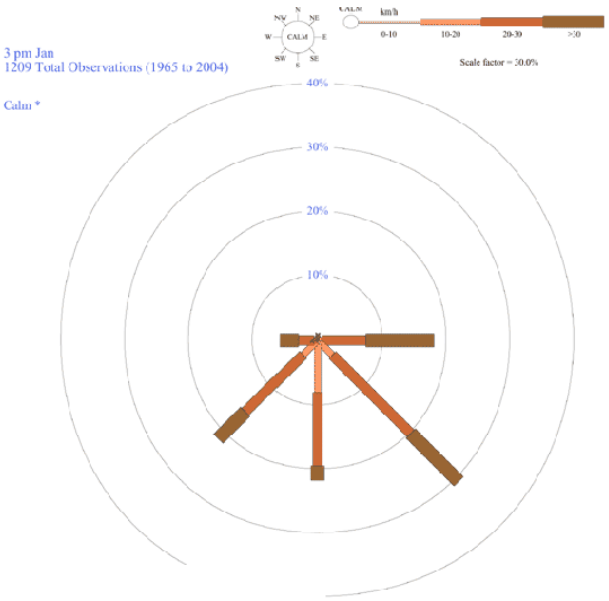


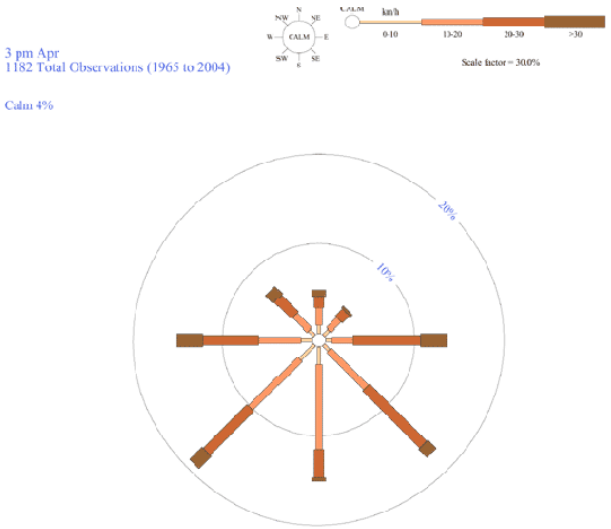


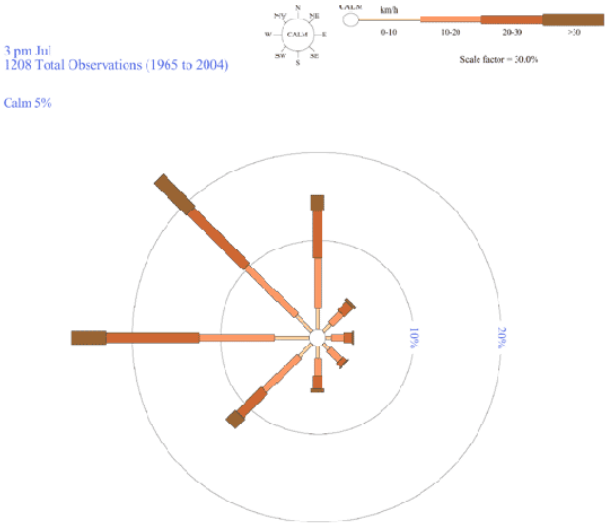


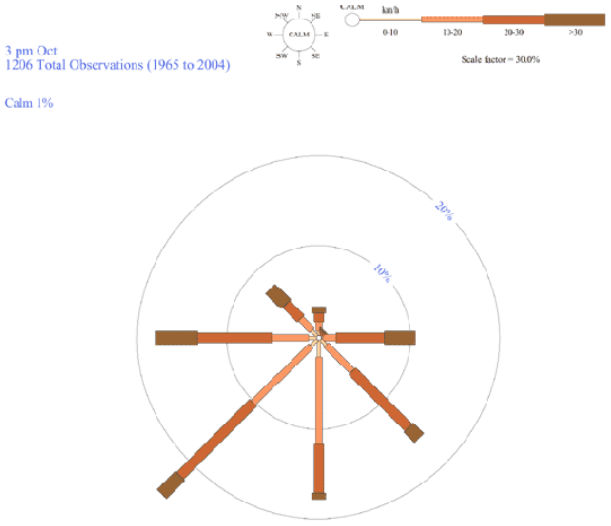


Wind Roses for Albany Airport at 3pm









Australian Government
Bureau of Meteorology

APPENDIX 3

Soil Profile Logs

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Bore Log

BORE HOLE No: CHE005

Project:	Vancouver Beach Resort	**Client:** CM	
Location:	CHE005	**Job No:**	CHE 2016-002

Elevation:		m, AHD	**Logged By:**	MP	
Coordinates:	N: 35°5.076	E: 117 56.723	**Date Logged:**	28/11/16	
Drill Method:	Excavator / auger		**Checked By:**		
Driller:	Steve Baker Trenching		**Initial Water Level: (m)**		**Static Water Level (m)**

Geological Unit	Depth (m)	Well Construction	Samples/Measurements	Graphic Log	Unified Soil Classification	Description (Trace <10%; Little 10%-20%; Some 20%-30%)
	0					0-15cm grey fine sand w/ organic matter
	1					Light / grey / brown fine sand
						15-30 light fine grained sand cream coloured
						GWA 1.1 BGL
						Infill silica sand 30 1.1
						Bottom of trench - slumping due to ground water.
						Slumping sands prevented deeper excavation
						Piezometer installed:
						Depth 2.71 m TOC
						SWL 1.67 m TOC
						TOC 0.42 m GL
						SWL 1.25 mBGL

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Bore Log

BORE HOLE No: CHE 006

Project:	Vanuovel Beach	**Client:**	Martin
Location:	CHE 006 Lot 660 La Perouse.	**Job No:**	CHE0016-002
Elevation:	m, AHD	**Logged By:**	MP
Coordinates:	N: 3505·035 E: 117·56·137	**Date Logged:**	
Drill Method:	Excavator Auger	**Checked By:**	
Driller:	Rob's Trenching	**Initial Water Level: (m)**	**Static Water Level (m)**

Geological Unit	Depth (m)	Well Construction	Samples/Measurements	Graphic Log	Unified Soil Classification	Description (Trace <10%; Little 10%-20%; Some 20%-30%)
	0					0 Dark brown / peaty / black High level of organics. 70cm White / cream sand 170cm Strong smell – sulpherous. Water at 2.0m BGL piezometer installed to approx 2.5m BGL. Depth from TOC 2.77m TOC 0.30m SWL 1.55m BTOC Slumping sands prevented deeper excavation. SWL = 1.25m BGL
	1					

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Bore Log

BORE HOLE No: CHE 007

Project:	Yanchep Beach Road	**Client:**	Cherry Martin
Location:	CHE 007	**Job No:**	CHE 2016-002

Elevation:	m, AHD	**Logged By:**	MP
Coordinates:	N: 35 04.4776 E: 117 56.1126	**Date Logged:**	28/11/16
Drill Method:	Bobcat w/ excavator	**Checked By:**	
Driller:	Barker Trenching	**Initial Water Level: (m)**	**Static Water Level (m)**

Slumping sand prevented deeper excavation.

Geological Unit	Depth (m)	Well Construction	Samples/Measurements	Graphic Log	Unified Soil Classification	Description (Trace <10%; Little 10%-20%; Some 20%-30%)
	0					Trench on track.
						0
						Slight organic matter & roots.
						grey/white sand - fine grained
						Grading to white/cream.
	1					100cm
						light brown/cream sand ~ / shells
	2					shells GW @ 2m BGL
						Piezometer Installed
						3.28m TOC Total Depth.
						SWL 2.85 TOC
						TOC 0.61AHD
						SWL = 2.24 m BGL

APPENDIX 4

Phosphorus Buffering Index Results

	Lab No	5DS16158	5DS16159	5DS16160	5DS16161	5DS16162	5DS16164	5DS16165
	Name	CHE005A	CHE005B	CHE005C	CHE006	CHE006	CHE007	CHE005D
	Code	Lot 660	Lot 660	Lot 660	Lot 660	Lot 660	Lot 660	Lot 660
	Customer	Martin	Martin	Martin	Martin	Martin	Martin	Martin
	Depth	0-10	1-10	0-10	0-10	70-100	0-10	0-10
Phosphorus Colwell	mg/Kg	4	6	2	3	< 2	3	3
Potassium Colwell	mg/Kg	23	< 15	26	84	< 15	< 15	< 15
PBI		14.8	10.4	4.9	5.8	11.0	3.5	< 1.0

APPENDIX 5

Soil Permeability Results

Job No.:	CHE-2016-002		
	Lot 660 La Perouse Court, Goode		
Site:	Beach	**Zone:**	50
Location ID:	CHE005	**Northing:**	6117174
Operator:	MP	**Easting:**	585420
Date:	28/11/2016	**Slope:**	Flat, near dunes

Vegetation: Next to track, Native vegetation
Soil structure: Grey to white sands, becoming creamy coloured
Groundwater at 1.1m BGL

Average time to fall 10cm:	4.04	sec
Depth of water in hole:	50	cm
Diameter of test hole:	8	cm
Depth to impermeable layer:	0	cm
Diameter of water reservoir:	6	cm
Diameter of air inlet tube:	0.8	cm

The method of calculation is taken from AS 1547:2012 On-site Domestic Wastewater Management

$$K_{sat} = \frac{4.4Q\left[0.5\sinh^{-1}\left(\frac{H}{2r}\right) - \sqrt{\left\{\left(\frac{r}{H^2}\right)+0.25\right\}} + \frac{r}{H}\right]}{2\pi H^2}$$

where

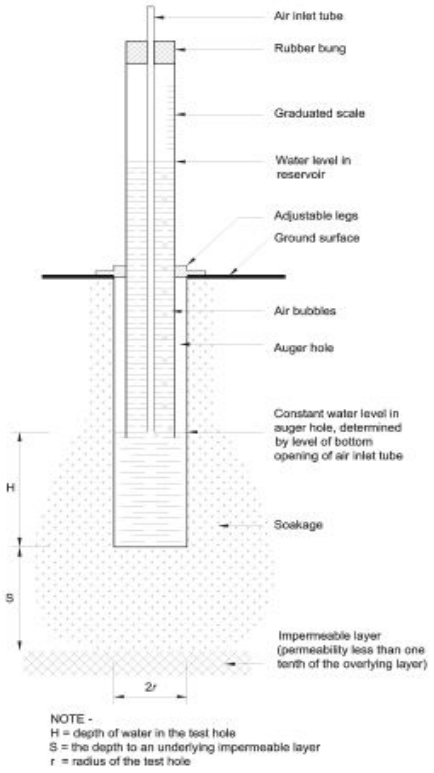
K_{sat} = saturated hydraulic conductivity of the soil in cm/min

4.4 = correction factor for a systematic under-estimate of soil permeability in the mathematical derivation of the equation

Q = rate of loss of water from the reservoir in cm^3/min

H = depth of water in the test hole in cm

r = radius of the test hole in cm

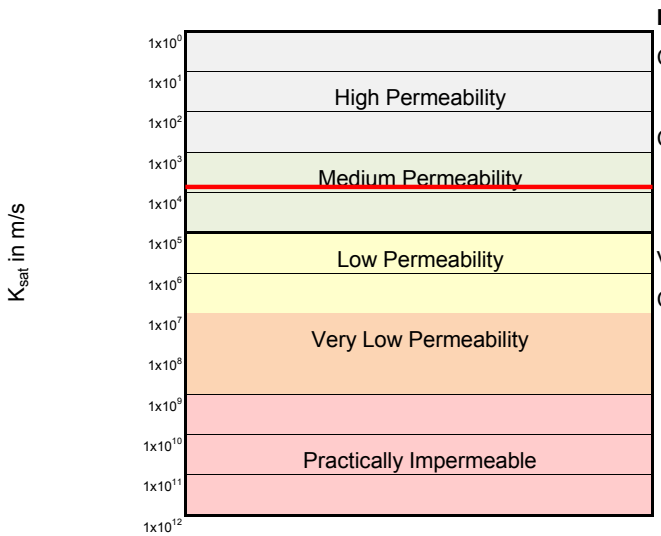


Rate of water loss

Q= 0.0687 L/sec
Q= 4124.1 cm^3/min

Saturated hydraulic conductivity

K_{sat}= 0.98 cm/min
K_{sat}= 14.05 m/day
K_{sat}= 1.63E-04 m/sec



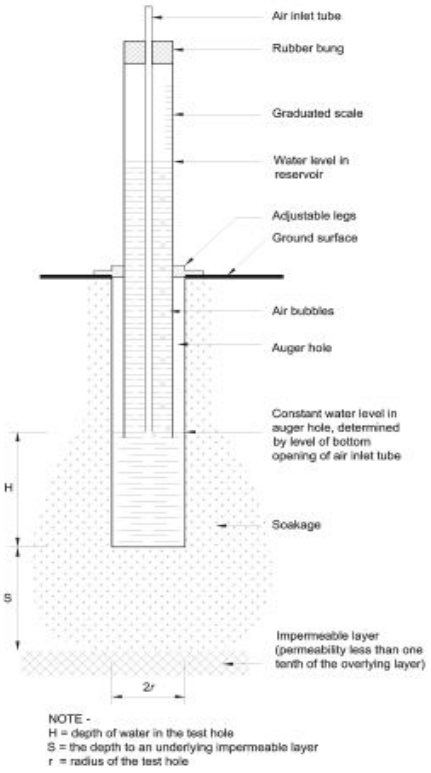
Inferred Soil Type

Clean gravels
Clean sands, sand gravel mixes
Very fine sands, silts and silty sands
Clay silts (greater than 20% clay)

Job No.:	CHE-2016-002		
	Lot 660 La Perouse Court, Goode		
Site:	Beach	**Zone:**	50
Location ID:	CHE006	**Northing:**	6117249
Operator:	MP	**Easting:**	585291
Date:	28/11/2016	**Slope:**	Flat, near dunes

Vegetation: Next to track, Native vegetation
Soil structure: Grey to white sands, becoming creamy coloured
Groundwater at 2m BGL

Average time to fall 10cm:	10.87	sec
Depth of water in hole:	50	cm
Diameter of test hole:	8	cm
Depth to impermeable layer:	0	cm
Diameter of water reservoir:	6	cm
Diameter of air inlet tube:	0.8	cm



The method of calculation is taken from AS 1547:2012 On-site Domestic Wastewater Management

$$K_{sat} = \frac{4.4Q\left[0.5\sinh^{-1}\left(\frac{H}{2r}\right) - \sqrt{\left\{\left(\frac{r}{H^2}\right)+0.25\right\}} + \frac{r}{H}\right]}{2\pi H^2}$$

where

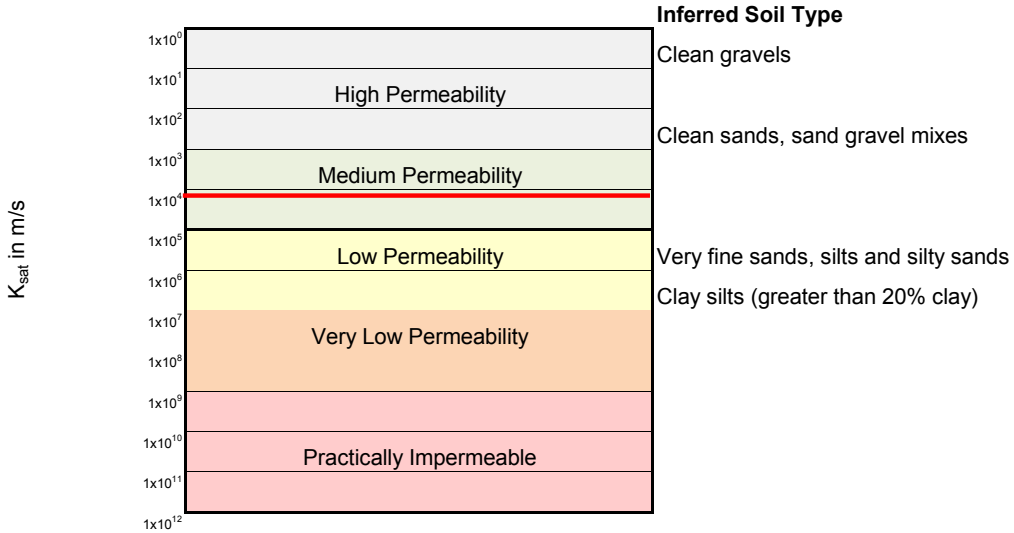
- K_{sat} = saturated hydraulic conductivity of the soil in cm/min
- 4.4 = correction factor for a systematic under-estimate of soil permeability in the mathematical derivation of the equation
- Q = rate of loss of water from the reservoir in cm^3/min
- H = depth of water in the test hole in cm
- r = radius of the test hole in cm

Rate of water loss

Q=	0.0255	L/sec
Q=	1533.0	cm^3/min

Saturated hydraulic conductivity

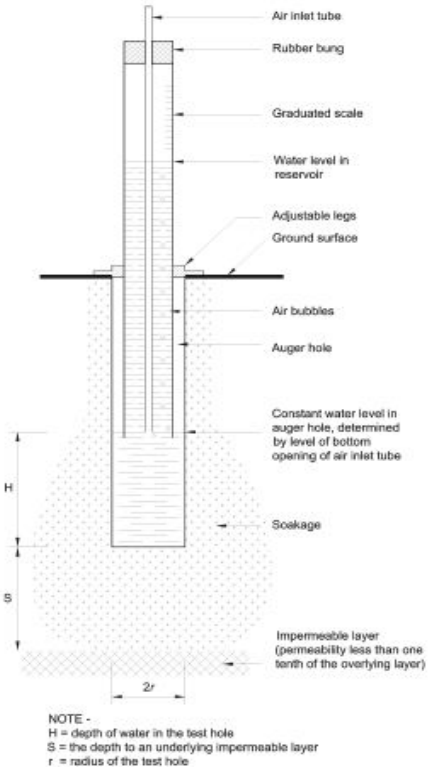
K_{sat}=	0.36	cm/min
K_{sat}=	5.22	m/day
K_{sat}=	6.04E-05	m/sec



Job No.:	CHE-2016-002		
	Lot 660 La Perouse Court, Goode		
Site:	Beach	**Zone:**	50
Location ID:	CHE008	**Northing:**	6117355
Operator:	MP	**Easting:**	585286
Date:	28/11/2016	**Slope:**	Slope, part of dune

Vegetation: Next to track, Native vegetation
Soil structure: Grey to white sands, becoming creamy coloured
0

Average time to fall 10cm:	8.55	sec
Depth of water in hole:	50	cm
Diameter of test hole:	8	cm
Depth to impermeable layer:	0	cm
Diameter of water reservoir:	6	cm
Diameter of air inlet tube:	0.8	cm



The method of calculation is taken from AS 1547:2012 On-site Domestic Wastewater Management

$$K_{sat} = \frac{4.4Q\left[0.5\sinh^{-1}\left(\frac{H}{2r}\right) - \sqrt{\left\{\left(\frac{r}{H^2}\right)+0.25\right\}} + \frac{r}{H}\right]}{2\pi H^2}$$

where

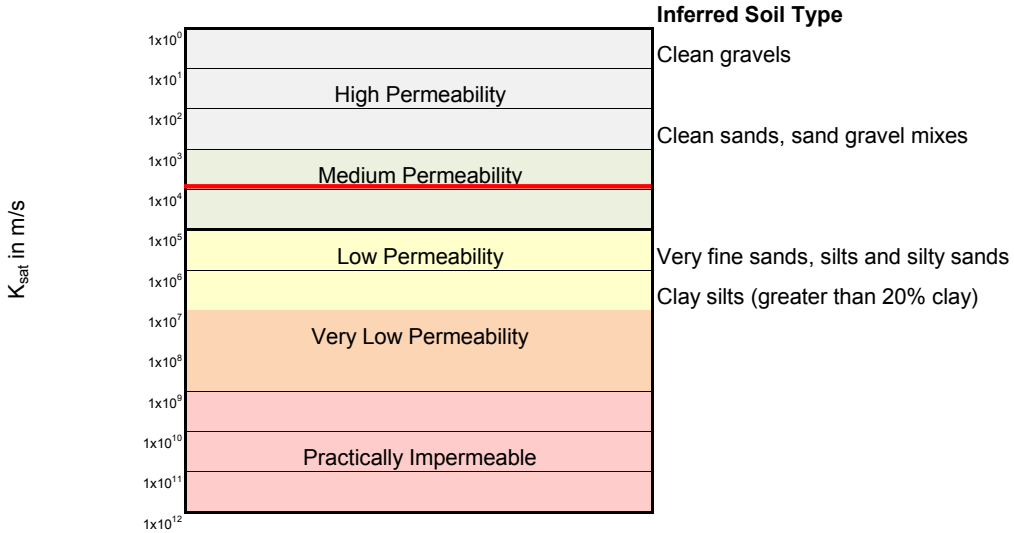
- K_{sat} = saturated hydraulic conductivity of the soil in cm/min
- 4.4 = correction factor for a systematic under-estimate of soil permeability in the mathematical derivation of the equation
- Q = rate of loss of water from the reservoir in cm^3/min
- H = depth of water in the test hole in cm
- r = radius of the test hole in cm

Rate of water loss

Q=	0.0325	L/sec
Q=	1949.6	cm^3/min

Saturated hydraulic conductivity

K_{sat}=	0.46	cm/min
K_{sat}=	6.64	m/day
K_{sat}=	7.69E-05	m/sec



APPENDIX 6

Rockwater Hydrological Study (1992)

Rockwater
PROPRIETARY LIMITED
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ALAN TINGAY & ASSOCIATES
L'OIRE INVESTMENTS

GROUNDWATER ASPECTS OF RESIDENTIAL DEVELOPMENT FRENCHMAN'S BAY, ALBANY

JUNE 1992

101.0/92/1
R42 GW

TABLE OF CONTENTS

Rockwater
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L'OIRE INVESTMENTS

GROUNDWATER ASPECTS OF RESIDENTIAL DEVELOPMENT FRENCHMAN'S BAY, ALBANY

JUNE 1992

1. INTRODUCTION

A small-scale residential subdivision is proposed to be developed along the coast at Goode Beach, west of Lake Vancouver within Lot 401 in the Albany area. For the Consultative Environmental Review certain issues related to the local groundwater regime need to be addressed. These are discussed below, using information collected from a groundwater investigation conducted in 1986 (Rockwater, September 1986). A locality plan is presented as Figure 1.

2. HYDROGEOLOGICAL SETTING

Sand deposits making up the peninsula constitute a shallow aquifer overlying granite bedrock. The latter is assumed to be impermeable, although the upper few metres of weathered granite can be aquifer in hydraulic connection with the sand. An east-west geological section is presented as Figure 2.

The shallow aquifer is bounded to the south by outcropping granite, and thickens in a northerly direction. It contains fresh groundwater underlain by sea water along the coastlines. The groundwater is recharged by direct infiltration of rainfall, and by water originating as rainfall in the granite hills, then flows northwards as surface water or groundwater.

Swamps represent out-cropping of the water table in the low-lying ground. Lake Vancouver is apparently in hydraulic continuity with the groundwater, although lake-bed silt and ooze would act as an aquitard.

3. GROUNDWATER LEVELS AND FLOW

The shallow aquifer of shelly sand, about 20 metres thick, has a water table of elevation less than one metre AHD in this area. Measurements made in September 1986 (Fig. 3) show water levels of 0.8 m AHD at locations about 50 m west of Lake Vancouver. The water table slopes downwards to the east ie. towards Goode Beach/ Frenchman's Bay where its elevation would be only slightly higher than AHD - and subject to tidal fluctuations. Lake Vancouver is evidently in hydraulic connection with the aquifer, and represents an 'outcrop' of the water table.

Beneath the subdivision area the water table was at elevations of 0.7 to 0.5 m AHD in September 1986, at a time near the seasonal water-level 'high'. Summer water levels measured in February 1987, are shown in Figure 4. They indicate that Lake Vancouver water level was 0.06 m lower than the groundwater to the east of it. Thus, at that time there was a slight gradient westwards towards the lake. For most of the year, the hydraulic gradient and groundwater flow direction is likely to be eastwards from the lake towards the shore.

4. IMPACT OF EFFLUENT ON LAKE VANCOUVER

If the nett direction of groundwater flow is eastwards, then effluent systems would have no effect on Lake Vancouver. Any nutrients added to the groundwater would move towards the shore rather than to the lake.

It is noted that a buffer zone of 60 m or more is proposed to be left between the residential development and Lake Vancouver. This will provide opportunity for nutrient extraction by vegetation, and add to the protection of the lake water.

5. PREDICTED IMPACT OF 15 BORES

Each of the 15 residences is proposed to have a bore, for watering lawn and garden areas that will cover relatively small proportions of each property: probably less than 500 sq m. Peak water requirements are estimated to be 5 cu m/day per residence ie. a combined rate of 75 cu m/d. Annually, the water usage estimated at 70% of average potential summer evaporation (820 mm) is calculated to be 4300 cu m for a combined lawn/garden area of 7500 sq m. As watering would be essentially limited to the months of November to March (151 days) the average combined pumpage is calculated to be 50 cu m/day ie. 3 cu m/day per household.

Calculations based on the Theis non-equilibrium equation and realistic aquifer coefficients (transmissivity = 60 sq m/d; storativity = 0.1) indicates water-level reduction of less than 0.1 m.

Given the normal seasonal fluctuations in rainfall, and the mitigating effects of summer rainfall and slightly reduced transpiration, it is expected that the reduction in water level caused by domestic pumping would not be environmentally deleterious, and would probably be un-measurable.

6. CONCLUSIONS

In winter the water table slopes downwards in an easterly direction towards the shore at Goode Beach. In summer there is a very slight slope downwards in a westerly direction towards Lake Vancouver. It is expected that on average through the year the nett movement of groundwater is eastwards, therefore nutrients added by septic tanks and garden cultivation should move towards the shore rather than Lake Vancouver.

Water-level drawdown resulting from the operation of domestic bores, is calculated to be less than 0.1 m and therefore negligible in comparison with seasonal fluctuations. It is unlikely to have any measurable effect on lake level.

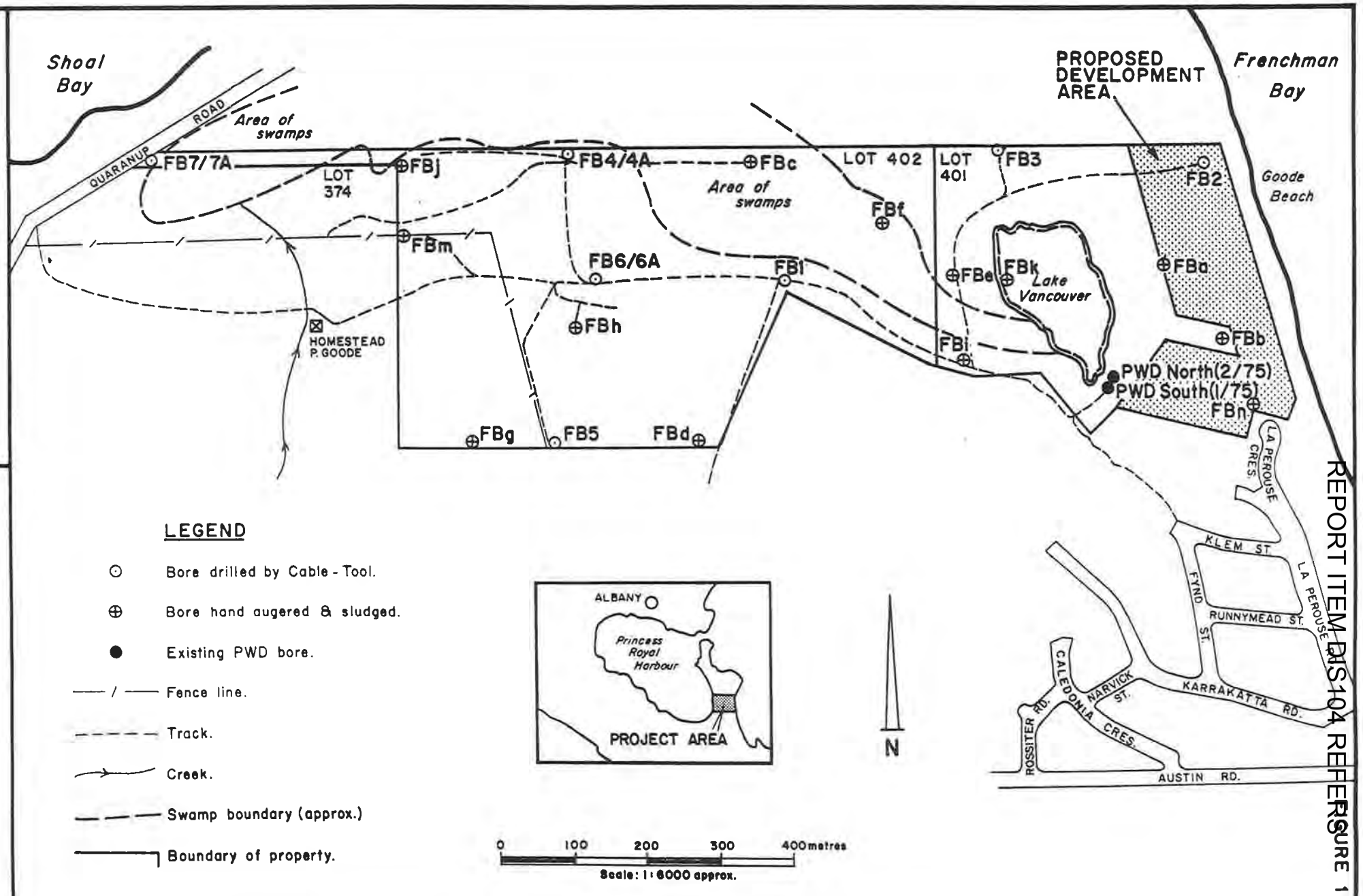
DATED: 23 JUNE 1992

ROCKWATER PTY LTD

for

J R PASSMORE
PRINCIPAL HYDROGEOLOGIST

FIGURES 1 - 4



Client : L'OIRE INVESTMENTS

Project: RESIDENTIAL DEVELOPMENT

Date : June 1992

Dwg. No. 101-0/92/1-1

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LOCATION MAP

REPORT ITEM DIS104 REFERS

Client : L'OIRE INVESTMENTS

Project : RESIDENTIAL DEVELOPMENT

Date : June 1992 Dwg. No. 101·0/92/1–2

EAST – WEST GEOLOGICAL CROSS SECTION

FIGURE 3

Client L'OIRE INVESTMENTS

Project RESIDENTIAL DEVELOPMENT

Date June 1992 Dwg No 101·0/92/1-3

WATER TABLE CONTOUR MAP (WINTER)

FIGURE 4

Client : L'OIRE INVESTMENTS

Project: RESIDENTIAL DEVELOPMENT

Date : June 1992 Dwg. No. 101·0/92/1-4

WATER TABLE CONTOUR MAP (SUMMER)

APPENDIX 7

Albany Regional Vegetation Survey Units

From Albany Regional Vegetation Survey (Sandiford and Barrett, 2010)

Vegetation Unit 2: Peppermint Low Forest

No. of relevés 10 **Mean spp. richness** 10 **Area** 1232 ha **% of Rem. Veg**. 2.8 **% in IUCN Reserve 1-IV** 23.0

Description

Peppermint Low Forest is restricted to the coastal dune system where it commonly occurs in swales and flats. A dense canopy of *Agonis flexuosa* (Peppermint) is characteristic of this unit with the structure varying from a closed heath on exposed coastal slopes to a low closed forest in swales with shrub species often sub or co-dominant in exposed areas. A tall shrubland of *Spyridium globulosum, Adenanthos sericeus, Bossiaea linophylla* and *Leucopogon obovatus* is usually present over an open or closed sedgeland with *Rhagodia baccata, Hardenbergia comptoniana* and *Clematis pubescens* common.

This unit forms a mosaic with Coastal Heath (3), Limestone Coastal Heath (5), Coastal *Banksia ilicifolia/*Peppermint Low Woodland (4) and Coastal Yate Woodland (1) and appears to be the climax of Coastal Heath (Beard 1979).

Three sub-units are described:

2a Peppermint Low Forest occurs on coastal dunes and swales and is described above.

2b Peppermint*/Eucalyptus megacarpa* Low Forest occurs along minor drainage lines on lower slopes of the coastal dunes. *Eucalyptus megacarpa* is co-dominant in the upper strata and *Lepidosperma effusum* and *Pteridium esculentum* are common.

2c Peppermint Low Forest/*Lepidosperma gladiatum* Sedgeland occurs in the swale behind the fore dune and occasionally in deep valleys on the inland dunes. *Lepidosperma gladiatum, Desmocladus flexuosus, Rhagodia baccata* and *Hardenbergia comptoniana* are prominent understorey species with *Hibbertia cuneiformis* and *Pimelea clavata* common shrubs.

Comments

This unit also includes *Agonis flexuosa* thickets that have invaded other units. In the Little Grove and Big Grove area, *A. flexuosa* is invading what was once *Banksia littoralis/*Woodland *Melaleuca incana* Shrubland (44) as indicated by the dead and dying *Banksia littoralis* and the presence of scattered species indicative of winter wet areas such as *Villarsia parnassiifolia, Sphenotoma gracilis* and *Melaleuca incana* under dense canopies of *A. flexuosa*. This invasion suggests that a significant and prolonged lowering of the water table may have occurred. Anecdotal evidence indicates that large areas of Little Grove and Big Grove were more swampy forty to fifty years ago (T. Allen, pers. comm.).

Many infestations of **Acacia longifolia* were observed within this unit, particularly in the Little Grove area. *Agonis flexuosa* occurs as a lower tree stratum or as a co-dominant in a number units (1, 4, 9 and 10) and where this species occurs as stands over pasture, identification of the unit has been based on the nearest intact vegetation.

Peppermint Low Forest is common along the south west coastline though those with *Adenanthos sericeus* in the understorey (2a) are restricted to areas around Albany as this species only occurs from the Nullaki Peninsula to Waychinnicup with an outlying population at Warriup. *Eucalyptus megacarpa* and *Hardenbergia comptoniana* reach their eastern limit near Mt Manypeaks and Cheyne Beach respectively (DEC 2009).

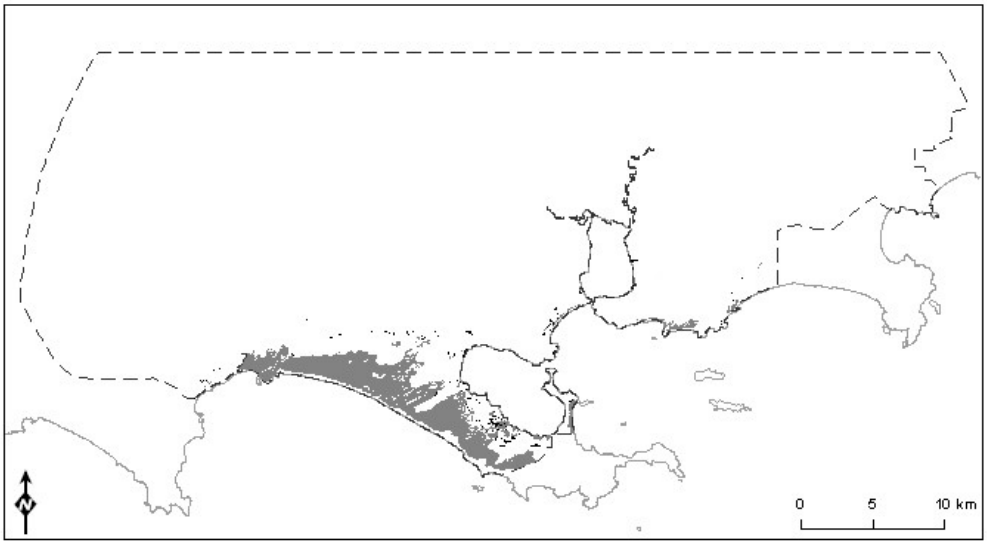
Floristic Summary

Lifeform	%cover	Species
Mallee/Tree <8m	M-D	*Agonis flexuosa +/-Eucalyptus megacarpa,+/-Hakea oleifolia*
Shrubs 1m to >2m	S	*Spyridium globulosum, Adenanthos sericeus, Bossiaea linophylla, Leucopogon obovatus, Hibbertia cuneiformis*
Shrubs 0.5-1m	V	*Rhagodia baccata*
Sedges/rushes	V-D	*Desmocladus flexuosus, Lepidosperma densiflora* forma proliferous, *Lepidosperma gladiatum, Lepidosperma effusum*
Herbs	V	*Hardenbergia comptoniana, Clematis pubescens, Opercularia hispidula, Billardiera fusiformis*

Key identifying Features

- Thickets with *Agonis flexuosa* dominant or co-dominant.
- Occurs on sand in coastal areas

Conservation species None recorded



Unit 2 Peppermint Low Forest

Vegetation Unit 3 Coastal Heath

No. of relevés 16 **Mean spp. richness** 21.1 **Area** 3737 ha **% of Rem. Veg**. 8.5 **% in IUCN Res. 1-IV** 22.2

Description
Coastal Heath is restricted to light grey sand on the coastal dunes system with extensive areas present from Torndirrup National Park west to Torbay Inlet. The mixed open heath is very diverse, occurring above a low open heath and a mixed sedgeland with *Cyathochaeta equitans* prominent and clumps of *Agonis flexuosa* common. Common larger shrubs include those typical of range of soils including *Bossiaea linophylla, Banksia grandis, Hakea florida, Hibbertia furfuracea* (typical of lateritic and granitic soils)*, Jacksonia horrida, Adenanthos cuneatus, Leucopogon obovatus,* (acidic sand) and *Acacia cochlearis*, *Spyridium globulosum* and less frequently *Adenanthos sericeus* and *Banksia praemorsa* (alkaline soils). *Banksia grandis* and *Hakea prostrata* are present as prostrate forms. Other typical species include *Hibbertia racemosa, Pimelea rosea* subsp *rosea, Amperea ericoides, Logania serpyllifolia, Allocasuarina humilis, Platysace compressa, Loxocarya cinerea, Lepidosperma densiflora, Anarthria prolifera* and *Lyginia* spp.

This unit forms a mosaic with Coastal Limestone Heath (5) and Peppermint Thicket (2) and in Torndirrup NP often occurs upslope of Coastal *Banksia ilicifolia/*Peppermint Low Woodland (4).

Four sub-units are described:

3a Coastal heath
This is the most widespread of the sub-units and is described above.

3b *Cyathochaeta equitans* Sedgeland
This sub-unit is restricted to deep swales and low flats in and abutting the coastal hills, where occasional frosts limit the growth of trees and shrubs. A diverse sedgeland dominated by *Cyathochaeta equitans* is the prominent feature of this sub-unit and a relatively open shrubland and/or open low heath may be present. Common species include *Melaleuca thymoides, Pultenaea reticulata, Jacksonia horrida, Leucopogon reflexus, Olearia axillaris, Hibbertia racemosa, Lepidosperma densiflora, Schoenus caespititius, Desmocladus flexuosus, Hypolaena exsulca, Anarthria prolifera* and *Lyginia imberbis*.

3c *Darwinia diosmoides* Coastal heath
This sub-unit is found on the isthmus north of Quaranup and on the lower slopes of Mt Adelaide and is distinguished by the dominance of *Darwinia diosmoides* in the understorey. These coastal rims were not well
surveyed during this survey and vary in species and structural composition with affinities to several units including Coastal *Banksia ilicifolia*/Peppermint Low Woodland (4) and some granitic and coastal shrubland units.

3d *Allocasuarina fraseriana* Woodland/Coastal Heath.
A large area of this sub-unit is found on the protected northern slopes of the coastal hills west of the prison. This sub-unit was not sampled but the common understorey species appear the same as those in the coastal heath sub- unit (3a).

Comments
*****_Acacia longifolia_ infestations were observed within this unit, particularly around the Albany Prison area.

This unit falls within the Mixed Heath and Peppermint Low Woodland and Scrub Heath mosaic mapped by Beard (1979) as part of the Torndirrup System. An extensive area of this unit has been described as common between Lake Gardner and Mt Gardner in Two Peoples Bay (Hopkins *et al*. unpublished) though some of this has reverted to Peppermint Low Forest in the absence of fire for over 30 years. This unit was mapped in the wind farm area, and described under "Inland Heath, Sedgelands and Woodlands" (Halpern Glick Maunsell 2000). The large areas of this unit between Mutton Bird and Sharp Point were not extensively sampled due to the unit being well represented in coastal conservation reserves and some of the sampled relevés on lower slopes are atypical.

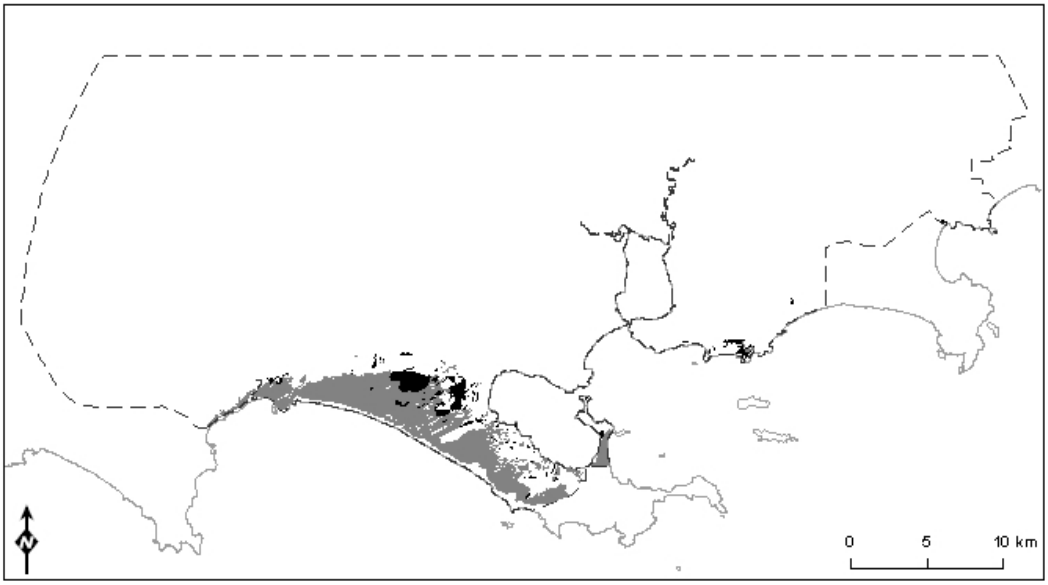
Key identifying Features

- Occurs on coastal dunes on acidic sand.
- Diverse mixed heaths with *Cyathochaeta equitans* a dominant sedge and interspersed with *Agonis flexuosa* clumps.

Conservation species *Calectasia cyanea* DRF, *Adenanthos cunninghamii* P4

Floristic Summary (sub-unit 3a)

Lifeform	%cover	Species
Trees<10m	E-V	*Agonis flexuosa*
Shrubs >2m	V	*Adenanthos sericeus, , +/- Banksia praemorsa,*
Shrubs 1-2m	M	*Bossiaea linophylla, Banksia grandis, Hakea florida, Hakea ruscifolia, Hibbertia furfuracea, Jacksonia horrida, Adenanthos cuneatus, Spyridium globulosum, Leucopogon obovatus, Isopogon formosus, Acacia littorea, Melaleuca thymoides*
Shrubs 0.5-1m	S	*Allocasuarina humilis, Lysinema ciliatum, Gompholobium confertum, Chorizema glycinifolium, Olax phyllanthi, Olearia axillaris, Gyrostemon sheathii*
Shrubs <0.5m	V-S	*Hibbertia racemosa, Pimelea rosea* subsp *rosea, Amperea ericoides, Olearia ciliata, Platysace compressa, Hakea prostrata, Hibbertia amplexicaulis, Banksia dallanneyi, Isopogon attenuatus, Lechenaultia expansa*
Sedges/rushes	S-M	*Cyathochaeta equitans, Desmocladus flexuosus, Anarthria prolifera, Schoenus caespititius, Lepidosperm densiflora, Lyginia imberbis, Lyginia barbata, Loxocarya cinerea*
Herbs	V	*Logania serpyllifolia, Conostylis aculeata* subsp *aculeata, Opercularia hispidula, Billardiera fusiformis, Cassytha racemosa, Cassytha glabella, Kennedia coccinea, Velleia trinervis, Stylidium hirsutum*



Unit 3 Coastal Heath

Vegetation Unit 5 Coastal Limestone Heath

No. of relevés 18 **Mean spp. richness** 14.6 **Area** 1849 ha **% of Rem. Veg**. 4.2 **% in IUCN Res.1-IV** 40.1

Description

Coastal Limestone Heath is a heterogeneous group that is restricted to yellow-grey and light grey alkaline sands and limestone soils of the coastal fringe. Several sub units are described with exposure, soil depth, rock cover
and time since fire factors influencing the structure and floristic composition of these sub-units. *Scaevola striata* and *Acacia littorea* are often very prominent in the first few years after fire.

This unit forms a mosaic with Coastal Heath (3), *Eucalyptus goniantha/Eucalyptus angulosa* Limestone Mallee (6) and Peppermint Low Forest (2).

5a Coastal Limestone Tall Shrubland

This sub-unit is common on deeper sand and, in more protected areas, may be overtopped by a sparse canopy of *Agonis flexuosa* with *Hakea oleifolia* occasionally present. Patches dominated by *Adenanthos sericeus* may occur along the coastal fringe and *Scaevola nitida* frequently dominates post-fire. Other common shrubs include *Banksia sessilis, Acacia littoralis, Allocasuarina lehmanniana, Leucopogon parviflorus, Spyridium globulosum, Acrotriche cordata, Platysace compressa* and *Pimelea ferruginea*. The sedgeland is dominated by *Desmocladus flexuosus* and *Lepidosperma densiflora* forma proliferous. Common herbs and grasses include *Opercularia* v*aginata, Conostylis aculeata* subsp *aculeata, Haloragis acutangula* and *Poa poiformis.*

5b Coastal Limestone Heath

This sub-unit occurs on shallower and more exposed areas than the former sub-unit and is lower in stature. Floristically this sub-unit is transitional between sub-unit 5a and unit 6, lacking many of the taller shrubs of sub-unit 5a and mallees of unit 6 and containing a greater variety of lower shrubs than either. Common shrubs include *Thomasia quercifolia* P2, *Acacia cochlearis*, *Acacia littorea, Lysinema ciliatum, Acrotriche cordata, Pultenaea heteroclila, Pultenaea tenuifolia, Chorizema ilicifolia, Pimelea ferruginea, Phyllanthus calycinus, Scaevola nitida, Spyridium majoranifolium* and *Acacia littorea.* The sedgeland is more diverse and more open than sub-unit 5a with *Gahnia* sp Headland, *Schoenus lanatus, Tetraria capillaris* forma limestone*, Desmocladus flexuosus* and *Lepidosperma densiflora* forma proliferous common. Common herbs include *Conostylis aculeata, Opercularia vaginata* and *Stylidium fasciculatum.*

5c *Banksia praemorsa* Tall Open Scrub.

This sub-unit is most frequent on the seaward slopes and is distinguished by the presence of a *Banksia praemorsa* Tall Open/Closed Scrub strata. *B. praemorsa* may also form a tall shrub stratum over Coastal Heath (3).

Comments

This unit was mapped as both Heath and Scrub Heath by Beard (1979) and described as part of Peppermint Low Woodland and Scrub Heath mosaic in the Torndirrup System. An extensive area of this unit has been described as common in the consolidated sand dunes in the south western part of Two Peoples Bay (Hopkins *et al.* unpublished), and it was mapped along the coastal fringe of the wind farm area where it was described under "Coastal Heath" and "Inland Heath" (Halpern Glick Maunsell 2000).

This unit is naturally restricted to the coastal fringe with most occurrences on the Meerup landform unit (Churchward *et al* 1988). Heaths occurring on coastal limestone and alkaline sands are common along the southern Western Australian coast however two species sometimes dominant in this unit: *Adenanthos sericeus* and *Banksia praemorsa* are largely restricted to the ARVS context area (DEC 2009).

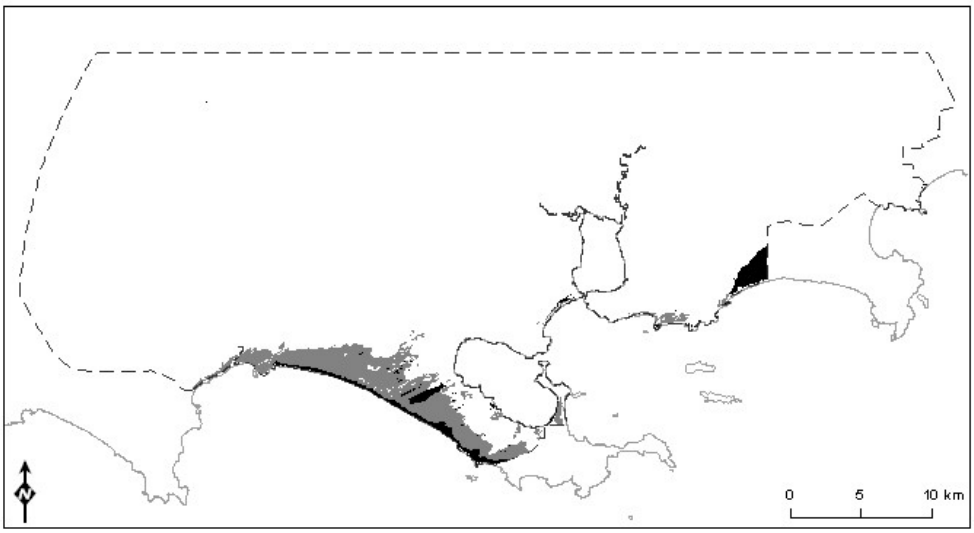
Key identifying Features

- Mixed tall shrub layer with *Adenanthos sericeus, Spyridium globulosum, Banksia praemorsa, Banksia sessilis, Leucopogon parviflorus, Acacia littorea, Allocasuarina lehmanniana* and *Scaevola nitida* dominant.
- Occurs on coastal sand dunes and adjacent flats with alkaline soils.

Conservation species *Thomasia quercifolia* P2, Adenanthos *cunninghamii* P4

Floristic Summary

Lifeform	%cover	Species
Tree<10m	E	*Agonis flexuosa, Hakea oleifolia*
Shrubs >2m	V-M	*Adenanthos sericeus, Spyridium globulosum, Banksia praemorsa, Banksia sessilis,* *Templetonia retusa*
Shrubs 1-2m	M	*Leucopogon parviflorus, Acacia littorea, Allocasuarina lehmanniana, Scaevola nitida, Exocarpos sparteus, Anthocercis viscosa, Melaleuca pentagona*
Shrubs 0.5-1m		*Acacia cochlearis, Spyridium majoranifolium, Lysinema ciliatum, Westringia dampieri*
Shrubs <0.5m	V	*Platysace compressa, Acrotriche cordata, Chorizema ilicifolia, Pimelea ferruginea, Scaevola thesioides, Pultenaea heterochila, Thomasia quercifolia, Hibbertia grossulariifolia, Thomasia triphylla*
Sedges/rushes	V-D	*Lepidosperma densiflora* forma proliferous*, Desmocladus flexuosus, Gahnia* sp Headland, *Tetraria capillaris* forma limestone*, Schoenus lanatus, Lepidosperma gladiatum, Schoenus submicrostachyus*
Herbs	V	*Conostylis aculeata, Phyllanthus calycinus, Opercularia vaginata, Haloragis acutangula, Stylidium fasciculatum, Senecio pinnatifolius*
Grasses	-	*Poa poiformis*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APPENDIX 8

Photographs of Site

Photograph 1 (15/3/16)

Euphorbia tarrecina herbland

Photograph 2 (6/12/16)

Lake Vancouver – *Leptocarpus elegans* sedgeland surrouned by *Melaleuca cuticularis* and *Banksia littoralis* low woodlands with Goode Beach residential area in the background.

Photograph 3 (6/12/16)

Agonis flexuosa/ Adenanthos sericeus closed scrub with Goode Beach residential area in the background.

Photograph 4 (6/12/16)

Agonis flexuosa/ Adenanthos sericeus closed scrub

APPENDIX 9

Conservation Code Definitions

CONSERVATION CODES

For Western Australian Flora and Fauna

Specially protected fauna or flora are species* 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.

Categories of specially protected fauna and flora are:

T **Threatened species**

Published as Specially Protected under the *Wildlife Conservation Act 1950,* and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

Threatened fauna is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the Wildlife Conservation Act.

Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the Wildlife Conservation Act.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR **Critically endangered species**

Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EN **Endangered species**

Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

VU **Vulnerable species**

Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

EX **Presumed extinct species**

Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.

IA **Migratory birds protected under an international agreement**

Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.

CD Conservation dependent fauna

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.

OS Other specially protected fauna

Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the *Wildlife Conservation Act 1950,* in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 Priority 1: 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.

2 Priority 2: 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.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: 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 are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

*Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

APPENDIX 10

Flora Species List

Results from Previous Flora Survey (June, 1992)

Species	**Common Name**	**Status**
Acacia hastulata		Not threatened
Acacia pulchella	Prickly Moses	Not threatened
Acacia l·fl·ůl·		Not threatened
Acanthocarpus preissii		Not threatened
Adenanthos cuneatus	Coastal jugflower	Not threatened
Adenanthos obovatus	Basket flower	Not threatened
Adenanthos sericeus	Woolly bush	Not threatened
Agonis flexuosa	Peppermint	Not threatened
Astartea fascicularis		Not threatened
Banksia littoralis	Swamp banksia	Not threatened
Banksia sessilis	Parrot bush	Not threatened
Billardiera floribunda	White-flowered Billardiera	Not threatened
Bossiaea linophylla		Not threatened
Callistachys lanceolatum	Wonnich	Not threatened
Carpobrotus virescens	Coastal pigface	Not threatened
Cassytha racemosa	Dodder laurel	Not threatened
Chaetanthus aristatus	Bearded twine-rush	Not threatened
Clematis linearifolia		Not threatened
Conostylis aculeata	Prickly Conostylis	Not threatened
Corymbia calophylla	Marri	Not threatened
Desmocladus flexuosus		Not threatened
Drosera pallida	Pale rainbow	Not threatened
Drosera pulchella	Pretty sundew	Not threatened
Eucalyptus marginata	Jarrah	Not threatened
Exocarpos sparteus	Broom ballart	Not threatened
Ficinia nodosa	Knotted club rush	Not threatened
Hakea linearis		Not threatened
Hakea oleifolia	Dungyn	Not threatened
Hibbertia cuneiformis	Cutleaf Hibbertia	Not threatened
Hibbertia furfuracea		Not threatened
Hypocalymma robustum	Swan River Myrtle	Not threatened
Lepidosperma gracile	Slender sword sedge	Not threatened
Lepidosperma tenue		Not threatened
Lepidosperma gladiatum	Coast sword-sedge	Not threatened
Leptocarpus elegans		Not threatened
Leucopogon australis	Spiked beard-heath	Not threatened
Leucopogon glabellus		Not threatened
Leucopogon racemulosus		Not threatened
Leucopogon sp.		Not threatened
Melaleuca cuticularis	Saltwater paperbark	Not threatened
Melaleuca halmaturorum		Not threatened
Melaleuca thymoides		Not threatened
Monotoca (grandiflora?)		
Olax phyllanthi		Not threatened
Olearia axillaris	Coastal daisybush	Not threatened
Pimelea ferruginea		Not threatened
Pithocarpa cordata		Not threatened
Pterostylis scabra	Bronze Shell Orchid	Not threatened
Regelia ciliata		Not threatened

Rhagodia baccata	Berry saltbush	Not threatened
Scaevola nitida	Shining fanflower	Not threatened
Spinifex hirsutus	Hairy spinifex	Not threatened
Spyridium globulosum	Basket bush	Not threatened
Taxandria parviceps		Not threatened
Thysanotus patersonii		Not threatened
Tricoryne elatior	Yellow Autumn lily	Not threatened

Source: Alan Tingay and Associates (1992)

APPENDIX 11

Threatened Species Flora List (DPAW)

DPAW THREATENED FLORA DATABASE TAXON IDENTIFIED IN THE DISTRICT

Taxon	Status	Rank	IUCN Criteria	EPBC	Distribution	Flowering Period	Habitat
Austrostipa mundula	3				Torndirrup N.P., Esperance, Fremantle, City Beach, Boranup, Bremer Bay, Nuytsland NR	September, October	-
Conospermum quadripetalum	2				Scott River, Albany, Torndirrup	Nov	Sandy clay, grey sand. Flats behind coastal hills.
Diuris drummondii	T	VU	D1	VU	Rocky Gully, Bridgetown, Pinjarra, Lake Muir, Frankland River, Nornalup Inlet, Perth, Lake Jasper, Torndirrup NP,Capel, Cranbrook, Yerina Spring, Bunbury, Eaton	Nov-Dec	Low-lying depressions, swamps.
Eucalyptus x missilis	4				Cheyne Beach, West Cape Howe National Park, Cape le Grand, Torndirrup, Two Peoples Bay, Esperance, Hood Point (FRNP)	Jan-Apr	Sand over limestone or granite. Coastal sites.
Gyrostemon thesioides	2				West Cape Howe, Two Peoples Bay, Torndirrup NP	Nov	Sand over limestone. Consolidated coastal dunes.
Melaleuca ringens	3				Point D'Entrecasteaux, Long Point, Pt Hillier, Torndirrup NP	Sep to Oct	Sand. Limestone ridges & clifftops.
Spyridium spadiceum	4				Porongurup Range, Albany, Gull Rock N.P., Mt Mason N.R., Vancouver Peninsula	Oct-Feb	Sand or gravelly loam. Granitic hills.
Synaphea preissii	3				Torndirrup NP, Albany, Mt Barker, Stirling Range NP, Gnowangerup, Narrikup, Rocky Gully	Aug-Sep	Sand, gravelly loam.
Thomasia quercifolia	4				Albany, Torndirrup NP, Walpole Nornalup N.P., Denmark, William Bay N.P.	-	-

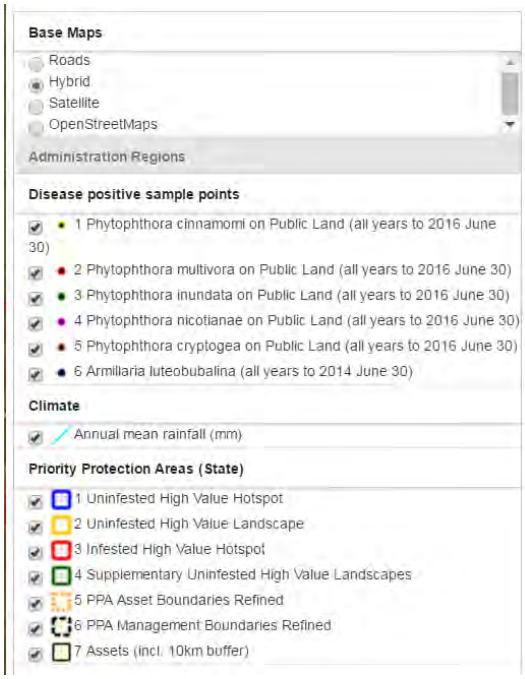
Taxon	Status	Rank	IUCN Criteria	EPBC	Distribution	Flowering Period	Habitat
Thysanotus isantherus	4				Mt Melville, Mt Clarence, Torndirrup N.P., Albany, Mt Lindesay N.P., Shannon River, Kent River, Gull Rock, Cowaremup, Red Hill	Nov	Granite
Adenanthos x cunninghamii	4				Albany, Broomehill-Tambellup	Mar or Sep to Oct	Grey sand. Coastal dunes & sandplains.
Banksia verticillata	T			V	Albany, Denmark, Manjimup, Plantagenet	Jan to Apr	Sandy loam. On or beside granite outcrops.
Isopogon uncinatus	T			E	Albany, Plantagenet	Oct to Nov	Loam or sand on granite, peaty sand. Swampy depressions, hillslopes.
Thomasia purpurea x solanacea	1				Albany	Nov to Dec or Jan	Grey sand over limestone. Creek sides.
Thomasia solanacea	4				Albany, Denmark, Gnowangerup, Jerramungup	Sep to Dec	Alluvium, sand over limestone, rocky loam. Coastal areas.
Laxmannia jamesii	4				Albany, Augusta-Margaret River, Busselton, Denmark, Plantagenet	May to Jul	Grey sand. Winter-wet locations.
Poa billardierei	3				Albany, Esperance, Manjimup, Ravensthorpe	-	-
Calectasia cyanea	T			CE	Albany, Cranbrook, Dandaragan, Irwin	Jun to Oct	White, grey or yellow sand, gravel

APPENDIX 12

Project Dieback Map

DIEBACK PUBLIC MAP

Sourced 7 April 2017: http://www.dieback.net.au/about/dieback-map.html




Disease Confidence Mapping P. cinnamomi to 2008 June 30
1 High Confidence Infested Pc to 2008
2 Moderate Confidence Infested Pc to 2008
3 Low Confidence Infested Pc to 2008
4 Unmappable to 2008
5 Uninterpretable to 2008
6 Low Confidence Uninfested to 2008
7 Moderate Confidence Uninfested to 2008
8 High Confidence Uninfested to 2008

APPENDIX 13

EPBC Protected Matters Search Results

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.

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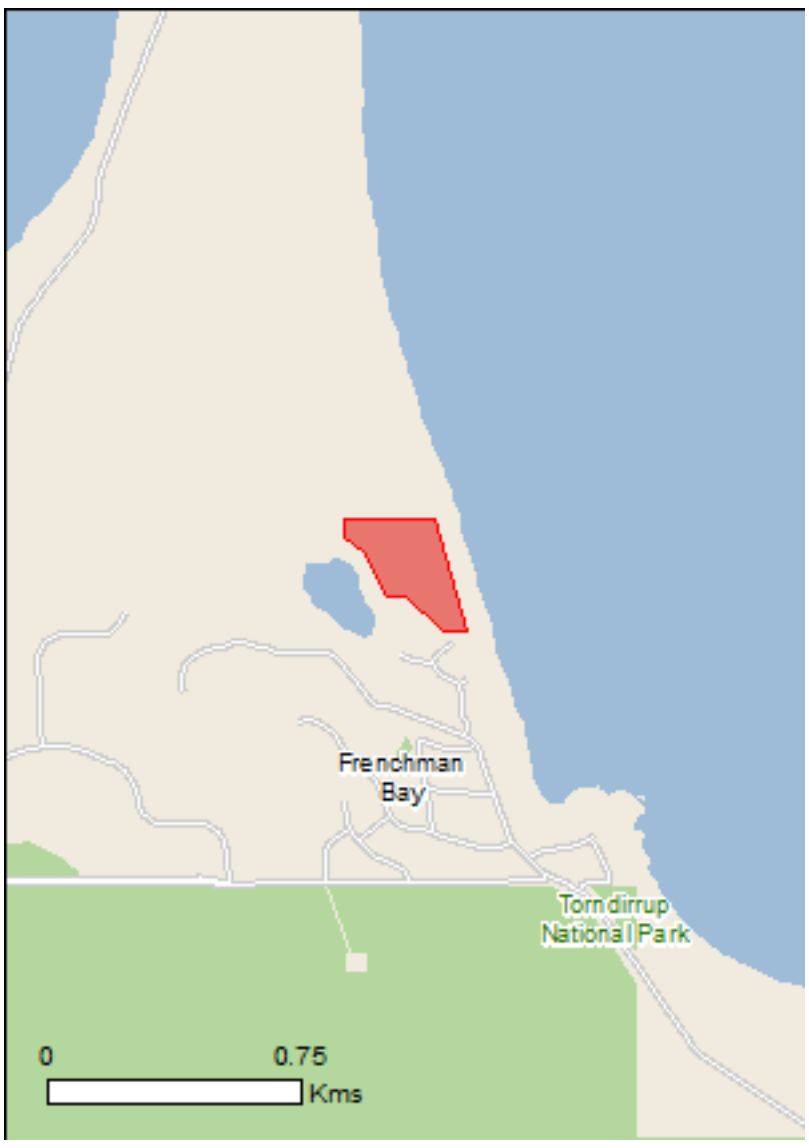

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
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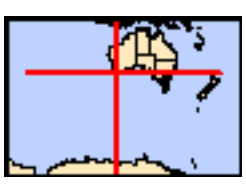


Summary

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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	25
Listed Migratory Species:	14

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:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	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:	None
Regional Forest Agreements:	None
Invasive Species:	17
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

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 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 likely to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat may occur within area
Dasyornis longirostris Western Bristlebird [515]	Vulnerable	Species or species habitat likely to occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may 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
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Sternula nereis nereis		
Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Thalassarche cauta cauta		
Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi		
White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Mammals		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Species or species habitat may occur within area
Plants		
Banksia brownii		
Brown's Banksia, Feather-leaved Banksia [8277]	Endangered	Species or species habitat likely to occur within area
Caladenia harringtoniae		
Harrington's Spider-orchid, Pink Spider-orchid [56786]	Vulnerable	Species or species habitat likely to occur within area
Isopogon uncinatus		
Hook-leaf Isopogon [20871]	Endangered	Species or species habitat known to occur within area
Kennedia glabrata		
Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to 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 within area
Diomedea epomophora (sensu stricto)		
Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Puffinus carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Thalassarche cauta (sensu stricto)		
Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence to occur within area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Migratory Terrestrial Species		
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known 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

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		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#) Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat may occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Cereopsis novaehollandiae grisea](#) Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat may occur within area
[Diomedea epomophora (sensu stricto)](#) Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
[Diomedea sanfordi](#) Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known 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
[Pachyptila turtur](#) Fairy Prion [1066]		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
[Thalassarche cauta (sensu stricto)](#) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
[Thinornis rubricollis](#) Hooded Plover [59510]		Species or species habitat likely to occur within area
Reptiles		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Extra Information

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
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Felis catus Cat, House Cat, Domestic Cat [19]		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 habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sage, Wild Sage [10892]		
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
Ulex europaeus Gorse, Furze [7693]		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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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

-35.082563 117.934046,-35.082563 117.934046,-35.082563 117.936407,-35.084951 117.937244,-35.084968 117.936621,-35.084213 117.935656,-35.084213 117.935184,-35.0833 117.934604,-35.082984 117.934046,-35.082563 117.934046

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
-Parks and Wildlife Commission NT, Northern Territory Government
-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, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-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.

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

APPENDIX 14

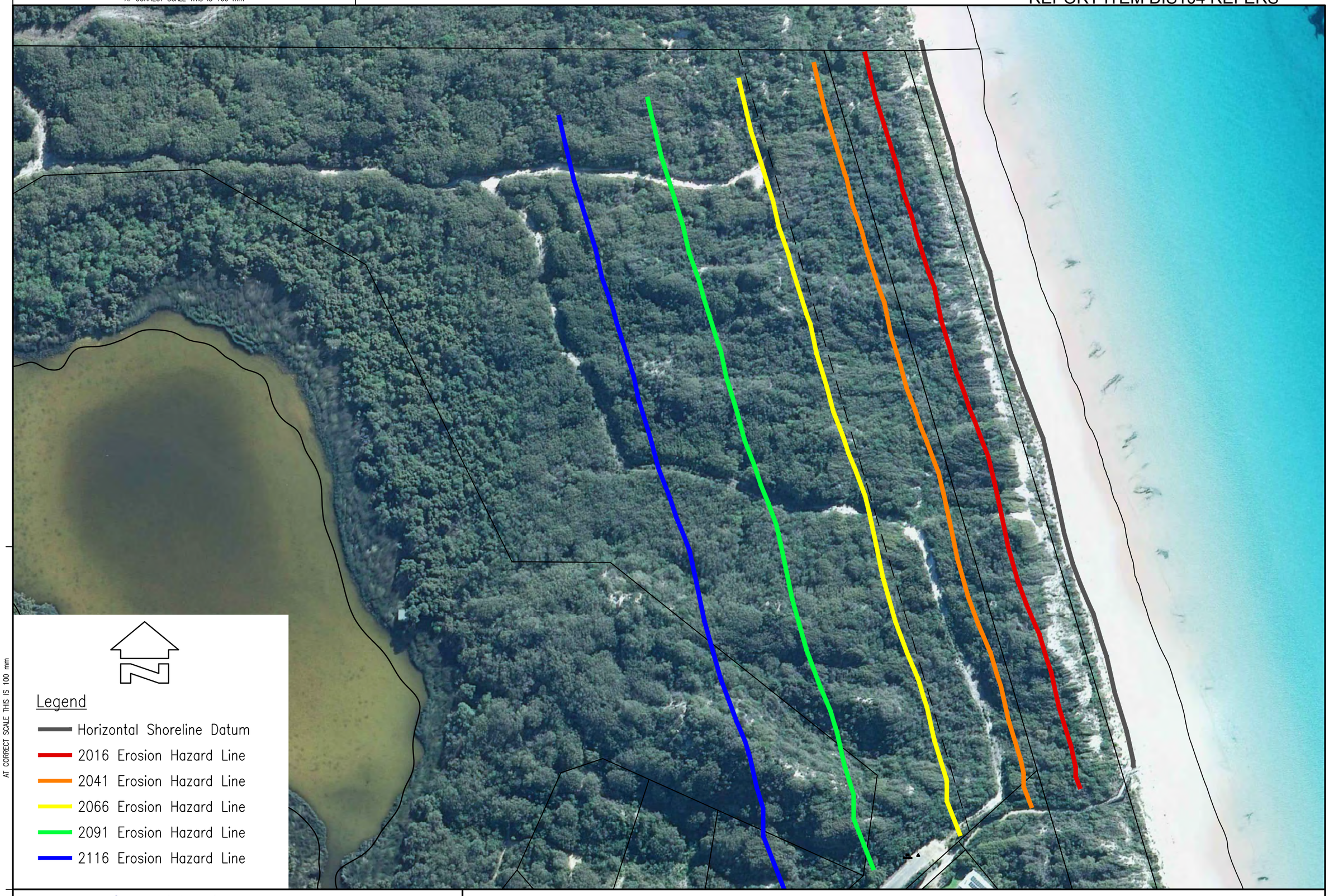
Targeted Fauna Survey

APPENDIX 15

Coastal Setback

AT CORRECT SCALE THIS IS 100 mm

REPORT ITEM DIS104 REFERS



AT CORRECT SCALE THIS IS 100 mm

m p rogers & associates pl
coastal and port engineers

Suite 1, 128 Main Street
Osborne Park 6017
Western Australia

t: +61 8 9254 6600
f: +61 8 9254 6699
admin@coastsandports.com.au

Vancouver Beach Resort

Coastal Erosion Hazard Assessment

May 2017

SCALE AT A3 1:1,250

SK1379-161102-01C

P:\MRA Paying Jobs\K1379 Vancouver Beach CHRMAP\5 MRA Dwgs\SK1379-161102-01A

APPENDIX 16

Aboriginal Heritage Inquiry Results

Search Criteria

1 Registered Aboriginal Sites in Custom search area (2); 584603.09mE, 6116836.85mN z50 (MGA94) : 585576.86mE, 6117490.01mN z50 (MGA94)

Disclaimer

The *Aboriginal Heritage Act 1972* preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Aboriginal Affairs by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at heritageenquiries@daa.wa.gov.au and we will make every effort to rectify it as soon as possible.

South West Settlement ILUA Disclaimer

Your heritage enquiry is on land **within or adjacent to** the following Indigenous Land Use Agreement(s): Wagyl Kaip Southern Noongar People ILUA

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Mines and Petroleum (DMP) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DMP, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at https://www.dpc.wa.gov.au/lantu/Claims/Pages/SouthWestSettlement.aspx.

Further advice can also be sought from the Department of Aboriginal Affairs (DAA) at heritageenquiries@daa.wa.gov.au.

Coordinate Accuracy
Accuracy is shown as a code in brackets following the coordinates. Map coordinates (Latitude/Longitude and Easting/Northing) are based on the GDA 94 Datum. The Easting/Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '500000mE:Z50' means Easting=500000, Zone=50.

Terminology (NB that some terminology has varied over the life of the legislation)
Place ID/Site ID: This a unique ID assigned by the Department of Aboriginal Affairs to the place
Status:

- **Registered Site**: The place has been assessed as meeting Section 5 of the *Aboriginal Heritage Act 1972*
- **Other Heritage Place which includes:**
  - **Stored Data / Not a Site:** The place has been assessed as not meeting Section 5 of the *Aboriginal Heritage Act 1972*
  - **Lodged:** Information has been received in relation to the place, but an assessment has not been completed at this stage to determine if it meets Section 5 of the *Aboriginal Heritage Act 1972*

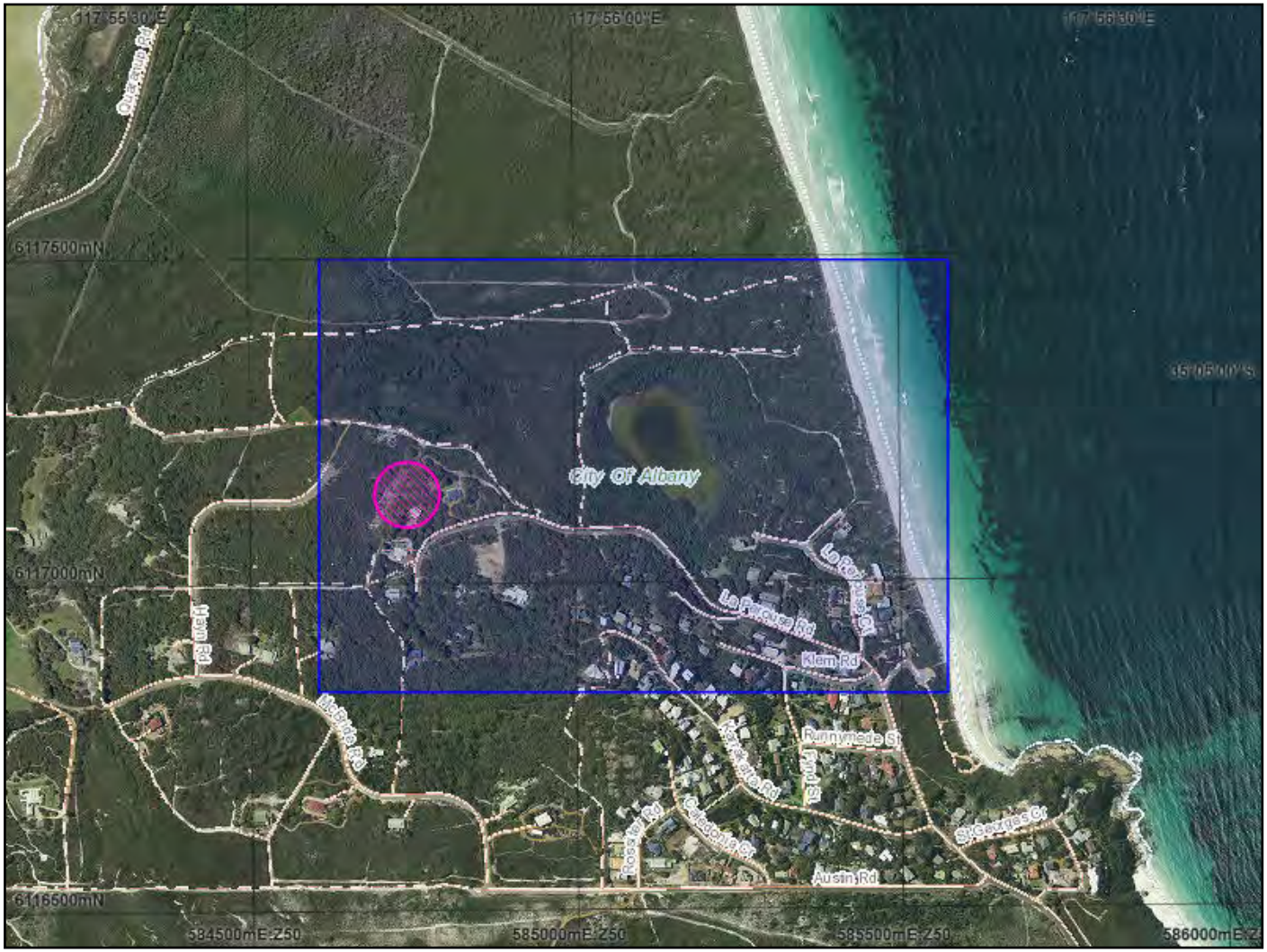
Status Reason: e.g. Exclusion - Relates to a portion of an Aboriginal site or heritage place as assessed by the Aboriginal Cultural Material Committee (ACMC). e.g. such as the land subject to a section 18 notice.
Origin Place ID: Used in conjuction with Status Reason to indicate which Registered Site this Place originates from.
Access and Restrictions:

- **File Restricted = No:** Availability of information (other than boundary) that the Department of Aboriginal Affairs holds in relation to the place is not restricted in any way.
- **File Restricted = Yes:** Some of the information that the Department of Aboriginal Affairs holds in relation to the place is restricted if it is considered culturally sensitive. This information will only be made available if the Department of Aboriginal Affairs receives written approval from the informants who provided the information. Download the Request to Access Restricted Information letter and form.
- **Boundary Restricted = No:** place location is shown as accurately as the information lodged with the Registrar allows.
- **Boundary Restricted = Yes:** To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the place is located. If you are a landowner and wish to find out more about the exact location of the place, please contact DAA.
- **Restrictions:**
  - **No Restrictions:** Anyone can view the information.
  - **Male Access Only:** Only males can view restricted information.
  - **Female Access Only:** Only females can view restricted information

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place. This has been replaced by the Place ID / Site ID.

List of Registered Aboriginal Sites with Map

Site ID	Site Name	File Restricted	Boundary Restricted	Restrictions	Status	Status Reason	Origin Place ID	Site Type	Knowledge Holders	Coordinates	Legacy ID
4456	LAKE VANCOUVER	No	No	No Gender Restrictions	Registered Site			Artefacts / Scatter		584741mE 6117136mN Zone 50 [Reliable]	S02764



Legend

Selected Heritage Sites

- Registered Sites
- Aboriginal Community Occupied
- Aboriginal Community Unoccupied
- Town
- Search Area

APPENDIX 17

Sub-catchments and Conceptual Drainage Management

REPORT ITEM DIS104 REFERS

Impervious Areas

Units	2310 sqm
Manager/Restaurant	660 sqm
Carparks	1220 sqm
Roads	560 sqm
Buggy Paths	1120 sqm
TOTAL	5870 sqm

Volumes

Required Volume (15mm)	88 cum
Actual Swale Volume	300 cum
Permeability (ave)	8.6m/day (358 mm/hr)
1 in 100 year ARI	41 mm/hr
(1 hr duration event)	

Catchment permeability exceeds 1 in 100 ARI intensity. Runoff unlikely

Site Access Road

RAINFALL DISCHARGE VOLUME ESTIMATE

Estimation by Rational Method - 1987 Australian Rainfall and Runoff

Design Rainfall Intensity
- Location: Albany — Duration: 23 minutes
- Storm Event: 100 year — Intensity: 85.7 mm/hr

Catchment Details
- Area: 630 m²
- Run-off Coefficient: 0.90
- Flow Rate: 13.513 L/s

Outflow Details
- Soil Type: Fine Sand
- Soakage Rate: 0.0001 m/s → 0.0035 m³/s (Total Soakage)
- Outlet: 0.0 m³/s

Storage Details
- Volume: 13.82 m³ *at 23 minutes*
- Surface Area: n/a m² *no freeboard* - m²
- Freeboard: 0 mm
- Batter/Slope: 1 in 3
- Depth: 0.302 m
- Base Area: 35.0 m²

RAINFALL DISCHARGE VOLUME ESTIMATE

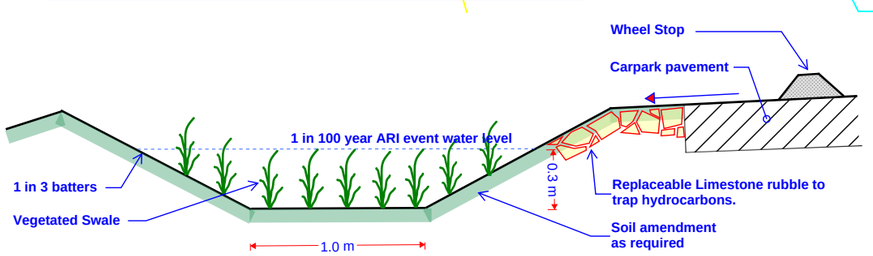
Estimation by Rational Method - 1987 Australian Rainfall and Runoff

Design Rainfall Intensity
- Location: Albany — Duration: 16 minutes
- Storm Event: 100 year — Intensity: 110.9 mm/hr

Catchment Details
- Area: 7 m²
- Run-off Coefficient: 0.90
- Flow Rate: 0.194 L/s

Outflow Details
- Soil Type: Fine Sand
- Soakage Rate: 0.0001 m/s → 0.0001 m³/s (Total Soakage)
- Outlet: 0.0 m³/s

Storage Details
- Volume: 0.13 m³ *at 16 minutes*
- Surface Area: n/a m² *no freeboard* - m²
- Freeboard: 0 mm
- Batter/Slope: 1 in 3
- Depth: 0.107 m
- Base Area: 0.6 m²



Typical Infiltration Swale to Carparks

nts

100m setback from Lake

Legend

- Infiltration Swale (sizes vary)
- Rain Tank (plumbed in for reuse) not to scale
- Flow from pavements

0 10 20 50m

SCALE 1:500 @ A1, 1:1000 @ A3

Stormwater Management Concept

WOOD & GRIEVE ENGINEERS

GKA GROUNDS KENT ARCHITECTS

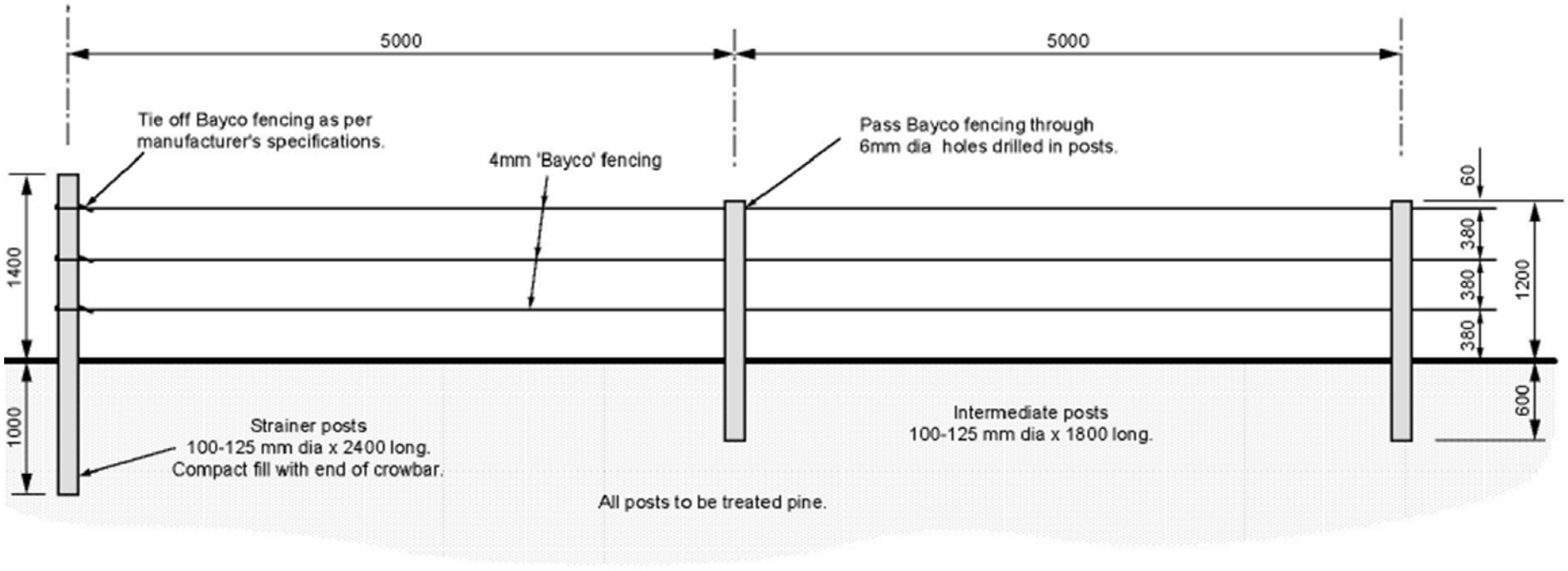
PROJECT No	DATE	DRAWING No.	REVISION
1503	00.00.16	SK101	-

APPENDIX 18

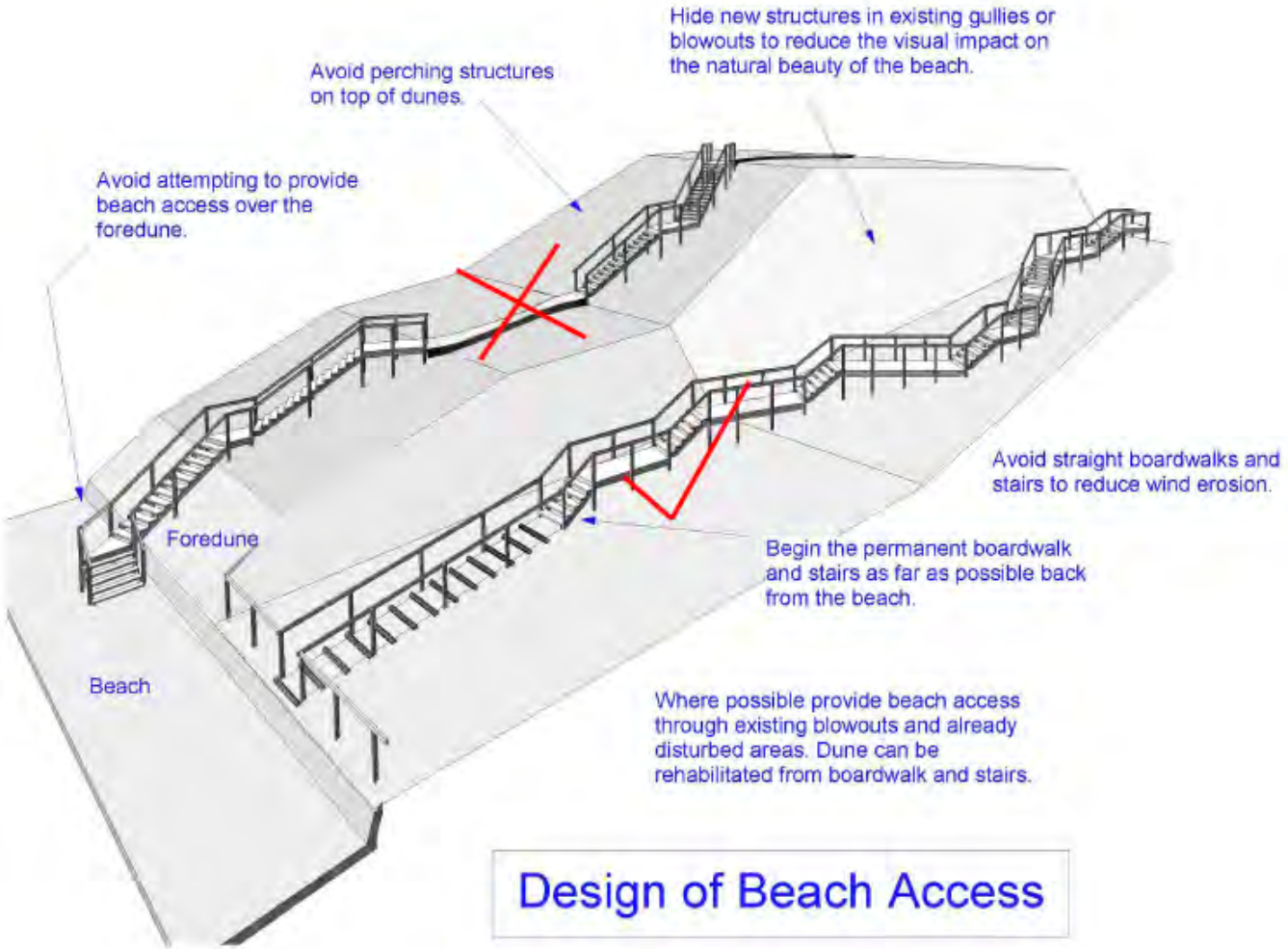
Foreshore Management

Fencing (using Bayco sighter wire)

Note: if sand cannot be compacted, posts should be concreted in place.



Coastal Access



Source: South Coast Management Group (2005) Coastal Management Specification Manual

APPENDIX 19

Bushfire Attack Level

Kathryn Kinnear, Bio Diverse Solutions
Accreditation No: BPAD30794
Valid to: Feb 2017
Jurisdiction: Level 2 - WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Unit 5A, 209 Chester Pass Rd
Albany, WA 6330
Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Legend

- Subject Site - Development Extent
- Woodland Extent
- Cadastre
- Forest Type A
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2
- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5

Scale
1:1,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016
Cadastre and Contours: Landgate 2016
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Cherry Martin
Vancouver Beach Resort
Goode Beach, WA 6330

BAL Contour Plan

STATUS	FILE	DATE
FINAL	MSC0122	21/03/2017

REPORT ITEM DIS104 REFERS

BUILDING SCHEDULE	
TYPE	NO. OFF
1 BED VILLA	12
1 BED STUDIO	20
1 BED DUPLEX	10
2 BED VILLA	8
TOTAL	50
CAR BAYS	50

SITE PLAN

0 10 20 50m

VANCOUVER BEACH RESORT
ALBANY
231

N

GKA
GROUNDS KENT ARCHITECTS
PROJECT No DATE DRAWING No. REVISION

APPENDIX 6

Targeted Survey for Western Ringtail Possum, Main's Assassin Spider and Black Cockatoo (Aurora Environmental)

2A Nakina Street
ALBANY WA 6330
T: (+61) 8 6819 5000
F (+61) 8 9481 3570
www.auroraenvironmental.com.au

TARGETED SURVEY FOR WESTERN RINGTAIL POSSUM, MAIN'S ASSASSIN SPIDER AND BLACK COCKATOO – LOT 660 LA PEROUSE COURT, GOODE BEACH CITY OF ALBANY, WESTERN AUSTRALIA

Prepared For:	Cherry Martin
	PO Box 7173 SHENTON PARK WA 6008
Report Number:	AA2016/19
Report Version:	V1
Report Date:	25 May 2017

DISCLAIMER

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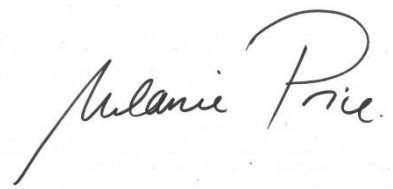
QUALITY ASSURANCE

Aurora Environmental has implemented a comprehensive range of quality control measures on all aspects of the company's operation.

An internal quality review process has been applied to each project task undertaken by us. Each document is carefully reviewed and signed off by senior members of the consultancy team prior to issue to the client.

Document No: CHE-2016-002_REPT_002_mp_V1.docx

Report No: AA2016/19

Author:	Melanie Price Associate Environmental Scientist		25 May 2017
		Signature	Date
Reviewed by:	Paul Zuvela Manager - Environmental Impact Assessment		25 May 2017
		Signature	Date

DISTRIBUTION

FORM	REPORT FILE NAME	REPORT STATUS	DATE	PREPARED FOR	INITIALS
PDF	CHE-2016-002_REPT_002_mp_V1.docx	V1	25 May 2017	Cherry Martin	MP

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TABLES IN TEXT

PLATES IN TEXT

ATTACHMENTS

LIST OF FIGURES

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LIST OF ABBREVIATIONS

AHD	Australian Height Datum
ARVS	Albany Regional Vegetation Survey
DBH	Diameter at Breast Height
DEE	Department of Environment and Energy (Commonwealth)
DPAW	Department of Parks and Wildlife (WA)
EPBC Act	Environment and Biodiversity Conservation Act 1999
GPS	Global Positioning System
ha	Hectare
km	Kilometre
m	Metre
mm	millimetre
MNES	Matters of National Environmental Significance
WRP	Western Ringtail Possum

SUMMARY

A targeted fauna survey was undertaken at Lot 660, La Perouse Court, Goode Beach to determine the status of habitat and presence of:

- *Pseudocheirus occidentalis* (Western Ringtail Possum, WRP);
- *Calyptorhynchus banksii naso* - Forest Red-tailed Black-Cockatoo;
- *Calyptorhynchus baudinii* - Baudin's Black-Cockatoo;
- *Calyptorhynchus latirostris* - Carnaby's Black-Cockatoo; and
- *Zephyrarchaea mainae* - Main's Assassin Spider.

The results of the assessment are:

Fauna Habitat

The subject land comprises 7.701 ha, 2.1 ha of which is proposed to be cleared for development. The area proposed to be cleared comprises Peppermint (*Agonis flexuosa*) *Adenanthos sericeus* closed scrub in Excellent (Keighery, 1994) or Type 1 Residual (Thackway and Lesslie, 2006) condition with little to no evidence of weeds or other disturbance.

Western Ringtail Possums

No dreys or other signs of WRP were noted in the day time survey. The nocturnal survey identified a single WRP to the west of Lake Vancouver. The habitat in the development footprint is considered to be suitable for WRP as it contains Peppermint (*Agonis flexuosa*) and is dense and relatively undisturbed.

Clearing of more than 0.5ha of suitable WRP habitat is a trigger for referral to the Department of Environment and Energy (DEE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Black Cockatoos

Black Cockatoos are known to be present in the Goode Beach area. Assessment of the area proposed to be cleared indicates that the vegetation is not likely to provide roosting, breeding or foraging habitat due to the absence of suitable species and structure.

Main's Assassin Spider

Sampling of 26 locations within the development footprint failed to locate Main's Assassin Spider. The presence of suspended leaf litter, the spider's favoured habitat was relatively sparse compared to the Sandpatch Windfarm area where the species is commonly found. It is unlikely that the spider is present within the area proposed to be cleared.

1 INTRODUCTION

Aurora Environmental has been commissioned by Cherry Lee (the landowner) to undertake a targeted fauna assessment on Lot 660 La Perouse Court, Goode Beach (the subject land). The assessment specifically focussed upon Western Ringtail Possum (WRP), Main's Assassin Spider and the three species of Black Cockatoo.

The subject land located in the City of Albany and comprises 7.7107 ha, approximately 8km southeast (20km by road) of the central business district of Albany, on the south eastern side of Princess Royal Harbour and at the base of Vancouver Peninsula (Figures 1 and 2). It is immediately adjacent to the Goode Beach residential area.

The landowner is proposing to establish a low key tourist resort with a footprint of approximately 2.1 ha. Road and service access will be established on existing cleared alignments.

No previous fauna surveys have been undertaken at the site but Department of Parks and Wildlife (DPAW; Appendix 1) and Commonwealth Department of Environment and Energy (DEE; Appendix 2) databases[1] indicate that the area may contain habitat suitable for threatened species outlined in Table A. Discussions with officers of Albany DPAW indicated that as the vegetation in the development footprint is 'long unburnt', it may contain suitable habitat for Main's Assassin Spider (*Zephyrarchaea mainae*).

TABLE A: SPECIES STATUS

SPECIES NAME	*WILDLIFE CONSERVATION ACT 1950* SCHEDULE 1	*ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999*
Pseudocheirus occidentalis - Western Ringtail Possum	Critically endangered mammals	Vulnerable
Calyptorhynchus banksii naso - Forest Red-tailed Black-Cockatoo	Vulnerable birds	Vulnerable
Calyptorhynchus baudinii - Baudin's Black-Cockatoo	Endangered birds	Vulnerable
Calyptorhynchus latirostris - Carnaby's Black-Cockatoo	Endangered birds	Endangered
Zephyrarchaea mainae - Main's Assassin Spider	Vulnerable invertebrate	

[1] DPAW Nature Maps data base (https://naturemap.dpaw.wa.gov.au/default.aspx) and DEE Protected Matters Search Tool (http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf)

2 DESKTOP ASSESSMENT

In completing the desktop assessment, the following was undertaken:

- Review of DPAW's NatureMaps (Appendix 1);
- Interrogation of DEE Database for Matters of National Environmental Significance (MNES) (Appendix 2); and
- A review of literature to assess the habitats present on site (vegetation).

2.1 WESTERN RINGTAIL POSSUM

The WRP has a patchy distribution from the Collie River to Two Peoples Bay in Western Australia, occurring most commonly in coastal or near coastal forest that includes Peppermint Tree (*Agonis flexuosa*) as a major component (Department of Environment, 2017a). The most inland population occurs at Perup and this is the only known population living in forest that does not contain Peppermint Tree. The species has been recorded as far north as Dawesville and as far east as Eucla. In the towns of Busselton and Dunsborough, some urban or developed areas support viable populations. Other populations in urban or semi-urban areas occur at Augusta and Albany (Jones *et al.* 1994). The post-1995 range of the WRP has been calculated at 7,155km^2 (DoE, 2017).

The diet of the WRP is not well understood (Gilfillan, 2008) because while it is generally accepted that the species occurs in vegetation dominated by *Agonis flexuosa*, it is sometimes found in areas that either do not contain *A. flexuosa,* or it occurs in low densities. Preferred habitat has been found to consist almost exclusively of myrtaceous plants: Peppermint, Marri and Jarrah (Jones et al., 1994). All but one of the populations surveyed by Jones *et al.* (1994) was dominated by *A. flexuosa* (Perup). In urban areas possums feed on introduced garden species (Richardson 2005), and captive animals fed on peppermint leaves show a preference for fresh, young green leaves rather than red leaves (Ellis and Jones 1992). Throughout the WRP's range Jones *et al.* (1994) found that vegetation at all occupied sites belonged to one of three broad vegetation types defined as *A. flexuosa* forest (55% of occupied localities), eucalypt woodland or forest with a mid-storey of *A. flexuosa* (38% of occupied localities), and eucalypt woodland or forest without *A. flexuosa* (11% of occupied localities). Urban or semi-urban habitat occurred at 7% of occupied localities, but *A. flexuosa* was common or abundant in all such habitats. Jones *et al.* (1994) also found that the highest density populations were near-coastal, and associated with abundant Peppermint trees with a high continuity of either the canopy or mid- strata, and that many areas with abundant *A. flexuosa* did not support WRPs.

Processes threatening the occurrence and geographical extent of the species include clearing and habitat fragmentation, urbanisation, fox and cat predation, harvesting of plantation forests, altered fire regimes, road kill, drought, disease and competition with Brush-tail Possums (DoE, 2014a).

DPAW records (NatureMap) and discussion with DPAW Albany officers indicated that no records of WRP currently occur for the Goode Beach area.

2.2 CARNABY'S BLACK COCKATOO (*CALYPTORHYNCHUS LATIROSTRIS*)

The species is endemic to and widespread in the south-west of Western Australia and occurs mostly in the Wheatbelt (areas with between 300mm and 750mm of rainfall annually) and wetter regions

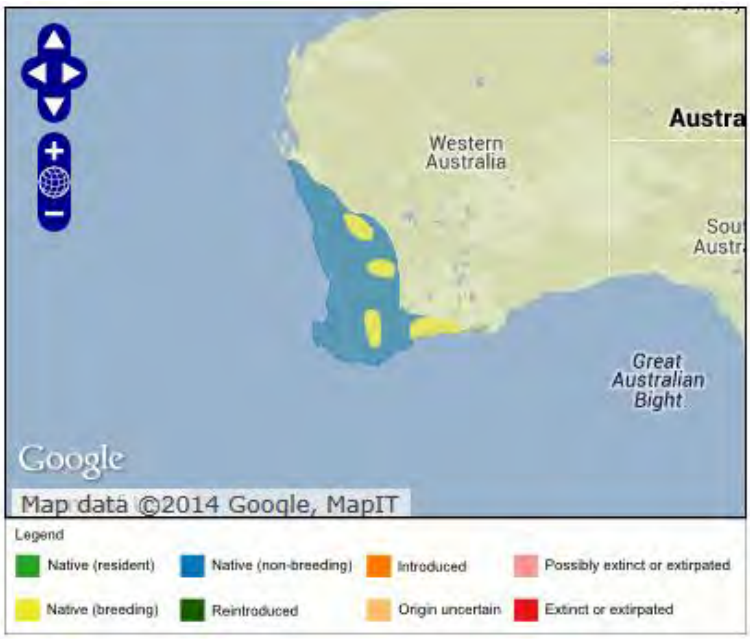
including the Swan Coastal Plain and South Coast (DoE, 2014b) and comprises an area between 32,000km^2 (DoE, 2014a) and 60, 525km^2 (DPaW, 2013).

Its habitat mostly comprises uncleared or remnant native eucalypt woodlands, especially those that contain Salmon Gum (*E. salmonophloia*) and Wandoo, and in shrubland or kwongan heathland dominated by *Hakea*, *Banksia* and *Grevillea* species.

Breeding habitat (or sites) encompasses those areas that contain suitable nest trees within the range of the species. Breeding activity is restricted to eucalypt woodlands mainly in the semiarid and subhumid interior (records from Three Springs District south to the Stirling Range, west to Cockleshell Gully and east to Manmanning) (DoE, 2014b). Breeding records indicate that this species is currently expanding its breeding range westward and south into the Jarrah-Marri forests of the Darling Scarp and into the Tuart (*E. gomphocephala*) forests of the Swan Coastal Plain, including Yanchep area, Lake Clifton and near Bunbury (DoE, 2014b).

The birds nest in large hollows in tall, living or dead eucalypts, mainly smooth-barked Salmon Gums and Wandoo, although other tree species have also been reported (DPaW, 2013). Suitable hollows can take from 120–150 years to develop. A map prepared by DEE using modelling techniques (Department of Sustainability, Environment, Water, Population and Communities, 2012) indicates that breeding Albany is within the breeding range of the species. However, Birdlife Australia (2014; Plate A) indicates that the birds are not known to breed in the Albany area but use the area for foraging and roosting in summer months. It is noted by DEE (Department of Sustainability, Environment, Water, Population and Communities, 2012) that birds may be starting to breed at new locations such as the Jarrah - Marri forests and coastal Tuart forest south of Perth (DPaW, 2013).

Plate A: Distribution of Carnaby's Cockatoo



Source: http://www.birdlife.org/datazone/speciesfactsheet.php?id=1391

During the non-breeding season, when most of the cockatoos migrate to the mid-west coast, Swan Coastal Plain and South Coast (DPaW, 2013), they roost in tall native or introduced eucalypts, and

occasionally in Marri and pines. Species known to be used for roosting include Flat-topped Yate (*E. occidentalis*), Salmon Gum, Wandoo, Karri, Blackbutt, Tuart, Blue Gum (*E. globulous*, introduced), *Pinus radiata* and *P. pinaster* (DoE, 2014b).

This species is threatened due to the high level of clearing of native vegetation in the Wheatbelt. Carnaby's black-cockatoos will traverse open space but may not use forage resources isolated from roosting habitat by long stretches of cleared agricultural land. A lack of connectivity between patches is "strongly implicated in the failure of Carnaby's cockatoo to survive in heavily cleared and fragmented rural landscapes" (DoE, 2014b). Corridors with breaks of less than 4 km between other foraging, commuting, breeding and roosting sites are considered important to allow the birds to move between areas.

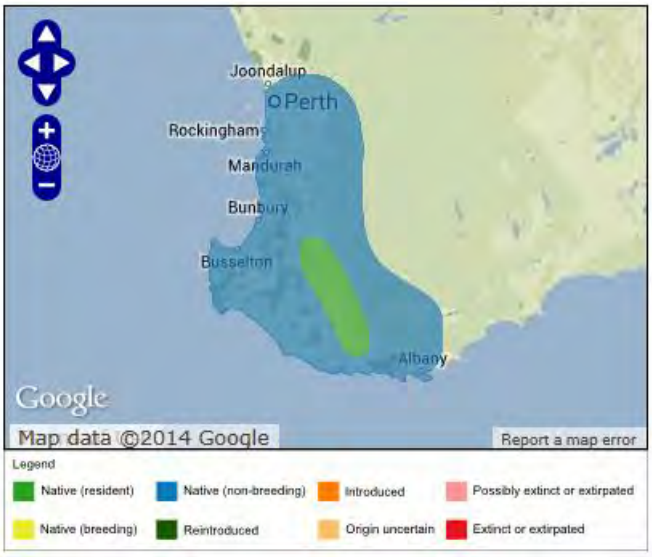
NatureMaps indicates that this species has been recorded in the Goode Beach area. The MNES database indicates that the area could contain habitat suitable for the species.

2.3 BAUDIN'S BLACK COCKATOO (*CALYPTORHYNCHUS BAUDINII*)

Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) is listed as Vulnerable under the *EPBC Act 1999* which means the species is facing a high risk of extinction in the wild (DoE, 2014c).

This Cockatoo is found only in the south-west of Western Australia and generally bounded by the 750mm rainfall isohyet (Albany, Gidgegannup and up to Mundaring and inland to the Stirling Ranges and Boyup Brook). Breeding has been recorded between Nornalup, northward to near Bridgetown, Lowden and Harvey (DoE, 2014c). Habitat comprises heavily forested areas dominated by Marri and other Eucalyptus species (particularly Karri and Jarrah). The distribution of the species comprises 40,000km^2 (DoE, 2014c) as shown in Plate B (Birdlife Australia, 2014).

Plate B: Distribution of Baudin's Black Cockatoo



Source: http://www.birdlife.org/datazone/speciesfactsheet.php?id=1390

Baudin's Cockatoo nests in hollows in mature trees such as Marri, Karri, Jarrah and Wandoo in the lower south-west of Western Australia (Department of Environment and Conservation, 2008). Breeding has been recorded in the far south of the range, in an area extending from Nornalup

northward to near Bridgetown, or sometimes further north to Lowden and Harvey (DoE, 2014c). Baudin's Black-Cockatoo roosts are generally located in the tallest trees in or near riparian environments or permanent water (DoE, 2014c).

Loss of habitat and forest management practices (not maintaining older trees) has previously impacted on the species. While the threat from habitat loss has largely abated in recent times (DoE, 2014c) there has been an ongoing decline in population numbers due to illegal shooting and competition for nesting hollows with feral bees, compounded by a low annual reproductive rate.

NatureMaps indicates that this species has been recorded in the Goode Beach area. The MNES database indicates that the area could contain habitat suitable for the species.

2.4 FOREST RED-TAILED BLACK-COCKATOO (*CALYPTORHYNCHUS BANKSII NASO*)

This sub-species is endemic to the south west of Western Australia and has been recorded from Gingin in the north and east to Mt Helena, Christmas Tree Well, West Dale (rarely to Brookton), North Bannister (rarely to Wandering) Mt Saddleback, Kojonup, Rocky Gully, upper King River and east to the Green Range (Department of Environment; DoE, 2014d). The current distribution is estimated to be 52,198km^2 (DoE, 2014d). The species inhabits dense Jarrah, Karri and Marri forests in areas that receive more than 600mm average rainfall annually (DoE, 2014d).

While there are no definitive maps of breeding areas, studies indicate that this cockatoo generally breeds in Marri, Jarrah, Blackbutt and Bullich (*E. megacarpa*) and Wandoo (DoE, 2014d). Nests are generally large, deep hollows with a broad floor and located high up in large 'veteran' trees. In Marri, the nest hollows of the Forest Red-tailed Black Cockatoo range from 8-14 m above ground, the entrance is 12–41 cm in diameter and the depth is 1-5 m (Department of Environment and Conservation, 2008).

Key threats to the Forest Red-tailed Black Cockatoo are habitat loss, nest hollow shortage and competition for available nest hollows from other species, injury or death from the European Honeybee (*Apis mellifera*), illegal shooting and fire (DoE, 2014c).

NatureMaps indicates that this species has been recorded in the Goode Beach area. The MNES database indicates that the area could contain habitat suitable for the species.

2.5 MAINS ASSASSIN SPIDER

Main's Assassin Spider is listed as a Schedule 1 species under the *Wildlife Conservation Act 1950,* as fauna that is rare or likely to become extinct. The species is known from only a narrow coastal strip on the south coast, from William Bay west of Denmark to Gull Rock east of Albany (Rix and Harvey, 2012).

Z. mainae requires a specific habitat within the undergrowth of moderately dense Peppermint (*Agonis*) stands. The subject land contains suitable habitat for *Z. mainae* (DPAW Albany pers. comm.). Due to the highly restricted distribution of this species, its status as a Schedule 1 species, and the suitability of the habitat within the site, a targeted site survey has been undertaken to determine if *Z. mainae* is present within the development footprint. Main's Assassin Spider favours peppermint (*Agonis*) coastal habitats where it inhabits shaded, long unburnt groves with an understorey of sedges (*Lepidosperma*), grasses and 'wiry' herbs (Restionaceae). Its microhabitat within these Peppermint groves is the

elevated leaf-litter layer which collects amongst the crowns, branches and foliage of the understorey plants (Rix and Harvey, 2012).

Discussions with DPAW Albany officers and Dr Mark Harvey of the Western Australian Museum indicate that the subject land could contain habitat suitable for Main's Assassin Spider.

2.6 VEGETATION MAPPING

Vegetation mapping and a flora survey have been undertaken (Alan Tingay and Associates, 1992). Vegetation mapping and flora nomenclature updating has been undertaken by Aurora Environmental (2017) and is shown in Appendix 3.

Vegetation of the subject land is associated with Peppermint low woodland (aLi) and scrub heath (aSZc) (Beard, 1981). The area was not included in the Albany Regional Vegetation Survey (ARVS; Sandiford and Barrett, 2010). However, Aurora has inferred that the vegetation aligns with a mosaic of ARVS units 2, 3 and 5 which comprises Peppermint low forest, coastal heath and coastal limestone heath. The proposed development will involve clearing up to 2.1 ha of ARVS mosaic units 2 and 3 (coastal heath and Peppermint low forest).

Vegetation mapping of the subject land identified five main vegetation zones, with distribution correlating with the underlying soil types of Quindalup dunes, relict dunes and peaty sand associated with Lake Vancouver (Alan Tingay and Associates, 1992). Vegetation is described as:

Foredunes (Quindalup)

The first dune system at the back of Goode Beach consists of a small foredune about 1m to 1.5m tall and 4m wide. The vegetation line closest to the beach, located at the base of the foredunes comprises *Cakile maritima**[2] and *Arctotheca populifolia**. On the top of the foredune strand species occur, dominated by *Euphorbia terracina** and *Spinifex hirsutus* with *Ficinia nodosa, Carpobrotus virescens* and *Cakile maritima**.

This vegetation type is not considered suitable habitat for WRP or black cockatoos due to lack of suitable foraging and shelter.

Quindalup Dunes

The seaward-facing slope of the first tall Quindalup Dunes contains a stunted *Adenanthos sericeus* low heath about 1-1.5m tall which is very dense in places. These shrubs have been wind-pruned by the salt laden sea breezes. At the dune crest and further west over the remainder of the Quindalup dunes the native peppermint (*Agonis flexuosa*) becomes co-dominant with the *Adenanthos* in an *Agonis flexuosa*, *Adenanthos sericeus* closed scrub. This vegetation type is dense and impenetrable with the dominant shrubs 3-4m tall, with 80-90% foliage cover arising from many individual stems and multi-stemmed plants. There is very little sub stratum under the shrubs due to the lack of light penetrating the dense overstorey. However, the ground is covered densely by the sedge *Desmocladus flexuosus* and to a lesser extent *Lepidosperma gladiatum* and *Ficinia nodosa*.

[2] * Introduced species.

This vegetation type is contained in the footprint proposed to be developed. It contains habitat potentially suitable for WRP. It is unlikely to contain breeding or roosting habitat for Black Cockatoos. Plant species found in this vegetation type are unlikely to provide foraging habitat for Black Cockatoos.

Peaty Sands

There is a relatively sharp boundary between the vegetation of the Quindalup dunes and the vegetation of the peaty sands associated with Lake Vancouver with two vegetation types associated with the soil type. Surrounding the water's edge is a narrow band (up to 20m wide) of *Leptocarpus trisepalus* sedgeland which is likely to experience long periods of inundation by fresh water. The *Leptocarpus* stands are about 1.5m tall and is relatively dense, which precludes most other species.

Further away from the lake's edge but still in swampy soils the vegetation comprises a *Melaleuca cuticularis/Banksia littoralis* low woodland with a low density of trees up to 6m tall over a 1m tall sedgeland of *Chaetanthus aristatus*, *L. trisepalus* and *Lepidosperma gladiatum*. *Callistachys lanceolata* is a common tall shrub throughout this vegetation type.

This vegetation type is considered to be marginal for WRP and not likely to be habitat for black cockatoos. This area is not part of the development foot print and will not be disturbed.

Relict Dunes

To the west of the Lake Vancouver vegetation types and the young Quindalup dune vegetation is a low heath dominated by *Melaleuca thymoides* occurring on Relict Dunes. The low heath is approximately 0.5m tall, dense and contains a different suite of species from the lake and Quindalup dune vegetation.

In the south-west corner of the subject land, the relict dune sands are mixed with colluvial sand derived from granite which is abundant immediately south of the lot boundary. In this area the low heath vegetation contains emergent trees of Jarrah *(Eucalyptus marginata)* and Peppermint (*Agonis flexuosa).*

This area will not be disturbed by the proposed development.

3 SCOPE OF WORK AND METHODS

The area of investigation included the extent of Lot 660, with a focus on the footprint of the proposed development. Surveys were undertaken by Melanie Price of Aurora Environmental, an experienced environmental scientist and zoologist.

3.1 FAUNA HABITAT ASSESSMENT

Vegetation, landform and soils units present at the subject site have been used to define broad fauna habitat types.

3.2 WESTERN RINGTAIL POSSUM SURVEY

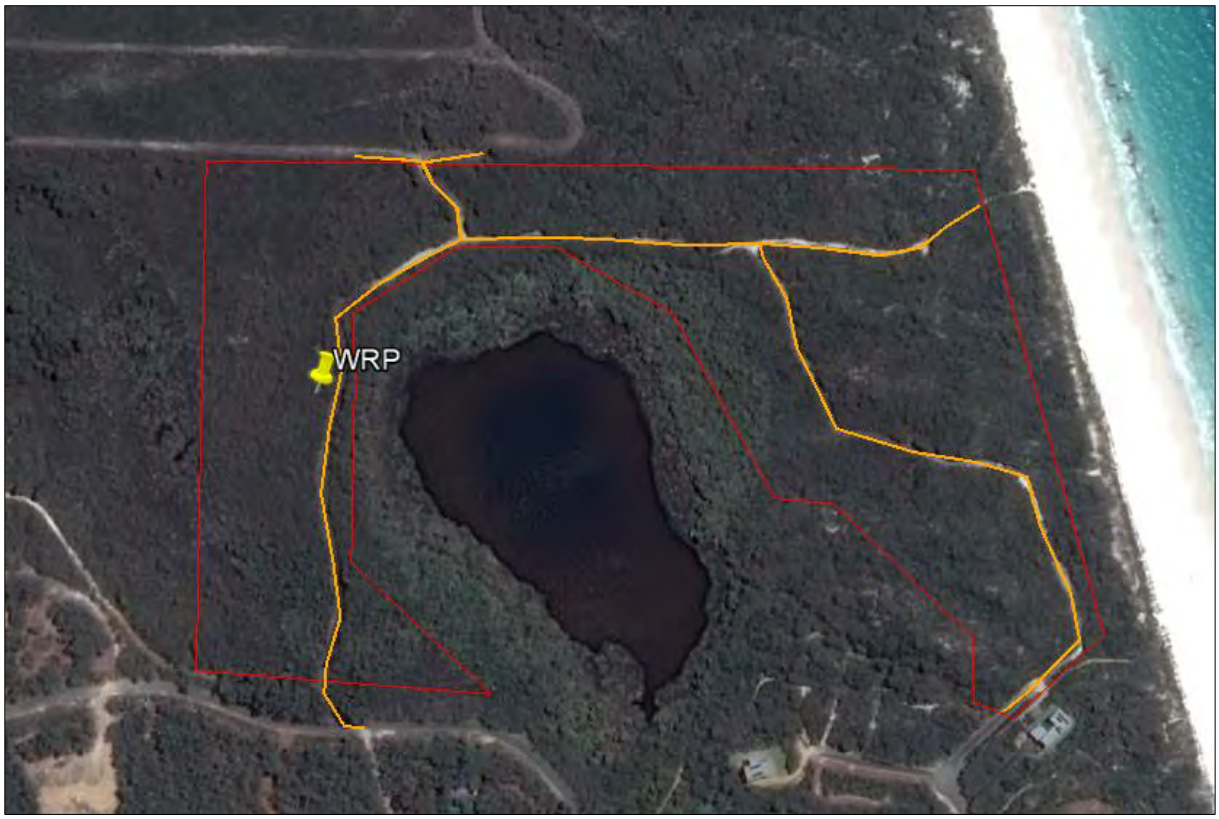
3.2.1 Daytime Survey

A day time survey to locate and record dreys, obvious tree hollows, scats and individual WRPs was carried out on the 6 December 2016. This involved traversing the study area on foot as shown in Appendix 4. The daytime conditions were clear, with no rain and a light breeze.

3.2.2 Night Time Survey

A night time survey to locate and record individual WRPs was carried out on the 6 December 2016. This involved searching along a survey line (tracks shown in Plate C) within the subject land, on foot using a LED head torch. The conditions were dry (no rain) with a light breeze.

PLATE C: AREA SURVEYED FOR WESTERN RINGTAIL POSSUM (NIGHT TIME)



3.2.3 Habitat Assessment

Description and comments on the amount and quality of WRP habitat within the subject land are provided based on observations made during the site surveys.

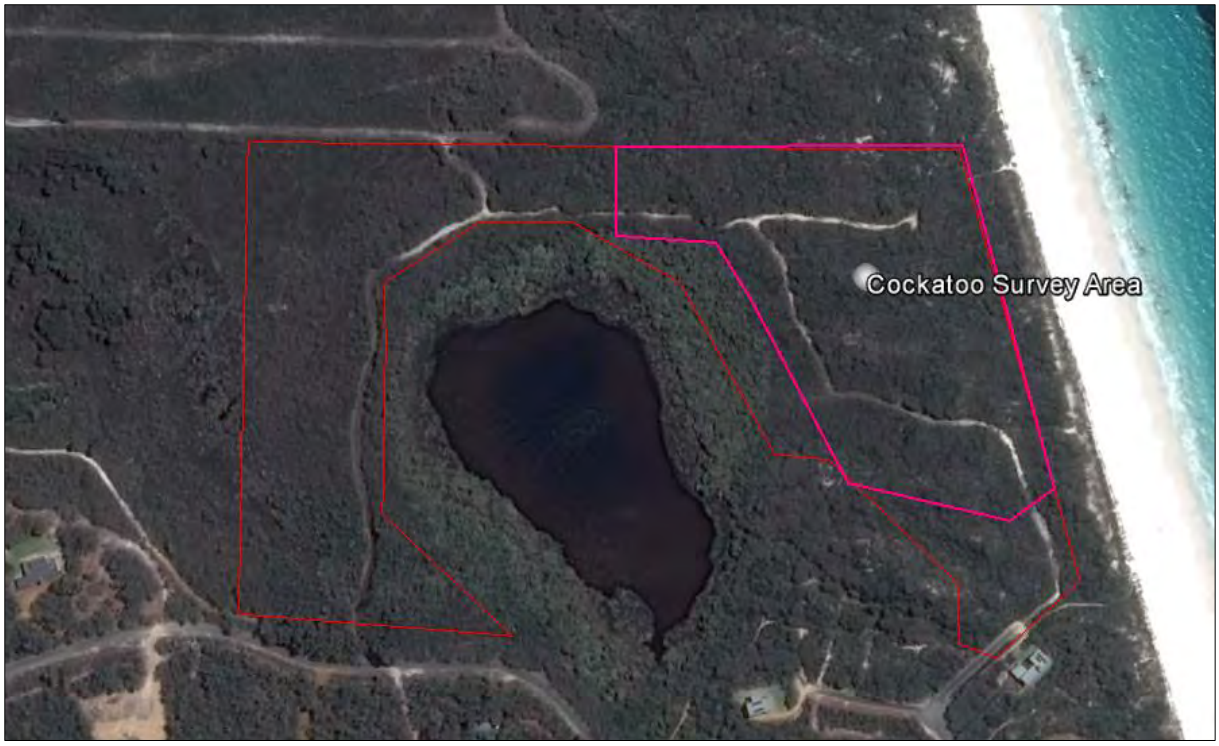
3.3 BLACK COCKATOO HABITAT ASSESSMENT

Habitat used by black cockatoos have been placed into three categories by DEE (DSEWPaC, 2012):

- Breeding Habitat;
- Foraging Habitat; and
- Night Roosting Habitat.

A habitat assessment of the area proposed to be cleared for development was carried out on 6 December 2016 (Plate D).

PLATE D: AREA SURVEYED FOR COCKATOO HABITAT



3.3.1 Breeding Habitat

Assessment of black cockatoo breeding habitat involves the identification of all suitable breeding trees species within the survey area that have a diameter at breast height (DBH) of over 50cm. If present, the DBH of each tree is estimated using a pre-made 50 cm tool. The location of each tree identified as being over the threshold DBH is recorded with a GPS and details on tree species, number and size of hollows (if any) noted. The location of trees observed to contain hollows (of any size/type) are recorded using a GPS. Target tree species include Marri, Jarrah and Flooded Gum or any other endemic *Corymbia/Eucalyptus* species of a suitable size that is present. Peppermints, *Banksia*, Sheoak and

Melaleuca tree species (for example) are not be assessed as they typically do not develop hollows that are used by black cockatoos.

For the purposes of this survey a tree containing a potential cockatoo nest hollow is defined as:

> *Generally, any tree which is alive or dead that contains one or more visible hollows (cavities within the trunk or branches) suitable for occupation by black cockatoo for the purpose of nesting/breeding. Hollows that had an entrance greater than about 12cm in diameter and would allow the entry of a black cockatoo into a suitably orientated and sized branch/trunk, will be recorded as a 'potential nest hollow'. Identified hollows are examined using binoculars for evidence of actual use by black cockatoos (e.g. chewing around hollow entrance, scarring and scratch marks on trunks and branches). The calls of chicks were also listened for, if a suitable hollow is present.*

3.3.2 Foraging Habitat

The location and nature of black cockatoo foraging evidence (e.g. chewed fruits around base of trees) observed during the field survey is recorded, if present. The nature and extent of potential foraging habitat present is also documented irrespective of the presence of any actual foraging evidence.

3.3.3 Night Roosting Habitat

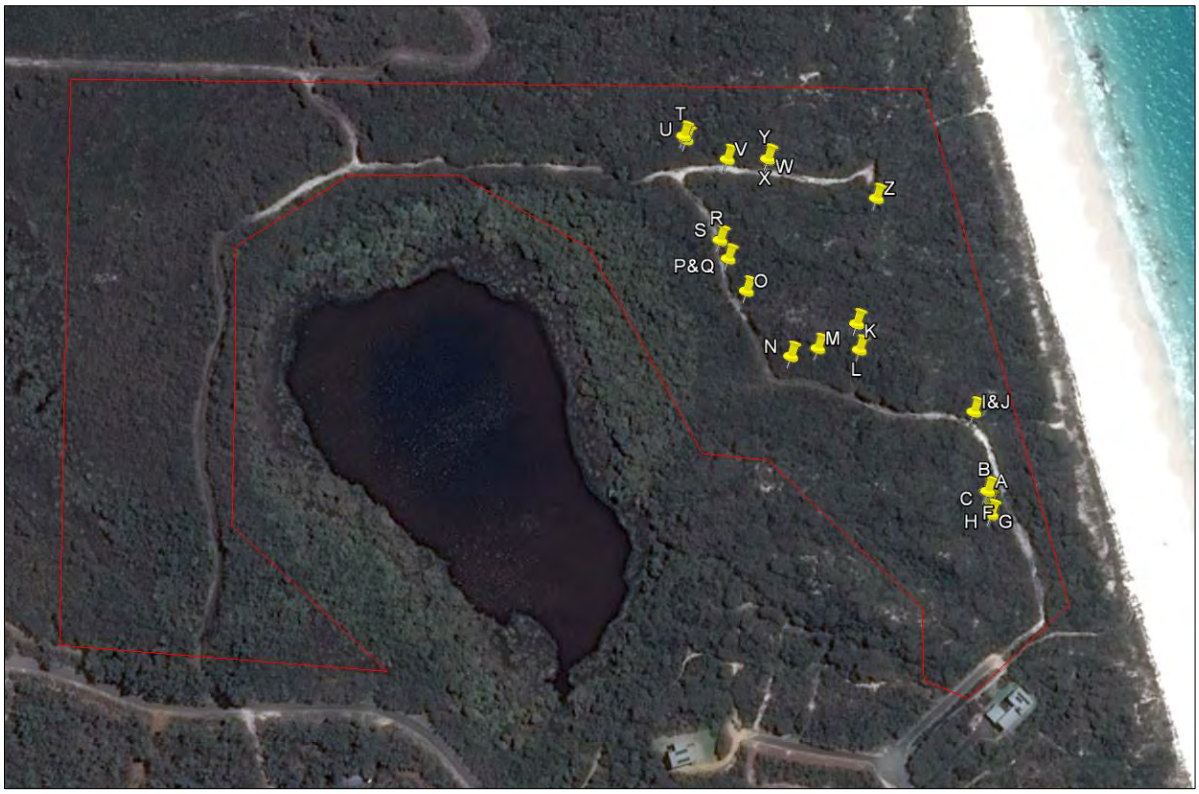
Direct and indirect evidence of black cockatoos roosting within trees on site is noted if observed (e.g. branch clippings, droppings or moulted feathers). This included a dusk survey prior to commencement of the nocturnal WRP survey aimed at observing any actual roosting activity.

3.4 MAIN'S ASSASSIN SPIDER

Twenty-six sites were sampled during the survey on 30 March 2017 (Plate E). Melanie Price has been trained by Dr Mark Harvey (WA Museum) in sampling techniques and the identification of Main's Assassin Spider.

At each sample location, a sieve on a sorting tray was placed beneath suspended leaf litter, with litter shaken into the tray and sorted to locate spiders. Spiders were examined using a jeweller's magnifying visor. No trapping or wet pit falling was conducted as part of this assessment. All fauna work was conducted according to DPAW licence number 08-000333-1 (Appendix 5).

PLATE E: SPIDER SAMPLING LOCATIONS



4 SURVEY CONSTRAINTS

Seasonal sampling has not been carried out as part of this fauna assessment. The conclusions presented are based on information from Western Australian and Commonwealth databases, discussion with officers from DPAW Albany, field data and the environmental monitoring carried out over a limited period of time. Therefore, the data and interpreted outcomes are indicative of the environmental conditions on the site at the time of the field assessment, as interpreted by an experienced zoologist. It is recognised that site conditions may change over time.

The number or presence/absence of WRPs observed during the nocturnal surveys represents the minimum number present within the area surveyed at the time of the survey. Due to various survey limitations, it is unlikely that every WRP present within the area was observed. The site is also open to the movement of WRP to and from nearby areas which may contain suitable habitat. As a consequence, some WRPs may have home ranges that overlap the boundary of the study area and as such, there is no guarantee that all WRPs that exist in the area utilised the survey area at the time of the nocturnal survey.

The black cockatoo habitat surveyed trees with hollows if they occurred within the survey area. Identifying hollows suitable for fauna species from ground level has limitations. Generally, the full characteristics of any hollow seen from the ground are not fully evident (e.g. internal dimensions). It is also difficult to locate all hollows within all trees as some are not observable from ground level. If present, hollows were inspected using a camera on a pole (within 5m of ground level). If present, the location of habitat trees was recorded using a handheld GPS. The accuracy of the coordinates obtained cannot be guaranteed below a level of 5 to 10m.

5 RESULTS AND CONCLUSION

5.1 FAUNA HABITAT

The vegetation present within the proposed clearing footprint of the subject land comprises AfAs - *Agonis flexuosa/Adenanthos sericeus* Closed Scrub (Appendix 3). As described by Alan Tingay and Associates (1992) and Aurora Environmental (2017), this vegetation type is dense with the dominant shrubs 3-4m tall, with 80-90% foliage cover arising from many individual stems and multi-stemmed plants. There is very little sub stratum under the shrubs due to the lack of light penetrating the dense overstorey. However, the ground is covered densely by the sedge *Desmocladus flexuosus* and to a lesser extent *Lepidosperma gladiatum* and *Ficinia nodosa*. The vegetation is in Excellent condition (Keighery, 1994) or Type 1 Residual (Thackway and Lesslie, 2006) with little to no evidence of weeds or other disturbance (Appendix 6). Photographs of the vegetation surveyed is shown in Plate F.

PLATE F: PHOTOGRAPHS OF HABITAT SURVEYED

Survey area within proposed development footprint - Peppermint (*Agonis flexuosa*) *Adenanthos sericeus* Closed Scrub

Understorey

Understorey with sparse suspended leaf litter

5.2 WESTERN RINGTAIL POSSUM

During the daytime survey, no WRP dreys, scats or other evidence of WRP were identified within the subject land. No trees containing hollows were observed within the study area and it is noted that the area is dominated by relatively low coastal heath. Trees on the site comprise thickets of peppermint (*Agonis flexuosa*) with shrubs of woolly bush (*Adenanthos sericeus*). Forks in trees, cavities in tree trunks, fallen hollow logs, rabbit burrows and dense ground cover (where present) can also be used by

WRPs for daytime refuge and therefore observations of dreys and hollows only provide a guide to WRP habitat use/quality as other opportunities for daytime refuge may exist.

A single WRP and was observed on the night survey on the western side of Lake Vancouver (Plate C). The WRP was observed in *Callistachys lanceolata*, approximately 2.5m above the ground.

Vegetation containing *Agonis flexuosa* and with a suitable dense structure (although not the low heath areas) is likely to be suitable for WRP. The vegetation proposed to be cleared for the development contains dense peppermint thickets.

The *Significant Impact Guidelines for the Vulnerable Western Ringtail Possum (Pseudocheirus occidentalis) in the Southern Swan Coastal Plain, WA* (Department of the Environment, Water Heritage and the Arts, 2009) indicates that if more than 0.5 ha of core, primary corridors or supporting habitat is proposed to be cleared, a referral to DEE should be made, to determine if the activity constitutes a controlled action under the EPBC Act. The clearing of 2.1 ha of potential habitat on the subject land triggers the need for referral.

5.3 BLACK COCKATOO HABITAT ASSESSMENT

5.3.1 Black Cockatoo Breeding Habitat

Trees considered potentially suitable for black cockatoos to use as nesting habitat (using DEE criteria – DSEWPaC, 2012) were not observed within the subject land as it comprises coastal heath and low peppermint thickets. The vegetation assemblages present are not hollow forming.

5.3.2 Black Cockatoo Foraging Habitat

When nesting, black cockatoos will generally forage within a 6–12 km radius of their nesting site. Following breeding, birds assemble into flocks and move across the landscape searching for food, usually foraging within 6 km of a night roost. Because of this mobility, potential for reduced seed set and flowering due to drought, and the irregular or infrequent flowering and fruiting patterns of many of their food sources, large areas of foraging habitat are required to support black cockatoo populations. Table B indicates the preferred foraging habitat for each cockatoo species.

TABLE B: FORAGING DESCRIPTION FOR THREE SPECIES OF BLACK COCKATOO

Habitat	Baudin's	Carnaby's	Forest Red-tailed
Foraging	Eucalypt woodlands and forest, and proteaceous woodland and heath. During the breeding season feed primarily on native vegetation, particularly Marri (*Corymbia calophylla*). Outside the breeding season, may feed in fruit orchards (mostly apple and pear, but also persimmon) and tips of *Pinus* spp.	Native shrubland, kwongan heathland and woodland dominated by proteaceous plant species such as *Banksia* spp. (including *Dryandra* spp.), *Hakea* spp. and *Grevillea* spp. Forages in pine plantations (*Pinus* spp.), eucalypt woodland and forest that contains foraging species. Also individual trees and small stands of these species.	Jarrah and Marri woodlands and forest, and edges of Karri (*Eucalyptus diversicolor*) forests including Wandoo (*E. wandoo*) and Blackbutt (*E. patens*), within the range of the subspecies.

Source: Department of Sustainability, Environment, Water, Population and Communities, 2012

The vegetation of the proposed clearing area is in excellent condition, but contains few species which are likely to provide high quality foraging for the three species of black cockatoos. Popular foraging species such as Marri (*Corymbia calophylla),* Jarrah (*Eucalyptus marginata),* Sheoak (*Allocasuarina fraseriana),* Balga (*Xanthorrhoea species)* and *Banksia* species are absent in the development footprint. Other foraging species (i.e. Pine trees, *Hakea, Grevillea, Callistemon* and *Erodium*) are also absent from the development footprint.

5.3.3 Black Cockatoo Roosting Habitat

A review of available data (Peck *et al*., 2016) indicates that there are two known roost sites for white tailed black cockatoos at Goode Beach (with other roost sites in the City of Albany at Robinson, Mt Clarence, Seppings, Kalgan, Cheynes, Mettler and McKail). Confirmed roost sites for Forest Red tailed Black Cockatoos occur at Kalgan and Torbay. The trees generally favoured by black cockatoos are included in Table C.

TABLE C: NIGHT ROOSTING HABITAT

Baudin's	Carnaby's	Forest Red-tailed
Generally in or near riparian environments or other permanent water sources. Jarrah, marri, flooded gum, Blackbutt *E. patens*, tuart, and introduced eucalypts including blue gum *E. globulus*, and lemon scented gum *Corymbia citriodora*.	Generally, in or near riparian environments or natural and artificial permanent water sources. Flat-topped yate *E. occidentalis*, salmon gum, wandoo, marri, karri, blackbutt, tuart, introduced eucalypts (for example blue gum) and introduced pines.	Tall jarrah, marri, blackbutt, tuart and introduced eucalypt trees within or on the edges of forests.

No potential roosting trees were identified in the study area during the survey.

The overall habitat assessment for the three species of Black Cockatoos indicates that the footprint of the area proposed to be cleared does not constitute significant habitat for breeding, roosting or foraging.

5.4 MAIN'S ASSASSIN SPIDER

A number of species of spider were observed and released during the site reconnaissance. However, none had features that were characteristic of Main's Assassin Spider.

Main's Assassin Spider favours peppermint (*Agonis*) coastal habitats where it inhabits shaded, long unburnt groves with an understorey of sedges (*Lepidosperma*), grasses and 'wiry' herbs (Restionaceae). Its microhabitat within these Peppermint groves is the elevated leaf-litter layer which collects amongst the crowns of the understorey plants (Rix and Harvey, 2009). While this habitat type is present on the subject land, the suspended leaf litter was sparse (compared to areas where the spider is relatively common, such as the Sandpatch Windfarm).

The survey indicates that Main's Assassin Spider is unlikely to occur within the area proposed to be cleared for development.

6 REFERENCES

Alan Tingay and Associates (1992) Residential Subdivision – Lot 401 Frenchman Bay, Albany. Consultative Environmental Review. Report No. 92/20. Prepared for L'Oire Nominees Pty Ltd.

Aurora Environmental (2017) Environmental Assessment - Vancouver Beach Resort - Lot 660 (40) La Perouse Court, Goode Beach - City of Albany, Western Australia. Prepared for Cherry Martin. V2

Beard, J.S. (1981) The vegetation of the Albany and Mt Barker Areas, Western Australia. Map and Explanatory Memoir. 1:250,000 Series. Vegetation Survey of Western Australia. Vegmap Publication. Second Edition.

Department of Parks and Wildlife (2014) Nature Map. Sourced on 28 February 2014 http://naturemap.dec.wa.gov.au/default.aspx

Department of the Environment (2014a) *Calyptorhynchus latirostris* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 28 Jan 2014 18:47:46 +1100.

Department of the Environment (2014b) *Calyptorhynchus latirostris* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 28 Jan 2014 18:47:46 +1100.

Department of the Environment (2014c) *Calyptorhynchus baudinii* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 28 Jan 2014 18:49:12 +1100.

Department of the Environment (2014d) *Calyptorhynchus banksii naso* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 28 Jan 2014 18:45:00 +1100.

Department of the Environment (2017a) *Pseudocheirus occidentalis* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed Tue, 28 Jan 2017 18:51:30 +1100.

Department of the Environment, Water Heritage and the Arts (2009) Significant Impact Guidelines for the Vulnerable Western Ringtail Possum (*Pseudocheirus occidentalis*) in the southern Swan Coastal Plain, Western Australia. Nationally Threatened Species and Ecological Communities EPBC Act Policy Statement 3.10.

Department of Parks and Wildlife (2013). Carnaby's cockatoo (*Calyptorhynchus latirostris*) Recovery Plan. Department of Parks and Wildlife, Perth, Western Australia.

Department of Parks and Wildlife (2014) Nature Map. Sourced on 28 February 2014 http://naturemap.dec.wa.gov.au/default.aspx

Department of Sustainability, Environment, Water, Population and Communities (2012) 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*.

Gilfillan, S. (2008) Western Ringtail Possum (Pseudocheirus occidentalis) Survey and Data Collation in the Greater Albany Area. Phase 1 Final Report. Prepared for DPAW.

Jones, B. A., How, R. A., and Kitchener, D. J. (1994) A field study of *Pseudocheirus occidentalis* (Marsupialia: Petauridae). II. Population studies. *Wildlife Research* **21**, 189–201. doi:10.1071/WR9940189.

Peck A., G. Barrett and M. Williams (2016) The 2016 Great Cocky Count: a community-based survey for Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) and Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*). BirdLife Australia, Floreat, Western Australia.

Richardson, J. (2005) DRAFT Western Ringtail Possum *Pseudocheirus occidentalis* Recovery Plan, July 2005-June 2010. Version 4. Department of Conservation and Land Management.

Rix M.G, and Harvey M.S. (2012) Australian Assassins, Part II: A review of the new assassin spider genus Zephyrarchaea (Araneae, Archaeidae) from southern Australia', *ZooKeys*, 191, pp. 1-62.

Sandiford E.M. and Barrett, S. (2010) Albany Regional Vegetation Survey. Extent, Type and Status. Department of Environment and Conservation. Albany, Western Australia.

FIGURES

PINPOINT CARTOGRAPHICS (08) 9562 7136 CHE2016-002_REPT_001_mp-f01.dgn

Aurora environmental

Cherry Martin
ENVIRONMENTAL ASSESSMENT - VANCOUVER BEACH RESORT
LOT 40 LA PEROUSE COURT - GOODE BEACH, CITY OF ALBANY, WA

Figure 1

REGIONAL LOCATION

Drawn: M. Price | Date: 7 Feb 2017 | Job: CHE2016-002

N

0 10 20 30 40 50m

SCALE 1 : 1 500 at A3 (MGA)

Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Topographic Contour
- Proposed Clearing Footprint

6 117 400mN

6 117 200mN

Lake Vancouver

LA PEROUSE ROAD

585 000mE

585 200mE

585 400mE

CADASTRAL SOURCE: Landgate, December 2016.
CONTOUR SOURCE: Alan Tingay & Associates, Figure 4.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown November 2016.

Aurora environmental

Cherry Martin
ENVIRONMENTAL ASSESSMENT - VANCOUVER BEACH RESORT
LOT 40 LA PEROUSE COURT - GOODE BEACH, CITY OF ALBANY, WA

Figure 2

SUBJECT LAND

Drawn: M. Price | Date: 11 May 2017 | Job: CHE2016-002

PINPOINT CARTOGRAPHICS (08) 9562 7136 CHE2016-002_REPT_001_mp-l02.dgn

APPENDIX 1

NatureMap Search Report

NatureMap Species Report

Created By Guest user on 19/05/2017

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 117° 56' 05" E,35° 05' 01" S
Buffer 2km
Group By Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	293	3568
Priority 1	1	2
Priority 2	1	1
Priority 3	2	3
Priority 4	5	11
Protected under international agreement	4	8
Rare or likely to become extinct	6	99
TOTAL	**312**	**3692**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rare or likely to become extinct					
1.	1854	*Banksia verticillata (Albany Banksia)*		T	
2.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)*		T	
3.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)*		T	
4.	2242	*Isopogon uncinatus*		T	
5.	24097	*Parantechinus apicalis (Dibbler)*		T	
6.	24145	*Setonix brachyurus (Quokka)*		T	
Protected under international agreement					
7.	25558	*Ardea ibis (Cattle Egret)*		IA	
8.	41324	*Ardea modesta (Eastern Great Egret)*		IA	
9.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
10.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
Priority 1					
11.	17049	*Thomasia purpurea x solanacea*		P1	
Priority 2					
12.	2790	*Gyrostemon thesioides*		P2	
Priority 3					
13.	35396	*Poa billardierei*		P3	
14.	2327	*Synaphea preissii*		P3	
Priority 4					
15.	16876	*Adenanthos x cunninghamii*		P4	
16.	24153	*Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)*		P4	
17.	1302	*Laxmannia jamesii (James' Paperlily)*		P4	
18.	5096	*Thomasia quercifolia (Oak Leaved Thomasia)*		P4	
19.	5100	*Thomasia solanacea*		P4	
Non-conservation taxon					
20.	15429	*Acacia alata var. alata*			
21.	3363	*Acacia hastulata*			
22.	3413	*Acacia leioderma*			
23.	3424	*Acacia littorea*			
24.	35624	*Acacia pentadenia subsp. pentadenia*			
25.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
26.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
27.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
28.	6203	*Actinotus glomeratus*			
29.	1791	*Adenanthos obovatus (Basket Flower)*			
30.	11685	*Adenanthos sericeus subsp. sericeus (Coastal Woollybush)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
31.	24301	*Aegotheles cristatus subsp. cristatus (Australian Owlet-nightjar)*			
32.	5316	*Agonis flexuosa (Peppermint, Wonil)*			
33.	17202	*Agonis flexuosa var. flexuosa*			
34.	185	*Aira cupaniana (Silvery Hairgrass)*	Y		
35.	13908	*Allocasuarina lehmanniana subsp. lehmanniana*			
36.		*Amblyomma fimbriatum*			
37.	4585	*Amperea ericoides*			
38.	4588	*Amperea volubilis*			
39.	24316	*Anas superciliosa (Pacific Black Duck)*			
40.	6306	*Andersonia caerulea (Foxtails)*			
41.	25844	*Andersonia caerulea subsp. caerulea*			
42.	6317	*Andersonia micrantha*			
43.	6321	*Andersonia sprengelioides*			
44.		*Anoplocapros lenticularis*			
45.	11505	*Anthocercis viscosa subsp. viscosa*			
46.	24561	*Anthochaera carunculata (Red Wattlebird)*			
47.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
48.	12040	*Apium prostratum var. prostratum (Sea Celery)*			
49.	24285	*Aquila audax (Wedge-tailed Eagle)*			
50.		*Araneus cyphoxis*			
51.		*Argiope trifasciata*			
52.	61	*Asplenium aethiopicum (Forked Spleenwort)*			
53.	7850	*Asteridea nivea*			
54.	6323	*Astroloma ciliatum (Candle Cranberry)*			
55.	32525	*Banksia formosa (Showy Dryandra)*			
56.	1822	*Banksia ilicifolia (Holly-leaved Banksia)*			
57.	1830	*Banksia littoralis (Swamp Banksia, Pungura)*			
58.		*Barnardius zonarius*			
59.	747	*Baumea rubiginosa*			
60.	748	*Baumea vaginalis (Sheath Twigrush)*			
61.	3713	*Bossiaea linophylla*			
62.	14291	*Bossiaea praetermissa*			
63.	26518	*Botryocladia sonderi*			
64.	46733	*Brachyloma baxteri*			
65.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
66.	10861	*Callistachys lanceolata (Wonnich)*			
67.	5394	*Callistemon glaucus*			
68.	31103	*Caloplaca gallowayi*			
69.	2957	*Cassytha racemosa (Dodder Laurel)*			
70.	1125	*Centrolepis drummondiana*			
71.	3148	*Cephalotus follicularis (Albany Pitcher Plant)*			
72.	17685	*Chaetanthus aristatus*			
73.	24187	*Chalinolobus morio (Chocolate Wattled Bat)*			
74.	1280	*Chamaescilla corymbosa (Blue Squill)*			
75.	5491	*Chamelaucium ciliatum*			
76.	1513	*Chasmanthe floribunda (African Cornflag)*	Y		
77.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
78.	4448	*Chorilaena quercifolia (Chorilaena)*			
79.	3754	*Chorizema diversifolium*			
80.	24980	*Christinus marmoratus (Marbled Gecko)*			
81.		*Chroicocephalus novaehollandiae*			
82.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
83.	24432	*Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)*			
84.	24288	*Circus approximans (Swamp Harrier)*			
85.	28205	*Cladonia capitellata var. capitellata*			
86.	27692	*Cladonia rigida*			
87.	2929	*Clematis pubescens (Common Clematis)*			
88.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
89.	4554	*Comesperma flavum*			
90.	4564	*Comesperma virgatum (Milkwort)*			
91.	40863	*Commersonia corylifolia (Hazel-leaved Rulingia)*			
92.	11826	*Conostylis aculeata subsp. aculeata*			
93.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
94.		*Cormocephalus hartmeyeri*			
95.	25592	*Corvus coronoides (Australian Raven)*			
96.	6352	*Cosmelia rubra (Spindle Heath)*			
97.	25701	*Coturnix ypsilophora (Brown Quail)*			
98.	24673	*Coturnix ypsilophora subsp. australis (Brown Quail)*			
99.	25595	*Cracticus tibicen (Australian Magpie)*			
100.	25596	*Cracticus torquatus (Grey Butcherbird)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
101.	3142	*Crassula natans*	Y		
102.	25398	*Crinia georgiana (Quacking Frog)*			
103.	4451	*Crowea angustifolia (Crowea)*			
104.	25049	*Ctenotus labillardieri*			
105.	13732	*Cuscuta campestris (Golden dodder)*	Y		
106.	26725	*Cystophora polycystidea*			Y
107.	26729	*Cystophora subfarcinata*			
108.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
109.	7439	*Dampiera fasciculata (Bundled-leaf Dampiera)*			
110.	5508	*Darwinia citriodora (Lemon-scented Darwinia)*			
111.	5510	*Darwinia diosmoides*			
112.	3835	*Daviesia preissii*			
113.	24052	*Delphinus delphis (Common Dolphin)*			
114.	16595	*Desmocladus flexuosus*			
115.	7487	*Diaspasis filifolia (Thread-leaved Diaspasis)*			
116.		*Dingosa serrata*			
117.		*Diodon holocanthus*			
118.	11049	*Diuris corymbosa*			
119.	13200	*Drosera enodes*			
120.	13218	*Drosera erythrogyne*			
121.	3117	*Drosera paleacea (Dwarf Sundew)*			
122.	3118	*Drosera pallida (Pale Rainbow)*			
123.	13186	*Drosera roseana*			
124.	8914	*Drosera sulphurea (Sulphur-flowered Sundew)*			
125.	25251	*Echiopsis curta (Bardick)*			
126.	25096	*Egernia kingii (King's Skink)*			
127.		*Egretta novaehollandiae*			
128.	48247	*Elachista nigra*	Y		
129.		*Elanus axillaris*			
130.	25250	*Elapognathus coronatus (Crowned Snake)*			
131.		*Eolophus roseicapillus*			
132.	24652	*Eopsaltria georgiana (White-breasted Robin)*			
133.	13866	*Eriochilus pulchellus*			
134.		*Eriophora biapicata*			
135.	5625	*Eucalyptus diversicolor (Karri)*			
136.	5709	*Eucalyptus megacarpa (Bullich, Pulidj)*			
137.	24818	*Eudyptula minor subsp. novaehollandiae (Little Penguin)*			
138.	4636	*Euphorbia paralias (Sea Spurge)*	Y		
139.	20214	*Eutaxia myrtifolia*			
140.	25621	*Falco berigora (Brown Falcon)*			
141.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
142.	48244	*Feldmannia mitchelliae*			
143.	27745	*Flavoparmelia haysomii*			
144.	1944	*Franklandia fucifolia (Lanoline Bush)*			
145.	24765	*Gallirallus philippensis subsp. mellori (Buff-banded Rail)*			
146.	20490	*Gastrolobium coriaceum*			
147.	25530	*Gerygone fusca (Western Gerygone)*			
148.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
149.	10909	*Gompholobium confertum*			
150.	29362	*Goodenia coerulea*			
151.	24443	*Grallina cyanoleuca (Magpie-lark)*			
152.	2787	*Gyrostemon sheathii*			
153.	25627	*Haematopus fuliginosus (Sooty Oystercatcher)*			
154.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
155.	2137	*Hakea ceratophylla (Horned Leaf Hakea)*			
156.	2156	*Hakea elliptica (Oval-leaf Hakea)*			
157.	2191	*Hakea oleifolia (Dungyn)*			
158.	2203	*Hakea ruscifolia (Candle Hakea)*			
159.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
160.	24295	*Haliastur sphenurus (Whistling Kite)*			
161.	25117	*Hemiergis peronii subsp. peronii*			
162.	27777	*Heterodermia obscurata*			
163.		*Heterodontus portusjacksoni*			
164.	5117	*Hibbertia cuneiformis (Cutleaf Hibbertia)*			
165.	5126	*Hibbertia furfuracea*			
166.	5132	*Hibbertia grossulariifolia*			
167.	47965	*Hieraaetus morphnoides (Little Eagle)*			
168.	24491	*Hirundo neoxena (Welcome Swallow)*			
169.	43384	*Hydrophis platurus (Yellow-bellied Seasnake)*			
170.		*Hydroprogne caspia*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
171.	24211	*Hydrurga leptonyx (Leopard Seal)*			
172.		*Isopeda leishmanni*			
173.	45301	*Jackelixia ligulata*			
174.	4017	*Jacksonia horrida*			
175.	1186	*Juncus microcephalus*	Y		
176.	4037	*Kennedia coccinea (Coral Vine)*			
177.	467	*Lagurus ovatus (Hare's Tail Grass)*	Y		
178.	25638	*Larus pacificus (Pacific Gull)*			
179.	4049	*Latrobea diosmifolia*			
180.		*Latrodectus hasseltii*			
181.		*Lepidoblennius marmoratus*			
182.	43041	*Lepilaena marina*			
183.	1653	*Leporella fimbriata (Hare Orchid)*			
184.	1080	*Leptocarpus scariosus*			
185.	2355	*Leptomeria squarrulosa*			
186.		*Lethocolea pansa*			
187.	16449	*Leucophyta brownii*			
188.	6396	*Leucopogon glabellus*			
189.	6399	*Leucopogon gracilis*			
190.	40940	*Leucopogon obovatus subsp. obovatus*			
191.	40941	*Leucopogon obovatus subsp. revolutus*			
192.	6425	*Leucopogon oxycedrus*			
193.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
194.	34718	*Leucopogon sp. Southern Forests (B.G. Hammersley 1000)*			
195.	7677	*Levenhookia stipitata (Common Stylewort)*			
196.	25661	*Lichmera indistincta (Brown Honeyeater)*			
197.	7403	*Lobelia heterophylla (Wing-seeded Lobelia)*			
198.	1232	*Lomandra micrantha (Small-flower Mat-rush)*			
199.		*Lophoictinia isura*			
200.	12783	*Lycopodiella serpentina*			
201.	18049	*Lyginia imberbis*			
202.	34736	*Lysinema pentapetalum*			
203.	25650	*Malurus elegans (Red-winged Fairy-wren)*			
204.	25654	*Malurus splendens (Splendid Fairy-wren)*			
205.	15993	*Melaleuca pentagona var. pentagona*			
206.	5980	*Melaleuca thymoides*			
207.		*Menneus wa*			
208.		*Missulena granulosa*			
209.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*			
210.		*Nanometa gentilis*			
211.	6464	*Needhamiella pumilio*			
212.	24738	*Neophema elegans (Elegant Parrot)*			
213.	24739	*Neophema petrophila (Rock Parrot)*			
214.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
215.		*Omegophora armilla*			
216.	46315	*Orianthera serpyllifolia subsp. serpyllifolia*			
217.	24693	*Pachyptila desolata (Antarctic Prion)*			
218.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
219.	25682	*Pardalotus striatus (Striated Pardalote)*			
220.	30472	*Patersonia occidentalis var. occidentalis*			
221.	24674	*Pavo cristatus (Common Peafowl, Indian Peafowl)*	Y		
222.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
223.	48061	*Petrochelidon nigricans (Tree Martin)*			
224.	25697	*Phalacrocorax carbo (Great Cormorant)*			
225.	24409	*Phaps chalcoptera (Common Bronzewing)*			
226.	25587	*Phaps elegans (Brush Bronzewing)*			
227.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
228.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
229.	4	*Phylloglossum drummondii (Pigmy Clubmoss)*			
230.		*Phyllopteryx taeniolatus*			
231.		*Phytophthora cinnamomi*			
232.	5239	*Pimelea clavata*			
233.	5243	*Pimelea ferruginea*			
234.	5249	*Pimelea hispida (Bristly Pimelea)*			
235.	11533	*Pimelea imbricata var. imbricata*			
236.	18117	*Pimelea rosea subsp. rosea*			
237.	5269	*Pimelea sylvestris*			
238.	42260	*Pithocarpa ramosa*			
239.	25720	*Platycercus icterotis (Western Rosella)*			
240.	6249	*Platysace compressa (Tapeworm Plant)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
241.	25703	*Podargus strigoides (Tawny Frogmouth)*			
242.		*Poltys laciniosus*			
243.	44084	*Prasophyllum sp. early (G. Brockman GBB 1626)*			
244.		*Pseudocalliurichthys goodladi*			
245.	27997	*Pseudocyphellaria neglecta*			
246.	25710	*Pterodroma macroptera (Great-winged Petrel)*			
247.	1698	*Pterostylis vittata (Banded Greenhood)*			
248.	28286	*Pultenaea heterochila*			
249.	4181	*Pultenaea reticulata*			
250.		*Purpureicephalus spurius*			
251.		*Pycnothea flynni*			
252.		*Ranzania laevis*			
253.	18547	*Rhadinothamnus anceps*			
254.	2578	*Rhagodia baccata (Berry Saltbush)*			
255.	48096	*Rhipidura albiscapa (Grey Fantail)*			
256.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
257.	6027	*Rinzia schollerifolia (Cranberry Rinzia)*			
258.	20495	*Rubus loganobaccus*	Y		
259.	27249	*Sargassum linearifolium*			
260.	27258	*Sargassum spinuligerum*			
261.	27262	*Sargassum verruculosum*			
262.		*Saurida grandisquamis*			
263.	7626	*Scaevola nitida (Shining Fanflower)*			
264.	970	*Schoenus acuminatus*			
265.	979	*Schoenus caespititius*			
266.	996	*Schoenus laevigatus*			
267.	19946	*Schoenus sp. South coast (R. Davis 10239)*			
268.	8204	*Senecio elegans (Purple Groundsel)*	Y		
269.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
270.	25515	*Sminthopsis griseoventer (Grey-bellied Dunnart)*			
271.	4202	*Sphaerolobium fornicatum*			
272.	4211	*Sphaerolobium vimineum (Leafless Globe Pea)*			
273.	31952	*Sphenotoma gracilis (Swamp Paper-heath)*			
274.	31951	*Sphenotoma parviflora*			
275.	4828	*Spyridium globulosum (Basket Bush)*			
276.	24645	*Stagonopleura oculata (Red-eared Firetail)*			
277.	25655	*Stipiturus malachurus (Southern Emu-wren)*			
278.	25597	*Strepera versicolor (Grey Currawong)*			
279.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
280.	7695	*Stylidium caespitosum (Fly-away Triggerplant)*			
281.	7733	*Stylidium glaucum (Grey Triggerplant)*			
282.	7785	*Stylidium repens (Matted Triggerplant)*			
283.	7799	*Stylidium spathulatum (Creamy Triggerplant)*			
284.	25804	*Stylidium thryonides*			
285.	7808	*Stylidium violaceum (Violet Triggerplant)*			
286.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
287.	4256	*Templetonia retusa (Cockies Tongues)*			
288.	2820	*Tetragonia decumbens (Sea Spinach)*	Y		
289.	2823	*Tetragonia implexicoma (Bower Spinach)*			
290.	2824	*Tetragonia tetragonoides (New Zealand Spinach)*			
291.		*Thalasseus bergii*			
292.	20731	*Thelymitra vulgaris*			
293.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
294.	4548	*Tremandra stelligera*			
295.	33438	*Trymalium odoratissimum subsp. trifidum*			
296.		*Upeneichthys lineatus*			
297.	7145	*Utricularia menziesii (Redcoats)*			
298.	7148	*Utricularia multifida*			
299.	7158	*Utricularia volubilis (Twining Bladderwort)*			
300.	25225	*Varanus rosenbergi (Heath Monitor)*			
301.	15618	*Verticordia plumosa var. plumosa*			
302.	6939	*Westringia dampieri*			
303.	1394	*Wurmbea dioica (Early Nancy)*			
304.	28144	*Xanthoparmelia isidiigera*			
305.	28159	*Xanthoparmelia neotinctina*			
306.	29036	*Xanthoparmelia pulla*			
307.	6289	*Xanthosia huegelii*			
308.	6292	*Xanthosia rotundifolia (Southern Cross)*			
309.	1144	*Xyris flexifolia*			
310.	1149	*Xyris lacera*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
311.	1150	*Xyris lanata*			
312.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

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

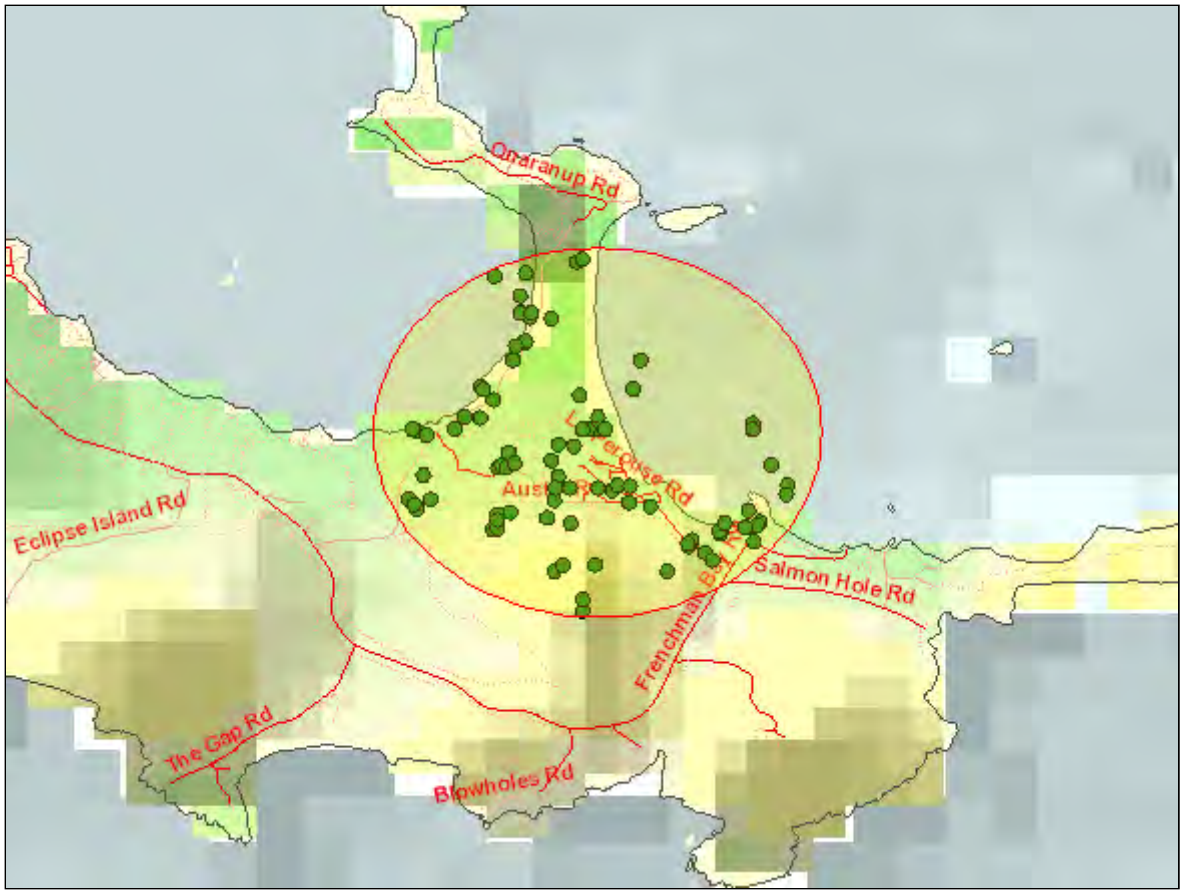
[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only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

REPORT ITEM DIS104 REFERS

NatureMap
Mapping Western Australia's biodiversity

Printed by Guest user on 19/5/2017

Query details : Current Names Only=Yes; Core Datasets Only=Yes; Method='By Circle'; Centre=117° 56' 05" E,35° 05' 01" S; Buffer=2km;



Search Results

Selected
- Selected Species

All Results
- Non-conservation taxon
- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Protected under international agreement
- Rare or likely to become extinct

Reference Layers

Major WA Towns

Roads
- Sealed
- Unsealed
- Track

State Borders

Australian Continent

APPENDIX 2

Protected Matters Search Tool

Australian Government
Department of the Environment and Energy

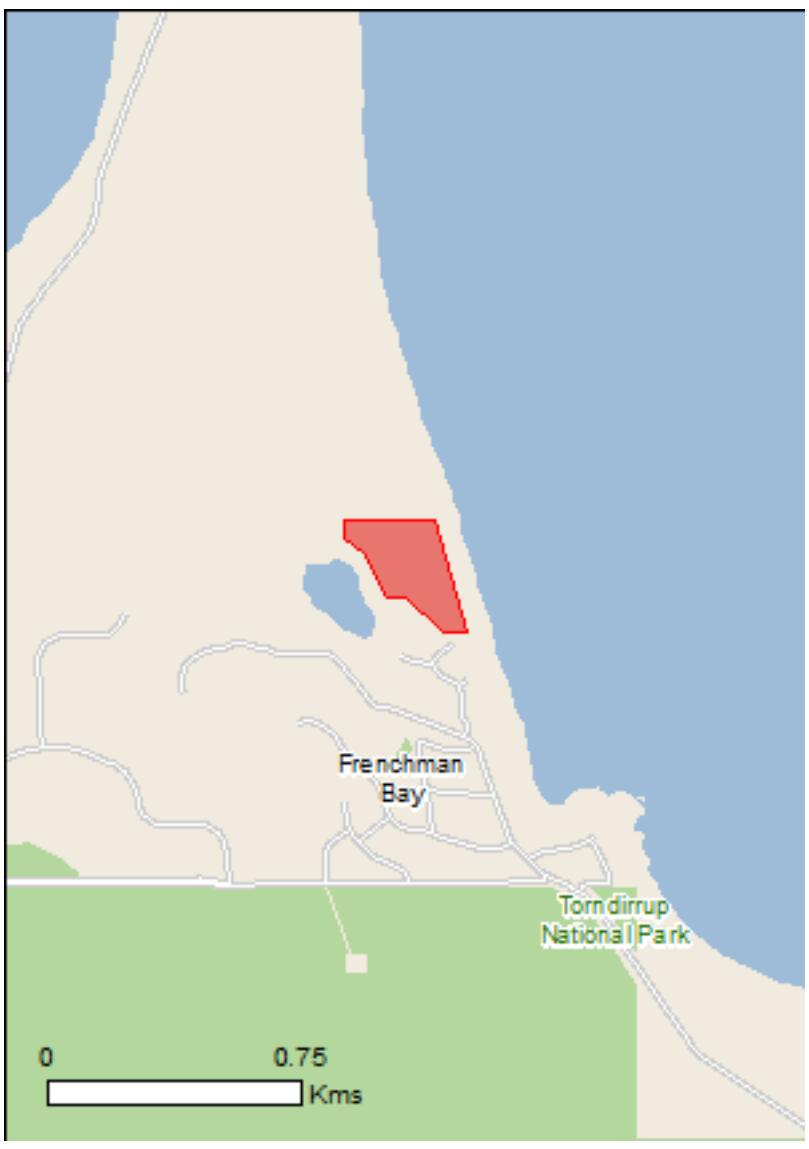
EPBC Act Protected Matters Report

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.

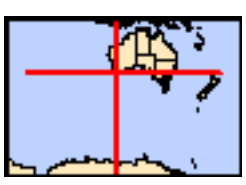
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 03/11/16 14:46:24



Coordinates
Buffer: 0.0Km



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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	25
Listed Migratory Species:	14

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:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	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:	None
Regional Forest Agreements:	None
Invasive Species:	17
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

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 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 likely to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat may occur within area
Dasyornis longirostris Western Bristlebird [515]	Vulnerable	Species or species habitat likely to occur within area
Diomedea epomophora (sensu stricto) Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may 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
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Sternula nereis nereis		
Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Thalassarche cauta cauta		
Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi		
White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Mammals		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Species or species habitat may occur within area
Plants		
Banksia brownii		
Brown's Banksia, Feather-leaved Banksia [8277]	Endangered	Species or species habitat likely to occur within area
Caladenia harringtoniae		
Harrington's Spider-orchid, Pink Spider-orchid [56786]	Vulnerable	Species or species habitat likely to occur within area
Isopogon uncinatus		
Hook-leaf Isopogon [20871]	Endangered	Species or species habitat known to occur within area
Kennedia glabrata		
Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to 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 within area
Diomedea epomophora (sensu stricto)		
Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Puffinus carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Thalassarche cauta (sensu stricto)		
Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence to occur within area
[Thalassarche steadi](#)		
White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
[Caretta caretta](#)		
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
[Chelonia mydas](#)		
Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
[Dermochelys coriacea](#)		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Migratory Terrestrial Species		
[Motacilla cinerea](#)		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Calidris ferruginea](#)		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Limosa lapponica](#)		
Bar-tailed Godwit [844]		Species or species habitat known 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

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		
[Apus pacificus](#)		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#)		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
[Ardea ibis](#)		
Cattle Egret [59542]		Species or species habitat may occur within area
[Calidris ferruginea](#)		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Cereopsis novaehollandiae grisea](#)		
Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat may occur within area
[Diomedea epomophora (sensu stricto)](#)		
Southern Royal Albatross [1072]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
[Diomedea sanfordi](#) Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known 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
[Pachyptila turtur](#) Fairy Prion [1066]		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
[Thalassarche cauta (sensu stricto)](#) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
[Thinornis rubricollis](#) Hooded Plover [59510]		Species or species habitat likely to occur within area
Reptiles		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Extra Information

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
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Felis catus Cat, House Cat, Domestic Cat [19]		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 habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sage, Wild Sage [10892]		
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
Ulex europaeus Gorse, Furze [7693]		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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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

-35.082563 117.934046,-35.082563 117.934046,-35.082563 117.936407,-35.084951 117.937244,-35.084968 117.936621,-35.084213 117.935656,-35.084213 117.935184,-35.0833 117.934604,-35.082984 117.934046,-35.082563 117.934046

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
-Parks and Wildlife Commission NT, Northern Territory Government
-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, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-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.

Department of the Environment
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Canberra ACT 2601 Australia
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APPENDIX 3

Vegetation Mapping

585 000mE
585 200mE
585 400mE
6 117 400mN
6 117 200mN

N
0 10 20 30 40 50m
SCALE 1 : 1 500 at A3 (MGA)

Mt
Af
AfAs
Le
McBl
AfEMt
Et
Lake Vancouver
Water
LA PEROUSE ROAD

Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Proposed Clearing Footprint
- Proposed Road/Path
- Proposed Building/Structure
- Vegetation Type Boundary
- AfAs Vegetation Type

Vegetation Types

Et - *Euphorbia tarrecina* Herbland
AfAs - *Agonis flexuosa*/*Adenanthos sericeus* Closed Scrub
Af - *Agonis flexuosa* Closed Scrub
AfEMt - *Agonis flexuosa*/*Eucalyptus* spp Woodland over *Melaleuca thymoides* Low Heath
Mt - *Melaleuca thymoides* Low Heath
McBl - *Melaleuca cuticularis*/*Banksia littoralia* Low Woodland
Le - *Leptocarpus elegans* Sedgeland

CADASTRAL SOURCE: Landgate, December 2016.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown November 2016.
DEVELOPMENT SOURCE: GKA, Dwg No. 1503-SK100, Rev A, 24-11-16.

Aurora environmental

Cherry Martin
ENVIRONMENTAL ASSESSMENT - VANCOUVER BEACH RESORT
LOT 40 LA PEROUSE COURT - GOODE BEACH, CITY OF ALBANY, WA

Figure 6

VEGETATION TYPES

Drawn: M. Price | Date: 11 May 2017 | Job: CHE2016-002

PINPOINT CARTOGRAPHICS (08) 9562 7136 CHE2016-002_REPT_001_mp-f06.dgn

APPENDIX 4

Day Time Survey Area for WRP

REPORT ITEM DIS104 REFERS

585 000mE
585 200mE
585 400mE
6 117 400mN
6 117 200mN
R 25295 8168
R 49672 300
R 48916 8244
R 45735 8023
R 43527 8022
R 43527 7821
R 28111 7763
R 49639 8246
Lot 660
Lake Vancouver
LA PEROUSE
ROAD
V CROWN LAND
615
620
604
603
600
162
1
2
655
654
653
652
656
8245

N

0 10 20 30 40 50m

SCALE 1 : 1 500 at A3 (MGA)

Legend

- Site Boundary
- Cadastral Boundary
- Easement Boundary
- Topographic Contour

CADASTRAL SOURCE: Landgate, January 2014.
CONTOUR SOURCE: Alan Tingay & Associates, Figure 4.
AERIAL PHOTOGRAPH SOURCE: Landgate, flown January 2012.

PINPOINT CARTOGRAPHICS (08) 9562 7136 CHE2013-001-REPT-001_mp-002.dgn

Aurora environmental

Cherry Martin
ENVIRONMENTAL SCOPING - TOURIST ACCOMMODATION
LOT 40 LA PEROUSE COURT, GOODE BEACH, ALBANY

Moon: First quarter.

Fauna Survey
SUBJECT LAND

Sunset: 7.12pm
Last light: 7.41pm

conditions clear, light breeze. warm.

Figure 2

Drawn: M. Price | Date: 27 Feb 2014 | Job: CHE2013-001

6/12/14

APPENDIX 5

DPAW Licence Number 08-000333-1

Department of Parks and Wildlife

Enquiries: 17 DICK PERRY AVE, KENSINGTON, WESTERN AUSTRALIA
Telephone: 08 9219 9000
Facsimile: 08 9219 8242
Web Site: https://wildlifelicensing-internal.dpaw.wa.gov.au/
Correspondance: **Locked Bag 30**
Bentley Delivery Centre WA 6983

Wildlife Conservation Act 1950

REGULATION 17

Regulation 17 – Licence to take fauna for scientific purposes (Regulation 17 - Standard)

The undermentioned person may take fauna for research or other scientific purposes and where authorised, keep it in captivity, subject to the following and attached conditions, which may be added to, suspended or otherwise varied as considered fit.

Director General

Conditions

1 The licensee shall comply with the provisions of the Wildlife Conservation Act 1950, Wildlife Conservation Regulations 1970 and any Notices in force under this legislation.

2 The licensee shall take fauna only in the manner stated on the endorsed Regulation 17 licence application form and endorsed related correspondence.

3 Unless specifically authorised in the conditions of this Licence or otherwise in writing by the Director General, species of fauna declared as likely to become extinct, rare or otherwise in need of special protection shall not be taken.

4 Any by-catch of fauna, which is declared to be rare, likely to become extinct, or otherwise in need of special protection shall be released immediately at the point of capture. Where such fauna taken under this licence is injured or deceased, the licensee shall contact the Department's Wildlife Licensing Section for advice on disposal. Records must be kept of any such fauna so captured and details are to be included in the report required under further condition below.

5 Any interaction involving Gazetted Threatened Fauna that may be harmful to the fauna and/or invasive may require approval from the Commonwealth Department of the Environment ph 02 6274 1111. Interaction with such species is controlled by the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and Environment Protection and Biodiversity Conservation Regulations 2000 as well as the Wildlife Conservation Act 1950 and Wildlife Conservation Regulations 1970.

6 No fauna shall be taken in areas where it would impinge on pre-existing scientific research programs.

7 Except in the case of approved lethal traps, the licensee shall ensure that measures are taken in the capture and handling of fauna to prevent injury or mortality resulting from that capture or handling. Where traps or other mechanical means or devices are used to capture fauna these shall be deployed so as to prevent exposure of trapped animals to ants and debilitating weather conditions and inspected at regular intervals throughout each day of their use. At the conclusion of research all markers used, and signs and structures erected by the licensee shall be removed and the environment returned to its original condition.

8 Not more than ten specimens of any one protected species of fauna shall be taken and removed from any location less than 20km apart. Where exceptional circumstances make it necessary to take a larger number of specimens from a particular location in order to obtain adequate statistical data, the collector must proceed with circumspection and justify their actions to the Director General in advance.

9 The licensee shall not release any fauna or their progeny in any area where it does not naturally occur, nor hand such fauna over to any other person or authority unless approved by the Director General, nor dispose of the remains of such fauna in any manner likely to confuse the natural or present day distribution of the species.

10 Bioprospecting involving the removal of sample aquatic and terrestrial organisms for chemical extraction and bioactivity screening shall not be conducted without specific written approval by the Director General.

11 No fauna shall be taken from any CALM land, as defined in the Conservation and Land Management Regulations 2002, without prior written approval of the Director General. No fauna shall be taken from any public land without the prior written approval of the Government Authority managing that land.

12 The licensee shall not enter upon any private property or pastoral lease for the purposes of this licence, nor take any fauna from any private land or pastoral lease without the prior consent in writing of the owner or occupier. Similarly, in the case of Aboriginal lands, the licensee must not enter upon or take fauna from such lands without the written approval of the Department of Aboriginal Affairs and/or the relevant native title holders or applicants.

13 Copies of this licence and any written approval or consent required by conditions of this licence must be carried by the licensee and any person/s authorised under the licence at all times when conducting activities relevant to the licence

Department of Parks and Wildlife

Enquiries: 17 DICK PERRY AVE, KENSINGTON, WESTERN AUSTRALIA
Telephone: 08 9219 9000
Facsimile: 08 9219 8242
Web Site: https://wildlifelicensing-internal.dpaw.wa.gov.au/
Correspondance: **Locked Bag 30**
Bentley Delivery Centre WA 6983

and must be presented to an authorised officer of the Department upon request.

14 All holotypes and syntypes and a half share of paratypes of species or subspecies permitted to be permanently taken under this licence shall be donated to the Western Australian Museum. Duplicates (one pair in each case) of any species collected, which represents a significant extension of geographic range shall upon request be donated to the Western Australian Museum.

15 To prevent any unnecessary collecting in this State, all specimens and material taken and retained under the authority of this license shall, upon request, be loaned to the Western Australian Museum. Any unused portion or portions of any specimen collected under the authority of this license shall be offered to the Western Australian Museum for inclusion in its collection or made available to other scientific workers if so required.

16 Within one month of the expiration of this licence, the holder shall submit an electronic return into the department's Wildlife Licensing System, detailing the locality, site, geocode, date and number of each species of fauna captured, sighted or vouchered during the currency of the licence. A copy of any paper, report or thesis resulting from the research shall upon completion be lodged with the Director General.

Purpose

Targeted fauna survey for the threatened Main's assassin spider (Zephyrarchaea mainae) using hand collection techniques, sieving of leaf litter, for the Vancouver Beach Resort environmental assessment. Up to one individual of the target species may be retained as a voucher specimen for lodgement with the WA Museum. Additional voucher specimens of the target species and other arachnids found may be retained at the request of the WA Museum.

Locations

Lot 660, La Perouse Court, Goode Beach, Albany

Authorised Person

Surname	**Given name(s)**

Date of Issue	09/03/2017
Valid From	13/03/2017
Date of Expiry	31/03/2017

Licensee:	Ms Melanie Price
Address	Aurora Environmental 2A Nakina Street Albany WA 6330 Australia

Issued by a Wildlife Licensing Officer of the Department of Parks and Wildlife under delegation from the Minister for Environment pursuant to section 133(1) of the Conservation and Land Management Act 1984.

APPENDIX 6

Vegetation Condition Scale Description

Vegetation Condition Scale (Thackway and Lesslie 2006)

		Native Vegetation Cover			Non-native Vegetation Cover		
Vegetation Cover Class Criteria	**Type 0 - Naturally bare Areas where native vegetation does not naturally persist**	**Type I Residual** Native vegetation community structure, composition, and regenerative capacity intact – no significant perturbation form landuse/land management practice	**Type II Modified** Native vegetation community structure, composition and regenerative capacity intact – perturbed by land use /land management practice	**Type III Transformed** Native vegetation community structure, composition and regenerative capacity significantly altered by land use/land management practice	**Type IV Replaced Adventive** Native vegetation replacement – species alien to the locality and spontaneous in occurrence	**Type V Replaced Managed** Native vegetation replacement with cultivated vegetation	**Type VI Removed** Vegetation removal
Diagnostic Criteria	Natural regenerative capacility unmodified	unmodified, structural and compositional integrity of native vegetation is very high	Natural regeneration tolerates/endures under past &/or present current land management practices. Structure is predominantly altered but intact e.g. a layer and/growth form and or age classes removed. Composition of vegetation is altered but intact	Natural regenerative capacity is limited/at risk under past &/or current land use or land management practices. Rehabilitation and restoration possible through modified land management practice Dominant structuring species of native vegetation community significantly altered e.g. a layer frequently and repeatedly removed	Regeneration of native vegetation community has been suppressed by ongoing disturbances of the natural regenerative capacity Limited potential for restoration. Dominant structuring species of native vegetation removed or predominantly cleared or extremely degraded.	Regeneration of native vegetation community lost or suppressed by intensive land management. Limited potential for restoration. Dominant structuring species of native vegetation community removed.	Nil or minimal. Vegetation absent or ornamental
Corresponding Keighery (1994) Condition Scale		Very good excellent, pristine	Good to very good	Very degraded to degraded/good	Completely degraded	Completely degraded	

Thackway, R. and Lesslie, R. (2006) Reporting Vegetation Condition Using the Vegetation Assets, States and Transitions (VAST) Framework. Ecological Management and Restoration. 7, Suppl. 1. S53-S62
Keighery (1994) Keighery, B.J. (1994) Bushland plant survey. A guide to plant community survey for the community. Wildflower Society of WA (Inc.), Nedlands, Western Australia.

APPENDIX 7

Bushfire Management Plan
(Eco Logical in Association with Biodiverse Solutions)

ecological AUSTRALIA

Bushfire Management Plan

Vancouver Beach Resort, Albany

Prepared for
Cherry Martin

1 June 2017

DOCUMENT TRACKING

Item	Detail
Project Name	Bushfire Management Plan, Vancouver Beach Resort, Albany
Project Number	16HNG_5966
Project Manager	Bruce Horkings 1/51 Owen Street, Huskisson NSW 2540
Prepared by	Daniel Panickar and Bruce Horkings (FPAA BPAD-A Certified Practitioner No. BPAD29962-L3)
Technical review by	Bruce Horkings (FPAA BPAD-A Certified Practitioner No. BPAD29962-L3)
Approved by	Bruce Horkings (FPAA BPAD-A Certified Practitioner No. BPAD29962-L3)
Status	Final
Version Number	V4
Last saved on	22 June 2017

This report should be cited as 'Eco Logical Australia, 2017. *Bushfire Management Plan, Vancouver Beach Resort, Albany*. Prepared for Cherry Martin.'

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1 Introduction

1.1 Project overview

Eco Logical Australia (ELA) has been commissioned by Cherry Martin to prepare a Bushfire Management Plan (BMP) to support a Development Application (DA) being prepared by their client to develop Vancouver Beach Resort, in Goode Beach, Albany (hereafter referred to as the subject site). The proposed development involves the construction of a tourist resort and associated infrastructure (**Figure 1, Figure 2**).

The subject site is located within a designated bushfire prone area as per the *Western Australia State Map of Bush Fire Prone Areas* (DFES 2017), which triggers bushfire planning requirements under *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7; WAPC 2015) and reporting to accompany submission of the DA in accordance with the associated *Guidelines for Planning in Bushfire Prone Areas v1.1* (the Guidelines; WAPC 2017).

Bio Diverse Solutions (BDS) has prepared a Bushfire Attack Level (BAL) contour map which depicts all buildings within the subject site as located in areas exposed to a BAL rating of BAL-29 or lower. SPP 3.7 (Policy Measure 6.6) requires development applications for vulnerable land uses (such as tourist resorts) in areas between BAL-12.5 and BAL-29 to be accompanied by a BMP, an emergency evacuation plan for proposed occupants and/or a risk management plan for any flammable on-site hazards.

1.2 Purpose and application of the plan

The purpose of this BMP is to provide guidance on how to plan for and manage the bushfire risk to the subject site through implementation of a range of bushfire management measures in accordance with the Guidelines. The BMP outlines how future on-site assets can be protected during the peak bushfire season.

A Bushfire Emergency Evacuation Plan (BEEP) is also being prepared for the proposed development. The BMP and BEEP are intended to be used in conjunction with one another to ensure that the intent of SPP 3.7 is achieved.

Figure 1: Site overview

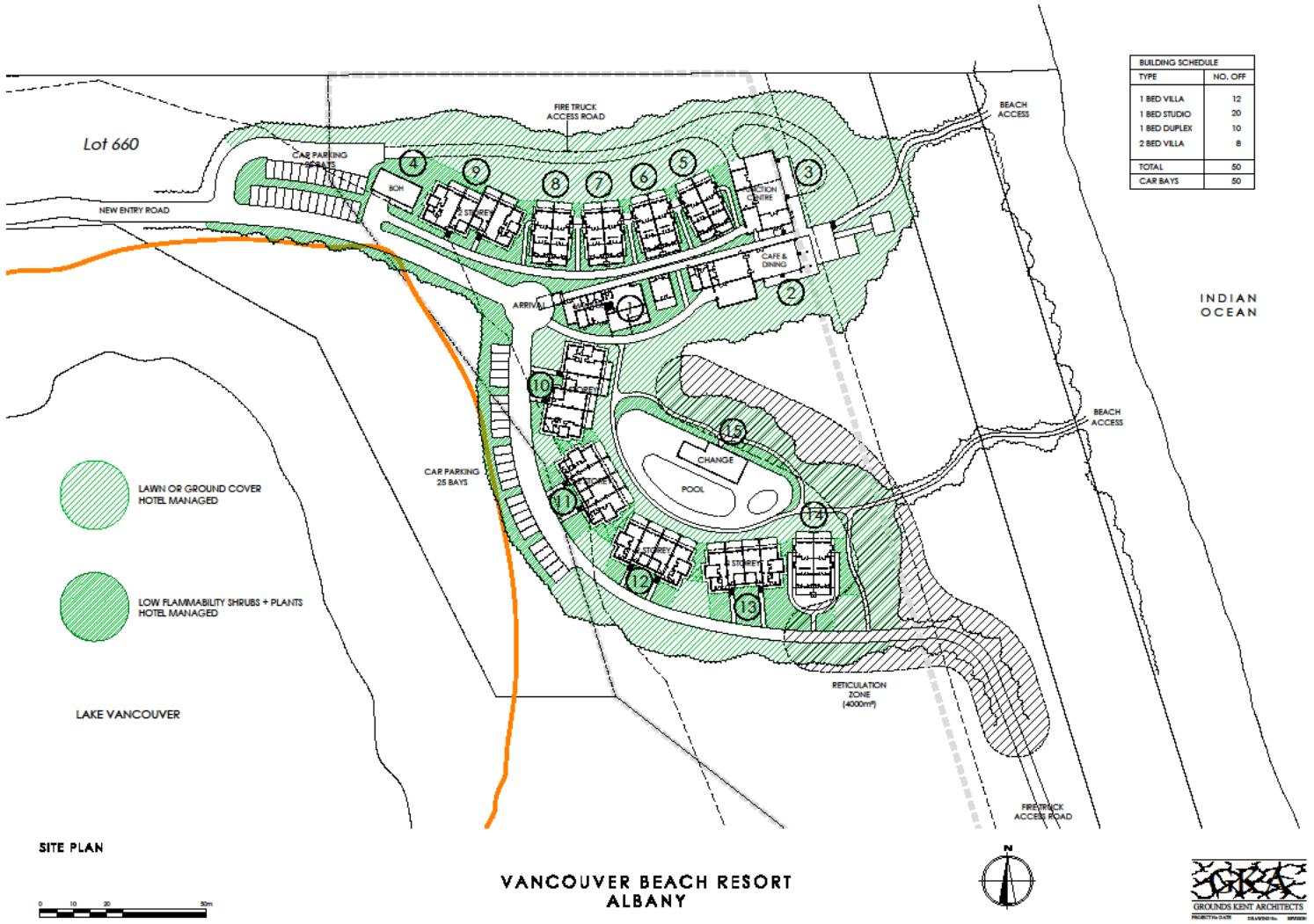

Figure 2: Concept plan

2 Spatial consideration of bushfire threat

2.1 General

The subject site is located within the City of Albany, in the Goode Beach locality, south-east of Shoal Bay, approximately 8 km from the Albany town centre. The subject site is situated within undeveloped bushland, north of the developed areas of Goode Beach.

2.2 Bushfire fuels

Vegetation within the subject site and surrounding 100 m (the assessment area) was assessed in accordance with *AS 3959-2009 Construction of Buildings in Bushfire Prone Areas* (SA 2009) and with regard given to the *Visual guide for bushfire risk assessment in Western Australia* (DoP 2016) by Biodiverse Solutions (2017) (**Appendix 1**).

The following vegetation classes and exclusions were identified within the assessment area as depicted in **Figure 3** and listed below:

- Class A forest;
- Class C shrubland;
- Class D scrub;
- Class G grassland; and
- Exclusion as per clause 2.2.3.2 (e) (i.e. non-vegetated areas).

Photographs and their locations relating to each vegetation type are included in the BAL contour assessment report prepared by Biodiverse Solutions (2017) included in **Appendix 1**.

Vegetation within the development area depicted in **Figure 3** will be cleared/modified as part of the development. A post-development vegetation class map is presented in **Figure 4**. Vegetation within the landscaping areas will be maintained as Low Threat Vegetation as per clause 2.2.3.2 (f) of AS 3959-2009 and maintained by the resort managers in perpetuity.

The BAL assessment addresses this topic further in **Section 2.5**.

2.3 Topography and slope under vegetation

The subject site is generally of a flat nature with some minor undulation associated with the near-coastal nature of the site. Slope under the classified vegetation is depicted in **Figure 3** and **Figure 4** and ranges from flat land or effectively upslope to between 5-10 degrees downslope.

The BAL assessment addresses this topic further in **Section 2.5**.

2.4 Bushfire history, risk of ignition and potential bushfire scenarios

Vegetation within the subject site has not been subject to a bushfire within the past 20 years (Landgate 2017). The accumulation of bushfire fuels over this time and moderate-high risk of ignition associated with high levels of public access and proximity to urban areas would potentially facilitate a potential bushfire occurrence within the subject site and surrounds.

Such an occurrence would most likely occur to the west or north of the subject site in association with longer fire runs (compared to those to the east which are limited due to the proximity of this interface to the coast) and prevailing winds (BoM 2017).

Figure 3: Pre-development vegetation class

Figure 4: Post-development vegetation class

2.5 Bushfire Attack Level (BAL) assessment

All land located within 100 m of the classified vegetation depicted in **Figure 4** is considered bushfire prone and is subject to a BAL assessment in accordance with AS 3959-2009.

The Method 1 procedure for calculating the BAL (as outlined in AS 3959-2009) incorporates the following factors:

- State adopted Fire Danger Index (FDI) rating;
- Vegetation class;
- Slope under classified vegetation; and
- Distance between proposed development areas and the classified vegetation.

Based on the specified BAL, construction/setback requirements for proposed buildings can then be assigned.

The BAL assessment for the subject site was undertaken by Biodiverse Solutions (2017) and is included in **Appendix 1**. ELA has not been on-site to verify this assessment.

2.5.1 Fire Danger Index

A blanket rating of FDI 80 is adopted for Western Australian environments, as outlined in AS 3959–2009 and endorsed by Australasian Fire and Emergency Service Authorities Council.

2.5.2 Vegetation class

Vegetation class is described in **Section 2.2**, depicted in **Figure 4** (i.e. post-development) and listed below:

- Class A forest;
- Class C shrubland;
- Class D scrub; and
- Class G grassland.

2.5.3 Slope under classified vegetation

Slope under classified vegetation is described in **Section 2.3**, depicted in **Figure 4** and summarised in **Table 1**.

2.5.4 Distance between proposed development areas and classified vegetation

Separation distances between proposed development areas within the subject site and classified vegetation are depicted in **Table 2**. The minimum separation distance was assessed at 13 m from Class D scrub (**Appendix 1**) to achieve a maximum radiant heat exposure of 29 kW/m^2 (BAL-29).

2.5.5 Method 1 BAL calculation

A Method 1 BAL calculation (in the form of BAL contours) has been completed for the proposed development in accordance with AS 3959-2009 methodology (**Table 2**). The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed buildings and subsequently informs the standard of building construction required to increase building tolerance to potentially withstand such impacts in line with the assessed BAL.

The assessed BAL ratings for the development are depicted as BAL contours in **Figure 4.**

All proposed buildings will be located in areas subject to a BAL rating of BAL-29 or lower.

Table 1: Slope under classified vegetation (Biodiverse Solutions [2017])

Plot	Vegetation classification	Effective slope
1	Class C shrubland	Upslope / Flat land
2	Class D scrub	Downslope >0-5 degrees
3	Class D scrub	Upslope / Flat land
4	Class D scrub	Downslope >5-10 degrees
5	Class D scrub	Upslope / Flat land
6	Class C shrubland	Upslope / Flat land
7	Class D scrub	Upslope / Flat land
8	Class C shrubland	Upslope / Flat land
12	Class G grassland	Upslope / Flat land
13	Class A forest	Downslope >0-5 degrees

* Plots 9-11 contain vegetation which has been excluded under clause 2.2.3.2 of AS 3959-2009 and therefore slope under vegetation is not applicable

Table 2: Method 1 BAL calculation (BAL contours)

Vegetation classification	Effective slope	Hazard separation distance	BAL rating	Comment
Class A forest*	Downslope >0-5 degrees	<20 m	BAL-FZ	No development proposed in this area
		20-<27 m	BAL-40	No development proposed in this area
		27-<37 m	BAL-29	No development proposed in this area
		37-<50 m	BAL-19	No development proposed in this area
		50-<100 m	BAL-12.5	No development proposed in this area
Class D scrub	Downslope >5-10 degrees**	<12 m	BAL-FZ	No development proposed in this area
		12-<17 m	BAL-40	No development proposed in this area
		17-<24 m	BAL-29	No development proposed in this area
		24-<35 m	BAL-19	No development proposed in this area
		35-<100 m	BAL-12.5	No development proposed in this area
	Downslope >0-5 degrees	<11 m	BAL-FZ	No development proposed in this area
		11-<15 m	BAL-40	No development proposed in this area
		15-<22 m	BAL-29	Development proposed in this area
		22-<31 m	BAL-19	Development proposed in this area
		31-<100 m	BAL-12.5	Development proposed in this area
	Upslope / Flat land	<10 m	BAL-FZ	No development proposed in this area
		10-<13 m	BAL-40	No development proposed in this area

Vegetation classification	Effective slope	Hazard separation distance	BAL rating	Comment
		13-<19 m	BAL-29	Development proposed in this area
		19-<27 m	BAL-19	Development proposed in this area
		27-<100 m	BAL-12.5	Development proposed in this area
Class C shrubland**	Upslope / Flat land	<7 m	BAL-FZ	No development proposed in this area
		7-<9 m	BAL-40	No development proposed in this area
		9-<13 m	BAL-29	No development proposed in this area
		13-<19 m	BAL-19	No development proposed in this area
		19-<100 m	BAL-12.5	No development proposed in this area
Class G grassland*	Upslope / Flat land	<6 m	BAL-FZ	No development proposed in this area
		6-<8 m	BAL-40	No development proposed in this area
		8-<12 m	BAL-29	No development proposed in this area
		12-<17 m	BAL-19	No development proposed in this area
		17-<50 m	BAL-12.5	No development proposed in this area

* Class A forest and Class G grassland vegetation occurs within the 100 m wide assessment area but are located greater than 100 m (Class A) and 50 m (Class G) from proposed buildings and therefore these classifications will not result in a BAL rating.
** These BAL contours may apply to proposed buildings within the subject site, however they have been overridden by higher BAL ratings as a result of closer/higher classed vegetation.

2.6 Identification of issues arising from the BAL contour assessment

The current development design shows all proposed buildings located outside of areas subject to BAL-FZ or BAL-40 ratings. Provided this design remains true and proposed buildings are constructed to the appropriate standard; no issues relating to the BAL assessment are expected.

Should there be any changes in development design or vegetation/hazard extent that requires a modified bushfire management response, then the above BAL contours will need to be reassessed for the affected areas and documented in a brief addendum to this BMP prepared to accompany a future planning/building application.

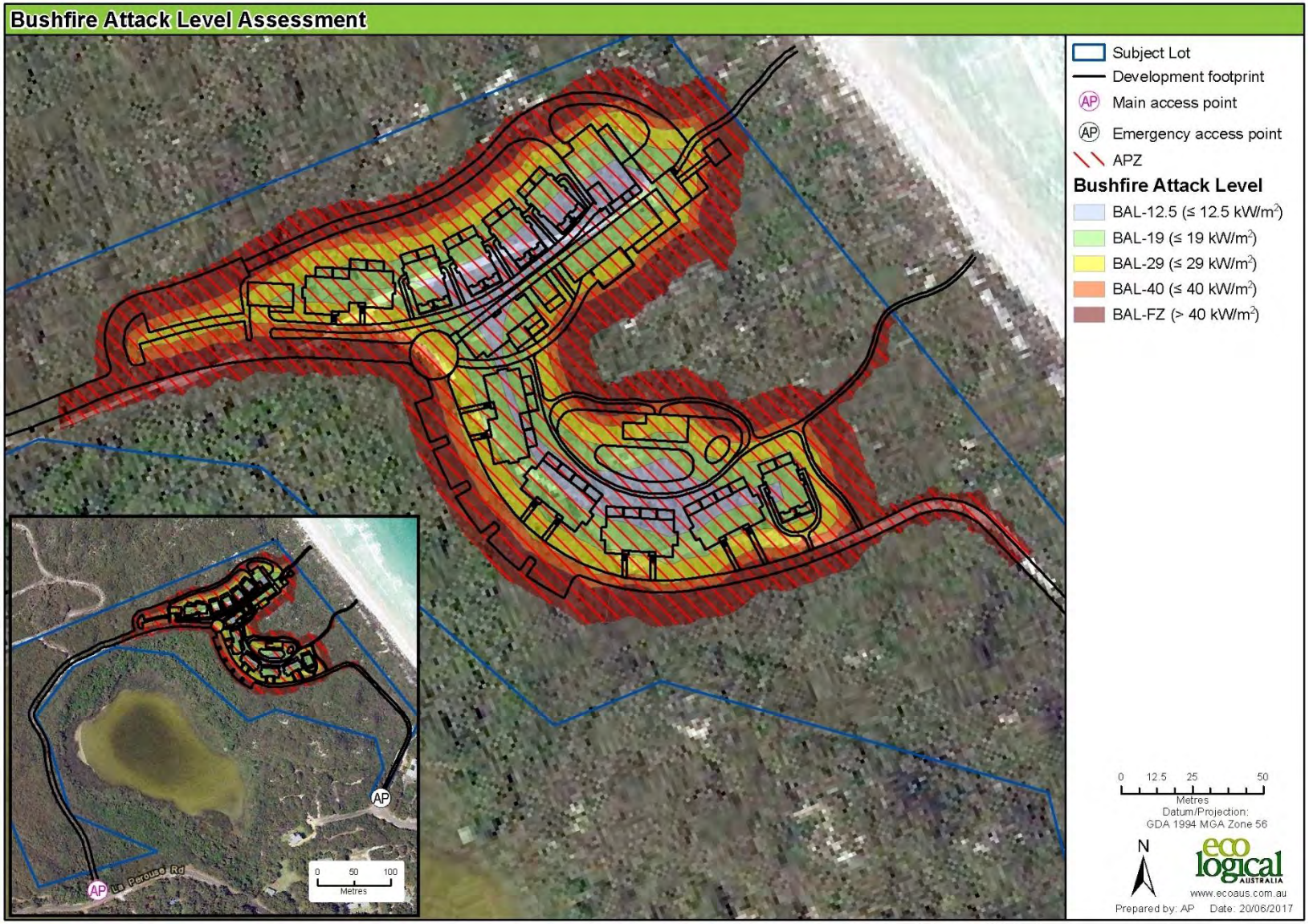

Figure 5: Bushfire Attack Level (BAL) map

3 Proposal compliance and justification

Proposed development of the Vancouver Beach Resort is required to comply with SPP 3.7 and the Guidelines, as required under the following policy measures:

6.2 Strategic planning proposals, subdivision and development applications

a) Strategic planning proposals, subdivision and development applications within designated bushfire prone areas relating to land that has or will have a Bushfire Hazard Level (BHL) above low and/or where a Bushfire Attack Level (BAL) rating above BAL-LOW apply, are to comply with these policy measures.

b) Any strategic planning proposal, subdivision or development application in an area to which policy measure 6.2 a applies, that has or will, on completion, have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, may be considered for approval where it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.

c) This policy also applies where an area is not yet designated as a bushfire prone area but is proposed to be developed in a way that introduces a bushfire hazard, as outlined in the Guidelines.

6.5 Information to accompany development applications

Any development application to which policy measure 6.2 applies is to be accompanied by the following information prepared in accordance with the Guidelines:

a) (i) a BAL assessment. BAL assessments should be prepared by an accredited Level 1 BAL Assessor or a Bushfire Planning Practitioner unless otherwise exempted in the Guidelines; or

a) (ii) a BAL Contour Map that has been prepared for an approved subdivision clearly showing the indicative acceptable BAL rating across the subject site, in accordance with the Guidelines. BAL Contour Maps should be prepared by an accredited Bushfire Planning Practitioner; and

b) the identification of any bushfire hazard issues arising from the BAL Contour Map or the BAL assessment; and

c) an assessment against the bushfire protection criteria requirements contained within the Guidelines demonstrating compliance within the boundary of the development site.

6.6 Vulnerable or high-risk land uses

6.6.1 In areas where BAL-12.5 to BAL-29 applies

Subdivision and development applications for vulnerable or high-risk land uses in areas between BAL-12.5 to BAL-29 will not be supported unless they are accompanied by a Bushfire Management Plan jointly endorsed by the relevant local government and the State authority for emergency services. Subdivision applications should make provision for emergency evacuation. Development applications should include an emergency evacuation plan for proposed occupants and/or a risk management plan for any flammable on-site hazards.

Implementation of this BMP is expected to meet the following objectives of SPP 3.7:

- 5.1: Avoid increasing the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact is paramount;
- 5.2: Reduce vulnerability to bushfire through the identification and assessment of bushfire hazards in decision-making at all stages of the planning and development process;
- 5.3: Ensure that planning proposals and development applications take into account bushfire protection requirements and include specified bushfire protection measures where land has or will have a moderate or extreme bushfire hazard level, and/ or where a rating higher than BAL-Low applies; and
- 5.4: Achieve a responsible approach between bushfire management measures and landscape amenity and biodiversity conservation values, with consideration of the potential impacts of climate change.

In response to the above requirements of SPP 3.7 and the Guidelines, bushfire management measures, as outlined in **Section 4** have been devised for the proposed development accordance with Guideline acceptable solutions to meet compliance with bushfire protection criteria. 'Acceptable solutions' have been used to meet all performance principles. The 'acceptable solutions assessment' is provided in **Section 4** to assess the proposed bushfire management measures against each bushfire protection criteria in accordance with the Guidelines and demonstrate that the measures proposed meet the intent of each element of the bushfire protection criteria.

A Bushfire Emergency Evacuation Plan has been prepared for the proposed development (as a separate document) in accordance with Policy Measure 6.6 of SPP 3.7.

4 Bushfire management measures

This section assesses the subject site against the Bushfire Performance Criteria and acceptable solutions outlined in the Guidelines and listed below:

- Location;
- Siting and design of development;
- Vehicular access; and
- Water.

ELA has identified a range of bushfire management measures that on implementation will enable all proposed areas to be developed with a manageable level of bushfire risk whilst maintaining compliance with the intent of the Bushfire Performance Criteria. The bushfire management measures are discussed in the following subsections and depicted in figures where applicable.

4.1 Element 1 - Location

Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.

Performance Principle (P1): The strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low, or a BAL–29 or below, and the risk can be managed. For minor development in areas where BAL–40 or BAL–FZ applies, demonstrating that the risk can be managed to the satisfaction of the Department of Fire and Emergency Services and the decision-maker.

Table 3 outlines the Acceptable Solutions (AS) that are relevant to the proposal; identifies where a Performance Solution (PS) has been used instead of an AS; and states, where applicable, the reason why the AS is not relevant to the proposal.

Table 3: Element 1 - Location

Solution	AS	PS	N/A	Comment
A1.1 Development location	☒	☐	☐	All proposed buildings will be located in areas subject to a BAL rating of BAL-29 or lower.

4.1.1 Acceptable Solution A1.1 Development location

The strategic planning proposal, subdivision and development application is located in an area that on completion will be subject to a BAL-29 or below for all habitable buildings.

Management measures / development response

As depicted in **Figure 5**, all proposed buildings will be located in areas subject to a BAL rating of BAL-29 or lower.

Asset Protection Zones (APZs) as detailed in **Section 4.2** will be implemented to ensure that these BAL ratings do not increase over the course of time.

4.2 Element 2 – Siting and design of development

Intent: To ensure that the siting of development minimises the level of bushfire impact.

Performance Principle (P2): The siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire threat that applies to the site. That it minimises the bushfire risk to people, property and infrastructure, including compliance with AS 3959 if appropriate.

Table 4 outlines the Acceptable Solutions (AS) that are relevant to the proposal; identifies where a Performance Solution (PS) has been used instead of an AS; and states, where applicable, the reason why the AS is not relevant to the proposal.

Table 4: Element 2 – Siting and design of development

Solution	AS	PS	N/A	Comment
A2.1 Asset Protection Zone (APZ)	☒	☐	☐	APZs will be maintained between all proposed buildings and classified vegetation in the form of carparks, roads, as well as other non-vegetated and landscaped areas.

4.2.1 Acceptable Solution A2.1 Asset Protection Zone (APZ)

Every building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:

a. Width: Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL 29) in all circumstances.

b. Location: the APZ should be contained solely within the boundaries of the lot on which a building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes).

c. Management: the APZ is managed in accordance with the requirements of '*Standards for Asset Protection Zones*' (below):

- Fences: within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used
- Objects: within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors
- Fine Fuel load: combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare
- Trees (> 5 metres in height): trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy (Figure 6).

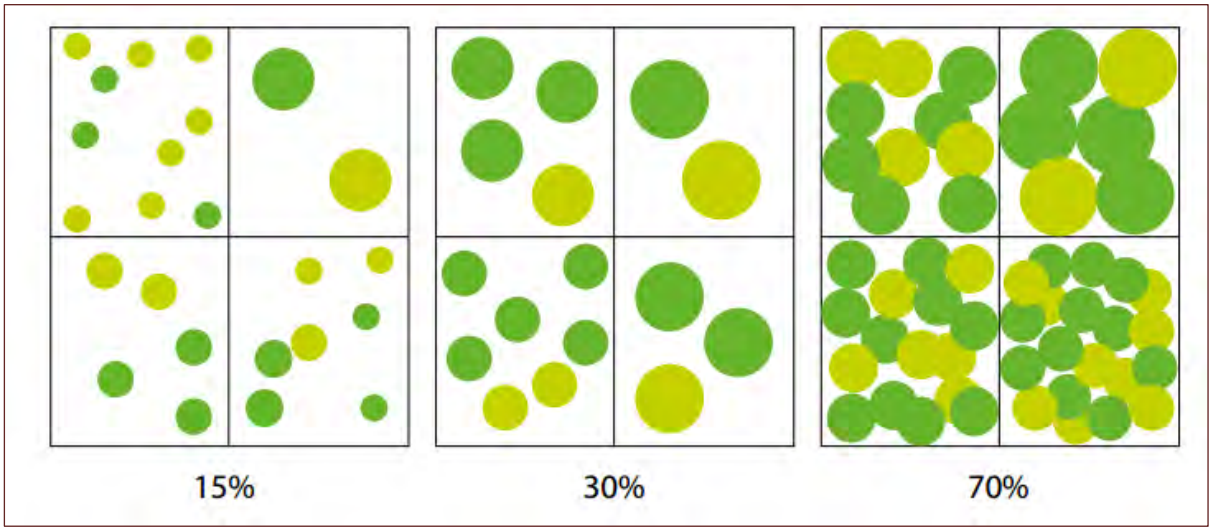

Figure 6: Illustrated tree canopy cover projection (WAPC 2017)

- **Shrubs (0.5 metres to 5 metres in height):** should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees
- **Ground covers (<0.5 metres in height):** can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs
- **Grass:** should be managed to maintain a height of 100 millimetres or less.

Management measures / development response

The Asset Protection Zone (APZ) is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level. Hazard separation in the form of using subdivision design elements or excluded and low threat vegetation adjacent to the lot may be used to reduce the dimensions of the APZ within the lot.

The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity. The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

The APZ proposed as part of this development is illustrated in **Figure 5**. This APZ will encompass carparks, roads, as well as other non-vegetated and landscaped areas and will be maintained as an APZ in perpetuity by resort management.

4.3 Element 3 – Vehicular access

Intent: To ensure that the vehicular access serving a subdivision/development is safe in the event of a bushfire occurring.

Performance Principle (P3): The internal layout, design and construction of public and private vehicular access in the subdivision/development allows emergency and other vehicles to move through it easily and safely at all times.

Table 5 outlines the Acceptable Solutions (AS) that are relevant to the proposal; identifies where a Performance Solution (PS) has been used instead of an AS; and states, where applicable, the reason why the AS is not relevant to the proposal.

Table 5: Element 3 – Vehicular access

Solution	AS	PS	N/A	Comment
A3.1 Two access routes	☒	☐	☐	
A3.2 Public Road	☒	☐	☐	
A3.3 Cul-de-sac (including a dead-end road)	☒	☐	☐	
A3.4 Battle-axe	☐	☐	☒	Not included in development
A3.5 Private driveway longer than 50 metres	☐	☐	☒	Not included in development
A3.6 Emergency access way	☒	☐	☐	
A3.7 Fire service access routes (perimeter roads)	☐	☐	☒	Fire service access is via emergency access ways
A3.8 Firebreak width	☐	☐	☒	Formal APZs replace the need for a 3 m wide mineral earth firebreak.

4.3.1 Acceptable Solution A3.1 Two access routes

Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.

Management measures / development response

The proposed development will provide one formal access point to La Perouse Road to the west. Access to the south will also be provided in the form of an emergency access way which will provide an alternate route of egress for residents and visitors and ingress for fire services in the event of a bushfire as detailed in **Section 4.3.6** (**Figure 4)**.

The proposed vehicular access network is a response to the surrounding road assets which do not include a public road connecting the subject site to the south. As the provision of a public road in this area is outside of the control of the developer; the proposed development is unable to provide two forms of access which are available to the public at all times. The Guidelines however, state that an emergency access way may be considered in cases where a public road cannot be provided, and therefore the intent of A3.1 can still be met in this instance.

4.3.2 Acceptable Solution A3.2 Public Road

A public road is to meet the requirements in Table 4, Column 1 of the Guidelines (reproduced in **Table 6**).

Management measures / development response

The proposed development includes the extension of La Perouse Road to the resort. This road will meet the requirements for public roads as detailed in **Table 6**.

4.3.3 Acceptable Solution A3.3 Cul-de-sac

A cul-de-sac and/or a dead-end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent), the following requirements are to be achieved:

- Requirements in Table 4, Column 2 of the Guidelines (reproduced in **Table 6**);
- Maximum length: 200 metres (if public emergency access is provided between cul-de-sac heads maximum length can be increased to 600 metres provided no more than eight lots are serviced and the emergency access way is no more than 600 metres); and
- Turn-around area requirements, including a minimum 17.5 metre diameter head.

Management measures / development response

The resort includes a cul-de-sac as part of the internal road network which will meet the requirements outlined in Table 4, Column 2 of the Guidelines (reproduced in **Table 6**).

The proposed cul-de-sac will also be linked to the fire truck access route from the south as depicted in **Figure 2**.

4.3.4 Acceptable Solution A3.4 Battle-axe

Battle-axe access leg should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) all of the following requirements are to be achieved:

- Requirements in Table 4, Column 3 of the Guidelines (reproduced in **Table 6**);
- Maximum length: 600 metres; and
- Minimum width: six metres.

Management measures / development response

No battle-axe lots are proposed as part of the development and therefore A3.4 is not applicable.

4.3.5 Acceptable Solution A3.5 Private driveway longer than 50 metres

A private driveway is to meet all of the following requirements:

- Requirements in Table 4, Column 3 of the Guidelines (reproduced in **Table 6**);
- Required where a house site is more than 50 metres from a public road;
- Passing bays: every 200 metres with a minimum length of 20 metres and a minimum width of two metres (i.e. the combined width of the passing bay and constructed private driveway to be a minimum six metres);
- Turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres) and within 50 metres of a house; and
- Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes.

- All-weather surface (i.e. compacted gravel, limestone or sealed).

Management measures / development response

No private driveways longer than 50 m are proposed as part of the development and therefore A3.5 is not applicable.

4.3.6 Acceptable solution A3.6 Emergency access way

An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet all of the following requirements:

- Requirements in Table 4, Column 4 of the Guidelines (reproduced in **Table 6**);
- No further than 600 metres from a public road;
- Provided as right of way or public access easement in gross to ensure accessibility to the public and fire services during an emergency; and
- Must be signposted.

Management measures / development response

The surrounding road network does not allow for two formal access ways to be provided to the proposed resort. Therefore, an emergency access way will be provided to the south of the resort which will allow for emergency evacuation of residents and visitors or access by fire services in the event of a bushfire. This emergency access way will comply with all of the requirements detailed above.

4.3.7 Acceptable solution A3.7 Fire service access routes (perimeter roads)

Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire fighters and link between public road networks for firefighting purposes. Fire service access routes are to meet the following requirements:

- Requirements Table 4, Column 5 of the Guidelines (reproduced in **Table 6**);
- Provided as right of ways or public access easements in gross to ensure accessibility to the public and fire services during an emergency;
- Surface: all-weather (i.e. compacted gravel, limestone or sealed);
- Dead end roads are not permitted;
- Turn-around areas designed to accommodate type 3.4 appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres);
- No further than 600 metres from a public road;
- Allow for two-way traffic and;
- Must be signposted.

Management measures / development response

No fire service access routes are proposed as part of the development and therefore A3.7 is not applicable.

4.3.8 Acceptable solution A3.8 Firebreak width

Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level as prescribed in the local firebreak notice issued by the local government.

Management measures / development response

No firebreaks are proposed as part of the development and therefore A3.8 is not applicable. Formal APZs replace the need for a 3 m wide mineral earth firebreak.

Table 6: Vehicular access technical requirements (WAPC 2017)

Technical requirements	Public road	Cul-de-sac	Private driveway	Emergency access way	Fire service access route
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal distance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5
Maximum grade <50 m	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius	8.5	8.5	8.5	8.5	8.5

* Refer to E3.2 Public roads: Trafficable surface

4.4 Element 4 – Water

Intent: To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.

Performance Principle (P4): The subdivision, development or land use is provided with a permanent and secure water supply that is sufficient for firefighting purposes.

Table 7 outlines the Acceptable Solutions (AS) that are relevant to the proposal; identifies where a Performance Solution (PS) has been used instead of an AS; and states, where applicable, the reason why the AS is not relevant to the proposal.

Table 7: Element 4 – Water

Solution	AS	PS	N/A	Comment
A4.1 Reticulated areas	☒	☐	☐	
A4.2 non-reticulated areas	☐	☐	☒	Reticulated area
A4.3 Individual lots within non-reticulated areas	☐	☐	☒	Reticulated area

4.4.1 Acceptable solution A4.1 Reticulated areas

The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.

Management measures / development response

The proposed resort will be provided a reticulated water supply through extension of adjacent services. The reticulated system will ensure a year-round supply of water is provided for the resort which meets minimum domestic and emergency water supply requirements.

4.4.2 Acceptable solution A4.2 Non-reticulated areas

Water tanks for firefighting purposes with a hydrant or standpipe are provided and meet the following requirements:

- Volume: minimum 50,000 litres per tank;
- Ratio of tanks to lots: minimum one tank per 25 lots (or part thereof);
- Tank location: no more than two kilometres to the further most house site within the residential development to allow a 2.4 fire appliance to achieve a 20 minute turnaround time at legal road speeds;
- Hardstand and turn-around areas suitable for a type 3.4 fire appliance (i.e. kerb to kerb 17.5 metres) are provided within three metres of each water tank; and
- Water tanks and associated facilities are vested in the relevant local government.

Management measures / development response

The subject site is located within a reticulated area and therefore A4.2 is not applicable.

4.4.3 Acceptable solution A4.3 Individual lots within non-reticulated areas

Single lots above 500 square metres need a dedicated static water supply on the lot that has the effective capacity of 10,000 litres.

Management measures / development response

The subject site is located within a reticulated area and therefore A4.3 is not applicable.

5 Implementation and enforcement

Implementation of the BMP applies to resort management and the City of Albany to ensure bushfire management measures are adopted and implemented on an ongoing basis. A summary of the bushfire management measures described in **Section 4**, as well as a works program, is provided in Table 8. These measures will be implemented to ensure the ongoing protection of proposed life and property assets is achieved. Timing and responsibilities are also defined to assist with implementation of each measure.

Table 8: Proposed works program

Bushfire management measure	Timing for application	Responsibility
Creation of APZs	Prior to occupation of the resort	Resort management
Maintenance of APZs	As required to achieve 2 t/ha threshold all year	Resort manager
Implementation of increased building construction standards	During construction of the proposed building	Construction contractor
Construction of roads, cul-de-sac and emergency access way as per the Guidelines	During construction of the proposed resort	Construction contractor
Provision of reticulated water supply	During construction of the proposed building	Construction contractor
Compliance with the bushfire emergency evacuation and risk management plan for the proposed building	Prior to occupation of the proposed building	Resort manager
Compliance with current fire control order	All year round as specified in the current fire control order	Resort manager

In the author's professional opinion, the bushfire protection requirements listed in this assessment provide an adequate standard of bushfire protection for the proposed development. As such, the proposed development is consistent with the aim and objectives of SPP 3.7 and associated guidelines.

References

Bio Diverse Solutions. 2017. *AS 3959 Bushfire Attack Level (BAL) Contour Plan Report – Vancouver Beach Resort.* Albany.

Bureau of Meteorology (BoM). 2017. *Climate statistics for Australian locations: Monthly climate statistics for Albany*, [Online], Commonwealth of Australia, available from: http://www.bom.gov.au/climate/averages/tables/cw_009500.shtml, [26 April 2017].

Department of Fire and Emergency Services (DFES). 2017. *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx, [24 April 2017].

Department of Planning (DoP). 2016. *Visual guide for bushfire risk assessment in Western Australia.* DoP, Perth.

Landgate. 2017. *Firewatch*, [Online], Government of Western Australia, available from: http://firewatch.landgate.wa.gov.au/landgate_firewatch_public.asp, [1 May 2017].

Standards Australia. 2009. *Construction of buildings in bushfire-prone areas, AS 3959-2009*. SAI Global, Sydney.

Western Australian Planning Commission (WAPC). 2015. *State Planning Policy 3.7 Planning in Bushfire Prone Areas*. WAPC, Perth.

Western Australian Planning Commission (WAPC). 2017. *Guidelines for Planning in Bushfire Prone Areas Version 1.1 (including appendices).* WAPC, Perth.

Appendix 1 BAL contour assessment report (Biodiverse Solutions [2017])

AS 3959 Bushfire Attack Level (BAL) Contour Plan Report

Site Details			
Address:	Vancouver Beach Resort		
Suburb:	Goode Beach	**State:**	W.A.
Local Government Area:	City of Albany		
Description of Building Works:	Tourism Accommodation		
Stage of WAPC Planning	Concept Planning/Structure Planning		

BAL Contour Plan Details			
Report / Job Number:	MSC0122	**Report Version:**	FINAL V2
Assessment Date:	7/2/2017	**Report Date:**	14/6/2017
Practitioner	Kathryn Kinnear	**Accreditation No.**	BPAD 30794

BIO DIVERSE SOLUTIONS

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

REPORT ITEM DIS104 REFERS

Kathryn Kinnear, Bio Diverse Solutions
Accreditation No: BPAD30794
Valid to: Feb 2018
Jurisdiction: Level 2 - WA

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Overview Map Scale 1:100,000

Legend

- Assessment Area
- Development Area
- 100m Assessment Boundary
- Separation Distances
- Slope Degrees
- Photo ID
- Cadastre
- 1m Contours

Vegetation

- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:2,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2017
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Cherry Martin
Vancouver Beach Resort
Goode Beach, WA 6330

Vegetation Classes

BAL Assessor	QA Check	Drawn by
KK	KK	BT
STATUS	**FILE**	**DATE**
FINAL	MSC0122	08/06/2017

SECTION 1 - Vegetation Classification

All vegetation within 100m of the site / proposed development was classified in accordance with Clause 2. 3 of AS 3959-2009. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified below and shown on the Vegetation Classes Map Page 2.

Plot	**1**	**Classification or Exclusion Clause**	**Shrubland Type C**
			Wetland shrubs along Lake Vancouver to the east of the subject site. Effective Slope: Flat land. Consisting almost solely of native sedges. A small number of stunted Banksias. Uniformly to 1.5m in height. Fuel loading at 15t/ha. Separation distance to the development area is 55m.
Photo Id 1: View looking south along Lake Vancouver.			
Plot	**2**	**Classification or Exclusion Clause**	**Scrub Type D**
			Paperbark scrub to the north and west of the proposed development. Occasional Peppermints, Banksias, sedges away from seasonally wet areas. Heights to 4m and averaging 3.5m. Occasional 5m tree. Foliage cover >30%. Effective Slope: Downslope >0-5 degrees. Fuel loading 25t/ha. Separation distance to the buildings is between 18-23m.
Photo Id 2: View looking north east under Plot 2.			

Plot	3	Classification or Exclusion Clause	Scrub Type D
			Situated within the proposed development. Undulating sand dunes. Consisting of Peppermints, Banksias, sedges, *Spiridium globulosum*, and other native scrubs. Coastal scrubs to 4m and averaging 3.5m. Some edge effect of Peppermints to 5m along access track. Fuel loading to 25t/ha. Foliage cover >30%. Effective Slope: Upslope. Separation distance 32m to closest buildings.
Photo Id 3: View looking northwest under Plot 3.			
Plot	**4**	**Classification or Exclusion Clause**	**Scrub Type D**
			Coastal Peppermint scrub situated to the south of the proposed development. Undulating sand dunes. Effective Slope: Down slope >5-10 degrees. Consisting of Peppermints, Banksias, Woolly Bush, sedges, *Spiridium globulosum*, and other native scrubs. Height to 4m and averaging 3.5m. Foliage cover >30%. Fuel loading to 25t/ha. Separation distance 31.8m to the development area.
Photo Id 4: View looking east along the internal access track within Plot 4.			

Plot	5	Classification or Exclusion Clause	Scrub Type D
			Area of coastal peppermint scrub on the eastern side of the proposed development. Undulating sand dunes fringing the foreshore area. Consisting of Peppermints, Banksias, Woolly Bush, sedges, *Spiridium globulosum*, and other native scrubs. Minor downslopes in gullies. Effective Slope calculated to be Upslope on completed development (average finished heights of 5-6m AHD levels of development). Height to 4m and averaging 3.5. Foliage cover >30%. Fuel loading to 25t/ha. Separation distance 13-27m to buildings.
Photo Id 5: View looking east under plot 5.			

Plot	6	Classification or Exclusion Clause	Shrubland Type C
			Shrubland situated on the coastal foreshore area. Directly adjacent to beach in a narrow perpendicular strip. Low coastal shrubs consisting of low shrubs, herbs and coastal sedges. Height averaging 0.5m. Fuel loading 15t/ha. >30% foliage cover. Separation distance 18.4m to development area.
Photo Id 6: View looking south along coastline.			

Plot	7	Classification or Exclusion Clause	Scrub Type D
			Coastal scrubs along the northern edge of the development proposal. Undulating sand dunes fringing the foreshore area. Consisting of Peppermints, Banksias, Woolly Bush, sedges, *Spiridium globulosum*, and other native scrubs. Height to 4m and averaging 3.5m. Some edge effects noted with occasional Peppermints reaching 5m along access tracks. Foliage cover >30%. Fuel loading to 25t/ha. Separation distance 14-24m to buildings.

Photo Id 7: View looking north into plot 7.

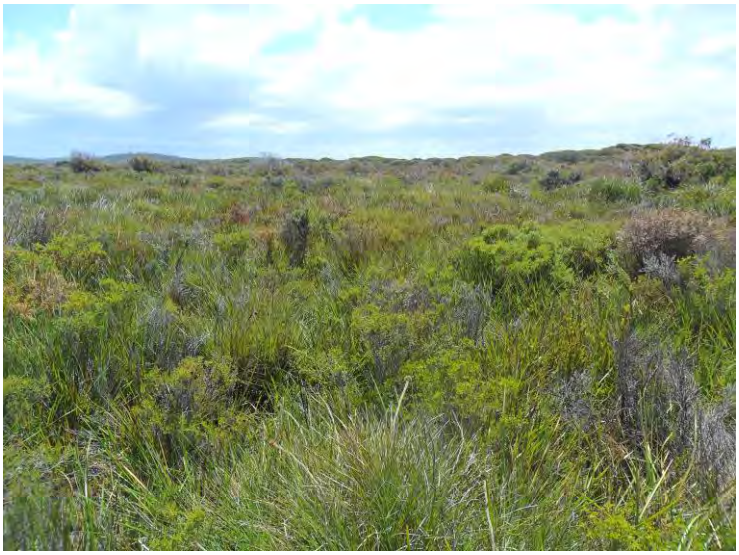
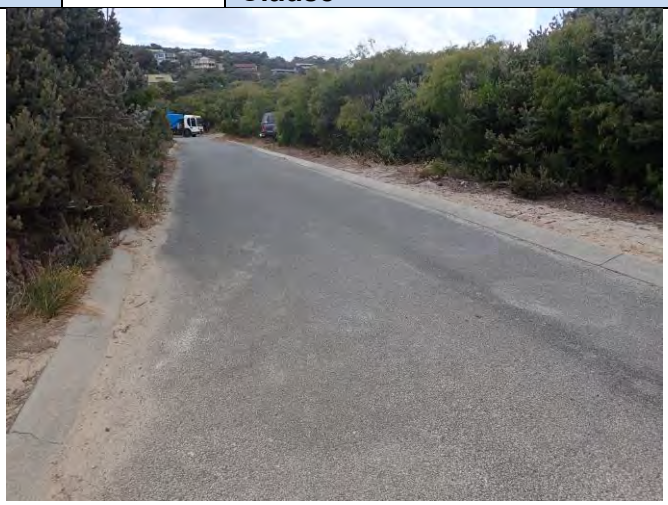
Plot	8	Classification or Exclusion Clause	Shrubland Type C
			Shrubland situated to the northwest of the proposed development. Low coastal heaths and sedges to 1.5m averaging 1m. Effective Slope: Upslope and flat land. Fuel loading 15t/ha. >30% foliage cover. Separation distance 110m from development area (included in assessment as was within 100m of cadastral boundaries).

Photo Id 8: View looking north across plot 8.

Plot	9	Classification or Exclusion Clause	Exclusion 2.2.3.2 (e)
			Roads, driveways, firebreaks and other hardstand areas. Excluded under clause 2.2.3.2 (e).
Photo Id 9: Looking southwest along La Perouse Court to the south of the development area.			
Plot	**10**	**Classification or Exclusion Clause**	**Exclusion 2.2.3.2 (e)**
			Bodies of water. Lake Vancouver located to the west of the development area.
Photo Id 10: View looking southwest across Lake Vancouver.			

Plot	11	Classification or Exclusion Clause	Exclusion 2.2.3.2 (e)
			Buildings excluded under clause 2.2.3.2 (e). Buildings in already developed areas to the south.
Photo Id 11: View looking at dwelling directly to the south of the subject lot.			

Plot	12	Classification or Exclusion Clause	Grassland Type G
			Unmanaged grasses on cleared vacant block to the south of the development area. Some bare areas with minimal fuel. Included in assessment area due to being 100m from subject site (cadastral boundary) Effective Slope: Upslope. Fuel loading 3-4.5 t/ha. Separation Distance 193.5m (included as within 100m to subject site, greater lot boundary).
Photo Id 12: View looking at grassed area directly to the south of the subject lot.			

SECTION 2: Potential Bushfire Impacts
The potential bushfire impact to the site / proposed development from each of the identified vegetation plots are identified below and shown on the BAL Contour Plan Page 11.

Table 1 - Potential Bushfire impacts to AS3959

Plot	Vegetation Classification	Effective Slope (Table 2.4.3)	Separation (m)	BAL Applied to development area
1	Shrubland Type C	Upslope and Flat land	55m	BAL 12.5 can apply
2	Scrub Type D	Downslope >0 to 5 deg	18-23m	BAL 29 and BAL 19 can apply
3	Scrub Type D	Upslope and Flat land	20-23m	BAL 29 and BAL 19 can apply
4	Scrub Type D	Downslope >5 to 10 deg	32m	BAL 19 (overridden by Plot 3)
5	Scrub Type D	Upslope and Flat land	13-27m	BAL 29 and BAL 19 can apply
6	Shrubland Type C	Upslope and Flat land	18m	BAL 12.5 (overridden by Plot 3)
7	Scrub Type D	Upslope and Flat land	14-24m	BAL 29 and BAL 19 can apply
8	Shrubland Type C	Upslope and Flat land	110m	BAL-Low (overridden by Plot 2 and 7)
9	Exclusion 2.2.3.2 (e)	N/A	N/A	BAL-Low
10	Exclusion 2.2.3.2 (e)	N/A	N/A	BAL-Low
11	Exclusion 2.2.3.2 (e)	N/A	N/A	BAL-Low
12	Grassland Type G	Upslope and Flat land	193m	BAL-Low

It is noted in Table 1 that where multiple BAL ratings apply (i.e. contours intercept the building), the highest BAL is always to apply. The final BAL allocation is dependent on final placement of the buildings.

COMMENTS ON BAL CALCULATIONS:

- Distances from vegetation were made based on surface fuels to edge of the development area and the (subject site) boundary;
- Effective slopes were measured in the field using a Nikon Forestry Pro and represented on the respective plots;
- Method 1 (AS3959-2009) Simplified procedure was used for vegetation classification and BAL Assessment process;
- All vegetation was classified within the subject site and within 100m of the lot boundary to AS3959 Table 2.3;
- The perimeter of the vegetation was measured using field GPS and notations on field GIS maps;
- The BAL Contour Plan was prepared by an Accredited Level 2 Bushfire Planning Practitioner (BPAD30794); and
- The BAL Contour Map has been prepared in accordance with Department of Planning (WAPC) Fact Sheet – BAL Contour Maps (Version 2, January 2016).

ASSUMPTIONS

- Development based on Concept Plan as supplied by PGPM Pty Ltd, (Appendix 1).
- Subject site is located in a Bushfire Prone Area, See Appendix 2 (Slip, 2016).
- Internal to the development area lines, internal to the site will be Asset Protection Zones (APZ) maintained in a Low Fuel state as per AS3959-2009 Exc Clause 2.2.3.2

(f). Grasses <100mm in height and forest areas fuel reduced to <2t/ha. Refer to Appendix 3.

- Buildings are to be placed in BAL 19 and BAL 29 zones.

COMMENTS FOR NEXT STAGE OF PLANNING

- Evacuation Planning - Consideration of safe refuge building on site. A central public building in BAL 19 that is upgraded to BAL 29. Consider it needs to house all of the persons on site in a bushfire event (alternative safe refuge site) for anywhere between 0.5-4hours (i.e. until safe to evacuate the area). (m^2/person?).
- Conceptual landscaping – undertake with Structure Plan to show low fuel areas surrounding the development, commitment from strata to maintain at all times. Maintain habitat or potential habitat trees on site, incorporate into landscape plan.
- Water requirements for the site – Mains connection (?), water for firefighting (tanks/hydrants?), water for buildings (sprinklers BCA requirements), head pressure if on site resources (?).
- Staging – Secondary access to be built in Stage 1, temporary and permanent turnaround areas (to have 17.5m diameter). Any Staging plan required for the BMP report.
- Engineering – Access standards, see Table 2 below. Consideration for minimum access standards and specifically any turnaround areas on site to meet minimum grades for access see below (i.e. service areas).

Table 2 – Vehicular Access Technical Standards

Technical requirements	Public Road	Cul-de-sacs	Private Driveways & Battle Axes	Emergency Access Ways (EAW)	Fire Service Access Ways
Minimum trafficable surface (m)	*6	6	4	6	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	4.5	4.5	4.5	4.5
Maximum grades	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity(t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius(m)	8.5	8.5	8.5	8.5	8.5
Maximum Length	N/A	600m, if connected by an EAW. Turnaround area 17.5m dia min.	50m, if greater turnaround areas required within 50m of a house	600m	N/A
*Denotes the width can include a 4m wide paving with one metre wide constructed road shoulders.					

(WAPC, 2017)

Kathryn Kinnear, Bio Diverse Solutions
Accreditation No: BPAD30794
Valid to: Feb 2018
Jurisdiction: Level 2 - WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

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Overview Map Scale 1:100,000

Legend

- Development Area
- Woodland Extent
- Cadastre

Vegetation

- Forest Type A
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5

Scale
1:1,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2017
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Cherry Martin
Vancouver Beach Resort
Goode Beach, WA 6330

BAL Contour Plan

BAL Assessor	*QA Check*	*Drawn by*
KK	**KK**	**BT**
STATUS	*FILE*	*DATE*
FINAL	**MSC0122**	**08/06/2017**

SECTION 3: DISCLAIMER

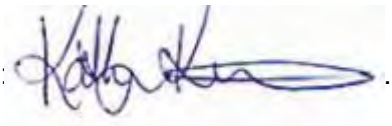
The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959-2009 – Building in Bushfire Prone Areas, WAPC State Planning Policy 3.7 (WAPC, 2015), WAPC Guidelines for Planning in Bushfire Prone Areas Version 1.1 (WAPC, 2017), and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.

AS3959-2009 disclaimer: It should be borne in mind that the measures contained within this Standard (AS3959-2009) cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather condition.
(AS3959, 2009)

Building to AS39590-2009 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.

SECTION 4: Certification

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level stated above in accordance with the requirements of AS 3959-2009 (Incorporating Amendment Nos 1, 2 and 3).

SIGNED, ASSESSOR:  ..... DATE: 24/3/2017

Kathryn Kinnear, Bio Diverse Solutions
Accredited Level 1 BAL Assessor
Accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD30794)

BIO DIVERSE SOLUTIONS

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

References

Western Australian Planning Commission (WAPC) (2017) Guidelines for Planning in Bushfire Prone Areas Vers 1.1. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) (2015) State Planning Policy 3.2 Planning in Bushfire Prone Areas. Department of Planning WA and Western Australian Planning Commission.

State Land Information Portal (SLIP) (2015 & 2016) map of Bushfire Prone Areas. Office of Bushfire Risk management (OBRM) data retrieved from:
https://maps.slip.wa.gov.au/landgate/bushfireprone/

Appendix 1: – Concept Plan

SITE LOCATION PLAN

VANCOUVER BEACH RESORT
ALBANY

GROUNDS KENT ARCHITECTS

BIO DIVERSE SOLUTIONS

Appendix 2 – State Bushfire Prone Area Mapping

(SLIP 21/5/2016)

https://maps.slip.wa.gov.au/landgate/bushfireprone2016/

Appendix 3 – APZ Standards to apply

An Asset Protection Zone (APZ) is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (WAPC, 2017). This is also defined as a "defendable zone". Internal to the site development area an APZ is to apply utilising Low threat or non-vegetated areas as classified by AS3959-2009 Section 2.2.3.2. The developer will be responsible for the maintenance of the APZ until the lot is handed over to strata managers. The APZ area will extend across the whole lots to ensure setbacks to BAL remains in perpetuity. Any replanting, revegetation and landscaping across the lots is to be to an APZ standard as per WAPC Guidelines.

WAPC Guidelines for an APZ (WAPC, 2017)

Fences: within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

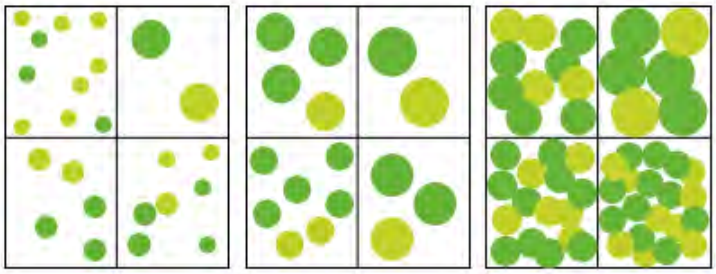
Objects: within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.

Fine Fuel load: combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.

Trees (> 5 metres in height): trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. See Figure 2 (WAPC Figure 16, Appendix 4) below.

Figure 1 – Tree Canopy Cover

Figure 16: Tree canopy cover – ranging from 15 to 70 per cent at maturity



(WAPC, 2017)

Shrubs (0.5 metres to 5 metres in height): should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m^2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: should be managed to maintain a height of 100 millimetres or less.

ecological AUSTRALIA

ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management

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1. Location details

Facility type:

- Short-term accommodation (Vancouver Beach Resort) in Rural Area

Location:

- Vancouver Beach Resort: 40 La Perouse Court, Goode Beach

Infrastructure:

- 30 accommodation units, resort infrastructure café, gym, kitchen, laundry, pool etc.)

Occupation / Visitation (number of people):

- Maximum visitors: 200 (based on guest, staff & restaurant use)

Access:

- La Perouse Road (west), internal buggy paths and tracks within site.

Fire Weather Forecast Area:

- South West Land Division Fire District
- Stirling Coast

2. Communications

Mobile:

- Mobile reception is available – however, mobile communications can become unreliable during bushfire/emergency events due to the volume of usage

Landline / NBN:

- The resort will have a landline available for emergency use

Radio:

- ABC: Albany - Local Radio (630 AM), Southern Agricultural – News Radio (92.1 FM)

Internet Sites:

- Preparing your Property – DFES Link
- Emergency WA – www.emergency.wa.gov.au
- DFES on Facebook - www.facebook.com/dfeswa
- DFES on Twitter - www.twitter.com/dfes_wa
- National Bushfires app - www.bushfireblankets.com/bushfire-app.html

3. Contacts

Fire reporting	000	
Resort Manager	TBC	TBC TBC
DFES (Emergency Information)	13 33 37	
SES (Emergency Assistance)	132 500	
WA Police	000	
WA Ambulance	000	
Bureau of Meteorology (BoM) Recorded Information	1300 659 213	

4. Evacuation preparedness

- All guests must be briefed during the Bushfire Danger Period on the bushfire evacuation procedures with updated advice provided when the fire danger exceeds Very High or a fire warning is issued by Emergency Services (currently DFES) for the locality.
- This Evacuation Plan is to be displayed in guest's rooms.

BUSHFIRE PREPAREDNESS MATRIX

ACTION	LOW/ MOD	HIGH	VERY HIGH	SEVERE	EXTREME	CATASTROPHIC
Resort Manager to perform daily check (after 4 pm) on the DFES and BoM websites to determine the Fire Danger Rating (FDR) for the following day and weekly prediction. Update resort visitors if there is a likelihood of the site being closed to visitors due to FDR.						
Resort Manager to monitor Emergency WA / or DFES website or ABC Radio or 'National Bushfires' app for fire incidents		Min. 1 pm	Min. 1pm, 3pm	Min. 11am, 1pm, 3pm	Min. 11am, 1pm, 3pm (or more frequently if fire event in locality)	Resort Closed to visitors
Complete building preparedness checks			By 10 am	By 8 am	By 8 am	

5. Evacuation triggers

A decision to evacuate off-site or to the nominated bushfire shelter (shelter-in-place; the Function Centre) is to be determined by:

- Instructions from Police, DFES, other Emergency Services or Resort Manager
- the Bushfire Evacuation Matrix (overleaf)
- A warning regarding a known bushfire in the locality (see Bushfire Evacuation Matrix overleaf)

SEE EVACUATION DECISION MATRIX (OVERLEAF)

6. Evacuation Procedures

Every bushfire attack is different. The response to each must therefore be specific and be in response to bushfire warnings

Bushfire Warning Notification

- Emergency WA website, SMS or the 'National Bushfires' App (for smartphones) will provide initial notification of a fire and evacuation instructions.
- DFES, Police (or other incident personnel) may also attempt to notify visitors (on site).
- The Resort Manager is also responsible to ensure any visitors are aware of a fire warning has been issued

Off-site evacuation

- Off-site evacuation is always safer, provided adequate time is available to complete it safely. Confirm with DFES or other Emergency Service prior to evacuating.
- Off-site evacuation is to occur by driving directly to Albany Leisure and Aquatics Centre on Barker Road which has been previously been used as an evacuation centre for the town. Obtain further advice from media warnings once safely in Albany.
- Evacuation well in advance of a fire's predicted arrival time is safer than remaining on-site.

On-site evacuation (Shelter-in-place)

- Evacuating to the nominated on-site refuge may be required where it is not possible to evacuate to Albany safely
- This nominated building has been constructed to a BAL 29 standard, and will provide for a greater level of protection than remining outdoors.

7. Visitor welfare during shelter-in-place

- This will be provided by the Resort Manager. Serious medical needs will require emergency response via 000.

8. Building Preparedness Checks

- Include such tasks as ensuring reduced fuel loads around buildings, routine house maintenance is up to date including cleaning of gutters, fire breaks are in place, and static water supply is available.
- Detailed information and checklists are available on the DFES website including the 'The Homeowner's Bushfire Survival Manual' and the '*Prepare Act Survive Booklet*' published by DFES:

https://www.dfes.wa.gov.au/safetyinformation/fire/bushfire/BushfireManualsandGuides/DFES_Bushfire-Homeowners_Survival_Manual.pdf

https://www.dfes.wa.gov.au/safetyinformation/fire/bushfire/BushfireManualsandGuides/DFES_Bushfire-Prepare_Act_Survive_Booklet.pdf

9. Notes on Fire Danger Rating and Total Fire Ban declarations

REPORT ITEM DIS104 REFERS

- The Fire Danger Rating (FDR) gives an indication of the potential consequences of a fire, if a fire was to start.
- The rating is based on predicted conditions such as the forecast temperature, humidity, wind and dryness of the landscape.
- The higher the fire danger rating, the more dangerous the conditions.
- During the Bushfire Danger Period (1st November – 30th April) the forecast FDR for the following day is typically released around 4pm but can be changed as weather conditions unfold.
- Both predicted and current FDR are available from the DFES and BoM websites.

A 'Total Fire Ban' (known as TFB) is a separate declaration (i.e. a particular day or part thereof may have both 'Severe' FDR and a TFB.

10. What to do if caught in a bushfire

The following provide current guidelines* on what to do if caught in a bushfire in a building or on foot. Each requires a different response involving critical decisions for your survival.

What to do if caught in a bushfire IN A BUILDING

Outside your building

- Ensure you drink plenty of water so you do not dehydrate
- Block your downpipes, (a sock full of sand/soil will help) and fill your gutters with water
- Move flammable items such as outdoor furniture, doormats,
- Gas cylinders should have the valve facing away from the building
- Do not stand on the roof with a hose. In bush fires, often more people are injured by falling from roofs than suffering burns
- Patrol the outside of the building, putting out any embers and spot fires that may start. An ember or spark can reach your home hours before the fire front arrives
- Just before the fire arrives, wet down timber decks and gardens close to the building
- Move any firefighting equipment to a place where it will not get burnt.

Inside your building

- Continue to drink water so you do not dehydrate
- Close doors, windows, vents, blinds and curtains to prevent flames, smoke and embers from entering
- Put tape across the inside of the windows so they stay in place if they break
- Shut off gas at the meter or bottle
- Move furniture away from the windows to prevent any embers that enter the building from igniting
- Fill sinks, bath and buckets with water for putting out any fires that may start inside
- Place wet towels around window and door edges to stop smoke and embers from entering
- Put a ladder next to the access hole to the roof space so you can check for spot fires.

During the fire

- When the fire arrives, go inside to protect you from the radiant heat
- Ensure you have torches ready as it is likely to become completely dark and you will not be able to see
- Patrol the inside of the building, including the roof space for sparks and embers
- Remember – if your life is at risk, call Triple Zero (000) immediately.

After the fire

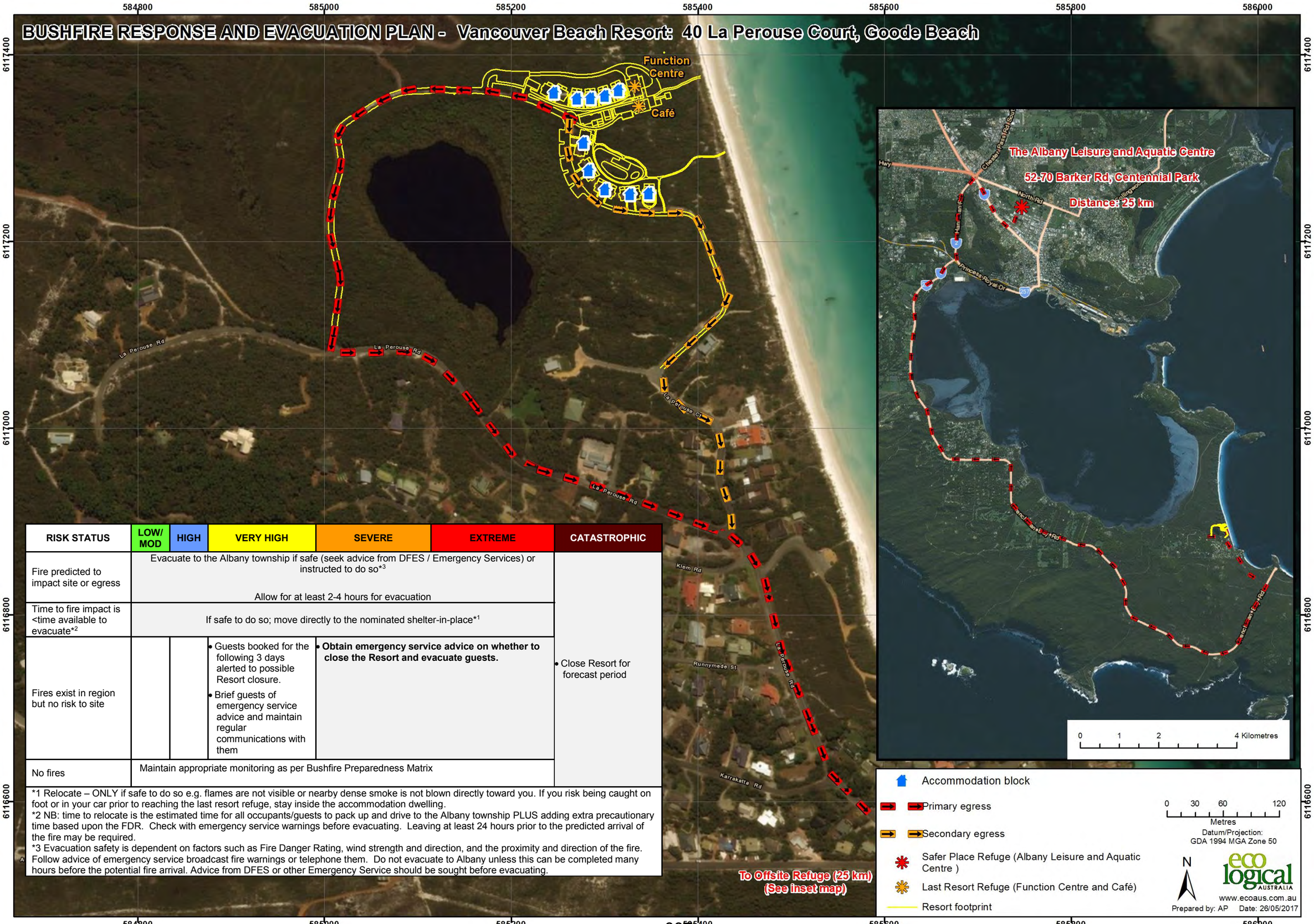
- Once the fire has passed, you may need to patrol the property for hours. Go outside and put out any part of the building which is alight.
- An ember or spark from a fire can impact on a house many hours after the main fire front has passed and small spot fires can quickly get out of control.

What to do if caught in a bushfire ON FOOT

- Try to move on to bare or burnt ground at least 100 m from where fire is likely to burn, if this is not feasible find the largest bare or burnt ground possible
- Do not run uphill or away from the fire unless you know a safe refuge is able to be reached before the fire arrives. Try and position yourself downhill of the on-coming fire.
- Move across the slope out of the path of the fire front and work your way downslope towards the back of the fire or onto burnt ground.
- Do not attempt to run through flames unless you can see clearly behind them. This generally means that the flames are less than 1 metre high and less than 1 to 2 metres deep at the back or on the flanks of the fire.
- Lulls in the fire often result in the flames in these parts being low enough to step or run through to the burnt ground beyond.
- When conditions become severe use every possible means to protect yourself from radiation. On bare ground cover yourself, use wheel ruts, depressions, large rocks or logs to give protection.
- Take refuge in ponds, running streams or culverts, but behind solid objects such a rock
- Remain calm and do not run blindly from the fire. If you become exhausted you are much more prone to heat stroke and you may easily overlook a safe refuge. Consider an alternative course of action.

* adapted from NSW RFS bushfire training modules.

BUSHFIRE RESPONSE AND EVACUATION PLAN - Vancouver Beach Resort: 40 La Perouse Court, Goode Beach



RISK STATUS	LOW/ MOD	HIGH	VERY HIGH	SEVERE	EXTREME	CATASTROPHIC
Fire predicted to impact site or egress	Evacuate to the Albany township if safe (seek advice from DFES / Emergency Services) or instructed to do so*3 Allow for at least 2-4 hours for evacuation					
Time to fire impact is <time available to evacuate*2	If safe to do so; move directly to the nominated shelter-in-place*1					
Fires exist in region but no risk to site			• Guests booked for the following 3 days alerted to possible Resort closure. • Brief guests of emergency service advice and maintain regular communications with them	• **Obtain emergency service advice on whether to close the Resort and evacuate guests.**		• Close Resort for forecast period
No fires	Maintain appropriate monitoring as per Bushfire Preparedness Matrix					

*1 Relocate – ONLY if safe to do so e.g. flames are not visible or nearby dense smoke is not blown directly toward you. If you risk being caught on foot or in your car prior to reaching the last resort refuge, stay inside the accommodation dwelling.
*2 NB: time to relocate is the estimated time for all occupants/guests to pack up and drive to the Albany township PLUS adding extra precautionary time based upon the FDR. Check with emergency service warnings before evacuating. Leaving at least 24 hours prior to the predicted arrival of the fire may be required.
*3 Evacuation safety is dependent on factors such as Fire Danger Rating, wind strength and direction, and the proximity and direction of the fire. Follow advice of emergency service broadcast fire warnings or telephone them. Do not evacuate to Albany unless this can be completed many hours before the potential fire arrival. Advice from DFES or other Emergency Service should be sought before evacuating.

APPENDIX 8

Civil Engineering Report
(Wood & Grieve Engineers)

WOOD & GRIEVE ENGINEERS

Vancouver Beach Resort

Civil Engineering Report

Traffic, Wastewater, Water Supply, Stormwater

Prepared for:

Dr Cherry Martin

Prepared by:

Greg Basden
Project No. 30735
P:\30735\PROJECT DOCUMENTATION\CIVIL\DOCUMENTS & REPORTS\C_CL_RE_001 REV2.DOCX

Date:
19 June 2017

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Revision

REVISION	DATE	COMMENT	APPROVED BY
0	20/01/2017	Draft For Client Review	**Greg Basden**
1	10/03/2017	Issue to Client	**Greg Basden**
2	19/06/2017	Base information updated	**Greg Basden**

Contents

Contents

Introduction

1. Introduction

Dr Cherry Martin has commissioned Wood & Grieve Engineers to undertake engineering assessment and provide advice in relation to the proposed development of Lot 660 La Perouse Court, Goode Beach.

Goode Beach is approximately 8km SE of the Albany CBD on the edge of the protected waters of King George Sound. The Goode Beach residential community is located immediately to the North of the proposed resort.

1.1 Proposal

It is proposed that the above lot be developed to establish a small, high quality, low impact Eco Resort. The proposed resort will accommodate approximately 50 resort style units, plus restaurant and service facilities. The development footprint is well set back from the coastline, Lake Vancouver and the existing homes.

1.2 Purpose

The purpose of this report is to provide picture of how the engineering constraints/opportunities will be dealt with as well as addressing any servicing constraints. This report will be lodged as part of the development proposal we understand being equivalent to a “Structure Plan”.

1.3 Investigations

With the above in mind, the level of investigation included in this report could be considered relatively detailed and “above and beyond” what would normally be appropriate at this stage of the development proposal.

As part of this report, we have investigated the following:

- Traffic Impact Assessment
- Servicing
- Stormwater Drainage Treatment
- Wastewater Treatment.

1.4 Further Investigations

As part of the development of this proposal, once the initial planning phases are completed, further detailed design will be required to provide engineering designs for ongoing approvals of the attached concepts.

2. Traffic Impact Assessment

2.1 Introduction

2.1.1 Study Background

Wood & Grieve Engineers (WGE) has been engaged by the developer Dr Cherry Martin to prepare a Traffic Impact Assessment for the development of Lot 660 La Perouse Road, Goode Beach. The lot is currently zoned 'Rural' and 'Parks and Recreation' under the City of Albany (COA) Town Planning Scheme No. 3, with intention to rezone the lot to 'Special Use Zone 1' for holiday accommodation.

The report has been prepared to address any concerns regarding the impact of any increase in traffic on the road system and also the residences in Goode Beach and particularly those along La Perouse Road.

2.1.2 Location

Location Plan is attached in Appendix 1. A Site Plan and Detailed Site Plan have been prepared by Ground Kent Architects and are attached in Appendices 2a and 2b.

2.1.3 Site Description

Key features and assumptions of the proposed development area summarised below:

- All traffic generated by the development will enter and exit via the existing access track (which will be formalised as part of the development) to the east of Lake Vancouver.
- Emergency access and possibly pedestrian only will be provided off La Perouse Court.
- A total of 53 parking bays will be provided.
- The total site area is approximately 7.7107ha.
- The accommodation will include 8 x 2 bed units; 2 x 1 bed units, 10 x 1 bed villa duplex, 20 x studio units; 50 units total, 58 beds.
- It is assumed that the resort will be on average at 85% capacity.
- It is assumed that the traffic growth along La Perouse Road will increase at a rate of 3%.

2.2 Existing Conditions

2.2.1 Traffic Data

Traffic count data has been supplied by the City of Albany. A summary of the traffic volumes in average vehicles per day (vpd) and counter locations is attached in Appendix 3, and the weekly traffic counts are attached in Appendix 4.

The data reveals that the traffic flow is moderately consistent throughout the day between 7am to 5pm, without any defined morning or afternoon peak hour periods.

A significant increase in daily traffic along La Perouse Road (between Karrakatta Road and St Georges Crescent) appears to have occurred between April 2008 (205 vpd) to February 2015 (306 vpd) however the reasoning is unknown. Only one count was recorded in October 2012 near the proposed entrance road of the development, with an average daily traffic volume of 48 vpd.

In general, the traffic volumes of La Perouse Road are approximately 300 vpd towards the centre of Goode Beach (between St Georges Crescent and Runnymede Street) and decrease to approximately 50 vpd near the proposed entrance of the development.

There is not enough traffic data to make an assessment of the annual traffic growth on La Perouse Road. Given there are several vacant lots along La Perouse Road, it would be reasonable to assume that there has been a general increase in traffic over time. An increase of 3% per year has been adopted to bring the traffic the counts to a common year of 2017 (see Section 2.3).

2.2.2 Existing Performance and Capacity

La Perouse Road is the main access road through Goode Beach, which turns into Vancouver Road before connecting to Frenchman Bay Road (the main connecting road towards Albany). However, due to the size of the catchment, La Perouse Road remains a relatively quiet street. Under the Liveable Neighbourhoods (WAPC, 2007) it would be classified as an Access Street C with preferred volume range of less than 3000 vpd. Using this figure La Perouse Road is functioning at around 10% of its capacity.

2.3 Traffic Generation

2.3.1 Trip Generation Rates

Austroads refers to the Roads and Traffic Authority of NSW (RTA, 1995) for typical trip generation rates, and this has been used as the basis for determining the trip generation rate for this development.

The appropriate average daily trips = 3 per unit (Section 3.4.1 Motel accommodation). It should be noted that this rate assumes 100% occupancy of the units, and it may be more appropriate to assume an 85% occupancy rate.

Maximum average number of trips per day = 50 x 3 = 150 vpd.
At 85% occupancy = 150 x 0.85 = 128 vpd.

For the purposes of this assessment it is not expected that the nature of the development will incur significant peak hour volumes, however it is acknowledged that check-out times will incur a higher hour volume. It is also acknowledged that both holiday periods, and seasons will vary the occupancy rate.

2.3.2 Traffic Increase

Due to the low traffic volume of La Perouse Road, the increase in traffic may be best represented by the average delay between vehicles traveling on Perouse Road between the hours of 7am - 7pm when a majority of the vehicles travel. Table A summarises the traffic counts between 7am - 7pm and projects the traffic volumes by 3% per annum to the year 2017. The 85% occupancy rate has been adopted (128 vpd) and it has been assumed that the traffic travelled outside the hours 7am - 7pm (for the development) will be negligible.

Traffic Count	Average vpd (7am-7pm) projected 3% per annum to 2017										Average delay (min)	Average delay with development (min)
	2008	2009	2010	2011	2012	2013	2014	2015	2016	**2017**		
Karrakatta - Runnymead SLK 0.32								**288**	297	**306**	2.4	1.7
Karrakatta - Runnymead SLK 0.30	**194**	200	206	212	218	225	232	239	246	**253**	2.8	1.9
Karrakatta - St George SLK 0.15	**274**	282	291	299	308	318	327	337	347	**358**	2.0	1.5
Karrakatta - St George SLK 0.17					**275**	283	292	300	310	**319**	2.3	1.6
La Perouse Ct - End SLK 0.90					**44**	45	47	48	50	**51**	14.1	4.0

Table A: Average delay between vehicles

The increase in traffic is expected to result in a decreased delay between vehicles from approximately 2.4mins to 1.7mins between Karrakatta Road and St George Crescent, and 14.1min to 4.0min near the entrance to the development (between La Perouse Court to the end of La Perouse Road).

2.4 Conclusion

The proposed development is expected to increase the traffic on La Perouse Road by a maximum of 150 vpd, or an average of 128 vpd (assuming an 85% occupancy rate).

The proposed developed is not expected to cause any congestion on La Perouse Road, nor approached anywhere near the actual capacity of the roads.

The increase in traffic is expected to result in a decreased average delay between vehicles travelling on La Perouse Road from approximately 2.4mins to 1.7mins between Karrakatta Road and St George Crescent, and 14.1min to 4.0min near the entrance to the development (between La Perouse Court to the end of La Perouse Road) between 7am to 7pm.

Based on the above results, it is still unlikely that more than one vehicle will be observed on the road at any one time, as the average time between vehicles is 1.7 minutes. The impact is therefore considered negligible.

It is unlikely that this development will have any traffic impact on the current “sleepy hollow” nature of Goode Beach and it road network.

3. Servicing

3.1 Reticulated Wastewater

There is no reticulated wastewater system in this area. Wastewater provision will require a dedicated Wastewater Treatment Plant, dealt with under a separate heading in this report.

3.2 Reticulated Potable Water

Goode Beach is serviced by a reticulated water system supplied by the Water Corporation of WA.

A small distribution main supplies an elevated storage tank on the Southern side of the hamlet. This provides a source for the gravity fed reticulation system which provides water to the small community.

A 100PVC-12 water main currently runs along La Perouse Road and La Perouse Court. The Water Corporation have confirmed that there is capacity in this pipe to service the proposed development based on an estimated demand of 21,000L/day (120 guests + 30 staff @ 140L/day = 21,000L/day).

3.3 Power

A preliminary load calculation indicates that the site is likely to require a power supply of approximately 150-250kva.

There is an existing Western Power transformer on the North Western end of La Perouse Court that could either be upgraded, or would have spare capacity to service the proposed development. If however, the maximum power demand exceeds 220Kva, it would be more economical to install high voltage power to a location central to the development.

It is not considered that power supply will be a constraint for this proposed development.

Further investigations will be undertaken once more detailed information is available regarding the likely maximum demand for the development. This will occur once the proposal proceeds and detailed design is required.

Alternative supplementary power supplies (eg. solar) will also be investigated at the appropriate time.

3.4 Communications

Communications will be provided to the site from the North Western end of La Perouse Court, via the proposed path/firetruck access. Communications pit and conduit will be “fibre ready” and provision will be made for phone and data lines in accordance with the developer’s requirements.

3.5 Gas

There is no reticulated Gas supply in this area. Bottled LPG is readily available

4. Stormwater Management

As with any development, the management of stormwater flows generated must be carefully managed and controlled as to not negatively impact the environment.

As such this development will comply with best management practice and comply with the City of Albany's "Development Guidelines" and the Department of Water "Stormwater Management Manual".

This section of our investigations should be read in conjunction with the report issued by Aurora Environmental.

4.1 Geotechnical Information

Previous investigations by Alan Tingay & Associates, as well as more recent investigations by Aurora Environmental (please see Aurora Environmental report) have shown the site to be free draining and elevated above any groundwater levels.

The site permeability results indicate that the site is capable of infiltrating in excess of the 1 in 100 year ARI storm event.

The site is highly undulating with many trapped low points which do not allow flows to discharge off site. There is no evidence of any surface water ponding or flowing on the site.

4.2 The Stormwater Proposal

Attached is a concept plan showing the site and proposed treatment/disposal system, and a plan showing catchments details.

As the site is free draining the stormwater generated by placing impervious surfaces over the site (buildings and pavements) will be contained on site. Roof based runoff generated will be stored in rainwater tanks plumbed into each unit for reuse in toilets, washing facilities and the swimming pool. Overflows from these tanks will be infiltrated at the point of discharge. Runoff from road pavements will be infiltrated at source via the use of vegetated swales.

In the unlikely event that flows will be occur in these swales, the flows will be directed to fully contain low points in the existing terrain.

The design concept considers infiltration and/or conveyance then infiltration of all storms up to and including the 1 in 100 year ARI event. All stormwater runoff will be infiltrated at source, with soil amendment used if required to remove any associated runoff particles.

The site, catchment plan and Stormwater Concept are shown in Appendix 5.

4.3 Lake Vancouver

Lake Vancouver is generally a reflection of groundwater levels, however also currently serves as the disposal point for stormwater runoff for roads within the Goode Beach development.

This development will have no connection to this water body. Infiltration of the rainfall generated by this development is generally downstream of the lake. It is unlikely that the stormwater runoff from this development will have any impact on Lake Vancouver.

5. Wastewater Treatment Plant Prelim Investigation

5.1 Summary

Further to review of the proposed project, environmental report, hydro-geotechnical information, geotechnical information and site plans, WGE consider it possible with current wastewater treatment technology to collect, treat and utilise (treated) wastewater in accordance with the health, environmental and engineering requirements of Western Australia.

The proposed system consists of two wastewater treatment plants (WWTP). The main plant accommodates the short stay units and the minor plant accommodates the kitchen/restaurant. The kitchen/restaurant has been provided with a dedicated WWTP to counteract consequences resulting from failure to maintain the grease traps associated with the kitchen/restaurant.

5.2 WWTP Report Scope

This report identifies:

- The Wastewater Infrastructure Philosophy.
- The approvals required for establishment of a Wastewater Treatment Plant (WWTP) to service the proposed Vancouver Beach Resort.
- Environmental and health information used as the basis for a WWTP selection.
- Performance Specification for the two WWTP systems.
- An indicative conceptual location of the equipment and irrigation field required to service the sewer reticulation system for the development – Appendix 6.
- An indicative layout for the main WWTP – Appendix 8.
- Construction issues which need to be considered.
- Operational and Maintenance issues which need to be considered.
- An Opinion of Potential Costs (OPC) to construct and operate the WWTP and Wastewater Pump Station (WWPS).

5.3 Wastewater Infrastructure Philosophy

All wastewater infrastructure will be owned, operated and maintained by the Resort entity.

The proposed resort includes short stay accommodation and kitchen/restaurant facilities. The kitchen/restaurant facilities need to discharge wastewater through a grease trap. Based on past experience, kitchen/restaurant facilities sometimes do not maintain the grease traps sufficiently and as a consequence, blockages occur. In order to avoid operational failures of the reticulation and main wastewater treatment plant, the following infrastructure strategy is proposed:

1. Short stay accommodation units discharge to sewer reticulation in accordance with AS3500.
2. The kitchen/restaurant facilities discharge to a grease trap upstream of a dedicated small scale WWTP.
3. In the event that kitchen grease traps fail and consequently cause disruption to the dedicated “kitchen WWTP”, the short stay portion of the resort is still able to function and no damage is caused to the main WWPS.
4. Sewer reticulation from the short stay accommodation will discharge to a WWPS.
5. The kitchen WWTP will discharge direct to the irrigation area.

6. The WWPS serving the short stay accommodation will transfer wastewater (from the short stay unit reticulation) to the main WWTP.
7. The main WWTP will treat effluent to levels below target values required by the Department of Water.
8. Following treatment, the effluent will be transferred to the irrigation area.
9. The irrigation area will be vegetated to further reduce nutrient levels in the effluent.
10. Discharge within the irrigation area can be above ground or sub-surface. Each option has operational constraints (eg. above ground may require restricted access signage and fencing whereas sub-surface irrigation requires additional filtration at the WWTP to minimise blockage potential) however, the sub-surface option has the lowest public health risk.
11. WWTPs to be below ground except for control cubicles.
12. Secondary treatment and chlorination utilised.

The above wastewater system is attached as Appendix 6.

5.4 Approvals Requirements

In order to establish a private WWTP the following approvals will need to be obtained (in addition to other approving obligations noted in the Development Application conditions):

- Western Australian Department of Health;
- Department of Water;
- Department of Environmental Regulation;
- State Environmental Protection Authority;
- Local Government; and
- Department of Parks and Wildlife.

5.5 Environmental and Health Basis for WWTP Selection

The following reports were utilised to form the basis of the engineering selection of the proposed WWTP:

- Aurora Environmental – CHE-2016-002_REPT_003_mp_V1 (attached as Appendix 7);
- WWTP Supplier Documents (WA Wastewater Management - Contact Damien Crane 0438 551 919).

5.6 Performance Specification for the Two WWTP Systems

The two WWTPs suggest at the conceptual phase are:

- Kitchen = 1x CE4200 + 1 x 7,000L Distribution tank + 1 x 4,000L Irrigation tank;
- Short Stay accommodation = 1x PCN20 + 1 x 15,000L Distribution tank + 1 x 11,000L Irrigation tank.

Specifications are indicated within the below table.

	1 x 4,200 L/day	1 x PCN20 = 20,000L/day
Installation	Subsurface	Subsurface
Configuration	1x CE4200 + 1 x 7,000L Distribution tank + 1 x 4,000L Irrigation tank	1x PCN20 + 1x 15,000L Distribution tank + 1x 11,000L Irrigation tank
Total Dimensions (approx.)	1.840m x 3.880m x 2.065m	As shown Appendix 8
Treated Water Quality	Advanced Secondary	Advanced Secondary
Biological Oxygen Demand	<10 mg/L	<10 mg/L
Suspended Solids (SS)	<20 mg/L	<20 mg/L
Total Nitrogen	<20 mg/L	<20 mg/L
Total Phosphorus	>80% removal	<2 mg/L
Thermal Tolerant Coliforms	<10 CFU/mL	<10 CFU/mL
Free Chlorine	0.5-2.0 mg/L	0.5-2.0 mg/L
Power Supply	240 Mains or Generator	240 Mains or Generator
Alarm Type	Audio Visual	Audio Visual

5.7 Construction Issues Which Need to be Considered

The following issues (although not exhaustive) will need to be considered as part of detailed design and construction:

- Interaction with other building footing loads.
- Ability to access underground components for maintenance.
- Interaction with surface vehicle loads.
- Interaction with groundwater or saturated soil above the tanks (eg. counteract buoyancy of the tanks).
- Power supply.
- Undermining existing buildings during excavations for the WWTP.
- Protection of vegetation during irrigation field construction.
- Materials selection to minimise “whole of life” costs eg. use of stainless steel components within corrosive environments reduces maintenance costs however higher capital costs are realised.
- As constructed recording and documentation to ensure ease of repair if required eg. accidental damage to a pressure main requires immediate location and repair.

5.8 Operational & Maintenance Issues Which Need to be Considered

The following issues (although not exhaustive) will need to be considered as part of operation and maintenance:

- **An Operation and Maintenance Contract is likely to be required due to the complex nature of operating, maintaining and producing the required quality of effluent from Wastewater Treatment Plants.**
- Ability to access underground components for maintenance ie. operational aspects of the restaurant/kitchen/short stay units/pool/landscaping/etc. should not interfere with the operation or maintenance requirements of the WWTP.
- Backup Power supply.
- Remote system monitoring and control option (used to minimise unforeseen failures).
- Failure alarm system configuration and placement (ie. do not want to disturb guests).

- Operation and maintenance manuals are required on site.
- Above ground irrigation needs to be compared with sub-surface irrigation to assess capital costs, operational costs, maintenance costs, public health risk, access restrictions, etc.

5.9 Opinion of Potential Costs (OPC)

5.9.1 Construction

The following OPC is suggested for the WWTP and associated infrastructure construction costs:

- Wastewater Pump Station with integrated wet well (less than 4m deep)/valve pit and control cubical = $70,000 plus GST.
- Sewer Pressure Main from the WWPS to the Main WWTP (assume DN63PE 100m long) = $10,000 plus GST.
- Main WWTP, Kitchen WWTP and Sub-surface irrigation area = $270,000 plus GST.
- Pressure Main from the kitchen WWTP to the Sub-surface irrigation area = $8,000 plus GST.
- Remote monitoring, control and SCADA system (optional) = $80,000 plus GST.
- Power supply, water supply, misc. civil support infrastructure = $20,000 plus GST.

Total Construction OPC = $458,000 plus GST.

It should be noted that the effluent quality generated by the WWTPs can be improved however, minor quality improvements have exponential cost increases eg. 20% reduced nutrient may require 100% increased capital cost.

5.9.2 Operations and Maintenance

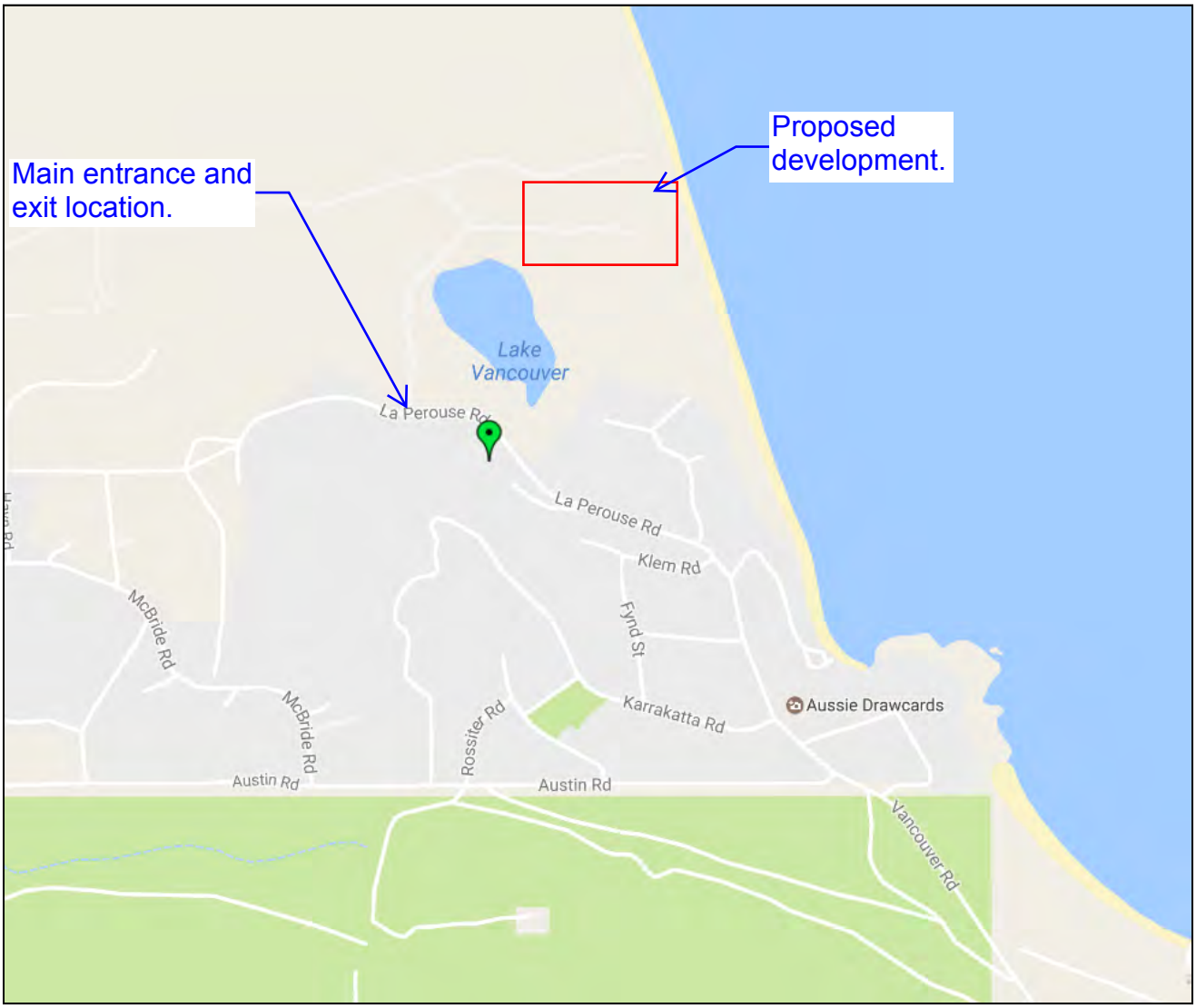
The following OPC is suggested for the WWTP and associated infrastructure annual operation and maintenance costs:

- Wastewater Pump Station operations (eg. power supply) and maintenance (eg. quarterly cleaning, service, and pump replacement every 5 years) = $7,000 plus GST.
- Main WWTP operations (eg. power supply) and maintenance (eg. quarterly cleaning, service, and pump/blower replacement every 5 years) = $15,000 plus GST.
- Kitchen WWTP = $8,000 plus GST.
- Sub-surface irrigation = $8,000 plus GST.
- Effluent Quality monitoring, testing reporting = $8,000.

Total Operations and Maintenance OPC = $46,000 plus GST.

Appendix 1

Location Plan



Appendix 1 - Location Plan

Appendix 2a

Site Plan

REPORT ITEM DIS104 REFERS

SITE LOCATION PLAN

0 10 50 100m

SCALE 1:1000 @ A1, 1:2000 @ A3

Appendix 2a - Site Plan

VANCOUVER BEACH RESORT
ALBANY
356

N

WOOD & GRIEVE ENGINEERS

GKA
GROUNDS KENT ARCHITECTS

PROJECT No	DATE	DRAWING No.	REVISION
1503	23.01.17	SK100	B

Appendix 2b

Detailed Site Plan

N OR GROUND COVER

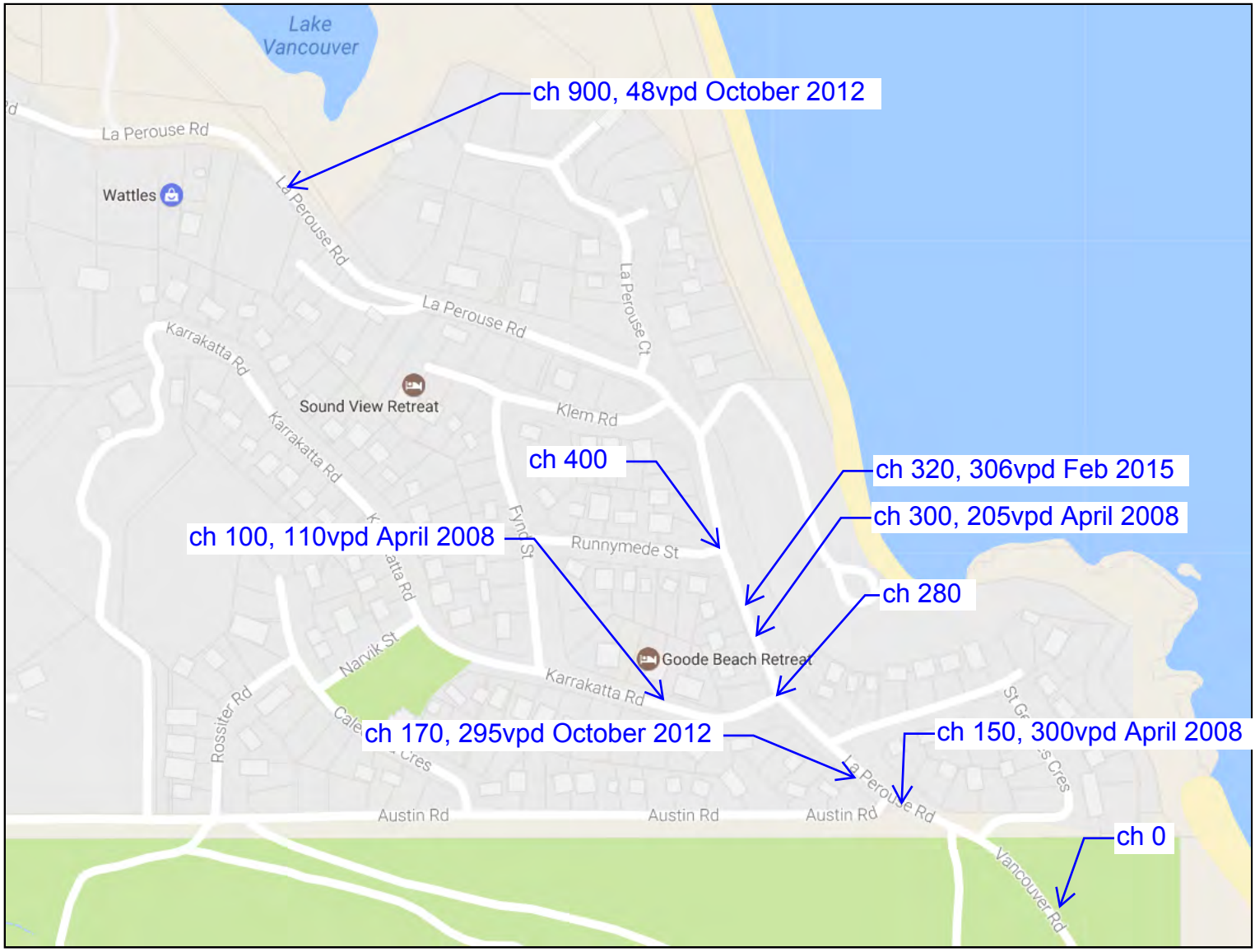
(4000m²)

Appendix 2b - Detailed Site Plan

WOOD & GRIEVE ENGINEERS

Appendix 3

Traffic Count Locations



Map source: Google Maps, accessed Dec 2016. vpd = average vehicles per day (7day average)

Appendix 4

Traffic Data

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-146 -- English (ENA)

Datasets:

Site:	**[1700] R862 (Karrakatta - Runnymead) SLK 0.32 / 0.28 - 0.4**
Direction:	6 - West bound A>B, East bound B>A. **Lane:** 0
Survey Duration:	12:00 Friday, 16 January 2015 => 8:21 Monday, 2 February 2015
Zone:	
File:	1700 La Perouse 2015-02-02 0822.EC0 (Plus)
Identifier:	K329W9WR MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default (v3.21 - 15275)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**12:00 Friday, 16 January 2015 => 8:21 Monday, 2 February 2015**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 5124 / 5133 (99.82%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-146
Site: 1700.0.0WE
Description: **R862 (Karrakatta - Runnymead) SLK 0.32 / 0.28 - 0.4**
Filter time: **12:00 Friday, 16 January 2015 => 8:21 Monday, 2 February 2015**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.1
0100-0200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0200-0300	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.2	0.1
0300-0400	0.3	0.0	1.5	0.5	1.0	0.0	0.0	0.6	0.4
0400-0500	0.3	0.5	2.5	1.5	0.5	0.7	0.0	1.0	0.8
0500-0600	0.7	1.5	0.0	0.5	1.0	0.3	0.0	0.7	0.5
0600-0700	3.7	4.5	9.0	9.0	6.0	1.3	1.0	6.2	4.4
0700-0800	3.0	15.5	10.0	16.0	14.0	6.0	4.3	10.9	8.9
0800-0900	9.7	16.5	15.0	18.5	13.0	10.3	9.7	14.1	12.6
0900-1000	25.0	35.5	25.0	27.5	21.5	16.7	19.3	26.9	23.6
1000-1100	31.5	26.5	32.5	34.5	26.0	20.3	27.0	30.2	27.8
1100-1200	**37.0<**	**41.5<**	**34.5<**	**38.5<**	**36.5<**	**28.7<**	**37.3<**	**37.6<**	**35.9<**
1200-1300	**44.0<**	31.5	**36.5<**	30.0	**28.0<**	**26.3<**	31.3	**33.5<**	**31.8<**
1300-1400	37.5	31.5	30.5	29.0	16.7	19.7	34.3	27.9	27.6
1400-1500	34.0	33.5	31.0	25.0	24.3	23.3	30.7	29.1	28.4
1500-1600	41.0	**36.5<**	26.5	**33.5<**	23.3	23.3	**36.0<**	31.4	30.8
1600-1700	34.0	35.0	22.0	31.5	18.3	20.0	27.0	27.3	25.9
1700-1800	30.0	28.5	18.0	31.0	22.3	18.0	20.7	25.6	23.4
1800-1900	12.5	14.0	14.5	18.5	6.0	8.0	11.3	12.5	11.5
1900-2000	11.5	8.0	3.5	9.5	4.0	3.0	5.7	7.0	6.1
2000-2100	2.0	3.0	3.0	2.0	2.7	3.7	2.7	2.5	2.8
2100-2200	3.5	2.5	2.5	1.5	1.7	1.7	0.7	2.3	1.9
2200-2300	1.5	0.5	0.5	1.0	1.7	0.3	1.7	1.1	1.1
2300-2400	0.0	0.5	0.0	0.5	0.7	0.7	0.0	0.4	0.4
Totals									
0700-1900	339.2	346.0	296.0	333.5	250.0	220.7	289.0	306.9	288.1
0600-2200	359.8	364.0	314.0	355.5	264.3	230.3	299.0	324.9	303.2
0600-0000	361.3	365.0	314.5	357.0	266.7	231.3	300.7	326.3	304.6
0000-0000	362.7	367.0	318.5	360.5	269.2	232.3	301.3	328.9	306.5
AM Peak	1100	1100	1100	1100	1100	1100	1100		
	37.0	41.5	34.5	38.5	36.5	28.7	37.3		
PM Peak	1200	1500	1200	1500	1200	1200	1500		
	44.0	36.5	36.5	33.5	28.0	26.3	36.0		

*** - No data.**

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-149 -- English (ENA)

Datasets:

Site:	**[1144] Karakatta Rd R0255 (La Perouse - Fynn) 0.10/0.00 - 0.22**
Direction:	8 - East bound A>B, West bound B>A. **Lane:** 0
Survey Duration:	13:36 Friday, 28 March 2008 => 13:07 Tuesday, 15 April 2008
Zone:	
File:	1144.EC0 (Plus)
Identifier:	K319Q0Q2 MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default (v3.21 - 15275)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**13:37 Friday, 28 March 2008 => 13:07 Tuesday, 15 April 2008**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 1988 / 1998 (99.50%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-149
Site: 1144.0.0EW
Description: **Karakatta Rd R0255 (La Perouse - Fynn) 0.10/0.00 - 0.22**
Filter time: **13:37 Friday, 28 March 2008 => 13:07 Tuesday, 15 April 2008**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.1	0.1
0100-0200	0.7	0.0	0.0	0.0	0.0	0.3	0.7	0.2	0.3
0200-0300	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.1
0300-0400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0400-0500	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.1	0.1
0500-0600	0.7	0.0	0.5	0.5	0.0	0.7	0.0	0.3	0.3
0600-0700	0.3	1.3	0.5	0.0	2.0	0.0	0.3	0.8	0.6
0700-0800	2.7	2.7	1.5	2.5	3.5	2.7	2.0	2.6	2.5
0800-0900	6.0	9.7	6.5	8.0	11.5	4.7	6.7	8.3	7.4
0900-1000	**14.0<**	**16.7<**	**14.5<**	**13.0<**	**14.0<**	11.3	9.3	**14.6<**	**13.2<**
1000-1100	7.3	9.3	10.0	4.5	8.5	**11.7<**	4.0	8.0	7.9
1100-1200	6.3	8.0	5.5	7.5	6.5	5.7	**10.3<**	6.8	7.2
1200-1300	6.0	5.0	9.5	6.5	7.5	**12.3<**	9.0	6.7	8.0
1300-1400	5.0	2.7	8.0	4.5	4.7	11.3	11.0	4.8	6.8
1400-1500	6.0	7.5	8.5	5.0	5.7	7.7	11.0	6.4	7.4
1500-1600	10.3	4.0	6.0	6.5	6.7	11.3	**11.0<**	7.0	8.4
1600-1700	**10.3<**	8.5	5.0	7.5	6.7	9.7	7.0	7.8	7.9
1700-1800	8.7	9.5	9.0	8.5	**10.7<**	9.7	9.7	9.3	**9.4<**
1800-1900	10.0	**12.5<**	**11.5<**	**12.0<**	9.7	6.3	6.3	**10.9<**	9.4
1900-2000	5.0	5.0	5.5	7.0	5.0	6.7	4.7	5.4	5.5
2000-2100	4.0	4.0	5.0	5.0	3.3	4.0	4.0	4.2	4.1
2100-2200	2.0	2.0	2.0	1.5	1.0	1.3	1.0	1.7	1.5
2200-2300	0.3	0.0	1.0	1.5	1.7	1.0	1.0	0.9	0.9
2300-2400	1.3	2.5	0.5	0.5	1.3	0.0	1.0	1.3	1.0
Totals									
0700-1900	92.7	96.0	95.5	86.0	95.5	104.3	97.3	93.1	95.6
0600-2200	104.0	108.3	108.5	99.5	106.8	116.3	107.3	105.2	107.3
0600-0000	105.7	110.8	110.0	101.5	109.8	117.3	109.3	107.4	109.2
0000-0000	107.0	110.8	110.5	103.0	109.8	118.3	110.7	108.0	110.1
AM Peak	0900	0900	0900	0900	0900	1000	1100		
	14.0	16.7	14.5	13.0	14.0	11.7	10.3		
PM Peak	1600	1800	1800	1800	1700	1200	1500		
	10.3	12.5	11.5	12.0	10.7	12.3	11.0		

*** - No data.**

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-157 -- English (ENA)

Datasets:

Site:	**[1513] La Perouse Rd R562 (LaPerouse Ct- End) SLK 0.90 / 0.48 - 1.37**
Direction:	6 - West bound A>B, East bound B>A. **Lane:** 0
Survey Duration:	0:00 Wednesday, 17 October 2012 => 14:40 Thursday, 8 November 2012
Zone:	
File:	1513_La Perouse.EC0 (Plus)
Identifier:	K318F81Z MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default (v3.21 - 15275)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**0:00 Wednesday, 17 October 2012 => 14:40 Thursday, 8 November 2012**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 1086 / 1087 (99.91%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-157
Site: 1513.0.0WE
Description: **La Perouse Rd R562 (LaPerouse Ct- End) SLK 0.90 / 0.48 - 1.37**
Filter time: **0:00 Wednesday, 17 October 2012 => 14:40 Thursday, 8 November 2012**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0100-0200	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.1
0200-0300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0300-0400	0.0	0.3	0.0	0.0	0.0	0.7	0.3	0.1	0.2
0400-0500	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0
0500-0600	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.1	0.1
0600-0700	0.3	0.7	0.0	0.3	0.3	0.3	0.0	0.3	0.3
0700-0800	2.0	5.0	2.8	2.8	4.0	1.0	0.7	3.2	2.6
0800-0900	3.7	4.7	3.3	3.5	4.7	2.3	1.7	3.9	3.4
0900-1000	5.0	3.3	1.5	1.8	3.3	4.0	2.3	2.8	2.9
1000-1100	**8.3<**	3.3	4.0	**4.0<**	3.7	**5.7<**	6.0	**4.6<**	**4.9<**
1100-1200	4.7	**5.3<**	**4.8<**	3.3	**5.0<**	3.0	**8.3<**	4.5	4.8
1200-1300	4.0	2.3	1.3	2.8	4.0	3.0	4.3	2.8	3.0
1300-1400	4.0	1.0	0.8	2.3	3.7	6.3	8.7	2.2	3.6
1400-1500	2.7	4.3	2.8	4.5	3.0	4.7	5.7	3.5	3.9
1500-1600	**6.0<**	3.3	4.0	3.0	**5.7<**	**7.0<**	**9.7<**	4.4	**5.5<**
1600-1700	3.0	**5.3<**	4.3	**5.3<**	4.3	4.3	7.0	**4.4<**	4.8
1700-1800	3.0	4.7	**5.0<**	3.3	2.3	3.3	5.3	3.8	3.9
1800-1900	0.7	1.3	1.8	1.3	1.7	0.7	0.3	1.4	1.1
1900-2000	2.0	0.3	0.3	1.0	1.0	0.3	0.3	0.9	0.7
2000-2100	0.7	0.0	0.0	1.3	0.3	0.7	0.7	0.4	0.5
2100-2200	0.0	1.7	1.0	0.3	0.3	2.7	1.0	0.7	1.0
2200-2300	0.3	0.7	0.3	1.7	0.3	0.7	0.3	0.6	0.6
2300-2400	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Totals									
0700-1900	47.0	44.0	36.0	37.8	45.3	45.3	60.0	41.5	44.4
0600-2200	50.0	46.7	37.3	40.7	47.3	49.3	62.0	43.8	46.9
0600-0000	50.3	47.7	37.5	42.3	47.7	50.0	62.3	44.4	47.6
0000-0000	50.3	48.3	37.5	42.6	47.7	52.0	62.7	44.6	48.0
AM Peak	1000	1100	1100	1000	1100	1000	1100		
	8.3	5.3	4.8	4.0	5.0	5.7	8.3		
PM Peak	1500	1600	1700	1600	1500	1500	1500		
	6.0	5.3	5.0	5.3	5.7	7.0	9.7		

*** - No data.**

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-155 -- English (ENA)

Datasets:

Site:	**[1502] La Perouse Rd R562 (St Georges - Karrakatta) 0.17 / 0.14-0.20**
Direction:	6 - West bound A>B, East bound B>A. **Lane:** 0
Survey Duration:	0:00 Wednesday, 17 October 2012 => 14:39 Thursday, 8 November 2012
Zone:	
File:	1502_La Perouse.EC0 (Plus)
Identifier:	K329W9WR MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default (v3.21 - 15275)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**0:00 Wednesday, 17 October 2012 => 14:39 Thursday, 8 November 2012**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 6686 / 6718 (99.52%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-155
Site: 1502.0.0WE
Description: **La Perouse Rd R562 (St Georges - Karrakatta) 0.17 / 0.14-0.20**
Filter time: **0:00 Wednesday, 17 October 2012 => 14:39 Thursday, 8 November 2012**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	0.0	0.0	0.3	0.0	0.3	0.0	0.3	0.1	0.1
0100-0200	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.1
0200-0300	0.0	0.0	0.0	0.0	0.0	0.7	0.3	0.0	0.1
0300-0400	0.0	0.3	0.0	0.0	0.0	0.3	0.3	0.1	0.1
0400-0500	0.0	0.3	0.3	0.0	0.0	0.0	0.3	0.1	0.1
0500-0600	2.0	0.7	1.0	0.8	1.3	1.7	0.3	1.1	1.1
0600-0700	4.0	5.7	4.5	3.8	6.3	2.0	1.3	4.8	4.0
0700-0800	23.7	24.7	27.8	18.0	26.0	12.0	8.3	23.9	20.3
0800-0900	30.7	**34.0<**	**34.3<**	18.8	**26.7<**	18.3	16.0	**28.6<**	**25.6<**
0900-1000	**32.3<**	23.3	16.3	9.3	24.0	26.0	22.0	20.1	21.1
1000-1100	19.7	23.7	20.0	17.0	20.3	**27.7<**	26.7	19.9	21.8
1100-1200	21.7	23.0	21.0	**21.8<**	24.3	27.3	**41.7<**	22.2	25.4
1200-1300	29.3	17.3	19.0	17.8	20.3	34.0	**48.3<**	20.5	25.9
1300-1400	20.3	16.3	12.3	8.3	24.7	**39.7<**	46.7	15.6	22.8
1400-1500	15.7	22.0	17.0	19.3	21.7	23.7	35.7	19.0	21.8
1500-1600	**30.7<**	20.3	**25.8<**	25.0	27.0	34.3	43.7	25.8	**29.4<**
1600-1700	28.7	26.7	24.0	**26.3<**	**28.0<**	19.3	26.0	**26.6<**	25.5
1700-1800	23.3	**29.0<**	19.5	23.0	19.7	20.0	24.3	22.7	22.5
1800-1900	8.0	15.0	13.3	14.3	13.7	12.3	12.7	12.9	12.8
1900-2000	8.3	5.0	4.8	10.0	6.7	5.0	4.7	6.8	6.3
2000-2100	3.0	2.3	2.0	5.3	4.0	3.3	2.7	3.3	3.2
2100-2200	1.0	2.3	3.5	3.3	3.3	4.7	1.7	2.8	2.9
2200-2300	1.3	2.3	1.3	2.3	2.3	2.7	1.0	1.9	1.9
2300-2400	0.0	1.3	0.3	0.7	0.3	0.7	0.0	0.5	0.5
Totals									
0700-1900	284.0	275.3	250.0	218.7	276.3	294.7	352.0	257.7	274.9
0600-2200	300.3	290.7	264.8	241.1	296.7	309.7	362.3	275.3	291.2
0600-0000	301.7	294.3	266.3	244.1	299.3	313.0	363.3	277.7	293.5
0000-0000	303.7	295.7	267.8	244.8	301.0	316.7	365.0	279.1	295.3
AM Peak	0900	0800	0800	1100	0800	1000	1100		
	32.3	34.0	34.3	21.8	26.7	27.7	41.7		
PM Peak	1500	1700	1500	1600	1600	1300	1200		
	30.7	29.0	25.8	26.3	28.0	39.7	48.3		

*** - No data.**

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-151 -- English (ENA)

Datasets:

Site:	**[1142] La Parouse Rd R0562 (St George - Karrakatta) 0.15/0.11 - 0.22**
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	15:00 Sunday, 30 March 2008 => 13:01 Tuesday, 15 April 2008
Zone:	
File:	1142.EC0 (Plus)
Identifier:	241589DJ MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default (v3.21 - 15275)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**15:00 Sunday, 30 March 2008 => 13:01 Tuesday, 15 April 2008**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 4782 / 4783 (99.98%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-151
Site: 1142.0.0NS
Description: **La Parouse Rd R0562 (St George - Karrakatta) 0.15/0.11 - 0.22**
Filter time: **15:00 Sunday, 30 March 2008 => 13:01 Tuesday, 15 April 2008**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	0.0	0.0	1.5	0.5	0.0	1.5	0.5	0.3	0.5
0100-0200	0.7	0.0	0.0	0.0	0.5	0.5	1.5	0.3	0.4
0200-0300	0.7	0.0	0.0	0.0	0.0	0.0	1.0	0.2	0.3
0300-0400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0400-0500	0.0	0.7	0.0	0.5	0.0	0.0	0.0	0.3	0.2
0500-0600	0.7	0.0	0.5	0.5	0.0	0.5	0.0	0.3	0.3
0600-0700	0.3	1.3	0.5	0.0	2.0	0.0	1.0	0.8	0.8
0700-0800	4.0	3.0	2.0	3.5	3.5	2.0	2.5	3.3	3.0
0800-0900	16.0	22.7	20.5	19.0	23.5	7.0	8.0	20.2	17.0
0900-1000	**32.3<**	**35.7<**	**31.5<**	**30.5<**	**34.5<**	24.0	18.5	**33.1<**	**30.1<**
1000-1100	13.0	21.3	25.0	20.5	22.5	**26.0<**	12.5	19.9	19.8
1100-1200	19.0	21.0	20.0	23.5	25.5	18.5	**33.5<**	21.5	22.6
1200-1300	28.3	10.0	19.0	26.0	24.0	37.0	38.0	21.1	25.2
1300-1400	26.0	11.7	25.5	24.0	24.0	**37.0<**	**39.0<**	21.7	25.8
1400-1500	28.7	20.5	19.5	19.0	23.5	24.5	34.0	22.8	24.5
1500-1600	24.7	17.5	17.5	26.0	19.0	24.5	24.0	21.3	22.2
1600-1700	28.7	32.0	18.0	**30.0<**	**34.0<**	29.5	29.3	28.5	**28.8<**
1700-1800	**32.0<**	25.0	**30.5<**	26.5	22.5	23.5	33.3	27.7	28.3
1800-1900	26.0	**36.0<**	29.0	28.5	25.5	23.5	20.7	**28.7<**	26.6
1900-2000	10.7	11.0	12.5	11.0	11.0	13.5	9.3	11.2	11.1
2000-2100	6.3	6.5	6.5	7.5	10.5	7.0	5.3	7.4	6.9
2100-2200	3.3	3.0	3.0	3.0	2.5	3.0	2.3	3.0	2.9
2200-2300	1.7	1.0	2.0	2.5	3.0	1.0	1.3	2.0	1.8
2300-2400	1.7	3.0	1.0	0.5	2.5	1.0	1.0	1.7	1.5
Totals									
0700-1900	278.7	256.3	258.0	277.0	282.0	277.0	293.3	269.8	273.8
0600-2200	299.3	278.2	280.5	298.5	308.0	300.5	311.3	292.1	295.5
0600-0000	302.7	282.2	283.5	301.5	313.5	302.5	313.7	295.9	298.7
0000-0000	304.7	282.8	285.5	303.0	314.0	305.0	316.7	297.2	300.4
AM Peak	0900	0900	0900	0900	0900	1000	1100		
	32.3	35.7	31.5	30.5	34.5	26.0	33.5		
PM Peak	1700	1800	1700	1600	1600	1300	1300		
	32.0	36.0	30.5	30.0	34.0	37.0	39.0		

*** - No data.**

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-153 -- English (ENA)

Datasets:

Site:	**[1143] La Parouse Rd R0562 (Karrakatta - Runnymede) 0.30/0.22 - 0.40**
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	16:00 Sunday, 30 March 2008 => 13:05 Tuesday, 15 April 2008
Zone:	
File:	1143.EC0 (Plus)
Identifier:	2414BTGZ MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default (v3.21 - 15275)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**16:00 Sunday, 30 March 2008 => 13:05 Tuesday, 15 April 2008**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 3238 / 3244 (99.82%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-153
Site: 1143.0.0NS
Description: **La Parouse Rd R0562 (Karrakatta - Runnymede) 0.30/0.22 - 0.40**
Filter time: **16:00 Sunday, 30 March 2008 => 13:05 Tuesday, 15 April 2008**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	0.0	0.0	1.5	0.0	0.0	1.5	0.5	0.3	0.4
0100-0200	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.1	0.1
0200-0300	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1
0300-0400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0400-0500	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.2	0.1
0500-0600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0600-0700	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.1
0700-0800	1.3	0.3	0.5	1.0	0.5	0.0	0.0	0.8	0.6
0800-0900	11.3	16.0	16.0	12.0	11.5	4.0	3.0	13.4	10.9
0900-1000	**20.0<**	**22.7<**	**18.5<**	**20.5<**	**25.0<**	**14.5<**	11.0	**21.3<**	**19.2<**
1000-1100	5.3	11.7	14.5	16.5	12.0	13.0	10.5	11.4	11.5
1100-1200	13.0	16.0	14.0	14.5	20.5	12.5	**24.0<**	15.4	16.1
1200-1300	22.0	7.7	12.0	18.0	19.0	**28.0<**	32.0	15.6	19.2
1300-1400	23.0	8.7	19.0	18.0	20.0	25.5	**35.5<**	17.4	20.7
1400-1500	22.3	14.5	16.5	15.5	16.5	17.0	25.0	17.5	18.5
1500-1600	16.7	13.5	13.0	19.0	12.5	18.0	28.5	15.1	17.3
1600-1700	23.3	**26.5<**	12.5	**24.0<**	**29.0<**	22.5	16.0	**23.1<**	**21.7<**
1700-1800	**24.3<**	20.0	**22.0<**	16.5	15.0	18.0	25.7	20.0	20.8
1800-1900	16.7	22.5	18.5	17.0	18.5	13.5	16.3	18.5	17.4
1900-2000	5.0	5.5	6.5	3.5	5.0	5.0	5.3	5.1	5.1
2000-2100	2.0	1.5	2.5	2.5	6.0	2.0	1.3	2.8	2.4
2100-2200	1.3	0.5	1.0	1.5	1.0	1.5	1.0	1.1	1.1
2200-2300	1.3	1.0	1.0	1.0	0.5	0.0	0.0	1.0	0.7
2300-2400	0.3	0.5	0.5	0.0	1.5	1.0	0.0	0.5	0.5
Totals									
0700-1900	199.3	180.0	177.0	192.5	200.0	186.5	227.5	189.5	193.9
0600-2200	207.7	187.5	187.0	200.0	212.0	195.0	235.7	198.5	202.6
0600-0000	209.3	189.0	188.5	201.0	214.0	196.0	235.7	200.1	203.8
0000-0000	210.0	189.7	190.0	201.0	214.5	197.5	236.7	200.7	204.6
AM Peak	0900	0900	0900	0900	0900	0900	1100		
	20.0	22.7	18.5	20.5	25.0	14.5	24.0		
PM Peak	1700	1600	1700	1600	1600	1200	1300		
	24.3	26.5	22.0	24.0	29.0	28.0	35.5		

*** - No data.**

Appendix 5

Catchment & Stormwater Concept Plans

BUILDING SCHEDULE	
TYPE	NO. OFF
1 BED VILLA	12
1 BED STUDIO	20
1 BED DUPLEX	10
2 BED VILLA	8
TOTAL	50
CAR BAYS	50

Lot 660

CAR PARKING
25 BAYS

NEW ENTRY ROAD

FIRE TRUCK
ACCESS ROAD

BOH

2 STOREY

FUNCTION
CENTRE

CAFE &
DINING

ARRIVAL

MANAGER

BEACH
ACCESS

INDIAN
OCEAN

CHANGE

POOL

CAR PARKING
25 BAYS

2 STOREY

2 STOREY

2 STOREY

RETICULATION
ZONE
(4000m²)

FIRE TRUCK
ACCESS ROAD

LAWN OR GROUND COVER
HOTEL MANAGED

LOW FLAMMABILITY SHRUBS + PLANTS
HOTEL MANAGED

LAKE VANCOUVER

Catchment Boundary

Potential Major Event Flow Path

Catchment Low Point

0 10 20 50m

N

WOOD & GRIEVE ENGINEERS

GKA
GROUNDS KENT ARCHITECTS

PROJECT No DATE DRAWING No. REVISION

Existing Catchment Plan

Impervious Areas

Units	2310 sqm
Manager/Restaurant	– 660 sqm
Carparks	– 1220 sqm
Roads	– 560 sqm
Buggy Paths	1120 sqm
TOTAL	5870 sqm

Volumes

Required Volume (15mm)	88 cum
Actual Swale Volume	300 cum
Permeability (ave)	8.6m/day (358 mm/hr)
1 in 100 year ARI	41 mm/hr
(1 hr duration event)	

Catchment permeability exceeds 1 in 100 ARI intensity. Runoff unlikely

Site Access Road

RAINFALL DISCHARGE VOLUME ESTIMATE

Estimation by Rational Method - 1987 Australian Rainfall and Runoff

Design Rainfall Intensity
Location : Albany — Duration : 23 minutes
Storm Event : 100 year — Intensity : 85.7 mm/hr

Catchment Details
Area : 630 m²
Run-off Coefficient : 0.90
Flow Rate : 13.513 L/s

Outflow Details
Soil Type : Fine Sand
Soakage Rate : 0.0001 m/s → 0.0035 m³/s (Total Soakage)
Outlet : 0.0 m³/s

Storage Details
Volume : 13.82 m³ at 23 minutes
Surface Area : n/a m² no freeboard — - m²
Freeboard 0 mm
Batter/Slope 1 in 3
Base Area : 35.0 m²
Depth 0.302 m

RAINFALL DISCHARGE VOLUME ESTIMATE

Estimation by Rational Method - 1987 Australian Rainfall and Runoff

Design Rainfall Intensity
Location : Albany — Duration : 16 minutes
Storm Event : 100 year — Intensity : 110.9 mm/hr

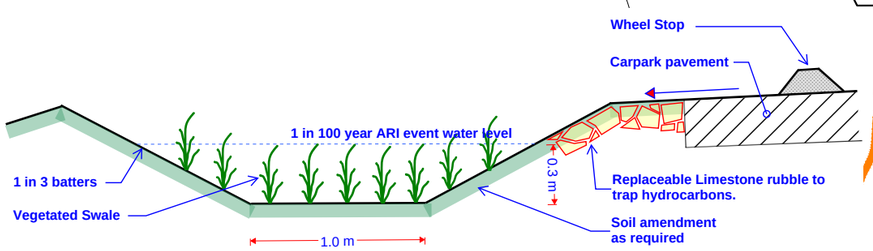
Catchment Details
Area : 7 m²
Run-off Coefficient : 0.90
Flow Rate : 0.194 L/s

Outflow Details
Soil Type : Fine Sand
Soakage Rate : 0.0001 m/s → 0.0001 m³/s (Total Soakage)
Outlet : 0.0 m³/s

Storage Details
Volume : 0.13 m³ at 16 minutes
Surface Area : n/a m² no freeboard — - m²
Freeboard 0 mm
Batter/Slope 1 in 3
Base Area : 0.6 m²
Depth 0.107 m

(4000m²)

100m setback from Lake



Typical Infiltration Swale to Carparks

nts

Legend

- Infiltration Swale (sizes vary)
- Rain Tank (plumbed in for reuse) not to scale
- Flow from pavements

Stormwater Management Concept

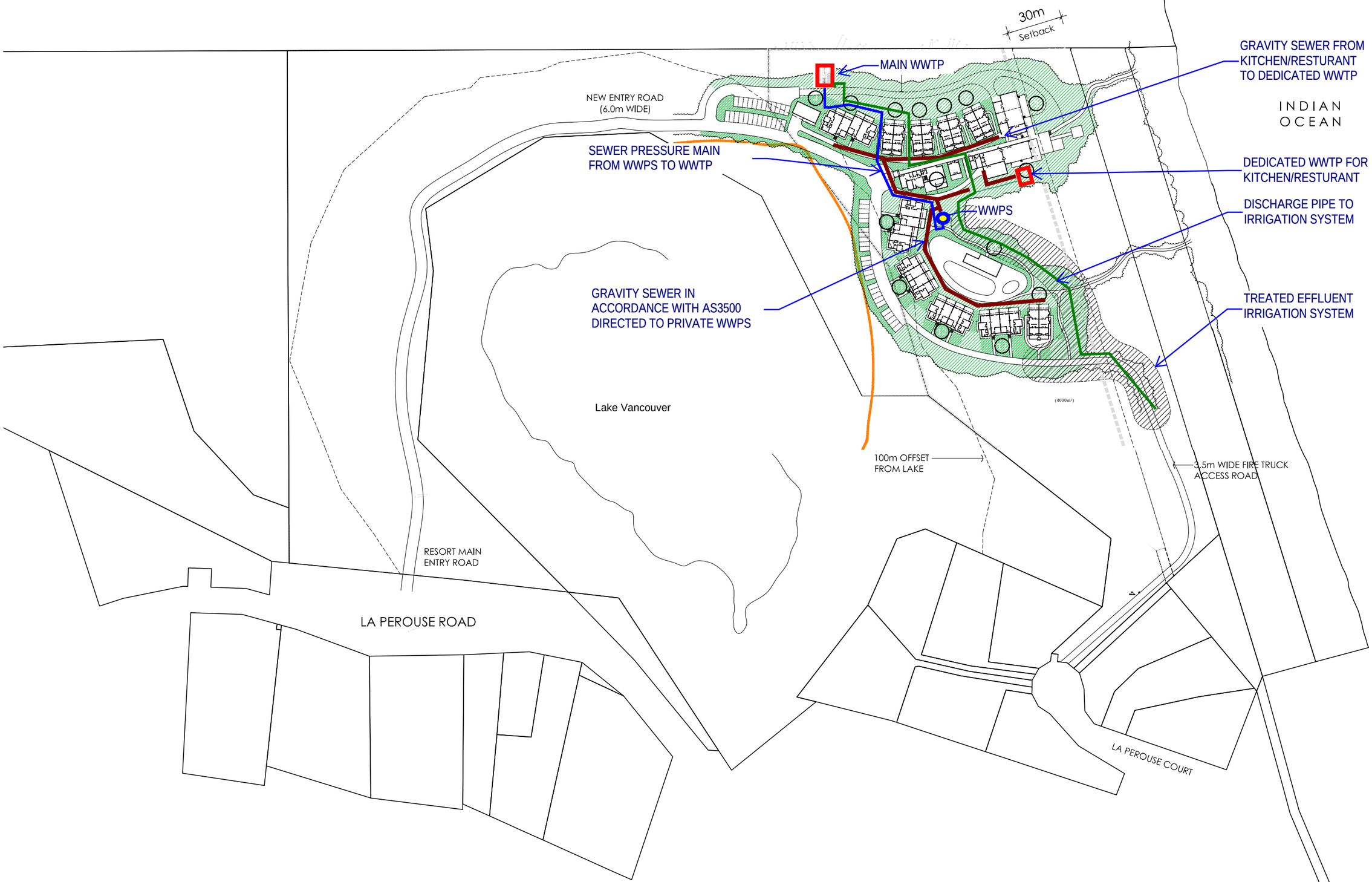
N

WOOD & GRIEVE ENGINEERS

GROUNDS KENT ARCHITECTS

Appendix 6

WWTP Concept Location



SITE LOCATION PLAN

Wastewater Treatment Plant
Concept Location Plan

0 10 50 100m

SCALE 1:1000 @ A1, 1:2000 @ A3

N

WOOD & GRIEVE ENGINEERS

GKA
GROUNDS KENT ARCHITECTS

PROJECT No	DATE	DRAWING No.	REVISION
1503	24.11.16	SK100	A

4-12-2016 WGE 30735

Appendix 7

Aurora Environmental Report

Onsite Effluent Disposal

Preliminary Analysis, Calculations and Liaison

In Western Australia, onsite effluent disposal is currently guided by *Draft Country Sewerage Policy* (DCSP; Department of Health 2002, amended 2003). However, a draft *Government Sewerage Policy* (GSP) has recently been released for public consultation (Government of Western Australia, November 2016). While the DCSP still applies, the GSP is more applicable to more recent technology and environmental policies.

Other supporting guidelines include *Code of Practice for Onsite Sewage Management* (consultation draft, Department of Health, 2012) and *Australian/New Zealand Standard – Onsite Domestic Wastewater Management AS/NZS 1547:2012*.

Aurora Environmental has taken these policies and guidelines into consideration in undertaking initial assessment and calculations for the Vancouver Beach project. This will allow us to demonstrate that the site is capable and indicate what management regimes should apply. The standards for on-site effluent disposal to be applied will depend on timing of adoption of the GSP. As the project is currently at the structure planning stage, we will most likely be subject to GSP by the time there is an application for a particular apparatus.

We have also spoken with Alan Richard (Water Unit) and Natalia Shishkina (Scientific Officer, Water Unit) at Department of Health to get some initial advice on approach (as referred by Henry Tan). Natalia indicated that the GSP are likely to be adopted in mid 2017.

Basic Requirements for Onsite Effluent Disposal

The proposed development site is designated as a 'sewage sensitive area' under the *Draft Government Sewerage Policy 2016*. In this case, this designation has been given because the site is:

- within 10km of Princess Royal Harbour. (However we note that the site is not within the surface or groundwater catchment for the harbour); and
- within 250 m, down groundwater gradient of a significant wetland. Lake Vancouver is in a reserve immediately to the west of the proposed resort site.

To minimise the risks associated with nutrients related to waste water treatment, we recommend the use of a secondary treatment system that incorporates nutrient removal.

Other requirements for onsite disposal are listed and compared to the site conditions in Table 1.

Table 1: Criteria for On-site Effluent Disposal

Environmental Parameter	Criteria	Comment
Separation from groundwater	1.5m below ground level (BGL) for sandy soil in a sewage sensitive area	The areas proposed to be used for subsurface irrigation of treated waste water are at between 4 and 6 m AHD. Winter groundwater in these areas is at approximately 2 m AHD. The site meets groundwater separation requirements. We recommend that the average finished ground level for the irrigation level be around 4m AHD.
Setback from private bore	30 m	There are no private bores within 30 m of the development.
Setback from waterway or wetland	100 m	Subsurface irrigation areas will be more than 100 m from Lake Vancouver.
Within an area subject to inundation and/or flooding	Risk of inundation and/or flooding in a 10 per cent Annual Exceedance Probability (AEP) rainfall event	The development area is not subject to flooding or inundation
Within a Public Drinking Water Source Area	Priority 1, 2 or 3 area	The site not in a PDWSA as defined under the *Country Areas Water Supply Act 1947*.

Source: Government of Western Australia (2016)

Number of People and Hydraulic Load

Based on preliminary figures the following occupancy and water use may apply:

Based on infrastructure	Number of people per day (estimate only)	Litres per person per day *	Volume of waste water per day (L)
10 x 1 bed units	20	120 people x 140L (Motel)	16,800
8 x 2 bed units	64		
21 X 1 bed units	32		
3 bed managers residence	4		
Function centre	100	30L (Restaurant, sit in customers)	3,000
Staff	20	30L (Offices, non showering staff)	600
	Estimation of Hydraulic Load (L/day)	**Total**	**20,400**

* as per *Supplement to Regulation 29 and Schedule 9 – Wastewater system loading rates based*.

Land Application Area

The GSP requires a minimum land application area for treated waste water based on number of litres per day, multiplied by a coefficient of 0.2 based on soil type (in this case, sand).

For 20,400 L the required application area is: 4,080 m^2

This area is required regardless of treatment levels of waste water based on water volumes. We recommend irrigation via sub-surface drippers, or similar in order to reduce risks associated with spray drift, odour, chlorine discharge (if this type of disinfection is used) and pathogen distribution.

The application area will need to be 100m from Lake Vancouver.

Single Residential Equivalent

The DCSP applies density development provisions to commercial or industrial development that cannot be connected to deep sewer based on:

- wastewater volume generated
- size of the lot.

This is known as single residential equivalent (SRE) and equates to 540L of wastewater output per day per 2000 m^2 of lot size. Based on the volume of waste water calculated above, the following applies:

Area of land / 2000 m^2 = 77,107 m^2 / 2000 = 38.5 SRE (permitted)

Volume of waste water / 540 L (standard residence output) = 20,400 / 540 = 37.7 SRE (proposed).

As the proposed SRE does not exceed the permitted SRE, then the volume complies with the DCSP.

This calculation would not be applied if the GSP is adopted (as advised by Natalia Shishkina, DoH).

If water use exceeds the volumes calculated above, and the SRE is exceeded, a strategy for water recycling, or another solution may need to be considered. Water recycling can be a complicated process and may require licencing by the Economic Regulation Authority (ERA), establishment of a partnership contract and preparation of a Recycled Water Quality Management Plan.

Nutrient Input Management

The Western Australian Department of Water's *Water Quality Protection Note 22 – Irrigation with Nutrient Rich Wastewater* (July 2008) provides a framework for the permissible nutrient application rates for wastewater irrigation for different soil types and receiving environments. The framework allocates a risk category for a site depending on the potential for adverse environmental impacts to occur as a result of nutrient application through irrigation. Table 2 summarises the criteria for the risk category classifications.

TABLE 2: SOIL AND RECEIVING ENVIRONMENT VULNERABILITY CATEGORIES

CHARACTERISTICS OF IRRIGATED SOILS	EUTROPHICATION RISK OF SURFACE WATERS WITHIN 500 METRES OF IRRIGATION SITE	RISK CATEGORY
Coarse grained soils e.g. sands and gravels	Significant	A
	Low	B
Fine grained soils (PBI above 100) e.g. loams, clays, clay	Significant	C
	Low	D

Source: Water Quality Protection Note 22 – Irrigation with Nutrient Rich Wastewater (DoW, July 2008)

Based on the risk category classification of a site, the Department of Water recommends a maximum nutrient application rate for nitrogen and phosphorus. These values are provided in Table 3. Based on the soil characteristics of the proposed development site and the relative proximity to the Lake Vancouver and Goode Beach, the irrigation area falls into Category A. As such, the recommended loading rates in accordance with WQPN 22 would be 140 kg/ha of N and 10 kg/ha of P.

TABLE 3: NUTRIENT APPLICATION RATES FOR SOIL/RECEIVING ENVIRONMENT RISK CATEGORIES

RISK CATEGORY	MAXIMUM INORGANIC NITROGEN (AS N)	MAXIMUM REACTIVE PHOSPHORUS (AS P)
	APPLICATION RATE (KG/HA/YR)	APPLICATION RATE (KG/HA/YR)
A	140	10
B	180	20
C	300	50
D	480	120

Source: Water Quality Protection Note 22 – Irrigation with Nutrient Rich Wastewater (DoW, July 2008)

A secondary treatment system, with optimal servicing can remove nutrients such as nitrogen and phosphorus and reduce the nutrient load in treated waste water. The example output for a Fuji CE4200 (secondary treatment system) is summarised in Table 4. The system also reduces biological oxygen demand (BOD <= 10 mg/L) and suspended solids (SS <= 10 mg/L). Table 4 indicates that the loading for nitrogen will be 19.5 kg/ha/year (below the DoW application rate of 140 kg/ha/year) when averaged across the subject land. In addition, loading for phosphorus will be 1.9 kg/ha/year (below the DoW application rate of 10 kg/ha/year).

Table 4: Nutrient Loading Based on Secondary Treatment

Waste Water Treatment Output Performance Criteria (secondary treatment system)	Volume treated L/day	Amount to be applied
Total Nitrogen <= 20 mg/L	20,400	0.41 kg/ day or 150 kg/ year Averaged over entire property (7.7 ha) , loading is 19.5 kg/ ha/ year of Nitrogen
Total Phosphorus <= 2 mg/L		0.041 kg/ day or 15 kg/ year Averaged over entire property (7.7ha), loading is 1.9 kg/ ha/ year of Phosphorus

Source: Fuji CE4200 specifications: http://www.fujiclean.com.au/Commercial.aspx

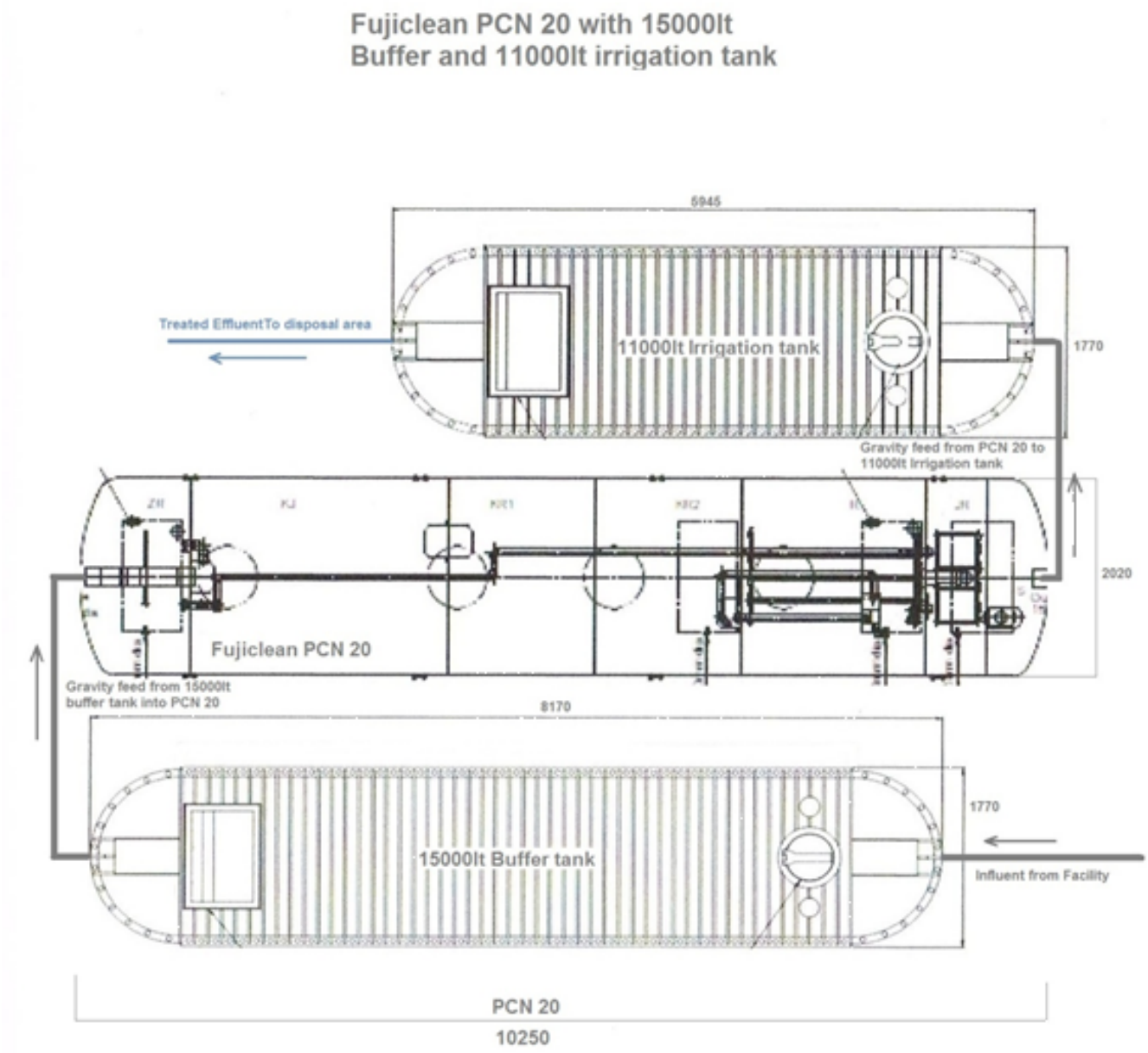
Summary

To date, it appears that there are no insurmountable issues in terms of onsite effluent disposal if the following can be achieved, based on :

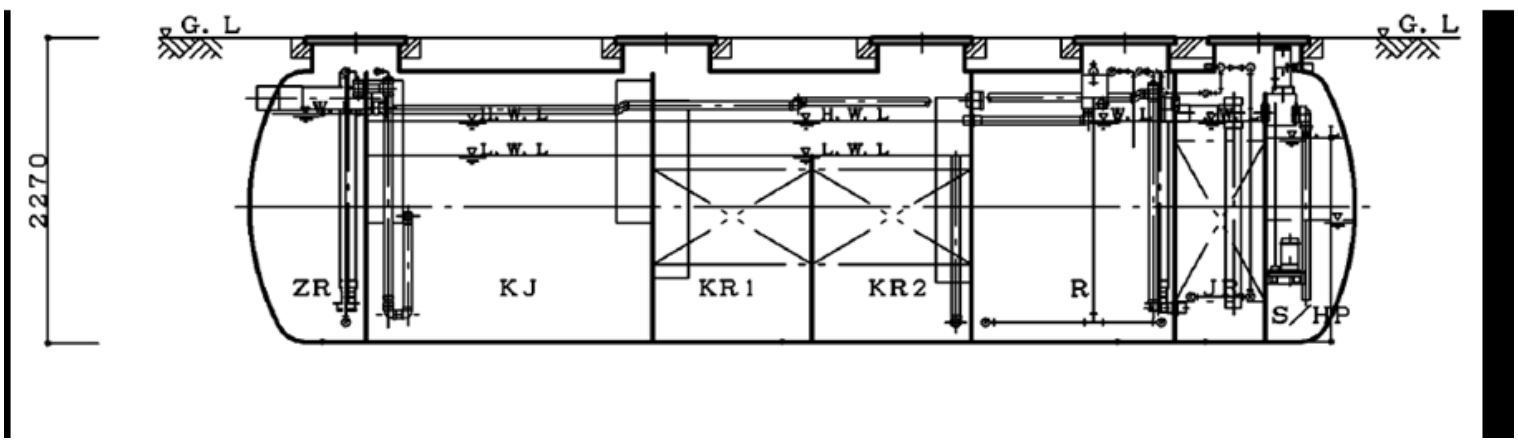
- Use a secondary treatment system that removes phosphorus/ nitrogen.
- Keep waste water volume rates to around 20,400 L per day.
- Identify 4,080m^2 irrigation area outside a 100m buffer zone to Lake Vancouver.
- 1.5m vertical separation distance from irrigation area to winter groundwater level (i.e. irrigation area at approximately 4m AHD (3.5m AHD minimum).

Appendix 8

Main WWTP Indicative Layout



WWTP PLAN VIEW



WWTP ELEVATION VIEW

WOOD & GRIEVE ENGINEERS

APPENDIX 9

Vancouver Beach Resort Concept Plan
(Grounds Kent Architects)

REPORT ITEM DIS104 REFERS

BUILDING SCHEDULE	
TYPE	NO. OFF
1 BED VILLA	12
1 BED STUDIO	20
1 BED DUPLEX	10
2 BED VILLA	8
TOTAL	50
CAR BAYS	50

SITE PLAN

0 10 20 50m

VANCOUVER BEACH RESORT
ALBANY
388

N

GKA
GROUNDS KENT ARCHITECTS
PROJECT No DATE DRAWING No. REVISION

APPENDIX 10

Draft Scheme Amendment Provisions to be inserted under Schedule 4 Special Use Zone of the Scheme under SU1 (AholaPlanning)

Schedule 4 Special Use Zones [cl.4.7]			
No.	**Description of Land**	**Special Use**	**Conditions**
SU1	Lot 660 La Perouse Road, Goode Beach Plan 36832	Holiday Accommodation (Resort) Caretakers Dwelling Restaurant Reception Centre (Function Centre)	1. Development of the special uses on the site shall be generally in accordance with an overall Structure Plan approved by the Local Government and endorsed by the Western Australian Planning Commission in accordance with the process set out in the Deemed Provisions. 2. The Structure Plan shall provide details on the development for the site including: a) Achieving a boutique high quality tourist resort holiday accommodation development (maximum 51 holiday accommodation units) commensurate with site conditions and potential risks to development by coastal processes; b) Buildings to be integrated and clustered together; c) Siting of buildings and associated access roads located within degraded/cleared areas to minimise clearing required for servicing, visitor access and built development; d) Siting of development to accord with an Erosion Hazard Line as identified/recommended in a Coastal Hazard Assessment and Risk Management Strategy submitted with the proposal to protect coastal processes in this area ; e) Building density, design, colours and materials to demonstrate that buildings are sympathetic within the site (namely landform and vegetation); f) Investigating foreshore management requirements to be incorporated into a Foreshore Management Plan and submitted with the Development Application; g) On-site stormwater drainage, effluent disposal methods and impacts on

			Lake Vancouver hydrology; h) Potable water supply; i) A Bushfire Management Plan incorporating the existing fire access tracks within the area; and j) Any additional controls required to be implemented to ensure the proposal complies with the objective of providing a boutique high quality tourist eco-resort holiday accommodation on the site. 3. All development shall be subject to the issuance of a planning approval. 4. In considering a Holiday Accommodation (Resort) proposal for development, the following shall be addressed to the satisfaction of the local government as they relate to each precinct contained on the Structure Plan: **a) Holiday Accommodation Precinct** (i) All Holiday Accommodation (resort) units, Reception Centre (Function Centre), Restaurant and Caretakers Dwelling are to be located within the Holiday Accommodation Precinct; (ii) The proposal to demonstrate sustainable land use and development outcomes that include: • low energy demand and consider sustainable power options for the development; • Provision of efficient water consumption through re-use of treated wastewater; and • Implementing a suitable wastewater processing system able to re-cycle and re-use treated water that ensures no adverse impacts to the environment; • Roof based stormwater runoff being stored in rainwater tanks for reuse in toilets, washing

			facilities and swimming pool; (iii) All Holiday Accommodation (resort) units, Reception Centre (Function Centre), Restaurant and Caretakers Dwelling and associated structures are to achieve; • a finished floor level greater than 2.4m AHD and be setback behind the 2066 Erosion hazard Line as shown on the Structure Plan and recommended in the Coastal Hazard Assessment and Risk Management Strategy; • effluent disposal systems to be setback 100m from Lake Vancouver; • a design outcome utilising clustering of buildings, colours and materials to demonstrate that buildings are sympathetic within the site (namely landform and vegetation); **b) Development Buffer Precinct** (iv) The Development Buffer Precinct is to contain the following land uses/functions; • Asset Protection Zone as required by an approved Bushfire Management Plan so as to achieve the BAL 29 rating for habitable buildings; • Low threat vegetation (landscaped gardens); • Constructed internal roads, carpark, footpaths, swimming pool and change rooms; • Reticulation zone required for application of treated wastewater (sub-surface irrigation); **c) Remnant Vegetation Precinct** (v) The Remnant Vegetation Precinct contains the remaining land within

			the Structure Plan to remain undeveloped with the exception of the following; • Internal entry/exit road to utilise the existing internal access track; • Emergency Access Way linking the development to La Perouse Court and to utilise the existing internal access track; • Existing and proposed beach access pathways, • Existing access track linking the land with firebreaks on adjoining Reserve 25925. 5. The site has been identified as a bushfire prone area and development and use shall comply with the requirements set out in an approved Bushfire Management Plan. 6. A Section 70A Notification being placed on the Certificate of Title of Lot 660 La Perouse Road, Goode Beach advising the landowner and any prospective purchaser that the land is subject to management in accordance with the Coastal Management Strategy provided as an appendix to the endorsed Structure Plan report. 7. All access/egress to/from the Holiday Accommodation Resort being confined to La Perouse Road. 8. A Foreshore Management Plan shall be prepared and submitted with the Development Application to address, amongst other things: a) Existing public access and parking via La Perouse Court; b) Rehabilitation and protection of fore shore areas, c) Suitable fencing and controlled access for visitors to the beach and adjoining PAW, and d) Interpretation and signage

			9. Stormwater drainage to be accommodated on site and incorporate water sensitive urban water design elements to the satisfaction of the local government;

ECO LOGICAL AUSTRALIA PTY LTD
ABN 87 096 512 088
www.ecoaus.com.au

Doug Van Bavel

Land Use Planning Officer

Department of Fire and Emergency Services

Reference: 5966

7 March 2018

Dear Doug,

Re: Refuge Area – Vancouver Beach Resort
LOT 660 LA PEROUSE ROAD, GOODE BEACH - PROPOSED LOCAL STRUCTURE PLAN NO. 9

Eco Logical Australia (ELA) has prepared this document to respond to comments made by the Department of Fire and Emergency Services (DFES) on the Bushfire Management Plan (BMP; Eco Logical Australia 2017) prepared to support the Structure Plan for Lot 660 La Perouse Road, Goode Beach (i.e. Vancouver Beach Resort). This response focuses only on the location of a refuge building for the resort. All other comments from DFES will be addressed through updates to the BMP and Bushfire Emergency Evacuation Plan (BEEP).

In response to comments received from DFES, the project team has revised the site plans for the proposed resort to include a 'Refuge Building' to serve as a shelter in the event of a bushfire. The location of the proposed refuge building (i.e. the function centre) has been determined using principles outlined in *Neighbourhood Safer Places – Guidelines for the Identification and Inspection of Neighbourhood Safer Places in* NSW (New South Wales Rural Fire Service 2017). The specific focus of the revised design was to relocate the proposed refuge building into an area subject to a radiant heat flux of 10kW/m^2 (kilowatts per square meter) or less. Accommodation buildings will still be located in area subject to a Bushfire Attack Level (BAL) rating of BAL-29 or less.

A Method 2 Bushfire Attack Level (BAL) Assessment was undertaken for the proposed building to ensure it is situated in an area subject to a radiant heat flux of 10kW/m^2 or less. Worst-case vegetation classifications and slope were used for the assessment, and the assessment inputs are detailed below in **Table 1**. Calculations are provided in **Appendix A** and the building location (including setbacks identified in the Method 2 BAL assessment) is depicted in **Appendix B**.

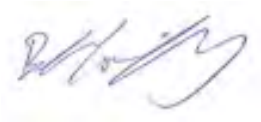
Table 1: Bushfire Attack Level (BAL) calculation

Vegetation Classification	FDI	Fuel load	Effective Slope	Site slope	Flame temperature	Separation	Radiant Heat Exposure
Class B woodland	80	Surface fuel load: 15 t/ha Overall fuel load: 25 t/ha	5° downslope	0°	1200K	55.5 m	9.98 kW/m^2
Class D scrub	80	Surface fuel load: 25 t/ha Overall fuel load: 25 t/ha	5° downslope	0°	1200K	50 m	9.78 kW/m^2

If you have any questions about any aspect of this, please contact me on (08) 6218 2200.

Yours sincerely,

Daniel Panickar
Senior Consultant / Bushfire Lead - WA
FPAA BPAD Certified Practitioner
No. BPAD37802-L2



Bruce Horkings

Senior Bushfire Consultant

FPAA BPAD Certified Practitioner No. BPAD29962-L3

Appendix A – Method 2 Calculations

FPA AUSTRALIA | FLAMESOL

Calculated February 23, 2018, 6:21 pm (BALc v.4.7)

Vancouver Beach Resort 10kW - Woodland

Bushfire Attack Level calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	2.03 km/h
Vegetation classification	Woodland	Flame length	16.21 m
Surface fuel load	15 t/ha	Flame angle	78 °
Overall fuel load	25 t/ha	Panel height	15.86 m
Vegetation height	n/a	Elevation of receiver	7.93 m
Effective slope	5 °	Fire intensity	26,263 kW/m
Site slope	0 °	Transmissivity	0.773
Distance to vegetation	55.5 m	Viewfactor	0.1155
Flame width	100 m	Radiant heat flux	9.98 kW/m²
Windspeed	n/a	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,200 K		

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

FPA AUSTRALIA | FLAMESOL

Calculated February 23, 2018, 6:23 pm (BALc v.4.7)

Vancouver Beach Resort 10kW - Scrub

Bushfire Attack Level calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	80	Rate of spread	5.88 km/h
Vegetation classification	Scrub	Flame length	13.62 m
Surface fuel load	25 t/ha	Flame angle	79 °
Overall fuel load	25 t/ha	Panel height	13.37 m
Vegetation height	3 m	Elevation of receiver	6.68 m
Effective slope	5 °	Fire intensity	75,987 kW/m
Site slope	0 °	Transmissivity	0.78
Distance to vegetation	50 m	Viewfactor	0.1123
Flame width	100 m	Radiant heat flux	9.78 kW/m²
Windspeed	45 km/h	Bushfire Attack Level	BAL-12.5
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,200 K		

Rate of Spread - Catchpole et al. 1998

Flame length - Byram, 1959

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Appendix B – Proposed location of Refuge Building


Proposed Refuge Building
Proposed building setbacks to achieve Radiant Heat Flux of ≤10kW/m2
Vegetation to be removed or landscaped within setback area
Subject Lot
Development Outline
100m wide assessment area
Non-vegetated/Low threat vegetation
Vegetation type, slope range
Excluded as per clause 2.2.3.2 (e) and (f) of AS3959-2009
Forest Type A, >5 to 10
Grassland Type G, Flat
Low fuel or non vegetated 2.2.3.2, Flat
Scrub Type D, Flat
Scrub Type D, >0 to 5 degrees
Scrub Type D, >5 to 10 degrees
Scrub Type D, upslope
Shrubland Type C, upslope
Woodland Type B, >0 to 5 degrees
0 20 40 80
Metres
Datum/Projection:
GDA 1994 MGA Zone 56
N
eco logical AUSTRALIA
www.ecoaus.com.au
Prepared by: EB Date: 28/02/2018

Schedule of Submissions

Local Structure Plan No.9 – Lot 660 La Perouse Road, Goode Beach

Note: This is a broad summary of the submissions only.
A copy of the submissions in full has been provided to the Council as a separate document.

NO.	SUBMITTER	COMMENTS – SUMMARIZED	CITY COMMENT AND RECOMMENDATION/MODIFICATION
		TOURISM	

1.		Support the proposal.	Note comments supporting the proposed structure plan. Supporting comments included:
			• Given the tourist attractions in the area, there's a need for 5 star tourist accommodation;
			• Proposal will provide jobs;
			• Opportunity to access restaurant.
			
			Dismiss concerns relating to tourism. Concerns include:
			• City of Albany Significant Tourist Accommodation Sites Policy (at page 19 of the Plan) states that a small scale, consolidated tourist development with a small building footprint is envisaged for the site; and
			• Tourists will have an adverse impact on the current tourist attractions like the Gap, Whaling Station and nature walks.
			
			It is recommended that the proposal is supported for the following reasons:
			• The conceptual layout designed to inform the structure plan envisages a low profile development that blends to the natural environment. Low profile characteristics include:
			  • buildings consisting of one and two storey (in-keeping with existing building developments at Goode Beach);
			  • 6000m^2 building footprint (similar size to three existing lots subdivided on La Perouse Court);
			  • 2.1ha clearing footprint (2.6ha designated in scheme for 'Special Use' development at Lot 660);
			  • Buildings clustered to the north of the site, away from existing housing and buffered by a hill and remnant vegetation;
			  • Designing buildings to blend with the site;
			  • Coastal and wetland setbacks in accordance with legislative requirements;
			  • Environmental imperatives have been researched and management criteria proposed to address issues in accordance with legislative requirements. Management plans are proposed to protect vegetation, the foreshore, groundwater, Lake Vancouver and property and life from bushfire.
			• The City's *Local Planning Strategy (Draft 2018),* seeks to encourage the development of tourism uses at the subject site.
			• The City of Albany Local Planning Strategy (2010) makes the following recommendation:

2.		Albany requires tourist accommodation.	
3.		I support the proposal	
4.		As a Goode Beach property owner for over 10 years I wish to advise that I am fully supportive of the proposal. I believe the property will enhance the Goode Beach area and will make available to the residents facilities that otherwise we could not avail ourselves of. The facility will also provide job opportunities for the residents. In particular students during vacation periods.	
5.		Support the proposal.	
6.		I am in favour of this Goode Beach tourist development. When I purchased my property 20 years ago I recognized that certain blocks were zoned tourism and realized that a tourist resort could be built here in the near future. It would be great if I am able to access facilities such as the restaurant at this resort.	
7.		A fantastic proposal that will provide many jobs and an excellent tourist facility. Goode Beach is the perfect beach that is underutilised by tourists and this will allow many more people to enjoy the location. May I say confidentially that the Frenchman Bay Association is not representative of many residents and is driven by a few who are opposed to any development that may bring more people to the locality.	
8.		Support the proposal subject to ensuring no adverse impact on Lake Vancouver and management of bushfire risk.	
9.		A 'high end 5 star resort would be good for Albany and a benefit for Frenchman Bay/Goode Beach.	
10.		Albany is sadly lacking in a substantial five star standard of holiday accommodation at present.	
11.		The Structure Plan for Lot 660 represents another opportunity to consider an eco-friendly small scale resort in Goode Beach. There are some particular issues, however, which would need to be addressed to the satisfaction of all the stakeholders especially the residents of Goode Beach. • Protect environment; • Ensure effluent and storm water disposal complies with relevant legislation; • Ensure bushfire Management Planning is implemented;	

		• Water and/or beach activities involving boats, vehicles etc should not be permitted in any form • Ensure that traffic will not impact on the safety and convenience of local residents. Consider minimizing conflict between pedestrians and traffic by implementing signage, speed pumbs and paths.	• *Encourage the development of sustainable tourism uses and proposals that integrate with the City's unique natural and man- made landscape and heritage values.* • Tourist accommodation opportunity within the locality is lacking. At present, tourists have to rely on accommodation within the central business district, which is approximately 24 kilometres away. • Tourist development in the region conforms to the 'State Government Strategy for Tourism in Western Australia 2020', which sees the Governments role to include: *…creating a favourable environment for tourism infrastructure investment and development, through policy creation.* • The proposal seeks to develop a quality resort in an iconic location, within reasonable distance to tourist attractions and will provide employment opportunity. • The proposal also relates to the 'Amazing South Coast Tourism Development Strategy', which has been endorsed by the Tourism Advisory Group (an industry lead group) and the Lower Great Southern Alliance (Shires of Demark and Mount Barker and the City of Albany). The overarching vision of the Amazing South Coast project and the Tourism Development Strategy is: • *To strengthen and diversify the economic base of the Amazing South Coast through unified promotion and development of an abundance of unique and unrivalled experiences. With an ultimate goal of, three million visitor nights by 2021.*
12.		Once the structure is built, there are to be no more applications to expand it.	
13.		The development may create employment opportunities. The development may create additional amenities e.g. café	
14.	Tourism WA Level 9, 2 Mill Street Perth WA 6000	Tourism Western Australia supports the possibility of a new tourism accommodation development proceeding in Albany and therefore supports the Structure Plan as it is presented.	
15.	Harley Dykstra	Tourist accommodation will add to the tourist attraction and accommodation offerings in this unique area.	
16.		Please approve this tourism accommodation development to enable it to be built as a matter of urgency to support: • Employment; • Tourism accommodation; • Inspirational Design; • Iconic location.	
17.		Additional tourists will have an adverse impact on the current tourist attractions like the Gap, Whaling Station and nature walks.	
18.		Given the world class tourist attractions in the area, and the lack of quality tourist accommodation, a project such as this if carefully managed through to a high quality product, could provide the much needed facility of quality, eco orientated accommodation in the area. I see this as a project that could have some significant value to both the tourist industry and also to the local community.	
19.		The 2010 City of Albany Policy "SIGNIFICANT TOURIST ACCOMMODATION SITES" states: "Any change in zoning should be delayed until the considerable environmental imperatives are known and suitably addressed." and "A small scale, consolidated tourist development with a small building footprint is envisaged for the site." I do not understand how this size development would even be considered appropriate.	
20.		The proposal contravenes the Planning Policy's definition of an Eco-tourist facility: The local Planning Policy defines an Eco-tourist facility as: "a form of tourist accommodation that is designed, constructed, operated and of a scale so as not to destroy the natural resources and qualities that attract tourists to the location."	
21.		The City of Albany Significant Tourist Accommodation Sites Policy (at page 19 of the Plan) further adds that a small scale, consolidated tourist development with a small building footprint is contemplated for the site.	

		UTILITIES	
22.	ATCO Gas	ATCO Gas has no objection to the proposed Structure Plan. ATCO Gas does not operate gas mains in the locality. The closest assets are over 10 kilometres away within Mt Melville.	Uphold comment from the Department of Health. **Recommend including the following provision in accordance with comment received from the Department of Health:** • **Effluent disposal systems are to be approved and managed in perpetuity to the satisfaction of the Department of Health and City of Albany.** o **Effluent quality should meet nutrient concentration targets of 10mg/L of nitrogen and 1mg/L of phosphorous.** o **Effluent disposal systems being in accordance with Department of Health publications which may be referenced and downloaded from:** **http://ww2.health.wa.gov.au/Articles/N_R/Recycled-water** **http://ww2.health.wa.gov.au/Articles/U_Z/Water-legislations-and-guidelines** **http://ww2.health.wa.gov.au/Articles/S_T/Subdivisions-and-town-planning- approvals** Dismiss concerns relating to the provision of services. Concerns included: • The proposed structure plan may place too heavy a demand on water supply which is already under some stress. It is recommended that the proposal is supported for the following reasons: • The Water Corporation confirmed that: o *The current Water Corporation reticulation system can serve the proposed development on Lot 660 as outlined in the Local Structure Plan.* **Recommend including the following Water Corporation notation to accompany the structure plan:** • **Development is required to connect to the Water Corporation's potable water system, to the satisfaction of the Water Corporation.** • **The developer may be required to fund new works or the upgrading of existing works and protection of all works.**
23.	Department of Health	The structure plan is to specify that developments are required to connect to scheme water and be in accordance with the draft Country Sewerage Policy. Separate approval is required for any on-site waste water treatment process with such proposals being in accordance with DOH publications which may be referenced and downloaded from: http://ww2.health.wa.gov.au/Articles/N_R/Recycled-water http://ww2.health.wa.gov.au/Articles/U_Z/Water-legislations-and-guidelines http://ww2.health.wa.gov.au/Articles/S_ T/Subdivisions-and-town-planning-approvals.	
24.	Water Corporation	The current Water Corporation reticulation system can serve the proposed development on Lot 660 as outlined in the Local Structure Plan. The developer may be required to fund new works or the upgrading of existing works and protection of all works.	
25.		Current water supply and electricity reliability are not adequate.	
26.		The current water infrastructure will be under pressure to support an additional 51 units along with gardens, a restaurant, pool and function centre. Water facilities should be significantly upgraded and empirical evidence produced to demonstrate that the water supply is sustainable.	
27.		The proposed structure plan may place too heavy a demand on water supply which is already under some stress.	
28.		Resort will need an alternative power and water supply due to current servicing issues.	
29.		Need to see the evidence behind Water Corporation's assurance that there is sufficient capacity to meet the additional demand of the proposed resort.	
30.		Infrastructure unable to keep up with development.	
		ENVIRONMENT	
31.		Concerns on the environmental impact , in particular: • the western ringtail possum; • mains assassin spider; • Carnaby cockatoos; and • Lake Vancouver.	Dismiss concerns relating to the environment. Concerns include: • Impact to flora and fauna (clearing vegetation, potential impact to threatened species); • Lack of environmental data, including data on groundwater and flora and fauna; • Impact to Lake Vancouver (contamination and ecosystem); • Impact to Groundwater (contamination and change to dynamics); • Increased tourists impacting on environment (erosion, rubbish); • Development not appropriate adjacent to unstable, fragile dune system susceptible to sea level rise and storm surge;
32.		Yet to see research to indicate that Lake Vancouver and its associated native flora and fauna systems will not be negatively impacted by the proposal.	
33.		Concerned about pollution to Lake Vancouver and Goode Beach.	

34.		The ecosystem of Lake Vancouver will be negatively impacted by building roads, a car park and a five star luxury resort in the very fragile sand dunes.	• Potential for introduced weeds; • Introducing phytophthora infection to the Lake Vancouver wetlands and adjacent Reserve; • Impact to water flows to Lake Vancouver; • Location of development adjacent to lake, beach and wetland vegetation; • Rare spider; • Inconsistent with provisions contained in the Ministerial statement/Bulletin 672; • 1.5m vertical separation from the discharge point of the on-site sewage disposal system to groundwater; • Not in accordance with State Coastal Planning Policy 2.6; • Proposed development in land reserved for 'Parks and Recreation'. It is recommended that the proposal is supported for the following reasons: • The structure plan is proposing to protect the integrity of the environment in accordance with preliminary consultation with the Department of Biodiversity Conservation and Attractions, relevant legislation and an environmental assessment of the site. • The environmental scientist (Aurora Environmental) working on behalf of the structure plan undertook an environmental assessment of the subject land. The wetland, flora and fauna, hydrology and threatened species were assessed. • No Threatened or Priority species were recorded on site. In addition, no species listed as Threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded. • Natural features associated (around) with the Lake Vancouver are proposed for protection (e.g. riparian vegetation – vegetation with wet feet that directly surrounds the lake and which acts to stabilise embankments and filter pollutants). • It is proposed to establish development with a minimum 100m buffer from the edge of the open water of Lake Vancouver, with protection of the hydrologically linked area (McBl vegetation). Development outside this area can be adequately managed (as per the draft Government Sewerage Policy) to mitigate risks to Lake Vancouver and associated vegetation. Setbacks to the beach foreshore and wetland vegetation surrounding the Lake Vancouver are proposed in accordance with the Draft Government Sewerage Policy (Government of WA, 2016), the Better Urban Water Management guidelines (WAPC, 2008) and discussions with the Department of Biodiversity Conservation and Attractions (January 2017). It was indicated by the Department of Biodiversity Conservation and Attractions, that wetland boundaries and associated setbacks based solely on hydric soils (in this case Melaleuca cuticularis / Banksia littoralis (McBl) vegetation as outlined in DER's *Wetland Buffer Study Report Case Study 3*) had not been adopted by the department due to difficulties with identification and application in the planning context. A conceptual approach was therefore discussed with DBCA with the protection of the McBl vegetation (vegetation directly around the lake) as a suitable method for considering setbacks. • The subject land already has development rights in accordance with the City's Local Planning Scheme No.1. Three substantive proposals have
35.		The ecological disturbance this project would make to what is a pristine and beautiful freshwater lake and wetland area.	
36.		The development will impact on the environment. Water and effluent will drain from the proposed development to the lake.	
37.		The environmental risk assessment to lake Vancouver, the dunes area, water table levels and water quality have not been adequately performed to ensure that any development does not adversely impact the area. This environment is unique and is not suitable for a resort of this size. Any building on this lot should be minimal if at all.	
38.		Clearing and restructuring of 2.1 hectares will negative impact a fragile coastline and lake Vancouver.	
39.		Development will impact negatively on flora and fauna in a unique fragile environment.	
40.		There is no way to control such visitors straying from paths, clambering down embankments and sand hills, picking wild flowers and so on.	
41.		Don't build a resort next to a beautiful lake and beach. Let's not screw up our wetlands ecosystem any more than we have too.	
42.		The primary concern is that of environmental impact of clearing a large area of bush so close to the Lake Vancouver and the impact on the lake (sewerage).	
43.		The proposed access point so close to Lake Vancouver will cut off green corridors for the flora and fauna.	
44.		Maintenance of the environs is paramount. Low level construction is preferable.	
45.		I am not in favour of the pristine bushland being cleared for buildings. Clearing would leave the dunes open to erosion. The impact on the water level of Lake Vancouver from any degradation of the dunes is not well researched and known.	
46.		The impact on the pristine wetlands around Lake Vancouver is likely to be extremely impacted due to the large scale of development.	
47.		Appose on environmental grounds including: • the site's fresh groundwater perched above a saline water table likely flows seasonally into Lake Vancouver. Consequently, the development would need the highest standard of groundwater protection from pollutants associated with the resort and associated roads. Evidence of sufficient investment to such standards is not provided by the proponents of Structure Plan No. 9. • resort building site is located on low stability coastal sand dunes • adjacent to a dynamic coastline facing rising sea levels • located (Lake Vancouver) right up against Lake Vancouver • low altitude of the site form a funnel for storm surge to break through the dunes flooding the resort site and injecting sea water into the freshwaters of Lake Vancouver and adjacent wetlands • further research is needed on groundwater movement/protection • clearing poses a risk to freshwater ecological systems	

		• Localised beach shells from previous shorelines of Princess Royal Harbour will be destroyed • Control of introduced weeds by resort is not addressed • Vegetation contains habitat presently used by several Threatened animal species protected by State and Federal legislation, including the carpet python, Carnaby's Black Cockatoo, and Ring-tailed Possum. • Adequate surveys of biodiversity including rare invertebrates and rare plants such as the Albany woolly bush (Adenanthos cunninghamii) on Lot 660 also need to be undertaken • The proposed access roadworks exacerbate threats from polluted runoff to Lake Vancouver's wetlands	been considered for the subject lot prior to the structure plan application being lodged. o The first application was for a 'Resort Hotel and Hotel Complex' development, which was conditionally approved in 1987. o The second application (see attachment 2) was for a rezoning to create fifteen 'Special Residential' lots (1999). The EPA recommended conditional support for the proposal. The Environmental Protection Authority concluded (Bulletin 672) that the management of environmental impacts can rely extensively on management controls through the planning process. The Minister for Planning recommended that the landholder pursue an appropriate zoning of the remaining rural lot to reflect the potential for low key tourism. o The third application (see attachment 2) was for the rezoning of the 'Rural' lot to the 'Special Use' zone to reflect the Ministers previous advice. The following provisions were included: ▪ Support holiday accommodation subject to provisions culminating from a 'Development Guide Plan' including: ✓ Max 10 chalet/cottage units ✓ Buildings clustered ✓ Minimising clearing ✓ Designing buildings to blend with the site ✓ Coastal setbacks ✓ Foreshore management plan ✓ Management of stormwater and effluent disposal to limit impact on the Lake Vancouver ✓ Potable water supply ✓ Implementing bushfire management criteria • The structure plan has considered Hydrological data recorded for the site (Rockwater) and more recent groundwater data collected post November 2016. A groundwater report developed for the subject area (Groundwater Aspects of Residential Development, Alan Tingay and Associates 1992) concluded that a buffer zone of 60 m between residential development and Lake Vancouver is suitable. The report stated that this will provide opportunity for nutrient extraction by vegetation, and add to the protection of the lake water. • The structure plan documentation (Aurora, 2017 Section 2.9) acknowledges the conservation status of Lake Vancouver and has incorporated best practice management options to mitigate risks to the lake (i.e. for road, other structure, stormwater, effluent treatment). • The Department of Water and Environmental Regulation stated (submission 1) that the proposed methodology for dealing with the stormwater generated on site is considered acceptable. • Flora and fauna surveys have been used to inform the structure planning process. Vegetation associated with Lake Vancouver will not
48.		The dune system between Lake Vancouver and the ocean is fragile and low-lying and the proposed development is environmentally unacceptable. It is difficult to see how any such development would not contaminate or place at great risk the ground water and Lake Vancouver itself.	
49.		The destruction of the naturally vegetated parabolic dune system, unacceptable in itself, will pose unacceptable risks to Lake Vancouver and the surrounding wetland.	
50.		Needs to be on-going weed control for the life of the development.	
51.		The proposed development will have a serious impact on the delicate balance that exists in the wetlands surrounding Lake Vancouver. This is a unique biosphere which will be adversely affected by the clearance of vegetation, sand blow if the dunes are levelled for construction, effluent disposal and dirty-water run-off from carparks and roads. A major attraction for tourists, particular bird lovers, will be lost if the development is allowed to go ahead.	
52.		Infilling land to enable a six meter wide, two way road would change the hydrology of the area and thus potentially killing existing vegetation that will be further inundated. Expanding this road to become a six meter two way thoroughfare will increase the potential for weed and dieback infestation of this pristine bushland and impacting on wildlife.	
53.		Importing suitable soil carries the risk of introducing phytophera infection to the Lake Vancouver wetlands and adjacent A Class Reserve. In some locations within the "development precinct", the groundwater table is exposed to create wetland areas. The proximity of the groundwater means that on-site effluent disposal involves significant risk of impacting on the Lake Vancouver wetlands and / or the nearshore marine of Goode Beach.	
54.		I do not consider that the development recognises the environmental considerations that have been identified (but not fully addressed or alternatively, not addressed) in the Plan. Those identified considerations relevantly include (amongst others) the impact on Lake Vancouver, appropriate setbacks from the Coast, effluent disposal and water management. By way of further illustration only, the report of Aurora Environmental concedes (at page 20 of 33) that due to various (unstated) survey limitations, it is unlikely that every Western Ringtail Possum was identified. Those further qualifications confirm that no weight should be afforded to those reports. The Department of Water and Environmental Regulation (DER) has identified that the ecological functional buffer of the wetland was 200m and that development within that area should be compatible with wetland values with management to ensure that acceptable environmental outcomes were achieved (including revegetation, weed control, fencing and installation of appropriate drainage compatible with Better Urban Water Management). Absent such endorsement by the DER the Application must fail.	

		No measures are identified to prevent the spread of dieback within the Property and no approval has been obtained from the DER or the proposed clearing of 2.1 hectares at the Property (the threshold for referral being a mere 0.5 hectares). The notion that the treated sewerage is used for irrigating in an area prone to flooding further illustrates the inadequacies of the analysis undertaken on behalf of the Applicants (or a misunderstanding of the location of the proposed resort).	
55.		The proposed development is in close proximity to the fragile fresh water wetlands of Lake Vancouver. It's our belief that it's environmentally unsustainable to allow this project to proceed.	
56.		The impact on local fauna and flora is of critical importance to such a sensitive location. The level of work already completed by the proponent in this area coupled with their local and internationally reputation for similar tourism projects, forebodes well.	
57.		Environmentally possibly the worst location choice for the following reasons: • biodiversity hotspot • Beautiful Vancouver Lake • Natural landscape	
58.		Vancouver Lake must not be affected in any way.	
59.	Department of Biodiversity, Conservation and Attractions.	There is little recognition of Lake Vancouver as a wetland of regional significance (South Coast Significant Wetlands, DoW 2008), and more detail on potential impacts would be useful. No 'direct discharge' of stormwater into Lake Vancouver does not adequately address possibility of high rainfall events? Need to articulate what 'management actions' to be undertaken that will minimise 'deleterious impacts' on the lake.	
60.		Concerned that much of the stormwater, road runoff and infiltrating treated effluent could flow into both groundwater and the Lake Vancouver wetlands, with possible environmental impacts on the water-dependent ecosystem if any of these waters have an undesirable chemistry. During summer, evaporation and wetland transpiration cause the lake to act as a giant 'pump'. This lowers the lake level to below the groundwater level and the flow is reversed with groundwater flowing westwards from under the proposed development into Lake Vancouver. An extensive groundwater monitoring network in and around the resort and between Goode Beach and Lake Vancouver is needed prior to considering structure plan.	
61.		Possible pollution of Lake Vancouver has been raised as detrimental to the quality of lake water and wetlands. The developers' consultants have provided for exceptional treatment of all liquid runoff and modern methods of such are extremely efficient. Against this it must be considered that at least 90 septic tanks have been voided into the lake catchment for over 50 years apparently without obvious detriment as shown by the attached reports. Engineering design of the roads within the resort area will provide for water flow to be directed away from the lake and into the existing natural channels towards Quaranup Road.	
62.		On-going monitoring of water quality of Lake Vancouver for the life of the development.	
63.		The proposal says there will be no harm to the wetland because wastewater going into the groundwater will flow east, out through the beach. But there is hardly any evidence to support this conclusion. Only 2 bores in the Rockwater study of 1986-92 are located on the proposed hotel site and only one indicates some groundwater movement to the beach in winter and to the lake in summer.	be disturbed. It is not necessary to undertake additional surveys for the following reasons: o A total of 56 native species were recorded during a flora survey carried out in June 1992 by Alan Tingay and Associates. The survey covered Lot 660, Reserve 48916 (Lake Vancouver) and Reserve 28111 (foreshore reserve). The species list has been checked for changes to nomenclature and compared to the most recent Threatened and Priority species listed under Schedule 1 of the Western Australian *Wildlife Conservation Act 1950.* No Threatened or Priority species were recorded on site. In addition, no species listed as Threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded. o Targeted surveys for three species of Threatened Black Cockatoo, Western Ringtail Possum and Main's Assassin Spider have been undertaken. A Western Ringtail Possum was detected to the west of Lake Vancouver during a targeted fauna survey on 6 December 2016 (Appendix 14). Potential foraging habitat for Black Cockatoos was identified in a targeted fauna survey as occurring immediately around Lake Vancouver (McBl) and to the west of the lake (AfEmt and Mt). This vegetation type is not proposed to be cleared. o The environmental consultant working on-behalf of the landholder also classified vegetation on the subject land by comparing to a mosaic of Albany Regional Vegetation Survey Units (Peppermint low forest, coastal heath and coastal limestone heath) undertaken for land to the north of the subject site. It was determined by the consultant that the vegetation units described are well represented in the ARVS study area and in the region. This was not contested by the DBCA. o Aurora Environmental has undertaken a targeted survey of the area proposed to be cleared for the Threatened flora species, Calectasia cyanea (Blue Tinsel Lily) on 20 October 2017 (flowering period of the species is June to October). The species was not detected and it was also noted that the habitat surveyed (Agonis flexuosa/ Adenanthos sericeus Closed Scrub) was not likely to host the species. • Proposed variations to current scheme standards, (e.g. function centre and restaurant) are designed considerate of legislative requirements including: o Department of Health and Water Corporation servicing standards; o Reference to the Biodiversity Act, which seeks to protect threatened species; o The Western Australian Liveable Neighbourhoods document for traffic design; o The State Planning Policy 3.7 Planning in Bushfire Prone areas; o The State Coastal Planning Policy 2.6 – Coastal Planning; o The City's Local Planning Scheme No.1 for setbacks to wetlands; o The Draft Government Sewerage Policy 2016 for the appropriate setback to wetlands.

		Freshwater / saltwater interface slopes westwards below Lake Vancouver, suggesting that for much of the year, much of the groundwater may go into the wetland. Measurements need to be taken of groundwater flow below the site for at least a year. The development will change the quantity and quality of the groundwater inflow and both these need to be calculated, as well as the effects of levelling the dunes and adding buildings, roads and car parks. The hotel plan says that wastewater will be treated to minimize harm, but even minimal pollution could have a catastrophic impact on the fragile wetland ecosystem. In addition, runoff from roads (photo 3) and car parks would inevitably reach the wetland that is only a few metres away Degradation of the pristine lake and wetland by invasive plants is also a major concern. It is hard to see how this could be avoided during the building of an access road and the fire emergency exit track, and later from the lawns and new planting around the proposed hotel.	• Various management plans are proposed to oversee implementation and operation phases of development, including: o An Urban Water Management Plan to ensure protection of water quality. This includes: best practice management, including no direct drainage into Lake Vancouver, treatments such as flush kerbing for diffuse discharge (where possible) and soil amendment of basins. Extra hydrological information to be gathered and analysed. o A Foreshore Management Plan. o Coastal Management Plan. o Remnant Vegetation management Plan (weeds, disease and revegetation). o Bushfire Management Plan. • The Minister for Environment previously concluded (1993 EPA Bulletin 672) that a proposal to subdivide the subject land into 15 lots and to develop onsite effluent disposal is environmentally acceptable, subject to development conditions, which the structure plan proposes to comply with, including: o Lake Vancouver and buffer area has now been incorporated into a Crown Reserve and is managed by the City of Albany. o It is intended by the structure plan that an urban water management plan will be developed, consistent with Better Urban Water Management principles (WAPC, 2008) which will comply with the Ministerial Condition. These plans consider the treatment, storage and conveyance of 15mm events, 20% annual exceedance probability (AEP) events and 1% AEP events (respectively). There will be no direct drainage to either Lake Vancouver or Frenchman Bay and treatments such as soil amendment will be considered. o Groundwater abstraction is not proposed by the structure plan. o The structure plan has taken into account SPP 2.6 State Coastal Planning with setbacks being agreed with the Department of Planning, Lands and Heritage. Land capability (including management of erosion risk during construction) has also been considered. • The current proposal complies with the 2016 Draft Government Sewerage Policy. It is proposed to install a package treatment plant that provides secondary treatment and removes nutrients (to 1 mg/L of phosphorus and 10 mg/L of nitrogen) as per 2016 Draft Government Sewerage Policy. The unit will also remove pathogens. Irrigation of the treated waste water will be set back from Lake Vancouver and spread over a minimum area of 4000 m^2 (in compliance with Schedule 3: Site Requirements for On-site Sewerage Disposal Systems in 2016 Draft Government Sewerage Policy and Department of Health (2015) Supplement to Regulation 29 and Schedule 9 – Wastewater System Loading Rates). • Other than the 2.1 ha proposed to be cleared for the current development, no other vegetation will be cleared. The remaining vegetation will be retained and managed to reduce risk of weeds and
64.		The wetland environment is also fragile, especially with the threats from dieback, climate change and increased nutrients and contaminants from development. Department of Water monitoring detected higher than recommended levels of nitrogen in the lake and the resort development would likely contribute to an even increased level of nutrient runoff from fertilizers and sewerage and the follow on effects would be algal blooms in the lake and degradation of biodiversity.	
65.		The development plan states no direct drainage will occur into Lake Vancouver. The scale of the development will mean stormwater run-off will occur and be a major issue. The Development plan should state there will be no discharge of stormwater to Lake Vancouver or the coast. This is a perfectly reasonable requirement given the nature of the sandy soils that will allow groundwater infiltration on site.	
66.		The protection of the environmental integrity of Lake Vancouver and the surrounding wetlands (a designated Conservation wetland) from the effects of polluted groundwater/stormwater is a major concern of the FBA. Pollution of the groundwater system may occur from the proposed onsite disposal of treated effluent and/or contaminated stormwater from within the development site that infiltrates into the groundwater system. There may also be potential for contaminated storm water to directly access the wetlands as run-off from the development site and access road. It is considered that a more comprehensive study is required to improve the knowledge of the groundwater flow system between Goode Beach and Lake Vancouver.	
67.	Department of Water and Environmental Regulation. (Submission 1)	Maintenance of the pristine condition of the lake's fringing vegetation is important for protecting the lake's water quality. The lake is a permanently inundated basin fed by surface water and groundwater. The salinity level in the lake is brackish, and salinity levels increase as the lake's waters evaporate during summer. Information on water quality is limited, but nutrient levels are generally below guideline values. It is recommended that the wetland's natural extent or boundary is assessed by the Department of Biodiversity, Conservation and Attractions and/or qualified consultants on site. The existing boundary of the Lake Vancouver reserve should be reviewed in the event of the proposal being approved due to the impacts of increased recreation pressure and adjacent land use intensification on the reserve. The reserve's boundary should reflect an appropriate buffer from the development.	

		A management plan will be needed to determine requirements for managing the interface with the reserve including fire, weed and dieback control, pedestrian interaction and connectivity with the lake's reserve, amenities and access control.	dieback. Any rehabilitation will use local native species (noting that landscaping within the development foot print will use a combination of native and non-native species). These objectives will be achieved through preparation of a Remnant vegetation management plan at the development approval stage. • Development can achieve a 1.5m vertical separation from the discharge point of the on-site sewage disposal system to the highest groundwater level. • A coastal management strategy has been prepared for this site in accordance with the requirements of the State Planning Policy 2.6 – coastal Planning Policy. The coastal management strategy outlined the potential implications of future sea level rise on the coastline and presented a future adaptation pathway whereby the risk of future coastal change is borne completely by the landowner. The coastal hazard report has been reviewed and accepted by the Department of Planning, Lands and Heritage and the Department of Transport. The coastal hazard assessment found that, even though the shoreline fronting the proposed site has only moved by around 2 metres in the period since 1961, allowance for future shoreline movement of 68 metres should be provided over the coming 50 years to ensure a low level of risk to the development over this time. In this regard, it is noted that a 50-year initial planning horizon has been adopted for this development on the basis that a tourist resort can generally be expected to have a useful service life of around 50 years before full redevelopment is required. Thereafter the redevelopment can be assessed and / or relocated as appropriate based on an assessment of coastal stability and risk at that time. Acceptance and acknowledgement of this risk is proposed through a notification on title as well as a commitment to undertake a managed retreat of the development at a time when identified trigger points are reached. Adoption of a managed retreat approach is entirely consistent with the policy requirements [refer SPP2.6 Section 5.5; Item (iii) Part (2)], particularly for a development such as that proposed – which is a tourist development with a finite structural lifespan before renewal is required. The Structure Plan identifies the '2066 erosion hazard line'. The 2066 hazard line (50-year planning horizon line) is identified in order that the basis for the layout and the setback from the beach is understood. It is not considered necessary or of any benefit to include additional lines. To determine now where an alternative layout could be located (if indeed it is even needed) seems to be dealing in a hypothetical which may have little relevance to the actual situation in the future. The relocation of the facility may be completed in accordance with the actual shoreline response at that time. **Recommend including provisions to ensure ongoing protection and management of the environment, including:** • **Referral to the Department of Environment and Energy is required, prior to development. The Department of the Environment and Energy is an Australian government department. The Department is responsible for matters including environment protection and conservation of biodiversity as well as energy policy.** • **The following management plans are to be implemented:**
68.	Department of Water and Environmental Regulation. (Submission 2)	The Structure Plan needs to ensure protection of the wetland's values through appropriate recognition of the wetland's boundary which is much larger than the area of open water of the wetland. In the case of Lake Vancouver the wetland boundary includes the lake's fringing vegetation and seasonally inundated Paperbark and Banksia vegetation identified as the 'McBl' community on the Structure Plan. The Structure Plan does not address the EPA's Guidance Statement for wetland protection. The EPA Guidance Statement No.33 defines 'wetland buffer' as '*the designated area adjoining a wetland that is managed to protect the wetland's ecosystem health'*. One of the key management actions for protecting wetlands as outlined in Guidance Statement No.33 – Chapter - Wetlands *B4-2:* Wetlands Management near protected wetlands is: '*to manage activities and development outside the buffer area to avoid adverse impacts on wetland values.* State government buffer assessment guidelines (*Department of Planning and Infrastructure: A land use planning guideline for the determination of wetland buffer requirements, final report May 2004)* are applied to wetlands in Western Australia (WA). These guidelines recommend a minimum of a 100m buffer for Conservation Category wetlands, however, the guidelines recommend that a site specific wetland ecological function area be determined, and from that an appropriate wetland buffer can be developed. It is recommended that further consultation is undertaken with key agencies including the Department of Biodiversity and Cultural Attraction's Wetland Management Unit and the DWER	
69.	Department of Biodiversity, Conservation and Attractions.	Comments on the impact this proposal would have on the vegetation could not be undertaken as a current flora survey was not conducted. The report quotes a survey was undertaken in 1992 and many changes have occurred since then (Appendix 10).	
70.	Department of Water and Environmental Regulation. (Submission 1)	DWER considers that the increased hydraulic loading from the development may impact the hydraulic gradient, leading to greater groundwater flow towards the lake. Increased hydraulic loading is also likely as a result of further clearing of native vegetation in the lake's catchment. It could be expected that groundwater levels in the area are now lower, which could affect the hydraulic gradient across the Vancouver Peninsula. DWER recommends that a number of shallow monitoring bores be drilled east and west of the lake, and be monitored monthly along with water levels in the lake for a minimum of 2 years to determine the seasonal variation in the groundwater levels and flow.	
71.	Department of Water and Environmental Regulation. (Submission 2)	The hydrological data and analysis provided by the consultant in the Structure Plan report does not adequately describe the current pre-development hydrology and insufficient analysis is presented to adequately demonstrate the post-development hydrology has been considered or how risks have been addressed. To assist in determining if the proposal is likely to create an unacceptable risk to Lake Vancouver, the department recommends further work be undertaken by appropriately qualified and experienced hydrological professionals to demonstrate the development can be designed and managed to reduce risks to the wetland to an acceptable level.	
72.		In some locations within the development precinct, the groundwater table is exposed to create wetland areas. The proximity of the groundwater means that on-site effluent disposal involves significant risk of impacting on the Lake Vancouver wetlands and / or the nearshore marine of Goode Beach. Once either of these pristine	

		environments become damaged they will be unable to be restored and the attraction of any tourist development on this site will be lost. The site has a long history of failed development attempts primarily due to the extreme constraints associated with the vulnerable coastal dunes and the potential environmental impacts on groundwater and nearshore marine environment. City of Albany staff should refer to the Land Capability Evaluations by JR Gozzard (circa 1989), and also the WA Country Coastal Planning Committee's assessment of Lot 401 (DPUD).	o **Foreshore Management Plan. Note:** ▪ **Development of a physical demarcation is to be accomplished on the boundary of the 'Development Buffer Precinct' to the wetland vegetation (McBl – Melaleuca cuticularis / Banksia littoralia Low woodland). A hard edge such as the proposed internal road is suitable for this purpose.** o **Urban Water Management Plan in accordance with Better Urban Water Management (WAPC, 2008). Note:** ▪ **For storm-water, the use of amended soils would be required within infiltration swales.** ▪ **Stormwater drainage to be accommodated on site and incorporate water sensitive urban water design elements to the satisfaction of the local government.** ▪ **Roof based stormwater runoff being stored in rainwater tanks for reuse in toilets, washing facilities and swimming pool.** ▪ **Identify and describe proposed measures to capture and treat the minor events; and** ▪ **Outline future monitoring and management requirements. Future groundwater monitoring is to be undertaken to the satisfaction of the City in consultation with the Department of Water and Environmental Regulation.** o **Coastal Management Plan.** o **Remnant Vegetation management Plan (weeds, disease and revegetation).** o **Sand/Dust/Erosion Management Plan.** o **Accommodation Management Plan (noise).** o **Effluent Management Plan, subject to Department of Health Approval.** o **Bushfire Management Plan.** • **Recommend including the following provisions to ensure appropriate management of effluent and ultimate protection of the environment:** o **A 1.5m separation from the discharge point of the on-site sewage disposal system to the highest groundwater level is to be achieved;** o **The type of on-site sewerage system should be determined in response to the site and soil conditions, vulnerability of the receiving environment and nature of the proposal.** o **On-site sewage disposal is to be located at least 100m from the edge of the wetland (McBl) vegetation.** o **Where on-site sewage disposal is to be provided by a secondary treatment system, notifications are to be placed on the title pursuant to s.70A of the Transfer of Land Act advising that an on-site secondary treatment sewage disposal system and unencumbered area to which treated sewage is to be distributed are required.** o **Approval is required for any on-site waste water treatment process with such proposals being in accordance with DOH publications which may be referenced and downloaded from: http://ww2.health.wa.gov.au/Articles/N_R/Recycled-water http://ww2.health.wa.gov.au/Articles/U_Z/Water-legislations-and-guidelines**
73.		There is no evidence in the environmental report that the ground water would not be contaminated as a result of this Application. There has been no long-term monitoring of ground water flow direction or rates in which to base the opinion that the sewerage, run-off from roads and the use of fertilisers for landscaping can be well managed without having a detrimental effect on the fragile and pristine environment surrounding Lake Vancouver.	
74.		Structure plan has failed to address the environmental issues, including rare spider.	
75.	Department of Water and Environmental Regulation. (Submission 2)	The Structure Plan is inconsistent with the provisions contained in the Ministerial statement/Bulletin 672 and therefore should be referred to the EPA for assessment.	
76.		The FBA members are extremely concerned about protecting the pristine wetlands around Lake Vancouver, the destruction and degradation of the parabolic dunes, and the proposed development set-back of only 70 metres from the beach. These are serious environmental risks which have been raised in a number of previous development applications over the past three decades. These same risks exist today, and are as relevant today as they have been in the past. The promulgation of LPS1, pertaining to Lot 660, is a product of extensive discussions, investigations and consultation with stakeholders, beginning in the 1970s and continuing until the WAPC (now SPC) -approved LPS1 in 2014. The proponents of Structure Plan No. 9 appear to want to sweep away all the environmental, social and fiscal risks identified in previous exhaustive investigations and replace it with an amended LPS1 that favours the particular development they intend to bring forward. The FBA has recently been advised by the City of Albany planners that previous studies are not relevant, as the proposed resort "is a completely different proposal to previous proposals" The FBA, however, strongly disagrees with this statement, because the site is exactly the same as it was three decades ago. It is the size of the proposed resort, as described in the Structure Plan, that is different, not the site.	
77.	Department of Water and Environmental Regulation. (Submission 1)	The Government Sewerage policy requires a 1.5m vertical separation from the discharge point of the on-site sewage disposal system to the highest groundwater level.	
78.	Department of Water and Environmental Regulation.	The development does not adequately demonstrate that on-site sewage disposal will not result in unacceptable environmental impacts. An appropriate setback for the location of on-site sewerage systems and disposal areas should be measured from the McBI boundary and be informed by supporting hydrological data.	

	(Submission 2)		**http://ww2.health.wa.gov.au/Articles/S_T/Subdivisions-and-town-planning-approvals** • **In-order to protect as much vegetation as possible, the width of internal access is to developed to a max 4m sealed width for main access and 4m gravel access for egress and is to include passing bays and turnaround areas.** • **Internal access is to be designed to ensure movement of water.** • **Prior to occupation of use, management and/or mitigation measures in response to findings from hydrological monitoring (2017-2018), are to be implemented to the satisfaction of the City of Albany. Surface water and groundwater data to be collected from Lake Vancouver and five existing piezometers and bores seasonally to determine and to manage any impacts.** • **As an ongoing condition of development, the following coastal assessment is to be undertaken:** o **Visual inspection and monitoring of the beach to identity any significant changes in the shoreline is to occur on an annual basis.** o **Every 5 years, aerial photographs are to be taken and the coastal vegetation line mapped to track the movement of the shoreline.** o **If the eroded shoreline came within a distance of approximately 36m of the resort site, survey cross sections should be completed every 1 to 2 years to determine the extent of change in shoreline profile.** • **Prior to occupation of use, a Section 70A Notification is to be placed on the Certificate of Title of Lot 660 La Perouse Road, Vancouver Beach advising the landowner and any prospective purchaser that:** o **The lot is within a Vulnerable Coastal Area** o **The land is subject to management in accordance with the Coastal Management Strategy;** o **The risk of future coastal change is borne completely by the landowner.** • **A geotechnical report is implemented to guide earthworks/development.** • **The Foreshore Management Plan is to ensure that the sensitive areas adjacent to the beach and wetland is protected and maintained in a natural state.**
79.	Department of Water and Environmental Regulation. (Submission 1)	There is a requirement for the on-site sewage disposal system to be located at least 100m from the edge of a significant wetland (Wetland Buffer Report, Department of Environment and Conservation). The separation distance should be measured from the outer edge of the riparian vegetation. Due to the development's location in a sewage sensitive area, effluent generated by the development will require a secondary treatment system with nutrient removal. Effluent quality should meet nutrient concentration targets of 10mg/L of nitrogen and 1mg/L of phosphorous. The proposed treatment system does not meet these targets. The quoted Department of Water guideline *Water quality protection note #22 Irrigation with nutrient rich wastewater* is not to be applied for the use of irrigation with treated sewage wastewater. The generic nutrient loading rates used in this guideline are also inappropriate in the context of a site identified as a sewage sensitive area and within the catchment of a conservation category wetland. Site specific maximum nutrient loading rates should be determined.	
80.		Although the buildings are to be set back to the 100 m line around the surface of the lake, they are only 25 m from the edge of the wetland and are only 2 m above the wetland groundwater.	
81.	Department of Water and Environmental Regulation. (Submission 1)	The proposed methodology for dealing with the stormwater generated on site is considered acceptable. The use of amended soils would be required within the infiltration swales.	
82.	Department of Water and Environmental Regulation. (Submission 2)	A Local Water Management Strategy is required to provide proof of concept, for instance, that the land is capable for the proposed development.	
83.		Drainage into the Lake Vancouver due to scale of proposed stormwater will run off and be a major problem.	
84.	Department of Water and Environmental Regulation. (Submission 1)	For the proponents of this development to dismiss state policies and instead state that they will plan and manage for a 50 year sea level rise is negligent to future owners and investors in the property as well as local and state government authorities that may be expected to protect the infrastructure from erosion. Managed retreat is not an option for this site which is constrained by the presence of Lake Vancouver. Further additions to the coastal reserve should be secured at this stage.	
85.	Department of Health	The document 'Land Use Planning for Natural Hazards' can also guide the use of land to effectively reduce risk and enhance sustainability for areas prone to hazards such as flooding (including storm surge), fire, strong wind and coastal erosion. Available for download from: https://www.ag.gov.au/EmergencyManagement/Tools-and- resources/Publications/Documents/Manual-series/manual-7-planning-safer-communities.pdf	
86.	Department of Transport	The Department of Transport assessed the coastal management strategy submitted as a component of the structure plan and confirmed that the structure plan adequately addresses coastal physical processes.	

		The Department of Transport recommended that: • The structure plan map is modified to show coastal hazard lines. • An area is identified for the relocation of replacement infrastructure beyond the 50 year planning horizon and a statutory mechanism is implemented to ensure enforceability.	
87.		It has been shown here that control of sand blow towards Lake Vancouver can be readily managed. Levelling and compacting this dune area has now provided homes for some nine existing residents on Goode Beach.	
88.		The geological, hydrogeological and botanical experts living in Goode Beach are not convinced that sufficient scientific work has been undertaken to demonstrate that this much larger-scale development would not damage the pristine beach and coastal environment irreversibly.	
89.		The proposed plan does not meet the Goals and Objectives of the State Coastal Planning Policy. The structure plan proposes a function centre and restaurant approximately 40 metres from the high water mark and chalets some of which are not much further back. This is far too close to the beach and with rising sea levels and an increase in storm activity in recent years would put the development at risk and cause significant opportunity for coastal erosion.	
90.		In this particular location, a combination of rising sea level, increasing frequency and severity of storm surges and tsunami poses a serious threat to the safety and stability of the hotel, and could be catastrophic even within the 50 year life-time proposed for the hotel. If the City of Albany Council approved the development knowing of this possibility, they would be responsible for any loss of life. If the Middleton Beach development is thought to require protection by a sea wall, the proposed development on Lot 660 at Goode Beach would require much greater protection. The argument contained in Structure Plan 9 that the resort hotel would only be expected to last for 50 years is not a reasonable excuse for omitting such protection. SPP 2.6 and Western Australian Planning Commission Policy DC6.1" say that the setback from the vegetation line should be at least 100m for a development on solid ground where the coastline is stable. The development is proposed on sand dunes within 60m of a shore that is expected to undergo substantial erosion in the coming years. As per the SPP2.6: • The area is a place of unique landscape, scientific and cultural significance and therefore should be conserved and managed including geomorphological, ecological, anthropological and historical sites. • Development should not occur on or adjacent to unstable or mobile dunes. • Development adjacent to enclosed … water bodies … should not impact upon processes such as nutrient cycling and should seek to avoid eutrophication or altered nutrient loads. Most of the wastewater from the proposed resort hotel would pass generally less than 2m though pure quartz eolian dune sand before reaching the Lake Vancouver groundwater. • Natural water movements, including ocean water and groundwater should not be significantly altered or affected by development. The changes to the groundwater regime, as a result of the development, would probably increase the percentage of total water going towards the lake and wetland.	

		• Where on-site effluent treatment and disposal systems are proposed, account must be taken of soil depth, soil absorption rates, soil absorption ability and whether the superficial water table is in hydrologic connection with the sea and enclosed water bodies • Should consider prohibiting high value developments and infrastructure in at risk areas in favour of low cost activities • The policy…requires consultation and engagement strategies with the community based on encouraging informed input into decision-making processes • A coastal planning strategy and/or foreshore management plan should be prepared to support proposals on the coast • In the application of the precautionary principle, private and public decisions should be guided by: (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and (ii) an assessment of the risk weighted consequence of various options	
91.		Setback should comply with state setback – 100m	
92.		The proponent discounts this risk/threat from sea level rise because the project '*has a 50 year life span'.*	
93.		There are huge concerns as to the degradation and damage that will be done to the area particularly with the resort's proximity to the fragile coastal dune environment and to Lake Vancouver. I note that buildings are planned within 60 metres of the beach. With increased risk associated with climate change and the consequences for coastal locations, the assurances that there will be limited impact on this special area seems questionable.	
94.		The development precinct for Lot 660 consists of steep, high primary parabolic coastal dunes with an extreme erosion risk when native vegetation is disturbed. These dunes are inherently unstable. You only need to look at the erosion that is occurring on the dunes at the end of Goode Beach opposite Mistaken Island to see how readily the dunes disintegrate.	
95.		The development plan shows buildings to be constructed within the existing Parks and Reserves coastal zoned land, and within 100m of the mean coastal water level. The development attempts to justify this by stating the development only has a 50 year time frame and as such only a 50 year time frame is needed for consideration of coastal development set back. This approach is not justified in any known policy, past practice or planning decisions and is not consistent with the State's Coastal planning policy that clearly requires consideration of a 100 year time frame. The Development plan is flawed in proposing a coastal set back based on development life frames.	
96.		We are concerned that the proposed clearing of vegetation and reshaping of 2.1ha dunes to allow construction of the proposed resort has the potential to transform the dune landform from stable to unstable.	
97.		Development should not occur on or adjacent to unstable or mobile dunes.	
98.	Department of Biodiversity, Conservation and Attractions.	As identified under 'Survey Restraints' section 4 of the "Targeted Survey for Western Ringtail Possum, Main's Assassin Spider and Black Cockatoo" it is noted that there were limitations with the survey for western ringtail possums and a more detailed survey should be undertaken.	
99.	Department of Biodiversity, Conservation and Attractions.	It should be noted that vegetation associations described as being present on site, do provide foraging habitat for Carnaby's Black Cockatoos in other areas (e.g. ARVS unit 3, coastal heath and 5, limestone heath) and confirmation in regards to clearing is requested.	
100.		Three Black-Cockatoo species are present in the area – Carnaby's Black-Cockatoo, Baudin's Black-Cockatoo and the Forest Red-tailed Black-Cockatoo, and all are listed as threatened under both state and federal legislation. These species, along with the Western Ringtail Possum, require a referral to the federal Department of Environment and Energy under the *Environment Protection and Biodiversity Conservation Act 1999*.	

101.		If the predicted erosion was to occur, the effective built portion of the development may be right at the sand dune line within 50yrs. The Council should not be accepting the potential issue that may occur in the future similar to what is currently occurring at Emu Point. Access roads, carparks, swimming pools etc, should not be within the potential coastal erosion area as this will encourage plant species to be placed that are not as effective as maintaining the dunal system. The positioning of the site access road is such that it is off-set from the lake to maintain sufficient environmental buffer. The proposed system should be backed up by independent testing data at an existing site similar to the one proposed (size/demand, soil types etc) demonstrating that it is doing what it says it will do. The suppliers of such systems are keen to demonstrate that their system works, so they should be able to provide such data and be willing for it to be independently tested and confirmed prior to acceptance by the CoA. There must be a requirement on the development that (as a minimum) 6 monthly testing, recording and reporting (to CoA) is undertaken for the life of the development in regards to the treated water quality observed within and adjacent the site, in particular, adjacent Vancouver Lake and the beach. This will provide a clear indication of whether the wastewater treatment system is performing as designed. The proposed layout / location of the water quality test bore sites, the testing regime and the process of testing is to be agreed to by the CoA. The tests should be undertaken and reported on by an independent contractor and lodged to the CoA. City of Albany needs to have legislation / agreement / contract (not sure the mechanism) with the developer / operator that allows the CoA to enforce the developer / operator to abide by the water quality testing and requirements and has the ability to shut the operation down until it is rectified. Again note that I have not been provided (nor was I able to download from Council website) the Appendix documents which I am assuming would have provided more detail in regards to the proposed wastewater treatment system proposed. Maintenance of invasive plants as a result of clearing for the development is always difficult. Again, the CoA should have the ability to enforce the developer / operator to maintain the immediately adjacent area to its nature state as inevitably weeds will start to impact adjacent remnant vegetation outside the area labelled “hotel managed”. The beach access landing points, path ‘running surface’ (eg raised timber, timber and chain etc) and angle of path, need to be designed to ensure they are considerate of the predominant winds that will cause scour and erosion in the dunal system.	
102.		It is still fragile today, and will remain so for a hundred years and beyond. I maintain that all reports prepared on the environmental issues pertaining to Lot 404/601 over the past three decades are still relevant, and should be referenced and considered very seriously when assessing the current proposed resort development.	
103.		Major concern is that a development of this scale and density is proposed to be built on a small piece of land lying between two fragile ecosystems, one being a wetland the other being coastal dunes. In 2008 the Department of Water, through the South Coast Wetland Monitoring Project, published a brochure called ‘*Lake Vancouver’*, this study concluded *“the main consideration for Lake Vancouver is to maintain the integrity and protection of this relatively pristine coastal system*”. The monitoring project discovered that there are already higher than recommended levels of nitrogen in the lake and a resort development would lead to an even higher level of nutrient	

		runoff from lawn fertilizers and sewerage. The effects of this would be algal blooms in the lake and degradation of biodiversity. I don't think a lake covered in algal bloom and surrounded by dying vegetation would attract many visitors. Not to mention the mosquitos which would become rampant due to the loss of habitat for bats which feed on these insects. Our next concern is that of the 50 year life span of the development. Have the developers only stated this to avoid planning for the risk of sea level rise? What do they plan to do with the buildings after 50 years? I find this an irresponsible mindset, considering it may not be them that is left to maintain or remove the development. I believe if the resort only has a life span of 50 years that the City should demand a commitment by the developer or any current and future owners to remediate the site, including the lake and bushland surrounding it. It is our understanding that most developments are now set back by 100m from the beach. These setbacks provide many ecosystem purposes, maintaining water quality, coastal dune stability and biodiversity corridor integrity. It is not only the dwellings which encroach on these setbacks. The proposed exit/entry road along the current firebreak actually runs through part of the wetland. Changing the current firebreak to a road would change the hydrology of the area and bring with it the danger of weed infestation and dieback infestation. Endangered Black cockatoos feed on Banksia that grow around the lake and this species of tree is also particularly vulnerable to dieback. We find it unacceptable that a plan can be put forward for a development between two fragile ecosystems without sufficient setbacks to preserve the very pristine environment which tourists come here to see and in which current residents have chosen to make their home.	
104.		Serious environmental concerns which have not been adequately addressed in the current plan. My understanding is that the proposed development will may a serious impact on the delicate balance that exists in the wetlands surrounding Lake Vancouver.	
105.		Main environmental concern would be the potential effect of treated effluent and stormwater run-off on the groundwater system that is responsible for Lake Vancouver and the surrounding wetlands. I understand that treated effluent and stormwater will be irrigated in a sub-surface procedure over an approximate 4000m2 area within the proposed development site. As the development site will be positioned directly over part of the subsurface freshwater aquifer that is connected to Lake Vancouver, my concern would be that the treated effluent and storm water has the potential to enter Lake Vancouver and adjacent wetlands via infiltration. There may also be potential for contaminated storm water to directly access the wetlands as run-off from the development site and access road. It has been stated by some that the location of the proposed development may result in inundation of Lake Vancouver and the associated wetlands through either sea level rise and/or storm activity resulting in erosion of the development site from the east leading to subsequent inundation. I do not fully concur with these assertions being reason to oppose the development because of the following: I) Any substantial rise in sea level above 1.5-2m would result in Lake Vancouver and the wetlands being inundated from Princess Royal Harbour where much of the land on Vancouver Peninsula at the eastern end of the harbour is below 2m AHD. Unless there is something done to prevent sea level rise within the harbour, I do not see how it would be possible to prevent inundation of Lake Vancouver from the west. ii) Should there be sufficient storm activity to cause erosion of low lying areas within the existing frontal dune system adjacent to Goode Beach, there are at least five other similar areas of low-lying topography between 150m and 1400m north of the proposed development site where similar erosion would occur leading to inundation of low lying areas of the Vancouver Peninsula and potentially inundating Lake Vancouver. The main concern would be that the site of the proposed development is the closest of these low-lying sites to Lake Vancouver. Consideration could be given to ensuring that a significant portion of the development site is sufficiently high to prevent any ingress of sea water to the wetlands.	

		Concern has been expressed that the clearing and levelling of sand dunes at the site of the proposed development will lead to further erosion of the dunes and deposition of sand into Lake Vancouver and adjacent wetlands through wind activity; particularly in summer when the prevailing wind is from the south-east and east. Significant comment is made about the 'fragility of the dunes'. These above-mentioned concerns could be alleviated. Aurora Environmental has already flagged that measures would need to be undertaken to prevent further erosion and removal of sand by wind action. Procedures to consider could be: i) Commencement of clearing and levelling in autumn/winter months when the prevailing wind is from the southwest (ie away from Lake Vancouver) ii) Immediate capping of exposed sand by some form of temporary or even permanent cover that is less susceptible to wind erosion iii) Use of sprinkler systems to wet down the sand areas during levelling and construction to reduce the potential for wind-blown sand. This method was successfully utilised on a nearby building site (Lot 664, La Perouse Road) once the dune had been cleared for house construction.	
106.		Increased storm velocity along our coast is happening, which in time will erode the coast and development. Leave our coastal sand dunes alone.	
107.		It is our understanding that most developments are now set back by 100m from the beach and in this plan it shows that the cleared/grassed areas will be inside the 100m setbacks. These setbacks provide many ecosystem purposes, maintaining water quality, coastal dune stability and biodiversity corridor integrity. It would be unacceptable to disturb the vegetation around the lake or on the coastal dunes within the 100m buffer. The proposed exit/entry road follows the perimeter of the lake along an existing firebreak. This current fire break is through wetland and would require infilling to raise the level of land that is inundated during the winter. Infilling this land to enable a six meter wide, two way road would change the hydrology of the area and thus potentially killing existing vegetation that will be further inundated. Expanding this road to become a six meter two way thoroughfare will increase the potential for weed and dieback infestation of this pristine bushland. Native fauna will be impacted by more vehicle traffic and there is a well understood land management effect called the 'edge effect' which will certainly occur as a result of opening up this area to increased human traffic and interference. Bats are common in Goode Beach and they inhabit the Paperbark trees around the lake. The bats have a beneficial function for humans living close to a lake and that is keeping insect numbers in balance. However bats are nocturnal and do not roost in places where they will be disturbed during the day. This entry/exit road will disturb the bats. Endangered Black cockatoos feed on Banksia that grow around the lake and this species of tree is also particularly vulnerable to dieback. The plan provides a map indicating the 50 yr sea level rise and impact zone, however the proponent discounts this risk/threat because the project '*has a 50 year life span'*. Sea level rise will likely also contribute to the level in the lake rising and quite possible the salinity of the lake will increase with less rainfall (from climate change) and less outflow of groundwater to the ocean. This could potentially mean that fringing vegetation that does not tolerate higher salinity will die and thus the fringing/riparian vegetation buffer will be reduced and degraded through this process not to mention the impacts from the development. In 2008 the Department of Water, through the South Coast Wetland Monitoring Project, published a brochure called '*Lake Vancouver'*, this study concluded *"the main consideration for Lake Vancouver is to maintain the integrity and protection of this relatively pristine coastal system*". This monitoring project detected higher than recommended levels of nitrogen in the lake and the resort development would likely contribute to an even	

		increased level of nutrient runoff from fertilizers and sewerage and the follow on effects would be algal blooms in the lake and degradation of biodiversity.	
108.		My long term major concern regarding this development is the storm damage from the ocean. In my memory many storms have eroded the sand dunes and in time, left to nature, the sand returns to the area. I have genuine concerns regarding the sewerage system and waste water from the motel and carparks. I am concerned there could be a malfunction and any waste will flood into Lake Vancouver. I feel that there should be a total restriction on washing of vehicles in the motel car park. Will the Motel developers be 100% accountable for any remediation that may be required at the lake in the event of an accident?	
109.		The ecosystem of the wetland and Lake Vancouver would be endangered. During the construction process when vegetation is cleared sand and contaminated earthworks could blow into the lake. Increased traffic could interfere with the free movements of fauna. Traffic pollutants can damage frog populations. The proposed access road off La Perouse Road would need to be constructed to avoid winter flooding and could lead to contamination of Lake Vancouver. It is a shame to destroy the ecosystem of the dunes for a resort that will only last 50 years.	
110.		The large development could only have an extremely negative impact on the fragile and complex nature of both the sand dunes and Lake Vancouver. I understand that the Lake has pristine water and marshlands around it.	
111.		Disposal of the treated effluent from 50 units, restaurant and pool will run into and pollute Lake Vancouver during the summer months when the water table is lower. This pollution would be irreversible and catastrophic. Monitoring of the ground water and modelling of effluent disposal needs to be carried out for at least a year to establish the impact of the development on the shallow groundwater envelope on which the resort hotel is to be built. The proposed buildings are to be 2-3 metres above sea-level, when rising sea-level is a given, this is very irresponsible of the developers to build so close to the sea. The Proposed Structure Plan No 9 does not seem to have allowed for storm surges that could well funnel into the complex once the dunes are denuded.	
112.		The proposed building site is located upon fragile ecosystems and as such need to be preserved as a priority. Introducing tourists in such a commercialised way will wreak havoc on the delicate eco systems, increasing the likely hood of more rubbish and waste. The site will also cut off green corridors within the area.	
113.		Environmentally sensitive area. The choice of the relatively thin strip of land between one of the most significant freshwater lakes in the Albany area and the beach is not defensible. The total destruction of the local vegetation and fragile sand dunes in the vicinity of the proposed development is just not acceptable. The setback of only 70 meters places the development and the lake (which is currently protected by the dunes) at considerable risk in the increasingly likely event of a storm surge similar to that which occurred in 1921.	
114.		There needs to be ongoing diligent regular examination by the relevant government authorities on the non-disturbance and water quality of Lake Vancouver.	
115.		Concerned about the impact this development will have on such a pristine untouched environment.	

116.		This is a significant wetland area.	
117.		Those dunes create the suburb's protection from the sea. They presently need weeding, revegetating and stabilising, not clearing and redistribution. The place is becoming more urbanised around the lake and this would be too taxing for the environment. Additional infrastructure poses threat of irreversible loss to local flora and fauna. The Vancouver Peninsula's Banksia brownii is labelled as critically endangered under the Wildlife Conservation Act. Its greatest threat is habitat loss, disturbance and modification - exactly what this development with ensure.	
118.		Concerned about adverse Environmental impact on the bushland and Lake Vancouver. I believe that further development can only make adverse impact on the flora and fauna of the immediate area.	
119.		The resort building site is located on low stability coastal sand dunes, adjacent to a dynamic coastline facing rising sea levels, with Torndirrup Peninsula's only freshwater permanent wetlands (Lake Vancouver) right up against the western edge of the site. The formation of surrounding dunes and very low altitude of the site form a funnel for storm surge to break through the dunes flooding the resort site and injecting sea water into the freshwaters of Lake Vancouver and adjacent wetlands. Further research is needed, the site's fresh groundwater perched above a saline water table likely flows seasonally into Lake Vancouver. Consequently, the development would need the highest standard of groundwater protection from pollutants associated with the resort and associated roads. Evidence of sufficient investment to such standards is not provided by the proponents of Structure Plan No. 9.	
120.		I can't see how such a development could have anything but a strong negative impact on the fauna using Lake Vancouver and what's left of its surrounds. Lake Vancouver is a unique habitat and it already has been badly affected. It's my belief that a large development will further compromise the fragile environment.	
121.		I believe we should be preserving our natural wetlands. I feel this proposal will affect this.	
122.		The first stage of putting a road to the building/accommodation site will cause irreversible destruction on the edge of the lake and winter wetlands. Earth-moving machinery, weeds and dieback go hand in hand and "damage management" is too late with culverts, drainpipes or whatever.	
123.		Concern about the destruction of the sand dunes. It will only take one significant storm event to destroy the dunes which protect not only Lot 660, but also the dunes. Setback to the beach should be 100m.	
124.		The current proposal does not give accurate information concerning likely destruction of the dunes from sea events, clearing, road works, including the 6m wide "emergency exit" parallel to the beach, etc. The proposal does not provide sufficient information concerning the likelihood of pollution of Lake Vancouver. The proposal does not provide sufficient information concerning the certainty of destruction of flora and fauna habitat, and the disturbance it will cause to fauna, particularly nocturnal fauna.	

125.		Prior to development of the current 10 Tourist Chalets that may be considered for this Lot, or the endorsement of a structure plan, a full EPA study and approval that includes sand-dune beach erosion and a hydrology investigation over a 2 year period is essential. If approved, the destruction this proposed development will cause, with bulldozers pushing a track through the sand dunes to get to the area they will flatten for the Resort, plus the Access Road on the West of the Lake, combined with the containment of sewerage, drainage etc. is huge. Even the latest Biomax have leaching problems if not serviced regularly. Albany cannot risk losing this "Treasure". It should be used into the future for scientific studies and for students and residents to enjoy nature - the birds, frogs and even snakes. The Lake Vancouver needs to be protected, including the vegetation surrounding. Habitat for Black Cockatoos also needs to be protected.	
126.		Against the proposal for the following reasons • Impact of proposed size of development • Road network barely adequate for existing developments • Adequacy of egress in the instance of a bushfire • Environmental impact – Lake Vancouver, flora and fauna.	
127.		Against the proposal for the following reasons • Setback from ocean • Height above current water level • Black water treatment (effluent) 100m from Lake Vancouver.	
128.	Department of Water and Environmental Regulation (Environmental Planning Branch, EPA Strategy and Guidance).	The original proposal was for a residential subdivision and the new proposal is for a resort complex. It is possible that the proposed change could be assessed under s45C. The proponent will need to demonstrate that the proposed changes meet the criteria for a s45C, ie: the change or changes to the proposal must not have a significant detrimental effect on the environment in addition to, or different from, the effect of the original proposal.	
129.	Environmental Protection Authority	In relation to request to change Ministerial Statement 319. The changes proposed (intensive tourism development comprising 51 units and associated infrastructure with a development footprint of 2.1 hectares (ha) within the newly created Lot 660) constitute a new proposal as the EPA assessment and the Ministerial Statement did not consider an intensive tourist development. It is recommended that the s.45c request is withdrawn. It is recommended that the new proposal is referred to the Environmental Protection Authority under s.38 of the EP Act or alternatively, the EPA will consider the proposal as a scheme amendment under s.48A of the EP Act. If a new proposal is referred to the EPA under s.38 of the EP Act, it may still be necessary to amend MS 319 to either remove the area of Lot 660 from MS 319 or clear all the conditions. This is less likely to be necessary if the EPA considers a scheme amendment.	
130.		It has been deemed previously that development should not occur on or adjacent to the unstable or mobile dunes.	

131.		Concern that effluent will contaminate ground water and Lake Vancouver	
132.		Rubbish disposal issues.	
		BUSHFIRE	
133.	Department of Fire and Emergency Services.	DFES is supportive of the integrated and clustered style of development proposed by the concept plan within the structure plan report and recommends that this style of development be enforced at subsequent planning stages (if not already a provision of the structure plan). DFES recommended that consideration be given at subsequent planning stages (subdivision and/or development) to the Guidelines (Version 1.2) Section 5.5.2 'Developing a Bushfire and Emergency Evacuation Plan' which now contains further detail in regard to what an EEP should include, when finalising the EEP for submission to the City. DFES acknowledges that there are two access routes available to/from the development, however they are to the same destination. The vehicular access is non-compliant as both proposed access routes exit onto the same non-compliant dead-end road (La Perouse Road) where access to two destinations is not available.	Uphold concerns in relation to bushfire and recommend development of a refuge building. • The subject structure plan area is located within a bushfire prone area. Development is therefore required to comply with State Planning Policy 3.7 and including a Bushfire Management Plan and Emergency Evacuation Plan. The Department of Fire and Emergency Services stated that the proposal does not have adequate access. Because of non-compliant access, DFES recommended the development of a 'Refuge' area or building that complies with the following: o in close proximity to the development; o safe to travel to in a bushfire emergency; o appropriate for both the amount of people on site and the risk; o max BAL – 02 is to be achieved for Refuge Open Area; o max BAL – 10 is to be achieved for Refuge Building. Compliance with Design and Construction of Community Bushfire Refuges – Information Handbook (2014); o Safe access to refuge area/building. • Subsequent to DFES advice, a certified practitioner confirmed that it may be possible to develop a refuge building at the subject site, with a heat flux rating less than the min 10kW/m^2. • **Consistent with State Planning Policy 3.7 and DFES comments, the following conditions are recommended:** o **Development of a refuge building that achieves a heat flux rating less than 10kW/m^2; and** o **Development and implementation of a Bushfire Management Plan and Emergency Evacuation Plan, to the satisfaction of the City, in consultation with the DFES.** o **All proposed habitable buildings are to be located in areas subject to a BAL rating of BAL 29 or lower.** o **All residential buildings and, as far as is practicable, non-residential developments, are to incorporate the bushfire resistant construction requirements of the Building Code, including as appropriate the provisions of AS3959 Construction of Buildings in Bushfire Prone Areas (as amended), commensurate with the bushfire attack level (BAL) established for the relevant portion of the site.** o **Development is to incorporate an Asset Protection Zone that is to be managed to reduce bushfire hazard to an acceptable level.** o **Emergency access being provided to the satisfaction of the City.**
134.		Increased risk of fire ignition.	
135.		Concern in relation to safety of guests in the incidence of a bushfire.	
136.		Concerned about bushfire hazard. It is unlikely that casual tenants in a holiday resort situation will have the same anti-fire attitude as those who live here permanently and could pose an increased risk to all.	
137.		Construction of the proposed access and egress roads for the resort will give considerable fire protection to both the resort and all the existing residences in Goode Beach settlement.	
138.		Bush fire emergency evacuation for up to 120 additional people (many of whom may not have their own vehicles) would overload the current emergency plans and put residents and resort users at further risk.	
139.		Risks to public safety during wildfire are significantly increased by this design, to the point of being unacceptable, which is counter to the Minister for Transport's announcement in 2013 of a 'process to determine, where possible, safe alternative access for South-West communities at risk of fire', following the devastating Gracetown fire of 2011.	
140.		The structure plan does not adequately address bushfire risk.	
141.		No provision for additional roads escape routes is proposed.	
142.		The FBA has been involved in extensive consultation with the Fire Officers of the CoA since the November 2015 bushfire. The overarching advice given to the community is to have individual survival plans ready in the event of a fire, and not to rely on direct help or instructions from fire-fighting agencies. The resort community, with many guests unfamiliar with local roads, is unlikely to be so well-prepared, and safe evacuation would be a major concern.	
143.		The proposal overlooks the dangers to guests, employees and locals in the event of a major bushfire incident.	
144.		There are real concerns about fire evacuation - a resort with that much accommodation will mean many more people to evacuate in an emergency in a cul-de-sac. This will put resident's lives at risk.	

			o **Water being provided for dedicated firefighting purposes, in accordance with a Bushfire Management Plan developed in accordance with State Planning Policy 3.7.** o **As an ongoing condition, occupation of the site is to occur in accordance with an Emergency Evacuation Plan developed to the satisfaction of the City and in consultation with the Department of fire and Emergency Services.**
145.		In the event of a bushfire, the increased numbers of people attending the resort, the restaurant and or the function centre could endanger themselves and the residents of Goode Beach due to the limited exit routes by road from this suburb.	
146.		Increased population will need to be considered in management of safety during bushfire emergency.	
147.		Currently there is only one road entry and exit to Goode Beach. Having an entry/exit point from Quaranup Road would also provide locals with an alternative exit in case of fire.	
		BUILDING SCALE/DESIGN	
148.		Consider developing without impacting on views to the ocean from the dwelling at 69 La Perouse Road. Consider developing single storey buildings. Consider using materials and colours that soften the appearance (e.g. green roofs).	Dismiss concerns relating to building scale and design. Concerns include: • Impact to views; • Obtrusive lighting; • Setback to lake Vancouver and ocean; • Scale of development not in-keeping with current standards; and • Lack of car parking. Uphold comments relating to: • Use of a mixture of building materials and blending building design (e.g. colour and use of materials) to natural surrounds. • Concealing incidental building elements such as water tanks and rubbish bins; • Limiting floor height of development; and • Limiting use of lighting. The Local Structure Plan No.9 has been submitted to justify variations to scheme zoning and reserve boundaries and scheme provisions. The structure plan is proposing: • 'Holiday Accommodation Precinct' comprising 10 holiday accommodation buildings totalling 51 units, a function centre, a café/dining/restaurant and manager's residence; • 'Development Buffer Precinct', comprising asset protection, car parking and access; and • 'Remnant Vegetation Precinct'. It is recommended that the proposal is supported for the following reasons: • Buildings are proposed to be limited to two storeys high. • Development is proposed to be setback from the coastal foreshore (68m) in accordance with the State Planning Policy 2.6 – Coastal Planning. The structure plan included a coastal management strategy, developed in accordance with the requirements of the State Planning Policy 2.6, Coastal Planning. The coastal management strategy outlined the potential implications of future sea level rise on the coastline and presented a future adaptation pathway whereby the risk of future coastal change is borne completely by the landowner. • A maximum of 10 chalet/cottage units may currently be considered for development in accordance with the City's scheme. The structure plan, which is a guide to inform future planning (e.g. scheme amendment process), is seeking a variation to current standards to enable: o 10 two storey buildings comprising approximately 5 units each;
149.		Waste treatment plans, water tanks, air conditioners and any other elements of the site that are required to be concealed from guests are also concealed from residents that have a view of the site. Buildings are restricted to single storey and do not go over the legal height limits; • External lighting is designed to be unobtrusive and buildings are designed to restrict the visibility of internal lighting from the residents of Goode Beach; • The site does not exceed the legal setback limits to the beach.	
150.		Service elements of the development such as waste skips, workshops, storage areas, car parks, water treatment plants, air conditioning plants and the alike would likely be situated at the rear of the development so as to not interfere with the guest's visual amenity, with little regard for current long term Goode Beach resident's views. The light emitted from the proposed development would severe impact on astrological observations uninhibited by artificial light in the foreground to the North. Lighting should be completely unobtrusive and perhaps even a curfew on external lighting. The proposed development is in breach of the current high water set back line. The development should adhere to the current set back requirement and does not encroach to within 40 meters of the high water mark. The development should adhere to the current scheme standard of 10 units only.	
151.		Changing the size of the development from the previously permitted 10 chalets to 51 units, with a possible 122 tenants plus staff, is a radical departure in the land use and scale of impacts. Insufficient detail on the actual buildings has been provided to assess what is intended.	
152.		I consider that the size of this proposed development is far too large: • for the available site, as it so close to Lake Vancouver; • for the fragile environment of the site; and • for the significant changes it will cause to the Goode Beach suburb and residents.	
153.		There should be a reduction in the overall development size to minimize impact on existing wet lands and natural sand dune vegetation.	

			o A function centre; o A café/dining/restaurant; o A manager's residence; o A 'Development Buffer Precinct', portions of which encroach outside of the 'Special Use' zone boundary; and o A 'Remnant Vegetation Precinct'. • The building footprint is varied marginally and the building footprint is somewhat decreased. The current Special Use site designated on the scheme map amounts to approximately 2.6ha. The proposed structure plan development footprint comprises 2.1ha (smaller). • The proposed 51 units is comparatively smaller than other tourist accommodation complexes approved in popular tourist areas such as Bunker Bay (Dunsborough WA). The Bunker Bay resort consists of 150 units and functions to provide a much needed high quality eco-tourism facility. • Proposed variations, which includes additional developments (e.g. restaurant) are designed considerate of legislative requirements including: o Department of Health and Water Corporation servicing standards; o Reference to the Biodiversity Act, which seeks to protect threatened species; o The Western Australian Liveable Neighbourhoods document for traffic design; o The State Planning Policy 3.7 Planning in Bushfire Prone areas; o The State Coastal Planning Policy 2.6 – Coastal Planning; o The City's Local Planning Scheme No.1 for setbacks to wetlands; o The Draft Government Sewerage Policy 2016 for the appropriate setback to wetlands. • Majority of current scheme standards are being maintained, including: o Buildings clustered o Minimising clearing o Designing buildings to blend with the site o Coastal setbacks o Foreshore management plan o Management of storm-water and effluent disposal to limit impact on the Lake Vancouver o Potable water supply o Implementing bushfire management criteria • In relation to car parking, the City'c Scheme states the following for hotel and motel: o 1 per employee + 1 per 3m^2 bar area + 1 per four seats in dining area + 1 per bedroom + 1 per 4m^2 other public areas. • In applying the above standards to the structure plan, approximately 73 car parking bays may be required (10 employees + 10m^2 bar area + 40 seats in dining area + 50 bedrooms). • The structure plan is currently proposing 53 car parking bays, a shortfall of 20 bays. It is recommended that additional bays are provided to comply with the standards of the scheme. **It is recommended that the following provisions are included:** • **The subject Lot 660 is to be maintained as one entitlement.**
154.		The parking provision in the LSP appears seriously inadequate. The LSP shows 50 car bays for 51 accommodation units (53 in the Traffic Impact Assessment); presumably the numbers are meant to be the same. It doesn't show any parking spaces for staff or for casual visitors using the café/restaurant, function centre and any other facilities. It's possible that the LSP is deliberately ignoring this for now, with the intention of coming back later in the process and saying "Actually we're going to need 20 bays for staff parking and a further 40 for casual visitors. Without this the project isn't viable, so you have to let us increase the area to be developed."	
155.		The southern face of all resort structures should be painted either black or olive green to minimise visibility from within the Goode Beach subdivision. A sighting from Karrakatta Road, of the black painted house on Lot 664 La Perouse Road, demonstrates how the building is hidden in the surrounding bush shadows. Lighting at the resort should be directed to the North so that there is no light display towards Goode Beach residences. Windows on southern walls should be minimal in size with all large glassed areas facing north or east. Objection to display of light from the resort has to be compared with the generally accepted lighting of three or four ships in the Sound at night. This is quite common during port operations.	
156.		The scale of development patently exceeds that allowed by LPS1. The size of the proposed resort is downplayed. It is implied that the occupation of 10 chalets would present the same environmental and social hazard as a 51---unit resort. If the resort were to go ahead as planned it would dominate the community and radically change its tranquil milieu.	
157.		The proposed development is much larger than that envisaged as an Eco-Village with up to 10 chalets. I would have thought a 10 chalet development would cater for no more than 40-50 persons. I note that this proposal is for up to 122 persons plus staff, which is hardly a low key development.	
158.		The concept of a resort such as that at Bunker Bay (according to the architect) is completely at odds with this area and the original application for max 10 chalet style units. This proposal is far too large for this quiet partially residential location. If any development occurs in this area it should be small scale, natural and camouflaged in keeping with the environment and for people who are interested in the natural environment who want to access the local attractions, beach, bird hide at the lake, walks, whale world etc.	
159.		It is far too big and will have a huge impact on the environment including increased traffic, excess noise, increase in numbers of people, increased lighting, removal and destruction of beautiful natural bushland. The Goode Beach environment is a beautiful, natural, peaceful, and unspoilt place to live and visit. The development proposed will ruin it.	
160.		The number of units planned is far greater than permitted and will impact on the environmental and traffic.	
161.		The land is zoned is for 10 chalets, the proposed 51 units on 10 buildings, together with function centres, restaurants is simply too large for the area and goes against the zoning. There needs to be more detail as to the type and elevation of the development, to ensure that it is sensitive to the area.	

162.		The proposal in its present form is much larger than was deemed to be appropriate for the area. The development is too much of an environmental risk to the adjacent pristine wetland area of Lake Vancouver. The appeal to me as a local resident is the quiet, remote and peaceful nature of the Goode Beach area. This will be significantly impacted by the proposed development with an increase in the transient population, an increase in the local vehicular traffic, and an increase in visitors to the area as a result of the development. This is likely to result in more noise - not just to the human Inhabitants of Goode Beach but also to the local fauna.	• **The structure plan (2018) proposes variations to current Local Planning Scheme No.1 Special Use zone boundary and scheme provisions. The Local Planning Scheme No.1 is to be amended prior to supporting development proposed in accordance with the Structure Plan (2018), endorsed by the Western Australian Planning Commission.** **Note:** **a) The planning scheme amendment process requires the Local Government to refer to the EPA a written notice of the proposal to amend a scheme; and such written information about the scheme or amendment as is sufficient to enable the EPA to comply with section 48A of the *Environmental Protection Act 1986* (EP Act). Schemes and scheme amendments can only be referred to the EPA by the responsible authority. Upon receipt of a scheme or scheme amendment and such written information about the scheme or scheme amendment which enables the EPA to comply with section 48A of the EP Act, the EPA will decide whether the referred scheme or scheme amendment:** • **should not be assessed (advice and recommendations may be provided); or** • **should be assessed; or** • **is incapable of being made environmentally acceptable.** **b) Prior to application for an amendment to the scheme, referral is to be made to the Department of Environment and Energy to determine if development constitutes a controlled action under the EPBC Act.** • **Development is to occur as stipulated within structure plan precincts, which include:** o **'Holiday Accommodation Precinct' comprising:** • **Maximum ten (10) two storey holiday accommodation buildings comprising maximum total 51 units (approximately 5 units each);** • **Maximum 120 persons at capacity;** • **Function centre also developed as a refuge (bushfire) building;** • **Café/dining/restaurant; and** • **Manager's residence;** o **A 'Development Buffer Precinct' comprising:** • **Access;** • **car parking;** • **Waste treatment;** • **Pool; and** • **Asset (bushfire) protection.** o **A 'Remnant Vegetation Precinct', comprising:** • **Vegetation protection; and** • **Main access, egress and max two pedestrian access-ways (to beach).** • **All development shall be subject to the issuance of a Development Approval.**
163.		The number of proposed buildings seems far too many for the size of the property.	
164.		Development is to blend with the natural surrounds.	
165.		The proposal is too big and will destroy the appearance of the relatively small lake as well as adversely affecting the peace and tranquillity of the area.	
166.		The proposal will nearly double what may be developed under the current zoning.	
167.		The proposed resort is not "low-key" in the context of its location, neither in its likely impact on the natural environment nor the local community.	
168.		This development proposal for 50 chalets will have a considerable impact to the current appearance of development and related style of living which is low density, individual dwellings. It would be unacceptable to disturb the vegetation around the lake or on the coastal dunes within the 100m buffer.	
169.		The scale of the proposed development is too large, and involves too many accommodation units.	
170.		Concerned about the number of buildings that are proposed, far more than the environmental authorities have stipulated the block can handle. Concerned that the roofs will be an eyesore in the landscape.	
171.		2.1 hectares (5acres) of fragile coastal sand dunes is being cleared for 10 large 2 storey buildings , a large 120 seat function centre and 100 seat restaurant, pool, caretaker accommodation and a range of storage and service facilities structures- this is NOT modest or low key (as was provided for in the initial approval - Maximum 10 cottage/chalets).	
172.		In a previous assessment of this fragile block of land it was suggested that a low key development of perhaps 10 chalets would be appropriate to the area. This seemed a reasonable idea however the proponent's suggestion that 51 units (61 beds, a population of 122 people) plus 50 car parking spaces, plus cafe and function centre are all to be located on a 2.1 ha parcel of land can hardly be thought of as low key. The buildings are close together, a function centre presumably allowing for further people on site, would require on site parking in addition to that for the proposed accommodation. Building a swimming pool as part of the development would seem to be unnecessary given the proximity to a pristine beach, the weather in Albany and the probability that sand from the fragile dune network would be constantly blown into it by the predominant easterly winds and pollute the water making it unusable. In short, the scale of the proposed development is too large, and involves too many accommodation units and the addition of a function centre.	
173.		The structure plan proposes a development that is 5 times the density of development that is allowed in the existing Scheme. In addition it proposes development within the Scheme's parks and reserves zoned land.	
174.		Too many chalets are proposed 5X current density.	

175.		Thirty three years ago when this Lot was created, and given the modest number and scale of the existing houses in the Goode Bch Community at that time, such a development would have been entirely out of place. However as the number and size of houses has increased dramatically in recent years, a project of such scale may now, not be out of place.	• **Prior to occupation of use, a Section 70A Notification is to be placed on the Certificate of Title of Lot 660 La Perouse Road, Vancouver Beach advising the landowner and any prospective purchaser that:** o **The lot is within a Vulnerable Coastal Area** o **The land is subject to management in accordance with the Coastal Management Strategy;** o **The risk of future coastal change is borne completely by the landowner.** • **Note:** o **A Coastal Management Strategy was prepared to accompany structure planning. The Coastal Management Strategy outlined the potential implications of future sea level rise on the coastline and presented a future adaptation pathway whereby the risk of future coastal change is borne completely by the landowner. Acceptance and acknowledgement of this risk was proposed through a notification on title as well as a commitment to undertake a managed retreat of the development at a time when identified trigger points are reached.** • **Lighting is kept low to the ground (bollard lighting).** • **Development is to be designed to blend with natural features within the area;** • **Incidental developments (e.g. bin storage areas) are appropriately screened;** • **Car parking is developed to the satisfaction of the City. Car parking shall be provided in accordance with the provisions of the Scheme. The scheme states the following standard for Hotel/Motel:** o **1 per employee + 1 per 3m² bar area + 1 per four seats in dining area + 1 per bedroom + 1 per 4m² other public areas.** • **All development shall comply with the following performance criteria:** o **The Holiday Accommodation precinct is developed to provide a unique, high quality tourist resort designed to blend (not dominate) with its natural surrounds.** o **High quality built form is provided across the site that recognises the iconic location and significance of the area (beach, foreshore reserves and Lake Vancouver).** o **The privacy of beach dwellers is not impacted via development overlooking.** o **The development of public land (access links to beach) is integrated to establish a safe and environmentally sustainable outcome.** o **An effective, efficient, integrated and safe access network that prioritises drainage management considerate of Lake Vancouver ecosystem and protection of flora and fauna.** o **Developments incorporate sustainable technologies and design including best practice with regard to energy efficiency, water sensitive urban design and fire safety requirements.** o **A reputable manager being accommodated on-site to oversee operations.** o **Areas disturbed during development are to be stabilised and/or restored.**
176.		It has been recognised for many years that the land can be used for tourism, however, due to the fragile and pristine environment it has been stated that any development would need to be "small scale....with small building footprint" (The City of Albany - Significant Tourist Accommodation Sites). The Application which includes for a 51 holiday “unit” development (1 and 2 bedroom villas, single bedroom studios and duplex rooms), manager’s residence, other (unspecified) facilities, private restaurant/café/dining and function centre (of capacities for 100 and 120 persons respectively), 4,080 square metre reticulated sewerage and (53) car parking areas across a 2.1 hectare resort development footprint certainly does not fit the description of a small scale....with small building footprint" and should be rejected by the City.	
177.		More details need to be provided to ensure buildings are designed to minimise visual impacts.	
178.		The scale of the proposed resort development is far too big for the site. As a consequence of the far greater numbers associated with the proposed resort development, when compared to what is permitted in the current scheme: • The wetlands, Lake Vancouver, and the dunes are at far greater risk • The development would double (or perhaps treble?) the resident population of Goode Beach • The environmental risks are further increased compared to a low key 10 cottage/10 key development, especially on the wetlands and Lake Vancouver. • There will be a doubling of traffic, and consequential increase in noise, and at antisocial hours • Fire Risk • Emergency Fire egress is a big concern, as there is only one way into and one way out of Goode Beach from Frenchman Bay Road. With the doubling (of more) of the population of Goode Beach due to the resort, the problems of egress will be magnified.	
179.		Will nearly double to population of the existing Goode Beach settlement.	
180.		The external colour scheme for roofs and walls should be designed to blend in with the surrounding vegetation so as not to be a visual 'eyesore'. The roofs should be completely non-reflective. Colours should be earthy dark greens/browns etc or even black. It has not been stated what the proposed form of the various buildings will be (other to say some will be two-storey construction). I think that buildings similar to those at the Bunker Bay resort would be acceptable.	
181.		Proposed complex far too big for the site for the following reasons: • Human pressure on fragile dune system • Waste water in the aquifer entering the lake • Causeway needed to enter the site • Massive increase in traffic • Huge change to what may currently be developed • 100m setback to beach required • Risk to people from Bushfire	
182.		The proposed building envelope will destroy the very fragile pristine and unique environment of the coastal dunes and wetlands adjacent to the Lake Vancouver.	

183.		If the environmental assessment states that there should only be 10 dwellings, how come the proposed plan has more and a convention centre for 120. This sounds too much.	
184.		Increase in traffic, light pollution at night, and the visual tainting of the building itself are all personal impacts, in addition to my main worry regarding the clearing of vegetation and disturbance to ground water.	
185.		It is incomprehensible that a development of the size being planned so close to Lake Vancouver and ocean could ever be considered.	
		ACCESS	
186.	Department of Water and Environmental Regulation. (Submission 1)	The proposed access road will impact upon the habitat values of the lake and the reserve.	Dismiss concerns relating to access. Concerns include: • Internal access will impact upon the habitat values of the lake and the reserve; • Impact of supply vehicles on local roads. • Increased traffic will impact the Goode Beach Character • Widening of Vancouver Road • Alternative access (e.g. via Quaranup Road) should be considered. Uphold comments relating to: • Potential impact to pedestrians • Limiting pedestrian access to the beach; • Limiting speed limit. It is recommended that the proposal is supported for the following reasons: • Internal access roads are proposed along existing tracks; • The Engineering report and traffic data submitted as a component of the structure plan indicate that the existing road network has sufficient capacity to accommodate the proposed resort traffic. La Perouse Road is developed as an Access Street – Class C. The preferred volume of vehicles for this type of street is 3000vpd. The proposed development is expected to increase the traffic on La Perouse Road from approximately 50vpd to 150vpd, (50units x 3vpd). • At resort capacity, the increase in traffic is expected to result in an acceptable delay between vehicles of 4 minutes near the entrance to the development. • Traffic analysis undertaken for La Perouse Road (2012) confirms that approximately 75% of the vehicles travel less than 50km/h. **It is recommended that the following provisions are included:** • **Development of a pedestrian path (1.5m wide) along La Perouse Road, to the satisfaction of the City;** • **Development of internal access considerate of surface and ground water flows. The width of internal access is developed to a max 4m sealed width for main access and 4m gravel access for egress and is to include passing bays and turnaround areas. Development of signage advising visitors of internal speed limit (max 20km/hr) and wildlife (e.g. Quenda);** • **Maximum two internal pedestrian access paths developed to the beach.**
187.		The road works, and the traffic they would subsequently bear, would have a potentially deleterious effect on the vegetation and animal life around the Lake.	
188.		Impact of supply vehicles on local roads.	
189.		We have safety concerns regarding the construction standard of La Perouse Road. • There is no pedestrian path; • There is a blind bend; • The road narrows near the entrance to Lot 660; • La Perouse Road is used as a pedestrian access and vehicle parking for persons visiting the Vancouver Lake Bird Hide.	
190.		Pedestrians will be impacted by the proposed access routes.	
191.		With regards to traffic and noise there are many pedestrians' young and old - walking dogs and riding bikes on La Perouse Road and throughout the Goode Beach neighbourhood to be considered.	
192.		Traffic management and road upgrades need to be undertaken to accommodate the proposed development. Currently pedestrian access is exposed to vehicles. Alternative access to the proposed development site should be considered. Limit beach access in order to protect the environment.	
193.		Community who live along La Perouse Road will be highly impacted by traffic and noise. With many more vehicles and no pedestrian paths, there is potential for serious accidents.	
194.		The traffic increase will be a hazard to all residents.	
195.		Increased traffic would be negligible in traffic planners' terms but could affect the children who play in La Perouse Road. Possibly a 30 km/hr limit would be appropriate.	
196.		The development will bring a significant increase in traffic.	

		The road near the entrance to the resort is designed as an 'Access Street C' and not as described in the report, an 'Access Street D'. An 'Access Street D' is described in the WAPC Liveable Neighbourhoods document as 'short, low volume and low parking demand streets…narrow yield or give way street'. Because there is no footpath, the increased traffic volume will impact on pedestrians, particularly children. Suggest that a new traffic survey be undertaken across December and January in order to determine the real impact of the addition of resort vehicle numbers over and above peak day-visitor numbers.	
197.		Concern was also raised that the increased traffic on La Perouse Road would be a danger to children playing on the road. I would suggest however that a condition of the approval for the resort should be that the developers should construct a footpath on the Northern side of La Perouse Road. I understand that a request had been made for the Goode Beach area be restricted to a 40 kilometre per hour limit as is the case within the vicinity of Middleton Beach in the city. This could be implemented for Goode Beach. Construction of a traffic slowing structure at the corner of La Perouse Court and La Perouse Road would also be desirable.	
198.		Increased traffic through Goode Beach would be considerable and adversely affect the ambiance of the area and cause increased safety risk to local residents and visitors. Traffic studies performed are not thorough and safety aspects not addressed. An alternate route from Quaranup Rd/Austin Road/Shoal Bay road may impact residents adjacent to these roads.	
199.		To access the site from La Perouse Road is totally inappropriate given this is a small residential area with the potential for a massive increase in traffic and noise, this is also a pedestrian route particularly in the summer months.	
200.		Increased traffic on La Perouse Road will make my residence noisy and not as safe for my family to walk and ride along. A function centre and restaurant will increase evening traffic and may be of cause for concern should alcohol be added to the mix.	
201.		The proposed access roads direct all traffic through Goode Beach residential roads, at a minimum doubling traffic and doubling the number of people living in the suburb. No consideration is given to placing the access road on ground above wetlands and running west across the City of Albany reserve and present slashed firebreak to Quaranup Road, providing another egress route for the Goode Beach community in the event of unstoppable wildfire.	
202.		The current roads and their condition would not support the traffic generated by the anticipated number of additional visitors.	
203.		The increase in traffic noise impacts and making it less safe for the kids to play in the street and pedestrians is not acceptable.	
204.		I would like to see another in/out route for the development and that is off Quaranup Road. Having only one way in and out of Goode Beach is asking for trouble in case of emergencies. Widening of Vancouver Road is a must. With increased traffic and speeds expected, there will be accidents.	

		Footpaths along the whole of La Perouse Road. Goode Beach is a suburb where people walk, and at the moment this has to be on the roads.	
205.		Could traffic calming devices be installed along La Perouse Road, between the La Perouse Court intersection and the main entrance to the development. Access to the beach needs to be high quality…e.g. board walk with erosion control with no vehicle access.	
206.		Road access should be from Quaranup Road.	
207.		Most roads do not have line markings, shoulders nor pedestrian paths. There are blind corners and minimal street lighting. Also there are often children riding bikes or playing in and around the quiet streets, especially during the holiday seasons. I imagine that there may be serious liability issues to the council if this is not addressed. In case of fire or other emergency, current access roads will prove inadequate.	
208.		The increase in traffic as a result of the proposed tourist development is considered negligible." This is nonsense: perhaps within a big city the traffic would seem negligible, but to the residents of Goode Beach there would likely be at least a 50% increase in traffic, and much more during construction.	
209.		The increased traffic using residential streets would have an adverse impact to the current lifestyle of residents for example children can now play cricket and ride their bikes on the road at the end of La Peruse Crt.	
210.		Concerned about traffic increase through Goode Beach and on Lake.	
211.		The suggestion that an additional 150 vehicles per day (without any allowance for service vehicles or users of the proposed function centre) through the heart of Goode Beach and then via La Perouse Road is of "negligible" impact (see page 4 of report of WGE dated 19 June 2017) or that it will not have "any impact" (see page 4 of report of WGE dated 19 June 2017) is, with respect to the author, equally misconceived. The noise that will be generated by the additional traffic created by the proposed resort (or for that matter from the function centre). That the Applicants (or their consultants) do not consider that the noise from traffic warrants investigation (see answer 8(b) of the Applicants' Answers) further illustrates a lack of understanding by the Applicants (or their consultants) of the Goode Beach area. The impact of headlights from traffic accessing the resort (and function centre) at night. The suggestion (see answer 15 of the Applicants' Answers) by the Applicants or their consultants that there will not be a significant increase in traffic volume (on the WGE report, 300% along La Perouse Road with no allowance for users of the function centre, service vehicles or private users of the facilities) does not bear scrutiny. Having regard to the failure to fully consider the impact of service traffic, users of the proposed function centre or the volume of traffic (as opposed to the functional capacity of the road), the traffic analysis that has been undertaken ought to be considered to be inadequate and no reliance placed upon it by the City or for that matter the WAPC.	
212.		Safety concerns due to lack of footpaths, lack of street lighting, dangerous intersection at La Perouse Road and La Perouse Court and increase in traffic due to tourists visiting the resort.	

213.		There is one road entry to the planned resort – ie La Perouse Rd. This will take all the traffic which includes construction trucks and other vehicles, residents, staff, function and dining centre visitors, service providers etc This same road is the one access to the beach for pedestrians. The resort will be busiest in Summer and on weekends when it will be busiest with pedestrians accessing the beach. This same road has the school bus stop and associated traffic with parents collecting children in an area where there is an increase in school age population. The road itself is winding and downhill on the way in and already is subject to speeding drivers as they enter the residential zone. The data traffic data provided in the report was dated and vague and did not address pedestrian use at all.	
214.		The increase to traffic in the Goode Beach settlement has only been addressed in terms of road capacity and no consideration has been made to the disruption it will cause to the local residents.	
215.		The traffic volumes have been calculated based on 3 movements/day. However, they do not appear to take into consideration the additional traffic movements resulting from the use of the reception centre, nor the restaurant. They do not take into consideration the traffic from staff, or deliveries. To state that there will be no impact from the increases in traffic movements because the road design can accommodate the traffic volumes is extremely short-sighted. The increase in traffic, even with the stated additional movements would result in a 6 dB increase in traffic noise levels, which is considered to be a significant impact.	
216.		With this development there would likely be more council input in road restoration, footpaths and general verge tidy up.	
217.		There is only one entry/exit road to the development and the existing roads are not suitable for this volume of traffic. In case of fire or other emergency, current access roads will prove inadequate for evacuation of the combined local and resort populations. The local roads are not marked, there are no provisions for cyclists and few pedestrian paths. Lighting is poor and several junctions are hazardous already with the current volume of traffic, with specific reference to the junctions of La Perouse Rd with Austin Rd, St Georges Tce and Runnymede St. Vehicles travel at speed on La Perouse, and visibility turning into this road from these streets is poor. Most roads do not have line markings, shoulders nor pedestrian paths. There are blind corners and minimal street lighting. Children are often walking, riding bikes or playing in and around the quiet streets, especially during the holiday seasons. There is already a risk for significant morbidity or mortality to pedestrians, which can only increase with the traversing of La Perouse Rd by vehicles accessing the resort. The liability for any accident must lie with the council if such a developmental application is approved.	

218.		The projected increased traffic will affect both the safety and general ambience of the Goode Beach subdivision. Many people use La Perouse road as a pedestrian access way to either access the beach from other parts of the subdivision or to walk the La Perouse Road-Discovery Woods forest reserve area-Karakatta Road loop. Increased traffic flow would create issues as only a small part of La Perouse Road has a footpath and there is no footpath along La Perouse Road from La Perouse Court to the projected access road for the resort development. The ideal scenario would be an access road to the resort off Quaranup Road that would only go into the resort and would not connect with any of the Goode Beach road infrastructure. The only road connection to Goode Beach would be the emergency access road onto la Perouse Court which would be only be accessible to traffic in an emergency situation.	
219.		I believe the main access to this Motel should be from Quaranup Road as Vancouver Road isn't wide or safe enough to cope with the increased traffic from patrons and service vehicles. The 'Lookout' corner is dangerous now with traffic going in both directions unclear as to the road layout. There isn't a defining centre line down the road and with the current speed limit and tourists who are unfamiliar with this corner, there have been many near misses. By using the Quaranup Road as a main entry this would make a *clear emergency exit* in the event of fire. The current emergency exit via Austin Road isn't clearly posted and is confusing.	
220.		I am fearful of an increase of traffic should the proposal be approved. A 120 person capacity function centre plus a 100 person capacity restaurant plus 122 people (50 cars) making a possible 3 trips to other tourist attractions a day could result in 740 car movements back and forth along La Perouse Road in one 24 hour period.	
221.		The access to the Proposed Structure Plan No 9 from La Perouse Road is under water for 3-4 months of the year depending on the rainfall. No doubt a road can be built over this flooding but how are the developers going to avoid the vehicle pollution from entering the ground water and thus polluting Lake Vancouver irreversibly?	
222.		The proposed access roadworks exacerbate threats from polluted runoff to Lake Vancouver's wetlands, and direct all traffic through Goode Beach residential roads, at a minimum doubling traffic and doubling the number of people living in the suburb. Risks to public safety during wildfire are significantly increased by this design, to the point of being unacceptable.	
223.		I fear for my mother-in-law with only one road in and out of the area is a safety risk in case of fire with more traffic this will only make this worse. The streets and beaches are also not suitable for more traffic.	
224.		The traffic associated with such a large development will be out of proportion in the small quiet settlement and be hazardous to our native fauna as they will once again find their territories have been altered and restricted further.	
225.		The proposal provides inadequate and misleading information concerning car parks and traffic movements.	
		CHARACTER – GOODE BEACH	
226.		The increased flow of traffic will affect the character of Goode Beach.	Note concerns relating to impact on Goode Beach character. Concerns include: • Currently few vehicles on roads. Development will bring increased traffic, which inherently means increased noise and vehicle headlights at night. • Access should be developed through to Quaranup Road. • More people using public facilities and recreation, including beach means more noise, greater potential for impact to natural environment; • Development will change the visual impact from natural to urban form; and • Quiet remote area will be transformed into noisy and busy resort precinct.
227.		The development will impact on the coastline and ambience of the townsite.	
228.		The increased traffic, noise from a function centre and numbers on the beach may be presented as acceptable in the proposal but they will make a huge change to the nature of the quiet Goode Beach community, and not an improvement, in my opinion.	
229.		Impact of up to one hundred people on local facilities and beach area.	

230.		The character of Goode Beach includes: • Natural bushland environment - sights & sounds of nature are all around, • No streetlights, • Night sky lit only by the moon and stars • Very little traffic. • Beautiful, • Peaceful, • Largely 'undeveloped. The proposed plan will substantially reduce the amenity value of living in Goode Beach from many aspects. In particular the ecological impact, the visual impact, the noise impact, the night-light impact, the traffic/road impact and the fire-plan impact	It is recommended that the proposal is supported for the following reasons: • The number of persons visiting the resort (traveling on roads, paths and using the coastline and other public amenities) is expected to increase as a result of the proposed development. However, due to the remote location of Goode Beach and the limited period of tourism activity expected in the region (subject to season variation), the resort is not expected to run at capacity for lengthy periods and therefore any change is expected to be marginal. The resort proposes to be self-contained, meaning tourists are inclined to stay within the resort area utilizing services, including a restaurant, function centre and pool. • The separation of the resort area from existing developed areas (150m) limits impact. Development is also somewhat buffered by a ridge and vegetation. • The Engineering report and traffic data submitted as a component of the structure plan indicate that the existing road network has sufficient capacity to accommodate resort traffic. La Perouse Road is developed as an Access Street – Class C. The preferred volume of vehicles for this type of street is 3000vpd. The proposed development is expected to increase the traffic on La Perouse Road from approximately 50vpd to 150vpd, (50units x 3vpd). • The conceptual layout developed to inform the structure plan envisages low profile buildings consisting of one and two storey development. The structure plan is proposing to maintain current standards including: o Buildings clustered o Minimising clearing o Designing buildings to blend with the site o Coastal setbacks o Foreshore management plan o Management of storm-water and effluent disposal to limit impact on the Lake Vancouver o Potable water supply o Implementing bushfire management criteria **It is recommended that the following provisions are included:** • **The Holiday Accommodation precinct is developed to provide a unique, high quality tourist resort designed to blend (not dominate) with its natural surrounds.** • **Prior to occupation of use, an Accommodation Management Plan (AMP) being implemented to the satisfaction of the City of Albany. The AMP is to be implemented by an on-site caretaker and is to provide criteria for appropriate behaviour of tenants considerate of surrounding landholders and the environment (e.g. management of noise and rubbish).**
231.		The location of Goode Beach is a small coastal community in an idyllic setting which would be negatively impacted by increased traffic, noise day and night, night lighting, etc.	
232.		Goode Beach Character impacted by traffic. Quaranup Road should be used as an alternative access.	
233.		Goode Beach is remote, quiet and with access to a pristine coastline and national park. A resort is going to turn this area into something ordinary, robbing what is so special and unique. Visitors do not care for the environment and use our beautiful natural resources with disrespect. More people, with no connection to this country, will increase the likelihood of more rubbish and more damage to the delicate environment.	
234.		Residential and visitor amenity and safety at unacceptable risk. The wrong location for the kind of development proposed. A much more suitable alternative location already exists on the site of the old Frenchman Bay Caravan Park. Noise and visual pollution, especially associated with functions at night, are genuine concerns of Goode Beach residents who bought land in the suburb expressly because it lacked major developments nearby.	
235.		Additionally, the proposed development would fundamentally change the character of Goode Beach, especially by virtue of the substantially increased traffic flow that would result. The existing road network is not suited to such vehicle movement, and road widening and re-alignment would seem to be necessary.	
236.		Development of this size and its use will put an unacceptable risk to the beach, the wetlands, Lake Vancouver. The development will pollute the lake (run off from fertilised lawns, effluent seepage and weeds). Development of this size and its use will impact visitor and residential amenity to the area (peaceful tranquil settlement). Impacts include noise and vehicles.	
237.		Residents do not want to see a change in the character and ambience of the quiet settlement with the construction and habitation of a large scale resort.	
238.		Potential impact on local residents due to noise, increased traffic flow and possible anti-social behaviour.	
239.		It is undesirable to locate a function centre within a residential area, with potential impact on local rate-paying residents due to noise, increased traffic flow and possible anti-social behaviour.	

		The potential for noise and heavy traffic loads during night time events is unwarranted and unacceptable. Previous Investigations and Environmental Assessments should not be ignored.	
240.		The perceived impact on the local community is a significant issue in that there is always a degree of nimbyism in a project such as this, regardless of how much care is taken to explain the detail of or in remediation, regardless of what the real outcome is likely to be.	
241.		The proposal does not give accurate information concerning guest numbers for accommodation, function centre and restaurant, nor the noise generated from these areas as well as the swimming pool. The proposal does not give detailed information concerning number of employees likely to be resident and travelling to and from the venue.	
242.		I believe the development would be detrimental to the amenity of the area. There is only one entry road to Goode Beach so all new traffic would pass through the community. The development is too close to the beach, the dunes and the lake. The development will depreciate the very amenities it is promoting as its selling points; tranquillity, low population, natural environment, etc.	
243.		The area is a beautiful quiet place. There are fewer places locals can go to enjoy peace and quiet. It will be destroyed by a huge building and more noise, traffic and people. Have you looked into the sacredness of the area? I imagine not.	
244.		To place a tourist development of over 50 chalets within this area is totally at odds with its current use.	
245.		Goode Beach is extremely special as the community is isolated and it's community members have resided here for exactly that reason. The proposed resort will completely ruin this community and negatively impact on our lives greatly. The traffic, the increased transient population, the loss of tranquillity, the noise, the lights will all destroy our community and what we have moved here for.	
246.		The proposed development will impact our location in many ways, including those listed below: - destruction and defilement of the proposed location (a pristine natural area); - negative impact on the surrounding environment (especially Lake Vancouver); - negative impact on view from the surrounding houses and the whole community; - heavily increased traffic on La Perouse Road; - noise disturbances relating to construction; and - noise disturbances relating to events held at site.	
247.		Would not like for the planned resort to go ahead and also do not like the idea of an influx of people visiting the resort where it will eventuate and that there would be only one access road to the resort in and out ie Frenchman Bay Road.	
248.		If the amendment to the LPS is supported then this development proposal for 50 chalets will have a considerable impact to the current appearance of development and related style of living which is low density, individual dwellings.	
249.		Because there is limited night lights in the area, night stars are easy to see. This is a tourist asset that needs to be protected.	

250.		Residents do not want to see a change in the character and ambience of the quiet settlement with the construction and habitation of a large scale resort.	
		VIEWS/VISUAL/NOISE/LIGHTING	
251.		Our view will be severely impacted by this development. The site would be filled in to an extent that the units will have ocean views over the sand dunes, impacting our views of the coastline.	Dismiss concerns relating to views, visual and noise impact. Concerns include: • Views will be impacted by the development; • Buildings should be restricted to single storey; and • Use of the resort will create disturbing noise to existing surrounding residents. Uphold comments relating to: • Limiting floor level and building heights; • Limiting artificial lighting at night. It is recommended that the structure plan is supported for the following reasons: • Buildings are not expected to be visible from the beach due to the height limits and a sand dune located between the beach and development. • The majority of Goode Beach is located on higher ground, which overlooks the subject site. Panoramic views to the ocean are not expected to be impacted due to future conditional development. • The development site is proposed in an area of depression – relative to surrounds. A ridge located between the proposed development site and the foreshore (beach) is expected to screen development. • Future development is proposed to be developed sympathetic to the natural surroundings. • Surrounding vegetation and landscaping is expected to provide screening and visual enhancement to surrounds. • Finished floor levels and building heights (2 storey) are proposed to be limited to protect the privacy of beach users. • Development is proposed to be clustered in the northern precinct of the subject lot – away from existing development and in a hollow. **It is recommended that the following provisions are included:** • **An accommodation management plan (noise) being implemented via a caretaker on-site.** • **A finished floor level greater than 2.4m AHD and setback behind the 2066 Erosion hazard Line as shown on the Structure Plan;** • **Finished floor levels for buildings not exceeding 3.5m AHD. Variation to a maximum 5m AHD may be considered under the following circumstances:** o **Justification to the satisfaction of the City, that cut and retaining to achieve a 3.5m AHD is necessary and that the retaining may compromise the amenity of development (retaining above a height of 2m is considered excessive); and** o **Justification to the satisfaction of the City, that two storey development does not visually dominate the landscape when viewed from the ocean and surrounding developed areas; and**
252.		Views will be severely altered to the negative should the proposed development go ahead. All buildings should be restricted to single storey. Land fill should not be used to raise any part of the site above current ground level.	
253.		At present we can see out to sea and enjoy the dark & beautiful night sky. At night the whole development will no doubt be ablaze with bright lights.	
254.		We will clearly see the resort every time we take a walk along Karrakatta or Austin Roads.	
255.		It has been said that the aesthetic outlook of the locality will be ruined by the resort. One only has to compare the view of some *150* houses and the 2000 metres of roads and power lines, from at sea or from Whalers Beach to consider that this has probably already happened. Nevertheless the local residents might not accept this fact.	
256.		Negative visual impact of such a large complex with car parking for up to or above 100 customers will be awful for those residents who have a view of the lake and surrounding area and who walk through the area. 2 storey dwellings seen from the beach or by visiting tourist boats is of great concern.	
257.		At the meeting on 18th September residents were assured that you would not be able to see the resort from the beach, only from higher up looking down. This is a misleading comment as buildings will clearly be visible from the beach based on the information provided.	
258.		The development plan needs to provide guidance on appropriate changes to landform, to ensure development does not have detrimental impacts on landscape values or visual amenity.	
259.		Guidance needs to be provided to ensure landscape is not impacted.	
260.		Goode Beach has been developed on a very steep inline. There would be a significant visual impact to residents overlooking the Application, particularly considering the size of the proposal.	
261.		There will also be considerable noise pollution associated with the development.	
262.		Noise pollution to local residents.	
263.		The proposed development will create noise day & night whereas at present we have no noise pollution and can hear the sounds of nature.	
264.		The size of the development is likely to disturb the peaceful tranquillity enjoyed by wildlife in and around the lake. We would hope that there would be no light pollution from the proposed resort. Concerned about the noise that could be generated from the development. Presently the inhabitants of Goode Beach are fortunate to be able to hear the sea and other sounds of nature and these sounds carry very well to the higher elevations where most of	

		the houses are situated. The sound travel will equally apply to things like air conditioners and I am concerned that the function centre could also be a source of annoying disturbance.	o **Justification to the satisfaction of the City, that the development does not overlook the beach fronting the subject land.** • **A design outcome utilising clustering of buildings and colours and materials to demonstrate that buildings are sympathetic within the site (namely landform and vegetation);** • **Building height is limited as follows:** o **Unless otherwise approved by Council, the maximum building height to top of external wall (roof above) 6m.** o **Unless otherwise approved by Council, the maximum building height to top of external wall (concealed roof) 7m.** o **Unless otherwise approved by Council, the maximum building height to top of pitched roof 9m.** • **Screening of incidental developments (e.g. bin storage areas), using bushfire resistant materials.** • **Subdued night time lighting to the Goode Beach townsite (south west direction from subject site). Consider using low bollard lighting.**
265.		Noise from the site is a concern but one that can be addressed by a combination of soundproofing (bar/restaurant and function room) and planning conditions (noise from outdoor events and from the accommodation units). But if the development goes ahead it would be highly desirable for planning consent to also include a condition limiting noise from outdoor functions and from sound systems in the accommodation units in order to preserve the quiet that most Goode Beach residents treasure.	
266.		No extra street lights to be installed along La Perouse Road, and lighting on the development to be low visibility.	
267.		The Function Centre is a concern re noise pollution in our neighbourhood.	
268.		There are no concept drawings or sketches of the design.	
269.		Object to the number of units and also the two storey planned units, restaurant or function centre overlooking the beach. This motel development should be unseen from the beach. Any families using the beach should have privacy to walk and swim without being overlooked.	
270.		From our property we would over-look the development, we will be impacted by the noise of people and movement of vehicles – sound travels far at Goode Beach. Light pollution at night from the Proposed Structure Plan No 9 would impact greatly on the current minimally illuminated suburb.	
271.		I am concerned that the site will deteriorate with number of visitors/guests as time goes on. This proposal has more severe visual and residential impact for residents of Goode Beach.	
272.		Concerned about lighting directed towards existing homes. Lighting should be low bollard type lighting.	
273.		People want to see white beaches, pristine sea water and the beauty of the under developed coastal environment…not built up housing development or tourists resorts.	
274.		If included in the final development, it is uncertain what will be the planned usage of the Function Centre. If it is planned to be used for weddings/conferences etc, I would foresee that there would be potential for noise disturbance to the Goode Beach community. This would impact mostly significantly on residents living upslope of the development site - for some reason, noise travels readily upslope. One of the current benefits of living at Goode Beach is the lack of noise in the evenings. One of the positive aspects of living at Goode Beach is the general lack of bright blights in the evening; either from housing or streetlights. It would be preferable that any external lighting be minimal, subdued and not in a street light form. Lighting from the various buildings should also be minimised by not having any south or south-east facing windows that could be seen from the upslope residences. It should be possible to orient the proposed units/buildings to minimise the amount of light observed during evenings.	
275.		Request that no land fill is used to raise any part of the ground level of the site.	
		DOGS	
276.		No part of the beach should be restricted to dogs in any way, at any time in the future.	Dismiss concerns relating to dogs

277.		Confirmation to be included in the plans that there will be no changes to dog access to any part of the beach now or in the future.	Development at Lot 660 has no relevance to dog access on the beach. A pedestrian path to the beach, in Crown ownership, is located running between Lot 660 and Lot 652. This pedestrian link is expected to remain as is.
278.		Should be no alteration to off leash dog exercise areas.	
279.		Many Goode Beach residents are dog owners and have fought hard for our dog friendly beach to the left of the first steps and guests at the resort are sure to complain about dogs on the beach.	
		ABORIGINAL HERITAGE	
280.		There appears to be little or no consideration, given for an ancient aboriginal midden, of indeterminable age found in the area.	Dismiss concerns relating to Aboriginal Heritage. Concerns include: o High significance for Noongar cultural use and heritage; o No consideration, given for an ancient aboriginal midden; o Thorough archaeological investigation of Lot 660 is needed. The subject Lot 660 is not a registered site under the Aboriginal Heritage Act and therefore the proponent is not required under the Aboriginal Heritage Act to undertake an archaeological survey of the site. **It is recommended that the following notation is included on the structure plan:** • **The Department of Aboriginal Affairs is to be notified should the construction phase reveal the presence of artefacts.**
281.		The site holds a significant aboriginal midden which should be taken into consideration.	
282.		Vancouver Peninsula is well-documented in historical and contemporary sources as a place of high significance for Noongar cultural use and heritage (camping, hunting, quarrying, restricted ceremonies) A thorough archaeological survey of Lot 660 for Aboriginal artefacts, in conjunction with local Noongar people, is essential before any clearing and earthworks are undertaken.	
283.		Vancouver Peninsula is well-documented in historical and contemporary sources as a place of high significance for Noongar cultural use and heritage (camping, hunting, quarrying, restricted ceremonies). Yet the Structure Plan provides only a desk-top review of government records of registered sites. The possibility of rare Aboriginal shell middens occurring on the site is raised by the recent discovery of a mussel shell midden 400 m to the north of the site of the proposed resort. A thorough archaeological survey of Lot 660 for Aboriginal artefacts, in conjunction with local Noongar people, is essential before any clearing and earthworks are undertaken.	
284.		The likelihood of destroying areas used by the Menang people as a meeting, food and fresh water source. The likelihood of destroying the area where in 1881 sailors from the whaling ship the Runnymede camped after their ship was forced in due to heavy easterlies.	
285.		There are clear indicators of precolonial indigenous activity near Lot 660. With the recent discovery of a shell midden 400 m North, containing mussels, Brachiodontes erosa, and with the registered aboriginal site 4456 (Department of Planning, Lands and Heritage) near La Perouse Rd, it affirms that a thorough archeological investigation of Lot 660 is needed, not just a routine desktop examination of registered sites.	
286.		There is a strong probability that there are ancient Aboriginal middens in the areas where buildings and or access roads are proposed.	
287.	Department of Planning Lands and Heritage	Lake Vancouver is not registered as a site as such but we do understand that it is considered an important location by many Aboriginal people because of its values as a natural resource. If there are burials in this area it is also likely that they could be exposed when any ground disturbing work occurs in the area requiring an immediate stop to works and reporting to the police (and then if they are determined to be of Aboriginal origin) and in-turn to our section. Should this occur the proponents should contact this office as soon as possible for further advice.	
		CONSULTATION	
288.		The lack of early community consultation on this project has shown the City in a bad light, something that should not be occurring.	Dismiss concerns relating to consultation. Concerns included: • Lack of early community consultation;

289.		The consultation period is too short and has fallen during school holidays when many of us are on holiday or preoccupied with children & grandchildren.	• Consultation period is too short. The City undertook consultation in accordance with legislative requirements (*Planning and development (Local Planning Schemes) Regulations 2015* – Part 4 cl.18).
290.		The SPP2.6 requires consultation and engagement strategies with the community based on encouraging informed input into decision-making processes.	
291.		We have not been given nearly enough time to absorb and comment on such a document. The period for comment also coincides with school holidays when many local stake holders are absent. It is also regrettable that the City did not advertise this matter in the newspaper and that we have been given insufficient time to address the issue properly.	
292.		The submission time is too short.	
293.		Community concerns should be the deciding factor.	
		PROCESS – STRUCTURE PLANNING	
294.		Compilation of a Structure Plan for a property currently seems to be a possible way of circumventing the current development rules and changing the zoning to allow larger developments.	Dismiss concerns relating to procedural requirements. Concerns included: • Possible way to circumvent the current development rules; • The process being followed is not 'orderly' as required by the WAPC • Development patently exceeds that allowed in the LPS1. • Orderly process would require the proponents of the Vancouver Resort to first of all make an explicit case for amending LPS1; • The City of Albany chose not to advertise it in the local press • Lot 660 is a portion of the previous notorious Lot 401. Lot 401 was subject to multiple development schemes that were all rejected by various government agencies Recommend supporting the proposed structure plan for the following reasons: • In accordance with the City's Local Planning Scheme No.1, development may be considered on the land zoned 'Special Use' (No.1) and the land reserved for Parks and Recreation. The landholder wishes to undertake development (restaurant and function centre) on the subject lot that is not in accordance with the 'Special Use' zone. The landholder wishes to therefore change the 'Special Use' zone No.1 - zoning boundary and 'Parks and Recreation' reservation boundary. Prior to making an application to amend the scheme, the proponent has submitted an application for a 'Structure Plan'. As defined in the *Planning and Development (Local Planning Schemes) Regulations 2015* (Part 4 cl14); *Structure Plan means a plan for the coordination of future subdivision and zoning of an area of land.* • The City has followed procedural requirements as stipulated in the Planning and Development (Local Planning Schemes) Regulations 2015 to deal with the Structure Plan submitted. The City advertised the structure plan in accordance with the Planning and Development (Local Planning Schemes) Regulations 2015 as follows: o By giving notice of the proposed structure plan to all landholders in Goode Beach, which included inviting landholders to make comment – 28 day advertising period
295.		The proponents of Structure Plan No. 9 appear to want to sweep away all this prior work and replace it with an amended LPS1 that favours the particular development that they intend to bring forward, not all of which is revealed in Structure Plan No. 9. The process being followed is not 'orderly' as required by the WAPC. The scale of development patently exceeds that allowed in the LPS1. An orderly process would require the proponents of the Vancouver Resort to first of all make an explicit case for amending LPS1 SU1.	
296.		The proponent should have been instructed to proceed in the first instance by way of an application for a Scheme Amendment, albeit one supported by a Structure Plan. The City of Albany chose not to advertise it in the local press. Albany ratepayers have thereby been denied the notice of the proposal they would have received had the proponents been compelled to proceed in the first instance by way of a Scheme Amendment, and as a result they have been denied the opportunity to make submissions on the Proposed Structure Plan.	
297.		The "structure plan process" that has been followed by the Applicants to support (in effect) an amendment to the City of Albany Local Planning Scheme No 1 (with reduced obligations for public notice) is wholly inappropriate and arguably creates a reasonable apprehension of bias in relation to any decision to recommend (or decision to approve) the Application.	
298.		Lot 660 is a portion of the previous notorious Lot 401. Lot 401 was subject to multiple development schemes that were all rejected by various government agencies due to the potential adverse impact on the coastal landscape, public amenity and groundwater ecology. Whilst each proposal varied in their scale, the site is essentially the same, and the risk and environmental constraints remain the same. There are several other sites, in the Albany region, zoned for tourism with approvals that have yet to be developed so there appears no immediate need to facilitate development on Lot 660, and certainly not a development as large and potentially damaging to the environment as this current proposal.	

		Council officers and Councillors need to familiarise themselves with the opinions of the Country Coastal Planning Committee of the Department of Planning, and the environmental impact assessment of the Consultative Environmental Review carried out by the EPA.	▪ The City included a summary of the structure plan to landholders ('Conversation') plan; and ▪ Facilitated a site meeting and conversation between consultants, City of Albany staff and councillors – to benefit the landholders. o By developing a sign on-site o By making a copy of the structure plan available on the City's – electronically on the City's website and as hard copy to the Frenchman Bay association and at the City's offices. **Recommend including the following provision:** • **The structure plan (2018) proposes variations to current Local Planning Scheme No.1 Special Use zone boundary and scheme provisions. The Local Planning Scheme No.1 is to be amended prior to supporting development proposed in accordance with the Structure Plan (2018), endorsed by the Western Australian Planning Commission.** • **Note:** o **Prior to application for an amendment to the scheme, referral is to be made to the Department of Environment and Energy to determine if development constitutes a controlled action under the EPBC Act.**
299.		It is inappropriate for the City of Albany to be considering or endorsing a Structure plan for Lot 660 when it does not conform to its existing Scheme.	
300.		Inconsistency with scheme.	
301.		It is clear that there has been extensive consultation between the Applicants and the City in relation to the Application and that the City has kept this a secret from the people most affected; the residents of Goode Beach. There has been no consultation with stakeholders to this date with the City opting for the shortest possible time for submissions and the minimum advertising. It appears to me that the City wants this Application to fly under the radar to the detriment of a whole community.	
302.		The proposed Structure Plan does not guide what is permitted by the scheme, namely a low key, clustered holiday accommodation development of up to 10 chalet/cottages, but what is not permitted by the scheme, namely a much larger development of 51 holiday units, a function centre, a café/restaurant and a caretaker's cottage. This being so the proponents should have proceeded, and been encouraged by the City of Albany and the Department of Planning to proceed, in the first instance, by way of an application for a scheme amendment. The City of Albany and the Department of Planning have clearly misinterpreted the Planning Regulations and LPS1. They need to annul the current Structure Plan approval process and insist that the proponents proceed de novo by way of an application for a scheme amendment	
303.		A scheme amendment should have been applied for by the proponents, thereby requiring it to be advertised. If approved, a Structure Plan should have followed. Not the other way round.	
304.		The Local Planning Scheme (LPS) under SU1 lists a condition of development as – '*achieving a low key holiday accommodation development commensurate (maximum of 10 chalet cottage units) with the fragile coastal nature of the area'. I*t was not made clear to the public, through the Conversation Plan, that firstly a submission to Local Govt to amend this condition and the number of chalets in the LPS from 10 to 50 must be successful before this type of development could go ahead.	
		ECONOMICS	
305.		Where is the economic model that was used to reach a conclusion about the size of the proposed development?	Dismiss concern relating to economic viability. The City is not required to consider the economic viability of the development. A decision to approve or refuse the proposed structure plan based on economic viability is not justified.
		PROPERTY VALUES	
306.		Property values in Goode Beach will be lower due to the development.	Dismiss concern relating to property values. Property values are not based on other/adjacent developments and is not a valid reason for support or refusal to a development application.
		FIVE STAR RESORT	
307.		Albany needs five star fully serviced accommodation. However the fact that the structure plan aspires to a "high end 5 star resort" does not guarantee that that is what would be built.	Uphold comment relating to five star development. It is recommended that the following performance measures are included to guide future development:

		A five star rating for hotels (and by implication for fully serviced resorts) requires the following scores in the three areas of assessment: • Quality & Condition: Excellent (90-100%) • Cleanliness: Excellent (95-100%) • Facilities & Services: Excellent (85-100%). Excellent quality and condition means that design, materials, construction and maintenance all have to be of a very high standard I'm confident that architects with the experience of Grounds Kent could deliver the sort of quality pointed to in the LSP on this site; the question is whether the cost of doing so would be too high to recoup from operating only 51 units with the comparatively limited range of 5-star services and facilities that that would necessitate.	• All development shall comply with the following performance criteria: o The Holiday Accommodation precinct is developed to provide a unique, high quality tourist resort designed to blend (not dominate) with its natural surrounds. o High quality built form is provided across the site that recognises the iconic location and significance of the area (beach, foreshore reserves and Lake Vancouver). o The privacy of beach dwellers is not impacted via development overlooking. o The development of public land (access links to beach) is integrated to establish a safe and environmentally sustainable outcome. o An effective, efficient, integrated and safe access network that prioritises drainage management considerate of Lake Vancouver ecosystem and protection of flora and fauna. o Developments incorporate sustainable technologies and design including best practice with regard to energy efficiency, water sensitive urban design and fire safety requirements. o A reputable manager being accommodated on-site to oversee operations. o Areas disturbed during development are to be stabilised and/or restored.
		COMMUNITY BENEFIT	
308.		There is absolutely no benefit to the local community.	Noted. It is proposed that a provision is included to ensure the development of a path, alongside La Perouse Road, to support the safety of pedestrians visiting the bird hide and beach.
		PREVIOUS DECISION(S)	
309.		Previous concerns that led to rejection of previous development proposals (15 lot subdivision) on this site are still relevant. Concerns include: • Min setback of 100m to shore • Non compliance with State Planning Commission Coastal Development setback guidelines • Road access located in possible hazard zone • Inconsistent with the Local Rural Strategy • The proposal has not adequately addressed the issue of wind erosion • The subject land is unique within the Shire in that it proposes residential development upon a fragile dune system with the potential to lose a significant proportion of the dune system through coastal erosion during the life of the development • The results of a recent land capability assessment indicated that" this land "has a low capability for the proposed land-use • The white quartz sands … forming steep dunes ... are very susceptible to remobilisation where the sparse vegetation is removed • buildings constructed on this unsuitable site may be prone to structural failures • entry of additional nutrients and stormwater into the wetland system and the possibility of dieback infection • administrative burden (community cost) which will be placed on Council monitoring and enforcing the proposed provisions.	Dismiss comments relating to previous decisions pertaining to the subject site. Comments included: • Previous 15 lot subdivision refused; • Previous investigations and environmental assessments should not be ignored. In consideration of a 15 lot subdivision of the then Lot 401, the Environmental Protection Authority (EPA) and Minister for Environment (1993 EPA Bulletin 672 and Ministerial Statement 319) supported the proposal (15 lot subdivision) subject to a buffer being established around Lake Vancouver and management controls being implemented, including: o Stormwater management o No groundwater extraction o Setback from the coast in accordance with land capability and suitability, to the satisfaction of the 'Shire' at the time o A Health Department of Western Australia approved alternative domestic wastewater treatment system

310.		Previous investigations and environmental assessments should not be ignored.	o Indigenous vegetation being retained on all areas of the site that are not required to be cleared for building envelopes, fences, firebreaks, access and servicing o No livestock. The buffer previously proposed by the EPA is similar to the one currently proposed by the structure plan. The 15 lot subdivision was rejected by the Minister for Planning, who recommended that the landholder pursue a zoning of the land to reflect the potential of low key tourism and to introduce land use controls. EPA conclude in Bulletin 672 that the management of environmental impacts will rely extensively on management controls through the planning process which has been addressed in the Structure Plan and environmental assessment documentation. A Foreshore Management Plan and Urban Water Management Plan is proposed to be developed and implemented to protect the integrity of Lake Vancouver. This includes: best practice management, including no direct drainage into Lake Vancouver, treatments such as flush kerbing for diffuse discharge (where possible) and soil amendment of basins. Extra hydrological information to be gathered and analysed. The Minister at the time recommended that the landholder "*pursue an appropriate zoning some time in the future to reflect the potential of the land for low key tourism…and to introduce any relevant land use controls".*
311.		Earlier major proposal was rejected by the Shire of Albany and Western Australian Planning Commission on the grounds of unacceptable environmental, social and fiscal risks.	
312.		The site is extremely fragile and the risks posed by the proposed development are so great that the site should not be developed. The proposed resort is located on sand dunes, close to sea level and the shore of an open beach facing directly into the strong south-easterly winds that dominate throughout the summer. There have been two previous lengthy episodes of investigation of the suitability of this location for the development of infrastructure. Firstly, a resort proposal (1986-1989) in which the main buildings, the hotel and village, would be located on the same ground as the currently proposed resort development, and secondly, a residential subdivision (1989-1997) of about 15 lots. These lengthy investigations by numerous government agencies and the Shire of Albany concluded that the landform and location were unsuitable for these proposed developments.	
		SOILS	
313.		The poorly compactible soils are unsuitable for roadworks or building foundations.	Dismiss concerns relating to poorly compactable soils. At the time of subdivision or development, a Geotechnical report is required, to determine foundation requirements. Phytophthora is likely to be present in all soils and to be dominant in soils (clay content) that hold water. **It is recommended that the following provisions are included:** • **Development is to occur in accordance with a Geotechnical report to the satisfaction of the City.** • **Prior to commencement of earthworks, a sand/dust/erosion management plan is to be developed and implemented to the satisfaction of the City.** • **Areas disturbed during development are to be stabilised and/or restored having regard to:** o **Cleared shrubs and trees should be chipped and used for mulching and not removed;** o **Topsoil should be re-used;** o **The duration of sand stockpiling should be minimised;** o **Vegetation cover should be established as quickly as possible;** o **Land should be cleared and rehabilitated in sequence, not simultaneously;** o **The site should be monitored during and after construction, and any eroding areas repaired.**
314.		The poorly compactable soils are unsuitable for roadworks or building foundations. Importing suitable soil carries the risk of introducing phytophera infection to the Lake Vancouver wetlands and adjacent A Class Reserve.	

		UNEXPLODED ORDNANCE	
315.		There may be unexploded ordnance in the area.	Uphold concern in relation to unexploded ordnance. A survey undertaken (2002) by Emergency Management & Hazard Planning, between Lake Vancouver and the beach revealed no evidence of unexploded ordnance. **Irrespective of the above, it is recommended that the following is included as a notation on the structure plan:** • **Historical research has revealed that during the past 100 years, former elements of the Australian Defence Forces may have conducted training and/or operational activities within or close to the area of the proposed development. It is possible that as a result of these activities, the subject area may contain unexploded ordnance (UXO). Whilst it is considered that the possible risk from UXO on the land is minimal, an absolute guarantee that the area is free from UXO cannot be given. Should, during development works, or at any other time, a form or suspected form of UXO be located, the following process should be initiated:** o **do not disturb the site of the known or suspected UXO;** o **without disturbing the immediate vicinity, clearly mark the site of the UXO;** o **notify Police of the circumstances/situation as quickly as possible; and** o **maintain a presence near the site until advised to the contrary by a member of the WA Police Service or Defence Forces.**

Recommended Structure Plan Provisions
'Schedule of Provisions'

Local Structure Plan No.9 – Lot 660 La Perouse Road, Goode Beach

GENERAL - PROVISIONS

Local Planning Scheme Amendment

1. The structure plan (2018) proposes variations to current *Local Planning Scheme No.1* 'Special Use' zone and 'Parks and Recreation' reserve boundaries and scheme provisions. The *Local Planning Scheme No.1* is to be amended prior to supporting development proposed in accordance with the Structure Plan (2018), endorsed by the Western Australian Planning Commission.

Note:

a) The planning scheme amendment process requires the Local Government to refer to the EPA a written notice of the proposal to amend a scheme; and such written information about the scheme or amendment as is sufficient to enable the EPA to comply with section 48A of the *Environmental Protection Act 1986* (EP Act). Schemes and scheme amendments can only be referred to the EPA by the responsible authority. Upon receipt of a scheme or scheme amendment and such written information about the scheme or scheme amendment which enables the EPA to comply with section 48A of the EP Act, the EPA will decide whether the referred scheme or scheme amendment:

- should not be assessed (advice and recommendations may be provided); or
- should be assessed; or
- is incapable of being made environmentally acceptable.

b) Prior to application for an amendment to the scheme, referral is to be made to the Department of Environment and Energy to determine if development constitutes a controlled action under the EPBC Act.

Structure Plan Precincts

2. Development is to occur as stipulated within structure plan precincts, which include:

a) 'Holiday Accommodation Precinct' comprising:
- Maximum ten (10) two storey holiday accommodation buildings comprising maximum total 51 units (approximately 5 units each);
- Maximum 120 persons at capacity;
- Function centre also developed as a refuge (bushfire) building;
- Café/dining/restaurant; and
- Manager's residence;

b) A 'Development Buffer Precinct' comprising:
- Access;
- car parking;
- Waste treatment;
- Pool; and
- Asset (bushfire) protection.

c) A 'Remnant Vegetation Precinct', comprising:
- Vegetation protection; and
- Main access, egress and max two pedestrian access-ways (to beach).

Development Approval

3. All development shall be subject to the issuance of a Development Approval.

4. Development is to comply with the provisions of *State Planning Policy No. 2.6 State Coastal Planning Policy.*

Note:

a) A Coastal Management Strategy was prepared to accompany structure planning. The Coastal Management Strategy outlined the potential implications of future sea level rise on the coastline and presented a future adaptation pathway whereby the risk of future coastal change is borne completely by the landowner. Acceptance and acknowledgement of this risk was proposed through a notification on title as well as a commitment to undertake a managed retreat of the development at a time when identified trigger points are reached.

Subdivision

5. The subject Lot 660 is to be maintained as one entitlement.

Performance Standards

6. All development shall comply with the following performance criteria:

a) The Holiday Accommodation precinct is developed to provide a unique, high quality tourist resort designed to blend (not dominate) with its natural surrounds.
b) High quality built form is provided across the site that recognises the iconic location and significance of the area (beach, foreshore reserves and Lake Vancouver).
c) The privacy of beach dwellers is not impacted via development overlooking.
d) The development of public land (access links to beach) is integrated to establish a safe and environmentally sustainable outcome.
e) An effective, efficient, integrated and safe access network that prioritises drainage management considerate of Lake Vancouver ecosystem and protection of flora and fauna.
f) Developments incorporate sustainable technologies and design including best practice with regard to energy efficiency, water sensitive urban design and fire safety requirements.
g) A reputable manager being accommodated on-site to oversee operations.
h) Areas disturbed during development are to be stabilised and/or restored.

Contribution

7. Prior to occupation of use, the owner/occupier (Lot 660) is to develop a sealed 1.5m wide pedestrian path located adjacent to La Perouse Road, between the main entrance to Lot 660 (La Perouse Rd) and the entrance to the bird hide (Lake Vancouver), or provide a contribution to the satisfaction of the City of Albany for the development of a path.

Note:

a) In relation to potable water, the developer may be required (Water Corp) to fund new works or the upgrading of existing works and protection of all works, to the satisfaction of the Water Corporation.

Ordnance

Note:

Historical research has revealed that during the past 100 years, former elements of the Australian Defence Forces may have conducted training and/or operational activities within or close to the area of the proposed development. It is possible that as a result of these activities, the subject area may contain unexploded ordnance (UXO). Whilst it is considered that the possible risk from UXO on the land is minimal, an absolute guarantee that the area is free from UXO cannot be given. Should, during development works, or at any other time, a form or suspected form of UXO be located, the following process should be initiated:

a) Do not disturb the site of the known or suspected UXO;
b) Without disturbing the immediate vicinity, clearly mark the site of the UXO;
c) Notify Police of the circumstances/situation as quickly as possible; and
d) Maintain a presence near the site until advised to the contrary by a member of the WA Police Service or Defence Forces.

Coastal Process

8. As an ongoing condition of development, the following action is to be undertaken:

Visual Inspections

a) Visual inspection and monitoring of the beach to identity any significant changes in the shoreline is to occur on an annual basis. Should significant changes occur, early planning around adapting to sea-level rise is to be undertaken.

Shoreline Mapping

a) Every 5 years, aerial photographs are to be taken and the coastal vegetation line mapped to track the movement of the shoreline. Should significant changes occur, early planning around adapting to sea-level rise is to be undertaken.

Survey Cross Sections

b) If the eroded shoreline came within a distance of approximately 36m of the resort site, survey cross sections should be completed every 1 to 2 years to determine the extent of change in shoreline profile. Should significant changes occur, early planning around adapting to sea-level rise is to be undertaken.

HOLIDAY ACCOMMODATION PRECINCT - PROVISIONS

Land Use

1. The following uses may be considered for development within the 'Holiday Accommodation' precinct:

    a) Holiday Accommodation (resort) units, maximum ten buildings (approximately 5 units per building), comprising maximum total 51 units / 61 beds;
    b) Function Centre;
    c) Restaurant;
    d) Caretakers Dwelling; and
    e) Car-parking and access.

2. Prior to occupancy of use of the resort, a 'Refuge Building' is to be developed to achieve a heat flux rating less than 10kW/m^2.

Note:

a) The 'Function Centre' may double as a 'Refuge' building that achieves a heat flux rating less than 10kW/m2.
b) A Bushfire Attack Level calculation (Method 2) for a proposed on-site refuge building, undertaken at the structure planning process, calculated radiant heat flux as follows:
    - 9.98 kW/m^2; and
    - 9.78 kW/m^2.

3. Prior to occupancy of use of the resort a caretaker's dwelling is to be developed to the satisfaction of the City. Holiday accommodation is to be accompanied by a caretaker (at all times) to oversee operations.

Energy Efficiency

4. Development(s) is to demonstrate sustainable land use and development outcomes that include:

    a) Low energy demand and consider sustainable power options for the development;
    b) Implementing a suitable wastewater processing system able to re-cycle and re-use treated water that ensures no adverse impacts to the environment;
    c) Roof based stormwater runoff being stored in rainwater tanks for reuse in toilets, washing facilities and swimming pool.

Geotechnical

5. Development is to occur in accordance with a Geotechnical report to the satisfaction of the City.

Sand/Dust/Erosion management plan

6. Prior to commencement of earthworks, a sand/dust/erosion management plan is to be developed and implemented to the satisfaction of the City.

7. Areas disturbed during development are to be stabilised and/or restored having regard to:

    a) Cleared shrubs and trees should be chipped and used for mulching and not removed;
    b) Topsoil should be re-used;
    c) The duration of sand stockpiling should be minimised;
    d) Vegetation cover should be established as quickly as possible;
    e) Land should be cleared and rehabilitated in sequence, not simultaneously;
    f) The site should be monitored during and after construction, and any eroding areas repaired.

Design

8. All development is to achieve;

    a) A finished floor level greater than 2.4m AHD and setback behind the 2066 Erosion hazard Line as shown on the Structure Plan;
    b) Finished floor levels for buildings not exceeding 3.5m AHD. Variation to a maximum 5m AHD may be considered under the following circumstances:
        - Justification to the satisfaction of the City, that cut and retaining to achieve a 3.5m AHD is necessary and that the retaining may compromise the amenity of development (retaining above a height of 2m is considered excessive); and

- Justification to the satisfaction of the City, that two storey development does not visually dominate the landscape when viewed from the ocean and surrounding developed areas; and
- Justification to the satisfaction of the City, that the development does not overlook the beach fronting the subject land.

c) A design outcome utilising clustering of buildings and colours and materials to demonstrate that buildings are sympathetic within the site (namely landform and vegetation);
d) Building height is limited as follows:
   I. Unless otherwise approved by Council, the maximum building height to top of external wall (roof above) 6m.
   II. Unless otherwise approved by Council, the maximum building height to top of external wall (concealed roof) 7m.
   III. Unless otherwise approved by Council, the maximum building height to top of pitched roof 9m.
e) Screening of incidental developments (e.g. bin storage areas), using bushfire resistant materials.
f) Subdued night time lighting to the Goode Beach townsite (south west direction from subject site). Consider using low bollard lighting.

Effluent Disposal/Management Plan

9. An effluent Management plan being implemented to the satisfaction of the City, in consultation with the Department of Health. Effluent disposal systems are to be approved and managed in perpetuity to the satisfaction of the Department of Health and City of Albany. Effluent quality should meet nutrient concentration targets of 10mg/L of nitrogen and 1mg/L of phosphorous. Effluent disposal systems being in accordance with Department of Health publications which may be referenced and downloaded from:
   http://ww2.health.wa.gov.au/Articles/N_R/Recycled-water
   http://ww2.health.wa.gov.au/Articles/U_Z/Water-legislations-and-guidelines
   http://ww2.health.wa.gov.au/Articles/S_T/Subdivisions-and-town-planning-approvals

10. A 1.5m separation distance is to be achieved from the discharge point of the on-site sewage disposal system to the highest groundwater level.

11. The type of on-site sewerage system should be determined in response to the site and soil conditions, vulnerability of the receiving environment and nature of the proposal.

12. Where on-site sewage disposal is to be provided by a secondary treatment system, notifications are to be placed on the title pursuant to s.70A of the Transfer of Land Act advising that an on-site secondary treatment sewage disposal system and unencumbered area to which treated sewage is to be distributed are required;

13. Secondary effluent disposal, is to be setback 100m from the wetland vegetation ('extent of woodland'), which surrounds Lake Vancouver;

Potable Water

14. Development is required to connect to the Water Corporations potable water system, to the satisfaction of the Water Corporation. The developer may be required to fund new works or the upgrading of existing works and protection of all works.

Better Urban Water Management

15. Prior to the submission of a Scheme Amendment, a Local Water Management Strategy being completed to the satisfaction of the City of Albany, in accordance with Better Urban Water Management (WAPC, 2008) and in consultation with the Department of Water, Environment and Regulation.

16. Prior to the submission of a Scheme Amendment, surface water and groundwater data shall be seasonally collected from Lake Vancouver from five existing piezometers and bores. Management and/or mitigation measures determine by a qualified hydrologist in response to findings from this monitoring are to be incorporated into the LPS provisions to the satisfaction of the City of Albany.

17. Prior to occupation of use, an Urban Water Management Plan being implemented to the satisfaction of the City of Albany, in accordance with Better Urban Water Management (WAPC, 2008) and in consultation with the Department of Water, Environment and Regulation.

Note:

a) For storm-water, the use of amended soils would be required within infiltration swales.
b) Stormwater drainage to be accommodated on site and incorporate water sensitive urban water design elements to the satisfaction of the local government.
c) Roof based stormwater runoff being stored in rainwater tanks for reuse in toilets, washing facilities and swimming pool.
d) Identify and describe proposed measures to capture and treat the minor events; and
e) Outline future monitoring and management requirements. Future groundwater monitoring is to be undertaken to the satisfaction of the City in consultation with the Department of Water and Environmental Regulation.

Accommodation Management Plan

18. Prior to occupation of use, an Accommodation Management Plan (AMP) being implemented to the satisfaction of the City of Albany. The AMP is to be implemented by an on-site caretaker and is to provide criteria for appropriate behaviour of tenants considerate of surrounding landholders and the environment (e.g. management of noise and rubbish).

Coastal Management Plan and Foreshore Management Plan

19. Prior to occupation of use, a Coastal Management Plan, prepared in accordance with SPP2.6, and a Foreshore Management Plan, being implemented to the satisfaction of the City of Albany. The Foreshore Management Plan is to ensure that the sensitive areas adjacent to the beach and wetland is protected and maintained in a natural state. This includes a maximum two internal pedestrian paths developed to the beach.

20. Prior to occupation of use, a Section 70A Notification is to be placed on the Certificate of Title of Lot 660 La Perouse Road, Vancouver Beach advising the landowner and any prospective purchaser that:

    a) The lot is within a Vulnerable Coastal Area
    b) The land is subject to management in accordance with the Coastal Management Strategy;
    c) The risk of future coastal change is borne completely by the landowner.

Bushfire Management

21. Prior to occupation of use, a Bushfire Management Plan, Emergency Evacuation Plan and Refuge Building, being implemented to the satisfaction of the City in consultation with the Department of Fire and Emergency Services.

    a) All proposed habitable buildings are to be located in areas subject to a BAL rating of BAL 29 or lower.
    b) All residential buildings and, as far as is practicable, non-residential developments, are to incorporate the bushfire resistant construction requirements of the Building Code, including as appropriate the provisions of AS3959 Construction of Buildings in Bushfire Prone Areas (as amended), commensurate with the bushfire attack level (BAL) established for the relevant portion of the site.
    c) Development is to incorporate an Asset Protection Zone that be managed to reduce bushfire hazard to an acceptable level.
    d) Emergency access being provided to the satisfaction of the City.
    e) Water being provided for dedicated firefighting purposes, in accordance with a Bushfire Management Plan developed in accordance with State Planning Policy 3.7.

Aboriginal

Note

    a) The Department of Aboriginal Affairs is to be notified should the construction phase reveal the presence of artefacts.

Car Parking

22. Car parking is developed to the satisfaction of the City. Car parking shall be provided in accordance with the provisions of the Scheme. The scheme states the following standard for Hotel/Motel:
    a) 1 per employee + 1 per 3m^2 bar area + 1 per four seats in dining area + 1 per bedroom + 1 per 4m^2 other public areas.

DEVELOPMENT BUFFER PRECINCT - PROVISIONS

Land Use

1. The Development Buffer Precinct is to contain the following land uses/functions;

    a) Asset Protection Zone as required by an approved Bushfire Management Plan so as to achieve the BAL 29 rating for habitable buildings;
    b) Development of low bushfire threat vegetation (landscaped gardens);
    c) Constructed internal roads, carparks, footpaths, swimming pool and change rooms; and
    d) Reticulation zone required for application of treated wastewater (sub-surface irrigation).

Asset Protection (Bushfire)

2. Prior to occupancy of use, an Asset Protection Zone being developed, as required by an approved Bushfire Management Plan, to the satisfaction of the City.

3. Development of a physical demarcation is to be accomplished on the boundary of the 'Development Buffer Precinct' to the wetland vegetation (McBl – *Melaleuca cuticularis / Banksia littoralia* Low woodland). A hard edge such as the proposed internal road is suitable for this purpose.

Landscaping

4. Prior to occupancy of use, a Remnant Vegetation Management Plan being implemented to the satisfaction of the City of Albany, to ensure landscaping commensurate of the Bushfire Management Plan, screening of incidental developments and to help improve amenity.

Car Parking

5. Car parking is developed to the satisfaction of the City. Car parking shall be provided in accordance with the provisions of the Scheme. The scheme states the following standard for Hotel/Motel:
   a) 1 per employee + 1 per 3m^2 bar area + 1 per four seats in dining area + 1 per bedroom + 1 per 4m^2 other public areas.

Effluent Disposal

6. Secondary effluent disposal, is to be setback min of 100m from the wetland vegetation ('extent of woodland'), which surrounds Lake Vancouver.

REMNANT VEGETATION PRECINCT - PROVISIONS

Land Use

1. The Remnant Vegetation Precinct contains the remaining land within the Structure Plan. The Remnant Vegetation Precinct is to remain undeveloped with the exception of the following;

   a) Internal entry/exit road to utilise the existing internal access track;
   b) Emergency Access Way linking the development to La Perouse Court and to utilise the existing internal access track;
   c) Asset protection (bushfire);
   d) Existing and proposed beach access pathways,
   e) Existing access track linking the land with firebreaks on adjoining Reserve 25925.

Remnant Vegetation Management Plan

2. Prior to occupancy of use, a Remnant Vegetation Management Plan being implemented to the satisfaction of the City of Albany, to ensure:

   a) Rehabilitation and protection of remnant vegetation areas,
   b) Protection of the integrity of the Lake Vancouver,
   c) Public access which limits where possible the need to clear vegetation,
   d) Suitable fencing and controlled access for visitors to the beach to prevent indiscriminate access throughout the dunes,
   e) Interpretation and signage to prevent indiscriminate access throughout the dunes.

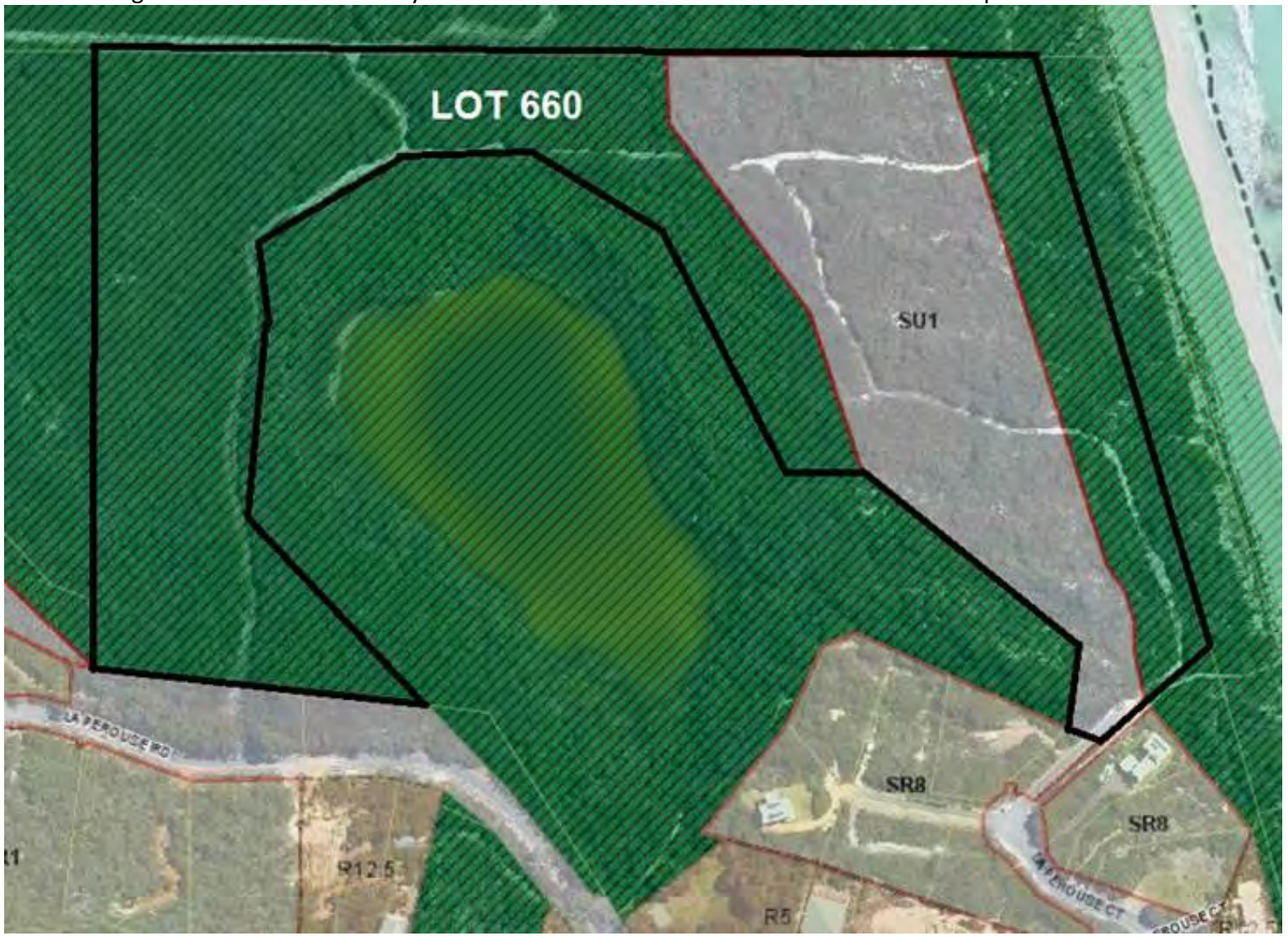
Access

3. Prior to occupancy of use, internal access being developed as indicated on the structure plan, in accordance with a Bushfire Management Plan, to the satisfaction of the City of Albany, in consultation with the DFES. Development is to include:

   a) 4m wide sealed main entry with passing bays and turnaround area(s) to the satisfaction of the City of Albany;
   b) 4m wide emergency egress with trafficable (gravel) surface in accordance with adopted Bushfire Management Plan, to the satisfaction of the City of Albany;
   c) Signage to limit speed limit to 20km/hr;
   d) Measures to enable surface water management considerate of sensitive environmental values including Lake Vancouver and Remnant vegetation.

4. Main access to and from the Holiday Accommodation Resort being confined to La Perouse Road.

The following illustrates areas currently reserved for 'Parks and Recreation' and zoned for 'Special Use' – current Lot 660



The following illustrates Structure Plan proposal comparative to existing zone and reservation.


DEVELOPMENT SCENARIO'S
EXISTING VRS PROPOSED
Legend
Existing 'Special Use' zone boundary
Chalets - Indicative
18m X 10m
20m appart
20m Assett Protection Zone to Special Use boundary
Proposed Holiday Accommodation Precinct
Proposed Development Buffer Precinct
Existing 'Parks and Recreation' reservation Lot 660
Cadastre boundaries
20 10 0 20 Meters

The following illustrates previous approval (1987) for 'Resort Hotel and Hotel Complex'

shire of albany

grant of planning scheme consent

applicant
name(s) TEVOR SALEEBA AND ASSOCIATES
address 16 CHURCHILL AVENUE
SUBIACO, W.A., 6008

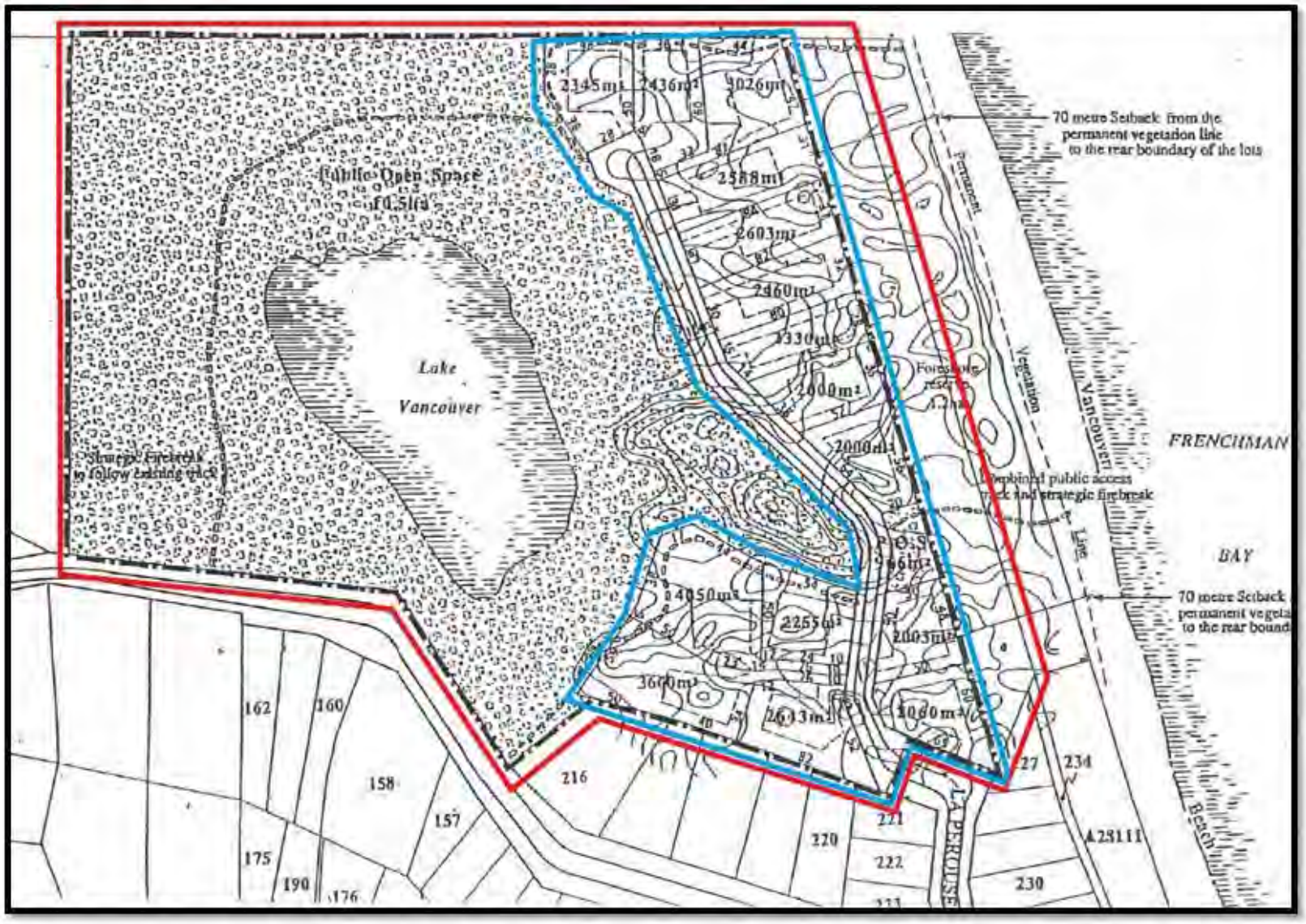
owner of land
name(s) L'IORE NOMINEES
address P.O. BOX 494,
ALBANY, W.A., 6330

description of land LOTS 401 AND 402, PLANTAGENET LOCATION 2104,
LA PEROUSE COURT,
FRENCHMAN BAY, W.A., 6330

planning scheme consent is hereby granted

1 to use the abovedescribed land/buildings for the purpose of:
RESORT HOTEL AND HOTEL COMPLEX.

The following illustrates proposal (1996) for rezoning from Rural to Special Residential (15 lots) (blue line) – original Lot 401 (red line)



Harley Dykstra

PLANNING & SURVEY SOLUTIONS

Special Use Zone 15 - Albany Waterfront Structure Plan

Proposed Amendment to Precinct 2

Prepared for Foreshore Investments Albany Pty Ltd

DOCUMENT CONTROL

Control Version	Date	Status	Distribution	Comment
A	31.5.2017	Draft	Internal	Review
B	9.6.2017	Draft	Internal	Amended to include mod 6 and staging revision
C	31.8.2017	Draft	Internal	Amended to address items raised by CoA and DoP 20.6.17 and outcomes of acoustic assessment
D	30.10.2017	Draft	CoA/DoP	For preliminary comment
E	19.01.2018	Final	CoA/DoP	For lodgement

Prepared for: 20536 Foreshore Investments Albany Pty Ltd

Prepared by: DC

Reviewed by: HD

Date: 19.01.2018

Job No: 20536

Version: E

DISCLAIMER

CONTENTS

1 EXECUTIVE SUMMARY

The Albany Waterfront Structure Plan was approved by the City of Albany on 16 May 2006, and outlines future development within the Structure Plan area. In response to market feedback, in 2011 the City of Albany approved changes to the Commercial and Accommodation precincts to increase the gross floor area and building height to increase the viable operation of future development.

The approved Structure & Precinct Plans guide development of the Waterfront Area by providing a detailed framework for the pattern of land use and development within the Structure Plan Area. The Structure Plan outlines proposed vehicle and pedestrian movement networks and the distribution of land uses within the Structure Plan area, with the Precinct Plan guiding future development standards.

A series of land use and urban structure modifications are proposed to the Accommodation Precinct (Precinct 2) of the approved Albany Waterfront Structure Plan, to provide increased flexibility with the design and siting of development within this precinct. The proposed changes will serve as a catalyst to promote further development within the Albany Waterfront Area (AWA), and contribute towards providing the critical mass required to support the year round operation of other land uses such as shops, offices and restaurants. The proposed changes will also ensure key design principles including building height and scale, active ground floor interfaces, public access ways and design guidelines including hotel/apartment entry points and screening of back of house activities are retained.

In order to stimulate increased activity and a high standard of development in the AWA, seven modifications are proposed to the Albany Waterfront Structure Plan and Accommodation Precinct Plan.

Importantly, it should be noted that there are no changes to the building height(s) or scale. Furthermore, the primary land use for the site will remain for Tourist purposes, with measures proposed to permit a limited amount of permanent residential accommodation.

This report provides a detailed description of these modifications and the rationale underpinning each change.

Table 1 provides a summary of these modifications.

Planning Instrument	Existing Provisions	Proposed Provisions	Process
Structure Plan & Precinct Plan	1. No permanent residential developments are permitted in the Albany Waterfront (c24.1).	1. *No permanent residential development is permitted in the Albany Waterfront Structure Plan Area, with the exception of Multiple Dwellings being a discretionary land use within the Accommodation Precinct. Multiple Dwellings are not permitted on the ground level fronting the Waterfront Promenade.*	1. Structure Plan & MOA simultaneous decision by Council. 2. MOA: a. Agreement between City of Albany and State of Western Australia to absolve or amend MOA pro tanto; or b. No agreement between City of Albany and State of Western Australia to amend MOA. 3. Progress Structure Plan Amendment as per P&D Regulations 2015.
	2. No provision for prioritising the location of tourism development.	2. *(A) The scale of any residential development is to complement the tourism component and priority is to be given to locating the tourism component(s) on those areas of the site providing the highest tourism amenity.* 2. *(B) Any staging of development is to occur so that the tourism development and provision of facilities occurs prior to, or concurrently with, any residential development.* 2. *(C) Multiple dwelling development shall not exceed a Gross Floor Area of 6,800m^2.*	
	3. Building footprints shown on Structure Plan.	3. *Revising the building footprints to the Accommodation Precinct to provide improved pedestrian connectivity through the Waterfront Area via revised pedestrian access points, and enable increased flexibility of building design and siting, while maintaining key principles of the Design Guidelines.*	

	4. No basement or part basement parking is permitted (c4.6).	4. *Basement parking, or part basement parking, to protrude a maximum 1.5m above the natural ground level of the Accommodation Precinct, excluding the active ground floor interface with the Waterside Promenade.*	
	5. All buildings will be setback a minimum of 25m from the Princess Royal Drive road reserve boundary (c2.1).	5. *Revise the building setback to Princess Royal Drive from 25m to 19m within the Accommodation Precinct to allow increased flexibility with design and siting of buildings.*	
	6. No current provision.	6. *All Holiday Accommodation and Multiple Dwellings located within the Accommodation Precinct are to incorporate Quiet House Design Package B.*	
	7. No current Provision.	7. *(A) Prior to development commencing a Management Statement is to be prepared in consultation with the City of Albany to ensure all Holiday Accommodation units will be let out for tourism purposes, preferably by an on-site letting agent (manager).* 7. *(B) Prior to development commencing a Management Statement is to be prepared in consultation with the City of Albany to address amenity and mitigation measures associated with the Port and Entertainment Precinct.* 7. *(C) The Local Government may consider the use of a Section 70A notification being placed on the Title(s) to advise prospective*	

		purchasers of potential impacts that may arise from activities associated with the Albany Waterfront or Port of Albany.	
Memorandum of Agreement	1. Acknowledgement and respect of 24 hour a day, 7 day a week heavy haulage access to the Port of Albany.	1. **No change.**	1. Relevancy of the MOA to be reconsidered by Local and State Government, and amended or absolve.
	2. Prohibition of permanent residential activity.	2. Permit limited permanent residential activity for a proportion of the Accommodation Precinct.	
	3. Unfettered Access to the Foreshore.	3. **No change.**	
	4. Maintain the iconic Princess Royal Harbour vista as seen in the York Street Commercial Precinct.	4. **No change.**	
Local Planning Scheme (LPS1)	1. Schedule 4 of LPS1 outlines the following special use and conditions relating to SU15:	1. Amend Schedule 4 of LPS1 with the following special uses and conditions relating to SU15:	1. Scheme Amendment to follow adoption of Structure Plan.
	<u>Land Uses</u> – Multiple Dwellings not permitted.	<u>Land Uses</u> – include Multiple Dwellings as "D" class permissibility in the Accommodation precinct.	
	k. Buildings to be setback a minimum of 25m from Royal Princess Drive; l. Not utilise basement parking.	k. Buildings to be setback a minimum of 25 metres from Royal Princess Drive, excluding the Accommodation Precinct; l. Basement parking permitted;	
	2. No provision for prioritising the development and location of tourism development.	2. *Include provision noting the scale of any residential development is to complement the tourism component and priority given to locating the tourism component(s) on those areas of the site providing the highest tourism amenity.*	
Policy	Identifies Precincts.	No change.	Nil.

Development Application			Development Application to be lodged following Amended Structure Plan, MOA and Scheme Amendment.

Table 1: Proposed summary of Modifications to Albany Waterfront Planning Controls

2 INTRODUCTION

2.1 Introduction & Purpose

This Amendment to the Albany Waterfront Structure Plan (the "Structure Plan") and Precinct Plan (the 'Precinct Plan') has been prepared by Harley Dykstra on behalf of the landowners, Foreshore Investments Albany Pty Ltd.

A series of land use and urban structure modifications are proposed to the Accommodation Precinct (Precinct 2) of the Albany Waterfront Structure Plan and Precinct Plan, to provide increased flexibility with the design and siting of future development in this precinct.

The proposed changes will serve as a catalyst to promote further development within the Albany Waterfront Area (AWA), and contribute towards providing the critical mass required to support the year round operation of other land uses such as shops, offices and restaurants. These changes ensure the retention of key design principles including building height and scale, active ground floor interfaces, public access ways and design guidelines (including hotel/apartment entry points and screening of back of house activities).

Since construction was completed in 2009, the AWA has largely remained as undeveloped land. In 2010 the Albany Entertainment Centre (AEC) was completed, marking the first building to be constructed in the Waterfront Area. The Due South Waterfront Restaurant was subsequently developed in 2014, and has since proven a popular attraction to the Waterfront Area and wider Albany region. A lack of private investment in the Waterfront Area can be partially attributed to overly restrictive planning regulations, resulting in development of the area being unviable.

In order to stimulate increased activity and a high standard of development in the wider Waterfront Area, a series of changes are proposed to the Albany Waterfront Structure Plan. These changes, support the vision for the Waterfront Area to:

> *"Actively link the CBD to Princess Royal Harbour by providing a people-focused development with a strong sense of vibrancy and excitement with a unique combination of entertainment, accommodation and mixed-use buildings facing a waterside promenade overlooking an active public marina."*

This report includes a detailed description of the proposed changes and outlines the planning rationale that underpins each change.

2.2 Subject Land

The subject land comprises of Lot 3 Toll Place, Albany and is located within the Albany Waterfront Structure Plan area (SU15). The lot has an area of 9,599m^2, and is located adjacent the Princess Royal Harbour. Since developed by Landcorp, the subject land has remained vacant.

A location plan of the subject site is illustrated in **Figure 1**.

Figure 1: Location Plan of Albany Waterfront Accommodation Precinct (Precinct 2)

3 PLANNING & ENVIRONMENTAL CONSIDERATIONS

3.1 City Of Albany Local Planning Scheme No. 1 (LPS 1)

The subject site is zoned "Special Use No. 15" (SU15) in the City of Albany Local Planning Scheme No. 1 (LPS 1), and identified as the "Accommodation Precinct" (Precinct 2) within the Albany Waterfront Structure Plan area.

The Albany Waterfront Structure Plan was approved by the City of Albany on 16 May 2006. In response to market feedback in 2011, the City of Albany approved changes to the Commercial and Accommodation precincts to increase the gross floor area and building height to increase the viable operation of future development.

Section 5.9.1.6 of LPS 1 enables the City of Albany to adopt a change to (or departure from) a Structure Plan if, in the opinion of the Local Government, the change or departure does not materially alter the intent of the Structure Plan.

3.2 Local Planning Scheme Regulations 2015 (LPS Regulations)

The *Planning and Development (Local Planning Scheme) Regulations 2015* (LPS Regulations) took effect on 19 October 2015, and cover a broad range of matters including local planning schemes, local development plans and structure plans.

Clause 29 (Schedule 2, Part 4) of the LPS Regulations outlines the process for amending an approved Structure Plan, and notes:

(1) *A structure plan may be amended by the Commission at the request of the local government or a person who owns land in the area covered by the plan.*
(2) *The procedures for making a structure plan set out in this Part, with any necessary changes, are to be followed in relation to an amendment to a structure plan.*
(3) *Despite subclause (2), the local government may decide not to advertise an amendment to a structure plan if, in the opinion of the local government and the Commission, the amendment is of a minor nature.*
(4) *An amendment to a structure plan does not extend the period of approval of the plan unless, at the time the amendment is approved, the Commission agrees to extend the period.*

Clauses 17-20 of Schedule 2, Part 4 of the LPS Regulations, require a local government to advertise a structure plan (and amendments if deemed necessary) with 28 days of receipt. Following public advertising of the structure plan, a local government must consider submissions and provide a report with a recommendation to the Western Australian Planning Commission (WAPC) for its consideration in determining amendment(s).

The proposed changes to the Albany Waterfront Structure Plan, as detailed in this report, have been prepared for the consideration of the City of Albany and the WAPC in accordance with the LPS Regulations.

3.3 Adopted Albany Waterfront Structure Plan And Precinct Plan

The City of Albany adopted the Albany Waterfront Structure Plan on 16 May 2006, and subsequent Precinct Plan on 19 September 2006. Changes to these two plans occurred in October 2011, when an increase to the gross floor area and building height to the Accommodation and Commercial Precincts was approved by the City.

The Structure & Precinct Plans guide development of the Waterfront Area by providing a detailed framework for the pattern of land use and development within the Structure Plan Area. The Structure Plan outlines proposed vehicle and pedestrian movement networks and the distribution of land uses within the Structure Plan area. The Precinct Plan provides design guidelines for future development within each precinct. A copy of the adopted Structure & Precinct Plans are included at **Appendix A**.

The Structure Plan divides the Waterfront Area into the five precincts which are characterised primarily by different land uses. These precincts are:

1. **Entertainment Precinct** (Precinct 1) is to the western side of Toll Place and comprises of the Albany Entertainment Centre, mixed use retail and commercial as well as public open space.
2. **Accommodation Precinct** (Precinct 2) is to the eastern side of Toll Place and provides for a hotel and short stay/serviced apartments.
3. **Commercial Precinct** (Precinct 3) is to the east of the Accommodation Precinct and provides for maritime focussed mixed commercial and retail uses with capacity for short-stay apartments.
4. **Town Jetty Precinct** (Precinct 4) is centrally located comprising mixed use maritime, retail and commercial uses.
5. **Harbour Precinct** (Precinct 5) comprises maritime based light industrial uses, and includes the marine, fishing industry hard stand boat ramp and trailer parking.

Together, the Structure Plan and Precinct Plan outline the relevant statutory planning requirements for the Albany Waterfront Area, including land use permissibility, development standards and design guidelines.

The Structure Plan and Precinct Plan Amendments detailed in this report are limited to land use and development guidelines for the Accommodation Precinct (Precinct 2) only.

3.4 Albany Waterfront Memorandum of Agreement (MOA)

The Albany Waterfront Memorandum of Agreement (MOA) is an agreement between the State of Western Australia and City of Albany. The MOA was executed in 2007 and serves to identify and confirm the strategic alliance that exists between the key stakeholders and the roles and responsibilities of each entity in bringing the project to fruition.

It is anticipated the MOA can be discharged, or a supplementary MOA entered into, as all key components of the scope have been completed, including; construction of the Waterfront, Boat Harbour & Pedestrian Bridge, Albany Entertainment Centre, Anzac Peace Park and associated land transactions.

Section 5 of the MOA outlines commitments to the community, and states:

> *The State of Western Australia and the City of Albany are committed to the following underlying principles regarding the development and ongoing operation of the Albany Waterfront:*
>
> - *Acknowledgement and respect of 24 hour a day, 7 day a week heavy haulage access to the Port of Albany.*
> - *Prohibition of permanent residential activity.*
> - *Unfettered community access to the foreshore.*
> - *Maintenance of the iconic Princess Royal Harbour vista as seen from the York Street Commercial Precinct.*

Consultation between the City of Albany and State of Western Australia to discharge the MOA, or enter into a supplementary MOA will occur concurrently with the proposed Structure Plan modifications and subsequent Amendment to the City of Albany Local Panning Scheme No. 1. The objective of this consultation is to reach agreement between Local and State governments to allow a limited amount of permanent residential activity to occur within the Accommodation Precinct.

Table 2 below provides a summary of the proposed changes to the community commitments outlined in the MOA.

Current commitment	Implementation of commitment
Acknowledgement and respect of 24 hour a day, 7 day a week heavy haulage access to the Port of Albany.	**No change.** To minimise potential traffic conflicts with heavy vehicles servicing the Port, a restrictive covenant has been lodged on the existing Title restricting access onto Princess Royal Drive. Further, Modification 7 proposes a notification to be placed on all future Titles for the subject site advising landowners that the site is located in close proximity to the Port of Albany and may be impacted by Port operations 24 hours a day.
Prohibition of permanent residential activity.	**Refer to Modification 1** (section 4.1) proposing the inclusion of limited permanent residential accommodation within the Accommodation Precinct only.
Unfettered community access to the foreshore.	**No change**. Modifications to the Structure Plan ensure strategic public access points on Lot 3 are retained and encourage an active ground floor interface with the foreshore area.
Maintenance of the iconic Princess Royal Harbour vista as seen from the York Street Commercial Precinct.	**No change** to the approved building heights that could impact on the harbour vistas from the York Street Commercial Precinct.

Table 2: Summary of community commitments in MOA

3.5 SPP 2.6 – State Coastal Planning Policy

Section 77 of the Planning and Development Act 2005 requires local governments, when preparing or amending a Local Planning Scheme, to have due regard to State Planning Policy 2.6 – State Coastal Panning Policy (SPP 2.6) where it affects its district. This policy encourages urban development to be concentrated in and around existing settlements, particularly areas with established infrastructure and services, and seeks to avoid significant and permanent negative impacts on the environment arising from new development.

SPP 2.6 notes *"a coastal proposal may be considered infill development if the subject site is between existing lots and adjacent to approved development"*. The site is considered to be infill development as it is surrounded by existing lots and approved development. Directly to the west is the Albany Entertainment Centre (AEC) and Due South Restaurant, to the south a marina development, to the east is the Albany Boat Shed Markets and to the north is the Albany Central Business District.

The subject site is serviced to a full urban standard, including underground power, reticulated scheme water, deep sewerage and stormwater drainage. Future development on the site will be connected to these services, with no discharge of pollutants into the coastal environment.

The Albany Waterfront Area (AWA) fronts onto Princess Royal Harbour, classified as a 'tidal reach of inland waters', and may be subject to influence by inundation and tidal processes. The AWA is less prone to shoreline movements, however suitable consideration should be provided to inundation and wave run up during a significant storm event.

The subject site has a shared coastal hazard risk with the surrounding development, and is protected from inundation and wave run up by the existing breakwater. The outer breakwater wall is approximately 3.35m AHD, road 2.45m AHD and inner wall 2.70m AHD. The breakwater has been designed to provide appropriate protection to the boat facilities and land development from the actions of climate change, inundation and wave overlap from Princess Royal Harbour. Section 22.2 of the AWA Precinct Plan notes that *"Over the lifetime of these structures there will be the need for some minor maintenance. This is expected to be needed about every 5 to 10 years and will require access for the equipment, materials and workmen."*

In addition to the above, the following outcomes from the proposed modifications to the Structure Plan include:

- A sustainable development which balances competing economic, social and environmental demands, as seen with other coastal developments including Middleton Beach, Elizabeth Quay and Port Coogee;
- Assisting to limit further peri urban coastal development, by providing a limited supply of dwellings for permanent accommodation within an existing settlement;
- No changes to the coastal processes, biodiversity or water circulation patterns as the subject site is located behind a foreshore reserve;
- No changes to any natural drainage patterns, nutrient cycles or water quality as no modifications are proposed to the environmental or servicing requirements to the site; and
- No impact on any vegetation or vegetation corridors as the site is vacant cleared land.

4 PROPOSED MODIFICATIONS & RATIONALE

The landowners are committed to completing a high standard of hotel and apartment development on the site. This development will be the stimulus for increased activity and further development within the wider Albany Waterfront Area.

A total of seven (7) modifications are proposed as part of this Amendment to the adopted Albany Waterfront Structure Plan. These changes are illustrated in **Appendix B** and described in the following sections, along with sound planning rationale.

4.1 Modification 1 – Multiple Dwellings

Incorporate Multiple Dwellings as a 'D' land use classification within the 'Accommodation Precinct', amend the Structure Plan and Clause 24.1 of the Precinct Plan Report to note:

"No permanent residential development is permitted in the Albany Waterfront Structure Plan Area, with the exception of Multiple Dwellings being a discretionary land use within the Accommodation Precinct. Multiple Dwellings are not permitted on the ground level fronting the Waterfront Promenade."

Modification 1 is proposed to respond to an increasing trend towards a flexible approach to tourism planning and to support the viable operation of these buildings, which have historically prevented the development of a hotel and short stay accommodation on Lot 3. To facilitate investment in new Hotels and Holiday Accommodation, there has been an increasing trend towards including an element of permanent residential accommodation within tourist developments. Examples of this include the Middleton Beach Hotel site, Elizabeth Quay, Port Coogee Marina and Bunbury Ocean View Hotel.

This change will introduce an opportunity to develop a limited number of multiple dwellings within the Accommodation Precinct. The scale of permanent residential accommodation will be complementary to the Tourist Accommodation within the precinct, as detailed in **section 4.2**.

Modification 1 will encourage further investment and development in the wider Waterfront Area and contribute to the critical population mass required to achieve year round activation. Due to the seasonal nature of tourism in Albany, it is necessary to create a year round active space to support other mixed uses such as businesses and retail that are available to tourists and the wider community throughout the year.

Importantly, it should be noted that the Holiday Accommodation and a Hotel will remain the primary land uses on the site, and multiple dwellings will be a secondary use.

4.2 Modification 2 – Tourism Priority

Insert clause 24.4 into the Precinct Plan Report and note on the Structure Plan:

- ***The scale of any residential development is to complement the tourism component and priority is to be given to locating the tourism component(s) on those areas of the site providing the highest tourism amenity.***
- ***Any staging of development is to occur so that the tourism development and provision of facilities occurs prior to, or concurrently with, any residential development.***
- ***Multiple dwelling development shall not exceed a Gross Floor Area of 6,800m².***

Modification 2 ensures priority is given to the development of a Hotel and/or Holiday Accommodation, and that short stay accommodation is the primary land use in the Accommodation Precinct.

Based on the approximate building footprints and areas tabled in the Structure Plan Report, the following Gross Floor Areas (GFA) may result from this modification:

Land Use	Current GFA	Proposed GFA	% of GFA (Approx)
Hotel Building	10,500m²	10,500m²	60%
Hotel / Holiday Accommodation / Multiple Dwellings	6,800m²	6,800m²	40%

Additional control measures can be incorporated through subsequent planning stages (i.e. - development application) to manage the number and location of any multiple dwellings proposed. Importantly, these measures should also ensure that that the number of bedrooms associated with the Holiday Accommodation and Hotel components will always, and at all times, exceed those associated with any multiple dwelling component.

It is intended that an apartment building(s) will contain a mixture of short stay Holiday Accommodation and Multiple Dwellings. However, this modification also provides flexibility to enable the apartment building to be developed as a Hotel, should market conditions allow for this to be a viable option. The owners of Multiple Dwellings will be encouraged to integrate their apartment into the management/letting pool for short stay accommodation if they are not occupied on a permanent basis.

This modification will significantly assist with developing the vision of the Waterfront development to *actively link the CBD to Princess Royal Harbour by providing a people-focused development with a strong sense of vibrancy and excitement with a unique combination of entertainment, accommodation and mixed-use buildings facing a waterside promenade overlooking an active public marina.*

4.3 Modification 3 – Building Footprints

Amend the Structure Plan, as follows:

Revising the building footprints to the Accommodation Precinct to provide improved pedestrian connectivity through the Waterfront Area via revised pedestrian access points, and enable increased flexibility of building design and siting, while maintaining key principles of the Design Guidelines.

Modification 3 is proposed to provide increased flexibility for building designs and siting of development within the Accommodation Precinct. Key design principles currently identified on the Structure Plan will be retained, to provide an active ground floor interface and shelter from the wind on the northern side of the buildings.

Key design principles including the hotel and apartment main entry points will be retained in the current locations identified on the Structure Plan. Public access to the eastern portion of the site is retained and will provide an important pedestrian connection between the waterside promenade and car parking areas. Two further pedestrian access points will provide improved connectivity through the Accommodation Precinct.

This modification also identifies appropriate and safe locations for access and egress associated with basement, or part basement parking if developed.

Modification 3 will ensure that key design principles are retained, including;

- An active ground floor interface between the apartment building and boardwalk promenade.
- All building frontages to maximise glazing and allow for visual permeability and where appropriate, flow out to encourage public activity at promenade level.
- All building ends facing Stirling Terrace are to maximise glazing and use of balconies in order to articulate and 'enliven' these building faces.
- All delivery points to service back of house facilities must not be within sight of Stirling Terrace.
- All apartments must include balconies in order to modulate building facades and ensure buildings reflect human scale.
- Consideration should be given to 'green roofs' on the hotel building as it could be viewed from some portions of Stirling Terrace.
- Entrance to buildings must be well defined and in keeping with the very public nature of the promenade.

Importantly, it should be noted that no changes are proposed to the existing building height or gross floor area. This modification simply allows increased flexibility with siting the building on the subject site.

4.4 Modification 4 – Basement Parking

Amend the Structure Plan and Clause 4.6 of the Structure Plan report to note:

"Basement parking, or part basement parking, to protrude a maximum 1.5m above the natural ground level of the Accommodation Precinct, excluding the active ground floor interface with the Waterside Promenade."

Modification 4 is proposed to provide an opportunity to deliver an improved built form outcome for the site, and increase the visual amenity when viewed from Stirling Terrace and other key vantage points in Albany. Separating vehicle and pedestrian movements will increase ground level pedestrian activity, safety and user experience within the Waterfront Area.

This modification will maintain the current requirement for covered parking for 130 cars on the site, and provide an opportunity to locate these parking bays below ground level. The opportunity for underground parking will reduce the development footprint dedicated to car parking, and allow for increased pedestrian connectivity between the Accommodation Precinct and surrounding areas.

The adopted Structure Plan provides reciprocal rights of parking within the Albany Waterfront Area, with motor vehicle parking easements burdening and benefiting Lots 1-5 (inclusive) and Lot 1583. This modification will not alter the reciprocal rights for parking on the subject Lot. However, if development approval is granted which incorporates basement parking then a condition of approval may require an amendment to the existing parking easements identified on the Deposited Plan subject to the proposed basement car park design.

This modification will ensure that approximately 80 of the 83 car parking bays identified to the northern and eastern boundaries are retained, with no change proposed to the total car parking numbers required for the site.

An Acid Sulphate Soil and Dewatering Management Plan (2007) prepared by Strategen for the AWA identifies ground water levels ranging from 0.3mAHD to 0.7mAHD over the subject site. These levels are approximately 1.7m to 2.1m below the existing surface level of 2.4mAHD. It should also be noted that the Albany Entertainment Centre located adjacent the subject site incorporates a basement level.

Where basement parking is proposed, dewatering may be required to allow excavation and compaction during construction. If dewatering is required, a Dewatering Management Plan will likely be required. A Groundwater Abstraction Licence may be required from the Department of Water prior to the commencement of any dewatering activities.

No changes to the approved building scale or height(s) will result from this modification.

4.5 Modification 5 - Setbacks

"Amend the Structure Plan to revise the building setback to Princess Royal Drive from 25m to 19m within the Accommodation Precinct to allow increased flexibility with design and siting of buildings."

Clause 2.1 of the Precinct Plan Report notes *"All buildings will be set back a minimum of 25m from the Princess Royal Drive road reserve boundary."* Modification 5 proposes to alter this setback from 25m to 19m to the Accommodation Precinct only, to allow increased flexibility with the design and location of development on the site.

This modification will also allow the potential for buildings to assist with screening back of house activities from view, when viewed from Stirling Terrace and other key viewpoints in Albany.

As the current noise levels generated from the surrounding environment has the potential to cause noise impacts on future development, independent consultants (Hewshott Acoustics) were engaged to complete a noise and vibration assessment in accordance with State Planning Policy 5.4 – Road and Rail Transport Noise and Freight Considerations in Land Use Planning.

The acoustic and vibration assessment confirms that modification 5 will have no impacts to the noise or vibration levels affecting the site, and that vibration mitigation measures are not deemed necessary. A copy of the assessment is attached at **Appendix C**.

4.6 Modification 6 – Quiet House Designs

Include the following notation on the Structure Plan:

"All Holiday Accommodation and Multiple Dwellings located within the Accommodation Precinct are to incorporate Quiet House Design Package B."

Modification 6 is proposed to protect the operations of the Port of Albany and promote compatibility between the Port activities and occupants located in the Accommodation Precinct. This change will ensure all apartments located within the Accommodation Precinct include appropriate design and construction methods to achieve an acceptable noise target for residents and occupiers.

AWA is located outside of the Albany Port Special Control Area identified in LPS 1 which provides for design and construction methods to limit noise levels and other impacts from the Port of Albany operations. While future development to the east of Lot 3 will assist to reduce noise from Port activities, quiet house design principles are proposed to the Accommodation Precinct to protect the Port of Albany operations and promote ongoing compatibility between the Port and residences.

Onsite monitoring of noise levels was undertaken by Hewshott Acoustic engineers to identify the noise impacts associated with passing road and rail traffic. The assessment identified *"Measured noise levels are generally in good agreement with noise level predictions. Based on measured noise levels and predicted results, the detailed noise assessment has identified that the "Quiet House Design package B (Table 2.4.4) will be required to adequately attenuate external noise levels in accordance with the internal noise criteria stated in SPP 5.4."*

Modification 7 notes that a Section 70A notification may be placed on the Title, noting that the property is located in close proximity to the Port of Albany and an entertainment precinct, and the amenity may be impacted by noise and dust.

4.7 Modification 7 – Notifications on Structure Plan

Include the following notations on the Structure Plan in relation to the Accommodation Precinct:

- ***Prior to development commencing a Management Statement is to be prepared in consultation with the City of Albany to ensure all Holiday Accommodation units will be let out for tourism purposes, preferably by an on-site letting agent (manager).***
- ***Prior to development commencing a Management Statement is to be prepared in consultation with the City of Albany to address amenity and mitigation measures associated with the Port and Entertainment Precinct.***
- ***The Local Government may consider the use of a Section 70A notification being placed on the Title(s) to advise prospective purchasers of potential impacts that may arise from activities associated with the Albany Waterfront or Port of Albany.***

The purpose of additional notifications on the Structure Plan, is to provide increased certainty to the community, Local and State Government Agencies regarding development and use of the land within the Accommodation Precinct.

To support a high quality tourism outcome, a management statement is to be prepared in consultation with the City of Albany to ensure all Holiday Accommodation units will be let out for tourism purposes, preferably by an onsite letting agent.

To protect surrounding land uses and activities, a Management Statement is to be prepared for Multiple Dwellings, in consultation with the City of Albany to address amenity and mitigation measures associated with the Port of Albany and Entertainment Precinct.

Furthermore, to ensure future landowners are aware of *potential impacts that may arise from activities associated with the Albany Waterfront or Port of Albany*, the City of Albany may require a Section 70A notification may be placed on the Certificate of Title(s).

5 CONCLUSION

The proposed Amendments to the Albany Waterfront Structure Plan have been prepared to facilitate an improved urban structure and spatial distribution of land uses within the Accommodation Precinct located in the Albany Waterfront Structure Plan Area.

The proposed modifications subject to this Amendment are limited to:

1. *Incorporate Multiple Dwellings as a 'D' land use classification within the 'Accommodation Precinct', and-revise Clause 24.1 of the Precinct Plan Report to note:*
   "No permanent residential development is permitted in the Albany Waterfront Structure Plan Area, with the exception of Multiple Dwellings being a discretionary land use within the Accommodation Precinct. Multiple Dwellings are not permitted on the ground level fronting the Waterfront Promenade."

2. *Insert clause 24.4 into the Precinct Plan Report and note on the Structure Plan:*
   a. ***The scale of any residential development is to complement the tourism component and priority is to be given to locating the tourism component(s) on those areas of the site providing the highest tourism amenity.***
   b. ***Any staging of development is to occur so that the tourism development and provision of facilities occurs prior to, or concurrently with, any residential development.***
   c. ***Multiple dwelling development shall not exceed a Gross Floor Area of 6,800m^2.***

3. ***Revising the building footprints to the Accommodation Precinct to provide improved pedestrian connectivity through the Waterfront Area via revised pedestrian access points, and enable increased flexibility of building design and siting, while maintaining key principles of the Design Guidelines.***

4. ***Basement parking, or part basement parking, to protrude a maximum 1.5m above the natural ground level of the Accommodation Precinct, excluding the active ground floor interface with the Waterside Promenade.***

5. ***Amend the Structure Plan to revise the building setback to Princess Royal Drive from 25m to 19m within the Accommodation Precinct to allow increased flexibility with design and siting of buildings.***

6. *Include notification on the Structure Plan noting* ***All Holiday Accommodation and Multiple Dwellings located within the Accommodation Precinct are to incorporate Quiet House Design Package B.***

7. *Include a notation on the Structure Plan, noting:*

a. ***Prior to development commencing a Management Statement is to be prepared in consultation with the City of Albany to ensure all Holiday Accommodation units will be let out for tourism purposes, preferably by an on-site letting agent (manager).***
b. ***Prior to development commencing a Management Statement is to be prepared in consultation with the City of Albany to address amenity and mitigation measures associated with the Port and Entertainment Precinct.***
c. ***The Local Government may consider the use of a Section 70A notification being placed on the Title(s) to advise prospective purchasers of potential impacts that may arise from activities associated with the Albany Waterfront or Port of Albany.***

The Proposed Amendment(s) will provide increased flexibility with land use, design and siting of development on the site, to achieve a high quality development whilst retaining key design principles including:

- Building height
- Gross Floor Area (GFA)
- Building Design Guidelines including screening of back of house operations
- Active ground floor interfaces
- Public access through the site
- Parking spaces, including reciprocal rights with other Lots in the AWA
- Maintained view of Princess Royal Harbour from the York Street commercial precinct

The proposed changes will promote further development within the AWA, and contribute towards providing the critical mass required to support the year round operation of other land uses such as shops, offices and restaurants.

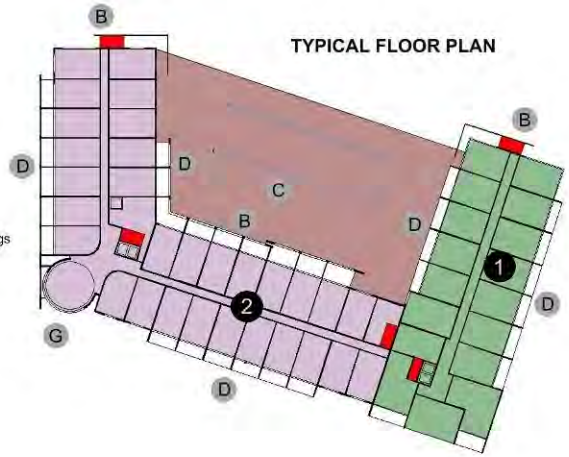
The modifications proposed in this report provide a more strategic and flexible approach to development responding to current planning practices. These modifications will ensure that the primary land use to occur on the site will be for Tourist purposes, with the ability to develop an incidental element of permanent residential accommodation.

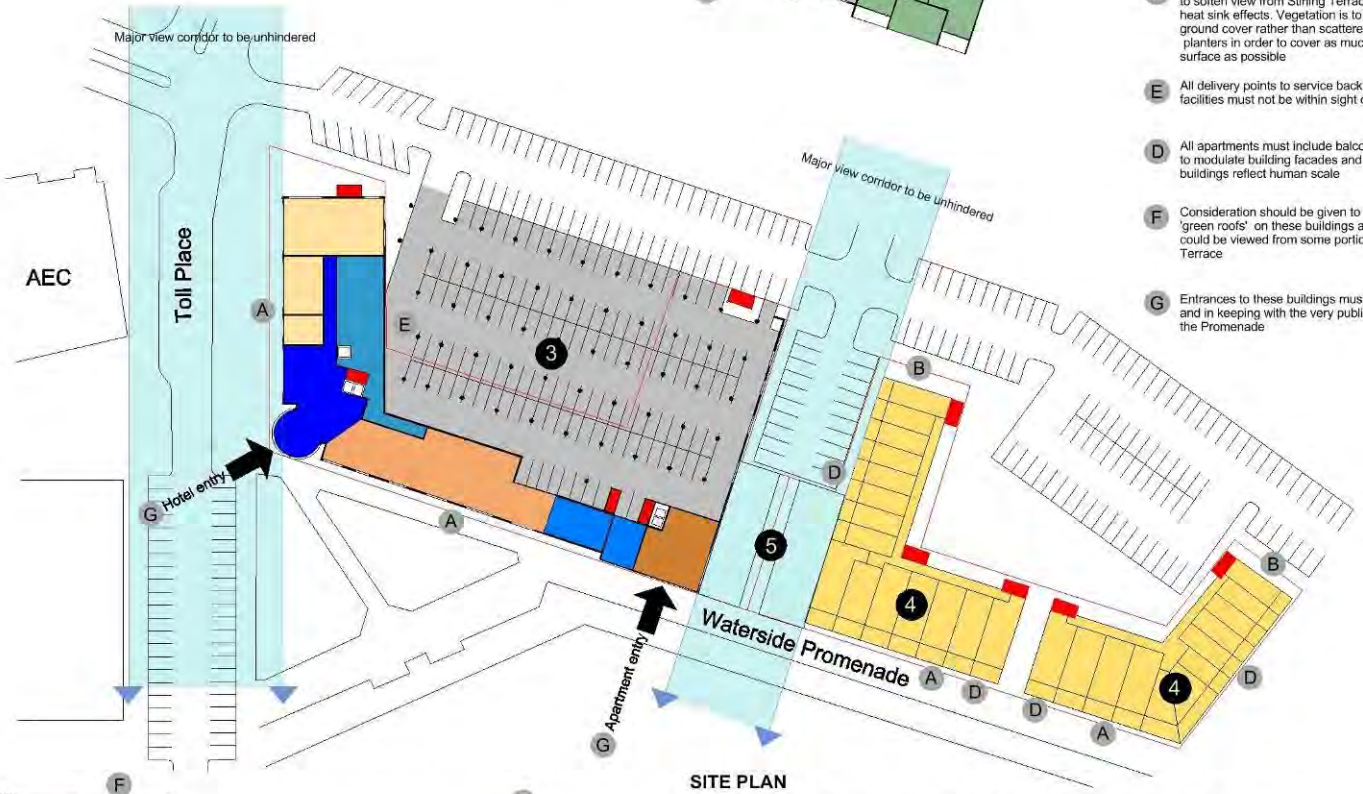
We respectfully request the City of Albany and WAPC support these changes which will serve as a catalyst to materialise the vision of the Waterfront development to *actively link the CBD to Princess Royal Harbour by providing a people-focused development with a strong sense of vibrancy and excitement with a unique combination of entertainment, accommodation and mixed-use buildings facing a waterside promenade overlooking an active public marina.*

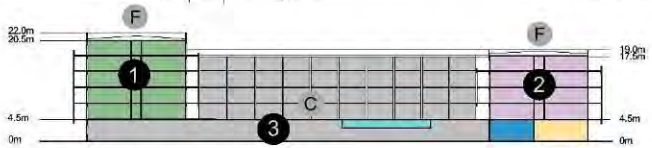
APPENDIX A

Current Approved Structure Plan

- Hotel Lobby
- Amenity area on covered parking
- Meeting rooms Approximately 400m2 shown
- Apartment lobby
- Back of house
- Short-stay apartments on five floors (60m2 average apartment size shown)
- Hotel rooms on four floors 55m2 average room size shown
- Covered parking
- Egress points
- Tavern, bar, restaurant Approximately 500m2 shown
- Short-stay apartments above commercial mixed-use buildings



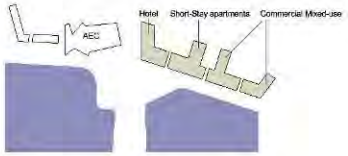




EAST WEST SECTION

SITE PLAN

NOTE: It is not intended that the plans shown here are to be replicated by a future owner/operator. The aim is to show what is possible and the extent of changes being proposed to the Structure Plan. Future development of the site will be required to follow these guidelines and maintain, approximately, the building footprints shown.



DEVELOPMENT GUIDELINES

- A All building frontages to maximize glazing and allow for visual permeability and where appropriate should flow out to encourage public activity at promenade level
- B All building ends facing Stirling Terrace are to maximize glazing and use of balconies in order to articulate and 'enliven' these building faces
- C Maximize vegetation on deck over parking area to soften view from Stirling Terrace and to reduce heat sink effects. Vegetation is to be in the form of ground cover rather than scattered trees in planters in order to cover as much of the paved surface as possible
- E All delivery points to service back of house facilities must not be within sight of Stirling Terrace
- D All apartments must include balconies in order to modulate building facades and ensure buildings reflect human scale
- F Consideration should be given to using 'green roofs' on these buildings as they could be viewed from some portions of Stirling Terrace
- G Entrances to these buildings must be well defined and in keeping with the very public nature of the Promenade

SUMMARY

Buildings within the Accommodation and Commercial Precincts of the Albany Waterfront Development are proposed to be increased to enable a higher development yield to occur. This is in response to feedback from potential operators/owners who advise the current capacity of these buildings is too low for viable operation.

The following increases to the Hotel, Short-stay Apartments and the Commercial Mixed-use buildings are proposed:

Increase Short-stay Apartments from four to six floors
Increase Commercial Mixed-use buildings from two to three floors

These height increases result in the following:

120 to 145 hotel rooms
134 to 144 short-stay apartments
A GFA increase from 16,600m2 to 24,050m2

	Current	Proposed
Hotel building	7,500m2 GFA	10,500m2 GFA
Short-stay apartment building	4,600m2 GFA	6,800m2 GFA
Commercial Mixed-use building	4,000m2 GFA	6,750m2 GFA
Car parking	700 bays	792 bays

PROPOSED CHANGES TO STRUCTURE PLAN

1. The short-stay apartments in the accommodation precinct increased from four to six floors. This increase will take the GFA from 4,600m2 as noted in the Structure Plan to 6,800m2. The configuration shown here is capable of providing 80 to 90 short-stay apartments depending on mix of apartment sizes.
2. The hotel portion of the accommodation precinct is shown here as a continuous building adjoining the short-stay apartments. The footprint shown produces a hotel with a GFA of 10,500m2 which is 3,000m2 larger than the estimated hotel area noted in the Structure Plan. The hotel in this configuration is capable of providing 120 to 145 rooms depending on the mix of room sizes.
3. Covered parking for 130 cars can be provided on this site. There are presently 38 car bays in this area which have reciprocal use arrangements and must maintain this status. The additional 92 bays will be for the exclusive use of hotel and short-stay apartment guests.
4. These two buildings in the commercial precinct are increased from two to three floors provided the top floor is used as short-stay accommodation. These buildings are designated mixed-use in the Structure Plan. Their approximate GFA is currently 4,500m2 which will increase to 6,750m2 with an additional floor. As a mixed-use development the current building would require 150 car bays. If the development became mixed-use at ground level and short-stay apartments above the car bays required would reduce to approximately 130 bays, depending on the number of apartments (54 apartments are shown as only a suggestion of potential numbers).

   Mixed-use at ground level may be concentrated to the waterside promenade and the rear portions can be ancillary to the short-stay apartments. No apartments are to be at ground level
5. The area between these 2 buildings is to be used for public purposes and cannot be built upon

EXISTING ALBANY WATERFRONT STRUCTURE PLAN

0m 50m 100m

July 22 2011 Revision D

LANDCORP

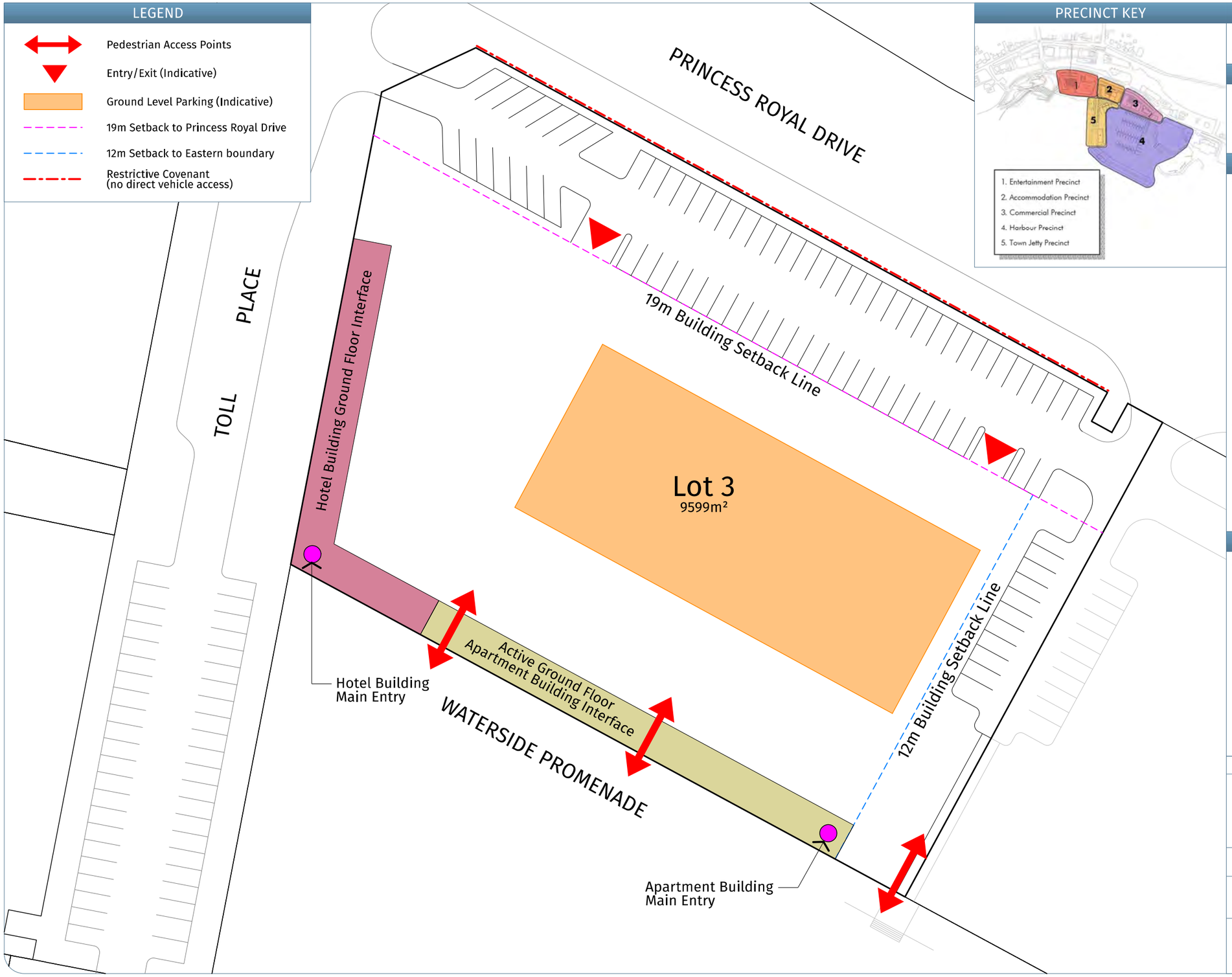
Please note this is the Existing Structure Plan

APPENDIX B

Proposed Structure Plan Modifications to Accommodation Precinct
(Incorporating Proposed Amendment Modifications)

LEGEND

- Pedestrian Access Points
- Entry/Exit (Indicative)
- Ground Level Parking (Indicative)
- 19m Setback to Princess Royal Drive
- 12m Setback to Eastern boundary
- Restrictive Covenant (no direct vehicle access)



PRECINCT KEY

SITE PLAN

Land uses within the Accommodation Precinct will be changed to include Multiple Dwellings. This change will incorporate Multiple Dwellings as a 'D' land use class within the Accommodation Precinct.

SUMMARY

This Structure Plan replaces previous revisions to the Structure Plan (2011) and plan within the Precinct Plan Report in so far as it affects the Accommodation Precinct (Lot 3).

The following changes are proposed in response to feedback received from potential operators/owners who advise the current Structure Plan (2011) is too restrictive for viable operation.

CHANGES TO THE STRUCTURE PLAN

1. No permanent residential development is permitted in the Albany Waterfront Structure Plan Area, with the exception of Multiple Dwellings being a discretionary land use ('D') within the Accommodation Precinct. Multiple Dwellings are not permitted on the ground level fronting the Waterfront Promenade.
2. The scale of any residential development is to complement the tourism component and priority is to be given to locating the tourism component(s) on those areas of the site providing the highest tourism amenity.
   - Any staging of development is to occur so that the tourism development and provision of facilities occurs prior to, or concurrently with, any residential development.
   - Multiple dwelling development shall not exceed a Gross Floor Area of 6,800m².
3. Revising the building footprints to the Accommodation Precinct to provide improved pedestrian connectivity through the Waterfront Area via revised pedestrian access points, and enable increased flexibility of building design and siting, while maintaining key principles of the Design Guidelines.
4. Basement parking, or part basement parking, to protrude a maximum 1.5m above the natural ground level of the Accommodation Precinct, excluding the active ground floor interface with the Waterside Promenade.
5. Building setback to Princess Royal Drive revised from 25m to 19m within the Accommodation Precinct to allow increased flexibility with design and siting of buildings.
6. All Holiday Accommodation and Multiple Dwellings located within the Accommodation Precinct are to incorporate Quiet House Design Package B.
7. Prior to development commencing a Management Statement is to be prepared in consultation with the City of Albany to ensure all Holiday Accommodation units will be let out for tourism purposes, preferably by an on-site letting agent (manager).
   - Prior to development commencing a Management Statement is to be prepared in consultation with the City of Albany to address amenity and mitigation measures associated with the Port and Entertainment Precinct.
   - The Local Government may consider the use of a Section 70A notification being placed on the Title(s) to advise prospective purchasers of potential impacts that may arise from activities associated with the Albany Waterfront or Port of Albany.

DEVELOPMENT GUIDELINES

A. All building frontages to maximise glazing and allow for visual permeability and where appropriate should flow out to encourage public activity at promenade level.

B. All building ends facing Stirling Terrace are to maximise glazing and use of balconies in order to articulate and 'enliven' these building faces.

C. Maximise vegetation on deck over parking area to soften views from Stirling Terrace and to reduce heat sink effects. Vegetation is to be in the form of ground cover rather than scattered trees in planters in order to cover as much of the paved surface as possible.

D. All delivery points to service back of house facilities must not be within sight of Stirling Terrace.

E. All apartments must include balconies in order to modulate building facades and ensure buildings reflect human scale.

F. Consideration should be given to using 'green roofs' on these buildings as they could be viewed from some portions of Stirling Terrace.

G. Entrances to these buildings must be well defined and in keeping with the very public nature of the Promenade.

	Current	Proposed
Building Height	The Hotel Building facing Toll Place to be 5 storeys. The adjacent apartment building to be 6 storeys. The building element used to signify the entry points may project beyond the roof to a maximum of 3 metres.	No Change
Plot Ratio	Plot ration shall be a maximum of 2.5:1 for all lots in the precinct.	No Change
Parking	A minimum of 222 car bays to be provided on Lot 3. This comprises of approximately 83 open bays and a minimum of 139 undercover bays.	No Change
Setbacks	25m minimum setback from Princess Royal Drive. 12m minimum from eastern boundary of 6 storey wall of apartment building. Nil setback from all other boundaries.	19m setback from Princess Royal Drive

MODIFICATIONS TO ALBANY WATERFRONT STRUCTURE PLAN - ACCOMODATION PRECINCT 2018

Lot 3 Toll Place, ALBANY WATERFRONT

Plan No. | 20536-02C
Date | 22/01/18
Drawn | BdR
Checked | DC
Revision | C

Scale | 1:600 @ A3

0 5m 10m 15m

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NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey

Harley Dykstra
PLANNING & SURVEY SOLUTIONS

1727a/CC

4th August 2017

Albany Waterfront Hotel

Harley Dykstra
Acoustic Concept Design, Structure Plan Amendment

Preliminary Acoustic Concept Design (Structure Plan) Rev. B

Document Control

Rev No	Date	Revision Details	Author	Verifier	Approver
A	4th August 2017	Preliminary Draft for Comment Issue	DML	DML	PH
B	28th August 2017	Second Issue For comment	DML	NB	DML

Table of contents

1. Executive Summary

Hewshott International have been engaged by Harley Dykstra to undertake the acoustic consultancy concept design services and the development application for the proposed Albany Waterfront Hotel.

This Acoustic concept design document has been prepared following early discussions with the Project Team.

This desktop review has identified key aspects of the acoustic design of the development.

The key aspects are:

- Environmental noise emissions from the development
- Noise and vibration and land use planning
- General internal noise criteria for the proposed development

To ensure that the final design of the building achieves the recommended acoustic design criteria, we recommend that a further acoustic assessment is undertaken at subsequent phases of the project (e.g. detailed design).

2. Assessment Location

2.1. Project Study Area

The proposed development is located within the Albany Waterfront Marina along Princess Royal Drive, adjacent to the Albany Entertainment Centre. Figure 2.1 below shows the site location (LOT 3).

Figure 2.1: Assessment location

3. Environmental Noise Impact Criteria

In Western Australia, the noise emissions from a development to a receiver are assessed in accordance with the Environmental Protection (Noise) Regulations 1997 (EPNR 1997). The noise emissions from the development are compared with calculated assigned noise levels at a given noise sensitive receiver. When noise emissions are very high and for a restricted number of events per year – e.g. rock concert or other large community event capable of emitting high noise levels – it is possible for the event organisers to apply for an exemption – see section 3.4.6.

3.1. EPNR 1997 Assigned Noise Levels Table

The Western Australian Department of Environmental Protection Noise Regulations (EPNR 1997), operate under the Environmental Protection Act 1986. The Regulations specify maximum noise levels that can be received at noise sensitive premises, including industrial, commercial and residential premises.

EPNR 1997 provides a methodology and stipulates clear procedures relating to noise assessments and control. The regulations provide limits for three types of assigned noise level:

- L_{Amax} assigned noise level which cannot be exceeded at any time;
- L_{A1} assigned noise level that cannot be exceeded for more than 1% of the time;
- L_{A10} assigned noise level that cannot be exceeded for more than 10% of the time.

The resulting assigned noise levels are displayed in Table 3.1.1 below.

Table 3.1.1: Assigned noise levels

Type of premises receiving noise	Time of day	Assigned noise level (dB_A)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use	07:00 to 19:00 Monday to Saturday	45+IF	55+IF	65+IF
	09:00 to 19:00 Sunday and Public holidays	40+IF	50+IF	65+IF
	19:00 to 22:00 All days	40+IF	50+IF	55+IF
	22:00 to 07:00 All days	35+IF	45+IF	55+IF
Noise sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use	All hours	60	75	80
Commercial premises	All times	60	75	80
Industrial and utility premises	All times	60	75	80

The “influencing factor” (IF) is calculated for each noise-sensitive premises receiving noise. It takes into account the amount of industrial and commercial land and the presence of major roads within a 450m radius around the noise receiver.

3.2. EPNR 1997 Noise Character Adjustments

It is a requirement of EPNR 1997 that the noise character of any breakout noise from a development be free of annoying characteristics, namely –

- Tonality, e.g. whining, droning;
- Modulation, e.g. like a siren; and
- Impulsiveness, e.g. banging, thumping.

According to EPNR 1997, "if these characteristics cannot be reasonably and practicably removed, e.g. in the case of an emission like music, then a series of adjustments to the measured levels are set out, and the adjusted level must comply with the assigned level". The adjustments are set out below.

Table 3.2.1: EPNR 1997 noise character adjustments

Adjustment where noise emission is not music These adjustments are cumulative to a maximum of 15 dB			**Adjustment where noise emission is music**	
Where tonality is present	Where modulation is present	Where impulsiveness is present	Where impulsiveness is not present	Where impulsiveness is present
+5 dB	+5 dB	+10 dB	+10 dB	+15 dB

3.3. Calculation of Assigned Noise Levels

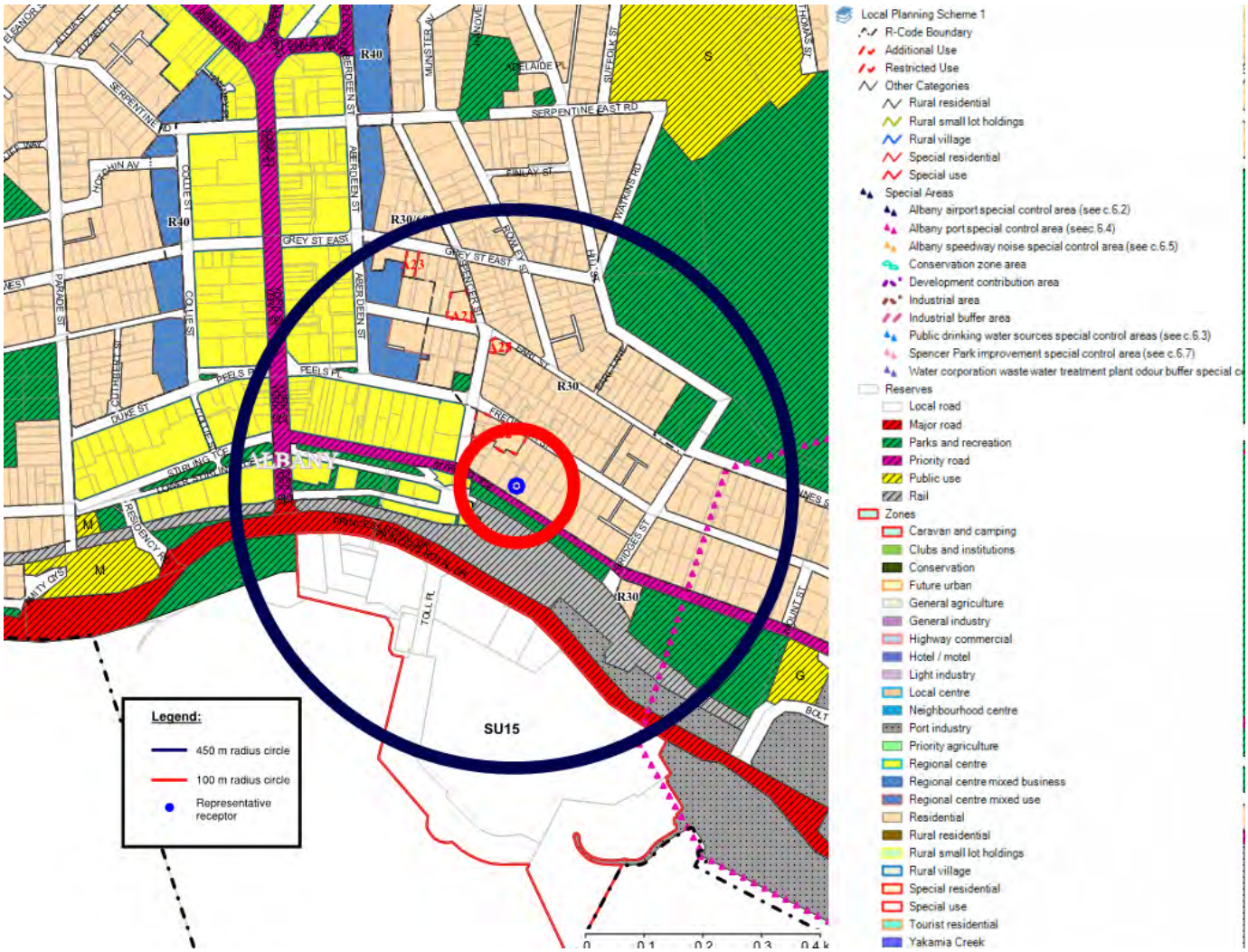
The assigned noise levels defined in the regulations have been calculated for the following nearest noise sensitive receivers (NSR's) below.

1. 22 Stirling Terrace
2. 24 Stirling Terrace
3. 26 Stirling Terrace

3.4. Nearest Noise Sensitive Receivers (NSR's)

Based on the regulations set out in the WA Environmental Protection (Noise) Regulations 1997, the maximum allowable noise levels are determined using the assigned noise level base values and the influencing factor (IF). The influencing factor takes into account zoning and road traffic around the receiver of interest within a 100 and 450m radius. In figure 3.4.1, the red circle is the 100m radius circle, and the blue circle is the 450m radius circle. Their centre is the noise-sensitive receiver under consideration (i.e 22-26 Stirling Terrace).

Figure 3.4.1: Composite map showing zoning around Stirling Terrace



3.4.1 *100-Metre-Radius Circle*

Based on the available information the percentage of commercial use within the 100-metre-radius circle is 0%, and 10% industrial activity has been identified within this area.

3.4.2 *450-Metre-Radius Circle*

Based on the available information, the percentage of commercial use within the 450-metre-radius circle is 12%, and 9% industrial activity has been identified within this area.

3.4.3 *Traffic/Transport Factor*

There are no major (more than 15,000) or minor (6,000 – 15,000) roads within the 100m or 450m radius area.

3.4.4 *Influencing Factor*

Based on calculations, and taking into account the percentage of commercial, industrial and residential areas as well as secondary and major roads in the 100 and 450 metre radius circles, the influencing factor is 2 dB.

3.4.5 *EPNR 1997 Assigned Noise Levels Table – NSR's*

The resulting assigned noise levels for the NSR's are displayed in Table 3.4.5.1 below.

Table 3.4.5.1: Assigned Noise Levels at Stirling Terrace

Type of premises receiving noise	Time of the day	Assigned Noise Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use	07.00 to 19.00 hrs Monday To Saturday	47	57	67
	09.00 to 19.00 hrs Sunday and Public holidays	42	52	67
	19.00 to 22.00 hrs All days	42	52	57
	22.00 to 07.00 hours all days	37	47	57
Commercial premises	All times	60	75	80
Industrial and utility premises	All times	60	75	90

L_{A10} is an acoustic descriptor which corresponds to the noise level exceeded for ten per cent of the time period under consideration; this may be considered to represent an "average maximum level" and is often used for the assessment of road traffic noise. The L_{A1} is the level exceeded for one per cent of the time; this is representative of the maximum levels recorded during the sample period. The L_{Amax} is the absolute maximum recorded level, which is most useful for assessing sounds of short duration.

3.4.6 *Community Activities - Exempt Noise*

Schedule 2 to the regulations lists the following activities as exempt noise

1. Noise emitted by spectators at an organised sporting activity.
2. Noise emitted by participants and spectators at a meeting or procession which has been authorised under the Public Meetings and Processions Act 1984.
3. Noise emitted from church services (as distinct from bellringing or calls to worship, which are covered by regulation 15) where the worship takes place on land which is exempt from rates because of its religious use.
4. Noise emitted from a recreational or educational activity on educational premises under control of the principal. The activity may use musical instruments but not mechanical equipment.
5. Noise emitted from agricultural shows, fairs, fetes, exhibitions and similar events.

Based on the above schedule, noise emitted by spectators at an organised sporting activity are exempt from the regulations, however noise from amplified music or mechanical services (plant room) are required to be assessed.

3.5. Noise emissions

The mechanical services noise emissions must be kept to a level that is not exceeded at any nearby neighbours' boundary. The night time assigned noise level is 37 dB, L_{A10} and has been calculated in Table 3.4.5.1.

All noise from plant or any activity associated with the proposed development must not exceed this value at the boundary of any nearby residential neighbour.

It is recommended that noise from plant such as condenser units be mitigated using the following options:

- All condenser units should be either screened from view or located in basement, facing away from nearby residents. If the intention is to mount units on walls, compliance with the assigned noise levels may be difficult to achieve and a detailed mechanical noise assessment should be undertaken.
- Vibration from any condenser units would also need to be controlled appropriately to minimise structure borne noise.

For building plant such as exhaust fan outlets that are proposed to be located in the external walls, it is the responsibility of the installer that noise at the outlet must be kept to a sound pressure level of 45 dBA or less at one metre. This can be achieved by using internally lined ducts. As far as practicable, noise from mechanical services including condenser units and exhaust fans should be free from tonality and impulsiveness.

Provided that condenser units and exhaust fans are carefully selected and mitigated, assigned noise levels will not be exceeded at nearby properties.

3.6. Vibration mitigation

It is the responsibility of the installer to ensure that any rotational equipment or pumps do not cause objectionable vibration. In order to minimise the transmission of vibration and noise from rotating reciprocating or vibrating equipment to building elements, it is necessary to provide vibration control comprising vibration isolators and inertia bases where necessary to limit building vibrations in occupied areas as follows:

Table 3.6.1: Maximum allowable RMS velocity levels

Equipment	Allowable rms velocity level mm/s
Pumps	3.3
Centrifugal compressors	3.3
Fans (vent sets, centrifugal, axial)	2.3

(ASHRAE)

Isolator selection: Select mounts with static deflections to limit building vibration allowing for span, stiffness and mass of supporting structure, and mass, imbalance, and operating speed range of equipment.

All equipment must be balanced to minimise vibration.

Rotating and reciprocating machinery – within evaluation zone A measured in accordance with *ISO 10816-3:2009* and *AS 2625.4:2003*.

4. Noise and Land Use Planning

4.1. State Planning Policy 5.4

Exiting noise levels generated from the surrounding environment has the potential to cause noise impacts on the proposed development. Therefore, it is necessary for a noise assessment to be undertaken in accordance with the guidelines of The Western Australian Planning Commission (WAPC) State Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations in Land Use Planning" (SPP 5.4).

An initial screening assessment has been undertaken to determine the existing noise climate of the proposed site and to incorporate in the future 20-year traffic horizon. Noise predictions were undertaken in accordance with the SPP 5.4 guidelines.

Table 4.1 presents the external noise level target and limits based on SPP 5.4 guidelines, criteria for indoor noise levels are discussed in section 5.1.1.

Table 4.1: Noise level objectives

Time of day	Target dB (A)	Limit dB (A)
Day time (06.00–22.00 hours)	55 $L_{Aeq,16hr}$	60 $L_{Aeq,16hr}$
Night time (22.00 – 06.00 hours)	50 $L_{Aeq,8hr}$	55 $L_{Aeq,8hr}$

4.2. Screening Assessment

A screening assessment for the site location in accordance with WAPC State Planning Policy 5.4 "Road and Rail Transport Noise and Freight Considerations in Land Use Planning", has been undertaken for 2017 and for 2037 and is detailed in Table 4.2.1 & 4.2.2 below. Traffic statistic information from the transportation consultants has been used for this assessment.

Table 4.2.1: Screening Assessment Worksheet 2017

List the nearest roads and any railways up to 300 metres from the site	For each future road or railway, estimate the distance from property boundary to edge of road carriageway or centre of rail line, in metres	For each future road and railway, estimate latest average traffic volume per day (e.g. Main Roads Traffic Digest for roads), or forecast based on 20-year horizon.	Estimate L_{Aeq},Day from Table A.1, dB.
Road			
Princess Royal Drive	15	3000	59*
Railway			
Port of Albany Line	100	1 per hour	53
		Total	**60**

** Indicates level adjusted in accordance with State Planning Policy 5.4 traffic flows*

Table 4.2.2: Screening Assessment Worksheet 2037

List the nearest roads and any railways up to 300 metres from the site	For each future road or railway, estimate the distance from property boundary to edge of road carriageway or centre of rail line, in metres	For each future road and railway, estimate latest average traffic volume per day (e.g. Main Roads Traffic Digest for roads), or forecast based on 20-year horizon.	Estimate L_{Aeq},Day from Table A.1, dB.
Road			
Princess Royal Drive	15	4458^	61*
Railway			
Port of Albany Line	100	1 per hour	53
		Total	**62**

** Indicates level adjusted in accordance with State Planning Policy 5.4 traffic flows*

^ Based on typical 2% p.a. traffic growth

From the values calculated in Table 4.2.1 and 4.2.2 above, the Policy states the following in Table 4.2.3.

Table 4.2.3: Noise Category Level

1	L_{Aeq},Day is • less than 55dB (day period noise target), OR • less than 50dB for any freight rail.	• No further measures are required.
2	L_{Aeq},Day is • between 55dB and 60dB inclusive, OR • between 50dB and 55dB for any freight rail.	• Arrange for notification on each title of property affected according to Guidelines Section 4.5. • 'Mitigation measures' need to be implemented. Direct proponent may implement appropriate acceptable treatment provisions according to Section 6.3 of the SPP5.4 Guidelines, or engage specialist advice to otherwise address the requirements of the Policy (Section 6.4). • Seek evidence of implementation / compliance as deemed necessary.
3	L_{Aeq},Day is • above 60dB (noise limit), OR • above 55dB for any freight rail.	• Arrange for notification on each title of property affected according to Guidelines (Section 4.5). • Detailed noise assessment required by competent professional to the satisfaction of authorities. The assessment may recommend some application of acceptable treatment provisions according to Section 6.3 or alternatives according to Section 6.4. • Confirm proponent is committed to implementing the recommendations of the noise assessment or separate noise management plan, and seek evidence of installation as deemed necessary.

For this assessment, the noise category falls within two and three, which states that a detailed noise assessment is required.

The proposed development will be slightly above the noise level limit in accordance with the SPP 5.4 guidelines, therefore a 'Quiet House design' package is likely to be required in order to achieve the indoor noise level standards.

Table 4.2.4: Acceptable Treatment Packages

Table 6.3: Acceptable treatment packages

Area	Orientation to road or rail corridor	Package A $L_{Aeq,Day}$ up to 60dB $L_{Aeq,Night}$ up to 55dB	Package B $L_{Aeq,Day}$ up to 63dB $L_{Aeq,Night}$ up to 58dB	Package C $L_{Aeq,Day}$ up to 65dB $L_{Aeq,Night}$ up to 60dB
Bedrooms	Facing	• Walls to R_w+C_{tr} 45dB • Windows and external door systems: Minimum R_w+C_{tr} 28dB (Table 6.4), total glazing area up to 40% of room floor area. [if R_w+C_{tr} 31dB: 60%] [if R_w+C_{tr} 34dB: 80%] • Roof and ceiling to R_w+C_{tr} 35dB (1 layer 10mm plasterboard) • Mechanical ventilation as per Section 6.3.1	• Walls to R_w+C_{tr} 50dB • Windows and external door systems: Minimum R_w+C_{tr} 31dB (Table 6.4), total glazing area up to 40% of room floor area. [if R_w+C_{tr} 34dB: 60%] • Roof and ceiling to Rw+Ctr 35dB (1 layer 10mm plasterboard) • Mechanical ventilation as per Section 6.3.1	• Walls to R_w+C_{tr} 50dB • Windows and external door systems: Minimum R_w+C_{tr} 34dB (Table 6.4), total glazing area limited to 40% of room floor area [if 20% of floor area or less, R_w+C_{tr} 31dB] • Roof and ceiling to R_w+C_{tr} 40dB (2 layers 10mm plasterboard) • Mechanical ventilation as per Section 6.3.1
	Side-on	• As above, except glazing Rw+Ctr values for each package may be 3dB less, or max % area increased by 20%		
	Opposite	• No requirements	• As per Package A 'Side On'	• As per Package A 'Facing'
Indoor living and work areas	Facing	• Walls to R_w+C_{tr} 45dB • Windows and external door systems: Minimum R_w+C_{tr} 25dB (Table 6.4), total glazing area limited to 40% of room floor area. [if R_w+C_{tr} 28dB: 60%] [if R_w+C_{tr} 31dB: 80%] • External doors other than glass doors to R_w+C_{tr} 26dB (Table 6.4) • Mechanical ventilation as per Section 6.3.1	• Walls to R_w+C_{tr} 50dB • Windows and external door systems: Minimum R_w+C_{tr} 28dB (Table 6.4), total glazing area up to 40% of room floor area. [if R_w+C_{tr} 31dB: 60%] [if R_w+C_{tr} 34dB: 80%] • External doors other than glass doors to R_w+C_{tr} 26dB (Table 6.4) • Mechanical ventilation as per Section 6.3.1	• Walls to R_w+C_{tr} 50dB • Windows and external door systems: Minimum R_w+C_{tr} 31dB (Table 6.4), total glazing area up to 40% of room floor area. [if R_w+C_{tr} 34dB: 60%] • External doors other than glass doors to R_w+C_{tr} 30dB (Table 6.4) • Mechanical ventilation as per Section 6.3.1
	Side-on	• As above, except the glazing R_w+C_{tr} values for each package may be 3dB less, or max % area increased by 20%		
	Opposite	• No requirements	• As per Package A 'Side On'	• As per Package A 'Facing'
Other indoor areas	Any	• No requirements	• No requirements	• No requirements
Outdoor living areas	Any (Section 6.2.3)	• As per Package C, and/or • At least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2 metres height above ground level	• As per Package C, and/or • At least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2.4 metres height above ground level	• At least one outdoor living area located on the opposite side of the building from the transport corridor

4.3. Potential Vibration Impacts (Freight Line)

The Port of Albany Rail Line is approximately 100m away from the proposed development, the line currently only accommodates freight cargo trains.

Based on previous project experience of ground borne vibration from railways, it is unlikely that vibration induced by freight trains will be perceptible at the proposed development.

Vibration measurements have subsequently being undertaken at proposed development and are detailed in section 5.2.

5. On-site measurements

5.1. Noise

Sample noise measurements were undertaken by Hewshott International engineering staff in various representative locations along Princess Royal Drive (LOT 3) 24th August 2017. The time period selected for the noise survey allowed the capture of typical existing ambient noise levels. Measurement locations are shown in Figure 5.1.1 with the results presented in Table 5.1.1. and 5.1.2.

Figure 5.1.1 Noise measurement locations

5.1.1 *Traffic Measurements*

Results of the traffic noise survey are given below in Table 5.1.1 for the measurement location, along with the corresponding L_{Aeq}, L_{A10} & L_{A90} noise data.

Table 5.1.1 Sample measurement data

Location, LOT 3	Time	L_{Aeq} (dB)	L_{A10} (dB)	L_{A90} (dB)
(1)	11:00 – 16:00	54	57	47
		54	58	48
(2)	11:00 – 16:00	56	60	46
		53	54	45
(3)	11:00 – 16:00	60	60	46
		60	61	46

$L_{Aeq,T}$: Is the equivalent continuous A-weighted sound pressure level in dBA. It is often accompanied by an additional subscript suffix "T" which is $L_{Aeq,15min}$, which means it is evaluated over 15 minutes and averaged throughout the monitoring period stated in Table 5.1.1.

$L_{A10,T}$: Is the A-weighted sound pressure level in decibels which is not surpassed for more than 10% of the measurement time.

$L_{A90,T}$: A-weighted sound pressure level in decibels which is not surpassed for more than 90% of the measurement time. This value is often used to have a certain reference of the constant floor background noise level

5.1.2 *Freight Measurements*

Results of the freight noise survey are given below in Table 5.1.2 for the measurement location, along with the corresponding L_{Aeq}, L_{Amax} & $L_{Aeq,}$Day noise data.

Table 5.1.2 Sample measurement data

Location	Time	L_{Aeq} (dB) pass by	L_{Amax} (dB)	$L_{Aeq,}$Day (dB) (16-Hours)
(3)	Pass by	65	76	50

$L_{Aeq,T}$: Is the equivalent continuous A-weighted sound pressure level in dBA. It is often accompanied by an additional subscript suffix "T" which is $L_{Aeq,15min}$, which means it is evaluated over 15 minutes and averaged throughout the monitoring period stated in Table 5.1.2.

L_{Amax}: Maximum A-weighted sound pressure level over a certain period of evaluation.

$L_{Aeq,}$Day: The equivalent continuous A-weighted sound pressure level in dBA. 'Day' means it is evaluated over 16 hours.

5.2. Vibration Measurements

Sample vibration measurements were undertaken by Hewshott International engineering staff in a representative location along Princess Royal Drive (LOT 3) 24th August 2017. Measurement locations are shown in Figure 5.1.1.

Vibration from a freight train and passing trucks have both been assessed.

5.2.1 *Equipment*

A Svan 958A vibration 4-channel monitoring analyser has been used to assess the vibration levels generated by the façade systems distinctive intermittent noise.

The tri-axial accelerometer was attached to various façade mullions to record vibration in 3 axes, horizontal (X), transverse (Y) and vertical (Z).

Table 5.2.1 below shows the relevant axis with the associated direction for the mullion, Figure 5.2.1 shows the accelerometer used.

Table 5.2.1: Accelerometer attachment and associated axis direction

Axis	Direction
X	Vertical (up and down)
Y	Horizontal (Left to right)
Z	Transverse (Front to back)

Figure 5.2.1: Accelerometer

5.2.2 *Human Response*

These standards relate to the response of humans within a building, when subjected to continuous or intermittent vibration (eg. footfall, transportation), or transient vibration (eg. piling during construction). The excitation frequency considered is between 1Hz and 80Hz.

- AS 2670-2001 “Evaluation of human exposure to whole-body vibration”.
- BS 6472-1:2008 “Guide to evaluation of human exposure to vibration in buildings”.

Equivalent to ISO 2631-2003 “Mechanical vibration and shock - Evaluation of human exposure to whole-body vibration”.

Where resonance of a building structure results from wind excitation with a resonance frequency less than 1Hz, the following standard is relevant:

- ISO 6897-1984 “Guidelines for the evaluation of the response of occupants of fixed structures, especially buildings and off-shore structures, to low-frequency horizontal motion (0.063 to 1Hz)”

5.2.3 *Effects on Structures*

The effects of vibrations in buildings is frequently associated with the assumption that if vibrations can be felt, then damage is inevitable. However, considerably greater levels of vibration are required to cause damage to buildings and structures.

The potential for cosmetic damage (non-structural) is considered against the limits given within British Standard 7385: Part 1:1990 and 2:1993 “Evaluation and measurement for vibration in buildings” which refer to a vibration limit of 50mm/s ppv for dominant frequencies above 40Hz. In the lower frequency region of 4 - 40 Hz, where strains associated with a given vibration velocity magnitude are higher, the guide values are reduced. The limit varies from 15 mm/s ppv at a predominant frequency of 4 Hz, increasing to 20 mm/s ppv at 15 Hz and then increasing at a higher rate to 50 mm/s ppv at 40 Hz. Figure 2 presents guide values for cosmetic damage.

The standard is very similar to DIN 4150-3, Structural vibration - Effects of vibration on structures.

Figure 5.3.2 below shows the measured vibration level in terms of peak particle velocity (PPV) mm/s from the façade mullion during a distinctive intermittent noise along with Curve 2 from BS 7385, which is considered the limits for cosmetic damage due to induced vibration.

5.3. Measured Results

5.3.1 *Human Exposure*

From the measured frequency weighted RMS acceleration, the estimated Vibration Dose value (eVDV) has been calculated to predict the internal vibration level of a typical commercial grade building. A transfer function has been used based on recommendations stated in the Transportation Noise Reference Book (1987).

The transfer function is based on the vibrations measured on unloaded ground and vibration at a building foundation which is approximately -6 dB for a typical trench foundation.

A vibration amplification factor has also been included in the predicted results to account for floor resonances which can potentially coincide with peaks in the transmitted vibration. Table 5.3.1 presents the predicted eVDV for freight trains and heavy vehicles.

Table 5.3.1 Estimated Vibration Dose Values (eVDV) at Upper Storey, $ms^{-1.75}$

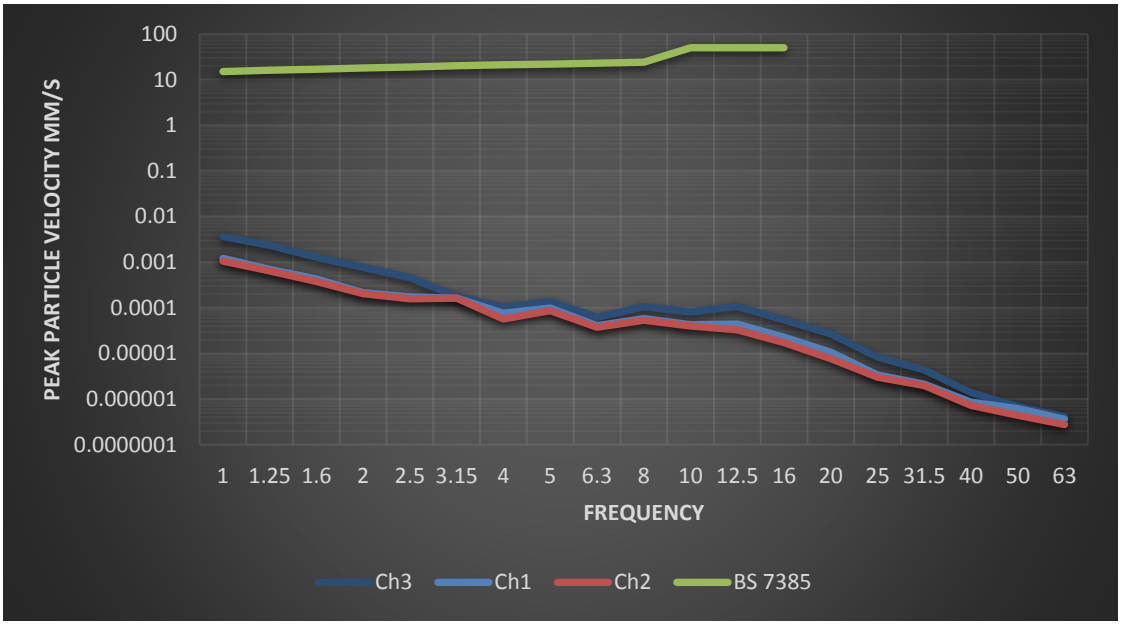
Location	Direction	Measured Frequency Weighted Acceleration RMS (m/s^2)	Transfer function	Resulting Estimated Vibration Dose Value ($ms^{-1.75}$)	Probabilities of adverse comment within buildings
3	1 freight train per hour	0.0016	3	0.043	Low Probability of Adverse Comment
3	500 heavy vehicles per day	0.0024	3	0.056	Low Probability of Adverse Comment

From Table 5.3.1 it can be seen that the above values indicate a less than low probability of adverse comment, vibration mitigation measures are therefore not deemed to be necessary.

5.3.2 *Structural Assessment*

Figure 5.3.2 below shows the measured vibration level in terms of peak particle velocity (PPV) mm/s along with Curve 2 from BS 7385, which is considered the limits for cosmetic damage due to induced vibration.

Figure 5.3.2: Measured vibration levels with transient vibration guide



Vibration measurements from external sources in terms of peak particle velocity are currently below the threshold for unreinforced or light framed structures to cause cosmetic damage.

6. General Internal Noise Criteria for the Proposed Development

Australian Standards (AS) are now equivalent of International Standards (ISO), although some additional Australian Standards are referenced in this briefing document which have not yet been introduced into an ISO version. Note that British and European Standards are now being merged with ISO Standards.

6.1. Noise

6.1.1 *Internal Noise*

- AS 2021-2015, "Acoustics-Aircraft Noise Intrusion-Building Siting and Construction".
- AS 2107-2016, "Acoustics-Recommended Design Sound Levels and Reverberation Times for Building Interiors".

6.1.2 *External Noise Emission*

- AS 1055-1997 "Acoustics - Description and measurement of environmental noise-general procedures"

The above standard is similar to ISO 1996:2003 "Acoustics - Description, measurement and assessment of environmental noise". It is common for the Local Authority to prescribe criteria with reference to these standards, as is the case in Perth, which include:

- Environmental Protection (Noise) Regulations 1997, see Chapter 3
- State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning, see Chapter 4.

6.1.3 *Room Acoustics*

- AS ISO 354-2006 "Acoustics - Measurement of sound absorption in a reverberation room"
- AS ISO 11654-2002 "Acoustics - Rating of sound absorption - Materials and systems"

  Also refer to AS 2107 above.

6.2. NCC 2016 F5 requirements

6.2.1 *Internal Sound Insulation (Residential)*

The National Construction Code (NCC) is an initiative of the Council of Australian Governments developed to incorporate all on-site construction requirements into a single code. The Building Code of Australia (BCA) is Volume One and Volume Two of the NCC.

The minimum sound insulation criteria for class 2 & 3 buildings are set in NCC 2016 and have been summarised in Table 6.2.1 below. An SOU is a single occupancy unit i.e. an apartment.

Table 6.2.1: Summary of NCC 2016 Part F5 requirements (class 2 & 3 buildings)

Construction	R_w	$R_w + C_{tr}$	$L_{n,w} + C_I$	Discontinuous Construction Required?
Walls separating habitable rooms in adjoining SOUs	-	≥ 50	-	-
Walls separating kitchens, toilets, bathrooms and laundries in adjoining SOUs	-	≥ 50	-	-
Walls between a bathroom, toilet, laundry or kitchen and a habitable room (other than a kitchen) in adjoining SOUs	-	≥ 50	-	Yes
Walls between a SOU and a public corridor, public lobby, stairway or the like or parts of a different classification	≥ 50	-	-	-
Walls between a SOU and a plant room or lift shaft	≥ 50	-	-	Yes
Walls or ceilings separating a duct, soil, waste or water supply pipe or storm water pipe from a habitable room	-	≥ 40	-	-
Walls or ceilings separating a duct, soil, waste or water supply pipe or storm water pipe from a kitchen or other non-habitable room	-	≥ 25	-	-
Floors between SOUs and between a SOU and a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification		≥ 50	≤ 62	-

6.2.2 *Internal Sound Insulation (General)*

- AS ISO 140-2006 “Acoustics - Measurement of sound insulation in buildings and of building elements”
- AS/NZS ISO 717-2004, “Acoustics-Rating of Sound Insulation in Buildings and of Building Elements-Airborne Sound Insulation”.
- AS 2822-1985, “Acoustics-Methods of Assessing and Predicting Speech Privacy and Speech Intelligibility”.

6.3. Sound Reinforcement

- BS EN 60268-16:2011, “Sound System Equipment-Part 16: Objective Rating of Speech Intelligibility by Speech Transmission Index”.

This is similar to AS 2822 (referred to above) which gives ratings in terms of “Articulation Index”.

7. Conclusions

7.1. Environmental Noise Emissions

Assigned noise levels have been determined at the NSR's in accordance with the Environmental Protection Noise Regulations (EPNR 1997), any noise emission from the development must comply with the assigned noise levels.

7.2. Noise and Vibration and Land Use Planning

Noise predictions were undertaken in accordance with the guidelines stated in SPP 5.4, based on 2037 traffic projections alone the noise level will increase at the proposed development by approximately 2 dB.

Measured noise levels are generally in good agreement with noise levels predictions. Based on measured levels and predicted results, the detailed noise assessment has identified that the 'Quiet House design' package B (Table 4.2.4.) will be required to adequately attenuate external noise levels in accordance with internal noise criteria stated in SPP 5.4.

The vibration assessment shows no impact on the proposed development from Port of Albany Freight Line, or impacts from heavy vehicles along Princess Royal Drive.

7.3. General Internal Noise Criteria for the Proposed Development

A general review of the internal sound insulation criteria between rooms has been identified in accordance with The Building Code of Australia (BCA). The BCA requirements for sound insulation are mandatory for the proposed development.

7.4. Further Recommendations

It is recommended that when construction details of the hotel are available calculations are undertaken to determine the appropriate noise attenuation based on SPP 5.4 guidelines.

It is further recommended that separating walls and floors are specified in accordance with the BCA mandatory requirements.

A. Glossary

Term	Description
A-weighting:	Refers to a standardised frequency response used in sound measuring instruments, specified in Australian Standard *AS 1259.1*. Historically it was developed to model human ear response at low-level sounds. However A-weighting is now frequently specified for measuring sounds irrespective of level, and studies have shown a relationship between the long term exposure to A-weighted sound pressure levels and hearing damage risk.
Airborne sound:	Sound waves propagate within a construction (structure-borne sound) and are radiated into the air where their propagation continues (airborne sound).
AS2107	AS/NZS 2107:2000 Acoustics -Recommended design sound levels and reverberation times for building interiors
Impact noise	Noise resulting from the direct impact on a building element (e.g. footfall, furniture movement on a floor).
D:	This value, in decibels, is the difference in sound pressure level values between two rooms.
dB:	Means the abbreviation for decibel.
dBA :	A-weighted sound pressure level in decibels.
D_{nT}:	The 'normalized level difference', in decibels, compares the sound pressure level values between two rooms by referring the result to a standard reverberation time value, typical in most residential rooms and office spaces.
$D_{nT,w}$:	The 'weighted standardized level difference' is a single-number value which is determined by applying *ISO 717-1* to the D_{nT} results obtained in the field measurements. It is used to describe the ability to isolate noise. Higher values represent a better performance. This value is usually between 5 to 8 dB lower than the laboratory tests for a certain type of construction (R_w).
$D_{nT,w}$ (C; C_{tr}):	This is the complete expression that covers all values obtained from the test. If the result is 20 (-2; -3), it means the $D_{nT,w}$ is 20 dB, the $D_{nT,A}$ is 20-2=18, and the value of the equivalent D_{nT} related to traffic noise or other similar sources is 20-3=17.
$L_{Aeq,T}$:	The equivalent continuous A-weighted sound pressure level in dBA. It is often accompanied by an additional subscript suffix "T" such as $L_{Aeq,15min}$, which means it is evaluated over 15 minutes.
$L_{A10,T}$:	A-weighted sound pressure level in decibels which is not surpassed for more than 10% of the measurement time. This value is often similar to that of the L_{Aeq} for the same period of time.
$L_{A1,T}$:	A-weighted sound pressure level in decibels which is not surpassed for more than 1% of the measurement time. This value is often used to have a reference of the highest levels of the measured noise and is used to evaluate the presence of occasional impulsiveness in the noise.
$L_{A90,T}$:	A-weighted sound pressure level in decibels which is not surpassed for more than 90% of the measurement time. This value is often used to have a certain reference of the constant floor background noise level.
L_{Amax} :	Maximum A-weighted sound pressure level over a certain period of evaluation.
L_w	Impact sound level reduction L_w is an acoustic descriptor quantifying the improvement in impact noise isolation as a result of the installation of a floor covering or floating floor on a test floor in a laboratory (*ISO717.2:1997*)
$L_{n,w}$	The lower the $L_{n,w}$ rating the better the performance of a building element at insulating impact noise.
Perception of noise level differences:	Generally, a variation of 2-3 dB in a sound pressure level cannot be detected by most of the population; a 5 dB difference is perceived as a louder noise, and a 10 dB variation is perceived as a sound which is twice as loud.

Term	Description
Reverberation time:	RT, or T_{60} is the time that would be required for a sound to decrease by 60 dB after the source has stopped emitting sound. Rooms with high reverberation time values are reverberant or acoustically “live”. If a room has a low reverberation time value, it is considered to be a quiet or “dead” space.
R_w:	The insulation of walls and doors against airborne sound is described by way of the sound reduction index R. This index specifies the number of decibels by which the sound is weakened as it passes through the component. The sound reduction index is therefore a component-related variable. As the sound insulation of components depends on frequency, the sound reduction index is also specified depending on the frequency, at least in one-third octave bands between 100 and 3150 Hz. For simplicity, a single value, the weighted sound reduction index R_w, is derived from the frequency-related values. R_w values provided by manufacturers must comply with standard international test regulation *ISO 140-3*.

Schedule of Submissions/Recommendations

LOCAL STRUCTURE PLAN No.12

Lot 3 Toll Place, Albany

No.	Address	Summary of Submissions ***Note: This is a broad summary of the submissions only.*** ***A copy of the submissions in full has been provided to the Council as a separate document.***	City of Albany – Comment/Recommendations
AGENCY			
		WATER/SEWERAGE	
1.	Water Corporation	The developer is expected to provide all water and sewerage reticulation if required. A contribution for water and sewerage headworks may also be required. In addition the developer may be required to fund new works or the upgrading of existing works and protection of all works. Please note there is a dead water main located within the subject area that is not used by the Water Corporation at present and will not be used in the future.	It is noted that the developer may need to develop water and sewer infrastructure and may need to fund headworks. The Water Corporation imposes requirements for any water works at the Building Permit stage. No modifications recommended.
		NOISE IMPACT	
2.	MRWA	Main Roads has no in principle objections to the Structure Plan subject to the impact of transport noise from Princess Royal Drive heavy haulage route being adequately addressed in any building approvals or development plan. If any residences are to be separately owned a notification on the title of noise impact is recommended.	Uphold the suggestion that quiet house design is necessary due to transport noise. An 'Acoustic concept design document' (desktop review) was undertaken to determine impacts of noise and vibration. The assessment established that: • vibration mitigation measures are not deemed necessary; and • Measured noise levels are generally in good agreement with noise levels predictions. • Quiet House Design Package B will be required to adequately attenuate external noise levels in accordance with SPP 5.4. The proposed Structure Plan includes provisions to address noise issues, including; • Provision for the application of a Section 70A notification to be placed on all title(s) to advise prospective purchasers of potential impacts that may arise from activities associated with the Albany Waterfront or Port of Albany; and • All holiday accommodation and multiple dwellings located within the accommodation precinct are to incorporate design measures to limit noise. These measures are proposed to protect future residents from impacts and to protect the integrity of the Port and Entertainment functions. No modifications recommended.
3.	Public Transport Authority	An Acoustic Noise and Vibration study must be undertaken in accordance with SPP5.4.	

		STATE PLANNING POLICY 5.4	
4.	Southern Ports	Southern Ports' objection to the proposed Structure Plan modification, includes: • The practical implementation of SPP 5.4 in relation to low volume road and rail corridors; and • The proposed Structure Plan modification and compliance with the State and local planning framework. The LG Acoustics assessment confirmed that the assessment is not detailed enough to recommend a specific noise control package for the proposed development and that further investigation is required and should be informed by: • Site-specific monitoring, capturing measurements from more than one train passby and including measurements from day and night periods; • a comparison between the LAeq (Day) and LAeq (Night) measurements; • commentary on the LAmax measurements and a comparison to the LAeq measurements; • site specific noise monitoring during peak trade periods; • accurate and current data on current and future traffic volumes and vehicle mix; and • consideration for seasonal peak and off-peak periods affecting traffic movements.	Uphold comment from Southern Ports' relating to the *State Planning Policy 5.4 - Road and Rail Transport Noise and Freight Considerations in Land Use Planning.* The noise acoustic assessment undertaken to determine appropriate building design considered average noise levels from surrounding land use (average meaning - the sound level in decibels equivalent to the total sound energy measured over a stated period of time). This method of assessment complies with the Western Australian Planning Commission's State Planning Policy 5.4. Southern Port's believe that the acoustic assessment should go beyond state planning policy requirements and consider <u>maximum</u> noise measurements (e.g. night time noise and the sound of a train horn). Southern Ports argues that maximum noise readings provide a more accurate reflection of the short term noise impact to residents, especially with regards to sleep disturbance at night. The World Health Organisation has recognised sleep disturbance from environmental noise as a significant issue with long term health impacts. City staff consulted with the proponent on the comments made by Southern Ports. Subsequently, the proponent recommended that the following condition is included on the structure plan to ensure compliance with maximum noise levels: *A detailed acoustic assessment is required to support a Development Application detailing the design, construction measures and acoustic treatments incorporated to adequately attenuate external noise levels to ensure night time noise levels within all Multiple Dwellings located within the Accommodation Precinct do not exceed 55dB (LA(Max)).* **It is recommended that Council Agree that the City of Albany seek input from the Southern Ports, the Department of Planning, Lands and Heritage and the Department of Water and Environmental Regulation on the below proposed provision:** ***A detailed acoustic assessment is required to support a Development Application detailing the design, construction measures and acoustic treatments incorporated to adequately attenuate external noise levels to ensure night time noise levels within all Multiple Dwellings located within the Accommodation Precinct do not exceed 55dB (LA(Max)).***

		MEMORANDUM OF AGREEMENT	
5.	Southern Ports	Southern Ports' objection to the proposed Structure Plan modification, includes the intent of the Albany Waterfront precinct and the Memorandum of Agreement between the State of WA and the City of Albany.	Note Southern Ports, WA Farmers, Forest Industries Federation (WA), Freight & Logistics Council of WA and Co-operative Bulk Handling Limited comment on the 2007 Memorandum of Agreement between the State of WA and the City of Albany. The City acknowledges the *Albany Waterfront – Memorandum of Agreement (2007)*, which seeks to: • Restrict permanent accommodation development at the Albany Waterfront; and • Respect 24 hour a day, 7 day a week heavy haulage access to the Port of Albany. The Memorandum of Agreement was established in 2007 and is between the State of Western Australia and the City of Albany. The Memorandum of Agreement (2007) states: *5. COMMITMENTS TO THE COMMUNITY* *The State of Western Australia and the City of Albany are committed to the following underlying principles regarding the development and ongoing operation of the Albany Waterfront…Acknowledgement and respect of 24 hour a day, 7 day a week heavy haulage access to the Port of Albany…Prohibition of permanent residential activity.* The modified Albany Waterfront structure plan proposes to support the development of permanent residential accommodation, which is inconsistent with the memorandum of agreement. The modified Albany Waterfront structure plan does not propose to restrict heavy haulage access to the Port. Determination on the structure plan, by the state government is the catalyst for the memorandum of agreement. Should the state government approve the structure plan, the memorandum of agreement is then amended to support permanent accommodation. No modifications recommended.
6.	WA Farmers	Section 5 of the Memorandum of Agreement negotiated in 2007 is very specific in the prohibition of permanent residential activity and acknowledgement and respect for continuous heavy haulage road and rail access to the Port of Albany. It is extremely disappointing that the City of Albany is considering changes to this agreement to allow permanent accommodation. Members of the Albany Zone of WA Farmers are opposed to any changes to the Memorandum of Agreement that would allow any permanent residential activity in the Albany Waterfront precinct.	
7.	Forest Industries Federation (WA)	FIFWA Albany Port users do not believe proposed alterations to the Albany Waterfront Memorandum of Agreement (MOA) are adequate to assure their ongoing freight operations, in the event of the proposed modifications to the Albany Waterfront Structure Plan. FIFWA urges the City of Albany to reject the proposed modifications to the Albany Waterfront Structure Plan.	

8.	Freight & Logistics Council of WA	FLCWA is concerned that approval of the proposed Structure Plan modifications will erode the intent of the Albany Waterfront Memorandum of Agreement (2007), and create a precedent for further changes to land use permissibility (including maximum floorspace requirements for permanent residential). Moreover, the proposed modifications will introduce provisions that prioritise the location of tourism land uses where the greatest tourism amenity exists. This would mean that the increasing population of permanent residents would be located in areas exposed to the highest impact of freight transport noise and vibration. Steps can be taken to ameliorate freight transport impacts on surrounding residents such as higher construction standards, larger building setbacks and caveats on titles. Notwithstanding the benefit of such initiatives, FLCWA's view is that permanent residential development as part of the Albany Waterfront project will inevitably lead to calls for operational restrictions on adjacent rail and road operations. That outcome would be disastrous for the efficiency of the Port and the international competitiveness of the goods it handles. The economic cost of such a result would far outweigh any local commercial benefit that might flow from changes to the original project Albany Waterfront Memorandum of Agreement (2007).	
9.	Co-operative Bulk Handling Limited	It is critical that the operation of port infrastructure including CBH's Albany terminal is in no way compromised. CBH would encourage the City of Albany to ensure that in its consideration of the proposal to modify the Albany Waterfront Structure Plan that it takes steps to ensure protection for both vital industries and people who live nearby. The proposed modifications to the existing Albany Waterfront Structure Plan including the reduction in setbacks and inclusion of permanent residential would obviously have the potential to directly impact on conditions agreed to in the *Albany Waterfront Memorandum of Agreement (2007).* *Albany Waterfront Memorandum of Agreement (2007)*, established to ensure (in part) that the current practice of 24 hours a day, 7 days a week receival of product by both road and rail, as well as for ship loading and discharge remain in place. Any acceptance of the proposed modifications to the existing Albany Waterfront Structure Plan is an erosion of what was agreed and endorsed by the City of Albany in both the 2007 MOU to which CBH was a party and the 2011 Structure Plan.	
		PERMANENT ACCOMMODATION	
10.		The allowance of permanent apartments, will significantly reduce the amount of people using the precinct, further deadening rather than enlivening the waterfront. Should not be allowed to now change the very nature of the building use for a privileged few. These residents will most likely be self-catering and self-contained singles or couples but not visitors or holiday making families that would eat and socialise out.	Dismiss comment relating to the proposed change to enable some permanent accommodation. The structure plan seeks to allow the introduction of a limited amount of permanent residential development at the Albany Waterfront to contribute towards providing the critical mass required to support the year round operation of other land uses such as shops, offices and restaurants.

11.	Forest Industries Federation (WA).	FIFWA members who use the Port of Albany are opposed to proposed modifications to the Accommodation Precinct (Precinct 2) of the Albany Waterfront Structure Plan. The introduction of permanent accommodation, as an optional land use, has the potential to compromise the operations of port users. There are no shortage of examples from around Australia, and internationally, where inappropriate residential development, adjacent to transport nodes like ports and airports, lead to a severe curtailment of freight operations.	The Structure Plan amendment reflects modern tourism development expectations that incorporate mixed land uses, including limited residential accommodation, required to underpin a tourism development. The Waterfront is currently underutilised, undeveloped and operating well below its designed and intended capacity. The proposed changes will assist to activate the tourist precinct, and serve as a catalyst for development of other precincts within the Albany Waterfront in accordance with their intended use. Residential dwellings currently exist adjacent to the primary road and rail freight corridors servicing the Port of Albany and other Ports throughout Australia (e.g. – Albany Highway, Leach Highway, Canning Highway, Stirling Highway, Leighton and North Coogee). The proposed structure plan proposes to ensure that a 'Hotel' is developed at the subject site to provide accommodation to support the tourism industry. The structure plan proposes to ensure that permanent residential accommodation is developed incidental to the 'Hotel'. The structure plan acknowledges the 'self-contained' and 'privileged' characteristics that permanent accommodation may portray by: • Limiting the amount of permanent accommodation development to a Gross Floor Area of 6,800m^2; • Restricting permanent accommodation from public domain areas including the ground floor area of the waterfront promenade; and • Giving priority to locating tourism components on those areas of the site providing the highest tourism amenity. No modifications recommended.

		HEAVY HAULAGE ACCESS TO THE PORT	
12.	Stirlings To Coast Farmers	Members of the Stirlings to Coast Farmers are strongly opposed to allowing permanent residential developments at the Albany Waterfront. In our view, any changes made that put our member's continued access to the Port facilities at risk would be seen to demonstrate a strong disregard for the concerns of hard-working farmers in our region by the Albany City Council.	Note comment relating to heavy haulage access to the Port. The structure plan does not seek to disrupt 24 hour a day, 7 day a week heavy haulage access to the Port of Albany. Various measures are proposed to protect 24/7 uninterrupted access to the Port from Princess Royal Drive freight route. These measures include: • Protecting people (residents and tourists), the transport corridors and entertainment precincts through inclusion of S70A Notification on Title(s) advising potential purchasers of potential for amenity to be impacted by activities associated with the Port and Entertainment precinct; • Protecting people (residents and tourists) through quiet house design and encouraging best practice design and construction standards; • Protecting people (residents and tourists), transport corridors, entertainment precincts and Port activities through management statements that establish appropriate mitigation measures in the event landowners or occupiers were impacted by activities associated with the Port or Entertainment Precinct; • Protecting transport corridors and entertainment precincts through strata management statements and bi-laws that control actions of landowners or occupants; and • Protecting the transport corridor and freight operations from incompatible urban encroachment through increased construction standards. Operations at the Port of Albany currently exist alongside permanent residential development. Permanent residential landholders are accepting of Port operations including 24 hr truck movement and respect the need to maintain Port operations to ensure the economic viability of business operations and Albany's economy as a whole. No modifications recommended.
13.	WA Farmers	The Albany Port infrastructure is crucial to the agricultural industry in this region and it is important that there is no potential conflict created for the future that could restrict the essential 24-hour per day , 7 day a week access by road and rail to this facility . Our members have cited a number of examples where complaints from recently arrived residents in agricultural or other industrial areas have resulted in restrictions to operating hours and the imposition of curfews. The possibility of any such restrictions to port access in the future would be extremely detrimental to the agricultural industry in Albany and surrounding region.	
14.		As a grain grower I am concerned the changes will impact the delivery of grain to the Port of Albany. Grain growers need 24 hour access to C.B.H to handle the large amounts of grain which are exported from the Port of Albany. Once people are allowed to live right next to this busy road and railway they will inevitably complain about the noise and will ask Council to take action to limit the noise.	

		After seeing the City of Albany's foresight in taking trucks out of built up areas with Menang Road and the proposed by pass west of Albany Highway it seems out of character to allow Lot 3 Toll Place to become a residential area. I ask you to think of the future efficiency of the Port of Albany.	
		VEHICLE ACCESS	
15.	MRWA	No new access from the subject Lot to Princess Royal Drive would be approved by Main Roads – This includes emergency access ways.	Note comment relating to access to and from Princess Royal Drive. No new access from the Lot 3 Toll Place to Princess Royal Drive is proposed. No modifications recommended.
16.	Public Transport Authority	Should service connections be required to pass through the rail corridor, standard PTA/Arc 3rd party service application process is to be followed.	Note comment relating to service connections. Service connections are not proposed through the rail corridor. No modifications recommended.
17.	Public Transport Authority	York St pedestrian crossing to be upgraded in accordance with Section 14 of Main Roads Railway Crossing Control in Western Australia Policy and Guidelines.	Note comment relating to the York Street pedestrian crossover. Responsibility for the York Street pedestrian crossover is vested in local and state government agencies. No modifications recommended.
		LAND DIRECTLY ADJACENT TO PRINCESS ROYAL DRIVE	
18.		I wish to point out a safety issue arising from the proposal to revise the setback to Princess Royal Drive from 25 m to 19 m. This will potentially result in persons parking in the car park to have the front of their car directly against the building. They will therefore have to walk down the centre of the road amongst the traffic to access the Albany Entertainment Centre or the waterfront. Traffic will be increased on this road due to it also being the access to the underground carpark. My interest in this relates to my position as President of Albany Sinfonia that regularly uses the Entertainment Centre. This car park becomes the overflow parking to the AEC and patrons should not be put at risk by this development. It is suggested that, whilst this 19m setback could be a property boundary, the Building Setback should be at least 2 m further from Princess Royal Drive to allow provision of a footpath between parked cars and the building. Such a provision would also allow for landscaping to soften the impact of what could be an ugly wall with industrial looking entries to the car park. Planting of trees in the car park could further soften what is potentially a barren looking wall facing the city.	Note comment relating to the land directly adjacent to Princess Royal Drive. The proposal to reduce the building setback to Princess Royal Drive does not impact on car parking, landscaping or pedestrian access adjacent to Princess Royal Drive. An area is proposed to be retained for car parking and landscaping. Pedestrians can utilise these areas for access. Car parks are to be landscaped to soften the spaces and to break down the expanse of parking. A continuous two metre wide landscape strip is to be maintained between the Princess Royal Drive road reserve boundary and car parking areas facing Princess Royal Drive. Public access is also retained between the waterside promenade area and car parking areas. Two pedestrian access points are proposed to be provide connectivity through the Accommodation Precinct. No modifications recommended.
19.	Department of Transport	With parking at a premium throughout the larger waterfront area, the City is requested to ensure that all permanent and hotel accommodation is supplied with adequate parking wholly within Lot 3 so there is no reduction in public parking availability for users and visitors to the marina.	

20.		I do not agree with the current set back from Princess Royal Drive to be minimised. This area should be used for more parking and landscaping.	
		STORMWATER	
21.	MRWA	No stormwater from the development is to be discharged into the Princess Royal Drive drainage System.	Note comment relating to stormwater. Stormwater is currently discharged to the harbour via existing infrastructure. It is proposed that stormwater is retained on site, and/or discharged in accordance with City of Albany requirements. This is a standard requirement applied at the development approval stage. No modifications recommended.
		FINANCIAL VIABILITY	
22.	Tourism WA	Tourism Western Australia (Tourism WA) would like to offer its support for the proposed modifications to an existing 'Albany Waterfront Structure Plan' (AWSP). Tourism WA does not object to the inclusion of; permanent accommodation at the site, revised setbacks and basement parking, if these amendments help to achieve the desired outcome of the building of viable accommodation on the site, as part of a measured development mix. Tourism WA understands the reason for the proposed amendments to the AWSP, which are largely economic, we feel that these amendments will assist the financial viability of the development, which we see as an essential piece of Albany accommodation infrastructure.	Note comment relating to tourism. The Structure Plan relates solely to the Accommodation Precinct and reflects modern tourism development expectations, including incorporating mixed land uses and limited permanent residential accommodation. The permanent accommodation is required to underpin development of holiday (hotel) accommodation. The proposed changes will assist to activate the tourist precinct, and serve as a catalyst for development of other precincts within the Albany Waterfront in accordance with their intended use. No modifications recommended.
		MANAGEMENT STATEMENT – Provision 7(b)	
23.	Department of Transport	The Department of Transport supports activation of Lot 3 in the manner proposed in that it will further vitalise the boat harbour and city centre to the benefit of the larger Albany region. The Department requests that Proposed Provision 7(b) be amended to also refer to the Albany Waterfront Marina.	Uphold request to amend provision 7(b). Proposed provision 7(B) states: *Prior to development commencing a Management Statement is to be prepared in consultation with the City of Albany to address amenity and mitigation measures associated with the Port and Entertainment Precinct.* **In light of comment received from the Department of Transport, should the Council resolve to recommend approval, it is recommended that proposed provision 7(b) is modified as follows:** ***Prior to development commencing a Management Statement is to be prepared in consultation with the City of Albany to address amenity and mitigation measures associated with the Port, Entertainment Precinct and Albany Waterfront Marina.***

		BOAT HARBOUR LAND	
24.	Department of Transport	The primary mandate of the Hon. Minister and the Department is to cater for maritime associated development in priority to the wider interest. Relevant to the proposal at hand, it is entirely possible that there may in future be proposals for appropriate maritime development that while consistent with the reserve's vesting, may not ideally suit the preferred outcomes proposed for Lot 3. This could, for example, involve the triangular grassed area and boardwalk adjoining Lot 3, an area providing obvious benefit, access and marketing appeal to proposed Lot 3 development. Additionally, it is possible that adjoining harbour water areas may at some point be reclaimed to facilitate further maritime development. It is therefore imperative that the City informs the proponent that the current use of nearby boat harbour land and waters cannot be guaranteed in perpetuity and that this be formally passed onto prospective tenants and purchasers so to avoid the possibility for later conflict or complaint. The proponent should also make provision for this possibility in their detailed development design. This is not to say that the Minister would ignore or progress, the maritime interest in isolation of the land around it, but it is important that all stakeholders understand the Department's primary objective is the promotion of harbour activities over the preservation of amenity or outlook for surrounding development.	Uphold comment relating to the nearby boat harbour land. ***Should the Council resolve to recommend approval, it is recommended that a Section 70A notification is placed on the Title(s) advising prospective purchasers that the current use of nearby boat harbour land and waters cannot be guaranteed in perpetuity.***
		SECTION 70A NOTIFICATION	
25.	Department of Transport	It is recommended that the proposed provision 7(c), stating that Council <u>may consider</u> the use of a Section 70A notification being placed on the Titles to advise prospective purchasers of potential impacts associated with the operation of the marina and port be amended to state that, Council <u>will</u> require this to occur so to lessen the potential of port and marina activities being compromised.	Uphold comment relating to Section 70A notification on Port and Marina operations. Proposed provision 7(c) states: *The Local Government may consider the use of a Section 70A notification being placed on the Title(s) to advise prospective purchasers of potential impacts that may arise from activities associated with the Albany Waterfront or Port of Albany.* **In light of comment received from the Department of Transport, should the Council resolve to recommend approval, it is recommended that proposed provision 7(c) is modified as follows:** ***A Section 70A notification is to be placed on the Title(s) advising prospective purchasers of potential impacts that may arise from activities associated with the Port, Entertainment Precinct and Albany Waterfront Marina.***
		ECONOMIC VALUE	
26.	Southern Ports	Southern Ports' objection to the proposed Structure Plan modification, includes the following key aspects/themes: • The value of the national supply chain, that encompasses the Port of Albany; • The economic value of the Albany Port to the Great Southern region and State of WA; • The need for strategic and statutory protection of economic assets, such as the freight road; and • Rail transport corridors (including the future Albany Ring Road) which leads to Albany Port.	Note concerns raised by Southern Ports in relation to protection of economic viability of the Port. The structure plan does not propose to impact on the economic viability of the Port. The structure plan provision, 'modification No.6', has been proposed to protect the operations of the Port of Albany and promote compatibility between the Port activities and occupants located in the Accommodation Precinct. The provision ensures apartments located within the Accommodation Precinct include appropriate design and construction methods to achieve an acceptable noise target for

			residents and occupiers. The provision reads as follows: *All Holiday Accommodation and Multiple Dwellings located within the Accommodation Precinct are to incorporate Quiet House Design Package B.* The provision has evolved to comply with the '*State Planning Policy 5.4, Road and Rail Transport Noise and Freight Considerations in Land Use Planning'.* City staff consulted with the proponent on the comments made by Southern Ports. Subsequently, the proponent recommended that the following condition is included on the structure plan to ensure compliance with maximum noise levels: *A detailed acoustic assessment is required to support a Development Application detailing the design, construction measures and acoustic treatments incorporated to adequately attenuate external noise levels to ensure night time noise levels within all Multiple Dwellings located within the Accommodation Precinct do not exceed 55dB (LA(Max)).* **It is recommended that Council Agree that the City of Albany seek input from the Southern Ports, the Department of Planning, Lands and Heritage and the Department of Water and Environmental Regulation on the below proposed provision:** ***A detailed acoustic assessment is required to support a Development Application detailing the design, construction measures and acoustic treatments incorporated to adequately attenuate external noise levels to ensure night time noise levels within all Multiple Dwellings located within the Accommodation Precinct do not exceed 55dB (LA(Max)).***
		SETBACKS/VIEWS	
27.		The view will be bad enough from Stirling Terrace without bringing the building closer to Princess Royal Drive.	Dismiss comments relating to setbacks and views. There are no changes to the permitted building height or gross floor area. The proposed setback variation is 6m. Considering the fact that the Lot 3 Toll Place is level and considering the distance (165m) between Lot 3 and properties at Stirling Terrace and beyond, the 6m variation is not expected to impact on the outlook from the north. The proposed modified structure plan proposes to protect visual amenity by giving consideration to: • Maintaining view corridors; • Using 'green roofs' on buildings; and • Articulating building facias (e.g. use of balconies and mixture of materials, including glass). No modifications recommended.
28.		Object to setback variation from 25m to 19m as this will impact on views.	
29.	Co-operative Bulk Handling Limited	A consistent 25 metre set back from Princess Royal Drive was established for all precincts under the plan to ensure suitable buffer to major transport route along Princess Royal Drive. Reducing the set back to 19 metres for the 'Accommodation precinct' only may ultimately allow all precincts to be reduced to 19 metres. Otherwise there is inconsistent application of the setback rule, also 'Accommodation precinct' is likely to be the most sensitive land use issues caused by the reduced setback. The proposal does reference putting a Section 70A notification on the title however this does not alleviate any potential conflicts caused by inappropriate siting of sensitive land uses and transport corridors. The optimal solution is to ensure suitable separation distances exist and land use conflicts are avoided. The current, *temporary only* nature of the accommodation supports this principle. Under '4.6 Modification 6 – Quiet House Design' the proposal appears to recognise the potential for land use conflict to occur. While this should be recognised and supported, if the proposal was to proceed it fails to recognise the matters noted above.	

		BUILDING HEIGHT	
30.		An essential part of such a change in plan involves a 30% increase in the height of the buildings. A way of declaring impact, is to provide a profile of the existing proposed heights for the buildings in relation to the peak of the Albany Entertainment Centre (AEC) structure.	Dismiss comment relating to building heights. The proposed structure plan seeks to maintain height limits endorsed by the 2011 Waterfront Structure Plan. The City of Albany endorsed a 2011 Waterfront Structure Plan. This structure plan supports 'Short Stay Apartments' at a height of 22m, 'Hotel' at a height of 19m and 'Covered Parking' at a height of 17.5m. Staff at the City measured a height of 15m to the top of the convention centre, which is the portion of building (Entertainment Centre) facing Toll Place. Building profiles are provided at the development stage. No modifications recommended.
31.		I do not agree with an increase in height for either structure as this will negatively affect the view of Albany community residents living in the town. This will also be more intrusive on the landscape from the other areas of the harbour eg Little Grove, looking back to town. We have a unique town and should not spoil our cultural landscape by setting a precedent for high rise developments that are beyond the human scale.	
32.		Permitting Basement Parking - I am concerned that allowing basement parking will require the overall height of the buildings to increase detracting from the visual amenity across the waterfront from substantial sections of the city, particularly Stirling Terrace and surrounds.	
33.		Support setback from Princess Royal Drive from 25m to 19m but suggest the additional 6 m should be offset by an overall reduction in the height of the buildings.	Dismiss the proposal to reduce building height. The proponent is not willing to reduce existing minimum height requirements. The City of Albany endorsed a 2011 Waterfront Structure Plan. This structure plan supports 'Short Stay Apartments' at a height of 22m, 'Hotel' at a height of 19m and 'Covered Parking' at a height of 17.5m. The proposed structure plan seeks to maintain height limits endorsed by the 2011 Waterfront Structure Plan. A revised building setback provides increased flexibility with siting of the building on the subject site. No changes to the building height or gross floor area are proposed. Considering the fact that the Lot 3 Toll Place is levelled and considering the distance (165m) between Lot 3 and properties at Stirling Terrace and beyond, the 6m variation is not expected to impact on the outlook from the north. No modifications recommended.
34.		I would love to see the waterfront area develop into a lively, low rise commercial and tourist precinct.	

		MULTIPLE DWELLINGS	
35.		Object to multiple dwellings because of an abundance of supply in the locality.	Dismiss comment relating to Multiple Dwellings. Multiple dwellings are an under represented and much needed product in Albany's housing stock, and an essential element necessary to achieve higher densities within the City Centre. Including an element of multiple dwellings provides increased housing choice for residents and visitors, increased activation and vibrancy of a city centre and supports local businesses and economic development. A multiple dwelling is defined as (Residential Design Codes): *A dwelling in a group of more than one dwelling on a lot where any part of the plot ratio area of a dwelling is vertically above any part of the plot ratio area of any other but:* • *does not include a grouped dwelling; and* • *includes any dwellings above the ground floor in a mixed use development.* No modifications recommended.
36.		Introducing Multiple Dwellings – I support this option as a mix of long term residents and tourists will add vibrancy to the development.	Noted. No modifications recommended.
		GLAZING AND BALCONIES	
37.		Object to use of glazing and balconies on future development. This will impact on views from Stirling Terrace.	Dismiss comment relating to the use of glazing and the development of balconies. No changes to the design guidelines for the site are proposed. Glazing and balconies assist to break down a buildings scale and bulk, and provide natural light and outdoor areas for their occupiers. In accordance with the City's scheme, all development within the zone is to: *(a) Reflect a maritime context…(e) Ensure building scale, materials, and colours which complement the existing CBD building stock…(f) Use materials that ensure longevity in a harsh marine environment…(h) Not use low pitch roofs concealed by parapet walls…* No modifications recommended.
38.		I support sensitive development of the Albany Waterfront and hope there will not be a "glass and steel box" development which detracts from the amenity of the waterfront and becomes a visual eyesore from a large area of the city. I expect this should be addressed when a development proposal is received.	
		PARKING	
39.		Object to basement parking as this will pollute groundwater.	Dismiss comment relating to basement parking. Basement parking would require a sealed and waterproof construction standard, preventing water ingress or pollutant egress. Development is required to comply with relevant regulations to ensure protection of groundwater quality. Groundwater quality is imperative to ensure the protection of healthy ecosystems and maintenance of environmental values as well as for future economic and population growth.

			Groundwater quality requires careful management due to an increasing reliance on the resource, the high risk of contamination from uncontrolled sources, and for management of groundwater dependent ecosystems. The process (National Strategy for Ecologically Sustainable Development) for managing the protection of groundwater quality is one of risk assessment that identifies where action is required, followed by implementation of management measures to protect groundwater quality so that it continues to meet all its identified Environmental Value categories. No modifications recommended.
40.		I think there is a need to maximise car parking on the site as it is very popular on weekends with the current area full of cars as it is. The extra accommodation will require extra parking.	Note comment relating to on-site parking. No changes to the existing car parking provisions or the reciprocal car parking requirements are proposed. Car parking is proposed to be provided as follows (refer to proposed scheme Amendment No.32): • Hotel - 1 bay per 2 employees + 1 per bedroom + 1 per 4m^2 in other public areas. • Retail – 1 bay per 40m^2 NLA. • Multiple dwellings – as per Residential Design Codes - 1.5 spaces/dwelling; and • 1 bicycle parking facility for every 10 car bays. No modifications recommended.
41.		Express no particular opposition to the proposed development, apart from the lack of information (and lack of planning?) about provision of parking for Entertainment Centre patrons. Can the planners please make clear the parking areas which will be required and provided if the proposed development eventuates? Parking in the Albany Waterfront areas already at a premium at certain times. Frequently in the evenings, all the parking bays adjacent to the Due South restaurant are occupied, with the overflow area at the foot of the fishing jetty also full, leading to several rows of vehicles being parked in the area marked with the blue border on the aerial map supplied to me by the council, and labelled ‘Accommodation Precinct‘. Additionally, the existing designated parking bays on the north and north west sides of the Entertainment Centre fill up at times of popular events, with the Accommodation Precinct also filling completely, with more vehicles parking on the gravel area to the east of the Accommodation Precinct. This area is at an inconvenient distance from the Entertainment Centre, and it, as well as the Accommodation Precinct, are poorly illuminated, with uneven surfaces, often muddy in inclement weather. At the least, the smaller gravelled area immediately to the west of the designated parking area for the Entertainment Centre needs hard surfacing to accommodate patrons.	Dismiss request for additional public car parking. There is approximately 380 public car parking bays developed in the vicinity of the Entertainment Centre. This does not include car parking developed to the east of the ‘Boat Shed’. There are five (5) precincts defined for the Albany Waterfront: 1) Entertainment Precinct [1] is to the western side of the Toll Place spine comprising the AEC, mixed use retail and commercial, public open space 2) Accommodation Precinct [2] is to the eastern side of the Toll Place spine comprising a hotel and short stay/serviced apartments 3) Commercial Precinct [3] is to the east of the Accommodation Precinct comprising maritime focussed mixed commercial and retail uses with capacity for short-stay apartments on the third floor 4) Town Jetty Precinct [4] is centrally located comprising mixed use maritime, retail and commercial uses 5) Harbour precinct [5] comprises maritime based light industrial uses complementing the uses of the Port and of Albany and the Town Jetty. This precinct also includes the marine, fishing industry hard stand, boat ramp and trailer parking. Each precinct is to provide car parking to accommodate designated uses, in accordance with the Albany Waterfront Structure Plan. Joint use of parking areas is encouraged – For Lot 3 Toll Place, 38 bays are to be made available for reciprocal use by surrounding lots and customers. In accordance with the current Albany Waterfront Structure Plan, the Entertainment Centre is required to provide 1 car parking bay for every four (4) seats. This equates to

			155 car parks (620 seats). Theoretically 130 car bays shall be provided on Lot 2 and 15 car bays shall be provided on Lot 1. It is envisage that 15 additional bays are to be developed at the gravelled area (Lot 1 Princess Royal Drive), to the west of the designated parking area for the Entertainment Centre. These additional bays are developed at the building development stage of the Lot 1. Development of car parking prior to building development may compromise options for design and access. The current landholder (Landcorp) has indicated support for the use of the Lot 1 for overflow car parking until such-time that the lot is sold. In considering the required entertainment centre parking ratio of 1:4, it is acknowledged that shortfalls in car parking may exist on occasion. Some customers may travel as individuals or two persons per car. It may be that customers need to consider parking and walking, car pooling and/or using public transport. No modifications recommended.
		HOTEL	
42.		Object to development of Hotel. Such a development will exacerbate current anti-social behaviour of existing hotels on Stirling Terrace.	Dismiss comment relating to 'hotel' development. Lot 3 is located within the Albany Waterfront Tourism precinct, and a Hotel is a permitted land use under Local Planning Scheme No. 1. The City of Albany endorsed a 2011 Waterfront Structure Plan supports the development of a 'Hotel' at the Lot 3 Toll Place. No modifications recommended.
43.		The precinct should be complementing a family friendly / small group "ecotourism into the eco hotspot" market which would be better served by short stay apartment access than in 5 star hotel. The local science and ecology research market for visiting researchers (wave science) is another potential expanding sector that would value a vanilla context for a stay while working in the field, rather than the additional overheads that come with hotel stays. I speak from the consumer perspective. Harley Dykstra cite Middleton Beach as a precedent however I would contest that the permanent residence lot there is existing residential houses which is not the case for the waterfront. I would suggest that Bunbury does not have the same eco market opportunity as Albany and the comparative success there of residential over short stay accommodation adjacent to hotel development is not a valid compare. While acknowledging that the developer has a duty of care to his investors to turn a profit, the loss of opportunity to keep a family friendly visitor context in that area would be regrettable, I believe. From proposed modification 4.2, I see he is also wanting to keep the option to develop a second hotel where the proposed short stay accommodation is. This would change the precinct atmosphere quite a bit. So allowing the flexibility has other potential consequences.	
		QUIET HOUSE DESIGN PRINCIPLES	
44.		Object to incorporating quiet house design principles within future development.	Dismiss comment relating to quiet house design. Quiet house design has been proposed to ensure compliance with SPP 5.4 – Road and Rail Transport Noise and Freight Considerations in Land Use Planning. This is proposed as part of best practice planning to protect both people (residents and tourists) and transport corridors. By incorporated quiet house design principles within development, the amenity of residents is enhanced. Quiet house design elements may include:

			• Locating bedrooms on opposite side of residence from road. • Locating of laundries / bathrooms on same side of road. • Protecting main entrance from road noise. • Enclosing eaves. • Roof insulation. • Use of thicker glazing, with casement windows using winders. • Double brick construction. No modifications recommended.
		MANAGEMENT STATEMENT	
45.		Object to the Management Statement prepared to address amenity and mitigation measures associated with the Port and Entertainment Precinct.	Dismiss comment relating to the proposed management statement. The structure plan is proposing that development implements a Management Statement to ensure Holiday Accommodation units address amenity and mitigation measures associated with activities at the Port and Entertainment Precinct. The structure plan is also proposing the use of a Section 70A notification being placed on the Title(s) to advise prospective purchasers of potential impacts that may arise from activities associated with the Albany Waterfront or Port of Albany. These measures are proposed to protect future residents from impacts and to also protect the integrity of the Port and Entertainment functions. No modifications recommended.

GREAT SOUTHERN
DEVELOPMENT COMMISSION

City of Albany Records
Doc No: ICR7041533
File: MAN168

Date: 02 NOV 2007
Officer: MECD

Attach:

Your Ref: MAN168/LT7012895
Our Ref: X1:1225
Enquiries: Russell Pritchard

31 October 2007

Mr Andrew Hammond
Chief Executive Officer
City of Albany
PO Box 484
ALBANY WA 6331

Attention: Jon Berry

Dear Mr Hammond

ALBANY WATERFRONT – MEMORANDUM OF AGREEMENT

I refer to the above agreement that was signed in Albany on 8 October by Mayor Alison Goode on behalf of the City of Albany and Ministers Alannah MacTiernan and Kim Chance on behalf of the State Government.

I have pleasure in returning a certified copy of the document. GSDC is holding the original on behalf of the State.

Certified copies of the agreement are being sent to the following parties:

- Office of the Minister for Planning and Infrastructure
- Office of the Minister for the Great Southern
- Department for Planning and Infrastructure

We look forward to an ongoing liaison in delivering the objectives of this agreement.

Thank you.

Yours faithfully

for **BRUCE W MANNING**
CHIEF EXECUTIVE OFFICER

enc

CITY OF ALBANY
2 NOV 2007
RECORDS OFFICE

516

REPORT ITEM DIS105 REFERS

ALBANY WATERFRONT

MEMORANDUM OF AGREEMENT

September 2007

STATE OF WESTERN AUSTRALIA

And

CITY OF ALBANY

Department of Housing and Works
Government of Western Australia

LANDCORP

GREAT SOUTHERN DEVELOPMENT COMMISSION

Department for Planning and Infrastructure

I certify that this is a photocopy of a document presented this date and appears to be identical

JP9544

Commissioner for Declarations
Justice of the Peace

Date: 30/10/07

Not Proof Read

CONTENTS

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J.P. 9544

Commissioner for Declarations
Justice of the Peace

Date: 30/10/07 Not Proof Read

REPORT ITEM DIS105 REFERS

1. PURPOSE

This document represents an agreement between the State of Western Australia and City of Albany in planning, funding, constructing and managing the Albany Waterfront Project.

The key stakeholders involved in the implementation of the project are:

- LandCorp
- City of Albany
- Great Southern Development Commission (GSDC)
- Department for Planning & Infrastructure (DPI)
- Department of Housing and Works

The Albany Waterfront has the approval of State Cabinet and the City of Albany, and has the support of the key stakeholder agencies.

The project also carries strong and well-demonstrated support from the community at large.

This document replaces the previous memoranda of agreement relating to the waterfront executed in December 2002 and September 2005 respectively and serves to confirm and identify the strategic alliance that exists between the key stakeholders and the roles and responsibilities each organisation has in bringing the project to fruition. It introduces the Department of Housing & Works as project manager for the Albany Entertainment Centre.

This Memorandum of Agreement is intended to be a high level document and not to resolve all project details. It is anticipated that as the project progresses, further supplementary agreements will be entered into serving the intent of this agreement.

2. BACKGROUND – KEY MILESTONES

- The Albany Waterfront project dates back to 1983 with early planning driven by the Great Southern Development Commission and the then Town of Albany.

- In April 2001 the State Government approved in principle a marina based waterfront precinct known as the Albany Boat Harbour Project and allocated $12.7 million in funding.

- In August 2002 a Management Steering Committee was formed consisting of the GSDC, DPI and the City of Albany which developed a design concept that was subsequently approved by the City of Albany in March 2004.

I certify that this is a photocopy of a document presented this date and appears to be identical

JP9544

Commissioner for Declarations
Justice of the Peace

- In September 2004 the Minister for Planning and Infrastructure advised that LandCorp would work with the other stakeholders to review the design concept to give greater focus to the land development.

- In February 2005 the State Government announced a $14.9m funding contribution towards the proposed Albany Entertainment Centre (AEC) planned for construction in York Street next to the Albany Town Hall Theatre.

- In March 2005 the Member for Albany and the Minister for Planning and Infrastructure proposed that consideration be given to co-locating the AEC with the Waterfront Development.

- In May 2005 the City of Albany appointed 7 Councillors to the newly constituted Albany Waterfront Development Committee to work with LandCorp officers and City staff in recommending preferred design options and concepts to the City Council.

- On 21 June 2005 the City of Albany gave approval to a concept plan which incorporated the relocation of the AEC from the York St Civic precinct to the western portion of the waterfront development site.

- On 19 July 2005 the State Government announced the allocation of additional funding for the Albany Waterfront bringing the total allocation to $27.8m including a $1m contribution from the City of Albany.

On 16 May 2006 the City of Albany approved the structure plan for the development.

- On the 19 September 2006 the City of Albany adopted the precinct plan that will be used to guide and facilitate development at the Albany Waterfront.

- On the 11 October 2006 the Premier of Western Australia announced funding for up to a further $19.95 million for the Albany Entertainment Centre project with a total project cost of $37.55 million. *Includes $1.2m commitment from the City of Albany and $1.5m funding being sought by the City of Albany from the Australian Government's Regional Partnerships program of the Department of Transport and Regional Services. (Funding unconfirmed at time of Agreement).*

- The Department of Housing and Works was also appointed as project managers and coordinators for the development of the Albany Entertainment Centre. In December 2007, the Department of Housing and Works appoint Cox, Howlett Bailey Woodland to undertake the detailed design of the Albany Entertainment Centre.

- On 25 July 2007, the Premier of Western Australia announced additional $10.5 million funding, taking the total project cost to $49 million. The additional allocation was to cater for increased building

costs and the costs associated with the crystalline concept design, a design in keeping with the iconic location.

- On 14 August 2007 the City of Albany endorsed the concept design.

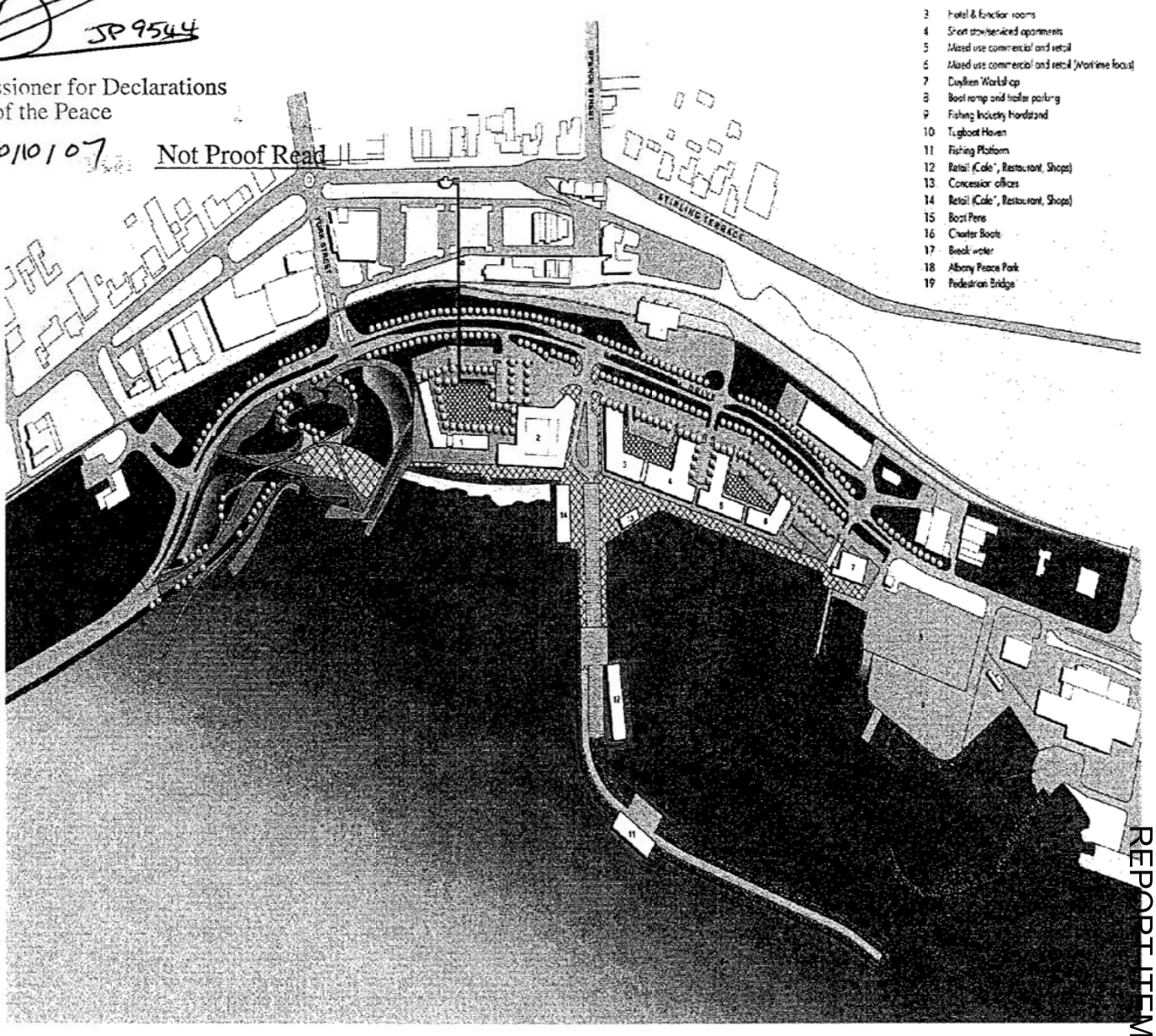

Fig1 Structure Plan – approved by City of Albany in May 2006

3. PROJECT VISION

The vision is to create a sustainable, attractive and exciting world-class waterfront precinct for the Albany community, the Great Southern Region, and visitors to the region.

The Albany Waterfront will provide a protected boat harbour serving the recreational, fishing and tourism industries together with land-based development adjacent to the town jetty providing a range of tourist accommodation, maritime servicing, entertainment, recreational and community based facilities.

4. PROJECT OBJECTIVES

- Extend the Town to the Waterfront
- Create a New Focus for the Town by creating a tourism and entertainment precinct
- Capitalise on the location and its surrounds:
  Port – Harbour – Anzac Park – Town – Tourism
- Create New Maritime Facilities:
  Recreation – Fishing – Charter – Support Industries
- Build a New Entertainment Centre in keeping with the Waterfront Development and iconic nature of Princess Royal Harbour.
- Create a vibrant Activity Mix
  Tourism – Retail – Commercial – Maritime – Entertainment-Public Facilities
- Respect Port Access

5. COMMITMENTS TO THE COMMUNITY

The State of Western Australia and the City of Albany are committed to the following underlying principles regarding the development and ongoing operation of the Albany Waterfront:

- Acknowledgement and respect of 24 hour a day, 7 day a week heavy haulage access to the Port of Albany.
- Prohibition of permanent residential activity.
- Unfettered community access to the foreshore.
- Maintenance of the iconic Princess Royal Harbour vista as seen from the York Street Commercial Precinct.

6. PROJECT SCOPE

This agreement consists of the following components (refer figure 2 & 3):

6.1 Albany Waterfront, Boat Harbour & Pedestrian Bridge

- Albany Waterfront - The appropriate remediation and development of approximately 5.5 hectares of waterfront land

into subdivided lots and civic space to accommodate and service the Albany Entertainment Centre, tourism accommodation, retail, commercial, maritime, parking and public facilities.

- Boat Harbour - The development of a marina immediately to the east of the Jetty for approximately 70-80 vessels.

- Pedestrian Bridge - The construction of a pedestrian bridge linking the Albany Waterfront Project to Stirling Terrace and the Albany Railway Station Precinct has been completed.

6.2 Purchase of Waterfront Land

- The provision of $1 million in revenue to the waterfront project from the City of Albany for the purchase of land to accommodate the Albany Entertainment Centre.

6.3 Albany Entertainment Centre

- Construction of a 620 seat Albany Entertainment Centre, architecturally compatible with, and complementary to, the future development of contiguously located hotel and convention/function facilities.

- The City of Albany will work to facilitate, in conjunction with LandCorp, an appropriately scaled and sufficient standard of convention/function facilities in the proposed hotel development which can link to and synergise with the Albany Entertainment Centre.

6.4 Anzac Peace Park

- The appropriate remediation and development of the 1.4Ha waterfront land approximately west of York St for public parkland purposes.

6.5 Emu Point Land Development

- The development of lots 1512 and 1523 at Emu point with associated funding linkages to the Waterfront project (refer fig 3).

7. ASSOCIATED LAND TRANSACTIONS

- The transfer in freehold to the City of Albany a parcel of land excised from the Albany Waterfront project site sufficient in area to construct the Albany Entertainment Centre and curtilage.

- The City of Albany has relinquished the Management Order over Lot 1512 Emu Point. (refer fig 3).

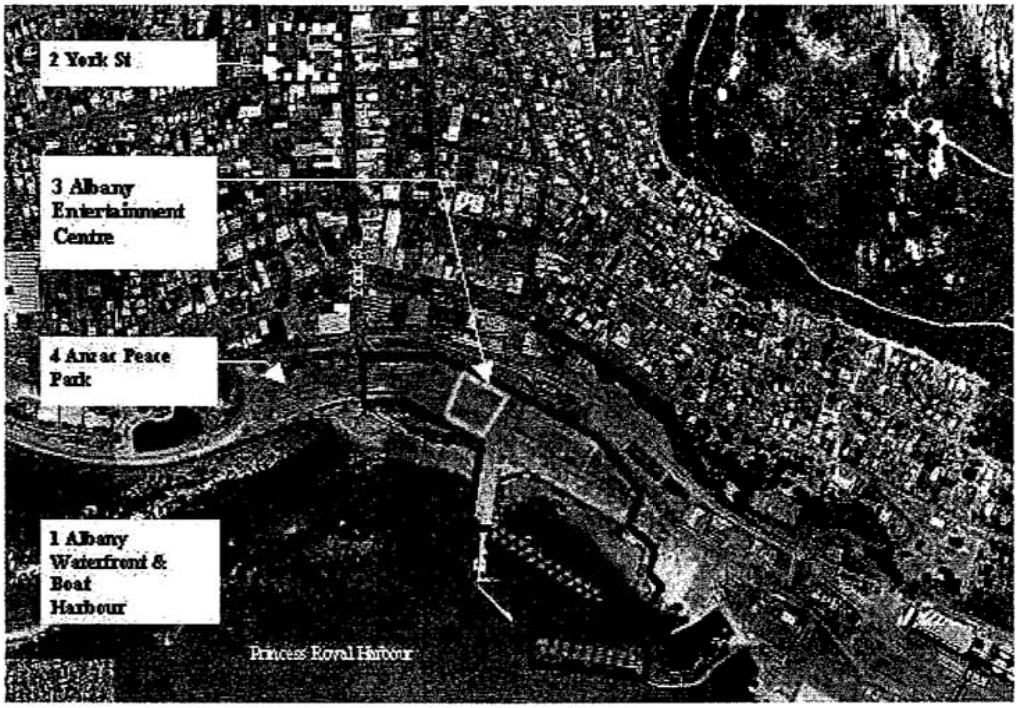

Fig2 Location Plan

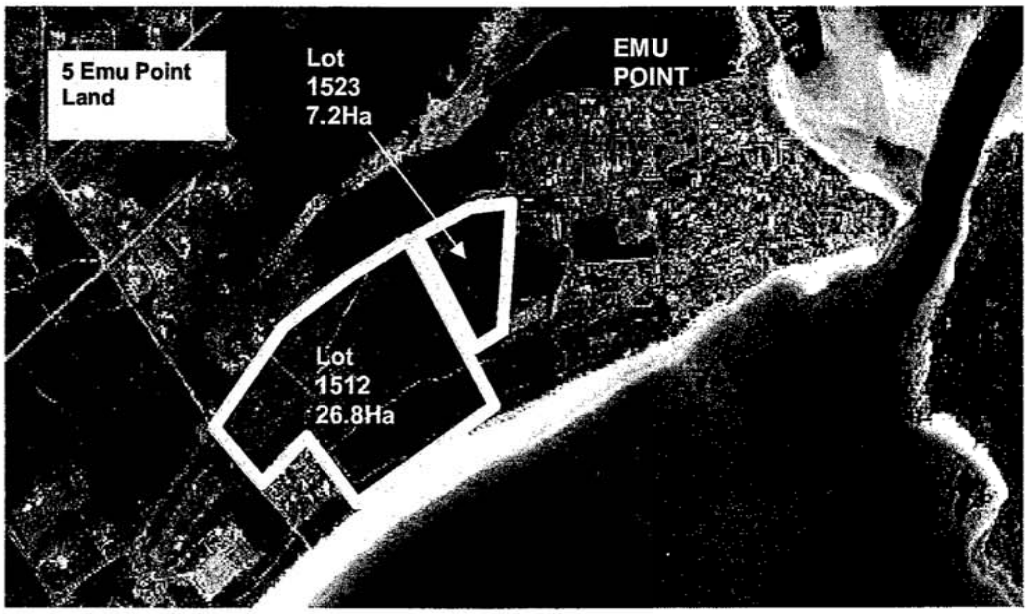

Fig3 Emu Point Land

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8. ROLES & RESPONSIBILITIES

8.1 Overall Co-ordination - Stakeholder Reference Group

A group consisting of representatives of the key stakeholders will meet at least bi-annually to facilitate coordination and timely delivery of the project components at an operational level. This group will consist of:

- Member for Albany (Chairman)
- LandCorp
- City of Albany
- Great Southern Development Commission (GSDC)
- Department of Planning & Infrastructure
- Department of Housing and Works

The group will be advisory in nature and will not hold any specific decision-making powers. The Stakeholder Reference Group will be chaired by the Member for Albany or his representative.

If appropriate the Stakeholder Reference Group may invite other agencies or parties to participate in meetings on matters of common interest.

8.2 Project Roles and Responsibilities

Roles and responsibilities for the delivery of the various project outcomes are as follows:

8.2.1 The Albany Waterfront, Boat Harbour & Pedestrian Bridge

- *LandCorp* will be principally responsible for and project manage the urban design, statutory approvals process, construction of infrastructure, and subdivision and release of land.

- *The City of Albany* will be responsible for the care and management of all road reserves, the pedestrian bridge, civic spaces, waterfront promenades and all fixtures and improvements coming into its control as a result of the subdivision process.

- *The Department of Planning and Infrastructure* will be responsible for the management of the Marina and the care and management of maritime infrastructure and any leasehold land coming into its control as a result of the subdivision process.

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8.2.2 The Albany Entertainment Centre

The Department of Housing and Works will be responsible for constructing the Albany Entertainment Centre including the project management, design, statutory approval processes, construction and commissioning.

The Great Southern Development Commission will oversee and administer the project capital works budget.

The *Department of Housing and Works* and the *Great Southern Development Commission* will provide the *City of Albany* with the opportunity to contribute to the design and selection of fitout for the facility and the endorsement of the selection of the architect and the final design and statutory approval (as necessary).

The *Department of Housing and Works, Great Southern Development Commission* and *City of Albany* will establish a Project Control Group (PCG) to provide strategic leadership and direction to the project.

The PCG will establish, as required, reference groups to input into the project, for example

- a design review committee to oversee the design phase of the project,
- a local reference group comprising of appropriately qualified City personnel to liaise with the project architect on matters relating to interior fitout, landscaping and public art

The City of Albany will own and operate the Albany Entertainment Centre and be responsible for the ongoing, care, control and management of the facility which includes any annual operating deficit.

The *City of Albany* will work to facilitate, in conjunction with LandCorp, an appropriately scaled and sufficient standard of convention/function facilities in the proposed hotel development which can link to and synergise with the Albany Entertainment Centre.

8.2.3 Anzac Peace Park

The City of Albany will be principally responsible for and project manage the design, statutory approvals process,

development, commissioning and ongoing care, control and management of the facility.

The City of Albany will collaborate with *LandCorp* in undertaking coordinated environmental investigations of the Anzac Peace Park site and Albany Waterfront site. The *City of Albany* will be the proponent for the environmental assessment and any resulting conditions pertaining to the development of the Anzac Peace Park.

The City of Albany will use best endeavours to construct the Anzac Peace Park project in the same timeframe as the Albany Waterfront project.

8.2.4 Emu Point

LandCorp will seek approvals to develop of lots 1512 and 1523 at Emu point these lots primarily for residential purposes with development proceeds to be allocated to the waterfront project and any surplus development profits are to be returned to the State Government.

8.2.5 Associated Land Transactions

LandCorp will transfer land excised from the Albany Waterfront project site sufficient in area to construct the Albany Entertainment Centre and curtilage to the City of Albany upon the creation of the new lot. LandCorp may consider a development lease to the City of Albany to allow construction of the Albany Entertainment Centre Facility to commence prior to the creation of the new lot.

The City of Albany has advised the Department of Land Administration that it has relinquished the Management Order over Lot 1512 Emu Point.

9. FINANCING

9.1 The State of Western Australia will contribute $38 million to the Albany Waterfront Project.

9.2 The State of Western Australia will contribute a maximum of $46.3 million to the Albany Entertainment Centre Project.

9.3 The City of Albany will contribute $1.0 million to the Albany Waterfront project in the 2007-08 financial year as payment for the land necessary to accommodate the Albany Entertainment Centre Project.

9.4 The City of Albany will contribute $1.2 million plus any Federal grant monies obtained in the order of $1.5million to the Albany Entertainment Centre Project.

9.5 The City of Albany is responsible for financing and obtaining further funding for the design and development of Anzac Peace Park.

9.6 The City of Albany acknowledges that the proceeds of the development of Lots 1512 and 1523 Emu Point are to be applied by the State Government to the Albany Waterfront Project.

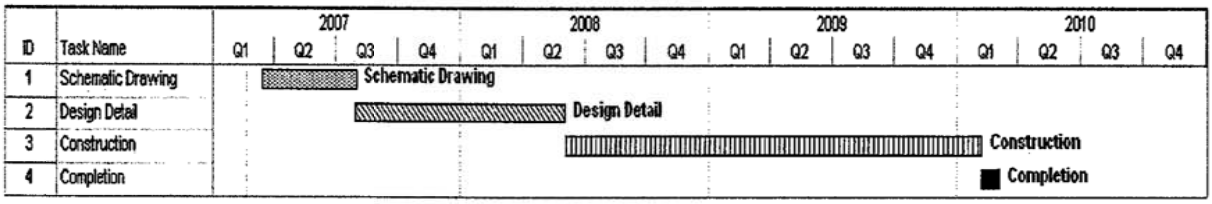
9.7 Project Cash Flow table: – Albany Waterfront, Albany Entertainment Centre and Anzac Park.

FORECAST CASHFLOW ($million)	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	TOTAL
ALBANY WATERFRONT (PROJECT)							
State of Western Australia							
Capital works allocation and land sales from the Waterfront and Emu Point	5.4	5.2	7.0	1.7	18.7		**38.0**
City of Albany							
City of Albany Contribution from development of the York St site			1.0				**1.0**
TOTAL	**5.4**	**5.2**	**8.0**	**1.7**	**18.7**		**39.0**
ALBANY ENTERTAINMENT CENTRE							
City of Albany Contribution			0.4	0.8			**1.2**
State Government through GSDC		0.68	0.42	25.46	15.44	4.3	**46.3**
Australian Government (unconfirmed)			1.5				**1.5**
TOTAL		**0.68**	**2.32**	**26.26**	**15.44**	**4.3**	**49**
ANZAC PEACE PARK (Notional In Negotiation)							
Australian Government Veterans Affairs			0.45				**0.45**
Australian Government DoTARS			0.44				**0.44**
City of Albany			0.68				**0.68**
Lotterywest			0.72				**0.72**
Premier and Cabinet (175th Anniversary Fund)			0.25				**0.25**
TOTAL			**2.54**				**2.54**

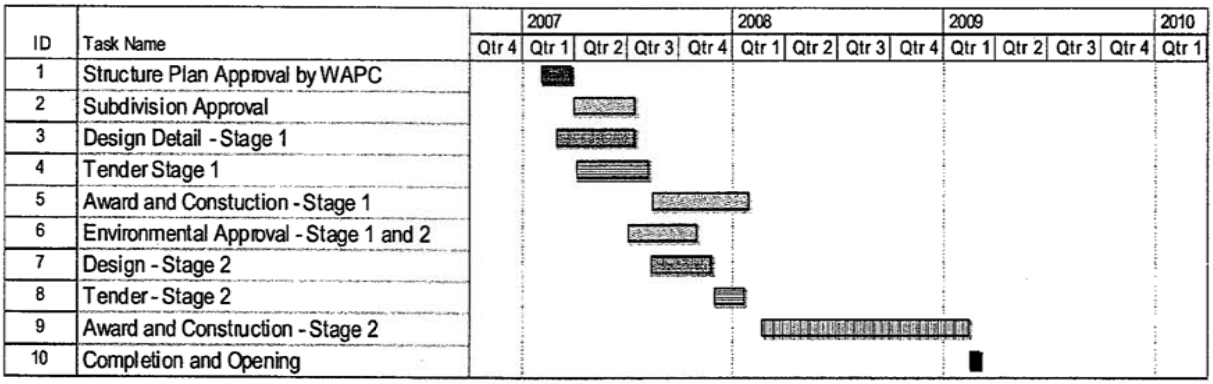
10. PROGRAM

The following timeframes are estimates only and subject to statutory approvals and more detailed planning.

Albany Entertainment Centre Program



Albany Waterfront Program



11. FUTURE AGREEMENTS

It is anticipated that as the project progresses, further supplementary agreements, partnerships, contracts and leases will emerge between project stakeholders and other parties serving the intent of this document.

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THE AGREEMENT

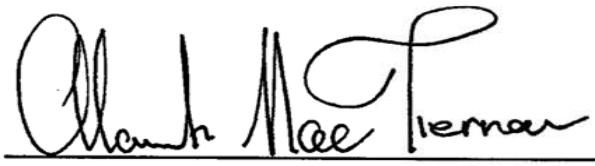
THE PARTIES HERETO AGREE TO THE FORMATION OF THIS PARTNERSHIP TO GUIDE THE PLANNING AND DELIVERY OF THE ALBANY WATERFRONT PROJECT AS EXPRESSED ABOVE.

Executed on behalf of the State of Western Australia

KIM CHANCE MLC
MINISTER FOR THE GREAT SOUTHERN

25 / 09 / 2007

ALANNAH MACTIERNAN MLA
MINISTER FOR PLANNING AND INFRASTRUCTURE



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Executed on behalf of the City of Albany

HER WORSHIP THE MAYOR ALISON GOODE

8 / 10 / 07

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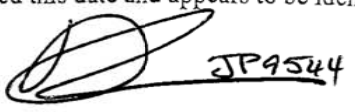

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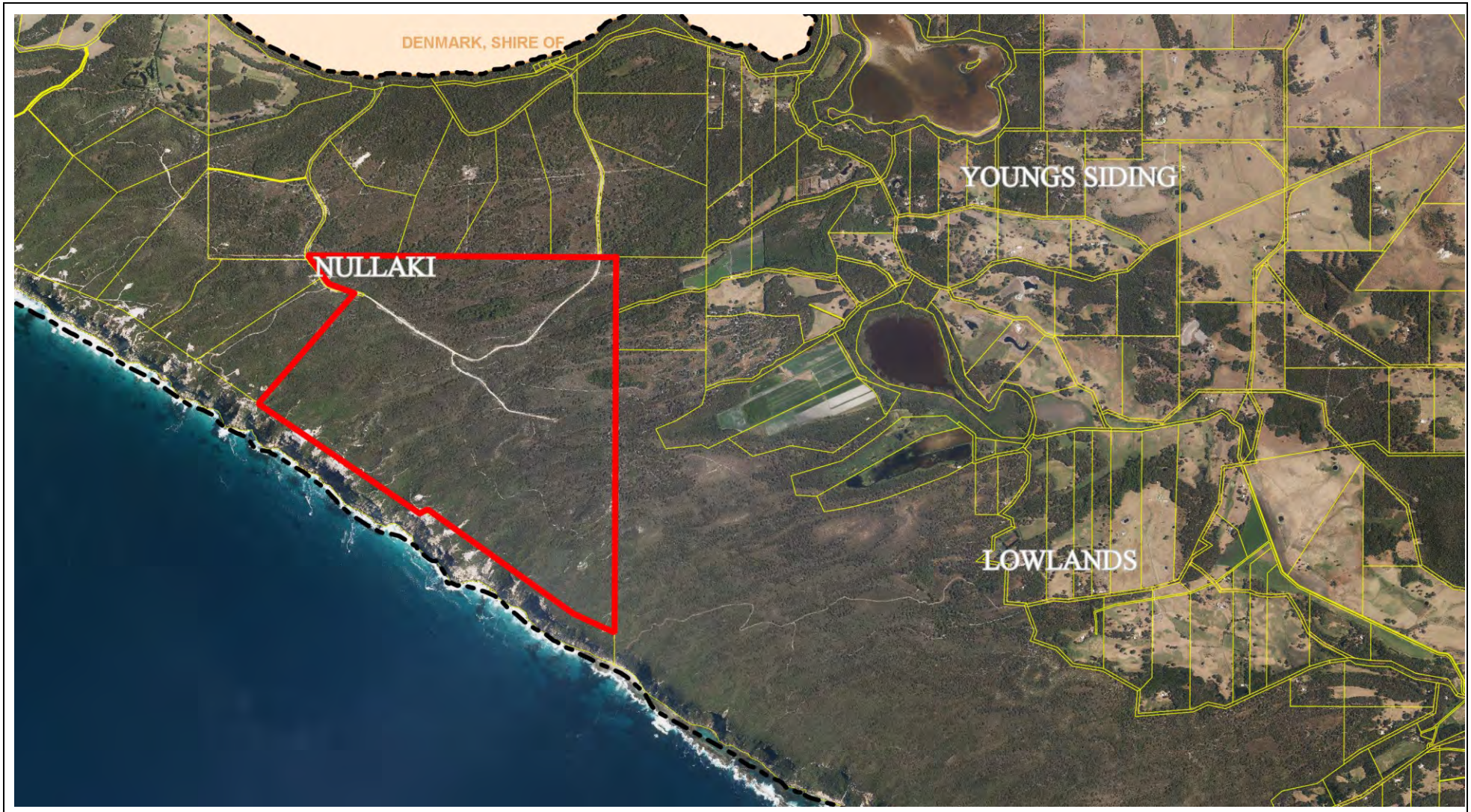
REPORT ITEM DIS105 REFERS



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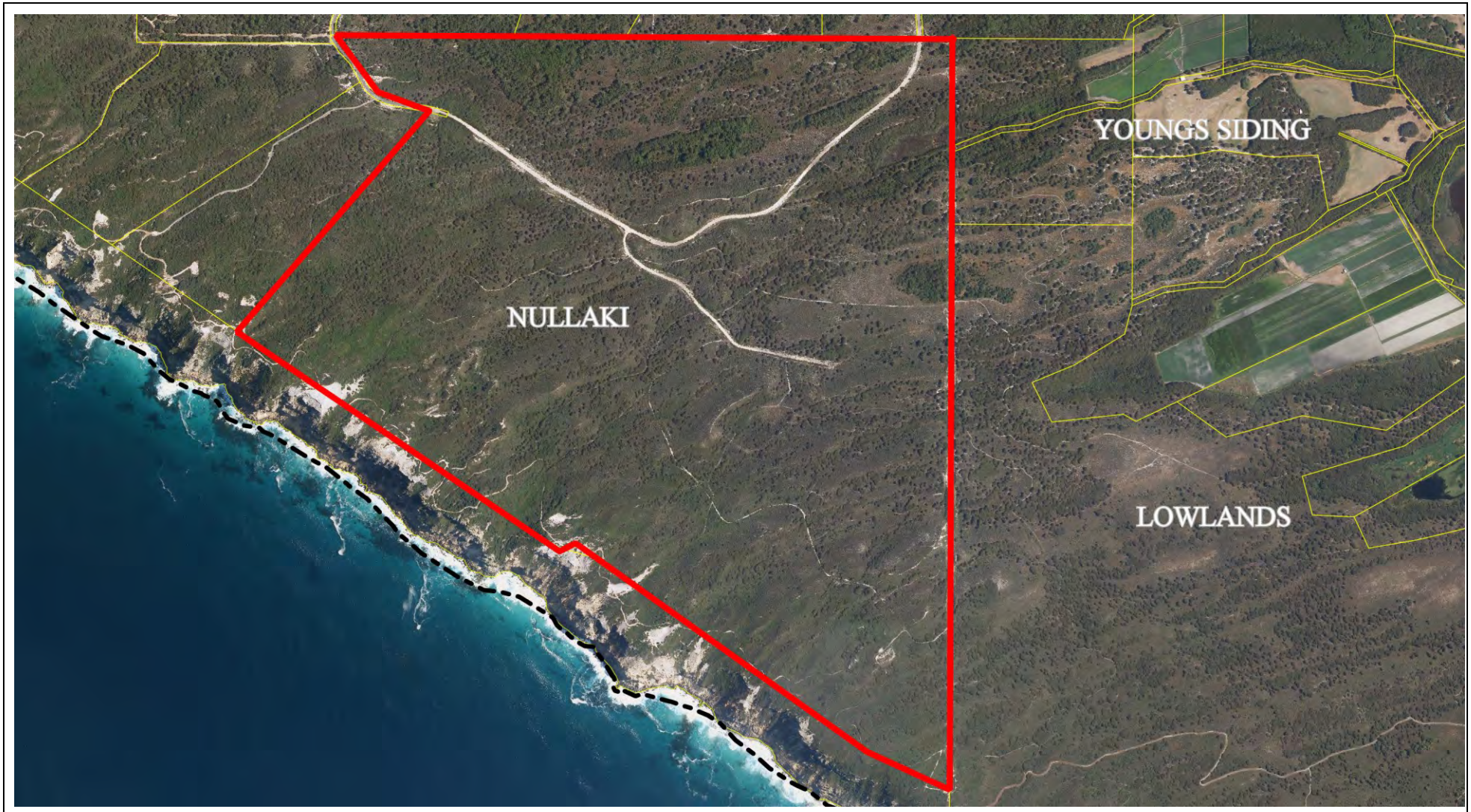

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Development Application for an Extractive Industries Licence (Lime Pit)

Lot 9005 Rock Cliff Circle, Nullaki

Table of Contents

1 Preliminary

1.1 Introduction

This report has been prepared by Sam Williams on behalf of Mr Graeme Robertson the proponent of the proposed development on a portion of Lot 9005 Rock Cliff Circle, Nullaki Peninsula, Albany (**the site**). Sam Williams has prepared this following report in support of an Application for Approval to Commence Development for an Industry Extractive Use (Extractive Industry- Lime Pit) and Extractive Industry Licence on the site for the extraction of limestone. The limestone will be crushed on site and carted for the application of crushed lime for agricultural purposes.

This report will discuss various elements pertinent to the proposal, including:

- Site Details.
- Proposed Development.
- Statutory Planning Framework.
- Strategic Framework.
- Relevant Supporting Documentation.

1.2 Background

A significantly small portion of the site contains a rehabilitated lime pit, which was previously used by the proponent for limestone extraction during the development of the Nullaki Peninsula for road construction purposes.

The site comprises the balance parent title of the original Nullaki Peninsula development, which represents a land area of 432ha, of which the proposed lime pit comprises 7.5ha or 1.7% of the site.

1.2.1 Nullaki Wilderness Association

In developing the Nullaki Peninsula the proponent/developer created the Nullaki Wilderness Association. This was established as a pseudo body corporate, in which the owners of lots on the Nullaki provided funds that provided for the environmental upkeep of the Nullaki. This included the maintenance of a vermin proof fence and gates on the Nullaki Peninsula, trapping and baiting programmes for feral animals and general maintenance of tracks and fire access ways.

Whilst successful in generating the environmental objectives of the Nullaki Conservation zoning, the provision of funds to the Nullaki Wilderness Association has diminished, as

landowners on the developed and sold lots are no longer willing to make funds available for the required environmental works on the Nullaki Peninsula. The required environmental works to maintain the environmental attributes of the Nullaki Peninsula are being undertaken completely at the cost and good will of the proponent of this Development Application, who also developed the Nullaki Peninsula. Currently, whilst the developer/proponent is willing to provide the required funds there is no guarantee this will be continued in perpetuity.

~~1.2.2 Subdivision Application~~

~~The site is currently subject to a proposed subdivision application, which seeks to create 11 additional conservation lots. A copy of the proposed *Plan of Subdivision* is included as **Appendix 1.**~~

~~All proposed lots, with the exception of proposed Lots 4 and 6, are subject to strict environmental controls by way of a conservation covenant recently applied to the parent title Lot 9005. Lots 4 and 6 will comprise circa 90ha and are located at the eastern end of the proposed subdivision area. All lots will also be subject to the existing conservation provisions of the LPS1, which provide specific future development requirements within the conservation zone.~~

~~The subdivision application is currently with the Western Australian Planning Commission (WAPC) for assessment and determination, noting this proposed Development Application for Extractive Industry has been prepared on the basis the subdivision application will be supported. Irrespective, the area identified for the lime pit constitutes a small portion of area within proposed Lots 4 and 6 and can be developed independently if required in the unlikely event the subdivision proposal is delayed or refused.~~

2 Site details

2.1 Legal description

Table 1 provides a description of the land subject to the proposed development.

Table 1: Existing title particulars:

Lot Description	Volume	Folio	Area

Lot 9005 on Plan52008	2653	12	432ha

Refer **Appendix 2** for a copy of the Certificate of Title.

2.2 Regional Context

The site is located within the municipality of the City of Albany (The City), on the Nullaki Peninsula. It is approximately 10 km south east from Denmark town site on the Nullaki Peninsula. Refer to **Figure 1**- Regional Context Plan.

2.3 Local Context

The proposed lime pit is situated in the south eastern corner of Lot 9005. To the south of the lime pit are sheer cliffs adjacent to the Southern Ocean. To the east, separated by the vermin proof fence is Reserve 17464 vested in the City of Albany and associated with the Nullaki campsite and Lake Sadie.

A portion of the Bibbulmun Track traverses Reserve 17464 to the east of the proposed lime pit. Given the significant undulation of the land, the small scale of the proposed lime pit operation, the remnant vegetation and the distance of the lime pit from the Bibbulmun Track there is no possibility of the lime pit being visible from the Bibbulmun track (refer **Figure 2**- surrounding land use)

To the north and west are vegetated blocks that form part of the Rock Cliff Circle subdivision. These lots address Eden Road and Rock Cliff Circle.

Currently the closest dwelling to the proposed Lime Pit is 2.3km, with the next closest being 2.8km. In placing this in context, the recently closed lime pit at the Shire of Denmark is 1km away from tourist accommodation and residential dwellings in a density far exceeding the development of the Nullaki Peninsula.

2.4 Land use and topography

The site is currently vacant and comprises remnant vegetation.

The site is undulating with the lime pit located on a high point, not visible from the surrounding locality. Pictures 1 and 2 below illustrate the immediate location of the lime pit. Furthermore, as the lime pit will be extracted any visibility will be significantly lessened. Picture 3 illustrates the gradient separation from the eastern boundary of the site (the limestone track) to the adjoining Reserve 17464.

Picture 1- Location of proposed lime pit looking towards the North East. Note the ridge line, which will provide a visual barrier to the lime pit.

Picture 2- Location of the proposed lime pit looking towards the South East to the Southern Ocean.

Picture 3- The Eastern boundary of Lot 9005 as defined by the Vermin Proof Fence looking towards the north at Wilson Inlet. Note the high point of the site in relation to the Reserve 17464 to the east.

3.0 Proposed Development

The lime pit will enable high quality lime for agricultural use to be extracted from a small ~~7.5ha~~8ha portion of the site, of which only 4ha will only ever be exposed. ~~on proposed Lot 6 and subsequently stockpiled within a designated 2ha storage area on proposed Lot 4.~~ The extracted material will be stockpiled at the extraction site. ~~carted from the extraction site to the stockpile via a limestone base constructed road located on the eastern boundary of Lot 9005 (refer Picture 2).~~ The material will be carted from the lime pit via road trains along the currently constructed firebreak on the western boundary of the site. The firebreak will be upgraded to a sealed access track to limit any dust. Extraction is anticipated to commence at around 20,000 tonnes per year rising to 50,000 tonnes per year. Refer **Appendix 3** *Excavation and Rehabilitation Management Plan*, prepared by Landform Research, which details the excavation process of the proposed lime pit.

Extracted crushed lime will be carted from the site via Lee Road. Whilst the Gazetted Lee Road Reserve currently extends to the eastern boundary of the site, it is only constructed to a gravel finish approximately 1.25km east of the site. As part of the

development of the lime pit the proponent, at his cost in a staged order, will construct Lee Road and other associated roads to a sealed ~~to a finished gravel~~ standard. ~~Furthermore, subject to the continual operation of the lime pit, the proponent will undertake to upgrade Lee Road at a rate of 500m a year.~~

To date minor exploration work has been completed for the proposed lime pit including the preparation of access tracks and drill platforms. In time, and following completion of all extraction, the site will be rehabilitated in accordance with the direction afforded under the *Excavation and Rehabilitation Management Plan* **(Appendix 3)** which details within Part 5.9 the rehabilitation measures proposed.

It is expected the lime pit will have a 20-year lifetime, ceasing operation in approximately 2037. The lime pit will also be required to operate in accordance with the conditions of any Extractive Industry Licence issued by the City under the City's *Extractive Industries Local Law 2009*.

The proposal has been supported, in principal, by the Department of Agriculture & Food, acknowledging the short supply of quality lime sources within the region (refer **Appendix 4**). The limestone on Lot 9005 is highly suitable for agriculture use as it neutralises the acidity of soils, and in addition it can also be used in the construction of road base.

Operations are intended to be undertaken in accordance with the recommendations of the supporting technical reports, included as Appendicies within this application

4.0 Environmental Consideration

The site will comprise a significantly small footprint on the Nullaki Peninsula (1.7% of Lot 9005 and 0.33% of the total Peninsula) and will have minimal environmental impact. Furthermore, the proponent will be contributing the lesser of 5% of revenue from the lime pit operation or $30,000 per financial year to the Nullaki Wilderness Association. This money will be used to maintain and protect the environmental attributes of the Nullaki Peninsula for the duration of the lime pit.

With respect to the Environmental consideration for the proposed lime pit, Martin Bowman-Environmental Scientist, has prepared an environmental assessment of the site and undertaken discussion with the Environmental Protection Authority (EPA). The findings from this report and outcomes of discussion with the EPA will be presented as a separate addendum to this report. At the time of preparing this report, Martin Bowman

was able to confirm there will be minimal to no environmental impacts resultant from the lime pit and the EPA did not raise any specific objection to the proposal.

5.0 Planning framework

The following documents outline the strategic planning framework applicable to the subject site.

5.1 City of Albany Local Planning Scheme No.1

Under the City of Albany Local Planning No.1 (LPS1), the site is zoned CZ1 – "Nullaki Peninsula Conservation Zone".

LPS1 currently allows limited land uses activities to occur on site, with all of these requiring planning approval from the City of Albany. Various other development controls, relating to Land Use, Fire Safety, Roads and Access, and Coastal and Foreshore Management also apply to the zone.

"Industry Extractive" is a use class not listed in accordance with the zoning of the site. However, Clause 5.2 of LPS1 is noted below, which states:

> *5.2 Variations to Site and Development Standards and Requirements*
>
> *5.2.1 Except for development in respect of which the Residential Design Codes apply, if a development is the subject of an application for planning approval and does not comply with a standard or requirement prescribed under the Scheme, the Local Government may, despite that non-compliance, approve the application unconditionally or subject to such conditions as the Local Government thinks fit.*
>
> *5.2.2 In considering an application for planning approval under this clause, where, in the opinion of the Local Government, the variation is likely to affect any owners or occupiers in the general locality or adjoining the site which is the subject of consideration for the variation, the Local Government is to—*
>
> *(a) Consult the affected parties by following one or more of the provisions for advertising uses pursuant to clause 9.4; and*
>
> *(b) Have regard to any expressed views prior to making its determination to grant the variation.*

5.2.3 The power conferred by this clause may only be exercised if the Local Government is satisfied
that—

(a) Approval of the proposed development would be appropriate having regard to the criteria set out in clause 10.2; and

(b) The non-compliance will not have an adverse effect upon the occupiers or users of the development, the inhabitants of the locality or the likely future development of the locality.

The criteria in Clause 10.2 state as follows:

10.2 MATTERS TO BE CONSIDERED BY THE LOCAL GOVERNMENT

The Local Government in considering an application for planning approval is to have due regard to such of the following matters as are in the opinion of the Local Government relevant to the use or development the subject of the application:

(a) The aims and provisions of the Scheme and any other relevant town planning schemes operating within the Scheme area;
(b) The requirements of orderly and proper planning including any relevant proposed new town planning scheme or amendment, or region scheme or amendment, which has been granted consent for public submissions to be sought;…

(i) The compatibility of a use or development with its setting;…
(l) The likely effect of the proposal on the natural environment and any means that are proposed to protect or to mitigate impacts on the natural environment;…
(o) The relationship of the proposal to development on adjoining land or on other land in the locality including but not limited to the likely effect of the height, bulk, scale, orientation and appearance of the proposal;…
(v) 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;…
(aa) Any other planning consideration the Local Government considers relevant."

In considering this, the general objective of the Conservation Zoning, and in particular the Nullaki Peninsula (CZ1) as prescribed in LPS1 is as follows:

4.2.18 Conservation Zone

(a) Provide for residential uses upon large lots adjoining significant environmentally sensitive areas such as coastal or conservation areas where there is a demonstrated commitment to protecting, enhancing and rehabilitating the flora, fauna and landscape qualities of the particular site; and

(b) Require innovative subdivision design and development controls to:

(i) Minimise visual impacts from subdivisional infrastructure, particularly roads;
(ii) Restrict access to any sensitive areas such as beaches, conservation areas or National Parks that adjoin the zone;

(iii) Prevent land uses and development that would adversely impact on the ecological values of the site for conservation purposes; and

(iv) Provide for the safety of future residents from the threat of wild fire.

2. Objectives of Conservation Zone 1

2.1 The purpose of CZ1 is to:

(a) Protect, enhance and rehabilitate the flora, fauna and landscape qualities of the Nullaki Peninsula;

(b) Provide for controlled public access to the Peninsula, the Wilson Inlet Foreshore and Anvil Beach; and

(c) Provide for limited wilderness retreat subdivision and development in a manner that is compatible with the conservation values of the Nullaki Peninsula.

Based on this, the following is established:

- LPS1 provides the ability for Council to determine a Development Application for a proposed development identified as a "Use Class Not Listed".
- In considering a Development Application for a "Use Class Not Listed", Council make a determination on the ability to deal with an Application in accordance with the intent of the underlying zoning of a landholding as prescribed under LPS1.
- For the site, the aim and provision under the CZ1 is to protect the environmental attributes of the Nullaki and provide for controlled development that is compatible with the conservation values of the Nullaki.

Given the above, should Council receive a Development Application that complements the Conservation zoning of the Nullaki, under their LPS1 they have the ability to deal with the application.

Whilst "Industry Extractive" is not a use class normally associated with Conservation zoned land, in the instance of the subject Development Application on the site an exception can be considered. As part of the approval of this Development Application for an Extractive Industry Licence request, the proponent's undertaking to contribute the lesser of 5% of the royalties from the extractive industry or $30,000 per financial year, will facilitate in the protection of the environmental attributes of the Nullaki.

Currently there is no mechanism in place that guarantees funding for the Nullaki Wilderness Fund and hence the environmental attributes of the Nullaki. The Lime Pit will guarantee these funds and hence protect the environmental attributes of the Nullaki.

5.2 Strategic Planning Context

5.2.1 State Government – Strategic Policies and Guidelines

The WAPC policies and guidelines relevant to this amendment proposal are listed below.

5.2.1.1 Lower Great Southern Strategy 2016

The *Lower Great Southern Strategy* (LGSS) specifically supports the identification and staged use of basic raw materials and minerals within Section 2.9 Mineral Resources and Basic Raw Materials.

The issues of agricultural lime are specifically mentioned the LGSS in relation to the existing limestone quarry at Denmark being in an environmentally sensitive A Class Reserve and the need for a new resource. It is further noted the recently closed

Denmark Quarry will be exhausted in 10 years. In this regard the following section is relevant:

> *2.9.2 Securing access to prospective mineral and basic raw material deposits*
> *Limestone and lime sand are located along the coastal dunes, predominantly to the west of Albany, but access to extract from those areas is increasingly becoming constrained by other land uses. For example, extensions to the Ocean Beach limestone quarry at Denmark could provide long-term supplies of agricultural lime, but this is impeded by its location adjacent to a local government conservation reserve. Although there are other known deposits to the west, these are on private land and scope for mining is regarded as low by the Department of Mines and Petroleum. Geological interpretation and exploration may locate further sites for agricultural lime extraction similar in geological setting to the Ocean Beach deposit. Given the need for agricultural lime in the agricultural industry, funding of a strategic assessment of the prospect under the auspices of the State lime supply strategy is warranted.*

This proposal has the potential to supply agricultural lime for the future and in line with the intentions of the LGSS.

5.2.1.2 State Planning Policy 2.0 – Environment and Natural Resources Policy

This policy provides for the protection of all natural resources under a number of sections. In addition to recognising the importance of protecting air quality, soil and land quality, water and wetlands and landscapes, the importance of Basic Raw Materials to the community is identified with reference to *SPP 2.4 Basic Raw Materials* (see below), *State Gravel Strategy 1998* and *State Lime Strategy 2001*.

Section 5.7 of SPP 2.0, deals with Minerals, Petroleum and Basic Raw Materials. Part of Section 5.7 states:

> *Basic raw materials include sand, clay, hard rock, limestone and gravel together with other construction and road building requirements. A ready supply of basic raw materials close to development 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:*

ii. *Identify and protect important basic raw materials and provide for their extraction and use in accordance with State Planning Policy No 10 (2.4); Basic Raw Materials.*
iii. *Support sequencing of uses where appropriate to maximise options and resultant benefits to community and the environment.*

The other factors of the natural environment are provided with the best protection possible, within the *Excavation and Rehabilitation Management Plan***,** by selection of the site, operational staging and footprint and rehabilitation, bearing in mind the constraints of excavating and processing the resource.

5.2.1.3 State Planning Policy 2.4 – Basic Raw Materials (2000)

State Planning Policy 2.4 – Basic Raw Materials makes many statements on the intent and actions, which local authorities should use to protect and manage basic raw materials. It is restricted to the Perth and Peel Region but is the leading document with respect to guidance on the protection and staged use of basic raw materials including limestone.

Section 3.4 is very specific in explaining that basic raw materials need identification and protection because of increased urban expansion and conservation measures. Sections 3.4.5 and 3.4.6 recognise that environmental and amenity matters need to be considered.

There are specific provisions in Section 6.2 Local Planning Scheme Provisions, such as:

- *No support for the prohibition of extractive industries in zones that permit broad rural land uses.*
- *Not precluding the extraction of basic raw materials on land which is not identified as a Priority Resource Location, Key Extraction Area or Extraction Area (6.4.2).*

The proposal is consistent with SPP 2.4 in that it provides an opportunity to provide a product of a high quality in an area that is agriculturally based, and which will support the sustainable and economic opportunities associated with agricultural activities.

5.2.1.4 State Planning Policy 2.5 – Agricultural and Rural Land Use Planning

State Planning Policy No 2.5, Agricultural and Rural Land Use Planning (SPP2.5), makes provision for the extraction of basic raw materials.

SPP 2.5 states *"sensitive land uses such as rural residential estates may limit or sterilise extraction of basic raw materials due to ongoing amenity concerns"*

State Planning Policies are required to be considered under the Local Planning Schemes as is the "identification and protection" for staged use, of basic raw materials. The site is located in a remote and access restricted part of Albany, which provides few residential dwellings, and as such the location of the lime pit is consistent with the expectations of SPP 2.5.

Furthermore, the requirements for Basic Raw Material Extraction as stated in SPP2.5 have been adequately addressed in **Appendix 3**- *Excavation and Rehabilitation Management Plan.*

5.2.1.5 State Planning Policy 4.1 – State Industrial Buffer Policy

State Planning Policy 4.1 – State Industrial Buffer Policy discusses the need to consider adjoining land uses when locating buffers but does not prescribe set buffers for operations such as this. The development and processing of the resource has been designed to maintain maximum buffer distances. In situations where the buffers are less, actions such as the provision of perimeter bunding to provide visual and noise management, tree planting and operational procedures, are used to mitigate and reduce impacts.

Surrounding Land Uses and Buffers

The site is remote and protected by a vermin proof fence along the eastern boundary of Lot 9005, which includes controlled gates. A number of Government Policies relate to buffer distances and the protection of basic raw materials. SPP 4.1 discusses the need to consider adjoining land uses when locating buffers but does not prescribe set buffers for operations such as this.

Generic buffer requirements were developed by the Victorian Government and used by the Environmental Protection Authority (EPA) as the basis for a draft guideline on recommended buffer distances. These formed the basis of the EPA's *Guidance Statement Number 3, Separation Distance between Industrial and Sensitive Land Uses, June 2005* (the "EPA Guidance Statement No. 3").

The Environmental Protection Authority of South Australia recommends a 300 metre separation for a Quarry – Non-Blasting.

The EPA lists the generic buffers for sand and limestone pits as 300 – 500 metres depending on the extent of processing. A generic buffer relates to the distance at which there are unlikely to be any problems without some further investigations and does not mean that smaller buffers are not acceptable. The *EPA Guidance Statement No. 3* provides for a case by case separation, based on the potential impacts.

For limestone extraction a generic buffer is suggested of 300 – 500 metres with case by case assessment where grinding and milling are used. SPP 4.1 recommends that all land uses within 1,000 metres be considered. The design of the footprint and the operation have been designed to minimise any impacts outside the disturbance areas. As established, there are no dwellings within 1,000 metres of the proposed lime pit and stockpile area. The excavation of limestone from the site complies with these policies.

5.2.2 Local Government – Strategic Policies and Guidelines

5.2.2.1 Local Planning Strategy

The City's *Local Planning Strategy* (LPS) provides the vision to guide the future growth of the Albany and surrounding areas across a range of different disciplines and interests. One of the key planning objectives of the LPS as it relates to extractive industries is as follows:

> *Mineral Resources and Basic Raw Materials – maximise opportunities to enable mineral and raw material exploration and extraction in accordance with accepted environmental standards.*

Key actions to be undertaken include:

- *Establish appropriate planning controls in the LPS1 to protect significant mining and basic raw material resources from encroachment by incompatible uses*
- *Require preparation and implementation of management plans (including clean up and rehabilitation measures) for new mining and basic raw materials proposals.*

The proposal is consistent with the intentions of the LPS, as there are significant separation distances between the proposed lime pit and surrounding sensitive uses, and in addition the operation of the lime pit will require both Planning Approval and an Extractive Industry Licence to be issued by the City. As part of this proposal a *Rehabilitation Management Plan* will be required. Noting that one has been prepared (refer to **Appendix 3** the *Excavation and Rehabilitation Management Plan*, prepared by Landform Research), along with the proponents' previous successful rehabilitation of

the original lime pit, support for the proposal on the basis that the environmental effects can be minimised and effectively mitigated, should be provided.

6.0 Conclusion

This Development Application for Extractive Industry Licence applies over a very small portion of the site, which has been identified as containing high quality limestone which is much needed for agricultural and road construction purposes. The proposal is supported in principle by the Department of Agriculture and Food and there is no preliminary objection from the EPA.

The proposal represents a small scale and a logical development opportunity for the City and one that will generate many direct and indirect benefits to the City and surrounding regions. Subject to appropriate management plans and best practice extraction methods being employed, as detailed within the *Excavation and Rehabilitation Management Plan,* it is expected there will be minimal long terms effects as a result of this proposal on the immediate and wider environment.

It has been established through the mechanism in LPS1 and the proposal for the provision of royalties towards environmental management that Council has the ability to deal with and approve this development application.

Appendix 1- Subdivision Application

Appendix 2- Certificate of Title

Appendix 3- Excavation and Rehabilitation Management Plan

Appendix 4- Correspondence from Department of Agriculture & Food.

Excavation and Rehabilitation Management Plan

PROPOSED AGRICULTURAL LIME QUARRY

Lot 9005
Nullaki Peninsula
City of Albany

Proponent
Graeme Robertson
PO Box 114
Denmark WA 6333

JUNE 2018

Excavation and Rehabilitation Management Plan, Proposed Agricultural Lime Quarry

Lot 9005
Nullaki Peninsula
Denmark

Landform Research

Lindsay Stephens BSc (Geology), MSc (Plant Ecology) U1 49 Birdwood Avenue, Como WA 6152
Mem Aus Geomechanics Soc – MEIANZ – FIQA Tel 08 9474 3978, landform@iinet.net.au

SUMMARY

Graeme Robertson proposes to open an agricultural lime quarry on 8.0 hectares of a limestone ridge on Lot 9005, Nullaki Peninsula Denmark.

The limestone on Lot 9005 is highly suitable for lime for agriculture and neutralisation of acidity in addition to some road bases. Drilling has been completed and testing of the lime neutralising value carried out.

The proposed excavation lies in the south eastern corner of Lot 9005, set back from the coastal cliffs and Foreshore Reserve (30883) which covers the cliffed slope. It is approximately 10 km south east from Denmark townsite on the Nullaki Peninsula.

To the east lies Reserve 17464, vested in the City of Albany and associated with Lake Saide. The Bibbulmun Track runs through the reserve.

Lot 9005 is covered by remnant coastal vegetation. The proposed quarry site has previously been used for a small limestone quarry to provide limestone for road construction on the subdivided part of the Nullaki Peninsula. The pit had been revegetated.

Minor exploration work has been completed for the existing proposal including the preparation of access tracks and drill platforms.

A predator proof fence runs across the Peninsula on the eastern side of Lot 9005.

The limestone will be used to prevent soil acidification, which is a well recognised major environmental issue, highlighted in the various State of Environment Reports on Western Australia, where it is estimated that 55% of the agricultural land in Western Australia is susceptible to the problem. Soil acidification also causes stock toxicity from some metals (eg aluminium) which move into solution in acidic or low pH conditions.

The only mechanism to counteract the increasing acidity is the application of calcium carbonate. The sources of calcium carbonate are limesand and Tamala Coastal Limestone.

The proposal seeks to provide a continued resource of strategically located limestone, suited to a variety of end products. The majority of the lime from this pit will be used in the agricultural industry with lime being transported as far as Hyden in the east through the Great Southern Region. Currently existing supplies are running out and farmers are sourcing material from Lancelin or Redgate at a significant transport cost advantage.

The Lower Great Southern Strategy in Section 2.9 Mineral Resources and Basic Raw Materials supports the identification and staged use of basic raw materials and minerals.

The issues of agricultural lime are specifically mentioned in the Lower Great Southern Strategy in relation to the existing limestone quarry at Albany being in an environmentally sensitive area and the need for a new resource. This proposal has the potential to supply agricultural lime for the future and in line with the Strategy.

This proposal seeks Development Approval and an Extractive Industries Licence for a staged extraction area of 8.0 hectares combined with a stockpile on the eastern portion of Lot 9005.

Initially 4.0 hectares of pit will be opened followed by two progressive stages of 2.0 hectares each. At any one time there will be approximately 4.0 hectares of pit open. Excavation is anticipated to extend to 8 metres in depth leaving an undulating land surface replicating other parts of the Nullaki Peninsula. An application for 20 years is made.

End Use will be a return to Conservation in compliance with the Town Planning Scheme Zoning.

There are no dwellings within 1 km of the site and the proposed operation has been designed to minimise or eliminate any dust, noise or visual impact.

The site has an old limestone pit on the proposed disturbance footprint in addition to some drill pads and access roads. Parts of the old pit have been allowed to very successfully rehabilitate demonstrating that the proposed methods of rehabilitation are proven.

It is anticipated that the life of the pit will be over 20 years. Extraction is anticipated to commence at around 20 000 tonnes per year rising to 50 000 tonnes per year At 50 000 tonnes that would equate to around 10 laden truck movements per day on average (six days per week) for the summer and autumn months. Smaller amounts of limestone are anticipated to be extracted at other times to fill specific contracts.

Transport will be along Lees Road to Browns Road to Lake Saide Road to Lower Denmark Road. A Transport Management Plan is to be produced and discussions are to be held with the City of Albany to determine a satisfactory transport route. Suitable road upgrades have been prepared in these proceedings and will be implemented by the Applicant. The road upgrade requirements are based on 14 laden small road train movements per day.

The Excavation and Rehabilitation Management Plan addresses;

- Groundwater quality and quantity protection;
- Land surface stabilisation and interim rehabilitation, including erosion mitigation and topsoil management
- Waste management
- Dust management
- Dieback management
- Contours and final ground surface levels;
- Fire management;
- Site security;
- Transport;
- Conservation Issues;

Environmental issues including dust, noise and traffic can be managed in such a way to minimise or eliminate any significant impact both on site and offsite. Dust and noise can be contained by the methods of extraction to be used and the control measures which will be put into place. Measures to protect the site and minimise the influence of dieback are addressed under Environmental Management.

Project Summary

ASPECT	PROPOSAL CHARACTERISTIC
EXCAVATION	
Area of proposed new excavation	Proposed Pit – 8.0 hectares in three stages of about 4.0 hectares followed by 2.0 ha and 2.0 ha.
Limestone extraction	Initially 20 000 tonnes per year rising to potentially 50 000 tonnes.
Total estimated resource	Limestone - approximately 1 000 000 tonnes.
Life of project	20 years
Area cleared per year for pit	Initially about 4.0 hectares to provide an operational area and then 0.5 hectares – per year depending on the elevation of the ridge.
Total area to be cleared	8.0 hectares in proposed pit.. In addition around 1.72 hectares along the Lees Road Reserve with edge trimming along the other road transport route.
Area mined per year	0.5 hectares approx.
Dewatering requirements	None
Maximum depth of excavations	Initially limited to 8 metres
PROCESSING	
Limestone	Same as the amount extracted.
Water requirements	Only required for dust suppression in excessively dusty situations on site transport and processing. The limestone will be moist when extracted and will not need dust suppression. Water will often clog the processing plant if excessive, therefore misting will be used
Water supply source	Local sump on Lot 9005.
INFRASTRUCTURE	
Total area of plant and stock	Mobile plant will be used, located within excavation footprint. It will be located on the floor of the pit and be moved from time to time and at the commencement of each yearly campaign.
Area of settling ponds	Not required
Fuel storage	Not required, mobile tankers will be used
TRANSPORT	
Truck movements	Variable but approximately 10 laden trucks per day maximum depending on the volumes of limestone extracted. Based on a 40 tonne load and 50 000 tonnes per year. Upgrades to the transport network are based on 14 laden truck movements per day.
Access	
WORKFORCE	
Construction	2 - 3
Operation	2 - 3
Hours of operation	Monday - Saturday 6.30 am to 5.00 pm excluding public holidays. Predominantly Summer and Autumn for around 4 months within December to April with smaller amounts at other times of the year to fill contracts

An Environmental Risk Assessment has been completed and follows.

CONTENTS

Environmental Factor	Environmental Objective	Identified Issues and Commitments	Proposed Management	References	Environment Risk	
					Innate Risk - Unmanaged	Risk when Managed
LAND						
FLORA and VEGETATION	To maintain representation, diversity, viability and ecological function at the species, population and community level.	Vegetation communities and/or biodiversity may be significantly impacted by clearing, and degradation by weeds and dieback.	This proposal seeks Development Approval and an Extractive Industries Licence for astaged extraction area of 8.0 hectares incorporating a stockpile on the eastern portion of Lot 9005. At any one time it is anticipated that only 4.0 hectares of pit will be open. Excavation is anticipated to extend to 8 metres in depth leaving an undulating land surface replicating other parts of the Nullaki Peninsula. An application for 20 years is made. The nearby vegetation of similar communities in excellent condition totals over 6 500 hectares. The 4 hectares open at any one time represents just 0.06%.	2.5 Flora Attached Flora and Vegetation Report.	Low	Low
		Threatened Communities may be impacted by inadvertent impacts.	Nil None present or likely	2.5 Flora Attached Flora and Vegetation Report.	NA	
		Priority species may be affected by clearing, disturbance, weeds, dieback and other impacts.	Considered unlikely. None were recorded in the vegetation assessment. *Banksia sessilis* var *cordata* (P4) grows on coastal limestone and may be present. *Sphaerolobium calcicola* (P3) as occurring within 10 km and may occur in sand over limestone. Targeted flora and vegetation studies as required, will be completed at an appropriate time of the year in consultation with DWER.		Low	Low
		Threatened Species may be impacted by inadvertent impacts.	Unlikely Targeted flora and vegetation studies as required, will be completed at an appropriate time of the year in consultation with DWER.	2.5 Flora Attached Flora and Vegetation Report.	NA Low	Low
		Weeds may become established and impact on the local and on site biodiversity	A weed management program is proposed. The site is largely weed free but monitoring management and treatment are proposed	Weed Management Plan in 5.6.6	Low	Low
		Dieback disease may be present and impact on the	Dieback management procedures are proposed.	Dieback Management Plan in 5.6.5	Low	Low

		local and onsite vegetation.	No dieback is recorded.			
		The developments may fragment communities, biodiversity and ecological linkages.	Little fragmentation will occur. Natural regrowth is rapid as proved by past revegetation. See also above.	Figures 8 to 10	Nil	
Landforms	To maintain the variety, integrity, ecological functions and environmental values of landforms and soils.	The local landform may be altered to a form that is not compatible with the surrounding geomorphology.	The excavated area will resemble natural deflated dune or undulating surface lowered by some 8 metres.	Figures	Low	Low
		The final land surface should be fit for its required end use.	The excavated area will resemble natural deflated dune headland and will have natural functions.	Sections Figures	Low to Moderate	Low
		The development and final landform will not lead to significant visual impacts	The excavated area will resemble natural deflated dune headland of the Nullaki Peninsula.	Figures 8 to 10	Low	Low
		The final landform and soils may be subject to erosion by wind, water or other processes.	The sand and limestone is highly porous and not subject to water erosion. Limestone readily crusts and does not blow. Limesand/limestone will have been removed andwind erosion risk and movement will reduce. No evidence of past erosion.	Attached Water Management Plan Figure 9	Low	Low
		The project has been assessed for karst features and has been designed to mitigate impacts on known and features that may potentially be present.	There is no known karst. Excavation will have a base some 140 metres above the water table.		Low	Low
Subterranean Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	The development may have an impact on an isolated population of subterranean fauna.	There are no known subterranean features.		Low	Low
		The development may fragment subterranean communities.	See above		NA	
		The diversity of subterranean fauna may be reduced at a population or assemblage level.	See above		NA	
		The final formed structures may not support continued subterranean fauna and	There will be similar regolith to the pre-excavation environment.		NA	

		their ecological functions.				
Terrestrial Environment Quality	To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.	At the end of excavation the created soils should be deep enough or of sufficient quality to be sustainable to meet the long term end use or ecological values.	The final rehabilitation will be to simulate natural deflated dunes and headland of the Nullaki Peninsula. Natural regrowth is rapid as proved by past revegetation. See also above.	Sections Figures	Low	Low
		The area of potential impacts will not impact on essential or desirable land uses.	Then end use will be the same as the pre-excavation land use. End Use is to Conservation, the Zoning of the site.	5.9 Rehabilitation	Low	Low
		The development will not adversely impact an area identified as having high agricultural or community values.	The area is private land but has high natural beauty that is not available to the public because of security predator proof fences.		NA	
		Acid soils are not exposed or are managed to ensure that there are no long term adverse effects.	There is no evidence of acid sulfate conditions. The site is elevated in oxidised soils with no prospect of sulfides in the soils. Soils are limesand on a limestone base.	Attached Water Management Plan	NA	
Terrestrial Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	Communities and fauna and/or biodiversity may be significantly impacted by clearing, and degradation by weeds and dieback.	This proposal seeks Development Approval and an Extractive Industries Licence for a staged extraction area of 8.0 hectares for pit and stockpile on the eastern portion of Lot 9005. At any one time it is anticipated that only 4.0 hectares of pit will be open. Excavation is anticipated to extend to 8 metres in depth leaving an undulating land surface replicating other parts of the Nullaki Peninsula. An application for 20 years is made. The nearby vegetation of similar communities in excellent condition totals over 6 500 hectares. The 4 hectares open at any one time represents just 0.06%. A predator proof fence is in place.		Low	Low
		Threatened Faunal Communities may be impacted by inadvertent impacts.	Unlikely		Low	Low
		Priority Fauna species may be affected by clearing, disturbance, weeds	Unlikely		Low	Low

		Threatened Fauna Species may be impacted by inadvertent impacts.	Unlikely • The potential feeding habitat of Black Cockatoos impacted is small because the only food source *Dryandra sessilis* is limited. With the staging and small footprints the proposed activities will not trigger referral to the Commonwealth. • All other fauna issues such as Mains Assassin Spider will be dealt with under the application for Clearing Permit. Targeted fauna studies as required, will be completed at an appropriate time of the year in consultation with DWER.		Low	Low
WATER						
Hydrological Processes	To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.	The ecological functions of watercourses are to be maintained.	There are no watercourses	Attached Water Management Plan	Moderate	Low
		Groundwater may be impacted by changes to recharge, over-pumping, alterations to flow paths or lead to significant evaporation and water loss.	No adverse impacts on water are likely based on excavations of limesand/limestone in other areas.	Attached Water Management	Low to moderate	Low
		Wetlands may be altered by draining or flooding, potentially changing their ecological functions and biodiversity.	There are no wetlands on site.	NA		
Inland Waters Environmental Quality	To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.	Hydrocarbons, fuels and other chemicals are stored in a manner that they pose no risk to the environment.	Extensive fuel and hydrocarbon management programs are proposed. A Waste inventory found no potentially adverse materials. There are no proposed changes to the methods of operation. See above	Attached Water Management Plan	Low to moderate	Low
		Runoff from operations is contained and all water is either retained or treated to removed sediment and any deleterious materials.	All water is retained on site in the base of the pit and soak into the porous ground.	Attached Water Management Plan.	Low to moderate	Low
		Water quality during and after development and	Excavation will have a base some 140 metres above the water table, replicating natural	Attached Water Management Plan.	Low	Low

		operations is not adversely affected or altered.	deflated dunes.			
AIR						
Air Quality	To maintain air quality for the protection of the environment and human health and amenity.	Dust emissions are minimised or controlled to ensure that the local amenity is protected.	A Dust Management Plan is provided. A DWER Licence will be required for crushing and screening if used. The closest sensitive premises are 1 to 2 km away. The access road is similar to any non sealed road and limestone does crust when moist. Dust management will be applied to the excavation, processing and transport as required.	5.4 Dust Management Plan	Low	Low
		Dust emissions will not significantly impact on local and on site personnel health or quality of life.	Quarrying must comply with the *Mines Safety and Inspection Act* for Health and Safety. Officers from the DMIRS will regularly inspect the site and the site must be registered under the DMIRS SRS system.	5.4 Dust Management Plan	Moderate to high for worker impact. Low for local amenity impact.	Low
		Noise levels will comply with the *Environmental Protection (Noise) Regulations 1997.*	Noise levels will comply with *Environmental Protection (Noise) Regulations 1997.* The operations are designed to minimise on site noise and the potential for offsite noise. The closest sensitive premises are 1 to 2 km away. The Noise Regulations do not apply to the Bibbulmum Track as it is not classed as a sensitive premises. A Noise study by Herring Storer Acoustics 2018 found that the operations will comply with the Noise Regulations, and in particular at the Nullaki Campsite for the design 14 laden truck movements per day, noting that the anticipated average number of truck movements is 10 per day. *Herring Storer Acoustics 2018, Limestone Quarry, Nullaki, Environmental Noise Truck Movements.*	5.3 Noise Management	Low	Low
		Noise levels and operational procedures will be used to protect on site personnel health and safety.	Excavation must comply with the *Mines Safety and Inspection Act* for Health and Safety. Officers from the DMIRS P will regularly inspect the site and the site must be registered under the DMIRS SRS system.	5.3 Noise Management	Low	Low

			With such small operations and the distance to sensitive premises of 1 to 2 km compliance will be readily achieved.			
		Emissions, gases and other materials potentially adverse to human health will not be used or will be managed.	There are no gaseous or other potential harmful emissions from the operations.		Low	Low
		Potential impacts from blasting will comply with the *Environmental Protection (Noise) Regulations 1997* and guidelines for ground vibration.	Blasting is not required	NA		
		Employ procedures and design the operations to minimise the risk of excessive greenhouse emissions.	The operations are designed to minimise fuel use and transport routes. There are no proposed changes to transport routes or operations from past activity.		Low	Low
Heritage	To ensure that historical and cultural associations are not adversely affected.	Known aboriginal heritage sites will be protected.	There are no known aboriginal sites on the DPLH database on the extraction area. A commitment is made to stop and assess any site if uncovered. Heritage sites uncovered during operations will be independently assessed and managed through communication with the community, Government and traditional owners.	6.5 Heritage	Low	Low
		Sites of European heritage will be protected.	None known		Low	Low
Human Health Amenity	To ensure that human health is not adversely affected.	Human health is protected from adverse impacts of dust, noise, other emissions and chemicals.	Limestone excavation must comply with the *Mines Safety and Inspection Act* for Health and Safety. Officers from the DMIRS will regularly inspect the site and the site must be registered under the DMIRS SRS system.		Moderate to high for worker impact.	Low
	Transport routes and operations are designed to minimise local impacts	Transport may impact on local, and regional roads or school bus routes.	The proponent has liaised with the City of Albany and will continue to do so A detailed and thorough road assessment has been conducted by Sam Laybutt of Cardno (WA) Pty Ltd on behalf of the City of Albany. The proponent is committed to comply with the provisions of the transport and road assessment with the roads to be upgraded in a staged manner.	4.9 Transport Corridors Cardno Transport assessment.	Low	Low

	Local Amenity – Visual Impact	The operations have been designed to provide sufficient buffers and visual protection.	The operations comply with the EPA Buffer Guidelines The closest dwelling is 1000 - 2000 metres away The operations are designed to minimise visual impact.	5.2 Aesthetics	Low	Low
INTEGRATING FACTORS						
Offsets	To counterbalance any significant residual environmental impacts or uncertainty through the application of offsets	Offsets are provided as necessary to reduce or mitigate the impacts on the development and operation of the project.	The proposed operations are small. The site will be returned to copy natural deflation areas. At any one time it is anticipated that only 4.0 hectares of pit will be open. Excavation is anticipated to extend to 8 metres in depth leaving an undulating land surface replicating other parts of the Nullaki Peninsula. An application for 20 years is made. The nearby vegetation of similar communities in excellent condition totals over 6 500 hectares. The 4 hectares open at any one time represents just 0.06%.	Not required	NA	
		Offsets are used to enhance the local environment, habitats, biodiversity and other identified factors.	See above No offsets are required.	Not required	NA	
Rehabilitation and Closure	To ensure that premises are closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State	All infrastructure, roads, hardstand, non natural materials are to be removed from site progressively when not required and all removed at the end of the project.	This is proposed	5.9 Rehabilitation	Low	Low
		No materials are to be left on site that may cause long term detrimental outcomes in terms of impacts to soils, water, heritage, vegetation health or other factors.	The proponent will remove all materials, equipment and plant associated with their operations at the end of excavation.	5.9 Rehabilitation	Low	Low
		All contaminated materials are to be removed from site prior to closure.	There are no contaminating materials apart from fuel and lubricants. Commitments are made to do this. Contingencies are in place. Extensive fuel and hydrocarbon management programs are proposed.	Attached Water Management Plan.	Low to moderate	Low

			A Waste inventory found no potentially adverse materials. There are no proposed changes to the methods of operation.			
		Landforms and other geomorphological features are to be compatible with the local area and end use and be sustainable in the long term.	The excavated area will resemble natural deflated dune headland of the Nullaki Peninsula.	Figures 8 to 10	Low - moderate	Low
		Soils are reconstructed to be able to sustain an ecologicalyl sustainable vegetation or other cover consistent with the end use and long term proposal for the site.	The open operations are small. The excavated area will resemble natural deflated dune headland of the Nullaki Peninsula.	Figures 8 to 10	Low	Low
		Weed levels are not to cause significant impacts on vegetation.	Managed during excavation and rehabilitation.	5.6.6 Weed Management Plan	Low	Low
		Ongoing monitoring of the rehabilitation will be conducted to ensure that any areas not meeting completion criteria are added to or replaced as necessary to enable the relevant criteria to be met.	This is proposed	5.9 Rehabilitation	Low - moderate	Low
OTHER FACTORS						
Resource Requirements	Basic Raw Materials are required for continued use by the community and for future developments.	There is significant basic raw material on site that is suitable for community resources.	The limestone will be used to prevent soil acidification, which is a well recognised major environmental issue, highlighted in the various State of Environment Reports on Western Australia, where it is estimated that 55% of the agricultural land in Western Australia is susceptible to the problem. Soil acidification also causes stock toxicity from some metals (eg aluminium) which move into solution in acidic or low pH conditions. The only mechanism to counteract the increasing acidity is the application of calcium carbonate. The sources of calcium carbonate	1.8 Planning Policies and Zonings	Low	Low

			are limesand and Tamala Coastal Limestone. The proposal seeks to provide a continued resource of strategically located limestone, suited to a variety of end products. The majority of the lime from this pit will be used in the agricultural industry with lime being transported as far as Hyden in the east through the Great Southern Region. Currently existing supplies are running out and farmers are sourcing material from Lancelin or Redgate at a significant transport cost dis-advantage. The Lower Great Southern Strategy in Section 2.9 Mineral Resources and Basic Raw Materials supports the identification and staged use of basic raw materials and minerals.			
Planning Compliance	To comply with Government Policy, planning zones and procedures.	The project is designed to comply with State and Local Planning requirements.	The issues of agricultural lime are specifically mentioned the Lower Great Southern Strategy in relation to the existing limestone quarry at Albany being in an environmentally sensitive area and the need for a new resource. This proposal has the potential to supply agricultural lime for the future and in line with the Strategy.	Lower Great Southern Strategy	Low	Low
Community Consultation	To provide a community consultation process commensurate with the size nature and time line of the project.	Community consultation will be handled by community input within the application and assessment phases, through direct community consultation as required and contact numbers being displayed at the entrance. An "Open Door Policy" will be used to enable ongoing dialogue between the operator and the community.	There has been and will be further consultation with the City of Albany and the key residents along the transport route. A detailed and thorough road assessment has been conducted by Sam Laybutt of Cardno (WA) Pty Ltd on behalf of the City of Albany. The proponent is committed to comply with the provisions of the transport and road assessment with the roads to be upgraded in a staged manner.	Cardno Transport assessment. 4.9 Transport Corridors	Low	Low
		An effective complaints procedure will be provided, combined with effective remedial procedures.	A complaints procedure is proposed.	5.4.9 Complaints Procedure	Low	Low

Safety	To ensure that the project provides high levels of safety to on site personnel and the community	Ensure that the project provides high levels of safety to on site personnel.	Limestone excavation must comply with the *Mines Safety and Inspection Act* for Health and Safety. Officers from the DMIRS will regularly inspect the site and the site must be registered under the DMIRS SRS system. The operations are required to be registered under the DMIRS SRS system. The proponent proposes extensive fire and safety management systems under the Project Management Plan.		Low	Low
		Ensure that potential impacts are retained on site and do not cause significant risk of safety to the local and wider community.	The operations are designed to comply with this.		Low	Low
		Have in place a transport policy to ensure that transport along public roads is conducted in a safe manner.	Transport has been considered and will be formulated with the City of Albany. See above.	4.9 Transport Corridors	Low	Low
Geotechnical Integrity	To ensure that all ground and geological materials is safe commensurate with the operations and final land surface.	The operational and final land surfaces will be made safe and not subject to subsidence, slippage or other adverse conditions.	The operations are designed to comply and operate to the *Mines Safety and Inspection Act 1994.* Excavation simply takes limestone from the dune leaving the natural angles of repose of dunes.	Demonstrated by past excavations. Figure 9.	Low	Low
		The quarry and operations will comply with the *Mines Safety and Inspection Act 1994.*	is The proponent is committed to complying with the relevant Acts and Regulations. The pit will be regularly inspected by officers from the DMIRS Safety Division.		Low	Low
		The operational and final surfaces and features are designed to be not affected by extreme climate events.	No impact from extreme weather events will result on the pit or to the pit or rehabilitated surface. The final surface will replicate the natural deflation surface under the dunes.		Low	Low

CONTENTS

1.0 INTRODUCTION

1.1 Background and Proposal

Graeme Robertson proposes to open an agricultural lime quarry on 8.0 hectares of a limestone ridge on Lot 9005, Nullaki Peninsula Denmark.

The limestone on Lot 9005 is highly suitable for lime for agriculture and neutralisation of acidity in addition to some road bases. Drilling has been completed and testing of the lime neutralising value carried out.

Location

The proposed excavation lies in the south eastern corner of Lot 9005, set back from the coastal cliffs and Foreshore Reserve (30883) which covers the cliffed slope. It is approximately 10 km south east from Denmark townsite on the Nullaki Peninsula.

To the east lies Reserve 17464, vested in the City of Albany and associated with Lake Saide. The Bibulmum Track runs through the reserve.

Current Land Use

Lot 9005 is covered by remnant coastal vegetation. The proposed quarry site has previously been used for a small limestone quarry to provide limestone for road construction on the subdivided part of the Nullaki Peninsula. The pit has been allowed to partially revegetate.

Minor exploration work has been completed for the existing proposal including the preparation of access tracks and drill platforms.

A predator proof fence runs across the Peninsula on the eastern side of Lot 9005.

Existing Approvals

There are no current approvals.

Proposal

This proposal seeks Development Approval and an Extractive Industries Licence for Agricultural Lime or limestone from Lot 9005.

An application for a 20 year approval is requested.

1.2 Importance and Rationale

Need for Lime for Mitigating Soil Acidity

The importance of the local lime is recognised in the *Department of Agriculture and Food Bulletin 4660, Survey of Western Australia agricultural lime sources*.

Crushed limestone and limesand is an essential resource to the State, for correcting soil acidity caused during normal farming operations through the use of nitrogenous fertiliser and legume crops. The need for crushed limestone for use as agricultural lime is recognised by the *Department of Agriculture and Food (Bulletin 4784)*.

Acidification of soils is seen as one of the major impediments to continued viable farming in Western Australia. The *State Of the Environment Report Western Australia 2007* shows that about two thirds of the South West agricultural soils are at risk of acidification. When the acidity builds up essential nutrients become unavailable to plants, and the crops reduce in vigour and eventually fail. In addition some other elements such as aluminium become soluble and lead to toxicity in stock and plants.

The normal method of treatment of soil acidity is to add agricultural limesand and crushed limestone as explained in *Department of Agriculture and Food Bulletin 4784 Soil Acidity, A guide for WA farmers and consultants.*

Abeysinghe, P B, 1998, *Limestone and Limesand Resources of Western Australia, Geological Survey of Western Australia,* Mineral Resources Bulletin 18, also summarises the uses for limestone and lime and the deposits, but does not list the limestone in this locality.

The need to mitigate soil acidity is also reiterated by the EPA. Acidification of soils is cited by the Environmental Protection Authority (EPA) in Section 3.3 of its *State of the Environment Report* as a serious threat to the sustainability of WA soils and agriculture. The report calls for the increased use of lime sand to combat soil acidification and to arrest the menace of sub-soil acidification and its effects on crops, water quality and native vegetation (EPA 2007).

The limestone is essential to the local agricultural industry, but is restricted in distribution and grade south of Perth and the South West. Whilst limestone is more common a significant part lies within the Conservation Estate. Much of the limestone and calcareous dunes are located within coastal Crown land and Reserves.

Department of Primary Industries and Regional Development have conducted various studies with respect to the need for lime for agriculture and Tim Overheu has provided a letter of support form the Department. The southern agricultural areas currently source their lime from a small pit near Denmark that is located in an A Class Reserve and which is nearing closure. Alternatively limesand has to be sourced from Lancelin. This is explained in the Lower Great Southern Strategy 2016

To be most effective limestone has to be of the highest grade and, whilst coastal calcareous dunes and limestone do contain calcium carbonate the grades are often too low for efficient and economic use. For example using limestone at half the calcium carbonate content will require double the amount to be excavated, leading to additional land clearing, excavation and transport for no greater gain.

The material on site will be crushed and will form smaller particles of lime than limesand and therefore provide quicker and more efficient sources of $CaCO_3$ than non crushed limesand.

Therefore whilst the grade of the limestone and neutralising value is up to 80% it averages around 75% and with blending it offers substantial savings to the southern agricultural regions because of reduced transport costs.

Lime is also required for remediation of acid sulphate conditions which occur on the coastal sands in the Albany Walpole area which have been subject to low lying coastal or estuarine processes. Lime is also required for some industrial processes.

The draft *State Lime Supply Strategy (2008)* advocates the use of known lime resources especially from those sites which have minimal impact on the conservation values of native vegetation and are well-positioned in terms of existing infrastructure to serve the farming and rural communities (DMP 2008). The identification of basic raw materials resources and their staged use is strongly supported in State Planning Policy 2.5, Rural Planning.

The resource has been identified by the Geological Survey of Western Australia which has studied the Limesand and Limestone Resources of Southern Western Australia in Record 2015/7. They did not test the limestone at this location but tested material to the east and at other locations.

The general geology and deposits have been reviewed by the Western Australian Geological Survey and summarised in Abeysinghe 1998.

Some consideration of the use of limestone for agricultural lime and other purposes is shown in the following documents which examine the resources in each area including the availability. The most relevant documents are listed first.

See;

- Geological Survey of Western Australia, 2015, *Limesand and Limestone Resources of Southern Western Australia.*
- Abeysinghe P B, 1998, *Limestone and Limesand Resources of Western Australia*, Geological Survey of Western Australia, Mineral Resources Bulletin 18.
- *Department of Agriculture and Food Bulletin 4660, Survey of Western Australia agricultural lime sources*
- *Department of Agriculture and Food Bulletin 4784 Soil Acidity, A guide for WA farmers and consultants.*

- Geological Survey of Western Australia, 1989, *1 : 50 000 Environmental Geology Series Torbay.*
- Muhling P C and A T Brakel, 1985, *1 : 250 000 Geological Series*, Geological Survey of Western Australia.
- Gozzard J R, 1987, *Limesand and Limestone Resources between Lancelin and Bunbury*, Geol Surv WA, Record 1987/5
- Western Australia, Western Australian Planning Commission*, State Planning Policy 2.4, Basic Raw Materials.*
- Chamber of Commerce and Industry, 1995 and 1996, *Managing the Basic Raw Materials of Perth and the Outer Metropolitan Region*, Parts 1 and 2.
- Chamber of Commerce and Industry, 2008, *Basic Raw Materials Access and Availability*.
- Fetherston J M, 2007, *Dimension Stone in Western Australia*, Volume 1, Department of Mines and Petroleum, Mineral Resources Bulletin 23.
- *WAPC 2012, Basic Raw Materials Demand and Supply Study for the Bunbury - Busselton Region*,

The community need for agricultural lime is indicated by the need for resources to be extracted.

If there was no community demand for limestone as a building product and for agricultural use it would be unlikely that this natural resource would ever be utilised for any other purpose and would have no economic significance.

The resource is strategically located and has the potential to provide raw materials for the lime for 20 plus years.

If the resource is not taken from this site it will have to be taken from another site where similar or more land clearing is required. The depth of sand on this site also minimises the area of farm land or vegetation that is likely to have to be cleared on an alternative site.

1.3 Proponent

The proponent is Graeme Robertson

Contact is

Graeme Robertson
PO Box 114
Denmark WA 6333

1.4 Landholding

Lot	LOT 9005 Nullaki Peninsula, City of Albany

1.5 Description of the Resource

The site covers part of the Nullaki Peninsula on the ocean side of Wilson's Inlet.

A ridge of limestone to 168 metres in elevation occurs on the peninsula with the ocean side eroded to a steep and cliffed coast. Figures 3 and 5

The limestone consists of interbedded limestone varying from calcarenite, a sandy limestone through to limestone. Figures 1 and 2.

There is also some recalcified capstone development on the current and older buried soil horizons.

The limestone ranges up to 80% $CaCO_3$ but ranges lower in some beds and with selection and blending is capable of averaging 75% $CaCO_3$. Due to dissolution of the calcium carbonate the $CaCO_3$ drops inland so that some few hundred metres from the coast the grade is typically 60%, hence the resource is located so close to the coast.

The limestone can be crushed for agricultural lime with the harder material being used for road base. The existing subdivisions on the Nullaki Peninsula are constructed from limestone taken from the site.

The limestone on site changes rapidly laterally and vertically through changes in the original dune morphology as does the degree of lithification (hardness). These changes determine the use to which each type of limestone can be put.

Figure 1 Limestone resource

Figure 2 Limestone resource

Although the resource extends to depth, extraction is likely to be initially limited to 8 metres AHD to provide an undulating and consistent final landform and to be consistent with the lower elevations available on site.

An estimated 20 plus years' limestone resources are present, although this depends on the rate of community demand.

1.6 Aims of the Proposal

A major and increasing environmental issue within Western Australian agriculture is the gradual, widespread and increasing levels of acidic soils, created through the use of nitrogenous fertiliser and the growth of leguminous crops. The agricultural industry of Western Australia is one of the most important to our economy through direct value, value added and employment.

Soil Acidification is a well recognised major environmental issue and is highlighted in the various State of Environment Reports on Western Australia, where it is estimated that 55% of the agricultural land in Western Australia is susceptible to the problem. Soil acidification also causes stock toxicity from some metals (eg aluminium) which move into solution in acidic or low pH conditions.

The trend towards acidification of the soils is unavoidable, because legume rotations are best practise farming, and nitrogen is essential for crop growth.

The only mechanism to counteract the increasing acidity is the application of calcium carbonate. The sources of calcium carbonate are limesand, Tamala Coastal Limestone, or other imported limestones, that have to be treated, or dredged lime/shell sand.

Most coastal areas of coastal Limestone are covered by remnant vegetation or are in areas where they are sterilised by increasing numbers of residents.

The aims of the proposal are to;

- Provide reserves of strategically located limestone, suited to a variety of end products.
- Supply lime to the agricultural industry.
- Provide additional limestone materials for a stable long term supply of limestone products in the Great Southern.
- Comply with State Planning Policy No 2.5 2016 which requires that basic raw materials should be taken prior to sterilisation of the area by development.
- Comply with the Lower Great Southern Strategy 2016.

2.0 EXISTING ENVIRONMENT

2.1 Climate

The climate of the area is classified as Mediterranean with warm summers and cool wet winters.

Temperatures are closest to Denmark Research Station, where the maximum temperatures in the summer months are 23.2 to 25.9 degrees Celsius. In winter the maxima are 16 to 17 degrees Celsius with the minima dropping to around 7 degrees C in July.

Rainfall for the area is approximately 1000 mm with most rain falling during the winter months April to October inclusive.

The wind direction is predominantly from the south.

2.2 Geology and Geomorphology

The site is an eroded high ridge of intebeded sequences of coastal dunes, of limestone 120 to 140 metres, rising to over 160 metres AHD on the highest peaks overlying an undulating Proterozoic granitic basement that outcrops as granite hills in the Denmark - Wilson Inlet area.

The limestone is a calc-arenite made from beach sand containing predominantly shell fragments with minor and variable quartz. The limestone has been lithified and recrystallised on the ridge tops to lift the percentage of calcium carbonate to over 70%. The limestone sequences also include buried soil horizons and recalcified limestone overtopped by younger dunes.

The geology is summarised in;

- Geological Survey of Western Australia, 1989, *1 : 50 000 Environmental Geology Series Torbay.*
- Muhling P C and A T Brakel, 1985, *1 : 250 000 Geological Series*, Geological Survey of Western Australia.
- Smith R A 1993, *1 : 250 000 Hydrogeological Series Mt Barker – Alban,* Department of Minerals and Energy.

The degree of lithification (hardness) changes over the property, and determines the use to which each type of limestone can be put.

The limestone is of Quaternary Age formed during changes to sea level during the Pleistocene.

Bores drilled on site and exposure in the cliffs show variable depths of limestone of over 150 metres thickness.

2.3 Soils

Soils on the site consist predominantly of grey organic sands in the swales over limestone with white to cream limey sands on the youngest dunes and surfaces.

The soils have been mapped at a very broad scale by CSIRO who categorise them with leached sands, but that is not locally correct.

The soil profile can be seen in the site photographs. Figures 1 and 2.

Figure 3 View west across the proposed quarry in the foreground

Figure 4 View north from the proposed excavation area

Figure 5 View east along the coast onto Reserve 30883

2.4 Hydrogeology

The site lies in the Albany Drainage District.

There is no surface drainage due to the porosity and permeability of the limestone, with precipitation draining to the water table.

The limestone coastal ridge is 120 to 140 metres, rising to over 160 metres AHD on the peak ridges. The proposed limestone quarry is located on the higher ground.

Smith R A 1993, *1 : 250 000 Hydrogeological Series Mt Barker – Albany,* Department of Minerals and Energy does not show the direction of groundwater movement.

Being so close to the ocean the groundwater elevation will be around zero, rising slightly under Nullaki Peninsula and then dropping down again to the north at Wilson Inlet.

The groundwater under the excavation area can be expected to be 0 – 1 metre AHD in elevation. Groundwater flow from under the pit will be towards the ocean to the south.

That means that the separation to groundwater from excavation activities will be over 140 metres.

The stockpile area will be located in the pit.

It has been estimated that perhaps <10 - 20 % of the rainfall will reach the water table at the processing area with slightly less at the ridge based on the separation to the water table.

2.5 Flora

A detailed Flora and Vegetation Study has been completed by Bio Diverse Solutions specifically covering the proposed excavation area. Kathryn Kinear completed the survey to map the vegetation communities, weeds and dieback to a Level 1 Flora Survey.

> Bio Diverse Solutions, 2016, *Vegetation Communities Survey, Lot 9005, Rock Cliff Circle, Denmark.*

A copy of the Vegetation Survey is attached.

A Flora and Vegetation Study has been completed for the Lee Road extension by Biodiverse Solutions.

> Bio Diverse Solutions, 2017, *Level 1 Flora and Vegetation Survey Report, Proposed Alignment Youngs Siding WA 6330.*

The site is within the Southwest Botanical Province and lies on the eastern part of the Warren Interim Bio-geographic Regional Area (IBRA) which extends east and west along the coast.

Limestone Ridge Vegetation

The limestone ridge vegetation is classified as Open Heath which on the excavation area consists of generally low Scrub without the taller species that grow in more sheltered locations.

Lifeform	Species
Trees <10m	*Agonis flexuosa*
Shrubs >2m	*Agonis flexuosa, Agonis theiformis, Acacia cyclops, Spyridium globulosum* and *Hakea varia.*
Shrubs 1-2m	*Allocasuarina humilis, Pteridium esculentum, Jacksonia horrida, Pultenaea reticulata* and *Xanthorrhoea preissii*
Shrubs 0.5-1m	*Hibbertia cuneiformis, Hibbertia racemosa, Leucopogon obovatus, Leucopogon parviflorus, Leucopogon propinquus, Lysinema ciliatum, Pimelea clavata, Pimelea rosea subsp. rosea, Anigozanthos flavidus, Hakea prostrata, Adenanthos cuneatus* and *Xanthorhoea gracilis*
Shrubs <0.5m	*Rhagodia baccata subsp. baccata, Andersonia caerulea, Gompholobium confertum, Boronia crenulata* and *Synaphea sp.*
Sedges and rushes	*Lyginia imberbis, Lyginia barbata, Lepidosperma squamatum, Tetraria octandra, Desmocladus flexuosus* and *Hypolaena exsulca*
Herbs and grasses	*Carpobrotus sp., Platysace compressa, Trachymene pilosa, Chamaescilla corymbosa, Drosera erythrogyne,* and *Opercularia hispidula*

Bio Diverse Solutions

Figure 6 Typical vegetation of the resource area

Figure 7 Typical vegetation of the resource area

- ***Species***

During the flora and vegetation survey a total of 112 native and 9 introduced species were observed. A species list is provided in the attached flora and vegetation report. 75 native species were identified along the Lee Road alignment with a further 11 introduced species.

- ***Vegetation Communities***

Bio Diverse Solutions broadly mapped the vegetation across the excavation area as Open Heath in Pristine Condition.

- ***Vegetation Condition***

Because of the previous excavation, and earthworks associated with exploration for the limestone, the vegetation is better shown as partially degraded, being degraded where cleared and pristine in uncleared areas.

Very few weed species were recorded and none were noticed on the proposed quarry site by Landform Research in May 2016.

Bio Diverse Solutions did not find any evidence of plant diseases.

- ***Threatened and Priority Species***

A search of NatureMap and the EPBC database was completed by Landform Research and is attached with the Flora and Vegstation Survey.

No Threatened taxa were recorded by Bio Diverse Solutions. Two Priority species were recorded across the whole study area by Bio Diverse Solutions, *Billardiera drummondii* and *Banksia sessilis* var *cordata*. In the 2017 study Bio Diverse Solutions found that there were 24 Threatened or Priority species listed on databases as occurring within a radius of 10 km.

Billardiera drummondii grows in Eucalypt Woodland and is less likely on the quarry footprint. The taxa currently has no priority listing on Florabase 2016-06-08.

Banksia sessilis var *cordata* (P4) grows on coastal limestone and may be present.

NatureMap lists *Gahnia sclerioides* (P4) as occurring within 10 km growing on moist sandy soils which are less likely on the disturbance areas.

Sphaerolobium calcicola (P3) as occurring within 10 km and may occur in sand over limestone.

Isopogon buxifolius var *buxifolius* is listed as occurring within 10 km but is unlikely to be present as it occurs in swampy areas.

Targeted Threatened and Priority searches are proposed to be conducted in spring.

- ***Threatened and Priority Communities***

No Threatened or Priority Ecological Community was recorded.

Vegetation Representation

EPA Position Statement No 2, December 2000, *Environmental Protection of Native Vegetation in Western Australia*, specifically targets the retention of native vegetation in the Agricultural Areas in 4.1, Clearing in the agricultural areas for agricultural purposes. In 4.3, Clearing in other areas of Western Australia, it is unclear what "other areas" refers to, but may refer to retention of a 30% threshold in non agricultural areas.

Section 4.3 Clearing in other areas of Western Australia, (*EPA Position Statement No 2*, December 2000) expects that clearing will not take vegetation types below the 30% of the pre-clearing vegetation as recommended by ANZECC, 1999, *National Framework for the Management and Monitoring of Australia's Native Vegetation*. The National Objectives and Targets for Biodiversity Conservation 2001 - 2005 (Commonwealth of Australia 2001) also recognise 30% as the trigger value.

The area of ground open at any one time is very small compared to the large expanse of similar coastal along the Nullaki Peninsula and nearby coast, most of which is protected in Reserves 1764 and 26177.

The nearby vegetation of similar communities in excellent condition totals over 6 500 hectares. The 4 hectares open at any one time represents just 0.06%.

At the end of excavation the site will be rehabilitated as shown by rehabilitation of other limestone pits including the old road base pit on site, where rehabilitation was effective with no weeds or disease.

2.6 Fauna

A fauna study was not conducted because the resource area represents a very small area within a large area of remnant vegetation with a small area only open at any one time.

A search of NatureMap and the EPBC database was completed by Landform Research and includes the fauna listed within the City of Albany and recorded within 10 km and is attached with the Flora and Vegetation Survey.

The small area of proposed disturbances and the large connectivity remaining in place will not cause any isolation of short range fauna.

The Nullaki Peninsula is protected by a predator proof fence to keep out cats and foxes in particular. The exclusion of these predators forms a significant protection measure for fauna which are advantaged by living within the protected zone. The protection fence is to remain in place.

Main's Assassin Spider *Zepharchaea mainae*, a listed Threatened species has been recorded within 10 km of the project area. Melanie Price of Aurora Great Southern Office noted in a witness statement related to the project that Mains Assassin Spider favours Peppermint (Agonis flexuosa) coastal habitats with sedge (*Lepidosperma* and Restionaceae) understorey which is not located on the project area.

Stygofauna and Troglofauna

The potential presence of cavities within the limestone has been considered by Lindsay Stephens of Landform Research during the site inspection.

EPA Guidance 54, concentrates on Stygofauna, which occur in caves and "are aquatic subterranean animals, found in a variety of groundwater systems". Environmental Protection Authority, 2013, *Consideration of subterranean fauna in environmental impact assessment in Western Australia* relates to the level of survey. On the limestone ridge a reconnaissance survey was completed by Lindsay Stephens of Landform Research during the site inspection.

The limestone ridge is not an isolated habitat, but is a very small portion of a long stretch of similar limestone based coast extending to the east and west. The limestone is Quaternary and therefore young in age with little to no calcrete development. The limestone is also likely to be too young to form significant cavities at the water table.

"Troglofauna occur in air chambers in underground caves or smaller voids".

The issues of these organisms is best addressed on a risks basis, because the water table is not proposed to be impacted, on with the base of the pit being approximately 140 metres above the water table. The stockpile area is approximately 15 metres above the water table.

Root mat communities are not known from this area and are unlikely to be present becaue the local geology, regolith and vegetation do not meet the criteria for their occurrence.

2.7 Wetlands

There are no nearby wetlands. Lake Saide lies to the north east – east surrounded by farmland. The access route will travel on local roads but not near the lake where the transport could impact on the wetland buffer.

3.0 PLANNING ISSUES

3.1 Current Land use

Lot 9005 is covered by remnant coastal vegetation. The proposed quarry site has previously been used for a small limestone quarry to provide limestone for road construction on the subdivided part of the Nullaki Peninsula. The pit has partially been revegetated.

Minor exploration work has been completed for the existing proposal including the preparation of access tracks and drill platforms.

A predator proof fence runs across the Peninsula on the eastern side of Lot 9005.
facilities.

3.2 Land Zonings and Policies

State Planning Policies

The State Planning Policy Framework provides for the implementation of a planning framework through the recognition and implementation of Regional Planning Policies above Local Planning Schemes and Policies.

Within each layer of planning, there are a number of key policies and strategies to provide guidance to planning and development to enable sustainable communities to develop, expand and prosper without compromising the environment and future generations.

Planning is governed under the *Planning and Development Act 2005.* This Act enables Government to introduce State and Regional Planning Schemes, Policies and Strategies to provide direction for future planning. The State and Regional Schemes sit above Town Planning Schemes and Strategies introduced by Local Government.

Strategies and Policies provide guidance on how planning is to be undertaken and how proposed developments are to be considered. These Strategies and Policies are at the State, Regional and Local levels.

Schemes are gazetted documents that provide for consideration and approval of proposed developments. These are normally at the Regional and Local Level.

In addition to the documents produced under the *Planning and Development Act 2005,* the *Local Government Act 1995* provides Local Governments with a mechanism to prepare Local Laws to manage issues of local significance.

Some policies do have relevance such as the State Industrial Buffer Policy and Basic Raw Materials Policy.

With respect to the supply of sand and limestone, the overarching document is the;

- State Planning Policy 1.0 State Planning Framework.

Complementing this are a number of Relevant State Policies;

- State Planning Policy 2.0, Environment and Natural Resources Policy
- State Planning Policy 2.4, Basic Raw Materials
- State Planning Policy 4.1, State Industrial Buffer Policy

- ***State Planning Policy 2.0, Environment and Natural Resources Policy***

This policy provides for the protection of all natural resources under a number of sections;

5.1 General Measures
5.2 Water Quality including stormwater and wetlands
5.3 Air Quality
5.4 Soil and Land Quality
5.5 Biodiversity
5.6 Agricultural Land and Rangelands
5.7 Minerals Petroleum and Basic Raw Materials
5.8 Marine Resources and Aquaculture
5.9 Landscape
5.10 Greenhouse Gas Emissions and Energy Efficiency.

In addition to recognising the importance of protecting air quality, soil and land quality, water and wetlands and landscapes, the importance of Basic Raw Materials to the community is identified with reference to *SPP 2.4 Basic Raw Materials*, *State Gravel Strategy 1998* and *State Lime Strategy 2001*.

Section 5.7 of SPP 2.0, deals with Minerals, Petroleum and Basic Raw Materials.

Part of Section 5.7 states;

> *Basic raw materials include sand, clay, hard rock, limestone and gravel together with other construction and road building requirements. A ready supply of basic raw materials close to development 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:*
>
> *ii. Identify and protect important basic raw materials and provide for their extraction and use in accordance with State Planning Policy No 10 (2.4); Basic Raw Materials.*
>
> *iii. Support sequencing of uses where appropriate to maximise options and resultant benefits to community and the environment.*

The other factors of the natural environment are provided with the best protection possible, by this management plan, by selection of the site, operational staging and footprint and rehabilitation, bearing in mind the constraints of excavating and processing the resource.

- ***State Planning Policy 2.4, Basic Raw Materials, 2000***

This policy makes many statements on the intent and actions which local authorities should use to protect and manage basic raw materials. It is restricted to the Perth and Peel Region but is the leading document with respect to guidance on the protection and staged use of basic raw materials including limestone.

Section 3.4 is very specific in explaining that basic raw materials need identification and protection because of increased urban expansion and conservation measures, (3.4.1), (3.4.2) and (3.4.4). Sections 3.4.5 and 3.4.6 recognise that environmental and amenity matters need to be considered.

There are specific provisions in Section 6.2 Local Planning Scheme Provisions, such as;

> *No support for the prohibition of extractive industries in zones that permit broad rural land uses.*
>
> *Providing an appropriate P, D or A use.*
>
> *Not precluding the extraction of basic raw materials on land which is not identified as a Priority Resource Location, Key Extraction Area* or Extraction Area (6.4.2).

- ***SPP 2.5 –Rural Planning 2016***

SPP 2.5 Rural Planning 2016 predominantly deals with the continued rural use of suitable land and its protection for the future. The policy was updated in December 2016 and provides strong measures to identify, protect and use basic raw materials.

SPP 2.5 does reiterate the need to protect and use basic raw materials.

Basic Raw Materials are included in the definitions as

> *Sand (including silica sand), clay, hard rock, limestone (including metalurgical limestone), agricultural lime, gravel, gypsum, and other construction 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.*

Amongst seeking to protect agricultural values, Policy Objective 4 (c) states

> *Outside the Perth and Peel Planning regions, secure significant basic raw material resources and provide for their extraction.*

Section 5.9 deals with Basic Raw Materials and seeks to achieve the following in an environmentally acceptable manner;

> *Protect the resources until the resource is extracted (5.9.a)*
>
> *Identify significant basic raw materials on sub-regional and local planning strategies, region and local planning schemes (5.9.b, 5.9.c, 5.9.d)*

The extraction of basic raw materials should not be generally prohibited (5.9.e)

Provide for sequential land use (5.9.f)

Limit sensitive land uses to locations demonstrated to not limit existing or potential extraction of basic raw materials (5.9.g)

Provide for the consideration of native vegetation or significant biodiversity values and may require retention and protection of vegetation and environmental assets (5.9.h)

Have regard for the potential impacts of fragmentation and connectivity of native vegetation (5.9.i)

Maintain adequate buffers to protect water quality in public drinking water source areas (5.9j).

SPP 2.5 also supports preventing conflicting land uses (5.12.1), supports the generic buffers recommended by other Government documents such as the EPA Guidelines for separation distances (5.12.3), and seeks to restrict subdivision from impinging on basic raw material resources.

The Policy is also supported by Guidelines that seek to protect the Landscape and secure Transport Routes.

- ***State Planning Policy No 4.1, State Industrial Buffer Policy***

SPP 4.1 discusses the need to consider adjoining land uses when locating buffers but does not prescribe set buffers for operations such as this. The development and processing of the resource has been designed to maintain maximum buffer distances. In situations where the buffers are less, actions such as the provision of perimeter bunding to provide visual and noise management, tree planting and operational procedures, are used to mitigate and reduce impacts.

This is discussed further in Section 2.8.1 Surrounding Landuses and 3.10 Buffers of this document.

- ***State Planning Strategy, 1997***

The Western Australian Planning Commission (WAPC) released the *State Planning Strategy in 1997*. It comprises a range of strategies, actions, policies and plans to guide the planning and development of regional and local areas in Western Australia and assists in achieving a coordinated response to the planning challenges and issues of the future by State and Local Governments.

The State Planning Strategy contains the following five key principles. These are:

- Environment & resources: to protect and enhance the key natural and cultural assets of the State and to deliver to all Western Australians a high quality of life which is based on sound environmentally sustainable principles.

- Community: to respond to social changes and facilitate the creation of vibrant, accessible, safe and self-reliant communities.

- Economy: to actively assist in the creation of regional wealth, support the development of new industries and encourage economic activity in accordance with sustainable development principles.

- Infrastructure: to facilitate strategic development of regional Western Australia by taking account of the special assets and accommodating the individual requirements of each region.

- Regional Development: to assist the development of regional Western Australia by taking account of the special assets and accommodating the individual requirements of each region.

- **Lower Great Southern Strategy 2016**

The Lower Great Southern Strategy, in Section 2.9 Mineral Resources and Basic Raw Materials, supports the identification and staged use of basic raw materials and minerals.

The issues of agricultural lime are specifically mentioned in the Strategy, in relation to the existing limestone quarry at Denmark, being in an environmentally sensitive area and the need for a new resource.

This proposal has the potential to supply agricultural lime for the future.

2.9.2 Securing access to prospective mineral and basic raw material deposits

Limestone and lime sand are located along the coastal dunes, predominantly to the west of Albany, but access to extract from those areas is increasingly becoming constrained by other land uses. For example, extensions to the Ocean Beach limestone quarry at Denmark could provide long-term supplies of agricultural lime, but this is impeded by its location adjacent to a local government conservation reserve. Although there are other known deposits to the west, these are on private land and scope for mining is regarded as low by the Department of Mines and Petroleum.

Geological interpretation and exploration may locate further sites for agricultural lime extraction similar in geological setting to the Ocean Beach deposit. Given the need for agricultural lime in the agricultural industry, funding of a strategic assessment of the prospect under the auspices of the State lime supply strategy is warranted.

Objectives and Actions for Mineral Resources and Basic Raw Materials			
Objective	**Actions**	**Timeframe**	**Responsibility**
Maximise opportunities to enable mineral exploration and extraction in accordance with acceptable environmental and amenity standards	Review and update the Albany Regional Basic Raw Materials Study (1996)	Medium term	DMP DoP/WAPC
	Ascertain the implications of the Walpole Wilderness Area for the future mining and extraction of gravel, under the auspices of the State gravel supply strategy	Medium term	DMP DPaW
	Fund a strategic assessment of the prospect for limestone in the Lower Great Southern, under the auspices of the State lime strategy	Medium term	DMP
	Identify existing and potential sites for basic raw material and agricultural mineral extraction in local planning strategies and protect them in local planning schemes, including consideration of neighbouring land uses, visual impact issues and buffer areas where necessary	Short term (completed or partially completed in some LGA's)	LG DMP DoP/WAPC
	Retain areas of high prospective geology as general rural zoning to allow for exploration or extraction	Ongoing	LG DoP/WAPC

- **Western Australian Geological Survey**

The Western Australian Geological Survey has produced new mapping identifying Strategically Important Basic Raw Materials across private land and State Forest.

This mapping is being extended to the Great Southern Region.

Local Government Planning Documents

- ***City of Albany Local Planning Scheme No 1***

The site is zoned Conservation under the City of Albany Local Planning Scheme. However the past excavation and success of rehabilitation has demonstrated that the limestone can be extracted and the land returned to conservation.

The Objectives of the zone do not mention extraction or basic raw materials and do not prohibit development as long as it is completed in a ecologically sensitive manner.

The proposed quarry is selected and designed to minimise impacts, with the past excavation and rehabilitation demonstrating that excavated land can be returned to high quality native vegetation that preserves the conservation values.

Extractive Industries are a use “Not Listed” in the Zoning Table, thereby providing the City with potential to approve the development. Any developments are to conform with Section 5.5.14 of the Town Planning Scheme.

Again Section 5.5.14 does not address Extractive Industries but does carry a number of requirements for developments. The proposed operations are consistent with the intent and provisions of Section 5.5.14.

- ***City of Albany Policy Extractive Industries and Mining***

The City of Albany Extractive Industries and Mining Policy prescribes the informaiton required for applications for extractive industries.

This management plan complies with the Policy.

A survey can be completed as a condition of approval when the land can be accurately surveyed and pegs installed to ensure that the approved footprints are complied with.

3.3 End Use

The planned end use of the site is to restore a natural soil and return the ridge to native vegetation and conservation.

3.4 Responsible Authorities

A number of state and local government authorities are responsible for overseeing the safety and management of the proposed quarry. Other authorities have an interest in the proposal but may not hold any responsibility.

City of Albany

- Provides Planning Consent.
- Issues the Extractives Industries Licence for the quarry.
- Regulates land zonings in conjunction with the Western Australian Planning Commission.
- Has control over local roads.

Main Roads

- Has an interest in the transport routes and controls major roads.

Department of Water Environment Regulation - Water

- Issues guidelines for water quality management for extractive industries.
- Oversees protection of groundwater and water courses.

Department of Water Environment Regulation - Licensing

- Oversees all aspects of environmental impact and management.
- Issues licences for crushing and screening plants.
- Has an interest in the flora and fauna of the area.
- Provides Approval for clearing under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004.*

Western Australian Planning Commission

- Responsible for structure plans.
- Responsible for State Planning Policies.
- Responsible with the Shire for land zoning.
- Responsible for State Planning Policy No 2.5, Rural Planning 2016.

Environmental Protection Authority

- Oversees the potential for significant environmental impacts on environmental matters. The EPA has determined that the proposal does not constitute a significant environmental impact and can be determined under the normal assessment processes under the *Environmental Act 1986* and the planning processes.

Department of Mines Industry Regulation and Safety

- Controls the safety and methods of excavation through the *Mines Safety and Inspection Act 1994.*
- Responsible for overseeing the health and safety of the operations and the administration of the *Mines Safety and Inspection Act 1994 and Regulations 1995.*

Department of Planning Land and Heritage

- Oversees the *Native Title Amendment Act* and the *Aboriginal Heritage Act 1972 - 1980*.

Commonwealth of Australia

- Oversees the potential for impacts on matters listed under the *EPBC Act 1999*.
- No matters of significance under the *EPBC Act 1999* were identified.

3.5 Social Impacts

The main protential social impacts are to perceived local recreation values and the need for lime for agriculture.

Bibbulmun Track

The Bibbulmun walking track runs from Albany in the east before swinging north prior to the eastern boundary of Lot 9005. The track is generally located some 400 metres from the limestone pit.

The track lies in heathland that is often higher than a person, making the excavation area difficult to see. The excavation area is designed to be excavated from the west to the east and to the north, working behind the vegetated eastern and northern faces which will assist in minimising or eliminating any visual impact of the pit from the Bibbulmun Track.

The Bibbulmun Track will cross Lee road. Signs and warning barriers will be used at the crossing point similar to other road crossings. Fred Wallfeld and Sam Laybutt have agreed in their conferrals as part of the State Administrative Tribunal Appeal process that the potential impact on the Bibbulmun Track “is likely to be acceptable”.

There is no access from the reserve land to the east, because of the private ownership of Lot 9005 and the tall separating predator proof fence.

The Bibbulmun Track as not regarded as a noise sensitive premises under the Noise Regulations and this has been confirmed by discussions with Herring Storer Acoustics 2018 .

Munda Biddi Trail

The Munda Biddi Trail, is coincident with 2.75 km of Lake Saide Road. Fred Wallfeld and Sam Laybutt have agreed that any potential impact on the Munda Biddi Trail “is likely to be acceptable”.

Nullaki Campsite

The Nullaki Campsite is located to the north west of the site, near the Lees Road extension. It is unclear whether the site, which lies over 1000 metres from the pit, constitutes a noise sensitive premises.

The main potential impacts might be truck movements on Lot 9005 because traffic on a public road is exempt from the Noise Regulations. A Noise study by Herring Storer Acoustics 2018 (attached to this Management Plan) found that the operations will comply with the Noise Regulations, and in particular at the Nullaki Campsite for the design 14 laden truck movements per day, noting that the anticipated average number of truck movements is 10 per day.

4.0 QUARRYING OPERATIONS

The proposed methods of excavation will be the same as those used on the existing limestone pits used for agriculture lime.

The site was previously used for limestone extraction for road base and a small rehabilitated pit is located on site. Access roads, exploration holes and drill pads are on site.

Limestone will predominantly be used for agriculture, although road base and minor other products will be produced as the higher grade material becomes exhausted. The taking of road base is more likely to be a second phase of excavation by another operator after all the limestone suitable for agriculture has been taken.

Quarry operations will be carried out under the *Mines Safety and Inspection Act 1994 and Regulations 1995.*

Environmental issues including dust, noise and traffic can be managed in such a way to minimise or eliminate any significant impact both on site and offsite. Dust and noise can be contained by the methods of extraction to be used and the control measures, which will be put into place. Measures to protect the site and minimise the influence of dieback are addressed under Environmental Management.

Overall the proposed pit is well isolated from any sensitive premises with none within 1 km.

Project Summary

ASPECT	PROPOSAL CHARACTERISTIC
EXCAVATION	
Area of proposed new excavation	Proposed Pit – 8.0 hectares in three stages of about 4.0 hectares followed by 2.0 ha and 2.0 ha.
Limestone extraction	Initially 20 000 tonnes per year rising to potentially 50 000 tonnes.
Total estimated resource	Limestone - approximately 1 000 000 tonnes.
Life of project	20 years
Area cleared per year for pit	Initially about 4.0 hectares to provide an operational area and then 0.5 hectares – per year depending on the elevation of the ridge.
Total area to be cleared	8.0 hectares in proposed pit.. In addition around 1.72 hectares along the Lees Road Reserve with edge trimming along the other road transport route.
Area mined per year	0.5 hectares approx.
Dewatering requirements	None
Maximum depth of excavations	Initially limited to 8 metres
PROCESSING	
Limestone	Same as the amount extracted.
Water requirements	Only required for dust suppression in excessively dusty situations, on site transport and processing. The limestone will be moist when extracted and will not need dust suppression. Water will often clog the processing plant if excessive, therefore misting will be used
Water supply source	Local sump on Lot 9005.
INFRASTRUCTURE	
Total area of plant and stock	Mobile plant will be used, located within excavation footprint. It will be located on the floor of the pit and be moved from time to time and at the commencement of each yearly campaign.
Area of settling ponds	Not required

Fuel storage	Not required, mobile tankers will be used
TRANSPORT	
Truck movements	Variable but approximately 10 laden trucks per day maximum depending on the volumes of limestone extracted. Based on a 40 tonne load and 50 000 tonnes per year. Upgrades to the transport network are based on 14 laden truck movements per day.
Access	
WORKFORCE	
Construction	2 - 3
Operation	2 - 3
Hours of operation	Monday - Saturday 6.30 am to 5.00 pm excluding public holidays. Predominantly Summer and Autumn for around 4 months within December to April with smaller amounts at other times of the year to fill contracts

4.1 Limestone Extraction

1. Vegetation cleared will be utilised for rehabilitation of the completed pit. See Section 5.9 Rehabilitation.

2. An Application for Clearing will be required with this application to cover the remnant vegetation on site. A Clearing Permit will be applied for to cover the clearing of the proposal area, and the transport route.

3. The excavation footprint has been determined from Landgate and Nearmap contour mapping and digital elevation models, field mapping, drilling and sampling, combined with detailed aerial photography

4. In the intial clearing phase of the proposal, vegetation cover will be removed by pushing it into windrows for use on the batters and rehabilitation areas, to minimise soil erosion and assist spreading on the final land surface as part of the final rehabilitation. This will be located in the approved pit footprint.

5. During the remainder of the project, where practicable, vegetation will be directly transferred to an area being rehabilitated. Smaller indigenous shrub material will be used in the rehabilitation process when available and suitable; for example on batter slopes of completed areas.

6. If direct transfer is not possible the vegetation will be stored in dumps, mulched or swapped with a nearby operator to try and ensure that the material is not wasted.

7. All topsoil will be removed for spreading directly onto areas to be revegetated and screening or perimeter bunds. If direct spreading is not possible the top soil will be stored in low dumps, for spreading at a later date. See 5.9.2 Rehabilitation Procedures.

8. Soil and overburden, as dark grey to black sand and low grade limestone, will then be removed and either directly transferred to a rehabilitation area or stored in low dumps for later rehabilitation use. Where this is not used overburden will be stored in dumps for future use in rehabilitation or the creation of bunds.

9. Limestone interburden, if encountered, will be incorporated into the overburden dumps for later use in re-contouring the land surface at the conclusion of excavation.

10. The limestone is relatively soft and can be removed with an excavator or loader without the need for a bulldozer or blasting. On occasions it may be safer for a bulldozer to be used.

11. A bulldozer may be used to rip and push the limestone down the excavation face and track roll the limestone in the process if the limestone becomes hard, or to increase levels of safety.

12. The preliminary crushed limestone will then be picked up by a rubber tyred loader and fed to the mobile crusher.

13. Excavation will commence on the southern slope, behind the ridge, working north and east on the floor of the pit behind the faces to prevent visual impact.

14. Upon completion of each section of quarry the excavated section will be reformed and back filled, where subgrade material is available, to achieve the proposed final contours which will replicate an undulating pre-mined Landform.

15. It is not anticipated that blasting will be required.

16. At the end of excavation the floor of the quarry will be progressively deep ripped, covered by overburden and top soil, and rehabilitated to a constructed soil. Details of the Rehabilitation are listed under 5.9 Rehabilitation.

Processing

All screening and crushing equipment is portable and brought to the site as needed. The necessary Licences for the equipment will be obtained from the Department of Water Environment Regulation for all plant used on site as required.

A mobile crushing and screening plant will be used to break down the limestone to small fragments to increase the surface area and make the material more readily soluble when applied to agricultural land.

All static and other equipment, such as crushers and screens (where used), will be located on the floor of the quarry to provide visual and acoustic screening.

All stockpiles will be located on the floor of the active pit.

4.2 Staging and Timing

The excavation footprint has been determined from Landgate contour mapping, Nearmap elevation modelling and detailed aerial photography. A staging plan is attached and shows indicative staging and the direction of excavation being from the south to the north to provide visual protection from Denmark and nearby properties.

At this stage it is difficult to predict the speed of excavation because the amount of material extracted depends on market conditions. Staging will be a first stage pit of 4.0 hectares that will be large enough for processing and stockpiles. When that stage is nearly exhausted a second stage of 2.0 hectares will be moved onto and as much ground as possible in the first stage rehabilitated. A further 2.0 hectare third stage is proposed following the second stage.

It is expected that the quarry will progress by up to 0.5 hectare per year. Over twenty year's of resource is anticipated to be available on site.

Extraction may commence slowly (as it is subject to demand) however it is anticipated that approximately 20 000 tonnes of limestone be extracted per year in the early years rising to the project's specified maximum of 50 000tonnes.

Limestone extraction will generally only be for about four months during the summer and autumn months for agricultural lime. Actual quantities will depend on the type and size of contracts won, and sales. It may be more efficient to provide a year round operation, making road bases in the off season for agricutlural lime. Smaller amounts of limestone will be extracted and transported at other times to fill specific contracts.

Depth is anticipated to be 8 metres, but higher grade limestone may extend to depth in places.

The active area needs to be large to enable a range of limestone products to be available at all times, and to provide sufficient area for processing/screening and for stockpiles.

Wherever possible all completed ground will be rehabilitated as soon as possible to ensure that the amount of ground that is open at any one time is minimised. The nature of the excavation means that it will be difficult to commence rehabilitation of the floor of the quarry until the underlying limestone has been removed.

4.3 Hours of Operation

Hours of operation will be 7.00 am to 5.00 pm Monday to Saturday inclusive, excluding public holidays.

Transporting material on Saturday is requested to enable farmers to access lime in the autumn period prior to sowing their crops.

4.4 Access Transport and Security

Transport and access to the site and management of the trucks will be addressed in the Traffic Management Plan.

Access to the site will be from Lower Denmark Road Saide Lake Road, Browns Road and Lees Road which will be extended along the existing reserves to Lot 9005.

From there access to the pit will be along the existing single lane fire break, that is formed on the access road that was used for the earlier pit on site. This road may require a small amount of edge trimming as only one truck at a time will be permitted to use the road.

The gradient for road trucks on gravel/limestone roads is normally 1 : 10 vertical to horizontal. The small areas of steeper slopes on the access road will be reduced in elevation to 1 : 10 or even 1 : 8 vertical to horizontal to vertical.

It is noted that only empty trucks will climb the hill with the laden trucks rolling down the hill which will minimise the amount of revving of the motors. Air/compression brakes will not be permitted except in emergency, with trucks leaving in low gear

Road trucks will access the pit one at a time to collect a load of limestone from the stockpiles, with regulation of the truck movements controlled by radio contact with the loader driver in the pit and other trucks.

A parking area will be established at a slightly wider section on the existing access road/fire break, where trucks will park, switch their engines off and wait until they are able to access the pit for loading.

The existing perimeter predator proof fences and gates will be maintained. Warning signs will be maintained as required by the Department of Mines Industry Regulation and Safety and the City of Albany.

The proponent will liaise with the City of Albany with respect to the access and road transport. See Section 4.9 Transport Corridors.

4.5 Equipment

All static and operational equipment will work on the quarry floor to provide maximum sound and visual screening.

Site office	A mobile or transportable office may be required at the stockpile area.
Toilet system	Portable serviced system will be used.
Bulldozer	Removal of limestone rubble and road base, track crushing of limestone as required and pushing down the resource on steeper slopes and where it is more efficient or the limestone is harder.
Excavator	Will normally be used to remove limestone.
Crushing and Screening plant	Preparation of road base and agricultural lime using mobile crushing and screening plant.
Water tanker	Used for dust suppression on the access roads and working floors as necessary. Not likely to be required for most of the year or at all.
Loader	Loading and handling materials from the stockpiles.
Fuel Storage	Refuelling will be undertaken using mobile tankers from Albany or Denmark.

4.6 Final Contours

The slope of the final contours of the proposed pit is an undulating surface at around 8 metres below the existing land surface

Slopes of the batters at the end of excavation will be retained at between 1 : 2 to 1 : 4 vertical to horizontal which has been demonstrated by past excavation to be stable and able to be rehabilitated.

4.7 Workforce

The workforce will vary, depending on the level of operation and market demands, but usually 2 to 3 persons can be expected to be working on site.

4.8 Water Usage

Water is unlikely to be required for dust suppression, apart from dry summer times on active areas such as the stockpile area.

The limestone will stay moist when excavated and crushed and screened.

It is not anticipated that water will be required for dust suppression because of the location and climate with rainfall through all months.

However a contingency remains for excavation and processing which will be carried out as required during drier weather. A water tanker will be used to water the access road, stockpile area and the pit floor whenever necessary to minimise dust generation from transport and during crushing. Crushing will use misting and consider the restricted operational times and the local climate, normally only small volumes of water will be used for a quarry of this type. A quarry could be expected to require less than 5 000 kL per year.

Water will be drawn from a sump located on the Nullaki Peninsula A licence from Department of Water Environment Regulation will be applied for to enable the taking of up to 5 000 kL water per year for dust suppression if required. If this is not available water will be brought to the site as required.

Potable water will be brought to the site as required.

4.9 Transport Corridors

Lime products are to be mostly transported from this site through summer and autumn for some 4 months in December to April.

Access to the site will be from Lower Denmark Road to Lake Saide Road, Browns Road and Lees Road and then along road reserve to Lot 9005. The public roads to be used are just under 8.0 kilometres in length.

There are few dwellings and those that do occur are set well back from the road.

There appear to be two dwellings near the sealed section of Lake Saide Road, with a further two to three dwellings along the gravel section of the road network with only one close to the road.

Traffic volumes along the access road are anticipated to be around ten laden truck movements per day for up to 50 000 tonnes of material. Normally the trucks transport agricultural lime first thing in the morning with a smaller number around lunchtime depending on the transport distance.

When transporting limestone road base to local areas there may be more movements at the non peak times.That means in general there is little potential to conflict with traffic for schools.

It is anticipated that most trucks will have a capacity of around 40 tonnes and these have been used for the consideration of potential impacts. These are the most efficient long distance transport, being pocket road trains which are used by most cartage contractors although other trucks may access the site depending on the contractor and the type of product carried; such as semi-trailers or rigid (8) wheeler trucks to a 5 axle dog trailerAt times when road making materials are being transported from the site the number of truck movements may be greater.

Lake Saide Road is sealed to Thompson Road and then unsealed. Other access roads are narrow and will require upgrade. Roads will be widened and progressively sealed.

Although the average number of trucks is anticipated to be 10 laden trucks (small road trains), the design of the road is based on 14 laden truck movements per day up to a maximum volume of 50 000 tonnes annually.

A detailed and thorough road assessment has been conducted by Sam Laybutt of Cardno (WA) Pty Ltd on behalf of the City of Albany. The proponent is committed to comply with the provisions of the transport and road assessment with the roads to be upgraded in a staged manner.

The proponent is committed to;

- Preparing a Traffic Management Plan to cover staged upgrade of the road network, and the management of traffic along it.
- Working with the City of Albany with respect to design, upgrade and maintenance of the transport route.
- Working with any school bus contractor to ensure that there are no conflicts
- Providing self imposed speed limits for various sections of the transport route, by way of driver education and exclusion for non compliant drivers.
- Excluding the use of compression brakes apart from an emergency.
- Providing for the staged upgrades recommended by Cardno (WA) Pty Ltd as generally outlined below.

The staged road upgrades are summarised below.

The initial upgrades will be to enable 20 000 tonnes of limestone to be transported per year. Prior to the transport of >20 000 tonnes of limestone the further upgrades for the 50 000 tonne scenario will be carried out.

Prior to commencement of commercial operations

- Upgrades recommended by Cardno (WA) Pty Ltd for up to 20 000 tonnes per year.
- Inspection of Browns Road Bridge for its ability to carry the proposed transport. Upgrade of the bridge as necessary.
- Vegetation trimming.
- Road widening as required.
- Intersections and corners will be upgraded.
- Upgrades to existing crossovers to dwellings and land.
- Clear the required width of Lees Road and provide gravel surface.
- In situations where the roads are to be partially upgraded for 20 000 tonnes and further upgrade for 50 000 tonnes, the full upgrade may be carried out prior to commencement.
- Maintenance of the gravel road by arrangements with the City of Albany for grading.
- Maintenance of the bitumen seal coat damaged by the heavy vehicles.

Road sealing

- *The transport route to the property and the haulage route on the property will be sealed following the first year of commercial operations.*

Prior to transport in excess of 20 000 tonnes per year

- Upgrades recommended by Cardno (WA) Pty Ltd for up to 50 000 tonnes per year.
- Further inspection of Browns Road Bridge for its ability to carry the proposed transport. Upgrade of the bridge as necessary.
- Further vegetation trimming as required.
- Further road widening, intersection and corner upgrades as required.
- Further upgrades to existing crossovers to dwellings and land to City of Albany specifications for sealed roads as the roads is bituminised.
- Extension of the bitumen seal coat on widening and length to enable 50 000 tonne per year transport.
- Maintenance of the gravel road by arrangements with the City of Albany for grading.
- Maintenance of the bitumen seal coat damaged by the heavy vehicles.

The destination of the lime is normally in the Wheatbelt and Great Southern Regions and any truck will normally only access the site once on any day.

The access and internal roads will be limestone based and watered as needed in the drier months to suppress dust.

4.10 Safety

Excavation will be conducted to *Mines Safety and Inspection Act 1994 and Regulations 1995.* Excavation practices, and operations procedures will be in compliance with the Act. Health and safety issues are overseen by the Department of Mines Industry Regulation and Safety (DMIRS).

Regular inspections and audits will be carried out by officers of the DMIRS to inspect safety, operational procedures and workplace health such as dust and noise.

The proponents will have procedures in place to manage safety, health, environmental impact, site completion and rehabilitation. All workers are required to wear full protective safety and high visibility gear when on site.

These will include Safety Management Plans and a site specific Emergency Response Plan to cover operational procedures, which include workforce induction and training to ensure that all employees involved are made aware of the environmental and safety implications associated with all stages of the mining activities.

Workers and staff on all sites are to be trained in the use of the procedures and all employees provided with site induction and training as necessary prior to commencing work on the site.

All vehicles and trucks will be equiped with two way radio capability.

No light vehicles will be permitted on site without registering with mobile plant on site. Full personal protection is required for all persons on site at all times.

The site is to be registered under the Department of Mines Industry Regulation and Safety SRS reporting system for minesites and quarries.

It is anticipated that the deepest excavation will be a maximum of approximately 8 metres below natural ground level.

At all times excavation will be in compliance with the *Mines Safety and Inspection Act 1994 and Regulations 1995.*

Fencing, locked gates and warning signs will be maintained.

The batter slopes of the pit will be dozed or pulled down at between 1 : 1 and 1 : 2 which will prevent any fall situations during excavation and these slopes will be reduced to 1 : 2 to 1 : 4 vertical to horizontal on closure.

Even though the site is remote and on private property, fence will be constructed around the top of any face, installed with warning signs. The fence will be approximately 1.2 metres high and of wire farm type construction.

Emergency

The site is within mobile phone contact and all vehicles will be equipped with two way radios. Safety management and operating procedures will be in place.

Fire

Fire risk is less than the risk from general farming or conservation land. The open area of excavation will form a natural firebreak and will be used for the emergency muster area.

A Bushfire Managemanet Plan has been prepared by Working on Fire Pty Ltd, 2018, who concluded that because of the bare open ground, the risk of fire was low and that the only requirement was emergency egress and access. These occupational safety considerations are covered under the SRS safety system managed by the Department of Mines Industry Regulation and Safety.

In order to provide a secondary point of egress from Rock Cliff Circle, the additional construction of an emergency access way is proposed. In the event of an emergency, this is intended for open use including by operational staff, local residents and firefighters. This is intended to ensure and improve the safety of all users of the locality from fire dangers.

The emergency access way will run from Rock Cliff Circle (which currently terminates on the northern boundary of Lot 9005), along the northern boundary of Lot 9005 to where Lee Road will intersect with the eastern boundary of Lot 9005. A document outlining the proposed Emergency Access Way Route has been prepared.

As per the requirements of SPP 3.7, the emergency access way will be constructed, at the applicant's expense, as a 6m wide trafficable (2WD) surface, and will be provided as an easement in gross.

Fire Safety is incorporated into safety management for the site.

The site is within mobile telephone range which will assist in fire safety.

Earth moving vehicles, and the water tanker when on site during excavation, will be available for fire fighting if required. Operators are trained in the use of fire extinguishers for all types of fire.

Perimeter fire breaks will be maintained, with the existing access road along the eastern fence of Lot 9005 forming a fire access break.

SAFETY			
Potential Impact	**Management**	**Outcome Commitments**	**Action Required**
Operational Safety	*Mines Safety and Inspection Act 1994 and Regulations 1995.* ▪ The site is within mobile and landline telephone contact. ▪ Safety Management procedures will be implemented prior to commencement. ▪ All workers will be provided with site induction and necessary training prior to entering the site.	The proponent is committed to maintaining a safe working environment and have standard Safety Management Plans for their operations.	Compliance with *Mines Safety and Inspection Act 1994 and Regulations 1995.* Ongoing
Adjoining properties	*Mines Safety and Inspection Act 1994 and Regulations 1995.* • Warning signs will be erected around the operating area. • Locked gates and fences will be maintained on site.	The proponent is committed to maintaining a safe working environment and have standard Safety Management Plans for their operations.	Compliance with *Mines Safety and Inspection Act 1994 and Regulations 1995* Compliance operating conditions

5.0 ENVIRONMENTAL IMPACTS AND MANAGEMENT

5.1 Surrounding Landuses and Buffers

The site is remote and protected by a high predator fence along the eastern boundary of Lot 9005 which includes controlled gates.

A number of Government Policies relate to buffer distances and the protection of basic raw materials. *State Planning Policy No 4.1, State Industrial Buffer Policy*, (draft July 2004) discusses the need to consider adjoining land uses when locating buffers but does not prescribe set buffers for operations such as this.

Generic buffer requirements were developed by the Victorian Government and used by the Environmental Protection Authority as the basis for a Draft guideline on recommended buffer distances. These formed the basis of EPA Guidance Statement Number 3, Separation Distance between Industrial and Sensitive Land Uses, June 2005.

The Environmental Protection Authority of South Australia recommends a 300 metre separation for a Quarry - Non Blasting.

EPA guidance "Separation Distances between Industrial and Sensitive Land Uses", June 2005 lists the generic buffers for sand and limestone pits as 300 - 500 metres depending on the extent of processing. A generic buffer relates to the distance at which there are unlikely to be any problems without some further investigations and does not mean that smaller buffers are not acceptable. EPA Guidance for the Assessment of Environmental Factors 3 June 2005 provides for a case by case separation, based on the potential impacts.

For limestone extraction a generic buffer is suggested of 300 to 500 metres with case by case assessment where grinding and milling are used.

State Planning Policy No 4.1, State Industrial Buffer Policy recommends that all land uses within 1000 metres be considered.

The footprint and the operation have been designed to minimise any impacts outside the disturbance areas.

These are generic buffers and can be varied on the basis of environmental and management studies.

The same type of quarrying therefore has very different generic buffers developed by State Environmental Protection Authorities, illustrating the need to consider separations on on-site environmental impact and not theoretical or generic buffers.

The main issues are the potential generation of dust and noise, which are addressed later.

As far as is known there are no dwellings within 1000 metres of the proposed excavation and stockpile area. The excavation of limestone from the site complies with these policies.

5.2 Aesthetics

Visual impact can occur in a number of circumstances, by the operation being set too high in the landscape, by being too close to neighbours and by insufficient visual protection.

The limestone resource of the highest grade is closest to the coast on the highest ground at an elevation of around 140 to 160 metres AHD. However excavation and all activities can be conducted in a manner that makes it most unlikely that the operations will be seen from public areas, roads or dwellings.

The limestone ridge can be seen at a long distance on a clear day from the higher parts of Denmark for example, such as dwellings being visible on the Nullaki Peninsula. The excavation will commence in the south behind the northern and eastern flanks of the ridge to provide the visual protection.

The most relevant visual management guideline is WAPC 2007, *Visual Landscape Planning in Western Australia* which has been viewed and the project considered against that document. The relevant section is Part Three, pages 144 to 152 of the Guideline.

That document recommends a visual impact assessment, which has been completed using contours and sections, in addition to site observations and aerial photography. The context of the visual impact has been reviewed to try and maintain the natural countryside and minimise visual impact.

Section 5.2.5 of the Guideline provides for “extractive industries and utilities”. The main directions are;

- the location of facilities to provide maximum screening
- entry points that are not at significant view points
- signage is visible but minimal
- visual management assessment may be required.

By excavating from the south, towards the east and north the operations in the pit will not be visible. The stockpile area will be located on the floor of the pit some 8 metres below natural ground level of the ridge where it can be screened by the design of the access road and the intervening vegetation.

The limestone will be extracted from a ridge and will result in the ends of the two dunes being reshaped down to the elevation of the intervening swale. The northern and eastern edges of the main ridge line will be left in place with the excavated land surface being similar to other parts of the Nullaki Peninsula.

There are a number of management actions that can be taken in quarries to minimise visual impact and these will be used wherever possible.

The general management actions are summarised below together with the visual impact issues that relate to this site. The actions will be used where applicable and as the opportunity presents to minimise visual impact.

It is felt that the operations are unlikely to be seen from any public location becaue of the way the pit and stockpile area are designed.

Below is a list of ideal visual management activites with a simple compliance audit for the operations.

IDEAL OPERATIONAL PROCEDURES	COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE
• Locate exposed features behind natural barriers and landform.	• The quarry and processing facilities are to be worked from the south and west behind the ridge of material being excavated. • The limit of the pit is set back 50 metres from the eastern boundary of Lot 9005 and the coastal Reserve 30883.
• Operate from the floor of the pit below natural ground level.	• The pit is to be worked from the inside out, below natural ground level via an internal haul road to the stockpile area. See Figure 13. • The processing area and stockpiles are to be located on the floor of the pit in the most efficient, safest location that provides the best visual management, some 8 metres below natural ground level and the ridge line • Over time as the pit progresses the mobile processing plant will be moved around and across the floor of the pit to increase the operational efficiency and provide the best visual management
• Avoid breaks in the skyline due to workings and haul roads.	• Excavation will come from the south and west. The main ridge will not be altered and the skyline will not appear to change although it will be lowered slightly in a localised area replicating other parts of the Nullaki Peninsula. See Figure 13. • There are no sensitive premises or locations from which people are likely to see the pit. See Figure 12. • At all times the pit and stockpile area will be operated behind a face of natural vegetation and ridge line.
• Push overburden and interburden dumps into positions where they will not be seen or can form screening barriers.	• Perimeter bunds of overburden and natural face are to be used when material becomes available, just ahead of excavation to increase the potential screening.
• Construct screening bunds and plant tree and shrub screens to reduce visual impact.	• Some screening bunds and natural vegetation are already in place around the perimeter and additional material will be stored there inside the edge of the approval footprint.. • The perimeter bunds will be used as overburden becomes available. • The quarry will not be able to be seen from the Bibbulum Track or from a distance within Reserve 17464 whichis remnant vegetation, vested in the City of Albany and associated with Lake Saide, based on the design and operation of the activities.
• Stage workings and progressive rehabilitation to provide visual protection of later activities.	• The staging of the pit footprint is designed to minimise visual impact with special attention concentrating on the eastern sightlines. • The pit will be excavated from south and west to east and north. See Figures 13 and 14.
• Cover barriers and landscaping with forms, colours and textures compatible with the natural environment.	• Natural vegetation will be retained around the perimeter.
• Adopt good house cleaning practices such as orderly storage and removal of disused equipment or waste.	• The proponent will maintain a tidy work environment at all their sites. Waste is regularly removed off site to an approved waste facility. • Where possible usable materials will be recycled which is part of normal operational procedures.
• Provide progressive rehabilitation of all completed or disturbed areas.	• This has always been used at pits and is proposed. • Such rehabilitation is in place at the old excavations and cut slopes that demonstrate that rehabilitation can be effective with good topsoil and vegetation management. • Areas not required will be revegetated when each part

	of the site has reached its final form; that is within 6 months of completion of that part of the pit.
• Minimise the amount of ground used at any one time.	• The amount of ground used will be minimised to that needed for current and future operations and fluctuations.

Light Overspill

No night activities are proposed.

Visual Management - Applicable Legislation / Policies
• None applicable
Commitments to Visual Management
• The proponent is committed to management of visual impact and will implement the measures outlined. • Every effort will be made to minimise the visual impact using appropriate methods from those listed above.

5.3 Noise

Regulation

Offsite noise is governed by the *Environmental Protection (Noise) Regulations 1997.*

The *Environmental Protection (Noise) Regulations 1997*, require that sensitive premises including dwellings in non industrial and rural areas, are not subjected to general noise levels (excluding blasting), during the hours 7.00 am to 7.00 pm Monday to Saturday that exceed 45 dBA. Allowable noise to 55 dBA is permitted for up to 10% of the time and to 65 dBA for 1% of the time. Noise levels are not to exceed 65 dBA during normal working hours.

Between 9.00 am and 7.00 pm on Sundays and Public Holidays and between 7.00 pm and 10.00 pm on all days the base level is 40 dBA.

At night, between 10.00 pm and 7.00 am Monday to Saturday, and before 9.00 am on Sundays and Public Holidays, the permitted level drops to 35 dBA.

The 10% and 1% “time above” allowances apply at night and on Sundays and Public Holidays as well.

There are penalties for tonality of 5 dB, modulation 5 dB and 10 dB for impulsiveness, that are added to the permitted levels. That is, if the noise is tonal or modulated the permitted levels drop by 5 dB. Impulsiveness is not likely to be relevant for the quarry under normal circumstances.

Influencing factors of external noise and nearby land uses such as busy roads, and industrial properties are not applicable to this site.

At a distance greater than 15 metres from the sensitive premises (eg dwelling), and commercial premises a base level of 60 dBA applies at all times with the 10% time permitted to be up to 75 dBA and the 1% permitted to be up to 80 dBA. For Industrial premises the base level is 65 dBA at all times with the 10% time permitted to be up to 80 dBA and the 1% permitted to be up to 90 dBA.

Gazetted and public roads are exempt from the Noise Regulations.

Noise can originate from a number of operations and may impact on onsite workers, or travel offsite and impact on external sensitive premises. Both potential noise impacts are addressed by reducing the noise generated from the quarrying and processing operations.

There are a number of management actions that can be taken in quarries to minimise noise generation or travel.

These actions are routinely used in quarries where applicable and as the opportunity presents to minimise noise on site.

The proponent will comply with the *Environmental Protection (Noise) Regulations 1997.*

There are no known sensitive premises within 1 km.

Noise Study

A Noise study by Herring Storer Acoustics 2018 found that the operations will comply with the Noise Regulations, and in particular at the Nullaki Campsite for the designed 14 laden truck movements per day, noting that the anticipated average number of truck movements is 10 per day. *Herring Storer Acoustics 2018, Limestone Quarry, Nullaki, Environmental Noise Truck Movements.*
The pit operations are too far away from the sensitive premises for noise impacts to trigger the Noise Regulations.

Occupational Noise

Occupational noise associated with the quarrying processes falls under the Mines *Safety and Inspection Act 1994 and Regulations 1995*.

The management of occupational noise is normally handled by providing all necessary hearing protection, as well as conducting worker inductions and educational programs for all staff. Regular site audits of quarry and mining operations are normally conducted by the Department of Mines Industry Regulation and Safety (DMIRS).

As part of its commitments, the proponent will be pro-active with its worker safety awareness;

- by providing all necessary safety equipment such as ear protection,
- identifying sections of the plant where hearing protection is required, as well as,
- conducting induction and educational programs for its staff.

The operating noise levels around the site will be regularly monitored by independent consultants in accordance with the *Mines Safety and Inspection Act 1994*, and the results communicated to DMIRS). All staff are provided with comprehensive ongoing training on noise protection as part of the commitment to occupational health and safety.

The DMIRS conducts Occupational Noise Audits of the Operations, on all operations.

Warning signs are to be used to identify areas of potential noise for workers.

All static and processing equipment will be located to provide maximum noise screening, behind bunds if sufficient overburden is available. Excavation will be staged from the west and south, behind the ridge which will provide continuous noise screening.

Not all equipment operates at the same time. Similarly not all resources will be worked at the same time.

Warning signs are to be used to identify areas of potential noise.

IDEAL OPERATIONAL PROCEDURES	COMMITMENTS ON ACTIVITIES CONDUCTED ON SITE
• Comply with the *Environmental Protection (Noise) Regulations 1997.*	• The proposed operations are so far from any dwelling, > 1 km and screened by the eastern and northern faces, that they will comply with the Regulations. • Herring Storer Acoustics confirmed that the Bibbulmun Track does not constitute a sensitive premises. They also confirmed that the Nullaki Campsite will comply with the Noise Regulations for the proposed truck movements based on 14 laden 40 tonne trucks per day.
• Comply with the provisions of the *Mines Safety and Inspection Act 1994 and Regulations 1995*.	• Like any quarry, the operations will be regularly inspected by officers of the DMIRS.
• Maintain adequate buffers to sensitive premises.	• The quarry complies with the Generic EPA Buffer Guidelines. • There are no dwellings or sensitive premises within 1000 metres.
• Locate exposed features behind natural barriers and landform.	• The eastern and northern faces of the pit will provide hard screening of the operations, which will be located on the floor of the pit.
• Operate from the floor of the pit below natural ground level.	• This will be used with the mobile plant operating at depths of up to 8 metres below the natural ridge line and ground surface
• Push overburden and interburden dumps into positions where they can form screening barriers.	• Perimeter faces, overburden dumps and natural vegetation are proposed where possible.
• Design site operations to maximise the separation and protection from sensitive premises.	• The shape of the pit, setbacks and method of operation have been designed to ensure landform protection is to be maximised. • Excavation will commence in the south to south west and progress east and west behind the faces.
• Maintain all plant in good condition with efficient mufflers and noise shielding.	• Efficient equipment that is maintained in good condition and replaced from time to time will be used.
• Maintain haul road and hardstand surfaces in good condition (free of potholes, rills and product spillages) and with suitable grades.	• The access road will be maintained in good condition in conjunction with the landholder's access road.
• Implement a site code outlining requirements for operators and drivers.	• A site induction and training program for all personnel is to be implemented and maintained.
• Shut down equipment when not in use.	• This is normal policy for quarries.
• Scheduling activities to minimise the likelihood of noise nuisance.	• Activities are proposed to minimise impacts on the local community. • The hours of operation are to be 7.00 am to 5.00 pm Monday to Saturday inclusive, excluding public holidays.
• Fit warning lights, rather than audible sirens or beepers, on mobile equipment wherever possible.	• Lights or low frequency beepers are to be used rather than beepers. • The design and shape of the pit will maximise noise screening.
• Use transport routes that minimise community disruption.	• There is only one road to access the site, so trucks will be specifically instructed to interrupt the local community as little as

	possible. • Gazetted roads are exempt from the Noise Regulations.
• Avoid the use of engine braking on product delivery trucks in built up areas.	• The surrounding area along the transport route is generally flat with reduced gradients. • Air brakes are unlikely to be required. Drivers are to be instructed not to use air brakes under normal situations when exiting along the access road.
• Minimise and conduct at the least disruptive times, non day to day activities such as vegetation, topsoil or overburden stripping on exposed ridgelines.	• The hours proposed are designed to minimise impact.
• Provide a complaints recording, investigation, action and reporting procedure.	• A complaints recording procedure is proposed to cover all site activities.
• Conduct training programs on noise minimisation practices.	• Site induction and training to all personnel is proposed.
• Provide all workers with efficient noise protection equipment.	• All noise protection personal equipment will be provided to staff.

• **Noise Management - Applicable Legislation / Policies** • *Environmental Protection (Noise) Regulations 1997.* • *Mines Safety and Inspection Act 1994 and Regulations 1995.* • *Australian Standard AS 2187.*
Commitments to Noise Management • The proponent is committed to minimising noise emissions and will implement the measures outlined above. • The proponent will comply with the *Environmental Protection (Noise) Regulations 1997.*

5.4 Dust

5.4.1 Environmental Dust

Background

Excessive dust has the potential to impact on both the workers and the adjoining land. However the potential generation of dust must be taken in context.

There are a number of key aspects to dust impacts;

- What is the source of particles?
- What is the potential for the particles to be disturbed?
- What is the nature of the particles and how are they likely to behave?
- What types of impacts are the particles likely to have if they move?
- What management actions can be used to mitigate or reduce dust impacts?

The most common form of disturbance is by mobile plant and vehicle impacts. In this local area dusty roads have the most potential to produce dust, such as the access road and depending on the substrate, traffic on the pit floor.

In many situations the fine particles are stablised by vegetation, soil microbial materials and reactions and interactions between particles, particularly limestone of the access road which crusts after being wet but breaks up when trafficked producing dust.

Once disturbed however dust can be generated and may continue to be a problem until the fine particles are wetted down or return to a relatively stable condition. With effective treatment of dust by water, which is proposed, the risks of onsite, and consequently offsite, dust are minimised.

Excessive dust has the potential to impact on both the workers and the adjoining land. However if occupational dust is managed environmental dust will also be managed.

Occupational dust associated with the quarrying processes falls under the *Mines Safety and Inspection Act 1994 and Regulations 1995* overseen by the Department of Mines Industry Regulation and Safety who will regularly inspect the site.

5.4.2 Assessment of Dust Risk

Dust Guidelines

Dust emissions fall under the *Guidance for the Assessment of Environmental Factors, EPA, March 2000*. Assessments of the potential dust risk are normally made using the Land development sites and impacts on air quality, *Department of Environmental Protection and Conservation Guidelines, November 1996.* These are still in place but are incorporated into the *DEC (DWER) 2011 Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites Remediation and other Related Activities.*

The *DEC (DWER) in 2008* released a *draft Guideline for the Development and Implementation of a Dust Management Plan.*

The setbacks provide effective dust management and comply with the EPA generic buffer guidelines and Department of Health Guidelines.

Onsite Risks

There are no offsite risks impacting on sensitive premises as these are too far away. Dust if uncontrolled may carry offsite to the adjoining vegetation.

There is a risk of dust generation from the access road and from any unsealed road.

Limesand is calcium carbonate based and is not known to carry any significant health risks to workers based on other operations and recreational use of limesand dunes. Being aeolian in origin the grainsize is greater than the particulate sizes that impact on occupational health.

The key Objectives for the operations are;

- Manage the potential for the generation of dust.
- Visually monitor dust levels and take steps to reduce the potential impact of dust on occupational and environmental aspects of the operation and local area.

5.4.3 Buffers

The setbacks to sensitive premises comply with the EPA generic buffer Guidelines for all operations.

EPA guidance "Separation Distances between Industrial and Sensitive Land Uses", June 2005 lists the generic buffers for sand and limestone pits as 300 - 500 metres depending on the extent of processing.

For limestone extraction a generic buffer is suggested of 300 to 500 metres with case by case assessment where grinding and milling are used.
The minimum separation distances are over 1 km for the northern portion of the resource and 50 metres for the eastern edge to the property boundary. The access road runs along the eastern edge of Lot 9005. The distances to sensitive premises are well in excess of the EPA generic buffer.

Dust particles are readily stopped by tree belts and distance, with which the site complies. Tree belts slow the wind and allow the dust to settle. See *Planning Guidelines Separating Agricultural and Residential Land Uses, Department of Natural Resources Queensland 1997(Pages 65 – 111) and Department of Health WA, 2012, Guidelines for Separation of Agricultural and Residential Land Uses which uses the same criteria (Pages 112 – 118).*

The Queensland Guidelines predominantly relate to agricultural spray drift, but based on particle size also relate to dust. They are based on field studies and demonstrate the effectiveness of tree belts and distance in providing screening against particulate travel.

The Guidelines provide for a buffer of 300 metres for open agricultural land, dropping down to 40 metres where an effective tree belt is in place. The Western Australian Department of Health also uses the same guidelines.

Whilst there are no tree belts the distances involved ensure that the operations comply with the Department of Health buffer recommendations.

5.4.4 Occupational Dust

The proponent will provide induction and protective equipment for all persons on site.

The DMIRS require personal dust monitoring to ensure dust levels comply with health risk guidelines.

The dust management procedures used on site will comply with these guidelines.

5.4.5 Actions and Management

Dust management applies to the access road which is no different to any non sealed road and the pit excavation processing and stockpiling area

There are a number of management actions that can be taken in quarries to minimise dust generation or travel and these are used wherever possible. The general management actions are summarised in the tables below, together with the potential dust issues that relate to this site. The actions are used where applicable and as the opportunity presents to minimise dust on this site. These are outlined in the following Dust Management – Risk below.

Loads on trucks that have the potential to generate dust are required to be covered.

DESIGN AND SITE

1. Minimising the amount of ground open.
2. Minimising the amount of ground being subject to traffic.
3. Locating access roads away from sensitive premises.
4. Design of the pit to reduce wind speed and potential dust lift off.
5. Maintaining effective setbacks.
6. Constructing perimeter bunds to reduce wind speed.
7. Providing wind break fencing generally and on top of bunds as required.
8. Maintaining a secure, fenced site, to prevent illegal access.
9. Rehabilitate and stabilise all completed areas as soon as practicable.

OPERATIONS

10. Locate active areas away from windy locations.
11. Working on the floor of the pit.
12. Operate some parts of the pit only when conditions are suitable.
13. Locating mobile plant and stockpiles in sheltered areas.
14. Design staging to minimise dust risk.
15. Conduct higher dust risk operations such as topsoil clearing and placement during more favourable conditions.
16. Shut down equipment that is not required.

ACCESS AND HARDSTAND

17. Constructing the access roads from hard materials that resist dust generation.
18. Using a sealant such as a polymer, chemical or emulsified oil or bitumen on the access road to reduce water use.

STOCKPILES

19. Minimise the number of stockpiles.
20. Maintain stockpiles in sheltered areas.
21. Reduce the elevation of stockpiles.
22. Limit the drop height to stockpiles and loading.

TRANSPORT

23. Cover all loads.
24. Ensure all trucks are dust free and not carrying particles and other materials outside the tray.
25. Choose the best transport routes.
26. Wet down or sweep the cross over and access roads.

HEALTH AND COMMUNITY

27. Maintain air conditioned cabins on all vehicles.
28. Provide a readily auditable trigger of no visible dust to cross the property boundary in line with DWER Licence and best practice in WA.
29. Provide a comprehensive visual monitoring program.
30. Conduct effective site induction and awareness training for all staff.
31. Training should include observation and mitigation where possible of all dust emissions.
32. Providing a complaints investigation, mitigation and recording procedure.
33. Liaising with Main Roads, City of Albany when required.
34. Ceasing operations when conditions are not favourable or when visible dust is crossing the boundary.
35. Obtain the latest weather conditions to increase the awareness of dust risk.
36. Cease operations during adverse weather conditions.

5.4.6 Dust Management Actions - Risk

ACTIVITY	POSSIBLE RISK SEVERITY and FREQUENCY	OPERATIONAL PROCEDURES AND COMMITMENTS	RISK AFTER MANAGEMENT
GENERAL			
Legislation	----	• The proponent will comply with the provisions of the *Mines Safety and Inspection Act 1994 and Regulations 1995.*	----
Buffers	----	• Large buffers of 1 to 2 km are provided to sensitive premises. • The Bibbulmum Track approaches near the access road at one location. The access road will be treated with dust suppressant and water as required to minimise dust. • The pit and processing area is 500 metres from the Bibbulmum Track, separated by vegetation. • Other sections of the transport route will be progressively sealed with dust treatment for gravel sections as required, prior to sealing.	----
Landform	----	• Activities are designed and located behind the natural ridges, where possible by excavating from the base of the pit up to 8 metres below natural ground level. • The separation distances mitigate the dust risk to the residences from excavation and processing. • Transport dust pose the greatest offsite risk.	----
	----	• The pit is worked from the floor where possible to reduce wind on the floor and to enable the face to provide barriers to dust lift off and carry.	----
Vegetation	----	• Vegetated buffers of 1000 metres are in place to sensitive premises.	----
Pit Design and Staging	----	• Design and staging have been selected to maximise dust management.	----
Screening	----	• The buffer distance are large enough for tree belts not to be required for quarrying and processing. • Operating on the floor of the pit reduces wind speed and lessens the risk of dust lift off.	----
MANAGEMENT			
Occupation	----	• Air conditioning and enclosed cabs will be used for on site operational mobile plant.	----
Monitoring	----	• A monitoring system is in place. See Trigger Conditions below.	----
Trigger conditions	----	• Most dust is generated from vehicle movements and uncontrolled crushing. • The trigger for dust management is the generation of visual dust. • The site supervisor is normally the loader driver who is in the best position to assess dust generation and to direct remediation. • On site operators are instructed to visually monitor dust, report and treat any visible dust.	----
Adverse weather	Moderate - Uncommon in winter, more common in summer.	• When winds are sufficiently strong, or other weather conditions are unacceptable to negate the effects of dust management, operations will cease until conditions improve and compliance can be achieved.	Low
Equipment failure	Low to moderate - Uncommon	• Machines and site activities will be shut down in the event of breakdowns that prevent adequate dust management.	Low
Training	----	• The proponent will use on site induction and training to all personnel at all operations.	----
Complaints	----	• A record of all dust complaints is to be maintained together with the mitigation measures to be used to reduce the dust impacts. • All complaints relating to dust are to be investigated immediately on receipt of a complaint.	----

		•	
EARTHWORKS			
Land Clearing	Moderate - Once per year	• The only significant clearing will be for the access road and the pit, which can be timed or the soil treated to minimise dust generation.	Low
Overburden removal	Moderate - Once per year	• There is no overburden. • Subgrade material will not be excavated or disturbed where possible.	Low
Land restoration	Moderate - Once or twice per year	• Land restoration will progressively follow excavation and will mainly consist of the floor being left in an undulating excavated state ready for planting.	Low
EXCAVATION - PROCESSING			
Excavation	High - Frequent	• A loader or excavator will extract material from the face and load directly to road trucks or the crushing and screening plant. • A bulldozer will be used from time to time. • A small crusher and screen may be required for calcified and lithified materials.	Low
Processing	High - Frequent	• Hardstand surfaces will be maintained in good condition (free of potholes, rills and product spillages) and with suitable grades. • The hardstand will be treated with water or dust retardant as necessary to minimise dust generation. • Plant location and approachwith respect to wind directions, will be used to minimise impact on operators and the carry of dust. • Any mobile crushing and screening plant will be located on the pit floor below natural ground level to reduce wind speed and reduce dust lift off. Any crushing or screening plant will be licensed through the DWER. • Dust impacts on adjoining vegetation has not been recorded around limestone quarries such as at Nowergup and Carabooda in WA nor along gravel roads. Whilst dust can fall on vegetation it is readily washed off locally by the frequent rain and drizzle and may be compensated for by the additional water available to plants adjoining cleared areas. Dust effects have been recorded in studies as impacting on the first 20 – 30 metres with dust readily stopped by shrubs and trees.	Low
Stockpiles	Moderate - Moderate	• Stockpiles will only be required where crushing and or screening is use and will be located on the floor of the pit at generally low elevations. • It is the vehicle movements during dry conditions that generate the greatest dust risk, and not the stockpiles of limestone which readily crust and do not blow even after the smallest rainfall event.	Low
		• Plant location, and approach with respect to wind directions, will be used to minimise impact on operators and the carry of dust. • The internal roads are to be graded and treated as required to minimise dust.	Low
TRANSPORT			
Access Road	Moderate to High - Frequent	• The access road is no different to any other local unsealed road and is used only to service the pit. • The access road is to be maintained in good condition (free of potholes, rills and product spillages). • Water or soil stabiliser will be used to wet down the access road as required to minimise and mitigate dust	Low
Loading and Road Transport	Moderate to High - Frequent	• Trucks are to be required to install tarpaulins or cover prior to exiting the quarry. • Transport and operations are anticipated to be intermittent through the year rather than continuous with the majority of transport occurring during summer and autumn.	Low
		• A site code and induction system is to be used for the quarry.	

		• Road trucks are to be required to be maintained in a clean condition. Loader drivers are to be instructed on the best means of loading to minimise overflow and spillage. • • A policy of instructing drivers to report and clean up spillages will be provided.	
		• Trucks are to be inspected prior to leaving the site and brushed down as necessary to remove loose particles	

5.4.7 Dust Monitoring

The most effective dust monitoring is the sighting of visible dust. Dust can be detected as soon as it leaves the wheels of vehicles and detection is not reliant on dust travelling to a machine monitor located near the boundary.

When trigger conditions are detected and/or alerted, relevant action is to be taken. This can include additional water suppression, modification of procedure, delay until more favourable conditions are present, use of alternative equipment etc.

Human monitoring can detect potential dust risks prior, and take action prior, to significant dust being generated. They notice dust immediately such as from tyres, whereas machine monitoring has to rely on significant dust being generated, travelling to the boundaries of the premises and triggering an alarm. The operators would be negligent if they let the dust get to that level of impact prior to taking action.

The auditable condition is visible dust crossing the boundary of the premises; the lot boundary. This is the condition used on Department of Water Environment Regulation Licences and all other quarries such as sand, limestone and hard rock quarries in Western Australia and has worked well in the past.

It is also the method used by the Department of Mines Industry Regulation and Safety to rapidly assess occupational dust on site.

Most dust generated from processing and vehicle movements has a very large visible component. Lesser risks emanate from excavation and land clearing. As invisible dust can be generated with the visible dust, recognising and dealing with visible dust is a very effective instantaneous method of recognising excessive dust.

The quarry manager and leading hand are ultimately responsible for site supervision of dust. They will travel around the operations and pit frequently and are in two way radio contact with all mobile plant.

All operators on site are to be instructed to be vigilant to dust generation and management and report any excessive dust or potential dust management issues.

Visual monitoring is even more effective when complemented by an extensive reporting and complaints process and this is used and this is proposed.

5.4.8 Greenhouse Gas

Over the years trucks have become more efficient with respect to greenhouse gas emissions, particularly with the use of truck and trailer and road train configurations.

The proponent will seek ways to reduce the amount of fossil fuels used, and has obtained more efficient mobile plant and equipment when this has become economically available.

The internal design of the operations will minimise the haulage route to save energy use and potential impacts.

The location of this pit means that it is closer to some parts of the Wheatbelt which provides for savings in fuel to get the limesand to the agricultural areas.

5.4.9 Complaints Procedure

Visual monitoring is more effective when complemented by an extensive reporting and complaints process.

An effective complaints mechanism is an essential part of the dust identification and management and is proposed.

A complaints book that lists the items below will be used. The book will be available as requested.

- The complaint,
- Nature of the complaint, time and date,
- Source of the complaint,
- Investigations of the complaint,
- Results of the investigation,
- If the complaint is valid, any mitigation actions that result,
- Any communication with the complainant.

Dust Management - Applicable Legislation / Policies
• *Guidance for the Assessment of Environmental Factors, EPA, March 2000.* • *Land development sites and impacts on air quality, DEP, 1996.* • Department of Environmental Protection Guidelines, November 1996 and *DEC 2008, A guideline for the development and implementation of a dust management plan*
Commitments to Dust Management
• The proponent will take the necessary steps to manage and contain dust by implementing and maintaining the Dust Management Plan.

5.5 Water Quality

Limestone excavation is a clean operation similar to sand excavation in the nature of the risk to groundwater. No chemicals are used apart from normal lubricants, which is similar to sand excavation, and sand excavation is one of the few industries that are permitted to operate in a Priority 1 Public Drinking Water Source Area, indicating the clean nature of the activity. See Department of Water *Land Use Compatibility in Public Drinking Water Source Areas.*

Limestone excavation does not affect the quality of water in the shallow ground water system because the only chemicals used are normal fuels and lubricants; a fact that is recognised by the Department of Environment Regulation who permit extractive industries in Priority Groundwater areas such as Lake Gnangara where sand excavation occurs within 3 metres of the water tableThe protection of water, whether groundwater or surface water, is an important part of the management of quarries.

The main Environmental Objective relating to water management is;

- Minimise the impact on surface and ground water quality.

The limestone pit site lies on a ridge that is well elevated and set 2 km away from the edge of Lake Saide.

Groundwater flow is deep and to the ocean under the pit and interpreted to be most likely also south to the ocean.

A sump on Nullaki Peninsula will be used for any water requirements which are anticipated to be low.

The base of the excavation will be over 140 metres to the water table.

Potable water will be brought in from scheme supply.

The management actions are considered in the attached Water Management Plan.

The proposal is consistent with all Government Policies for extraction of limestone and sand and complies with the same requirements for extracting in Priority Drinking Water Source Protection Area.

Water Management - Applicable Legislation / Policies

DWER –DMIRS P Water Quality Protection Guidelines for Mining and Mineral Processing

- *Overview*
- *Minesite water quality monitoring*
- *Minesite stormwater*
- *Mechanical servicing and workshop facilities*
- *Mine dewatering*
- *Health Act 1911*

Commitments to Water Management

- The site complies with Department of Water Guidelines for separation to groundwater.
- The nature of the operation and the depth to groundwater will minimise any risk to groundwater systems.
- Management procedures outlined above are committed to, to protect water quality.
- There will be no alteration to surface water flows or groundwater levels.
- The proponent will have in place a site code outlining requirements for operators and drivers.
- The proponent will conduct training programs on pollution minimisation practices.

5.6 Biodiversity Management

5.6.1 Vegetation and Flora

A detailed Flora and Vegetation Study has been completed by Bio Diverse Solutions specifically covering the proposed excavation area. Kathryn Kinear completed the survey to map the vegetation communities, weeds and dieback to a Level 1 Flora Survey.

> Bio Diverse Solutions, 2016, *Vegetation Communities Survey, Lot 9005, Rock Cliff Circle, Denmark.*
>
> Bio Diverse Solutions, 2017, *Level 1 Flora and Vegetation Survey Report, Proposed Alignment Youngs Siding WA 6330.*

See Section 2.5 Flora.

The site is within the Southwest Botanical Province and lies on the eastern part of the Warren Interim Bio-geographic Regional Area (IBRA) which extends east and west along the coast.

- ***Vegetation Communities - Limestone Ridge Vegetation***

The limestone ridge vegetation is classified as Open Heath which on the excavation area consists of generally low Scrub without the taller species that grow in more sheltered locations.

Lifeform	Species
Trees <10m	*Agonis flexuosa*
Shrubs >2m	*Agonis flexuosa, Agonis theiformis, Acacia cyclops, Spyridium globulosum* and *Hakea varia.*
Shrubs 1-2m	*Allocasuarina humilis, Pteridium esculentum, Jacksonia horrida, Pultenaea reticulata* and *Xanthorrhoea preissii*
Shrubs 0.5-1m	*Hibbertia cuneiformis, Hibbertia racemosa, Leucopogon obovatus, Leucopogon parviflorus, Leucopogon propinquus, Lysinema ciliatum, Pimelea clavata, Pimelea rosea subsp. rosea, Anigozanthos flavidus, Hakea prostrata, Adenanthos cuneatus* and *Xanthorhoea gracilis*
Shrubs <0.5m	*Rhagodia baccata subsp. baccata, Andersonia caerulea, Gompholobium confertum, Boronia crenulata* and *Synaphea sp.*
Sedges and rushes	*Lyginia imberbis, Lyginia barbata, Lepidosperma squamatum, Tetraria octandra, Desmocladus flexuosus* and *Hypolaena exsulca*
Herbs and grasses	*Carpobrotus sp., Platysace compressa, Trachymene pilosa, Chamaescilla corymbosa, Drosera erythrogyne,* and *Opercularia hispidula*

No Threatened or Priority Ecological Community were recorded.

Bio Diverse Solutions broadly mapped the vegetation across the excavation area as Open Heath in Pristine Condition. However because of the previous excavation, and earthworks associated with exploration for the limestone, the vegetation is better shown as partially degraded, being degraded where cleared and pristine in uncleared areas.

Very few weed species were recorded and none were noticed on the proposed quarry site by Landform Research in May 2016.

Bio Diverse Solutions did not find any evidence of plant diseases.

During the flora and vegetation survey a total of 112 species were observed. A species list is provided in the attached flora and vegetation report.

No Threatened taxa were recorded by Bio Diverse Solutions.

The following Priority taxa are listed within 10 km or were detected by Bio Diverse Solutions.

- *Billardiera drummondii* grows in Eucalypt Woodland and is less likely on the quarry footprint. The taxa currently has no priority listing on Florabase 2016-06-08.
- *Banksia sessilis* var *cordata* (P4) grows on coastal limestone and may be present.
- NatureMap lists *Gahnia sclerioides* (P4) as occurring within 10 km growing on moist sandy soils which are less likely on the disturbance areas.
- *Sphaerolobium calcicola* (P3) as occurring within 10 km and may occur in sand over limestone.
- *Isopogon buxifolius* var *buxifolius* is listed as occurring within 10 km but is unlikely to be present as it occurs in swampy areas.

Based on the small area to be cleared, out of many hectares of similar vegetation along the Nullaki Peninsula and nearby coast, most of which is protected in Reserves 1764 and 26177, the temporary impact of excavation will be very small.

The nearby vegetation of similar communities in excellent condition totals over 6 500 hectares and the 4 hectares open at any one time represents just 0.06% which is not regarded as significant.

At the end of excavation the site will be rehabilitated as shown by rehabilitation of other limestone pits including the old road base pit on site where rehabilitation has been effective with no weeds or disease.

5.6.2 Vegetation Clearing

*Clearing is controlled under the **Environmental Protection (Clearing of Native Vegetation) Regulations 2004.** These regulations provide for a number of principles against which clearing is assessed.*

	CLEARING PRINCIPLE *(Schedule 5 Environmental Protection Amendment Act, 1986*
1a	*High Level of diversity*
1b	*Significant fauna habitat*
1c	*Necessary to existence of Rare flora*
1d	*Threatened Ecological Community*
1e	*Significant area of vegetation in an area that has been extensively cleared*
1f	*Wetland or watercourse*
1g	*Land degradation*
1h	*Impact on adjacent or nearby conservation areas*
1i	*Deterioration of underground water*
1j	*Increase flooding*

Although the Clearing Principles consider Biodiversity and other conservation issues, they do not specifically address the issues of the metropolitan area or resource needs such as agricultural lime. Therefore some additional principles need to be added when considering the need for Basic Raw Materials.

The *Environmental Protection ACT 1986 Section 51O* states that the "CEO may take into account other matters that the "CEO considers relevant" (*EP ACT 1986 Section 51O*). Therefore Section 51O of the *Environmental Protection Act 1986* allows the CEO to take planning matters into account when making clearing decisions, such as a State Planning Policy and community need.
Separate Flora and Vegetation Assessment and Reports have been prepared for the site by Bio Diverse Solutions for the pit and Lees Road extension..

A Clearing Permit will be applied for, to cover the pit, and access road on Lot 9005 and the transport route including the trimming of vegetation and the clearing of the Lees Road extension. Targeted flora and vegetation studies as required, will be completed at an appropriate time of the year in consultation with DWER.

The procedures used for vegetation clearing are documented in 5.9.2 Rehabilitation. These were used and are included here in case a small area of additional clearing is applied for to the immediate north of the existing permited area.

Topsoil and overburden treatment is covered in 5.9 Rehabilitation. All suitable materials will be retained for rehabilitation and directly transferred where possible.

5.6.3 Fauna

A fauna study was not conducted because the resource area represents a very small area within a large area of remnant vegetation with a small area only open at any one time; 0.06% of the nearby vegetation.

A search of NatureMap and the EPBC database was completed by Landform Research and includes the fauna listed within the City of Albany and recorded within 10 km and is attached with the Flora and Vegetation Survey.

The Nullaki Peninsula is protected by a predator proof fence to keep out cats and foxes in particular. The exclusion of these predators forms a significant protection measure for fauna which are advantaged by living within the protected zone. The protection fence is to remain in place.

The nearby vegetation of similar communities in excellent condition totals over 6 500 hectares. The 4 hectares open at any one time represents just 0.06%. The small area of proposed disturbances and the large connectivity remaining in place will not cause any isolation of short range fauna.

With the small area proposed to be open at any one time, a return to local native habitiat, the proven rehabilitaiton methods and the benefits of the predator proof fence, the impacts on fauna are not considered significant.

- No matters of significance under the *EPBC Act 1999* were identified. The potential feeding habitat of Black Cockatoos impacted is small because the only food source *Dryandra sessilis* is limited. With the staging and small footprints the proposed activities will not trigger referral to the Commonwealth.

All other fauna issues such as Mains Assassin Spider will be dealt with under the application for Clearing Permit. Targeted fauna studies as required, will be completed at an appropriate time of the year in consultation with DWER.

5.6.4 Wetlands

The only nearby wetland is Lake Saide which is 2 km from the operational site.

Bibbulmun Walking Trail, Munda Biddi Track and Nullaki Campsite

The Bibbulbun walking track runs from Albany in the east before swinging north prior to the eastern boundary of Lot 9005. The track is located some 400 metres from the limestone pit but one section swings close to the eastern boundary of Lot 9005.

The track lies in heathland that is often higher than a person, making the excavation area difficult to see. The excavation area is designed to be excavated from the west, to the east and to the north, working behind the vegetated eastern and northern faces which will assist in minimising or eliminating any visual impact of the pit from the Bibbulmun Track.

The Bibbulmun Track will cross the access road. Signs and warning barriers will be used at the crossing point similar to other road crossings.

Discussions of the potential impacts are covered under Section 3.5 Social Impacts, and show that the three features will not be significantly impacted by the proposal.

Biodiversity - Applicable Legislation / Policies
• None applicable – Likely to be conditioned
Commitments to Biodiversity Management
• The excavation areas are selected and the operations designed to minimise impacts on Biodiversity. • Biodiversity impacts will be very small and temporary as the land excavation will be staged and rehabilitated as soon as possible.

5.6.5 Dieback Management Plan

Dieback of vegetation is often attributed to *Phytophthora cinamomi* even though there are other *Phytophthora* species and other diseases such as *Armillaria* that can cause dieback like symptoms. Microscopic soil-borne fungi of the genus *Phytophthora* kill a wide range of native plants and can cause severe damage to many vegetation types, particularly those from the families Proteaceae, Epacridaceae, Xanthorrhoeaceae and Myrtaceae.

In most cases dieback is caused by a pathogen which infests the plant and causes it to lose vigour, with leaves dying, and overtime may kill the plant. As such the management of Dieback is essentially related to plant hygiene when coming onto a site and within a site.

Bio Diverse Solutions did not find any evidence of dieback or other plant disease infestations and neither did Landform Research during their site inspection.

There are several guides to the management of Dieback.

- Department of Environment and Conservation (DPaW) Dieback Hygiene Manual 1992 is a practical guide to Dieback management.
- Department of Environment and Conservation (DPaW) Best Practice Guidelines for the Management of Phytophthora cinamomi, draft 2004.
- Dieback Working Group 2005, Management of Phytophthora Dieback in Extractive Industries.

The Department of Environment Regulation generally recognises that Dieback is less likely to impact on vegetation on limestone and Spearwood/Cottesloe Land Systems, Podger F D and K R Vear, 1998, *Management of Phytophthora and disease caused by it, IN Phytophthora cinnamomi and the disease caused by it - protocol for identifying protectable areas and their priority for management*, EPA 2000. The same is noted in DEC 2009.

Dieback is only likely to be an issue when equipment is brought to the site from a dieback affected area either through vehicles or plant and soil materials, therefore the following general principles are applied to Dieback management.

Even there is no evidence of infestations strict hygiene measures will be used.

Not all potential impacts will apply to all parts of the proposed quarry operations.

- Excavation will be undertaken using practices recommended by DWER . See *CALM Dieback Hygiene Manual 1992* which is more practical and *CALM Best Practice Guidelines for the Management of Phytophthora cinamomi, draft 2004.* See also *Dieback Working Group 2005, Management of Phytophthora Dieback in Extractive Industries.*
- Dieback diseases are more likely to be transported under moist soil conditions.
- All vehicles and equipment to be used during land clearing or land reinstatement, should be clean and free from soil or plant material when arriving at site.
- The site will effectively be a spit system with road traffic restricted to the stockpile loading area.
- Washdown of vehicles and equipment should be prior to arriving on site and to the procedures in CALM Guidelines for Dieback Management.
- No soil and vegetation should be brought to the site apart from that to be used in rehabilitation.
- Plants to be used in rehabilitation should be from dieback free sources.
- Vegetated areas ahead of excavation should be quarantined to onsite access
- Unwanted access to vegetated areas is to be discouraged through a lack of tracks and external fencing.
- Excavation vehicles will be restricted to the excavation area apart from clearing land.
- Rehabilitated surfaces are to be free draining and not contain wet or waterlogged conditions.
- Illegally dumped rubbish is to be removed promptly.
- When clearing land or firebreaks vehicles are to work from dieback free areas towards dieback areas; or, in situations where dieback interpretation is not possible, from areas of higher quality vegetation to areas of lower quality vegetation.
- Roads should be free draining and hard surfaced.
- A hygienic site is to be maintained by not bringing any soil or plant material onto the site except for rehabilitation purposes or from known dieback free areas.
- All plants, seeds and other materials used in rehabilitation will be sourced from dieback free areas.
- The predator proof fence and gate system will be maintained.
- Compliance with the Weed Management Policy.

Dieback principles will be followed even though there is a reduced risk of spread on calcareous soils such as this. (Podger F D and K R Vear, 1998).

The proposed access road will be limestone road.

The aim of dieback management during excavation is to minimise the risk of entry of dieback into the site. The calcareous soils of the remnant vegetation are unlikely to allow *Phytophthora* to spread but there may be other pathogens such as *Armillaria.*

In many ways the management of the site for dieback is similar to that for the management of weeds, and the two management practices should be considered together.

The other management is to ensure that all excavation equipment and road transport vehicles are clean and free from soil and vegetable matter prior to entering the operations.

Vehicles are to be prohibited from entering vegetation ahead of excavation, apart from normal travel along made firebreaks and roads for normal security and farm maintenance activities.

Topsoil will be cleared according to 5.9.2 Rehabilitation Procedures.

Dieback - Applicable Legislation / Policies
• *DEC (DBCA) Dieback Hygiene Manual 1992.* • *DEC (DBCA DPaW) Best Practice Guidelines for the Management of Phytophthora cinamomi, draft 2004.* • Dieback Working Group 2005, *Management of Phytophthora Dieback in Extractive Industries.*
Commitments to Dieback Management
• The proponent will not impact on the adjoining vegetation outside the approval footprint • The proponent will maintain the Dieback Management Policy to reduce the spread of Plant Pathogens.

5.6.6 Weed Management Plan

The management of weeds is essentially similar to that for plant diseases. The impact of weeds is really the impact within the local area and the more they are controlled the better. It is desirable that the site does not become a haven for environmental weeds and therefore a management and control program is warranted at all sites.

Weeds can be declared under the *Agriculture and Related Resources Protection Act 1976* which requires that Declared Weeds are eradicated. Other weeds are not Declared but may be classified as Environmental Weeds because they are well known for impacting on vegetation.

Generally if the actions taken for Dieback are applied they will also control weeds.

Minimal weeds were observed by Bio Diverse Solutions over the whole of Lot 9005, and none were observed on the excavation area by Landform Research in May 2016. During the flora and vegetation survey a total of 112 native and 9 introduced species were observed. A species list is provided in the attached flora and vegetation report. 75 native species were identified along the Lee Road alignment with a further 11 introduced species.

The greatest threat from weeds is from edge effects and from the risk of dirty trucks arriving on site.

Even so weed management practices will be used.

- All vehicles and equipment to be used during land clearing or land reinstatement, will be clean and free from soil or plant material when arriving at site.
- Trucks will arrive on site and park at the entrance to Lot 9005 where any dirty trucks will be rejected. There will be no washing or brushing out on site.

- No soil and vegetation will be brought to the site apart from that to be used in rehabilitation.
- Plants to be used in rehabilitation will be free from weeds.
- Vegetated areas ahead of excavation will be quarantined to excavation vehicles until required.
- Unwanted access to vegetated areas is to be discouraged through a lack of tracks and external fencing.
- Weed affected top soils may need to be taken offsite, used in weed affected areas, buried by 500 mm soil/overburden or taken offsite or sprayed to minimise the weed impact.
- Illegally dumped rubbish is the major source of weeds and is to be removed promptly.
- No weed contaminated or suspect soil or plant material is to be brought onto the site.
- When clearing land or firebreaks vehicles are to work in conjunction with dieback principles and push from areas of better vegetation towards areas of lower quality vegetation.
- Weeds will be sprayed with broad spectrum spray prior to planting or seeding in weed affected soils.
- Unwanted grasses will be sprayed with grass selective spray prior to seeding or rehabilitation.
- Weed management will work from least affected areas to most affected.
- Declared weeds will be treated promptly by digging out or spraying.
- Weeds will be treated promptly no matter how few there are.
- The predator proof fence and gate system will be maintained.
- Ongoing monitoring of weeds should be undertaken at least annually in autumn, prior to winter rains.

The Dieback Management actions will also be used to assist weed management.

Inspections should be conducted to monitor the presence and introduction of weeds on an annual or more frequent basis. On identification, introduced weeds will either be removed, buried, or sprayed with a herbicide.

Weed - Applicable Legislation / Policies

- *Agriculture and Related Resources Protection Act 1976.*

Commitments to Weed Management

- The proponent will use the weed policy to try and prevent the introduction of Declared, Environmental or other weeds to the site.

5.7 Fire Protection

Fire risk is normally controlled through the *Bush Fires Act 1954* and local authority bylaws.

The excavation area will form a natural firebreak; the access road will also assist. Water available on site can be used for fire fighting.

Normal eastern and other straegic firebreaks will be maintained, based on the existing track and access network.

The safety of workers is managed through a Safety Management Plan developed through *the Mines Safety and Inspection Act 1994 and Regulations 1995*.

A Bushfire Management Plan has been prepared by Working on Fire Pty Ltd, 2018, who concluded that because of the bare open ground, the risk of fire was low and that the only requirement was emergency egress and access.

These occupational safety considerations are covered under the SRS safety system managed by the Department of Mines Industry Regulation and Safety.
There are a number of management actions that can be taken in quarries to minimise fire risk and these will be used wherever possible. The general management actions are summarised below, together with the potential issues that relate to this site. The actions will be used where applicable and as the opportunity presents to minimise fire risk.

- Restrict vehicles to the operational area, particularly on high fire risk days.
- Use diesel rather than petrol powered vehicles.
- Maintain perimeter fire breaks as required.
- Ensure fire risk is addressed and maintained through the site Safety Management Procedures.
- Provide an emergency muster area, communications and worker induction and training.
- Establish on site water supplies for potential use in extinguishing fire.
- Secure the site from unauthorised access.
- Maintain normal farm fire breaks and fire prevention procedures.

There is less potential fire risk from quarries than other land uses because quarries clear land, and vehicles are restricted to cleared access roads, the pit floor, processing and stockpile areas.

These cleared areas form a natural firebreak. The main risk comes from an external fire in the surrounding vegetation, impacting on the quarry. As such the fire risk is no greater than a rural property.

If there is a fire the site will be evacuated. If vehicles or plant are left on site, they will be parked in the centre of the pit in line with normal minesite actions.

In addition, the proposed emergeny access way will provide safe passage for those in the locality (see part 4.10)

Fire Management - Applicable Legislation / Policies
• *Bush Fires Act 1954.* • *City of Albany Bylaws.*
Commitments to Fire Management
• The proponent will ensure the quarry operates to the standards in the *Mines Safety and Inspection Act 1994 and Regulations 1995.* • The proponent will ensure the quarry complies with the local fire safety requirements and operates in compliance with normal rural fire practise and restrictions.

5.8 Aboriginal Heritage

A search of the Department of Planning Land and Heritage database reveals that there are no recorded sites on the Nullaki Peninsula. An ethnographic survey of the Nullaki Peninsula has been completed.

Aboriginal Sites
• *Aboriginal Heritage Act 1972-1980*
Commitments to Aboriginal Heritage Management
• Should any evidence of early aboriginal occupation be uncovered during the operation of the quarry, development will be stopped pending an assessment by a recognised consultant. • If the site is confirmed as a site under the provisions of *Section 15 of the Aboriginal Heritage Act 1972-1980* and Amendments, the proponent will comply with the provisions of the Act, relating to development in areas of recognised aboriginal sites.

5.9 Rehabilitation

5.9.1 Background

The area is currently remnant coastal heathland vegetation partially disturbed by tracks, a previous small excavation that has been allowed to rehabilitate, drill pads and soil test holes.

The old limestone pit that has been rehabilitated demonstrates that the retention and direct spread of topsoil can provide fast and good rehabilitaiton of local native species and communities.

It also demonstrates that excavation can be completed with reduced impacts as there is an absence of weeds and dieback diseases in the previoulsy excavated and disturbed areas.
The best means of revegetation is to use;

- Vegetation and topsoil recovered from clearing.
- Brush cut from adjoining vegetation.

The use of additional seed collection and seeding remains a contingency, but based on other rehabilitaiton is not considered necessary.

- **End Use**

The extraction of limestone is seen as an interim use of the land prior to utilisation of the area by the current land holder.

The final contours are anticipated to be undulating around 8 metres below the existing land surface replicating other portions of the limestone ridge.

The end use will be Conservation in line with the land zoning.

- **Mine Closure Considerations**

Rehabilitation will be directed towards the final end land use of Conservation, and is to be aimed at the highest level of rehabilitation.

Rehabilitation will contain Dieback and Weed Management in addition to monitoring and replanting failed areas.

Appropriate vegetation clearing and reuse combined with topsoil management is seen to be an important element in achieving successful rehabilitation and plant re-establishment on the restored surface.

The following procedures have been selected from observation of the existing operations and experience in the rehabilitation of the old limestone pit and other limestone quarries worked on by Landform Research.

- **Rehabilitation Objectives**

There are a number of management actions that can be taken in quarries to maximise rehabilitation effort and these will be used wherever possible. The general management actions are summarised below and will be used where applicable and as the opportunity presents.

- **Completion criteria – Interim Final Landuse**

    - Stable post-mining landscape, and the minimisation of wind or water erosion.
    - Provide for the protection of the local groundwater resource in terms of both quality and quantity.
    - Control or eliminate weed species so that they are not likely to threaten the revegetation or local vegetation communities.
    - Kep the local vegetation as dieback free.
    - Provide a self sustaining cover of local native plants at a minimum of 1200 native plant stems per hectare at 3 years

5.9.2 Rehabilitation Procedures

- **Vegetation Clearing – Recovery**

1. A Clearing Permit will be required for areas of native vegetation to be cleared under *Section 46 of the Environmental Protection Act 1984.*
2. Dieback and weed management will be undertaken as outlined in the attached Dieback and Weed Management Plans.
3. Essentially all topsoil, vegetation fragments and any overburden will be recovered from cleared areas and retained for use in rehabilitation. The vegetation will be stored with the topsoil in low dumps <1 metre high around the perimeter of the pit.
4. Topsoil clearing will be progressive and minimised to that required for each stage of excavation.
5. Smaller vegetation will be track crushed and directly transferred to areas under rehabilitation to assist soil and habitat generation. The vegetation contains a significant seed source, because of the contained seed on many species, it is also a source of microbial material for soil formation, adds to habitat and assists in managing wind erosion.
6. The vegetation will also be used on the batters to minimise soil erosion and spreading on the final land surface as part of the final rehabilitation.

7. If direct transfer is not possible the vegetation will be stored in low dumps to 1 metre high or swapped with a nearby operator to try and ensure that the material is not wasted.

8. Topsoil will be pushed to one side and formed into low storage dumps for later use for rehabilitation using either a loader or bulldozer.

9. Overburden, as yellow and brown sand and low grade limestone, will then be pushed to the perimeters, normally by bulldozer, to form bunding around the active area.

Figure 8 Rehabilitation that has been cleared for new testing of limestone

Figure 9 Rehabilitation of a steep slope on the access road to the pit

Figure 10 Rehabilitation on coastal limestone at Lancelin

- **Landform Reconstruction and Contouring**

1. At any one time it is anticipated that around 4.0 hectares of pit ground will be open and require rehabilitation. Progressive rehabilitation of completed land will be used.

2. Land restoration and rehabilitation of any completed areas will be conducted prior to the site being vacated following the yearly excavation campaign at the end of autumn which is an appropriate time for rehabilitation.

3. All buildings, plant and any other foreign materials will be removed from site.

4. All inert materials associated with processing will either be buried or removed from site. All non inert materials will be removed.

5. Limestone roadbase and hard stand will either be removed from site to an approved disposal situation or buried by 0.5 metres plus of limestone overburden and soil.

6. Any hardstand and roadbase areas will be deep ripped using a tyne attached to a loader, grader or bulldozer.

7. The onsite waste disposal system (serviced portable or septic system) will be removed from site.

8. The land surface will be formed to be geotechnically stable to the requirements of the *Mines Safety and Inspection Act 1994 and Regulations 1995* as a final land surface.

9. The final land surface will be smoothed to be compatible with the existing natural landform of the area with some slopes left potentially at the angle of natural repose for limesand to replicate the natural dune system.

10. As the limestone is porous there will be no need for upslope contour or diversion banks to prevent water entering the void. Similarly there will be no need for drainage works on the floor of the void. The floor will be formed to drain to low points to manage storm events.

11. Where possible any disturbed areas that are no longer required will be rehabilitated using the methods described above within 6 months of becoming available.

12. The final landform will be formed to the interim final concept plan.

13. The land surface will be a gently undulating floor with sloping batters at less than I : 4 vertical to horizontal and some at 1 : 2 to replicate the pre-excavation limestone ridge.

14. Limestone floor will be deep ripped in two directions. The width between rip lines will be 1 metre intervals.

15. A minimum of 300 mm of overburden will be spread over the surface where available to provide a substrate for revegetation.

- **Pre - Vegetation Establishment**

1. Pre-seeding weed control is only likely to be required where topsoils are used that contain weed species.

2. If required this is normally only conducted after overburden and topsoil have been spread and any seeds have been allowed to germinate. Broadscale weed treatment can be detrimental to the germination and growth of native and some pasture species but may be required if the weed load is to be reduced.

3. Any weeds likely to significantly impact on the rehabilitation will be sprayed with Roundup or similar herbicide or grubbed out, depending on the species involved. Weed affected topsoil and overburden will be buried. The Weed Management Plan will form the basis of weed treatment. Depending on the nature of the planting substrate, a broad spectrum spraying program may be used. In areas where grass only is a potential problem grass specific sprays will be used. In some areas where topsoil from cleared native vegetation is available no spraying may be required.

- **Revegetation**

1. Topsoil will be re-distributed in rehabilitated areas to depths of 50 mm where available.

2. Topsoil provides a useful source of seed for rehabilitation of Limestone Heathlands, when the correct handling of the topsoil is used; stripped and replaced dry (autumn direct return). Maximum depth of 50 mm can be used to optimise revegetation of species-rich plant communities. However this needs to be balanced against the weed load as described under Weed Management.

3. Native vegetation, plus leaf, root and organic matter collected from the land clearing procedures will be spread across the topsoil. This will increase the total organic carbon fraction, improving soil properties such as resistance to water and wind erosion and moisture retention. The difference in properties between existing topsoil and subsoils is not considered a major impediment to rehabilitation of native species in the area.

4. Studies have shown that topsoil stripping and placement is best undertaken in summer for maximum germination, but this raises the potential for additional dust generation from the fine humus particles.

5. Topsoil will be spread directly from an area being cleared where possible, otherwise reclaimed from a topsoil dump.

6. Topsoil will be spread at depths of 50 mm and should be spread during summer, preferably by the end of February.

7. Rehabilitation will take place during the first winter months following the restoration earth works of each particular section of quarry. Leaving the completed earth works for one season will reduce the success of rehabilitation by at least 50%, due to compaction effects.

8. If insufficient revegetation is achieved, local provenance seed will be collected from the site or purchased from commercial seed collectors.

9. Rehabilitation wil consist of

   - topsoil spreading
   - seed spreading (if necessary)
   - tube plants (if necessary)

   A species list is attached in the Bio Diverse Solutions Report.

10. A combination of the three methods is always preferred by Landform Research and has proven to be the most versatile and successful.

11. Seeding conducted in summer will use scarified leguminous seeds that have been “dry smoked”. Seeding conducted in July to August will have the leguminous seeds heat treated and all seeds will be smoke treated by soaking in “smoke water” for 24 hours prior to seeding.

12. Seed spreading will be achieved either using mechanical seed dispersal equipment or using manual methods. Bulking with a spreading agent such as sawdust, vermiculite or sand is desirable.

13. Rehabilitation will progressively follow mining with completed areas of the excavation being revegetated as soon as practicable.

- **Irrigation**

1. Experience with the previous regeneration on site, and by Landform Research in rehabilitation of quarries in limestone, has shown that when completed well there is no need for irrigation of the rehabilitation.

- **Erosion Control**

2. Soil erosion occurs when soil is exposed and disturbed by wind or water. Erosion involves soil particles being detached from areas not adequately protected by vegetation, and moved down-slope. This is not normally a significant problem in limestone, which crusts after the first winter. See Figure 9.

3. The limestone soils are very permeable but readily crust during rainfall making them suitable. Runoff is normally minimal unless surface materials become non-wetting. Even so experience with limestone extraction shows that there is minimal non wetting and surface particle movement under such conditions.

4. Water erosion on the batter slopes can be avoided by the permeability of the materials and by leaving the surface soft, rough and undulating, with the undulations running along contour. The final machinery run should be along contour and not down slope.

5. Wind erosion will be controlled by rehabilitating the disturbed ground as soon as practicable.

6. For rehabilitation areas, revegetation will take place as soon as possible following landform and soil reconstruction.

- **Monitoring**

1. During late summer an assessment of the success of the rehabilitation will be made to determine the rehabilitation requirements for the following winter.

2. Monitoring includes visual assessments and, where necessary, counts to determine the success of the soil stabilisation.

3. Native vegetation cover and soil stability will be assessed and corrected if found to be non compliant.

4. As necessary steps will be taken to correct any deficiencies in the vegetation.

5. Rehabilitation of each stage will be monitored for a period of three years to ensure that the revegetation meets the completion criteria of providing self sustaining vegetation cover.

6. In areas of rehabilitation that do not meet the completion criteria measures are to be taken to increase the stem density to achieve the completion criteria. This could include but not be limited to additional seeding or planting.

Temporary Closure

1. If for any reason the site is closed on a temporary basis for any period of time the following will be implemented.

2. The faces will be made safe or protected by bunds and/or fencing with signs in compliance with the *Mines Safety and Inspection Act 1994*.

3. All fluids, liquids and other materials that could leak over time, change or potentially impact on the environment will be removed from site, or stored in a manner that will not permit any environmental impact.

4. Mobile and other plant will be made safe or removed from site in compliance with the *Mines Safety and Inspection Act 1994.*

5. Fencing will be maintained to make the pit safe.

6. Perimeter signage will be maintained.

7. The site will be monitored for weeds and interim rehabilitation success twice per year.

8. Regular site inspections will be made to ensure compliance with the *Mines Safety and Inspection Act 1994,* and any other actions that are required to make the site compliant or environmentally sound will be made as the need arises.

Rehabilitation - Applicable Legislation / Policies
• *EPA, Guidance 6, Rehabilitation of Terrestrial Ecosystems*
Commitments to Rehabilitation
• The proponent will ensure the completed land surface is formed to the standards in the *Mines Safety and Inspection Act 1994 and Regulations 1995.* • The proponent will rehabilitate the surface as outlined above and monitor the revegetation as described above.

ADDITIONAL REFERENCES - READING

Abeysinghe P B, 1998, *Limestone and Limesand Resources of Western Australia*, Geological Survey of Western Australia, Mineral Resources Bulletin 18.

Abeysinghe P B, 2003, *Silica resources of Western Australia*, Geological Survey of Western Australia, Mineral resources Bulletin No 21.

ANZECC, 1999, *National Framework for the Management and Monitoring of Australia's Native Vegetation*.

Australian Geomechanics Society, 2003, *Engineering Geology of Perth, Parts 1 and 2*, Volume 38 No 3 and No 4.

Australian Government, Department of Environment and Heritage, 2000, *Interim Recovery Plan Aquatic Root Mat Community of Caves of the Swan Coastal Plain 2000-2003.*

Basic Raw Materials Resource Protection Working Plan, prepared for the Department of Planning and Urban Development (DPUD, 1996).

Bastian L V, 1996, *Residual soil mineralogy and dune subdivision, Swan Coastal Plain, Western Australia*, Australian Journal of Earth Sciences 43, 31-44.

Bastian L V, 2007, *Karst Examination of Nowergup Property*, Unpublished report to WA Limestone.

Chamber of Commerce and Industry, 1995 and 1996, *Managing the Basic Raw Materials of Perth and the Outer Metropolitan Region*, Parts 1 and 2.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Commonwealth of Australia, 2001, *National Objectives and Targets for Biodiversity Conservation 2001 – 2005.*

Csaky D, 2003, *Review of the Karst Hazards in the Wanneroo Area*, Perth, Western Australia, Geoscience Australia.

Department of Environment and Conservation 2009, (Freeman, K, Be Keighery, G Keighery, V Longman, A Black and S Molloy), *Flora and Vegetation of the Dawesville to Binningup Region (Swan Coastal Plain)*, prepared for the DEC.

Department of Environment WA, 2004, *Stormwater Management Manual for Western Australia*.

Department of Environmental Protection (1997b*). Environment Protection (Noise) Regulations 1997: Summary of the Regulations.* Department of Environmental Protection, Perth.

Department of Minerals and Energy (1991). *Environmental Management of Quarries: Development, Operation and Rehabilitation Guidelines.* DOIR, Perth.

Department of Water (1999b). *Water Quality Protection Note: Above Ground Chemical Storage Tanks in Public Drinking Water Source Areas*. Water and Rivers Commission, Perth.

Department of Water (1999a). *Water Resource Protection Series WRP16: Draft Policy and Guidelines on Construction and Silica Sand Mining in Public Drinking Water Source Areas.* Water and Rivers Commission, Perth.

Department of Water (1999c). *Water Quality Protection Note: Recharge Criteria for Public Drinking Water Source Areas.* Water and Rivers Commission, Perth.

Department of Water, *Water Quality Protection Note: Washdown of Mechanical Equipment*, Perth.

Engineers Australia 2003, *Australian Runoff Quality*, National Committee on Water Engineering.

Environmental Protection Authority (2004), *Guidance Statement, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, No 51, June 2004.*

Environmental Protection Authority, Guidance 10, *Level of assessment for proposals affecting natural areas within the System 6 Region and Swan Coastal Plain portion of the System 1 Region.*

Environmental Protection Authority, Position Statement No 2, December 2000, *Environmental Protection of Native Vegetation in Western Australia*.

Environmental Protection Authority, 2013, *Consideration of subterranean fauna in environmental impact assessment in Western Australia.*

Firman J B, 2006, *Ancient weathering zones, pedocretes and palaeosols on the Australian Precambrian shield and in adjoining sedimentary basins: a review*, IN Journal of the Royal Society of Western Australia, Volume 89 part 2.

Geological Survey of Western Australia, 1990, *Geology and Mineral Resources of Western Australia*, Memoir 3.

Geoscience Australia, 2005, *Natural hazard risk in Perth*, Western Australia.

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

Government of Western Australia, 2000, *Bush Forever*.

Gozzard J R, 1987, *Information on Industrial Minerals - Coastal Plain between Lancelin and Fremantle,* Geological Survey of Western Australia record 1978/11.

Gozzard J R, 1987, *Limesand and Limestone Resources between Lancelin and Bunbury*, Geol Surv WA, Record 1987/5.

Grimes K G, 2006 Syngenetic karst in Australia: a review, Helictite 39 (2) 200

Guidelines for Groundwater Protection in Australia, ARMCANZ, ANZECC, September 1995.

Hopkins, A.J.M. & Griffin, E.A. (1989*). Fire in the Banksia Woodlands of the Swan Coastal Plain.* Journal of the Royal Agricultural Society of Western Australia, No.71, pp.93-94.

Jasinke E J, 1997, *Fauna of aquatic root mats in caves of South Western Australia; Origin and Ecology*, unpublished PhD Thesis, University of Western Australia.

Kaesehagen, 1995, *Bushland Condition Mapping*, IN Invasive Weeds and Regenerating Ecosystems in Western Australia, Proceedings of Conference held at Murdoch University, July 1994, Institute for Science and Technology Policy, Murdoch University.

Playford, P E, 1988, *Guidebook to the Geology of Rottnest Island*, Geological Survey of Western Australia Excursion Guidebook No 2.

Playford, P E, A E Cockbain and G H Low, 1976, *Geology of the Perth Basin Western Australia*, Geological Survey of Western Australia Bulletin 124.

Rockwater 2009*, Dawesville to Binningup Technical Environmental Studies, Hydrogeology Study*, prepared for the DEC.

Semeniuk V and C, 2009, *Quaternary geology, landforms and wetlands between Dawesville and Binningup – Description, key features and geoheritage significance* prepared by the DEC.

Tiller K G, 1993, Micronutrients, IN Soils and Australian Viewpoint, CSIRO

Western Australian Planning Commission, 2012*, Basic Raw Materials Demand and Supply Study for the Bunbury - Busselton Region*

Western Australia, Western Australian Planning Commission*, State Planning Policy 2.4.*

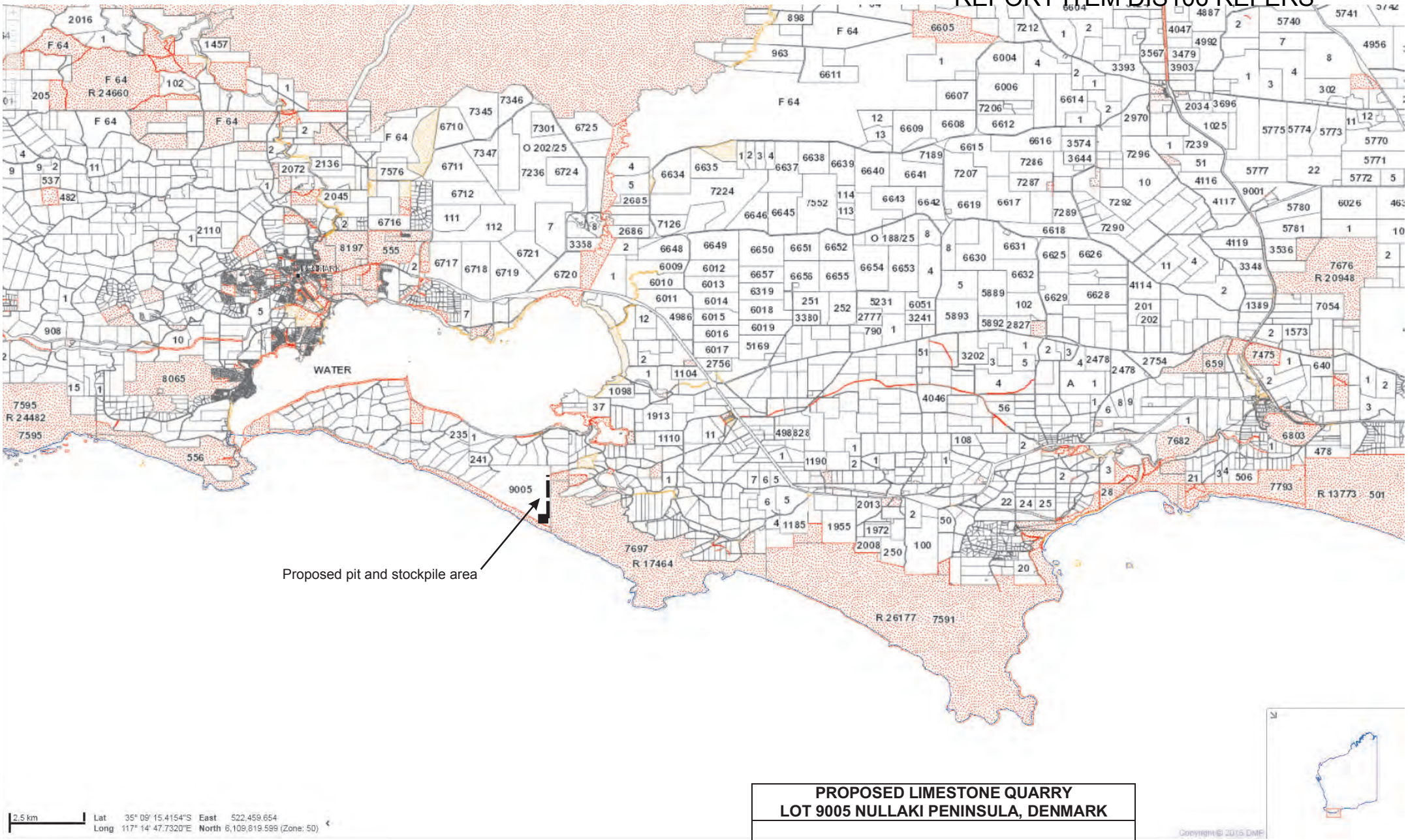
Western Australia, Western Australian Planning Commission*, State Planning Policy 2.5.*

Western Australian Museum, (undated) *Faunal Studies of the Northern Swan Coastal Plain.*

Western Australian Planning Commission, *Statement of Planning Policy No 4.1, State Industrial Buffer Policy, (draft July 2004).*

Western Australian Water Quality Guidelines for Fresh and Marine Waters, EPA Bulletin 711, 1*993.*

Willett, I R, 1993, *Oxidation-reduction reactions* IN Soils and Australian Viewpoint,

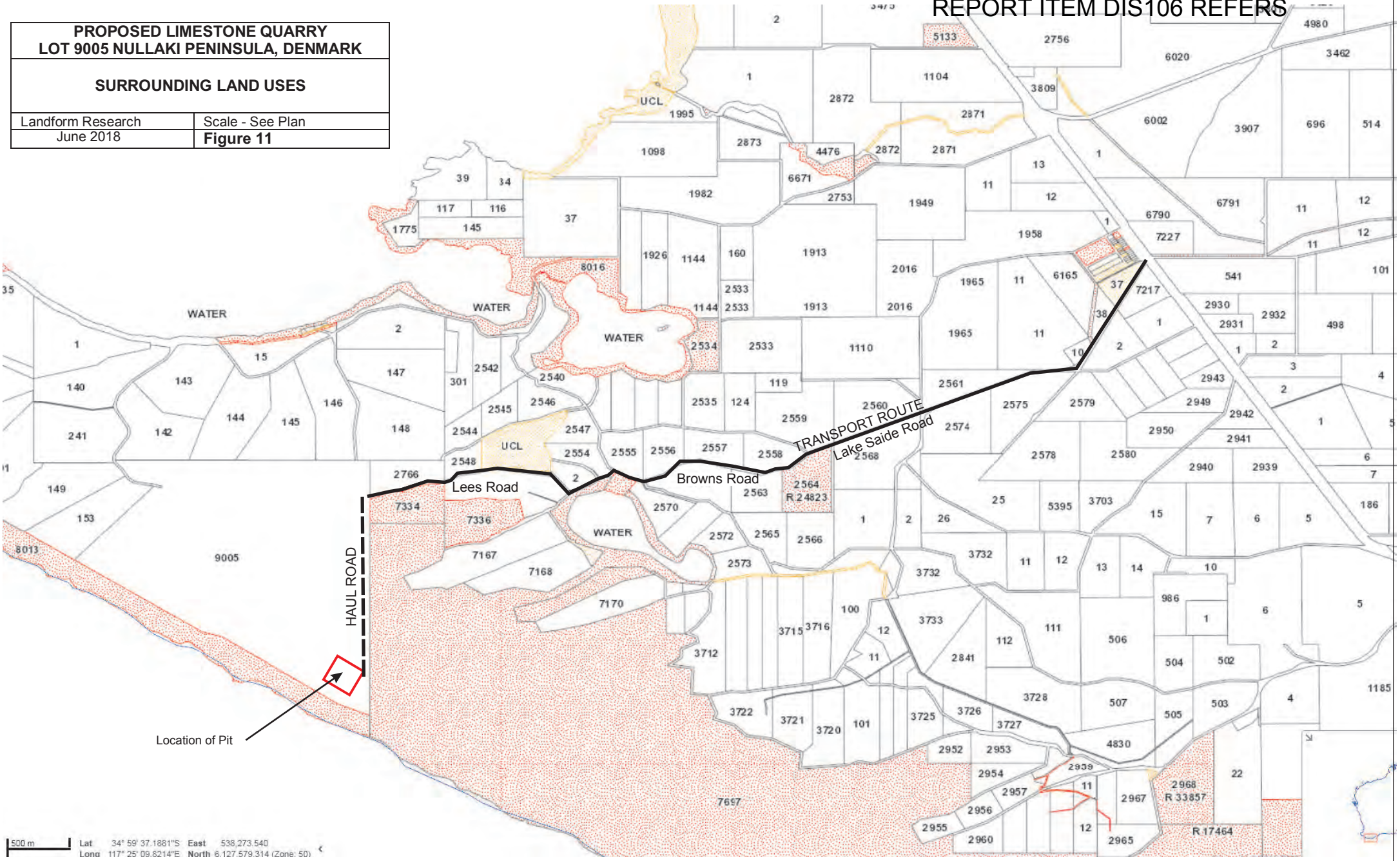


PROPOSED LIMESTONE QUARRY
LOT 9005 NULLAKI PENINSULA, DENMARK

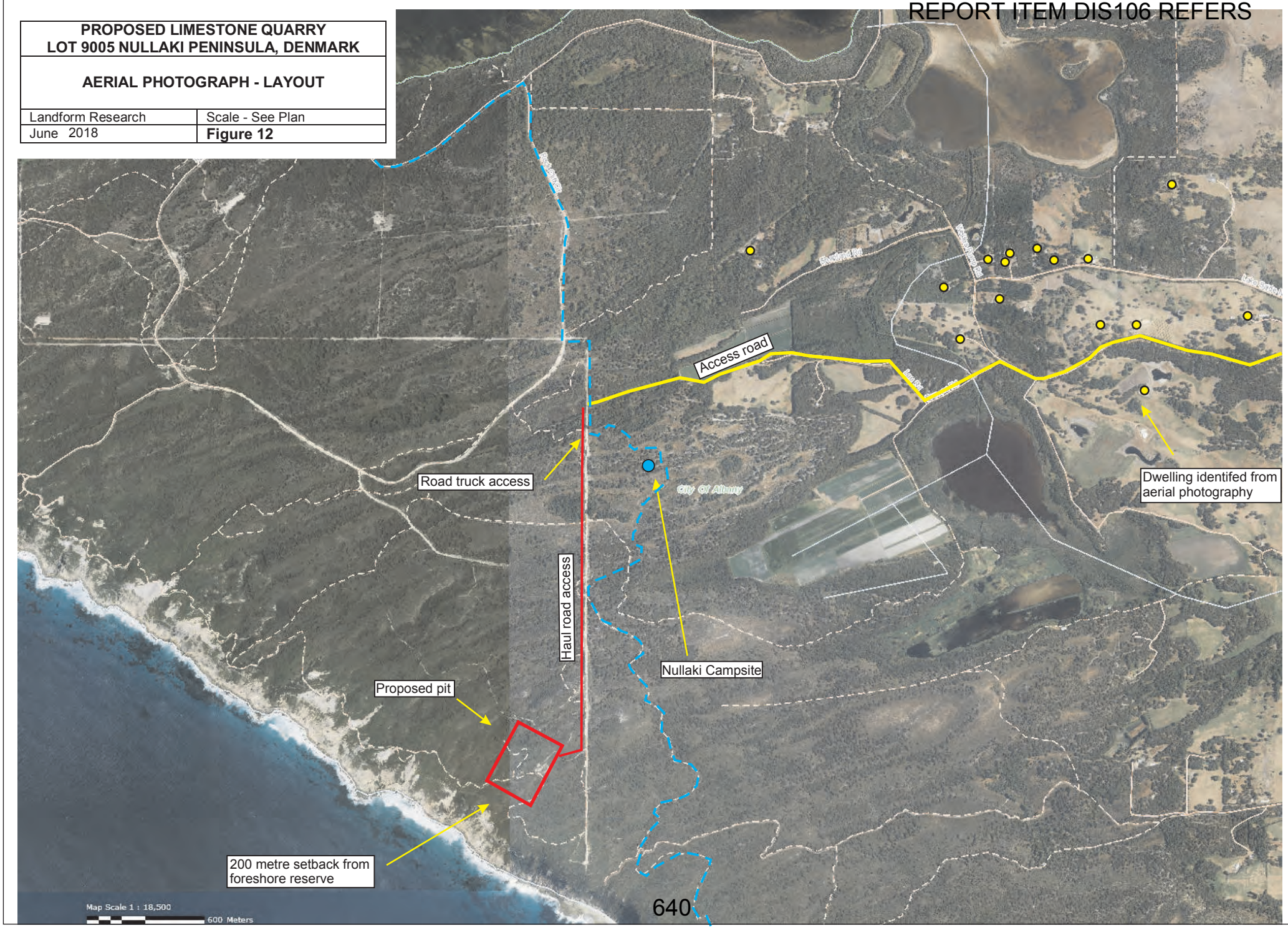
LOCATION

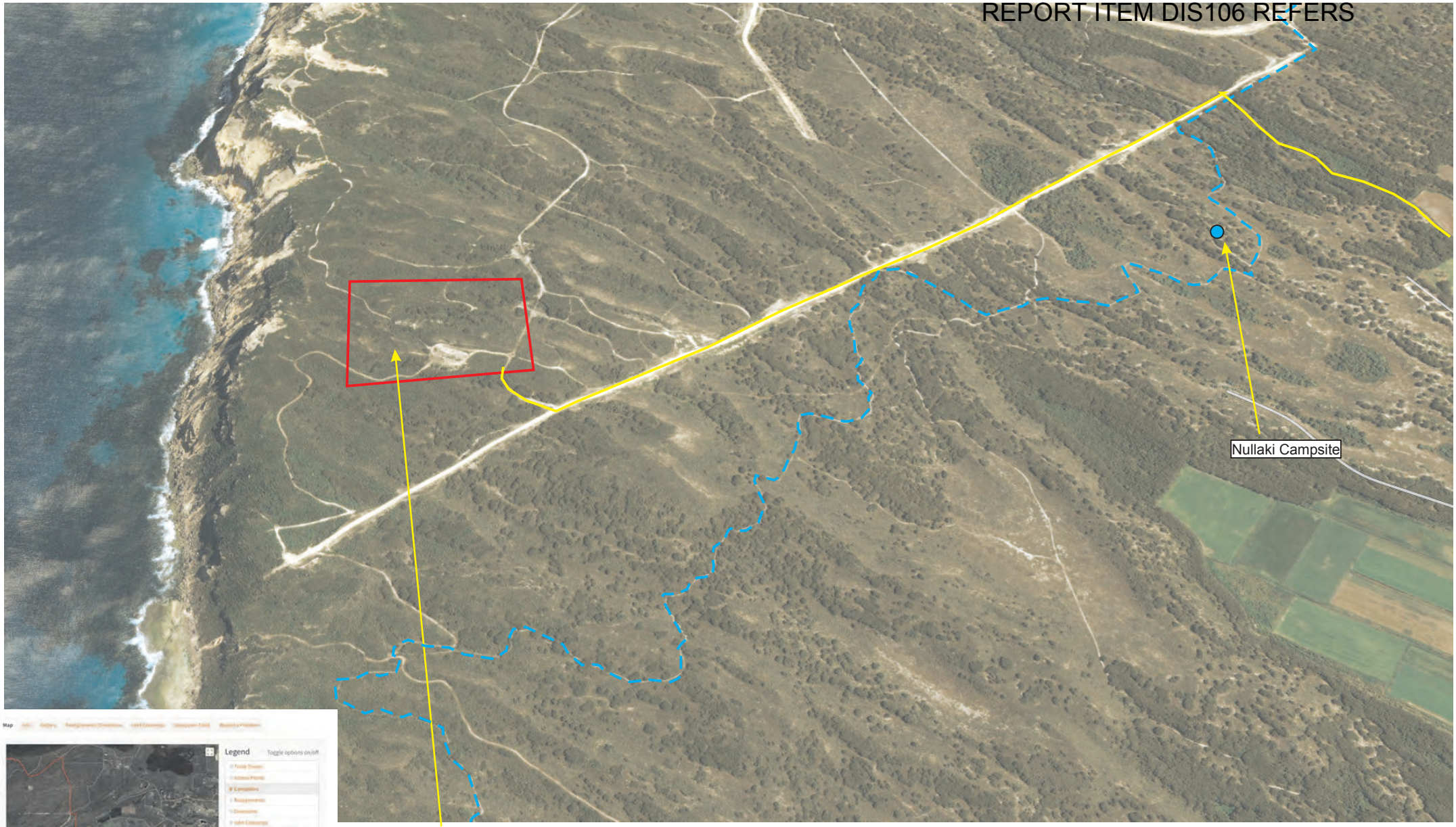
Landform Research	Scale - See Plan
June 2016	**Figure 10**

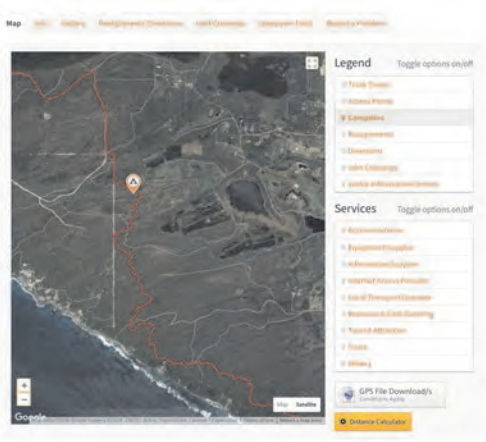
PROPOSED LIMESTONE QUARRY LOT 9005 NULLAKI PENINSULA, DENMARK	
SURROUNDING LAND USES	
Landform Research	Scale - See Plan
June 2018	**Figure 11**



PROPOSED LIMESTONE QUARRY LOT 9005 NULLAKI PENINSULA, DENMARK	
AERIAL PHOTOGRAPH - LAYOUT	
Landform Research	Scale - See Plan
June 2018	**Figure 12**







Aerial - Oblique view from the east showing the pit location and stockpile area

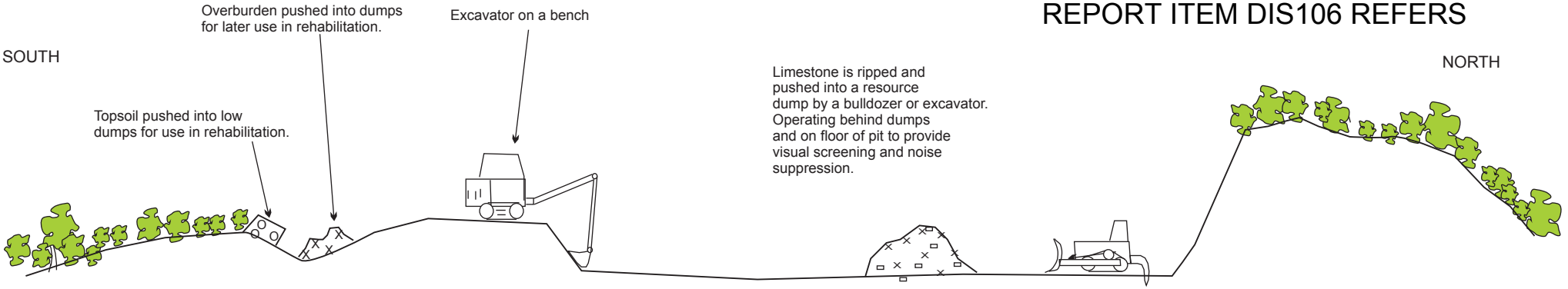
The arrows show the direction of excavation, behind the active face providing visual protection. See also Figure 14.

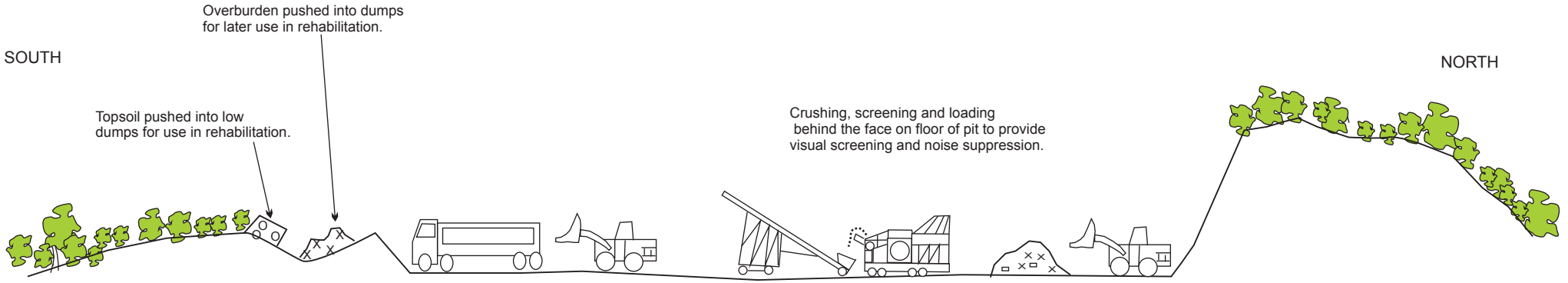
Access road

Bibbulmum Track

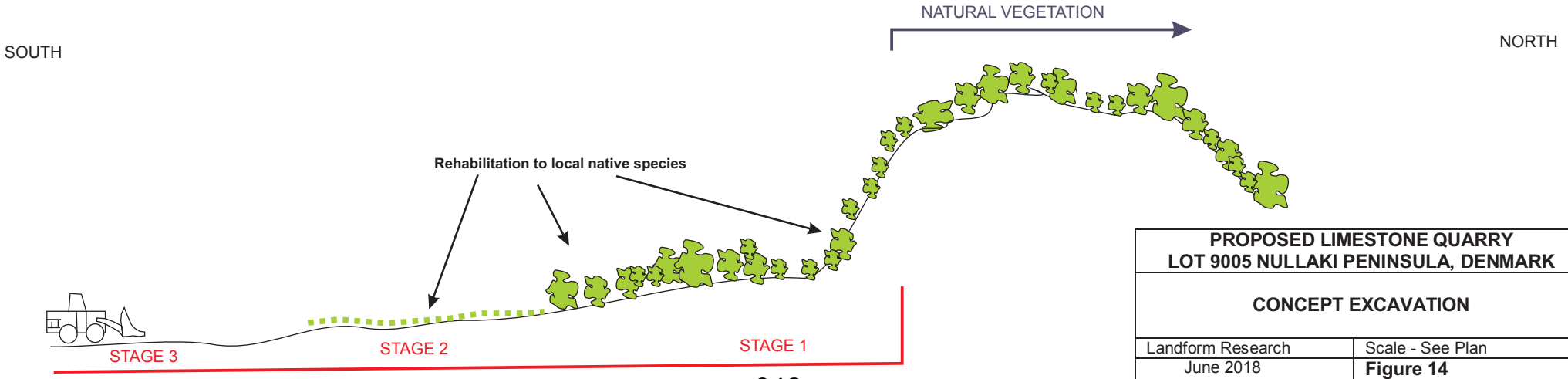
PROPOSED LIMESTONE QUARRY LOT 9005 NULLAKI PENINSULA, DENMARK	
AERIAL PHOTOGRAPH - OBLIQUE VIEW	
Landform Research	Scale - See Plan
June 2018	**Figure 13**

REPORT ITEM DIS106 REFERS





LAND RESTORATION



PROPOSED LIMESTONE QUARRY LOT 9005 NULLAKI PENINSULA, DENMARK	
CONCEPT EXCAVATION	
Landform Research	Scale - See Plan
June 2018	**Figure 14**

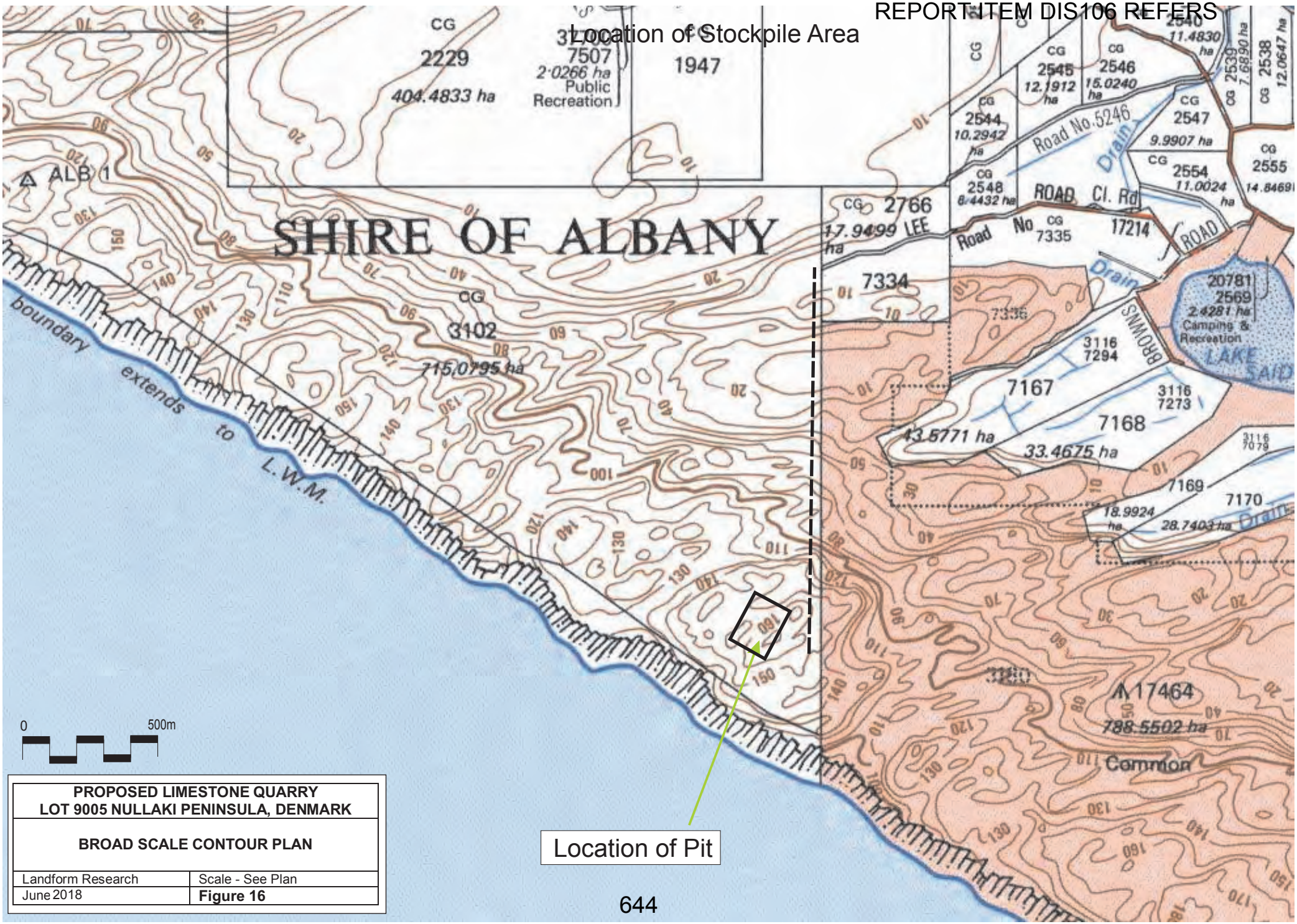
Bulldozer ripping and crushing limestone

Loader feeding a small mobile crusher

Loader, loading limestone

Loading a road truck

PROPOSED LIMESTONE QUARRY LOT 9005 NULLAKI PENINSULA, DENMARK	
TYPICAL EXCAVATION EQUIPMENT	
Landform Research	Scale - See Plan
June 2016	**Figure 15**



PROPOSED LIMESTONE QUARRY LOT 9005 NULLAKI PENINSULA, DENMARK	
BROAD SCALE CONTOUR PLAN	
Landform Research	Scale - See Plan
June 2018	**Figure 16**

REPORT ITEM DIS106 REFERS

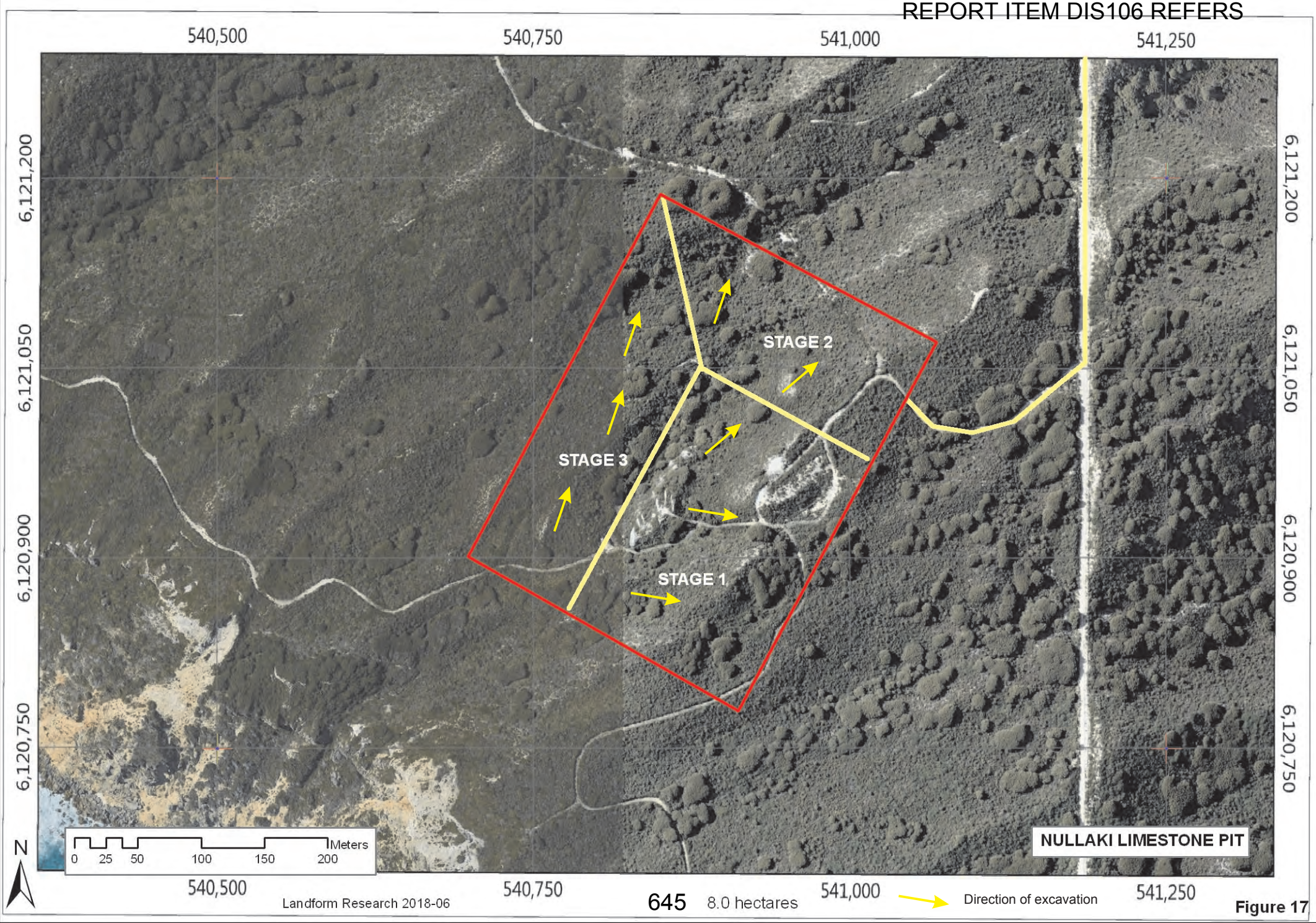


Figure 17

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TABEC Civil Engineering Consultants

PROJECT DENMARK VIEWSHED

TITLE NULLAKI PENINSULA EXISTING VIEWLINES

DRAWING NUMBER S171-SK-001 ISSUE E

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Figure 18

Excavation and Rehabilitation Management Plan

PROPOSED AGRICULTURAL LIME QUARRY

Lot 9005
Nullaki Peninsula
City of Albany

Proponent
Graeme Robertson
PO Box 114
Denmark WA 6333

Appendices

JUNE 2018

1 Index of appendices

Vegetation Communities Survey

Kathryn Kinnear

Bio Diverse Solutions

19/04/2016

BIO DIVERSE SOLUTIONS

TABLE OF CONTENTS

1.3 Geology, geomorphology and soils

The topography of most of the survey area is dominated by a gently undulating plain sloping to the coast with numerous small drainage lines. The coastal fringe is dominated by coastal dune systems, limestone headlands and cliffs (Churchward *et al.* 1988).

Geologically the area is underlain by Proterozoic rocks including granites and metamorphic gneiss of the Albany Fraser Province which are exposed as hills to 360 meters high along the coastal and near coastal fringe (Muhling and Brakel 1985). Along the coastal fringe the Quaternary sediments of the Tamala Limestone may be present and are overlain by dunes systems.

1.4 Regional context

The survey area lies within the Southwest Botanical Province and forms part of the Southwest Australian Biodiversity Hotspot, one of 34 internationally recognised biodiversity hotspots (Myers *et al.* 2000). It occurs in the eastern portion of the Warren Interim Bio-geographic Regional Area (IBRA), which runs along the coast from just south of Yallingup to south of the Princess Royal Harbour near Albany (IBRA 2012).

The Warren bioregion is described as a combination of hills, plateaux and plains and features four main soil types including loamy soils supporting karri forest; red laterites supporting jarrah-marri forests; leached sandy soils in depressions and as plains supporting low jarrah woodlands and paperbark/sedge swamps, and; holocene marine dunes supporting *Agonis flexuosa* thickets, *Banksia* woodlands and heaths (McKenzie *et al.* 2002).

Notable values of this bioregion include tall forests (karri, jarrah and tingle), which provide a refuge for relictual invertebrates; barren limestone areas with underground drainage systems (karst regions) that support an endemic invertebrate fauna; peat or organic wetland systems that support relictual populations of aquatic invertebrates; mound-forming microbial associations in the west of the region; and a highly endemic flora and fauna, especially in plant groups such as Myrtaceae, Rutaceae, Proteaceae, Papillionaceae, Restionaceae, Stylidiaceae and Sterculiaceae (McKenzie *et al.* 2002).

Gondwanan invertebrate fauna include: the Tingle *Bertmainius* trapdoor spider and Torndirrup's *Austrarchaea mainae* spider, *Dardarus sp.* millipede, *Cynotelopus notabilis* pill millipede and velvet worms. A number of notable critical weight range mammals also persist in the region, including the quokka, southern brown bandicoot, chuditch and brush-tailed phascogale.

The eastern limit of the bio region marks the transition zone from the more mesic forested south west of Western Australia to the drier interior and eastern coastal areas that are vegetated by mallee, woodland and shrubland associations.

2.2 Flora survey outcomes

During the field survey 112 species, consisting of 39 families and 70 genera were found. The most common families were Fabaceae, Cyperaceae, Proteaceae, Myrtaceae and Ericaceae. This list includes 103 native species (Table 1) and nine introduced species (Table 3). Two species of priority flora were found within the survey area including: *Banksia sessilis var cordata* (Priority 2) and *Billardiera drummondii* (Priority 4).

See Appendix B for definitions of the conservation codes.

Table 1: Native flora species recorded within survey area

Family	Species	Common Name
Aizoaceae	*Carpobrotus sp.*	Pigface
Anarthriaceae	*Anarthria prolifera*	
Anarthriaceae	*Lyginia barbata*	
Anarthriaceae	*Lyginia imberbis*	
Apiaceae	*Platysace compressa*	Tapeworm Plant
Araliaceae	*Trachymene pilosa*	
Asparagaceae	*Chamaescilla corymbosa*	Blue Squill
Asparagaceae	*Lomandra pauciflora*	
Asteraceae	*Olearia axillaris*	Coastal Daisybush
Asteraceae	*Sonchus oleraceus*	Common Sowthistle
Casuarinaceae	*Allocasuarina humilis*	Dwarf Sheoak
Chenopodiaceae	*Rhagodia baccata subsp. baccata*	Coastal Salt Bush
Colchicaceae	*Burchardia multiflora*	Dwarf Burchardia
Cyperaceae	*Baumea juncea*	Bare Twigrush
Cyperaceae	*Cyathochaeta avenacea*	
Cyperaceae	*Cyathochaeta equitans*	
Cyperaceae	*Ficinia nodosa*	Knotted Club Rush
Cyperaceae	*Gahnia decomposita*	
Cyperaceae	*Gahnia trifida*	Coast Saw-sedge
Cyperaceae	*Lepidosperma effusum*	Spreading Sword-sedge)
Cyperaceae	*Lepidosperma gladiatum*	Coast Sword-sedge
Cyperaceae	*Lepidosperma gracile*	Slender Sword Sedge
Cyperaceae	*Lepidosperma squamatum*	
Cyperaceae	*Mesomelaena graciliceps*	
Cyperaceae	*Mesomelaena tetragona*	Semaphore Sedge
Cyperaceae	*Tetraria octandra*	
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Dilleniaceae	*Hibbertia cuneiformis*	Cutleaf Hibbertia
Dilleniaceae	*Hibbertia furfuraceae*	
Dilleniaceae	*Hibbertia racemosa*	Stalked Guinea Flower
Droseraceae	*Drosera erythrogyne*	

Table 1 continued: **Native flora species recorded within survey area**

Family	Species	Common Name
Poaceae	*Microlaena stipoides*	Weeping Grass
Poaceae	*Tetrarrhena laevis*	Forrest Ricegrass
Polygalaceae	*Comesperma confertum*	
Polygonaceae	*Muehlenbeckia adpressa*	Climbing Lignum
Polygonaceae	*Persicaria capitata*	
Proteaceae	*Adenanthos cuneatus*	Coastal Jugflower
Proteaceae	*Banksia attenuata*	Slender Banksia
Proteaceae	*Banksia grandis*	Bull Banksia
Proteaceae	*Banksia littoralis*	Swamp Banksia
Proteaceae	*Banksia sessilis var cordata (P2)*	Parrot Bush
Proteaceae	*Hakea prostrata*	Harsh Hakea
Proteaceae	*Hakea ruscifolia*	Candle-spike Hakea
Proteaceae	*Hakea varia*	Variable Leaved Hakea
Proteaceae	*Synaphea sp*	
Ranunculaceae	*Clematis pubescens*	Common Clematis
Restionaceae	*Desmocladus flexuosus*	
Restionaceae	*Hypolaena exsulca*	
Restionaceae	*Leptocarpus tenax*	Slender Twine Rush
Restionaceae	*Loxocarya cinerea*	
Rhamnaceae	*Spyridium globulosum*	Basket Bush
Rhamnaceae	*Trymalium odoratissimum*	
Rubiaceae	*Opercularia hispidula*	Hispid Stinkweed
Rubiaceae	*Opercularia vaginata*	Dog Weed
Rutaceae	*Boronia crenulata*	Aniseed Boronia
Rutaceae	*Crowea angustifolia var. angustifolia*	
Santalaceae	*Exocarpos sparteus*	Broom Ballart
Solanaceae	*Anthocercis littorea*	Yellow Tailflower
Thymelaeaceae	*Pimelea clavata*	
Thymelaeaceae	*Pimelea rosea subsp. rosea*	Coastal Banjine
Xanthorrhoeaceae	*Xanthorhoea gracilis*	
Xanthorrhoeaceae	*Xanthorrhoea preissii*	Grass Tree
Zamiaceae	*Macrozamia reidlei*	Zamia

2.3.2 *Banksia Woodland*

Description: Occurs on lower slopes. The overstorey consists of a canopy of large, mature *Banksia littoralis,* with *Banksia attenuata* co-dominant in some areas and occasional *Eucalyptus marginata* subsp. *marginata*. The understorey consists of an open heath over a low shrubland and sedgeland. Common understorey species include *Jacksonia horrida, Pultenaea reticulata, Adenanthos cuneatus, Leucopogon obovatus, Acacia pulchella, Hibbertia racemosa, Anarthria scabra, Anarthria prolifera, Lyginia barbata, Cyathochaeta equitans, Lepidosperma squamatum, Mesomelaena graciliceps* and *Desmocladus flexuosus.*

Floristic Summary:

Lifeform	Species
Trees <10m	*Banksia littoralis, Banksia attenuata* and *Eucalyptus marginata subsp. marginata*
Shrubs 1-2m	*Jacksonia horrida, Pultenaea reticulata, Adenanthos cuneatus, Leucopogon obovatus, Leucopogon parviflorus, Acacia pulchella, Hovea elliptica* and *Spyridium globulosum*
Shrubs 0.5-1m	*Hibbertia racemosa* and *Leucopogon propinquus*
Sedges and rushes	*Anarthria scabra, Anarthria prolifera, Lyginia barbata, Cyathochaeta equitans, Lepidosperma squamatum, Mesomelaena graciliceps, Mesomelaena tetragona, Desmocladus flexuosus* and *Loxocarya cinerea*
Herbs and grasses	*Opercularia hispidula*

2.3.4 Coastal Scrub

Description: Occurs in the western portion of the survey area and is characterised by dense shrubs and mallees that form a tall (1.5-3m), closed canopy. On the crests the overstorey is dominated by *Eucalyptus angulosa,* and in the more protected swales the overstorey is dominated by *Scaevola nitida* with some *Banksia sessilis var. cordata* (P2) in the southern areas. Other common shrubs include *Acacia littoralis, Leucopogon parviflorus, Spyridium globulosum* and *Agonis flexuosa.* Common sedges and rushes include: *Anarthria prolifera, Lepidosperma gladiatum, Desmocladus flexuosus* and *Loxocarya cinerea.*

Floristic Summary:

Lifeform	Species
Trees <10m	*Eucalyptus angulosa*
Shrubs >2m	*Scaevola nitida, Banksia sessilis var. cordata (P2), Acacia littoralis, Leucopogon parviflorus, Spyridium globulosum* and *Agonis flexuosa*
Shrubs 1-2m	*Exocarpos sparteus*
Shrubs 0.5-1m	*Olax phyllanthi*
Shrubs <0.5m	*Lysinema ciliatum* and *Conostylis aculeata subsp. aculeata*
Sedges and rushes	*Anarthria prolifera, Lepidosperma gladiatum, Desmocladus flexuosus* and *Loxocarya cinerea*
Herbs and grasses	*Clematis pubescens* and *Opercularia vaginata*

2.3.6 Open Heath

Description: Occurs in swales, flats and on crests of dunes. Where overstorey is present, it consists of low and scattered *Agonis flexuosa, Acacia cyclops* or *Banksia attentuata* in flats with low thickets of *Agonis flexuosa* on ridgelines and in swales. The southern areas closest to the coast have a complete absence of overstorey. The understorey consists of a diverse mix of species. Those most dominant include: *Hakea varia, Allocasuarina humilis, Jacksonia horrida, Pultenaea reticulata, Spyridium globulosum, Adenanthos cuneatus* and *Banksia attenuata.* A mix of sedges, herbs and grasses form the basis of the groundcover, some of which include: *Lyginia imberbis, Lyginia barbata, Lepidosperma squamatum, Desmocladus flexuosus, Hypolaena exsulca* and *Opercularia hispidula.*

Floristic Summary:

Lifeform	Species
Trees <10m	*Agonis flexuosa*
Shrubs >2m	*Agonis flexuosa, Agonis theiformis, Acacia cyclops, Spyridium globulosum* and *Hakea varia.*
Shrubs 1-2m	*Allocasuarina humilis, Pteridium esculentum, Jacksonia horrida, Pultenaea reticulata* and *Xanthorrhoea preissii*
Shrubs 0.5-1m	*Hibbertia cuneiformis, Hibbertia racemosa, Leucopogon obovatus, Leucopogon parviflorus, Leucopogon propinquus, Lysinema ciliatum, Pimelea clavata, Pimelea rosea subsp. rosea, Anigozanthos flavidus, Hakea prostrata, Adenanthos cuneatus* and *Xanthorhoea gracilis*
Shrubs <0.5m	*Rhagodia baccata subsp. baccata, Andersonia caerulea, Gompholobium confertum, Boronia crenulata* and *Synaphea sp.*
Sedges and rushes	*Lyginia imberbis, Lyginia barbata, Lepidosperma squamatum, Tetraria octandra, Desmocladus flexuosus* and *Hypolaena exsulca*
Herbs and grasses	*Carpobrotus sp., Platysace compressa, Trachymene pilosa, Chamaescilla corymbosa, Drosera erythrogyne,* and *Opercularia hispidula*

2.3.8 Sessilis Thicket

Description: Occurs on coastal dunes with a southerly aspect in the southern portion of the survey area. Tall shrub layer (2-4m) dominated by *Banksia sessilis var. cordata* (P2) over a dense sedge layer dominated by *Lepidosperma gladiatum*.

Floristic Summary:

Lifeform	Species
Shrubs >2m	*Olearia axillaris, Scaevola nitida, Spyridium globulosum* and *Exocarpos sparteus*
Sedges and rushes	*Lepidosperma gladiatum, Desmocladus flexuosus and Loxocarya cinerea*

2.3.10 Tree Mallee

Description: Occurs on slopes and in protected swales within the coastal scrub vegetation in the western portion of the survey area. The mallees form a tall (5-15 m) closed woodland dominated by *Eucalyptus angulosa. Banksia sessilis var. cordata* (P2) is a common co-dominant or sub-dominant canopy species. The understory is dominated by *Spyridium globulosum, Acacia littoralis, Lepidosperma gladiatum, Desmocladus flexuosus* and *Loxocarya cinerea.*

Floristic Summary:

Lifeform	Species
Trees <10m	*Eucalyptus angulosa*
Shrubs >2m	*Scaevola nitida, Banksia sessilis var. cordata* (P2), *Acacia littoralis, Leucopogon parviflorus, Spyridium globulosum* and *Agonis flexuosa*
Shrubs 1-2m	*Exocarpos sparteus*
Shrubs 0.5-1m	*Olax phyllanthi*
Shrubs <0.5m	*Lysinema ciliatum* and *Conostylis aculeata subsp. aculeata*
Sedges and rushes	*Anarthria prolifera, Lepidosperma gladiatum, Desmocladus flexuosus* and *Loxocarya cinerea*
Herbs and grasses	*Clematis pubescens* and *Opercularia vaginata*

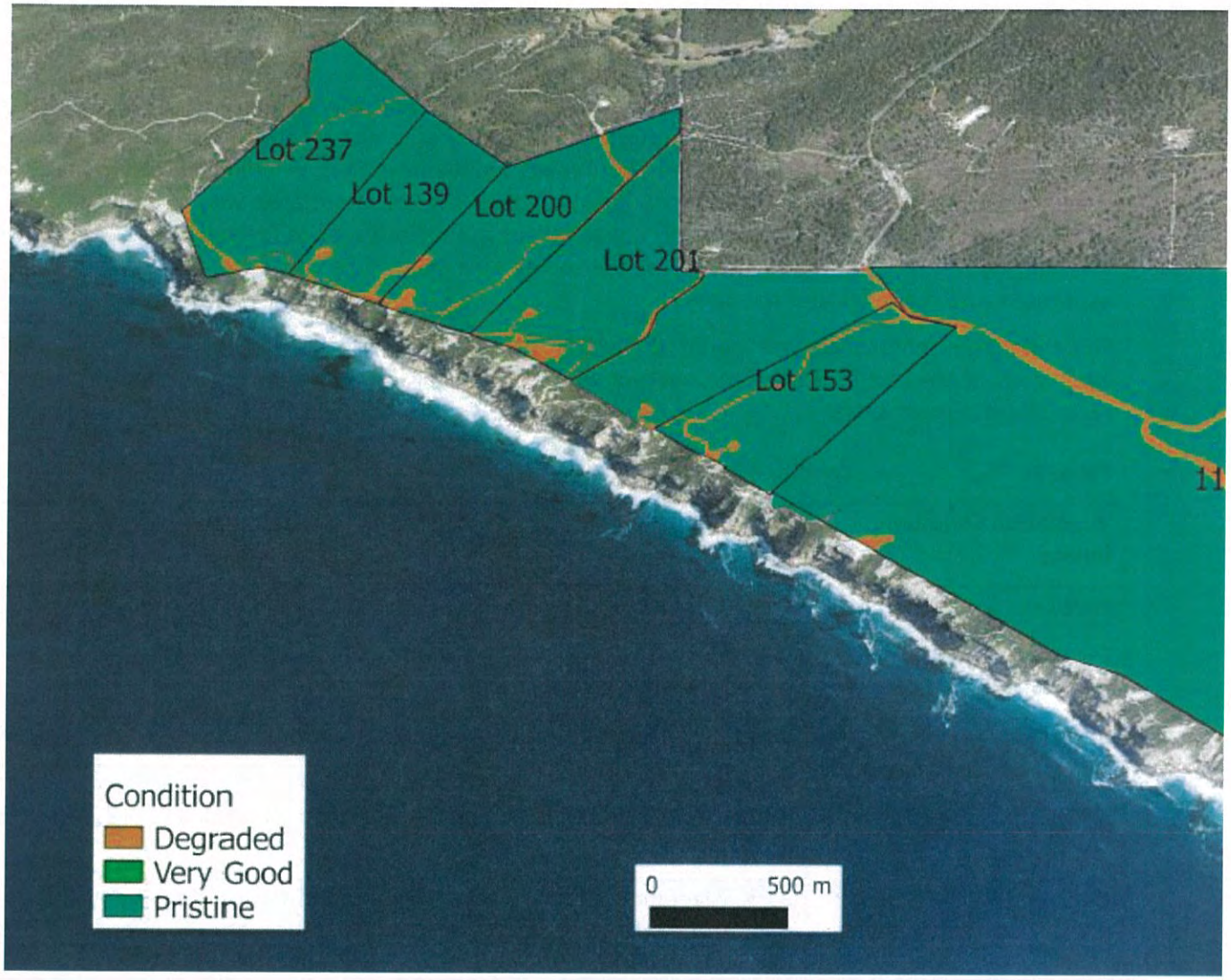


Figure 3: **Vegetation condition mapped within survey area**

2.5 Weeds

Of the 112 species recorded within the survey area, nine (<1%) were introduced species (Table 3).

Table 3: Weed species recorded from the survey area

Family	Species	Common Name	BAM Rating	EWS Rating
Asteraceae	*Conyza bonariensis*	Fleabane	None	Low
Asteraceae	*Hypochaeris glabra*	Smooth Catsear	None	Moderate
Asteraceae	*Hypochaeris radicata*	Flatweed	None	None
Geraniaceae	*Pelargonium capitatum*	Rose Pelargonium	None	High
Poaceae	*Cynodon dactylon*	Couch	None	Moderate
Poaceae	*Ehrharta longiflora*	Annual Veldt Grass	None	Moderate
Primulaceae	*Anagallis arvensis var. arvensis*	Scarlett Pimpernel	None	Mild
Solanaceae	*Solanum nigrum*	Blackberry Nightshade	None	Moderate
Typhaceae	*Typha orientalis*	Bulrush	None	High

Overall the main weed invaded area was associated a drainage line on the eastern boundary, which has resulted in the movement of aggressively invasive weeds such as *Typha orientalis* into the sedgeland.

Of the weeds recorded, none are declared agricultural weeds under the *Biosecurity and Agriculture Management Act 2007* and two species have been assigned a high priority for control in the Environmental Weeds Strategy for Western Australia (CALM 1999). These species include: *Pelargonium capitatum* (Rose Pelargonium) and *Typha orientalis* (Bulrush). The strategy classifies weeds according to their relative level of threat to conservation (high medium or low) and this rating is based their distribution, relative level of invasiveness and environmental impact (Appendix D).

3 SUMMARY

The survey area contains a high diversity of vegetation communities ranging from open heath, coastal scrub and sedgelands through to tree mallees, woodlands and forests with a range of dominant canopy species and a diverse range of shrub, sedge and herbs comprising the understorey. Most vegetation is in pristine condition, with no sign of *Phytophthora, Armilaria* or Cankers. The only area with any evidence of degradation is a small sedgeland on the eastern boundary where weeds have invaded as a result of roadwork and drainage from off-site. Targeted threatened flora surveys were not undertaken as a part of the scope of works, however two priority listed flora species were located during the vegetation mapping, including *Billardiera drummondii* (P4) and *Banksia sessilis var cordata* (P2).

5 APPENDICES

APPENDIX A: Flora and Fauna Species Identified within 5 km of Survey area Through Nature Map
Generated from Nature Map (DPaW 2016) on 6 April 2016

865. 15429 Acacia alata var. alata
866. 3247 Acacia browniana
867. 11731 Acacia browniana var. browniana
868. 3262 Acacia cochlearis (Rigid Wattle)
869. 3282 Acacia cyclops (Coastal Wattle)
870. 3307 Acacia divergens
871. 3331 Acacia extensa (Wiry Wattle)
872. 3347 Acacia gilbertii
873. 3363 Acacia hastulata
874. 18217 Acacia iteaphylla Y
875. 3424 Acacia littorea
876. 3428 Acacia luteola
877. 3453 Acacia myrtifolia
878. 3484 Acacia pentadenia (Karri Wattle)
879. 35624 Acacia pentadenia subsp. pentadenia
880. Acacia provincialis Y
881. 3502 Acacia pulchella (Prickly Moses)
882. 15482 Acacia pulchella var. goadbyi
883. 15483 Acacia pulchella var. pulchella
884. 3523 Acacia robiniae
885. 30036 Acocia saligna subsp. stolonifera
886. 3530 Acacia scolpelliformis
887. 3576 Acacia tetragonocarpa
888. 3588 Acacia uliginosa
889. 3591 Acacia urophylla
890. 15487 Acacia varia var. varia
891. 3602 Acacia willdenowiana (Grass Wattle)
892. 3185 Acaena novae-zelandiae Y
893. 1208 Acanthocarpus preissii
894. 13146 Acetabularia peniculus
895. 17774 Acetosella vulgaris Y
896. 10824 Acidonia micracarpa
897. 6295 Acrotriche cordata (Coast Ground Berry)
898. 5315 Actinodium cunninghamii (Albany Daisy)
899. 6203 Actinotus glomeratus
900. 6206 Actinotus omnifertilis
901. 1773 Adenanthos cuneatus (Coastal Jugflower)
902. 1791 Adenanthos obovatus (Basket Flower)
903. 5316 Aganis flexuosa (Peppermint, Wonil)
904. 17202 Agonis flexuosa var. flexuosa
905. 17203 Agonis flexuasa var. latifolia
906. Agonis sp.
907. 19789 Agonis theiformis
908. 177 Agrostis capillaris Y
909. Agrostis sp.
910. 182 Agrostis stolonifera (Creeping Bent) Y
911. 23474 Agrostacrinum hirsutum

963. 20249 Astartea leptophylla
964. 45213 Astartea pulchella
965. 20283 Astartea scoparia
966. Astartea sp.
967. Asterella drummondii
968. 7851 Asteridea pulverulenta (Common Bristle Daisy)
969. 6325 Astroloma drummondii
970. Astroloma sp.
971. 2462 Atriplex hypoleuca
972. 2471 Atriplex prostrata (Hastate Orache) Y
973. 17240 Austrostipa flavescens
974. 17241 Austrostipa hemipogon
975. 17245 Austrostipa mollis
976. 17253 Austrostipa semibarbata
977. 231 Avellinia michelii Y
978. 233 Avena barbata (Bearded Oat) Y
979. 20013 Axonopus fissifolius Y
980. 5364 Baeckea pygmaea
981. 1800 Banksia attenuata (Slender Banksia, Piara)
982. 1819 Banksia grandis (Bull Banksia, Pulgarla)
983. 1822 Banksia ilicifolia (Holly-leaved Banksia)
984. 1830 Banksia littoralis (Swamp Banksia, Pungura)
985. 1837 Banksia occidentalis (Red Swamp Banksia)
986. 1844 Banksia quercifolia (Oak-leaved Banksia)
987. 1848 Banksia seminuda (River Bonksia)
988. 32084 Banksia serra (Serrate-leaved Dryandra) P4
989. 32315 Barbula calycina
990. 739 Baumea acuta (Pale Twig-rush)
991. 741 Baumea articulata (Jointed Rush)
992. 743 Baumea juncea (Bare Twigrush)
993. 744 Baumea laxa
994. 745 Baumea preissii
995. 747 Baumea rubiginosa
996. 5381 Beaufortia decussata (Gravel Bottlebrush)
997. 5392 Beaufortia sparsa (Swamp Bottlebrush)
998. 3154 Billardiera coriacea
999. 25787 Billardiera drummondii
1000. 3157 Billardiera floribunda (White-flowered Billardiera)
1001. 25798 Billardiera fusiformis (Australian Bluebell)
1002. 25796 Billardiera heterophylla (Australian Bluebell)
1003. 3159 Billardiera laxiflora
1004. Billardiera sp.
1005. 3165 Billardiera variifolia
1006. 749 Bolboschoenus caldwellii (Marsh Club-rush)
1007. 4403 Boronia alata (Winged Boronia)
1008. 4413 Boronia crenulata (Aniseed Boronia)
1009. 11503 Boronia crenulata var. crenulata
1010. 4416 Boronia denticulata
1011. 4422 Boronia gracilipes (Karri Boronia)
1012. 4423 Boronia heterophylla (Kalgan Boronia)
1013. 16631 Boronia juncea subsp. micrantha

1065. 32338 Campylopus introflexus Y
1066. 7909 Corduus pycnocephalus (Slender Thistle) Y
1067. 2956 Cassytha pomiformis (Dodder Laurel)
1068. 2957 Cassytha racemosa (Dodder Laurel)
1069. 11799 Cassytha racemosa forma racemosa
1070. 41564 Cenchrus clandestinus (Kikuyu Grass) Y
1071. 6539 Centaurium erythraea (Common Centaury) Y
1072. 6542 Centaurium tenuiflorum Y
1073. 6214 Centella asiatica
1074. 7367 Centranthus ruber (Red Valerian) Y
1075. 35322 Centranthus ruber subsp. ruber Y
1076. 1121 Centrolepis aristata (Pointed Centrolepis)
1077. 1125 Centrolepis drummondiana
1078. 1133 Centrolepis pilosa
1079. 1134 Centrolepis polygyna (Wiry Centrolepis)
1080. 3148 Cephalotus follicularis (Albany Pitcher Plant)
1081. Cephaloziella varians
1082. 13119 Cerastium balearicum Y
1083. 32462 Ceratodon purpureus subsp. convolutus
1084. 17685 Chaetanthus aristatus
1085. 1065 Chaetanthus leptocarpoides
1086. 17687 Chaetanthus tenellus
1087. Choetophyllopsis whiteleggei
1088. 1280 Chamaescilla corymbosa (Blue Squill)
1089. 3169 Cheiranthera preissiana
1090. 2483 Chenopodium album (Fat Hen) Y
1091. 2494 Chenopodium murale (Nettle-leaf Goosefoot) Y
1092. Chiloscyphus semiteres var. semiteres
1093. 17689 Chordifex laxus
1094. 2335 Choretrum lateriflorum (Dwarf Sour Bush)
1095. 4448 Chorilaena quercifolia (Chorilaena)
1096. 763 Chorizandra enodis (Black Bristlerush)
1097. 13112 Chorizema aciculare subsp. aciculare
1098. 8971 Chorizema cordatum
1099. 3754 Chorizema diversifolium
1100. 3758 Chorizema ilicifolium (Holly Flame Pea)
1101. 3760 Chorizema reticulatum (Showy Flame Pea)
1102. 13107 Chorizema retrarsum
1103. 3761 Chorizema rhombeum
1104. 14586 Chorizema spathulatum
1105. 7937 Cirsium vulgare (Spear Thistle, Scotch Thistle) Y
1106. 2929 Clematis pubescens (Common Clematis)
1107. 4550 Comesperma calymega (Blue-spike Milkwort)
1108. 4551 Comesperma ciliatum
1109. 4552 Comesperma confertum
1110. 4554 Comesperma flavum
1111. 4557 Comesperma nudiusculum
1112. Comesperma sp.
1113. 4564 Comesperma virgatum (Milkwort)
1114. 40863 Commersonia corylifolia (Hazel-leaved Rulingia)
1115. 40864 Commersonia cygnorum

1167. 10871 Daucus carota (Wild Carrot) Y
1168. 6218 Daucus glochidiatus (Australian Carrot)
1169. 3791 Daviesia alternifolia
1170. 3811 Doviesia flexuosa
1171. 3817 Daviesia inflata
1172. 17691 Desmocladus fasciculatus
1173. 16595 Desmocladus flexuosus
1174. 299 Deyeuxia quadriseta (Reed Bentgrass)
1175. 16326 Dianella brevicaulis
1176. 7487 Diaspasis filifolia (Thread-leaved Diaspasis)
1177. 306 Dichelachne crinita (Longhair Plumegrass)
1178. 32344 Dicranoloma diaphanoneuron
1179. 32346 Didymodon torquatus
1180. 40865 Dielsiadoxa lycopodioides
1181. 38261 Dielsiodoxa tamariscina P2
1182. 320 Digitaria sanguinalis (Crab Grass) Y
1183. 3011 Diplotaxis muralis (Wall Rocket) Y
1184. 3867 Dipogon lignosus (Dolichos Pea) Y
1185. 19649 Disa bracteata Y
1186. 7962 Dittrichia viscosa Y
1187. 11049 Diuris corymbosa
1188. 1638 Diuris setacea (Bristly Donkey Orchid)
1189. Diuris sp.
1190. 4765 Dodonaea humifusa
1191. 1640 Drakaea glyptodon (King-in-his-carriage)
1192. 1642 Drakaea thynniphila
1193. 13218 Drosera erythrogyne
1194. 3110 Drosera microphylla (Golden Rainbow)
1195. 3112 Drosera myriantha (Star Rainbow)
1196. 3113 Drosera neesii (Jewel Rainbow)
1197. 11768 Drosera neesii subsp. neesii
1198. 3118 Drosera pallida (Pale Rainbow)
1199. 3122 Drosera platypoda (Fan-leaved Sundew)
1200. 3124 Drosera pulchella (Pretty Sundew)
1201. 13186 Drosera roseana
1202. 3131 Drosera stolonifera (Leafy Sundew)
1203. 8914 Drosera sulphurea (Sulphur-flowered Sundew)
1204. 33480 Dysphania pumilio (Clammy Goosefoot)
1205. 32351 Eccremidium pulchellum
1206. 11105 Echinochloa crus-galli Y
1207. 6681 Echium plantagineum (Paterson's Curse) Y
1208. 347 Ehrharta calycina (Perennial Veldt Grass) Y
1209. 349 Ehrharta longiflora (Annual Veldt Grass) Y
1210. 1643 Elythranthera brunonis (Purple Enamel Orchid)
1211. 1644 Elythranthera emarginata (Pink Enamel Orchid)
1212. 1067 Empodisma gracillimum
1213. 32353 Entosthodon apophysatus
1214. 32354 Entosthodon productus
1215. 1645 Epiblema grandiflorum (Babe-in-a-cradle)
1216. 11992 Epilobium billardiereanum subsp. intermedium
1217. 373 Eragrostis brownii (Brown's Lovegrass)

1269. 10909 Gompholobium confertum
1270. 3950 Gompholobium knightianum
1271. 3954 Gompholobium polymorphum
1272. 11083 Gompholobium scabrum
1273. 3957 Gompholobium tomentosum (Hairy Yellow Pea)
1274. 3958 Gompholobium venustum (Handsome Wedge-pea)
1275. 11115 Gompholobium villosum
1276. 16746 Gonocarpus benthamii subsp. benthamii
1277. 7505 Goodenia eatoniana
1278. 7523 Goodenia leptoclada (Thin-stemmed Goodenia)
1279. 13165 Gaodenia pusilla
1280. 1977 Grevillea cirsiifolia (Varied-leaf Grevillea)
1281. 13084 Grevillea fuscolutea T
1282. 2052 Grevillea occidentalis
1283. 15991 Grevillea pulchella subsp. pulchella
1284. 2080 Grevillea quercifolia (Oak-leaf Grevillea)
1285. 2112 Grevillea trifida
1286. 908 Gymnoschoenus anceps
1287. 32390 Gymnostomum calcareum
1288. 2787 Gyrostemon sheathii
1289. 1474 Haemodorum sparsiflorum
1290. 2137 Hakea ceratophylla (Horned Leaf Hakea)
1291. 2150 Hakea cucullata (Hood Leaved Hakea)
1292. 2171 Hakea laurina (Pincushion Hakea, Kodjet)
1293. 2174 Hakea linearis
1294. 2191 Hakea oleifolia (Dungyn)
1295. 2197 Hakea prostrata (Harsh Hakea)
1296. 2203 Hakea ruscifolia (Candle Hakea)
1297. Hakea sp.
1298. 2212 Hakea sulcata (Furrowed Hakea)
1299. 6183 Haloragodendron racemosum (Shrubby Raspwort)
1300. 3961 Hardenbergia comptoniana (Native Wisteria)
1301. 32391 Hedwigia ciliata
1302. 32392 Hedwigidium integrifolium
1303. 29594 Helichrysum luteoalbum (Jersey Cudweed)
1304. 439 Hemarthria uncinata (Matgrass)
1305. 11451 Hemarthria uncinata var. uncinata
1306. 6839 Hemiandra pungens (Snakebush)
1307. 6855 Hemigenia humilis
1308. 6856 Hemigenia incana (Silky Hemigenia)
1309. 6865 Hemigenia podalyrina
1310. 5109 Hibbertia amplexicaulis
1311. 5114 Hibbertia commutata
1312. 5117 Hibbertia cuneiformis (Cutleaf Hibbertia)
1313. 5118 Hibbertia cunninghamii
1314. 5119 Hibbertia depressa
1315. 5126 Hibbertia furfuracea
1316. 5132 Hibbertia grossulariifolia
1317. 5135 Hibbertia hypericoides (Yellow Buttercups)
1318. 5144 Hibbertia micraphylla
1319. 19687 Hibbertia notibractea

1371. 1188 Juncus pallidus (Pale Rush)
1372. 1190 Juncus planifolius (Broadleaf Rush)
1373. Juncus sp.
1374. 1196 Juncus usitatus (Common Rush) Y
1375. 4036 Kennedia carinata
1376. 4037 Kennedia coccinea (Coral Vine)
1377. 1221 Kingia australis (Kingia, Pulonok)
1378. 5832 Kunzea ericifolio (Spearwood, Pondil)
1379. 17506 Kunzea ericifolia subsp. ericifolia
1380. 15498 Kunzea globrescens (Spearwood)
1381. 5841 Kunzea recurva
1382. 5844 Kunzea sulphurea
1383. 20019 Lachnagrostis filiformis
1384. 2253 Lambertia uniflora
1385. 5033 Lasiopetalum floribundum (Free Flowering Lasiopetalum)
1386. 4047 Lathyrus tingitanus (Tangier Pea) Y
1387. 4048 Latrobea brunonis
1388. 4049 Latrobea diosmifolia
1389. 4050 Latrobea genistoides
1390. 1303 Laxmannia grandiflora
1391. 1302 Laxmannia jamesii (James' Paperlily) P4
1392. 7572 Lechenaultia expansa
1393. 7590 Lechenaultia tubiflora (Heath Leschenaultia)
1394. Leionema lamprophyllum subsp. lamprophyllum
1395. 8099 Leontodon saxatilis (Hairy Hawkbit) Y
1396. Leontodon sp. Y
1397. 3021 Lepidium bonariense (Peppercress) Y
1398. 19989 Lepidium didymum Y
1399. 3042 Lepidium pseudotasmanicum P4
1400. 925 Lepidosperma angustatum
1401. 932 Lepidosperma effusum (Spreading Sward-sedge)
1402. 933 Lepidosperma gladiatum (Coast Sword-sedge, Kerbin)
1403. 934 Lepidosperma gracile (Slender Sword Sedge)
1404. 937 Lepidosperma longitudinale (Pithy Sword-sedge)
1405. Lepidosperma sp.
1406. 945 Lepidosperma squamatum
1407. 946 Lepidosperma striatum
1408. 948 Lepidosperma tetraquetrum
1409. 19833 Leptocarpus laxus
1410. Leptocarpus sp.
1411. 1082 Leptocarpus tenax (Slender Twine Rush)
1412. 17703 Leptomeria ellytes
1413. 2350 Leptomeria pauciflora (Sparse-flowered Currant Bush)
1414. 2353 Leptomeria scrobiculata
1415. 2355 Leptomeria squarrulosa
1416. 17852 Leptorhynchos scaber (Lanky Buttons)
1417. 1084 Lepyrodia drummondiana
1418. 1087 Lepyrodia hermaphrodita
1419. 1089 Lepyrodia monoica
1420. 1090 Lepyrodia muirii
1421. Lethocolea pansa

1473. 1244 Lamandra sanderi
1474. 1246 Lomandra suaveolens
1475. 4059 Lotus angustissimus (Narrowleaf Trefoil) Y
1476. 8564 Lotus subbiflorus Y
1477. 4063 Latus uliginosus (Greater Lotus) Y
1478. 1092 Loxocarya cinerea
1479. 1097 Lyginia barbata
1480. 18049 Lyginia imberbis
1481. 1656 Lyperanthus serratus (Rattle Beak Orchid)
1482. 6456 Lysinema ciliatum (Curry Flower)
1483. 6457 Lysinema canspicuum
1484. 34736 Lysinema pentapetalum
1485. 5281 Lythrum hyssopifolia (Lesser Loosestrife) Y
1486. 18119 Macrozamia fraseri
1487. 85 Macrozamia riedlei (Zamia, Djiridji)
1488. 36522 Malva pseudolavatera Y
1489. 17637 Marianthus candidus (White Marianthus)
1490. 17636 Marianthus coeruleopunctatus (Blue-spotted Marianthus)
1491. 25822 Marianthus sylvaticus
1492. 4072 Medicago arabica (Spotted Medic) Y
1493. 4076 Medicogo lupulina (Black Medic) Y
1494. 4079 Medicago polymorpha (Burr Medic) Y
1495. 17679 Meeboldina coangustata
1496. 1098 Meeboldina denmarkica
1497. 17694 Meeboldina scariosa
1498. Meeboldina sp.
1499. 17693 Meeboldina thysanantha P3
1500. Meeboldina thysanantha MS
1501. 34676 Meionectes brownii (Swamp Raspwort)
1502. 40780 Melaleuca citrina Y
1503. 5900 Melaleuca cuticularis (Saltwater Paperbark)
1504. 5902 Melaleuca densa
1505. 5921 Melaleuca incana (Grey Honeymyrtle)
1506. 5922 Melaleuca lanceolata (Rottnest Teatree, Moonah)
1507. 5926 Melaleuca lateritia (Robin Redbreast Bush)
1508. 5938 Melaleuca microphylla
1509. 13274 Melaleuca ordinifolia P2
1510. 5946 Melaleuca pauciflora
1511. 5952 Melaleuca preissiana (Moonah)
1512. 5959 Melaleuca rhaphiophylla (Swamp Paperbark)
1513. Melaleuca sp.
1514. 5968 Melaleuca spathulata
1515. 5980 Melaleuca thymoides
1516. 37683 Melaleuca viminalis P2
1517. 5987 Melaleuca viminea (Mohan)
1518. 4085 Melilotus indicus Y
1519. 6883 Mentha pulegium (Pennyroyal) Y
1520. 957 Mesomelaena tetragona (Semaphore Sedge)
1521. 485 Microlaena stipoides (Weeping Grass)
1522. 1657 Microtis alba (White Mignonette Orchid)
1523. 34158 Microtis alboviridis

1575. 2306 Petrophile rigida
1576. 17765 Petrophile squamata subsp. squamata
1577. 548 Phalaris aquatica (Phalaris) Y
1578. 20460 Pheladenia deformis
1579. 18530 Philotheca nodiflora
1580. 1173 Philydrella pygmaea (Butterfly Flowers)
1581. 16177 Phyllangium paradoxum
1582. 4140 Phyllota barbata
1583. 2793 Phytolacca octandra (Red Ink Plant) Y
1584. 5231 Pimelea angustifolia (Narrow-leaved Pimelea)
1585. 5239 Pimelea clavata
1586. 5242 Pimelea erecta
1587. 5243 Pimelea ferruginea
1588. 5249 Pimelea hispida (Bristly Pimelea)
1589. 11402 Pimelea imbricata var. piligera
1590. 5252 Pimelea lanata
1591. 5255 Pimelea longiflora
1592. 11639 Pimelea longiflora subsp. longiflora
1593. 5261 Pimelea rosea (Rose Banjine)
1594. 18117 Pimelea rosea subsp. rosea
1595. Pimelea sp.
1596. 5264 Pimelea spectabilis (Bunjong)
1597. 5266 Pimelea suaveolens (Scented Banjine)
1598. 5269 Pimelea sylvestris
1599. 5270 Pimelea tinctoria
1600. 42281 Pithocarpa cordata
1601. 18352 Pithocarpa pulchella var. melanostigma
1602. 42260 Pithocarpa ramosa
1603. 7303 Plantago lanceolata (Ribwort Plantain) Y
1604. 6249 Platysace compressa (Tapewarm Plant)
1605. 6253 Platysace filiformis
1606. 6258 Platysace pendula
1607. 4524 Platytheca galioides
1608. 4525 Platytheca juniperina
1609. 32478 Pleuridium nervosum var. nervosum
1610. 19062 Pleurophascum occidentale P4
1611. Plumatichilas turfosa
1612. 573 Poa drummondiana (Knotted Poa)
1613. 577 Poa poiformis (Coastal Poa)
1614. 16098 Poa poiformis var. poiformis
1615. 578 Poa porphyroclados
1616. Poa sp.
1617. 86 Podocarpus drouynianus (Wild Plum, Kula)
1618. 8175 Podolepis gracilis (Slender Podolepis)
1619. 8182 Podotheca angustifolia (Sticky Longheads)
1620. 29919 Polianthion wichurae
1621. 2905 Polycarpon tetraphyllum (Fourleaf Allseed) Y
1622. 4578 Polygala virgata Y
1623. 2419 Polygonum aviculare (Wireweed) Y
1624. 582 Polypogon monspeliensis (Annual Beardgrass) Y
1625. 4688 Poranthera drummondii

1677. 40425 Rytidosperma caespitosum
1678. 40430 Rytidosperma pilosum
1679. 40428 Rytidosperma racemosum
1680. 40427 Rytidosperma setaceum
1681. 2906 Sagina apetala (Annual Pearlwort) Y
1682. 79 Salvinia molesta (Salvinia) Y
1683. 6483 Samolus junceus
1684. 6484 Samolus repens (Creeping Brookweed)
1685. 3192 Sanguisorba minor (Sheep's Burnet) Y
1686. 2593 Sarcocornia quinqueflora (Beaded Samphire)
1687. 7598 Scaevola auriculata
1688. 7613 Scaevola glandulifera (Viscid Hand-flower)
1689. 7614 Scaevola globulifera
1690. 7624 Scaevola microphylla (Small-leaved Scaevola)
1691. 7626 Scaevola nitida (Shining Fanflower)
1692. 7634 Scaevola phlebopetala (Velvet Fanflower)
1693. 7646 Scaevola striata (Royal Robe)
1694. 13175 Scaevola striata var. striata
1695. 41660 Schenkia australis
1696. 24 Schizaea fistulosa (Narrow Comb Fern)
1697. 6263 Schoenolaena juncea
1698. 970 Schoenus acuminatus
1699. 983 Schoenus cruentus
1700. 986 Schoenus efoliotus
1701. 8312 Schoenus maschalinus
1702. 1001 Schoenus multiglumis
1703. 1004 Schoenus nitens (Shiny Bog-rush)
1704. 1006 Schoenus odontocarpus
1705. 1017 Schoenus subbulbosus
1706. 1018 Schoenus subfascicularis
1707. 1021 Schoenus sublaxus
1708. 1023 Schoenus tenellus
1709. 7651 Selliera radicans P1
1710. 32433 Sematophyllum homomallum
1711. 32483 Sematophyllum subhumile var. contiguum
1712. 8208 Senecio hispidulus (Hispid Fireweed)
1713. 20663 Senecio multicaulis subsp. multicaulis
1714. 25884 Senecio pinnatifolius var. latilobus
1715. 8218 Senecio ramosissimus (Auricled Groundsel)
1716. Senecio sp.
1717. 19453 Setaria parviflora Y
1718. 11803 Silene gallica var. quinquevulnera Y
1719. 8225 Siloxerus humifusus (Procumbent Siloxerus)
1720. Siloxerus sp.
1721. 7017 Solanum laciniatum (Kangaroo Apple) Y
1722. 9259 Solanum nodiflorum (Glossy Nightshade)
1723. 8231 Sonchus oleraceus (Common Sowthistle) Y
1724. 1312 Sowerbaea laxiflora (Purple Tassels)
1725. 4200 Sphaerolobium alatum
1726. 20348 Sphaerolobium calcicola P3
1727. 17551 Sphaerolobium drummondii

1779. 7802 Stylidium squamosotuberosum (Fleshy-rhizomed Trigger Plant)
1780. 1260 Stypandra glauca (Blind Grass)
1781. 2322 Synaphea favosa
1782. 16859 Synaphea incurva P1
1783. 12911 Synaphea obtusata
1784. 16864 Synaphea petiolaris subsp. petiolaris
1785. 16863 Synaphea petiolaris subsp. triloba
1786. 2326 Synaphea polymorpha (Albany Synaphea, Pinda)
1787. 2328 Synaphea reticulata
1788. 32439 Syntrichia papillosa
1789. 15827 Taraxis grossa
1790. 20100 Taxandria angustifalia
1791. 20114 Taxandria fragrans
1792. 20115 Taxandria juniperina
1793. 20135 Taxandria linearifalia
1794. 20134 Taxandria marginata
1795. 20133 Taxandria parviceps
1796. 32440 Tayloria octoblepharum
1797. Tecticornia sp.
1798. 4256 Templetonia retusa (Cockies Tongues)
1799. 2823 Tetragonia implexicoma (Bower Spinach)
1800. 1034 Tetraria capillaris (Hair Sedge)
1801. 1036 Tetraria octandra
1802. Tetraria sp.
1803. 35578 Tetraria sp. Blackwood River (A.R. Annels 3043) P3
1804. 35579 Tetraria sp. Jarrah Forest (R. Davis 7391)
1805. 667 Tetrarrhena laevis (Forrest Ricegrass)
1806. 4526 Tetratheca affinis
1807. 4536 Tetratheca hispidissima
1808. 1701 Thelymitra antennifera (Vanilla Orchid)
1809. 10856 Thelymitra benthamiana (Leopard Orchid)
1810. 1704 Thelymitra cornicina (Lilac Sun Orchid)
1811. 1706 Thelymitra cucullata (Swamp Sun Orchid)
1812. 1707 Thelymitra flexuosa (Twisted Sun Orchid)
1813. 11053 Thelymitra macrophylla
1814. 5091 Thomasia paniculata
1815. 5092 Thomasia pauciflora (Few Flowered Thomasia)
1816. 5094 Thomasia purpurea
1817. 5096 Thomasia quercifolia (Oak Leaved Thomasia) P4
1818. 5097 Thomasia rhynchocarpa
1819. 5100 Thomasia solanacea P4
1820. 33488 Thomasia sp. Vasse (C. Wilkins & K. Shepherd CW 581)
1821. 32442 Thuidium sparsum
1822. 1333 Thysanotus glaucifolius
1823. 1339 Thysanotus multiflorus (Many-flowered Fringe Lily)
1824. 1351 Thysanatus sparteus
1825. Tortula sp.
1826. Tradescantia sp.
1827. 4547 Tremandra diffusa
1828. 4548 Tremandra stelligera
1829. 17684 Tremulina tremula

1881. 1149 Xyris lacera
1882. 1150 Xyris lanata
1883. 32457 Zygodon intermedius

APPENDIX C: Structural Classification used for Vegetation Mapping (Keighery 1994)

Life form/ height class	Canopy Cover			
	100-70%	70-30%	30-10%	<10%
Trees > 30	Tall Closed Forest	Open Forest	Tall Woodland	Tall Open Woodland
Trees 10-30	Closed Forest	Open Forest	Woodland	Open Woodland
Trees < 10m	Low Closed Forest	Low open Forest	Low Woodland	Low Open Woodland
Tree Mallee	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Shrub Mallee	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs >2m	Closed Tall Scrub	Tall Open Scrub	Tall Shrubland	Tall Open Shrubland
Shrubs 1-2m	Closed Heath	Open Heath	Shrubland	Open Shrubland
Shrubs <1m	Closed Low Heath	Open Low Heath	Low Shrubland	Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

Table 9.1 Structural Classification (Keighery 1994)

Life form / height class	Canopy cover			
	100-70%	70-30%	30-10%	10-2%
Trees over 30 Trees 10-30m Trees under 10 m	Tall Closed Forest Closed Forest Low Closed Forest	Open Forest Open Forest Low Open forest	Tall woodland Woodland Low Woodland	Tall Open Woodland Open Woodland Low Open Woodland
Tree Mallee Shrub Mallee	Closed Tree Mallee Closed Shrub Mallee	Tree mallee Shrub Mallee	Open Tree Mallee Open Shrub Mallee	Very Open Tree Mallee Very Open Shrub Mallee
Shrubs over 2m Shrubs 1-2m Shrubs under 1m	Closed Tall Scrub Closed Heath Closed Low Heath	Tall Open Scrub Open Heath Open Low Heath	Tall Shrubland Shrubland Low Shrubland	Tall Open Shrubland Open Shrubland Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

NatureMap Species Report

Created By Guest user on 08/06/2016

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 117° 25' 00" E,35° 05' 00" S
Buffer 10km
Group By Family

Family	Species	Records
Acanthizidae	9	107
Accipitridae	9	46
Anarthriaceae	3	6
Anatidae	10	114
Apiaceae	4	9
Archaeidae	1	1
Ardeidae	6	54
Arthoniaceae	1	1
Asparagaceae	2	2
Asteraceae	11	19
Bittacidae	1	1
Blenniidae	1	7
Bolbitiaceae	1	1
Boletaceae	1	1
Buccinidae	3	3
Bulimulidae	1	1
Burhinidae	1	1
Caliciaceae	1	1
Campanulaceae	2	2
Campephagidae	1	8
Casuarinaceae	1	4
Centrolepidaceae	2	3
Cerithiidae	1	1
Cerithiopsidae	2	2
Charadriidae	7	24
Cheloniidae	1	1
Chenopodiaceae	3	3
Chernetidae	1	1
Chironemidae	1	1
Cinclosomatidae	2	2
Cladoniaceae	2	2
Climacteridae	1	1
Clinidae	1	1
Coccocarpiaceae	1	1
Columbellidae	3	3
Columbidae	3	22
Conidae	1	1
Corallanidae	1	1
Corvidae	1	43
Cracticidae	4	51
Crassulaceae	1	1
Creediidae	1	1
Cuculidae	3	7
Cyperaceae	13	19
Dicruridae	2	19
Dilleniaceae	7	16
Diomedeidae	1	3
Elaeocarpaceae	2	2
Elapidae	1	1
Epitoniidae	1	1
Ericaceae	10	16
Estrildidae	2	8
Euphorbiaceae	1	2
Fabaceae	28	43
Falconidae	4	12
Fasciolariidae	1	1
Galaxiidae	1	1
Gekkonidae	1	10
Gentianaceae	1	1
Geoglossaceae	1	1
Geraniaceae	1	1
Gobiidae	3	18
Goodeniaceae	9	11
Gyrostemonaceae	1	1
Haematopodidae	2	14
Haemodoraceae	2	5
Halcyonidae	2	37
Haloragaceae	3	3
Hemerocallidaceae	2	4
Hemiramphidae	1	1
Heterodontidae	1	1
Hirundinidae	1	16
Hygrophoraceae	2	2
Hylidae	1	1
Iridaceae	1	3
Ischyroceridae	2	2
Juncaceae	2	2

Labridae	2	2
Lamiaceae	1	1
Laridae	5	77
Lecanoraceae	3	3
Loganiaceae	1	3
Lottiidae	1	1
Macropodidae	1	2
Maluridae	5	88
Malvaceae	2	3
Marginellidae	1	1
Meliphagidae	7	103
Menyanthaceae	1	1
Mugilidae	1	1
Muridae	1	3
Myrtaceae	18	23
Nannopercidae	1	1
Neosittidae	1	1
Olacaceae	1	2
Olividae	1	1
Orchidaceae	16	19
Orobanchaceae	1	1
Otariidae	1	2
Oxalidaceae	1	1
Pachycephalidae	2	45
Paralichthyidae	1	1
Pardalotidae	2	6
Parmeliaceae	5	5
Pelecanidae	1	29
Peronosporaceae	1	3
Petroicidae	1	17
Phalacrocoracidae	5	39
Phasianidae	1	1
Phyllanthaceae	1	1
Physaraceae	1	1
Pittosporaceae	1	1
Platycephalidae	1	4
Plotosidae	1	2
Poaceae	11	20
Podargidae	1	2
Podicipedidae	3	16
Poeciliidae	1	1
Polygalaceae	2	2
Polygonaceae	2	2
Polyporaceae	1	2
Portulacaceae	2	3
Potamogetonaceae	1	1
Primulaceae	1	1
Procellariidae	1	1
Proteaceae	14	19
Psittacidae	15	104
Rallidae	6	28
Ranellidae	2	2
Recurvirostridae	3	26
Restionaceae	5	8
Rhamnaceae	1	2
Rubiaceae	1	2
Rutaceae	6	11
Santalaceae	2	4
Scincidae	2	2
Scolopacidae	6	28
Scrophulariaceae	1	1
Siliquariidae	1	1
Sillaginidae	1	1
Solanaceae	1	2
Sparidae	2	3
Sphaeromatidae	2	2
Strigidae	1	3
Stylidiaceae	8	10
Sulidae	1	7
Sylviidae	4	12
Teloschistaceae	3	3
Terapontidae	1	1
Threskiornithidae	3	49
Thymelaeaceae	7	12
Turnicidae	1	1
Veneridae	2	2
Zamiaceae	1	1
Zosteropidae	1	48
TOTAL	**453**	**1781**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthizidae					
1.		*Acanthiza (Acanthiza) apicalis subsp. apicalis*			
2.		*Acanthiza (Geobasileus) chrysorrhoa subsp. chrysorrhoa*			
3.		*Acanthiza (Geobasileus) inornata*			
4.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
5.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
6.	24262	*Acanthiza inornata (Western Thornbill)*			
7.	25530	*Gerygone fusca (Western Gerygone)*			
8.	24271	*Gerygone fusca subsp. fusca (Western Gerygone)*			
9.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
Accipitridae					
10.		*Accipiter (Leucospiza) fasciatus subsp. fasciatus*			
11.		*Accipiter (Paraspizias) cirrocephalus subsp. cirrocephalus*			
12.	25536	*Accipiter fasciatus (Brown Goshawk)*			
13.	24285	*Aquila audax (Wedge-tailed Eagle)*			
14.	24288	*Circus approximans (Swamp Harrier)*			
15.		*Elanus axillaris*			
16.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*		IA	
17.	24295	*Haliastur sphenurus (Whistling Kite)*			
18.		*Pandion cristatus*			
Anarthriaceae					
19.	1060	*Anarthria laevis*			
20.	1062	*Anarthria prolifera*			
21.	1097	*Lyginia barbata*			
Anatidae					
22.	24310	*Anas castanea (Chestnut Teal)*			
23.	24312	*Anas gracilis (Grey Teal)*			
24.	24315	*Anas rhynchotis (Australasian Shoveler)*			
25.	24316	*Anas superciliosa (Pacific Black Duck)*			
26.	24318	*Aythya australis (Hardhead)*			
27.	24319	*Biziura lobata (Musk Duck)*			
28.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
29.		*Cygnus (Chenopis) atratus*			
30.	24322	*Cygnus atratus (Black Swan)*			
31.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
Apiaceae					
32.	6214	*Centella asiatica*			
33.	6249	*Platysace compressa (Tapeworm Plant)*			
34.	6284	*Xanthosia candida*			
35.	6289	*Xanthosia huegelii*			
Archaeidae					
36.	42361	*Zephyrarchaea mainae (Western Archaeid Spider)*		T	
Ardeidae					
37.	25558	*Ardea ibis (Cattle Egret)*		IA	
38.	41324	*Ardea modesta (Eastern Great Egret)*		IA	
39.		*Egretta garzetta*			
40.		*Egretta novaehollandiae*			
41.	24347	*Ixobrychus flavicollis subsp. australis (Australian Black Bittern)*		P1	
42.	25563	*Ixobrychus minutus (Little Bittern)*		P4	
Arthoniaceae					
43.	27584	*Arthonia ilicina*			
Asparagaceae					
44.	1280	*Chamaescilla corymbosa (Blue Squill)*			
45.	1354	*Thysanotus tenellus*			
Asteraceae					
46.	7851	*Asteridea pulverulenta (Common Bristle Daisy)*			
47.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
48.	8127	*Olearia axillaris (Coastal Daisybush)*			
49.	8143	*Olearia paucidentata (Autumn Scrub Daisy)*			
50.	42281	*Pithocarpa cordata*			
51.	18352	*Pithocarpa pulchella var. melanostigma*			
52.	42260	*Pithocarpa ramosa*			
53.	8175	*Podolepis gracilis (Slender Podolepis)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
54.	8182	*Podotheca angustifolia (Sticky Longheads)*			
55.	8195	*Quinetia urvillei*			
56.	8225	*Siloxerus humifusus (Procumbent Siloxerus)*			
Bittacidae					
57.		*Harpobittacus similis*			
Blenniidae					
58.		*Parablennius tasmanianus*			
Bolbitiaceae					
59.	38784	*Descomyces albus*			
Boletaceae					
60.		*Austroboletus sp.*			
Buccinidae					
61.		*Buccinulum bednalli*			
62.		*Cominella (Cominella) eburnea*			
63.		*Fusus sp.*			
Bulimulidae					
64.		*Bothriembryon (Bothriembryon) kingii*			
Burhinidae					
65.		*Burhinus (Burhinus) grallarius*			
Caliciaceae					
66.	27708	*Cyphelium trachylioides*			
Campanulaceae					
67.	7403	*Lobelia heterophylla (Wing-seeded Lobelia)*			
68.	7408	*Lobelia tenuior (Slender Lobelia)*			
Campephagidae					
69.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
Casuarinaceae					
70.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
Centrolepidaceae					
71.	1117	*Aphelia cyperoides*			
72.	1121	*Centrolepis aristata (Pointed Centrolepis)*			
Cerithiidae					
73.		*Cacozeliana granarium*			
Cerithiopsidae					
74.		*Ataxocerithium serotinum*			
75.		*Seila magna*			
Charadriidae					
76.		*Charadrius (Charadrius) ruficapillus*			
77.	24376	*Charadrius rubricollis (Hooded Plover)*		P4	
78.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
79.		*Elseyornis melanops*			
80.	24382	*Pluvialis fulva (Pacific Golden Plover)*		IA	
81.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
82.		*Thinornis rubricollis*			
Cheloniidae					
83.	25335	*Caretta caretta (Loggerhead Turtle)*		T	
Chenopodiaceae					
84.	2471	*Atriplex prostrata (Hastate Orache)*	Y		
85.	11341	*Rhagodia baccata subsp. baccata*			
86.		*Tecticornia sp.*			
Chernetidae					
87.		*Conicochernes crassus*			
Chironemidae					
88.		*Threpterius maculosus*			
Cinclosomatidae					
89.	25579	*Psophodes nigrogularis (Western Whipbird)*			
90.	24388	*Psophodes nigrogularis subsp. nigrogularis (Western Whipbird (western heath))*		T	
Cladoniaceae					
91.	27672	*Cladonia calyciformis*			
92.	28208	*Cladonia cervicornis subsp. verticillata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Climacteridae					
93.	24396	*Climacteris rufa (Rufous Treecreeper)*			
Clinidae					
94.		*Heteroclinus eckloniae*			
Coccocarpiaceae					
95.	28063	*Spilonema paradoxum*			
Columbellidae					
96.		*Mitrella (Dentimitrella) austrina*			
97.		*Mitrella (Dentimitrella) semiconvexa*			
98.		*Mitrella (Zemitrella) menkeana*			
Columbidae					
99.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
100.	24409	*Phaps chalcoptera (Common Bronzewing)*			
101.	25587	*Phaps elegans (Brush Bronzewing)*			
Conidae					
102.		*Conus anemone*			
Corallanidae					
103.		*Argathona sp.*			Y
Corvidae					
104.	25592	*Corvus coronoides (Australian Raven)*			
Cracticidae					
105.	25595	*Cracticus tibicen (Australian Magpie)*			
106.	25596	*Cracticus torquatus (Grey Butcherbird)*			
107.		*Strepera (Neostrepera) versicolor subsp. plumbea*			
108.	25597	*Strepera versicolor (Grey Currawong)*			
Crassulaceae					
109.	3137	*Crassula colorata (Dense Stonecrop)*			
Creediidae					
110.		*Limnichthys fasciatus*			
Cuculidae					
111.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
112.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
113.	24432	*Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)*			
Cyperaceae					
114.	739	*Baumea acuta (Pale Twig-rush)*			
115.	743	*Baumea juncea (Bare Twigrush)*			
116.	20216	*Ficinia nodosa (Knotted Club Rush)*			
117.	17744	*Gahnia sclerioides*		P4	
118.	917	*Isolepis marginata (Coarse Club-rush)*			
119.		*Isolepis sp.*			
120.	925	*Lepidosperma angustatum*			
121.	932	*Lepidosperma effusum (Spreading Sword-sedge)*			
122.	933	*Lepidosperma gladiatum (Coast Sword-sedge, Kerbin)*			
123.	946	*Lepidosperma striatum*			
124.	986	*Schoenus efoliatus*			
125.	1004	*Schoenus nitens (Shiny Bog-rush)*			
126.	1034	*Tetraria capillaris (Hair Sedge)*			
Dicruridae					
127.	24443	*Grallina cyanoleuca (Magpie-lark)*			
128.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
Dilleniaceae					
129.	5109	*Hibbertia amplexicaulis*			
130.	5117	*Hibbertia cuneiformis (Cutleaf Hibbertia)*			
131.	5126	*Hibbertia furfuracea*			
132.	5132	*Hibbertia grossulariifolia*			
133.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
134.	5155	*Hibbertia pilosa (Hairy Guinea Flower)*			
135.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
Diomedeidae					
136.	34007	*Thalassarche chlororhynchos (Atlantic Yellow-nosed Albatross)*		T	
Elaeocarpaceae					
137.	4525	*Platytheca juniperina*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
138.	4536	*Tetratheca hispidissima*			
Elapidae					
139.	25251	*Echiopsis curta (Bardick)*			
Epitoniidae					
140.		*Opalia (Opalia) australis*			
Ericaceae					
141.	6306	*Andersonia caerulea (Foxtails)*			
142.	6321	*Andersonia sprengelioides*			
143.	6352	*Cosmelia rubra (Spindle Heath)*			
144.	6360	*Leucopogon australis (Spiked Beard-heath)*			
145.	6396	*Leucopogon glabellus*			
146.	6417	*Leucopogon obovatus*			
147.	40941	*Leucopogon obovatus subsp. revolutus*			
148.	6436	*Leucopogon propinquus*			
149.		*Leucopogon sp.*			
150.	6456	*Lysinema ciliatum (Curry Flower)*			
Estrilidae					
151.		*Stagonopleura (Zonaeginthus) oculata*			
152.	24645	*Stagonopleura oculata (Red-eared Firetail)*			
Euphorbiaceae					
153.	4585	*Amperea ericoides*			
Fabaceae					
154.	15429	*Acacia alata var. alata*			
155.	3262	*Acacia cochlearis (Rigid Wattle)*			
156.	3282	*Acacia cyclops (Coastal Wattle)*			
157.	3363	*Acacia hastulata*			
158.	3424	*Acacia littorea*			
159.	3453	*Acacia myrtifolia*			
160.	3502	*Acacia pulchella (Prickly Moses)*			
161.	3523	*Acacia robiniae*			
162.	30036	*Acacia saligna subsp. stolonifera*			
163.	3588	*Acacia uliginosa*			
164.	3713	*Bossiaea linophylla*			
165.	3718	*Bossiaea rufa*			
166.	10861	*Callistachys lanceolata (Wonnich)*			
167.	3754	*Chorizema diversifolium*			
168.	3758	*Chorizema ilicifolium (Holly Flame Pea)*			
169.	13107	*Chorizema retrorsum*			
170.	20214	*Eutaxia myrtifolia*			
171.	3891	*Gastrolobium bilobum (Heart Leaf Poison)*			
172.	10909	*Gompholobium confertum*			
173.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
174.	3961	*Hardenbergia comptoniana (Native Wisteria)*			
175.	3965	*Hovea elliptica (Tree Hovea)*			
176.	4017	*Jacksonia horrida*			
177.	4037	*Kennedia coccinea (Coral Vine)*			
178.	4155	*Psoralea pinnata (African Scurfpea)*	Y		
179.	4181	*Pultenaea reticulata*			
180.	20348	*Sphaerolobium calcicola*		P3	
181.	4256	*Templetonia retusa (Cockies Tongues)*			
Falconidae					
182.		*Falco (Falco) longipennis subsp. longipennis*			
183.	25621	*Falco berigora (Brown Falcon)*			
184.	25622	*Falco cenchroides (Australian Kestrel)*			
185.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
Fasciolariidae					
186.		*Microcolus dunkeri*			
Galaxiidae					
187.		*Galaxias sp.*			
Gekkonidae					
188.	24980	*Christinus marmoratus (Marbled Gecko)*			
Gentianaceae					
189.	6539	*Centaurium erythraea (Common Centaury)*	Y		
Geoglossaceae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
190.		*Trichoglossum sp.*			
Geraniaceae					
191.	4346	*Pelargonium littorale*			
Gobiidae					
192.		*Favonigobius lateralis*			
193.		*Favonigobius sp.*			
194.		*Pseudogobius olorum*			
Goodeniaceae					
195.	7487	*Diaspasis filifolia (Thread-leaved Diaspasis)*			
196.	7523	*Goodenia leptoclada (Thin-stemmed Goodenia)*			
197.	13165	*Goodenia pusilla*			
198.	7572	*Lechenaultia expansa*			
199.	7614	*Scaevola globulifera*			
200.	7626	*Scaevola nitida (Shining Fanflower)*			
201.	7634	*Scaevola phlebopetala (Velvet Fanflower)*			
202.	7662	*Velleia macrophylla (Large-leaved Velleia)*			
203.	7665	*Velleia trinervis*			
Gyrostemonaceae					
204.	2787	*Gyrostemon sheathii*			
Haematopodidae					
205.	25627	*Haematopus fuliginosus (Sooty Oystercatcher)*			
206.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
Haemodoraceae					
207.	1407	*Anigozanthos flavidus (Tall Kangaroo Paw)*			
208.	11826	*Conostylis aculeata subsp. aculeata*			
Halcyonidae					
209.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
210.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
Haloragaceae					
211.	6183	*Haloragodendron racemosum (Shrubby Raspwort)*			
212.	34676	*Meionectes brownii (Swamp Raspwort)*			
213.	6198	*Myriophyllum salsugineum*			
Hemerocallidaceae					
214.	1285	*Corynotheca micrantha (Sand Lily)*			
215.	1260	*Stypandra glauca (Blind Grass)*			
Hemiramphidae					
216.		*Hemiramphus sp.*			
Heterodontidae					
217.		*? ?*			
Hirundinidae					
218.	24491	*Hirundo neoxena (Welcome Swallow)*			
Hygrophoraceae					
219.	38795	*Hygrocybe conica*			
220.		*Hygrocybe viscidibrunnea*			
Hylidae					
221.	25388	*Litoria moorei (Motorbike Frog)*			
Iridaceae					
222.	1550	*Patersonia occidentalis (Purple Flag, Koma)*			
Ischyroceridae					
223.		*Cerapus sp.*			
224.		*Rhinoecetes sp.*			
Juncaceae					
225.	11922	*Juncus kraussii subsp. australiensis*			
226.		*Juncus sp.*			
Labridae					
227.		*Pseudolabrus sp.*			
228.		*Siphonognathus beddomei*			
Lamiaceae					
229.	6939	*Westringia dampieri*			
Laridae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
230.		*Chroicocephalus novaehollandiae*			
231.		*Hydroprogne caspia*			
232.	25638	*Larus pacificus (Pacific Gull)*			
233.	25644	*Sterna nereis (Fairy Tern)*			
234.		*Thalasseus bergii*			
Lecanoraceae					
235.	33645	*Ramboldia arandensis*			
236.	28036	*Ramboldia sorediata*			
237.	28037	*Ramboldia stuartii*			
Loganiaceae					
238.	13128	*Logania serpyllifolia subsp. angustifolia*			
Lottiidae					
239.		*Lottia onychitis*			
Macropodidae					
240.	24145	*Setonix brachyurus (Quokka)*		T	
Maluridae					
241.		*Malurus (Leggeornis) elegans*			
242.	25650	*Malurus elegans (Red-winged Fairy-wren)*			
243.	25654	*Malurus splendens (Splendid Fairy-wren)*			
244.	25655	*Stipiturus malachurus (Southern Emu-wren)*			
245.	24554	*Stipiturus malachurus subsp. westernensis (Southern Emu-wren)*			
Malvaceae					
246.	5033	*Lasiopetalum floribundum (Free Flowering Lasiopetalum)*			
247.	5094	*Thomasia purpurea*			
Marginellidae					
248.		*Balanetta baylii*			
Meliphagidae					
249.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
250.	24561	*Anthochaera carunculata (Red Wattlebird)*			
251.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
252.		*Gliciphila melanops subsp. melanops*			
253.	25661	*Lichmera indistincta (Brown Honeyeater)*			
254.		*Phylidonyris (Meliornis) novaehollandiae subsp. longirostris*			
255.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
Menyanthaceae					
256.	36178	*Liparophyllum lasiospermum*			
Mugilidae					
257.		*Aldrichetta forsteri*			
Muridae					
258.	24215	*Hydromys chrysogaster (Water-rat)*		P4	
Myrtaceae					
259.	5316	*Agonis flexuosa (Peppermint, Wonil)*			
260.	17203	*Agonis flexuosa var. latifolia*			
261.	20127	*Astartea glomerulosa*			
262.	5364	*Baeckea pygmaea*			
263.	5425	*Calothamnus preissii*			
264.	5430	*Calothamnus schaueri*			
265.	5605	*Eucalyptus cornuta (Yate, Yeid)*			
266.	5709	*Eucalyptus megacarpa (Bullich, Pulidj)*			
267.	5763	*Eucalyptus rudis (Flooded Gum, Kulurda)*			
268.	5841	*Kunzea recurva*			
269.	5900	*Melaleuca cuticularis (Saltwater Paperbark)*			
270.	5902	*Melaleuca densa*			
271.	5921	*Melaleuca incana (Grey Honeymyrtle)*			
272.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
273.	5987	*Melaleuca viminea (Mohan)*			
274.	20100	*Taxandria angustifolia*			
275.	20115	*Taxandria juniperina*			
276.	20134	*Taxandria marginata*			
Nannopercidae					
277.		*Edelia vittata*			
Neosittidae					
278.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Olacaceae					
279.	2366	*Olax phyllanthi*			
Olividae					
280.		*Amalda sp.*			
Orchidaceae					
281.	15328	*Caladenia applanata subsp. applanata*			
282.	15329	*Caladenia applanata subsp. erubescens*			
283.	1580	*Caladenia cairnsiana (Zebra Orchid)*			
284.	15348	*Caladenia flava subsp. flava*			
285.	1596	*Caladenia huegelii (Grand Spider Orchid)*		T	
286.	1599	*Caladenia latifolia (Pink Fairy Orchid)*			
287.	1605	*Caladenia marginata (White Fairy Orchid)*			
288.	1627	*Cryptostylis ovata (Slipper Orchid)*			
289.	10916	*Cyrtostylis huegelii*			
290.	1636	*Diuris pauciflora*			
291.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
292.	1644	*Elythranthera emarginata (Pink Enamel Orchid)*			
293.		*Plumatichilos turfosa*			
294.	1680	*Prasophyllum parvifolium (Autumn Leek Orchid)*			
295.	18658	*Pterostylis sp. short sepals (W. Jackson BJ259)*			
296.	1698	*Pterostylis vittata (Banded Greenhood)*			
Orobanchaceae					
297.	7122	*Orobanche minor (Lesser Broomrape)*	Y		
Otariidae					
298.	24210	*Neophoca cinerea (Australian Sea Lion)*		S	
Oxalidaceae					
299.	4358	*Oxalis purpurea (Largeflower Wood Sorrel)*	Y		
Pachycephalidae					
300.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
301.	25679	*Pachycephala pectoralis (Golden Whistler)*			
Paralichthyidae					
302.		*Pseudorhombus jenynsii*			
Pardalotidae					
303.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
304.	25682	*Pardalotus striatus (Striated Pardalote)*			
Parmeliaceae					
305.	43942	*Austroparmelina pruinata*			
306.	27743	*Flavoparmelia diffractaica*			
307.		*Parmotrema sp.*			
308.	28114	*Xanthoparmelia congensis*			
309.	29033	*Xanthoparmelia glabrans*			
Pelecanidae					
310.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
Peronosporaceae					
311.		*Phytophthora cinnamomi*			
Petroicidae					
312.	24652	*Eopsaltria georgiana (White-breasted Robin)*			
Phalacrocoracidae					
313.		*Microcarbo melanoleucos*			
314.	25697	*Phalacrocorax carbo (Great Cormorant)*			
315.	24664	*Phalacrocorax carbo subsp. novaehollandiae (Great Cormorant)*			
316.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
317.	25699	*Phalacrocorax varius (Pied Cormorant)*			
Phasianidae					
318.	25701	*Coturnix ypsilophora (Brown Quail)*			
Phyllanthaceae					
319.	4691	*Poranthera microphylla (Small Poranthera)*			
Physaraceae					
320.	39033	*Fuligo septica*			
Pittosporaceae					
321.		*Billardiera sp.*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Platycephalidae					
322.		*Platycephalus speculator*			
Plotosidae					
323.		*Cnidoglanis macrocephalus*			
Poaceae					
324.	185	*Aira cupaniana (Silvery Hairgrass)*	Y		
325.	187	*Aira praecox (Early Hairgrass)*	Y		
326.	35159	*Ammophila arenaria subsp. arenaria*	Y		
327.	17240	*Austrostipa flavescens*			
328.	231	*Avellinia michelii*	Y		
329.	244	*Briza maxima (Blowfly Grass)*	Y		
330.	245	*Briza minor (Shivery Grass)*	Y		
331.	306	*Dichelachne crinita (Longhair Plumegrass)*			
332.	533	*Paspalum vaginatum (Salt Water Couch)*	Y		
333.	573	*Poa drummondiana (Knotted Poa)*			
334.	11137	*Vulpia fasciculata*	Y		
Podargidae					
335.	25703	*Podargus strigoides (Tawny Frogmouth)*			
Podicipedidae					
336.	25704	*Podiceps cristatus (Great Crested Grebe)*			
337.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
338.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
Poeciliidae					
339.		*Gambusia affinis*			
Polygalaceae					
340.	4550	*Comesperma calymega (Blue-spike Milkwort)*			
341.	4552	*Comesperma confertum*			
Polygonaceae					
342.	2412	*Muehlenbeckia adpressa (Climbing Lignum)*			
343.	2432	*Rumex conglomeratus (Clustered Dock)*	Y		
Polyporaceae					
344.		*Laccocephalum mylittae*			
Portulacaceae					
345.	2845	*Calandrinia brevipedata (Short-stalked Purslane)*			
346.	2856	*Calandrinia liniflora (Parakeelya)*			
Potamogetonaceae					
347.	44492	*Stuckenia pectinata*			
Primulaceae					
348.	6484	*Samolus repens (Creeping Brookweed)*			
Procellariidae					
349.	24715	*Puffinus huttoni (Hutton's Shearwater)*		T	
Proteaceae					
350.	1819	*Banksia grandis (Bull Banksia, Pulgarla)*			
351.	1830	*Banksia littoralis (Swamp Banksia, Pungura)*			
352.	1841	*Banksia praemorsa (Cut-leaf Banksia)*			
353.	1844	*Banksia quercifolia (Oak-leaved Banksia)*			
354.	1863	*Conospermum capitatum*			
355.	1944	*Franklandia fucifolia (Lanoline Bush)*			
356.	2137	*Hakea ceratophylla (Horned Leaf Hakea)*			
357.	2191	*Hakea oleifolia (Dungyn)*			
358.	2197	*Hakea prostrata (Harsh Hakea)*			
359.	2222	*Isopogon attenuatus*			
360.	12908	*Isopogon buxifolius var. buxifolius*		P2	
361.	2226	*Isopogon cuneatus (Coneflower)*			
362.	2262	*Persoonia elliptica (Spreading Snottygobble)*			
363.	2282	*Petrophile acicularis*			
Psittacidae					
364.		*Barnardius zonarius*			
365.		*Calyptorhynchus (Calyptorhynchus) banksii subsp. naso*			
366.		*Calyptorhynchus (Zanda) baudinii*			
367.		*Calyptorhynchus (Zanda) latirostris*			
368.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo), Baudin's Cockatoo)*		T	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
369.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)*		T	
370.		*Calyptorhynchus sp.*			
371.	24735	*Glossopsitta porphyrocephala (Purple-crowned Lorikeet)*			
372.		*Neophema (Neonanodes) elegans subsp. carteri*			
373.	24738	*Neophema elegans (Elegant Parrot)*			
374.	24739	*Neophema petrophila (Rock Parrot)*			
375.	41348	*Pezoporus flaviventris (Western Ground Parrot)*		T	
376.		*Platycercus (Violania) icterotis subsp. icterotis*			
377.	25720	*Platycercus icterotis (Western Rosella)*			
378.		*Purpureicephalus spurius*			
Rallidae					
379.	25727	*Fulica atra (Eurasian Coot)*			
380.		*Porphyrio (Porphyrio) porphyrio subsp. bellus*			
381.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
382.		*Porzana (Porzana) pusilla subsp. palustris*			
383.		*Porzana (Porzana) tabuensis*			
384.	24771	*Porzana tabuensis (Spotless Crake)*			
Ranellidae					
385.		*Charonia lampas*			
386.		*Cymatium (Turritriton) labiosum*			
Recurvirostridae					
387.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
388.	25734	*Himantopus himantopus (Black-winged Stilt)*			
389.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
Restionaceae					
390.	17685	*Chaetanthus aristatus*			
391.	17692	*Cytogonidium leptocarpoides*			
392.	16595	*Desmocladus flexuosus*			
393.	1070	*Hypolaena exsulca*			
394.	18381	*Stenotalis ramosissima*			
Rhamnaceae					
395.	4828	*Spyridium globulosum (Basket Bush)*			
Rubiaceae					
396.	7348	*Opercularia hispidula (Hispid Stinkweed)*			
Rutaceae					
397.	4416	*Boronia denticulata*			
398.	4422	*Boronia gracilipes (Karri Boronia)*			
399.	4429	*Boronia molloyae (Tall Boronia)*			
400.	4448	*Chorilaena quercifolia (Chorilaena)*			
401.	4451	*Crowea angustifolia (Crowea)*			
402.	18547	*Rhadinothamnus anceps*			
Santalaceae					
403.	10765	*Exocarpos sparteus (Broom Ballart, Djuk)*			
404.	2355	*Leptomeria squarrulosa*			
Scincidae					
405.	25049	*Ctenotus labillardieri*			
406.	25096	*Egernia kingii (King's Skink)*			
Scolopacidae					
407.		*Calidris (Erolia) acuminata*			
408.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
409.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
410.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
411.	30932	*Limosa lapponica (Bar-tailed Godwit)*		IA	
412.	24808	*Tringa nebularia (Common Greenshank)*		IA	
Scrophulariaceae					
413.	7107	*Verbascum virgatum (Twiggy Mullein)*	Y		
Siliquariidae					
414.		*Siliquaria (pyxipoma)*			
Sillaginidae					
415.		*Sillaginodes punctatus*			
Solanaceae					
416.	6949	*Anthocercis littorea (Yellow Tailflower)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Sparidae					
417.		*Acanthopagrus butcheri*			
418.		*Rhabdosargus sarba*			
Sphaeromatidae					
419.		*Exosphaeroma sp.*			
420.		*Paracassidina sp.*			
Strigidae					
421.	25748	*Ninox novaeseelandiae (Boobook Owl)*			
Stylidiaceae					
422.	7670	*Levenhookia dubia (Hairy Stylewort)*			
423.	7676	*Levenhookia pusilla (Midget Stylewort)*			
424.	7677	*Levenhookia stipitata (Common Stylewort)*			
425.	7678	*Stylidium adnatum (Common Beaked Triggerplant)*			
426.	7695	*Stylidium caespitosum (Fly-away Triggerplant)*			
427.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
428.	7785	*Stylidium repens (Matted Triggerplant)*			
429.	7799	*Stylidium spathulatum (Creamy Triggerplant)*			
Sulidae					
430.		*Morus serrator*			
Sylviidae					
431.		*Acrocephalus (Acrocephalus) australis subsp. gouldi*			
432.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
433.	25758	*Megalurus gramineus (Little Grassbird)*			
434.		*Megalurus gramineus subsp. thomasi*			
Teloschistaceae					
435.	41654	*Caloplaca dahlii*			
436.		*Caloplaca sp.*			
437.	28065	*Teloschistes chrysophthalmus*			
Terapontidae					
438.		*Pelates octolineatus*			
Threskiornithidae					
439.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
440.	24844	*Threskiornis molucca (Australian White Ibis)*			
441.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
Thymelaeaceae					
442.	5231	*Pimelea angustifolia (Narrow-leaved Pimelea)*			
443.	5239	*Pimelea clavata*			
444.	5243	*Pimelea ferruginea*			
445.	5251	*Pimelea imbricata*			
446.	5252	*Pimelea lanata*			
447.	5261	*Pimelea rosea (Rose Banjine)*			
448.	18117	*Pimelea rosea subsp. rosea*			
Turnicidae					
449.		*Turnix (Austroturnix) varius subsp. varius*			
Veneridae					
450.		*Eumarcia fumigata*			Y
451.		*Irus (Irus) carditoides*			
Zamiaceae					
452.	85	*Macrozamia riedlei (Zamia, Djiridji)*			
Zosteropidae					
453.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

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

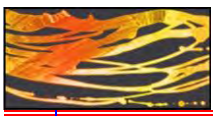
[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only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

Water Management Plan

Limestone Extraction for Agricultural Lime

Lot 9005
Nullaki Peninsula
City of Albany

June 2018 ~~February 2017~~



Landform Research


Landform Research
Land Systems - Quarries - Environment
ABN 29 841 445 694

CONTENTS

WATER QUALITY MANAGEMENT

FIGURES

See figures within the Management Plan

WATER QUALITY MANAGEMENT

1.0 BACKGROUND

1.1 Overview

An agricultural lime quarry is proposed to be opened on ~~7.5~~ 8.0 hectares of a limestone ridge on Lot 9005, Nullaki Peninsula City of Albany.

The limestone on Lot 9005 is highly suitable for lime for agriculture and neutralisation of acidity in addition to some road bases. Drilling has been completed and testing of the lime neutralising value carried out.

Location

The proposed excavation lies in the south eastern corner of Lot 9005, set back from the coastal cliffs and Foreshore Reserve (30883) which covers the cliffed slope. It is approximately 10 km south east from Denmark townsite on the Nullaki Peninsula.

To the east lies Reserve 17464, vested in the City of Albany and associated with Lake Sadie. The Bibulmum Track runs through the reserve.

Current Land Use

Lot 9005 is covered by remnant coastal vegetation. The proposed quarry site has previously been used for a small limestone quarry to provide limestone for road construction on the subdivided part of the Nullaki Peninsula. The pit had revegetated.

Minor exploration work has been completed for the existing proposal including the preparation of access tracks and drill platforms.

A predator proof fence runs across the Peninsula on the eastern side of Lot 9005

1.2 Water Source Protection Areas

There are no water source protection areas, although the ocean edge of the Nullaki Peninsula is listed as being part of the Albany Drainage District.

1.3 Water Source

It is not anticipated that any water will be required for dust suppression. ~~The first 60 metres of access road will be sealed.~~

1.4 Water Quality Protection Guidelines

The protection of water whether groundwater or surface water is an important part of the management of quarries. Different types of quarries have different potential impacts which are listed below in general terms. Not all potential impacts will apply to this quarry and the main impacts affecting this site are also listed.

Guidance on the quality of water can be found in;

- *Western Australian Water Quality Guidelines for Fresh and Marine Waters, EPA Bulletin 711, 1993.*
- *ANZECC, 1992, Australian Water Quality Guidelines for Fresh and Marine Waters.*

A number of documents provide guidance on the management and disposal of surface water that can lead to waterways, wetlands and underground water systems. These mainly apply to urban development but the methods are also applicable to the quarrying industry.

- *Engineers Australia 2003, Australian Runoff Quality, National Committee on Water Engineering.*
- *Stormwater Management Manual for Western Australia, Department of Environment WA, 2004.*
- *Guidelines for Groundwater Protection in Australia, ARMCANZ, ANZECC, September 1995.*

Documents specific to the mining and quarrying operations are the DOW – DMP Water Quality Protection Guidelines for Mining and Mineral Processing.

- *Overview*
- *Minesite water quality monitoring*
- *Minesite stormwater*
- *WQPN 28 Mechanical servicing and workshop (2006)*
- *Mine dewatering*
- *WQPN Landuse Compatibility in Public Drinking Water Source Areas (2004)*
- *WQPN 11 Water quality management in mining and mineral processing: mine dewatering.*
- *WQPN 15 Extractive Industries near sensitive water resources.*
- *Department of Water Environment Regulation – Water resource considerations for extractive industries.*
- *Department of Water Environment Regulation, South West Region Guideline – Water resource considerations for extractive industries.*

The continued excavation complies with all the documents above. The most relevant documents are WQPN 15 *Extractive Industries near sensitive water resources* and *South West Region Guideline – Water resource considerations for extractive industries.*

Potable water will be brought to the site. Serviced portable support facilities and ablutions are to be at the western end of the site.

2.0 PHYSICAL ATTRIBUTES

2.1 Geology and Geomorphology

The site is an eroded high ridge of interbeded sequences of coastal dunes, of limestone 120 to 140 metres, rising to over 160 metres AHD on the highest peaks overlying an undulating Proterozoic granitic basement that outcrops of granite hills in the Denmark - Wilson Inlet area.

The limestone is a calc-arenite made from beach sand containing predominantly shell fragments with minor and variable quartz. The limestone has been lithified and recrystallised on the ridge tops to lift the percentage of calcium carbonate to over 70%. The limestone sequences also include buried soil horizons and recalcified limestone overtopped by younger dunes.

The geology is summarised in;

- Geological Survey of Western Australia, 1989, *1 : 50 000 Environmental Geology Series Torbay.*
- Muhling P C and A T Brakel, 1985, *1 : 250 000 Geological Series*, Geological Survey of Western Australia.
- Smith R A 1993, *1 : 250 000 Hydrogeological Series Mt Barker – Alban,* Department of Minerals and Energy.

The degree of lithification (hardness) changes over the property, and determines the use to which each type of limestone can be put.

The limestone is of Quaternary Age formed during changes to sea level during the Pleistocene.

Bores drilled on site and exposure in the cliffs show variable depths of limestone of over 150 metres thickness.

2.2 Regolith and Soils

Soils on the site consist predominantly of grey organic sands in the swales over limestone with white to cream limey sands on the youngest dunes and surfaces.

The soils have been mapped at a very broad scale by CSIRO who categorise them with leached sands, but that is not locally correct.

2.3 Climate

The climate of the area is classified as Mediterranean with warm summers and cool wet winters.

Temperatures closest to Denmark Research Station, where the maximum temperatures in the summer months are 23.2 to 25.9 degrees Celsius. In winter the maxima are 16 to 17 degrees Celsius with the minima dropping to around 7 degrees C in July.

Rainfall for the area is approximately 1000 mm with more than most rain falling during the winter months April to October inclusive.

The wind direction is predominantly from the south.

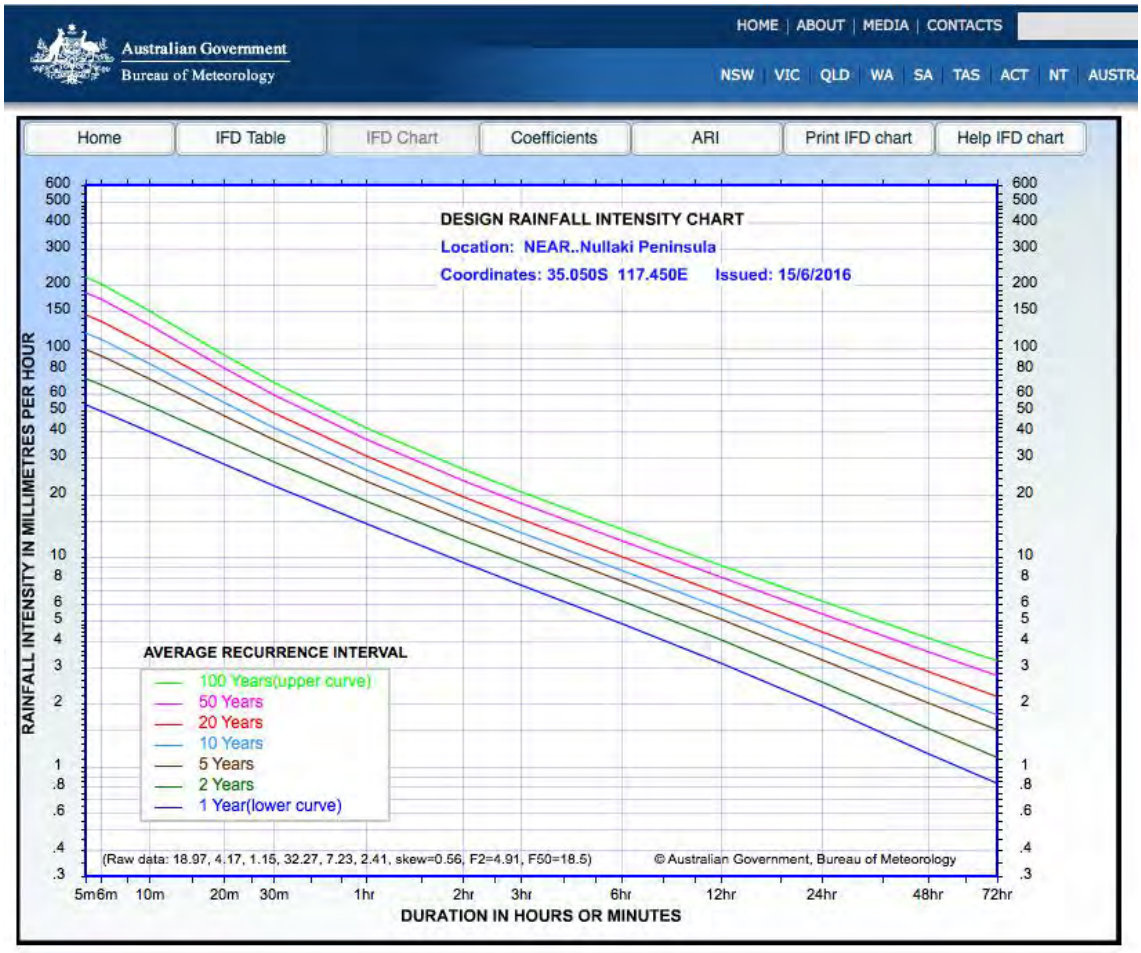


Figure 1 Rainfall Intensity Chart

3.0 Hydrogeology

3.1 Background

Limestone and sand excavation does not affect the quality of water in the shallow ground water system because the only chemicals used are normal fuels and lubricants; a fact that is recognised by the Department of Water who permit extractive industries in Priority Groundwater areas.

3.2 Surface Water

The area has no surface drainage because of the permeable and porous nature of the limesand and limestone. Groundwater in the area flows south to the ocean.

3.3 Groundwater

The site lies in the Albany Drainage District.

There is no surface drainage due to the porosity and permeability of the limestone, with precipitation draining to the water table.

The limestone coastal ridge is 120 to 140 metres, rising to over 160 metres AHD on the peak ridges. The proposed limestone quarry is located on the higher ground.

Smith R A 1993, *1 : 250 000 Hydrogeological Series Mt Barker – Albany,* Department of Minerals and Energy does not show the direction of groundwater movement.

Being so close to the ocean the groundwater elevation will be around zero, rising slightly under Nullaki Peninsula and then dropping down again to the north at Wilson Inlet.

The groundwater under the excavation area can be expected to be 0 – 1 metre AHD in elevation. Groundwater flow from under the pit will be towards the ocean to the south.

That means that the separation to groundwater from excavation activities will be over 140 metres.

~~The stockpile area will be located at an elevation of 20 metres AHD some 18 metres above the groundwater. Groundwater under the stockpile area is likely near the gentle peak of the water table divide but is still likely to flow south to the ocean based on groundwater movement principles under permeable ridges such as this. It is possible that the drains to Lake Saide locally lower the groundwater and the stockpile area lies just over the divide flowing laterally to the drains or north to Wilson Inlet.~~

It has been estimated that perhaps <10 - 20 % of the rainfall will reach the water table at the processing area with slightly less at the ridge based on the separation to the water table. With an annual rainfall of around 1000 mm this equates the 100 to 200 mm recharge per year.

4.0 PROTECTION OF WATER QUALITY

4.1 Surface Water, Dewatering and Drainage

There is no surface water and will be no dewatering or drainage because the limesand and limestone are so porous.

4.2 Groundwater Protection and Water Use

There will be no activities on site that will change the levels of solute in soils, ground or surface water.

4.3 Salinity Protection

The amount of clearing is minimal in the context of the areas involved, and there is no evidence of subsurface salinity with the groundwater being fresh as shown in bores and dams on the Nullaki Peninsula. Therefore the proposed clearing will not change the local recharge.

Groundwater on site is fresh, flushed by high rainfall and porous soils.

There will be no activities on site that will change the levels of solute in soils, ground or surface water.

4.4 Recharge and Water use

The groundwater was considered by the *Environmental Protection Authority in Bulletins 512, 788, 821 and 818,* and whilst these do not specifically refer to the extraction of basic raw materials they do consider the impact of clearing, planting trees and rural residential developments. The figure the EPA used for recharge from native vegetation was 10 – 15% rainfall, whereas cleared land had a recharge of 30 – 40 %. The floor of the quarry is also cleared and so there is not expected to be any reduction in recharge to the site.

Based on Environmental Protection Authority Bulletins for the Lake Clifton Area, 512, 788, 821 and 818, and an annual average rainfall in that area of 900 mm.

It has been estimated that perhaps <10 - 20 % of the rainfall will reach the water table at the processing area with slightly less at the ridge based on the separation to the water table.

Cleared land such as the pit floor will have an estimated recharge of 40% annual rainfall on the 2.0 hectare stockpile area and perhaps 20 % under the pit. Therefore for one hectare of pit the additional recharge will result in an increase of 10 – 20 % or rainfall or 100 to 200 mm per year or 1 000 to 2 000 kL per hectare.

This proposal seeks Development Approval and an Extractive Industries Licence for an staged extraction area of 7.5 hectares combined with a stockpile are of 2 hectares on the eastern portion of Lot 9005. At any one time it is anticipated that only 2.0 hectares of pit will be open.

The total ground open at any one time will be around 4 hectares which will result in a temporary increase in groundwater of around 5 000 to 8000 kL which will drop back to the normal recharge on closure and revegetation.

Potable water is to be brought to the site as needed.

4.5 Acid Sulfate Risk

There has been an increased interest in acid sulfate soils since the release of WAPC Planning Bulletin 64. However the interest has been over reactive and conditions and risk applied in many areas where there is no geological risk or evidence of acid sulfate.

Definitive survey procedure is produced in DEC (DWER) 2013, *Identification of Acid Sulfate Soils and acidic Landscapes* and within document Acid Sulfate Soil Management Advisory Committee NSW, 1998, *Acid Sulfate Manual*. This information forms the basis for much of the assessment procedures in Australia, including those adopted by the Western Australian Planning Commission and the Department of Environment Regulation.

The *Acid Sulfate Manual* adopts the procedure of reviewing the published data followed up by field assessment, which has been completed for this site. If a geological risk is determined, then a Preliminary Acid Sulfate Assessment is conducted.

Acid Sulfate Soils can potentially form under reducing conditions when there is a source of carbon and a source of sulfur (normally from sea or saline water). Micro-organisms are thought to play an important role in reducing the sulfates within the sediments to form the iron sulfide. It is a natural phenomena, that can be exacerbated by disturbance.

Potential acid sulfate conditions most commonly form under current or past estuarine conditions, peaty conditions, and may also result from weathering of some geological formations and situations which contain sulfides.

The soils most at risk are normally saline/estuarine soils, gley soils, peat and some organoferricretes when exposed to the atmosphere.

Acid sulfate only becomes a potential risk when a number of circumstances are present.

- There is rock, soil or regolith present that is carrying sulfides.
- Sulfide carrying materials from below the water table are to be exposed to the atmosphere.
- Excavation below the water table is to be carried out exposing the sulfide carrying materials to oxygen in the atmosphere.
- Dewatering of the sulfide carrying materials is proposed, exposing them to oxygen.
- Exposure of peat or organoferricrete materials, that were permanently under reducing conditions, to the air.

None of these at risk conditions occur on site.

The site is elevated high $CaCO_3$ content limesand that is alkaline and oxidised with no evidence or potential of reducing conditions or other risk factors and none would be expected in this geological environment. This type of material is used to neutralize acidic conditions whether it be on agricultural soils or acidic conditions arising from acid sulfate impacts.

Therefore there is no risk of acid sulfate conditions.

4.6 Waste Rock and Tailings Management

Waste and Tailings management is considered in;

- *Department of Mines and Petroleum, 1999, Mining Environmental Management Guidelines, Safe Design and Operating Standards for Tailings Storage.*

As all the limesand and limestone is used in one type of product or another and any sub grade will be natural and suitable for rehabilitation there are no waste rock or tailings.

Potential "at risk" Waste Inventory - Characterisation

Type	Comment	Treatment	Reference
Saline surface water	Not present		
Saline ground water	Not present		
Acidic materials and drainage	Not present		
Sodic or dispersive materials	Not present		
Asbestos – asbestiform minerals	None present		
Radioactive materials	Not present		
Metallic or chemical materials	Not present		
Tailings storage	Not required		
Ablutions waste		Serviced portable facilities	Water Management Plan
Dangerous Goods and Hazardous Materials	***None will remain on closure***.	There are normally no hazardous materials used for ~~hard rock~~ quarrying, apart from fuel, ~~blasting~~ and servicing. The only other materials are for tasks such as weed management and are dealt with under those sections.	
	EXPLOSIVES	Not used	
	FUEL The various plant will be refueled from mobile tanker. ***None will remain on closure***.	Any soil or other materials with drips and spills will be removed offsite to an approved waste site or location. Fuel is discussed in this~~e~~ Water Management Plan.	Water Management Plan
	SERVICE MATERIALS Only minor lubrication will be conducted on site All major servicing will be conducted offsite. ***None will remain on closure***	Any wastes will be collected and removed from site promptly to an approved recycling or waste disposal area. Servicing is discussed in this~~e~~ Water Management Plan.	Water Management Plan
General waste		Regularly removed from site to an approved disposal area	Water Management Plan

- Wastes generated will be recycled wherever possible and periodically disposed of at an approved landfill site.

4.7 Unauthorised Access and Illegal Dumping

The potential for rubbish to be dumped relates mainly to unauthorised access and is low as the site is set back from roads. Access restrictions such as gates or barriers will be installed when the site is unmanned and equipment retained on site.

- Any illegally dumped materials are to be removed promptly to an approved landfill or other suitable site, depending on the nature of the material.

4.8 Solid Domestic and Light Industrial Wastes

Non essential or old plant and materials will be removed from the site. Locked gates and the existing fences will be maintained to prevent illegal dumping and contamination of water.

All solid domestic and light industrial wastes will be stored in commercial waste storage containers and/or removed to an approved landfill facility. There will be no waste disposal on site. Waste storage containers will be sealed so that rainfall cannot enter, therefore preventing the formation of leachates.

Wastes generated will be recycled wherever possible and periodically disposed of at an approved landfill site. Any illegally dumped materials are to be removed promptly to an approved landfill or other suitable site, depending on the nature of the material.

Regular inspections (at least weekly) are conducted to ensure no wastes, litter and the like are present in or around the excavation and processing area.

4.9 Wastewater Disposal

A service portable toilet system will be used when the site is manned. Serviced means they are pumped out by a licensed contractor from Albany or Denmark.

4.10 Refuelling

The protection of water from fuels and other chemicals is an important part of the management of quarries. Different types of quarries have different potential impacts which are listed below in general terms. Not all potential impacts will apply to this quarry and the main impacts affecting this site are also listed

Extraction of hard rock/limestone is a clean operation similar to sand excavation in the nature of the risk to groundwater. Similar quarries have operated locally for many years with no known significant pollution incidents.

No chemicals are used apart from normal lubricants, which is similar to sand excavation, and sand excavation is one of the few industries that are permitted to operate in a Priority 1 Public Drinking Water Source Area, indicating the clean nature of the activity. See Department of Water *Land Use Compatibility in Public Drinking Water Source Areas.*

All spills are to be cleaned up in accordance with the summarised procedures following.

Documents specific to the fuel and maintenance are the ~~DOW~~ DWER – DMIRS ~~DMP~~ Water Quality Protection Guidelines for Mining and Mineral Processing

- *Mechanical servicing and workshop facilities*
- *Above-ground fuel and chemical storage*
- *WQPN 28 Mechanical servicing and workshop (2006)*
- *WQPN 15 Extractive Industries near sensitive water resources.*
- *Department of Water Environment Regulation – South West Region Guideline – Water resource considerations for extractive industries.*

A list of the management actions for maintenance is provided. The actions will be used where applicable and as the opportunity presents to maintain water quality on this site.

Best Practice Quarry Management ensures high levels of safety and pollution management procedures for all their operations. Normally self contained service and recovery vehicles to undertake minor servicing in the field are used.

Fuel Management Plan

Fuel Storage

Currently it is proposed to use mobile tankers to refuel mobile and fixed plant when the site is manned.

Minor fuels will also be required for smaller mobile and fixed plant.

Any drums for smaller plant will be retained on trucks and if placed on site will be stored in a bunded lined facility to retain 110% of the volume stored.

Fuel Spill Management Plan

- Fuel and maintenance will be carried out in accordance with the DWERDOW – DMIRS DMP Water Quality Protection Guidelines for Mining and Mineral Processing, *Mechanical servicing and workshop facilities* and *Above-ground fuel and chemical storage*.

- Soils, limestone and roadbase hardstand such as those on this site are adsorptive. The main risk of contamination is the minor drips that occur during the removal of hoses etc. Minor spills are quickly degraded by soil microbial matter.

- Refuelling and lubricating activities only occur in designated areas. Equipment for the containment and cleanup of spills is to be provided in these areas.

- Spillage will be contained in plant and working areas by shutting down plant or equipment if the plant or equipment is the source of the spill (provided it is safe to do so).

- In the event of a spill or adverse incident, activities will be stopped in that area until the incident is resolved.

- Any spills will be contained by the excavation or processing area. A fluid spill emergency response kit is in place. For larger spills soil and resource will quickly be placed around the spill to contain it in as small an area as possible. When contained, the contaminated aggregate/loam soils will be scooped up and removed to an approved landfill or other approved site.

- All significant adverse incidents (such as a fuel spill of >5 litres) in one dump, are recorded, investigated and remediated. A record is to be kept of incidents and the Local Authority and Department of Water Environment Regulation notified within 24 hours. No such incidences have been recorded at the quarry.

- The only other risk is from a tank rupture, but tanks are designed to manage this eventuality. A commitment is made to notify Department of Water Environment Regulation/Department of Water and Shire of HarveyCity of Albany of any spill greater than 5 litres in one dump. This is much less than the DOW DWER requirement trigger of 100 litres. Soil contaminated by large spills will be removed from the site to an approved disposal area.

- No significant non compliances have been recorded.
- Spillage will be contained in plant and working areas by shutting down plant or equipment if the plant or equipment is the source of the spill (provided it is safe to do so).
- Transport chemicals in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code).

4.11 Dangerous Goods and Hazardous Substances

There is no transport, storage or handling of hazardous materials involved in hard rock extraction.

Fuel will be carried on vehicles when brought to site for refuelling. Fuel cartage will be governed by normal mobile fuel transport management and the DMIRS/DWER ~~DMP/DOW~~ guidelines listed above. Minor fuel may be required for small on site mobile and fixed plant and hand equipment and this will not be stored on site unless personnel are on site.

4.12 Servicing and Maintenance

Documents specific to the fuel and maintenance are the ~~DOW – DMP~~ DMIRS - DWER Water Quality Protection Guidelines for Mining and Mineral Processing

- *Mechanical servicing and workshop facilities*
- *Above-ground fuel and chemical storage*

The main risk of contamination comes from tank or hose rupture on earth moving machines. A spill kit containing absorbent granules is located on site for emergency use. ~~A commitment is made to notify Department of Water and DMP of any spill greater than 5 litres. DER Guidelines suggest 100 litres but this is felt to be too high.~~

- All major servicing of vehicles will be conducted off site.
- Servicing plant and equipment will be in accordance with a maintenance schedule.
- Lubricating and maintenance activities are to occur in designated areas in the processing area and pit. Equipment for the containment and cleanup of spills is to be provided.
- Spillage will be contained in plant and working areas by shutting down plant or equipment if the plant or equipment is the source of the spill (provided it is safe to do so).
- Waste substances and chemicals will be stored in accordance with the Site Waste Guidelines.
- Waste oil and other fluids derived from the routine maintenance of mobile machinery, will be transported off site and disposed off at an approved landfill site. Grease canisters, fuel filters, oil filters and top-up oils will be stored in appropriate containers in a shed or brought to the site as required.
- Vehicle washdown is not proposed.
- Regular inspections and maintenance of fuel, oil and hydraulic fluids in storages and lines will be carried out for wear or faults.

- Accidental spill containment and cleanup protocol will be implemented as necessary.
- Any waste chemicals derived during routine maintenance activities will be stored in appropriate sealed containers within a designated storage area or taken from site and disposed of at an approved facility.
- Rubbish generated is to be recycled wherever possible and periodically disposed of at an approved landfill site.
- The site will be maintained in a tidy manner by removing all rubbish regularly offsite.

5.0 Monitoring

As there is no surface water and the groundwater is not being accessed, combined with the low inherent risk of excavating limesand and past experience, no water monitoring is required or proposed.

REFERENCES

DMIRS – DWER ~~DOW and DMP~~ (2000). *Water Quality Protection Guideline: Above Ground Fuel and Chemical Storage.*

DMIRS – DWER ~~DOW and DMP~~ (2000). *Water Quality Protection Guideline: Mechanical and Servicing Worksop Facilities.*

DMIRS – DWER ~~DOW and DMP~~ (2000). *Water Quality Protection Guideline: Mine Dewatering.*

DMIRS – DWER ~~DOW and DMP~~ (2000). *Water Quality Protection Guideline: Minesite Water Quality Monitoring.*

DWER ~~DOW~~ (2000). *WQPN 11 Water quality management in mining and mineral processing: mine dewatering.*

DWER ~~DOW~~ (2004), *Water Resource Protection Series WRP16: Draft Policy and Guidelines on Construction and Silica Sand Mining in Public Drinking Water Source Areas.* Water and Rivers Commission, Perth.

DWER ~~DOW~~ (2013). *WQPN 13 Extractive Industries near sensitive water resources.*

Department of Environment WA, 2004, *Stormwater Management Manual for Western Australia*.

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

Department of Industry and Resources, 1999, *Mining Environmental Management Guidelines, Safe Design and Operating Standards for Tailings Storage.*

Department of Minerals and Energy (1991). *Environmental Management of Quarries: Development, Operation and Rehabilitation Guidelines.* DOIR, Perth.

Department of Resources Development, 1999, *Mining Below the Water Table in the Pilbara,* Pilbara Iron Ore Environemtnal Committee.

Engineers Australia 2003, *Australian Runoff Quality*, National Committee on Water Engineering.

Environmental Protection Authority Victoria/ Melbourne Water, undated, *Urban Stormwater, Best Practice Environmental Management Guidelines*

Environmental Protection Authority, 2007, *State Of the Environment Report Western Australia*

Environmental Protection Authority, Position Statement No 2, December 2000, *Environmental Protection of Native Vegetation in Western Australia*.

Firman J B, 2006, *Ancient weathering zones, pedocretes and palaeosols on the Australian Precambrian shield and in adjoining sedimentary basins: a review*, IN Journal of the Royal Society of Western Australia, Volume 89 part 2.

Geological Survey of Western Australia, 1990, *Geology and Mineral Resources of Western Australia*, Memoir 3.

Guidelines for Groundwater Protection in Australia, ARMCANZ, ANZECC, September 1995.

Jasinke E J, 1997, *Fauna of aquatic root mats in caves of South Western Australia; Origin and Ecology*, unpublished PhD Thesis, University of Western Australia.

Western Australian Planning Commission, *Statement of Planning Policy No 4.1, State Industrial Buffer Policy, (draft July 2004).*

Western Australian Water Quality Guidelines for Fresh and Marine Waters, EPA Bulletin 711, 1*993.*

Willett, I R, 1993, *Oxidation-reduction reactions IN Soils and Australian Viewpoint*.

Proposed Lee Road Alignment, Youngs Siding WA 6330

Level 1 Flora and Vegetation Survey Report

Bio Diverse Solutions

04/04/2017

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1 INTRODUCTION

1.1 Site location

The survey area is located approximately 12.5 km South East of Denmark, in Crown Allotment Lot 7334 and Reserve 17464 within the City of Albany municipality (Department of Planning, 2017). This survey and report relates to 1.4ha of the 2.7ha Lee Road alignment proposed by the Client. The proposed new road alignment will extend and connect the end of the existing section of Lee Road through R17464 and the adjacent Lot 9005 to Rockcliff Circle. The area surveyed is outside of the predator proof fence which runs along the eastern boundary of Lot 9005. To the west of the survey area is the Nullaki Peninsula (CZ1) which is classified as "Conservation/Protection" under the City of Albany Town Planning Scheme No. 1.

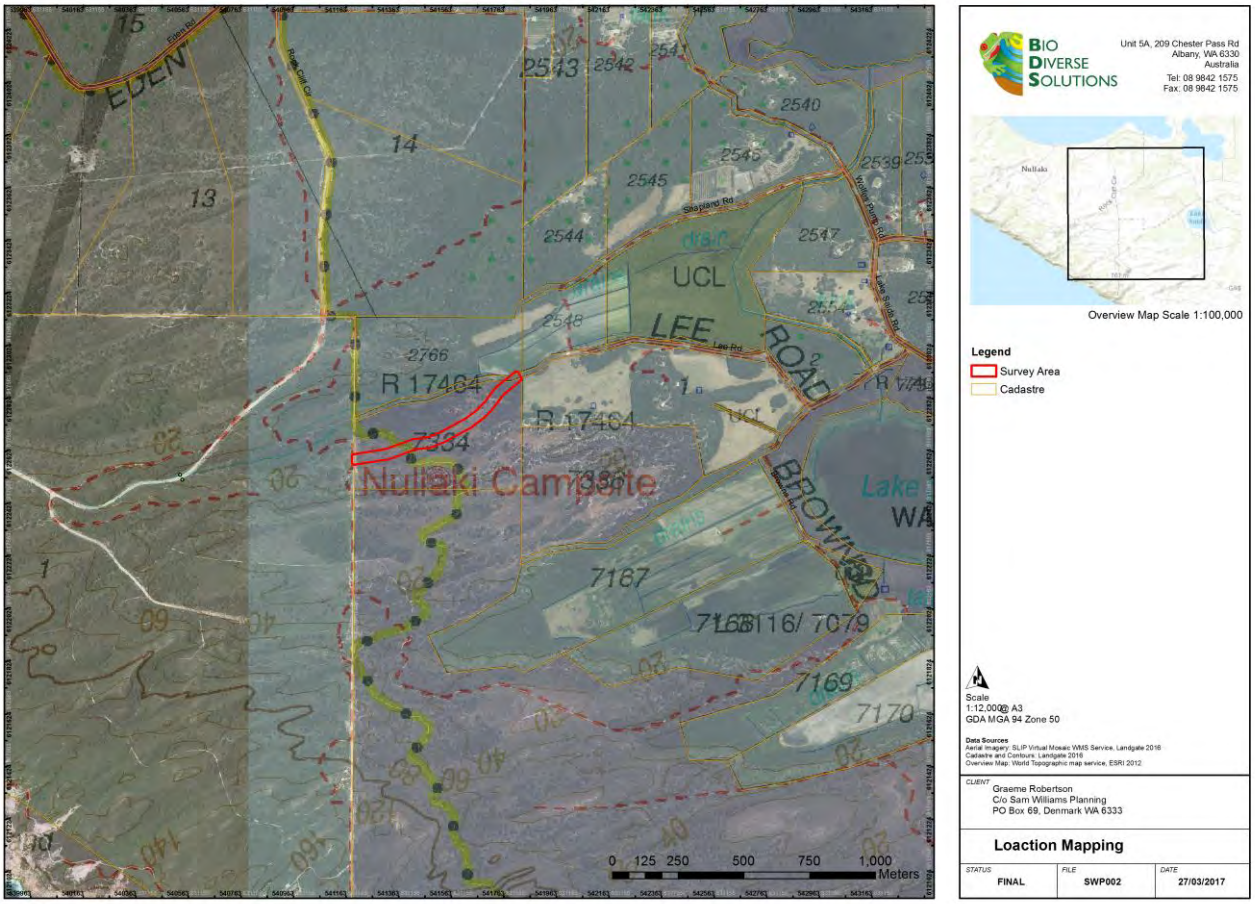


Figure 1: Location of the survey area

1.2 Scope of work

Bio Diverse Solutions was commissioned by Graeme Robertson ("the Client") to undertake a Level 1 Flora and Vegetation Survey along a proposed road alignment within Lot 7334. The proposed alignment extends into the adjacent area of land to the west (Lot 9005), however this area has previously been surveyed by Bio Diverse Solutions in 2016 and as such was deemed outside of the scope for this survey.

A Level 1 Flora and Vegetation Survey was undertaken in accordance with EPA Guidance Statement 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004). Targeted surveys for DRF and priority flora were also undertaken in areas defined as containing potential habitat. The survey was undertaken on the 22nd March 2017, which is noted to be outside of the spring flowering period (as required for a Level 1 Flora Survey).

1.3 Hydrogeology, Geology, geomorphology and soils

The topography of most of the survey area is dominated by a gently undulating plain sloping to the coast with numerous small drainage lines. The coastal fringe is dominated by coastal dune systems, limestone headlands and cliffs (Churchward *et al.* 1988). The survey area is located approximately 5m AHD to 15m AHD (5m contour data). Geologically the broader area is underlain by Proterozoic rocks including granites and metamorphic gneiss of the Albany Fraser Province which are exposed as hills to 360 meters high along the coastal and near coastal fringe (Muhling and Brakel 1985).

Regolith Mapping (Department of Mines and Petroleum - Geological Survey Division 2001) indicates soils across the survey area are classified as "*Sandplain, mainly eolian; includes some residual deposits"* and forms part of the Proterozoic Nornalup Complex. (refer to Appendix A – Hydrogeological and Soil Mapping.). Australian Geoscience Mapping and Department of Water 250K Hydrogeological mapping places the survey area from the "*Quaternary - Cainozoic – Phanerozoic: Alluvium, minor colluvium-grave, sand, silt and clay".* The aquifer is a *"Surficial aquifer - local aquifer, possible sedimentary aquifer beneath, minor groundwater resources".* Refer Appendix A – Hydrogeological and Soil Mapping.

1.4 Regional context

The survey area lies within the Southwest Botanical Province and forms part of the Southwest Australian Biodiversity Hotspot, one of 34 internationally recognised biodiversity hotspots (Myers *et al.* 2000). It occurs in the eastern portion of the Warren Interim Bio-geographic Regional Area (IBRA), which runs along the coast from just south of Yallingup to south of the Princess Royal Harbour near Albany (IBRA 2012).

The Warren bioregion is described as a combination of hills, plateaux and plains and features four main soil types including loamy soils supporting karri forest; red laterites supporting jarrah-marri forests; leached sandy soils in depressions and as plains supporting low jarrah woodlands and paperbark/sedge swamps, and; holocene marine dunes supporting *Agonis flexuosa* thickets, *Banksia* woodlands and heaths (McKenzie *et al.* 2002).

Notable values of this bioregion include tall forests (karri, jarrah and tingle), which provide a refuge for relictual invertebrates; barren limestone areas with underground drainage systems (karst regions) that support an endemic invertebrate fauna; peat or organic wetland systems that support relictual populations of aquatic invertebrates; mound-forming microbial associations in the west of the region; and a highly endemic flora and fauna, especially in plant groups such as Myrtaceae, Rutaceae, Proteaceae, Papilionaceae, Restionaceae, Stylidiaceae and Sterculiaceae (McKenzie *et al.* 2002).

Gondwanan invertebrate fauna includes The Tingle *Bertmainius* trapdoor spider and Torndirrup's *Austrarchaea mainae* spider, *Dardarus sp*. millipede, *Cynotelopus notabilis* pill millipede and velvet worms. A number of notable critical weight range mammals also persist in the region, including the quokka, southern brown bandicoot, chuditch and brush-tailed phascogale.

The eastern limit of the bio region marks the transition zone from the more mesic forested south west of Western Australia to the drier interior and eastern coastal areas that are vegetated by mallee, woodland and shrubland associations (Bio Diverse Solutions 2016).

2 VEGETATION AND FLORA

The vegetation of the area has been mapped on a broad landscape scale by Beard (1979). This mapping forms part of a state-wide mapping and vegetation classification system based on geographic, geological, soil, climate, structure, life form and vegetation characteristics. Vegetation units were regarded as associations and were grouped into Vegetation Systems representing a particular pattern of association distribution within a given area. Beard (1979) recognised one vegetation system within the survey area; the Torndirrup system and one vegetation association; Shrublands: *Acacia* scrub-heath.

2.1 Survey methods

Desktop inventory of flora species likely to occur within 10km of the survey area was undertaken using the following databases and previous reports:

- Nature Map Database Search (combined data from DPaW, WA Museum and WA Herbarium) (DPaW 2017 Appendix B); and
- Protected matters search tool (DoE 2017, Appendix B);
- Albany Regional Vegetation Survey, Extent Type and Status E.M Sandiford & S. Barrett (2010); and
- Bio Diverse Solutions 2016 – Vegetation Communities Survey. Unpublished Flora and vegetation report prepared for the Client for Lots 139, 153, 237, 200, 201 and 9005 on the Nullaki Peninsular.

The list compiled from this data is based on observations from a broader area than the survey area and is likely to include species that would not occur in the actual survey area due to a lack of suitable habitat. The data also includes very old records and in some cases the species in question may have become locally or regionally extinct.

The conservation significance of flora species was assessed using data from the following sources:

- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Administered by the Australian Government Department of the Environment (DoE);
- Wildlife Conservation Act 1950 (WC Act). Administered by the Western Australian Department of Parks and Wildlife (DPaW);
- DPaW Priority Flora list. A non-legislative list maintained by DPaW for management purposes.

Ecologists' Karlene Bain (BSc MSc PhD) and Bianca Theyer (BSc Hons) from Bio Diverse Solutions undertook a Level 1 flora and vegetation survey on 22nd March 2017 where the survey area was traversed by foot. The vegetation was assessed in detail using longitudinal transects that strategically targeted the range of diverse ecotypes present onsite, as identified using aerial photographs and visual observation. Flora species were systematically recorded and collections of plant specimens were made where further identification was required. Vegetation communities were mapped in the field using GPS and aerial photographs. Vegetation types were categorised based on dominant species' and structure, using structural classification according to Keighery (1994) (Appendix D).

2.2 Flora Survey Outcomes

During the field survey 75 species, consisting of 33 families and 59 genera were found. The most common families were Asteraceae, Fabaceae, Proteaceae, Ericaceae, Poaceae, Restionaceae, and Cyperaceae This list includes 63 native species (Table 1) and 11 introduced species (Table 3). *Banksia sessilis var cordata* (Priority 4) was the only Priority species to be positively identified within the survey area.

See Appendix C for definitions of the conservation codes.

Table 1 - Flora species recorded within survey area

Family	Species	Common Name	Native
Aizoaceae	*Carpobrotus sp.*	Pig face	Y
Anarthriaceae	*Anarthria prolifera*		Y
Anarthriaceae	*Lyginia barbata*		Y
Anarthriaceae	*Lyginia imberbis*		Y
Apiaceae	*Apium prostratum*	Sea Celery	Y
Apiaceae	*Platysace compressa*	Tapeworm Plant	Y
Araceae	*Zantedeschia aethiopica*	Arum Lily	N
Asteraceae	*Conyza bonariensis*	Fleabane	N
Asteraceae	*Hypochaeris glabra*	Smooth Catsear	N
Asteraceae	*Olearia axillaris*	Coastal Daisybush	Y
Asteraceae	*Rhodanthe citrina*	Asteraceae	Y
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	N
Casuarinaceae	*Allocasuarina humilis*	Dwarf Sheoak	Y
Chenopodiaceae	*Rhagodia baccata subsp. baccata*	Sea Berry Saltbush	Y
Cyperaceae	*Ficinia nodosa*	Knotted Club Rush	Y
Cyperaceae	*Lepidosperma gladiatum*	Coast Sword-sedge	Y
Cyperaceae	*Lepidosperma squamatum*		Y
Cyperaceae	*Schoenus subfascicularis*		Y
Dennstaedtiaceae	*Pteridium esculentum*	Bracken	Y
Dilleniaceae	*Hibbertia cuneiformis*	Cutleaf Hibbertia	Y
Dilleniaceae	*Hibbertia furfuracea*		Y
Dilleniaceae	*Hibbertia racemosa*	Stalked Guinea Flower	Y
Droseraceae	*Drosera sp.*		Y
Ericaceae	*Leucopogon obovatus*		Y
Ericaceae	*Leucopogon parviflorus*	Coast Beard-heath	Y
Ericaceae	*Leucopogon propinquus*		Y
Ericaceae	*Lysinema ciliatum*	Curry Flower	Y
Fabaceae	*Acacia cyclops*	Coastal Wattle	Y
Fabaceae	*Acacia hastulata*		Y
Fabaceae	*Acacia pulchella*	Prickly Moses	Y
Fabaceae	*Bossiaea linophylla*		Y
Fabaceae	*Gompholobium confertum*		Y
Fabaceae	*Gompholobium tomentosum*		Y
Fabaceae	*Hardenbergia comptoniana*	Native Wisteria	Y
Fabaceae	*Jacksonia horrida*		Y
Fabaceae	*Psoralea pinnata*	African Scurfpea	N
Fabaceae	*Pultenaea reticulata*		Y
Geraniaceae	*Pelargonium capitatum*	Rose Pelargonium	N
Haemodoraceae	*Anigozanthos flavidus*	Tall Kanagroo Paw	Y

Table 1 Cont.

Family	Species	Common Name	Native
Haemodoraceae	*Conostylis aculeata ssp. aculeata*		Y
Lauraceae	*Cassytha racemosa*	Dodder Laurel	Y
Myrtaceae	*Agonis flexuosa*	Peppermint	Y
Myrtaceae	*Eucalyptus megacarpa*	Bullich	Y
Olacaceae	*Olax phyllanthi*		Y
Orchidaceae	*Caladenia sp.*		Y
Phyllanthaceae	*Phyllanthus calycinus*	False Boronia	Y
Phytolaccaceae	*Phytolacca octandra*	Red Ink Plant	N
Pittosporaceae	*Billardiera*		Y
Pittosporaceae	*Marianthus drummondianus*		Y
Poaceae	*Austrostipa sp.*		Y
Poaceae	*Cenchrus clandestinus*	Kikuyu	N
Poaceae	*Microlaena stipoides*	Weeping Grass	Y
Poaceae	*Poa sp.*		Y
Polygonaceae	*Muehlenbeckia adpressa*	Climbing Lignum	Y
Polygonaceae	*Rumex acetosella*	Sorrel	N
Proteaceae	*Banksia grandis*	Bull Banksia	Y
Proteaceae	*Banksia littoralis*	Swamp Banksia	Y
Proteaceae	*Banksia sessilis var. cordata*	Parrot Bush	Y
Proteaceae	*Hakea amplexicaulis*	Prickly Hakea	Y
Proteaceae	*Hakea prostrata*	Harsh Hakea	Y
Proteaceae	*Hakea ruscifolia*	Candle-spike Hakea	Y
Restionaceae	*Desmocladus flexuosus*		Y
Restionaceae	*Hypolaena exsulca*		Y
Restionaceae	*Leptocarpus tenax*	Slender Twine Rush	Y
Restionaceae	*Loxocarya cinerea*		Y
Rhamnaceae	*Spyridium globulosum*	Basket Bush	Y
Rubiaceae	*Opercularia hispidula*	Hispid Stinkweed	Y
Rutaceae	*Boronia crenulata*	Aniseed Boronia	Y
Solanaceae	*Solanum nigrum*	Black Berry Nightshade	N
Thymelaeaceae	*Pimelea rosea subsp. rosea*	Coastal Banjine	Y
Thymelaeaceae	*Pimelea sp.*		Y
Typhaceae	*Typha orientalis*	Bulrush	N
Xanthorrhoeaceae	*Xanthorrhoea gracilis*	Graceful Grass Tree	Y

2.3 Threatened Ecological Communities

A search of the EPBC *Act* Protected Matters Search Tool (DoE 2017) identified one Threatened Ecological Community is likely to occur within 10 km of the survey area (Table 2).

Table 2: Threatened Ecological Communities that are likely to occur within 10 km of the survey area.
Generated from Protected Matters Search Tool (DOE 2017), with a field assessment of occurrence within the survey area

Community Name	Status	Description	Survey Outcome
Subtropical and Temperate Coastal Saltmarsh	VU	Occurs on sandy or muddy substrate on the coast in areas with at least some tidal connection, including coastal clay pans, estuaries and embayment's. Dominated by salt-tolerant vegetation (halophytes). Succulent herbs, shrubs and grasses generally dominate and vegetation is < 0.5 m height (with the exception of some reeds and sedges). Species characteristic of the community include: *Austrostipa stipoides*, *Gahnia trifida*, *Juncus kraussii,* and *Samolus repens*. In the south-west of WA there is a high diversity of Tecticornia, Triglochin, Samolus and Puccinellia. Proportional cover by tree canopy such as mangroves, Melaleucas or Casuarinas is not greater than 50%, nor is proportional ground cover by seagrass greater than 50%.	Not Present within the survey area

2.4 Threatened and Priority Flora

A search of the *EPBC Act* Protected Matters Search Tool (DoE 2017) and NatureMap (DPaW 2017) identified 24 Threatened or Priority species that are likely to occur within 10 km of the survey area (Table 3). These two database searches did not indicate that any variants of *Banksia sessilis* may be present in the area, however, during the survey *B. sessilis var cordata* (P4) was identified (See Figure 3 in Section 2.5.4). This conclusion on species variant was made based on known distributions of *B. sessilis var cordata* occurring in the Denmark area and is consistent with the previous survey undertaken by Bio Diverse Solutions in 2016. In order to positively identify the species variant from *B. sessilis* a flowerhead is needed due to the presence of a key identifying feature - the pistil the known flowering time (August to November). Furthermore, the DRF species *Drakaea micrantha* was not able to be detected during this survey as it is a geophyte and requires a spring survey in order to detect basal leaves or flowering parts.

Table 3: Potential Threatened Flora Species Occurring Within 10 km of Survey Area.
Generated from NatureMap (DPaW 2017), Protected Matters Search Tool (DOE 2017) with a post hoc assessment flowering periods and a field assessment of habitat suitability

Species	Status (WA)	Habitat	Flowering period	Potentially Suitable Habitat Present	Survey Outcome / Comment
Xanthosia eichleri	P4	Grey sand over granite, sandy loam. Granite outcrops, Jarrah/Marri woodland.	Oct-Nov	N	Species not found. No suitable habitat present within the survey area.
Laxmannia jamesii	P4	Grey sand. Winter-wet locations.	May-Jul	Y	Species not found. Some potentially suitable habitat in the sedgeland habitat, and within sections of the *Bullich-Agonis* woodland.

Table 3: Cont.

Species	Status (WA)	Habitat	Flowering period	Potentially Suitable Habitat Present	Survey Outcome / Comment
Centrolepis caespitosa	P4	White sand, clay. Salt flats, wet areas.	Oct-Dec	N	No suitable habitat present within the survey area.
Gahnia sclerioides	P4	Loam, sandy soils. Moist shaded situations.	Not published	Y	Species not found. Some potentially suitable habitat present within the survey area. Genus identifiable. There were no unidentifiable *Gahnia* found.
Schoenus benthamii	P3	White, grey sand, sandy clay. Winter-wet flats, swamps.	Oct-Nov	Y	Species not found. Some potentially suitable habitat present within the survey area. Genus identifiable. There were no unidentifiable *Shoenus* found.
Calectasia cyanea	DRF	White, grey or yellow sand, gravel.	Jun-Oct	N	Species not found. No suitable habitat present within the survey area.
Andersonia sp. amabile	P3	Black sand in seasonally wet swamps in heath.	Sept-Nov	N	Species not found. No suitable habitat present within the survey area.
Sphenotoma drummondii	DRF	Stony or shallow soils over granite or quartzite. Steep rocky slopes, crevices of rocks.	Sept-Dec	N	Species not found. No suitable habitat present within the survey area.
Kennedia glabrata	DRF	Soil pockets, sandy soils. Granite outcrops.	Aug-Nov	N	Species not found. No suitable habitat present within the survey area.
Sphaerolobium calcicola	P3	White-grey-brown sand, sandy clay over limestone, black peaty sandy clay.	Sept-Nov	N	Species not found. No suitable habitat present within the survey area.
Selliera radicans	P1	Saline mud. Estuarine areas.	Dec-Feb	N	Species not found. No suitable habitat present within the survey area.
Conostylis misera	DRF	White or grey sand, sandy loam. Winter-wet flats.	Oct-Nov	Y	Species not found. Some potentially suitable habitat present within the survey area. Genus identifiable. There were no unidentifiable *Conostylis* found.
Trithuria australis	P4	Trithuria species are often semi-aquatic, in wet clay and mud.		N	Species not found. No suitable habitat present within the survey area.
Ornduffia submersa	P4	Aquatic habitats; occurs in freshwater up to 0.6m in depth.	Sept-Nov	N	Species not found. No suitable habitat present within the survey area.

Table 3: Cont.

Species	Status (WA)	Habitat	Flowering period	Potentially Suitable Habitat Present	Survey Outcome / Comment
Melaleuca ordinifolia	P2	Sandy loam or clay.	Aug-Oct	Y	Species was not found. Genus is readily identifiable. Potentially suitable habitat within *the Bullich-Agonis* woodland.
Verticordia apecta	DRF	Sandy clay with loam & broken granite. Slopes.	Nov	N	Species not found. No suitable habitat present within the survey area.
Drakaea micrantha	DRF	White-grey sand.	Sept-Oct	Y	Species not found. Suitable habitat is present. Genus is not identifiable outside of flowering period.
Banksia brownii	DRF	Sand over laterite, gravel, loam over granite. In gullies.	Mar-Jul	N	Species not found. Species and Genus readily identifiable outside of flowering period.
Isopogon buxifolius var. buxifolius	P2	Grey sand. Swampy areas.	Jul-Dec	Y	Species not identified. Some potential habitat within the Open Heath. Genus identifiable. There were no unidentifiable *Isopogon* found.
Isopogon uncinatus	DRF	Loam or sand on granite, peaty sand. Swampy depressions, hillslopes.	Oct-Nov	N	Species not found. No suitable habitat present within the survey area.
Chordifex abortivus	DRF	Sand. Low rises & undulating areas.	Sep-Oct	Y	Species not found. Potential habitat present within the survey area. Genus identifiable. There were no unidentifiable *Chordifex* found.
Boronia virgata	P4	Peaty sand or clay. Swampy or waterlogged places.	Aug-Dec	N	Species not found. No suitable habitat present within the survey area.
Stylidium lepidum	P3	Gravelly sand or loam, clay. Winter-wet depressions.	Oct-Nov	N	Species not found. No suitable habitat present within the survey area.
Stylidium roseonanum	P3	Swamps.	Oct	Y	Species not found. Suitable habitat present within the survey area. Genus is not identifiable outside of flowering period.

2.5 Vegetation Units

Three vegetation types were identified within the survey area. These are described in the following pages and mapped in Figure 2.

2.5.1 Bullich - Agonis Woodland

Description: Occurs in protected swales, slopes, crests and flats on brown loamy sand along ridges and grey sand on the lower profiles in the eastern portion and along the north-western extent of the survey area. The overstorey is dominated by tall (15-25 m) *Eucalyptus megacarpa.* The midstorey consists of *Agonis flexuosa* and the occasional *Banksia grandis* and *Banksia littoralis.* The understorey is often dense and dominated by smaller *Agonis flexuosa, Bossiaea linophylla, Spyridium globulosum, Hibbertia cuneiformis, Leucopogon propinquus, Leucopogon parviflorus* and climbing herbs such as *Muehlenbeckia adpressa* and *Cassytha racemosa*. The ground cover is dominated by a variety of sedges and grasses.

Within the portion of woodland situated in the far eastern extent of the survey area is a gully which had a higher component of sedges. The northern edge of this same area of woodland is adjacent to a water body associated with farming practices, as such there was a higher proportion of weeds along this edge.

Floristic Summary:

Lifeform	Species
Trees	*Eucalyptus megacarpa*
Trees <10m	*Agonis flexuosa, Banksia grandis* and *Banksia littoralis (occasional).*
Shrubs >2m	*Agonis flexuosa, Spyridium globulosum, *Psoralea pinnata, Acacia pulchella* and *Pultenaea reticulata.*
Shrubs 1-2m	*Olearia axillaris, Xanthorrhoea preissii, Acacia hastulata, Bossiaea linophylla, Hakea ruscifolia, Hakea prostrata* and *Allocasuarina humilis.*
Shrubs 0.5-1m	*Anigozanthos flavidus, *Zantedeschia aethiopica, Leucopogon propinquus, Leucopogon parviflorus, Marianthus drummondianus* and *Xanthorrhoea gracilis.*
Shrubs <0.5m	*Hibbertia cuneiformis, Hibbertia furfuracea* and *Rhagodia baccata subsp. baccata.*
Sedges and rushes	*Gahnia sp., Ficinia nodosa, Lepidosperma gladiatum, Lyginia barbata, Anarthria prolifera, Lepidosperma squamatum, Desmocladus flexuosus, Loxocarya cinerea, Leptocarpus tenax* and **Typha orientalis.*
Herbs and grasses	*Apium prostratum, Austrostipa sp., Cassytha racemosa, Hardenbergia comptoniana, Muehlenbeckia adpressa, Microlaena stipoides, Opercularia hispidula, Poa sp., *Pelargonium capitatum, *Conyza bonariensis, *Cenchrus clandestinus, *Solanum nigrum, *Phytolacca octandra, *Hypochaeris glabra* and **Sonchus oleraceus.*

* Weed species

2.5.2 Open Heath

Description: Occurs in swales, flats and on crests of dunes. Where overstorey is present, it consists of low and scattered *Agonis flexuosa* or *Banksia littoralis* in flats with low thickets of *Agonis flexuosa* on ridgelines and in swales. The understorey consists of a diverse mix of species. Those most dominant include: *Acacia cyclops, Agonis flexuosa, Jacksonia horrida*, *Leucopogon propinquus, Leucopogon obovatus, Pultenaea reticulata* and *Spyridium globulosum.* A mix of sedges, herbs and grasses form the basis of the groundcover, some of which include: *Lyginia barbata, Lyginia imberbis, Desmocladus flexuosus, Schoenus subfascicularis* and *Opercularia hispidula.*

Floristic Summary:

Lifeform	Species
Trees <10m	*Agonis flexuosa, Banksia littoralis and Banksia grandis.*
Shrubs >2m	*Agonis flexuosa, Hakea ruscifolia, Spyridium globulosum, Acacia pulchella, Pultenaea reticulata and Banksia sessilis var. cordata.*
Shrubs 1-2m	*Hakea amplexicaulis, Olearia axillaris, Allocasuarina humilis, Jacksonia horrida, Acacia hastulata, Bossiaea linophylla* and *Pteridium esculentum.*
Shrubs 0.5-1m	*Leucopogon propinquus, Hibbertia racemosa, Phyllanthus calycinus, Pimelea sp., Leucopogon obovatus, Anigozanthos flavidus, Hakea prostrata, Platysace compressa* and *Gompholobium tomentosum.*
Shrubs <0.5m	*Gompholobium confertum, Boronia crenulata, Lysinema ciliatum* and *Olax phyllanthi.*
Sedges and rushes	*Desmocladus flexuosus, Lyginia imberbis, Leptocarpus tenax* and *Hypolaena exsulca.*
Herbs and grasses	*Billardiera sp., Poa sp., Conostylis aculeata subsp. aculeata, Carpobrotus sp., Opercularia hispidula, Caladenia sp., Drosera sp., Hardenbergia comptoniana., Rhodanthe citrina, Lyginia barbata, Schoenus subfascicularis. *Hypochaeris glabra* and **Pelargonium capitatum,*

* Weed species

2.5.3. Sedgeland

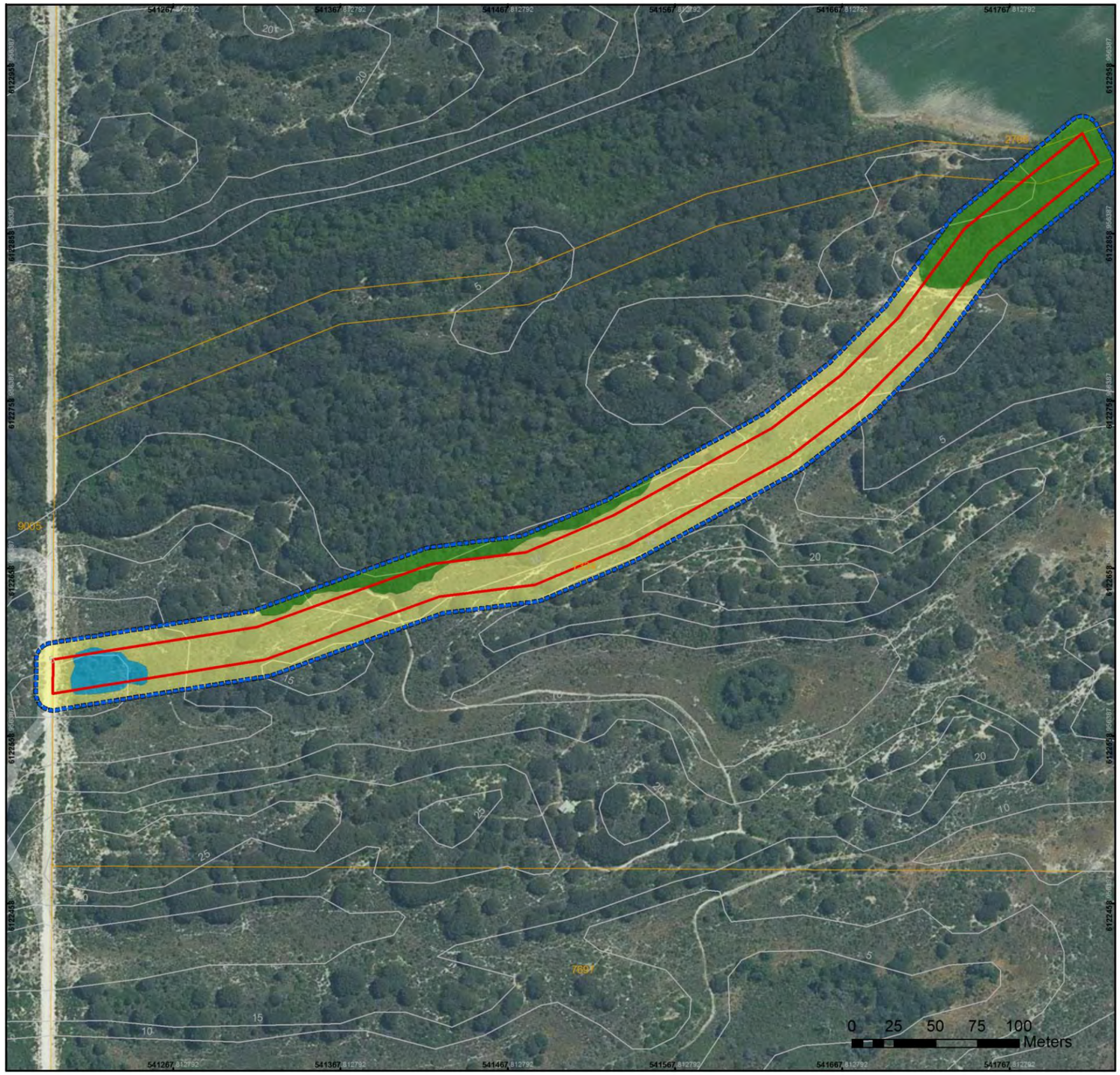
Description: Restricted to a single swale in the western portion of the survey area. Dominant species include: overstorey of *Banksia littoralis* with understorey of *Pteridium esculentum, Ficinia nodosa, Lepidosperma gladiatum, Austrostipa sp.,* and *Muehlenbeckia adpressa.* There is some weed invasion associated with the the road /track having imported material and drainage modified at the area.

Floristic Summary:

Lifeform	Species
Trees <10m	*Banksia littoralis*
Shrubs >2m	*Spyridium globulosum* and *Olearia axillaris.*
Shrubs 0.5-1m	*Pteridium esculentum* and *Pimelea rosea ssp rosea.*
Shrubs <0.5m	*Rhagodia baccata subsp. baccata.*
Sedges and rushes	*Ficinia nodosa* and *Lepidosperma gladiatum.*
Herbs and grasses	*Austrostipa sp., *Rumex acetosella* and *Muehlenbeckia adpressa.*

* Weed species

2.5.4 Vegetation Mapping



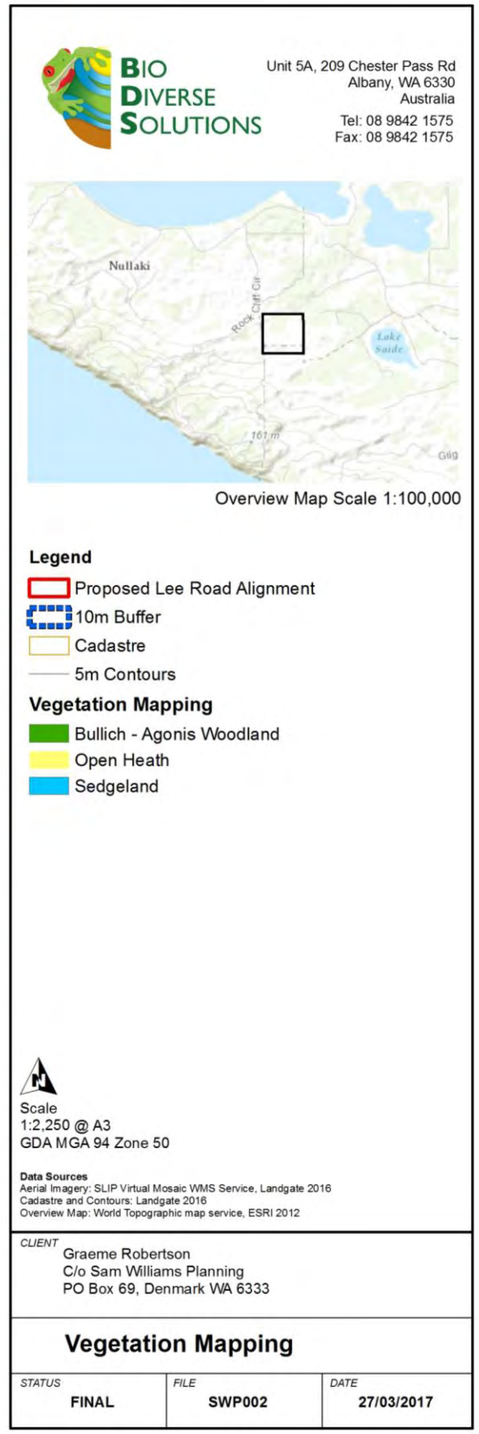
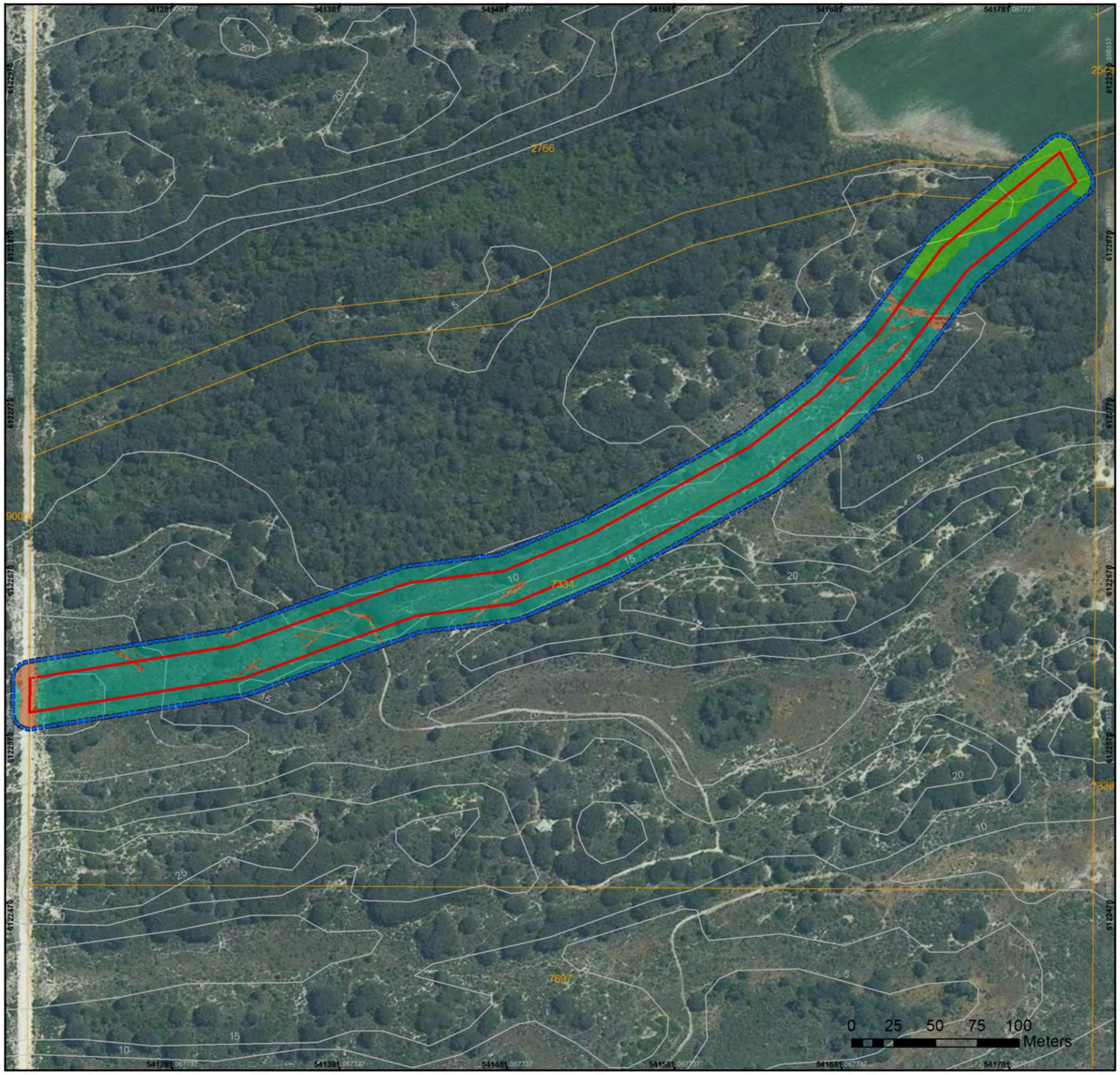


Figure 2: Vegetation units mapped within survey area



BIO DIVERSE SOLUTIONS
Unit 5A, 209 Chester Pass Rd
Albany, WA 6330
Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Legend

- Proposed Lee Road Alignment
- 10m Buffer
- Cadastre
- 5m Contours

Vegetation Condition

- Very Good
- Pristine
- Degraded

Scale
1:2,250 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016
Cadastre and Contours: Landgate 2016
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Graeme Robertson
C/o Sam Williams Planning
PO Box 69, Denmark WA 6333

Vegetation Condition Mapping

STATUS	*FILE*	*DATE*
FINAL	**SWP002**	**27/03/2017**

Figure 3: Vegetation condition mapped within survey area

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Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Legend

- Proposed Lee Road Alignment
- 10m Buffer
- Banksia sessilis var. cordata
- Cadastre
- 5m Contours

Scale
1:2,250 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016
Cadastre and Contours: Landgate 2016
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Graeme Robertson
C/o Sam Williams Planning
PO Box 69, Denmark WA 6333

Threatened Flora Mapping

STATUS	*FILE*	*DATE*
FINAL	**SWP002**	**27/03/2017**

Figure 3: Locations of individual *Banksia sessilis var cordata*

2.6 Vegetation Condition

The vegetation condition for the survey area was mapped using the Keighery condition rating scale (Keighery 1994, Table 2). Vegetation throughout the survey area was mostly in "Pristine" condition. The north-eastern portion of the *Bullich-Agonis* Woodland has been classified as "Very good". Mid and understorey vegetation structure within the woodland varied from being quite dense and forest like to very sparse, particularly in the most north-eastern extent of the survey area. There were some weed species present which are likely associated with farming practices located to the north and south of the survey area. Of concern is the occasional presence of *Zantedeschia aethiopica* (Arum lily), although this is a declared weed it was not widely spread and consisted of individual plants instead of clumps when observed. Areas that have been classified as "Degraded" are areas associated with drainage lines, fauna tracks and man-made walking tracks (Bibbulmun track). Some individual *Banksia* senescence was noted throughout the survey area, however, senescing trees occurred among other healthy and mature *Banksias* with some evidence of seedling recruitment. Refer to Figure 2 and Table 2.

Table 2: Condition Rating Scale (Keighery 1994)

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

2.7 Weeds

Of the 75-species recorded within the survey area, 11 were introduced (Table 3). Overall the main weed infested area is located within the Bullich-Agonis Woodland in the eastern portion of the survey area in association with the surrounding agricultural practices. There is a man-made water body directly adjacent to this area which has resulted in the occurrence of species such as *Typha orientalis.* This eastern section of the survey area appears to have a higher level of human traffic due to the presence of roads, man-made water body and a shed containing farm equipment for the nearby potato farm operation.

Of the weeds recorded, *Zantedeschia aethiopica* (Arum lily) is the only declared agricultural weed under the *Biosecurity and Agriculture Management Act 2007.* Furthermore, three species; *Zantedeschia aethiopica* (Arum lily) *Pelargonium capitatum* (Rose pelargonium) and *Typha orientalis* (Bulrush) have been assigned as high priority for control in the Environmental Weeds Strategy for Western Australia (CALM 1999). The strategy classifies weeds according to their relative level of threat to conservation (high medium or low) and this rating is based on their distribution, relative level of invasiveness and environmental impact (Appendix E).

Table 3: Weed species recorded from the survey area

Family	Species	Common Name	BAM Rating	EWS Rating
Araceae	*Zantedeschia aethiopica*	Arum Lily	Declared Pest - s22(2) C3 Management	High
Asteraceae	*Conyza bonariensis*	Fleabane	None	Low
Asteraceae	*Hypochaeris glabra*	Smooth Catsear	None	Moderate
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	None	Moderate
Fabaceae	*Psoralea pinnata*	African Scurfpea	None	Mild
Geraniaceae	*Pelargonium capitatum*	Rose Pelargonium	None	High
Phytolaccaceae	*Phytolacca octandra*	Red Ink Plant	None	Mild
Poaceae	*Cenchrus clandestinus*	Kikuyu	None	Moderate
Polygonaceae	*Rumex acetosella*	Sorrel	None	TBA
Solanaceae	*Solanum nigrum*	Black Berry Nightshade	None	Moderate
Typhaceae	*Typha orientalis*	Bulrush	None	High

3 SUMMARY

The survey area contains three vegetation communities *Bullich-Agonis* Woodland, Open Heath and Sedgeland, with a range of dominant canopy species and a diverse range of shrub, sedge and herbs comprising the understorey. The majority of vegetation surveyed is in pristine condition, with no signs of *Phytophthora, Armillaria* or Cankers. The north-eastern portion of the *Bullich-Agonis* Woodland is considered to be in very good condition due to the spread of weeds in the area, likely as a result of its proximity to surrounding agricultural practices and higher levels of human traffic. Areas classified as degraded are associated with drainage lines, kangaroo tracks and the Bibbulmun Track which crosses through the Open Heath.

This survey was conducted outside of the spring flowering time, as such the presence / absence of *Drakaea micrantha* (DRF) was not able to be confirmed, due to the genus not being identifiable outside of this flowering time.

Of the 75-species recorded within the survey area, 11 were introduced. Overall the main weed infested area is located within the *Bullich-Agonis* Woodland in the eastern portion of the survey area in association with the surrounding agricultural practices. There is a man-made water body directly adjacent to this area which has resulted in the occurrence of species such as *Typha orientalis.* This eastern section of the survey area appears to have a higher level of human traffic due to the presence of roads, man-made water body and a shed containing farm equipment for the nearby potato farm operation.

4 REFERENCES

Beard, J. S. (1979). Vegetation of the Albany and Mt. Barker Areas, Western Australia. Map and Explanatory Memoir, 1: 250,000 Series. Vegetation Survey of Western Australia.

Bio Diverse Solutions (2016). Vegetation Communities Survey. Unpublished Flora and Vegetation report.

Churchward, H. M, McArthur, W. M., Sewell, P. L. and Bartle, G. A. (1988) Landforms and Soils of the South Coast and Hinterland, Western Australia, Northcliffe to Manypeaks. Divisional Report 88/1, CSIRO, institute of Natural Resources and Environment, Division of Water Resources.

Department of Conservation and Land Management (1999). *Environmental Weed Strategy for Western Australia,* Department of Conservation and Land Management, Como.

Department of Mines and Petroleum - Geological Survey Division (2001) 1:250 000 regolith map (1300 metre grid) of Western Australia.

Department of Parks and Wildlife (2017) *Nature Map Mapping Western Australia's Biodiversity*, accessed online March 2017 at https://naturemap.dpaw.wa.gov.au/

Department of Planning (2017) *PlanWA Interactive Planning Map,* accessed online March 2017.

Department of Water (2001) 1:250 000 Hydrogeology Map Series Mapping dataset, Government of Western Australia.

Environmental Protection Authority (2004) Guidance for the Assessment of Environmental Factors (in accordance with the Environmental Protection Act 1986) *Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*.

Interim Biogeographical Regionalisation for Australia (IBRA) (2012). 'IBRA Version 7. Sub-regions.' (Australian Government Department of the Environment and Heritage: Canberra.) Available at http://www.environment.gov.au.

Keighery, B. (1994). *Bushland plant survey: a guide to plant community survey for the community*. Wildflower Society of WA (Inc.) Nedlands, WA.

McKenzie, N. L., May, J. E. and McKenna, S. (2002). *Bio Regional Summary of the 2002 Biodiversity Audit for Western Australia*. Department of Conservation and Land Management, Como.

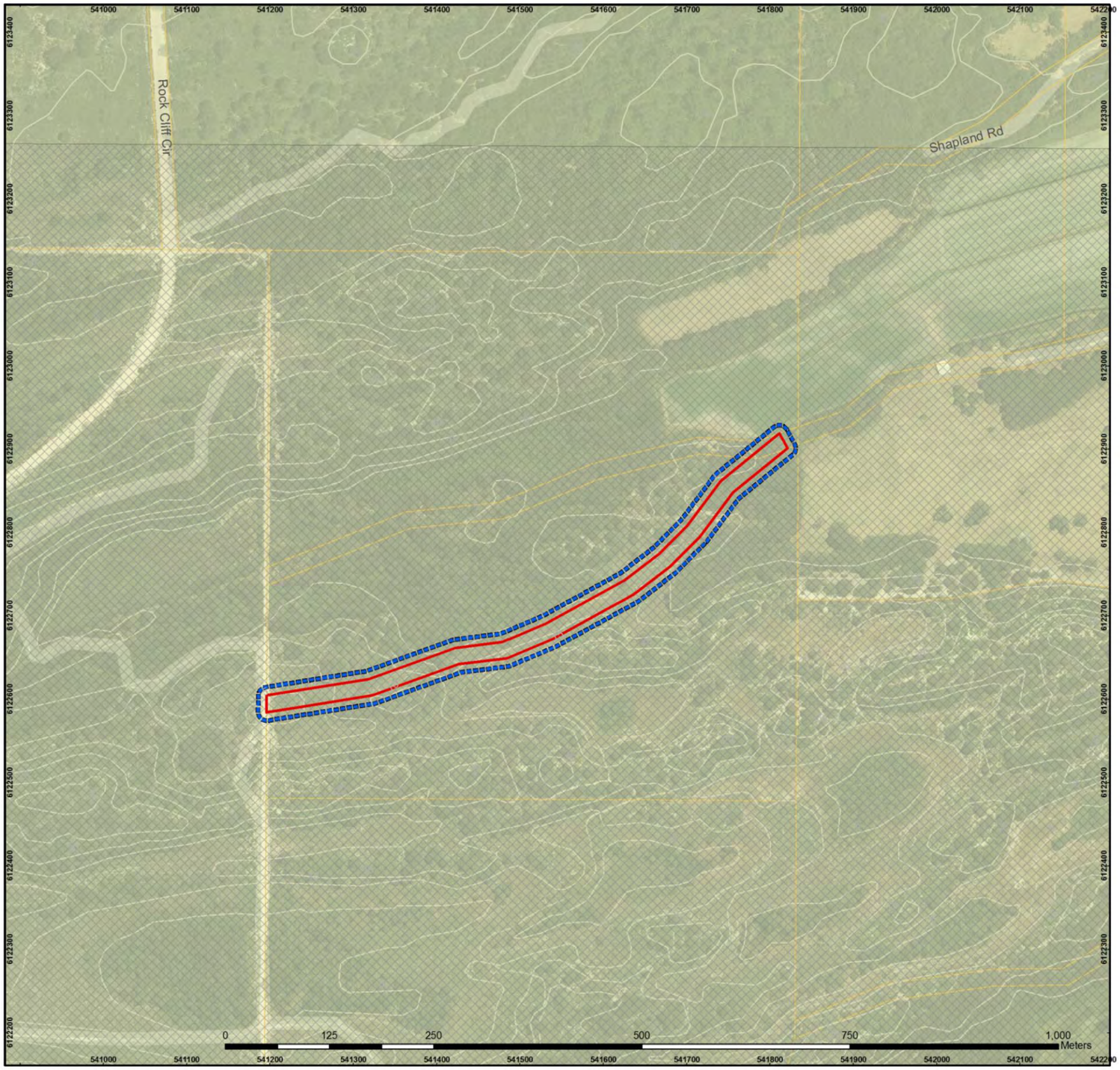
Muhling, P. C. and Brakel, A. T. (1985). 1:250,000 Geological Series – Explanatory Notes, Mount Barker - Albany, Western Australia. Geological Survey of Western Australia, Perth Western Australia.

Myers, N. Mittermeier R. A., Mittermeier, C. G., da Fonseca, G. A. B. and Kent, J. (2000). Biodiversity hot spots for conservation priorities. *Nature* 403, 803-8.

Sandiford E.M & Barrett S. (2010) Albany Regional Vegetation Survey, Extent Type and Status. WAPC, SCNRM & CoA for the Department of Environment and Conservation.

5 APPENDICES

APPENDIX A: Hydrogeological and Soil Mapping.



BIO DIVERSE SOLUTIONS
Unit 5A, 209 Chester Pass Rd
Albany, WA 6330
Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Legend

- Proposed Lee Road Alignment
- 10m Buffer
- Cadastre
- Proterozoic, Nornalup Complex
- Sandplain, mainly eolian; includes some residual deposits

Scale
1:4,500 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016
Cadastre and Contours: Landgate 2016
Overview Map: World Topographic map service, ESRI 2012

CLIENT
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PO Box 69, Denmark WA 6333

Geology and Soils Mapping

STATUS	FILE	DATE
FINAL	SWP002	27/03/2017

BIO DIVERSE SOLUTIONS
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Albany, WA 6330
Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Legend

- Proposed Lee Road Alignment
- 10m Buffer
- Cadastre
- QUATERNARY - CAINOZOIC - PHANEROZOIC

Scale
1:4,500 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016
Cadastre and Contours: Landgate 2016
Overview Map: World Topographic map service, ESRI 2012

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Hydrogeological Mapping

STATUS	FILE	DATE
FINAL	SWP002	27/03/2017

APPENDIX B: Database Searches (EPBC Protected Matters Search Tool and NatureMap) within 10 km of Survey area

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.

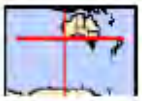
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 20/03/17 15:50:55

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 10.0Km



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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	54
Listed Migratory Species:	55

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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	85
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	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:	1
Invasive Species:	24
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
South-west

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
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	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 likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Roosting known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known 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]	Vulnerable	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur

Name	Status	Type of Presence within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may 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
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	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
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat may occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Vulnerable	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Banksia brownii Brown's Banksia, Feather-leaved Banksia [8277]	Endangered	Species or species habitat may occur within area
Calectasia cyanea Blue Tinsel Lily [7669]	Critically Endangered	Species or species habitat likely to occur within area
Chordifex abortivus Manypeaks Rush [64868]	Endangered	Species or species habitat may occur within area
Conostylis misera Grass Conostylis [21320]	Endangered	Species or species habitat may occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Isopogon uncinatus Albany Cone Bush, Hook-leaf Isopogon [20871]	Endangered	Species or species habitat likely to occur within area
Kennedia glabrata Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat likely to occur within area
Sphenotoma drummondii Mountain Paper-heath [21160]	Endangered	Species or species habitat may occur within area
Verticordia apecta Hay River Featherflower, Scruffy Verticordia [65545]	Critically Endangered	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Sharks		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	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 within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Sterna anaethetus Bridled Tern [814]		Foraging, feeding or related behaviour likely to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may 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]		Roosting known to occur within area
Arenaria interpres		
Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba		
Sanderling [875]		Roosting known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Roosting known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Roosting known to occur within area
Calidris ruficollis		
Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta		
Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris		
Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius leschenaultii		
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus		
Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago megala		
Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura		
Pin-tailed Snipe [841]		Roosting known to occur within area
Glareola maldivarum		
Oriental Pratincole [840]		Roosting known to occur within area
Limosa lapponica		
Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa		
Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

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]		Roosting known 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]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Roosting known to occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Roosting known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Roosting known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Himantopus himantopus Black-winged Stilt [870]		Roosting known to occur within area
Larus pacificus Pacific Gull [811]		Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may 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
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Sterna anaethetus Bridled Tern [814]		Foraging, feeding or related behaviour likely to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may

Name	Threatened	Type of Presence
		occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stigmatopora olivacea a pipefish [74966]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		

Name	Status	Type of Presence
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Rudyard Beach	WA
West Cape Howe	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

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
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		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 habitat likely to occur within area
Plants		

Name	Status	Type of Presence
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
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to 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
Ulex europaeus Gorse, Furze [7693]		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

-35.035535 117.458384,-35.035000 117.458401,-35.036123 117.457837,-35.036430 117.45750,-35.036861 117.457097,-35.037221 117.456528,-35.037371 117.456228,-35.037000 117.455487,-35.03705 117.454758,-35.038047 117.454157,-35.038410 117.452034,-35.038513 117.451668,-35.038363 117.451668,-35.038258 117.452034,-35.038003 117.45370,-35.037863 117.454307,-35.037702 117.454770,-35.037151 117.456202,-35.036750 117.456047,-35.036554 117.457172,-35.036044 117.457044,-35.035535 117.458384

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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NatureMap
Mapping Western Australia's Biodiversity

NatureMap Species Report

Created By Guest user on 20/03/2017

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Species Group All Plants
Method 'By Line'
Vertices 35° 02' 18" S,117° 27' 05" E 35° 02' 08" S,117° 27' 20" E
Group By Family

Family	Species	Records
Acrobolbaceae	1	1
Aizoaceae	1	1
Anarthriaceae	6	9
Aneuraceae	2	3
Apiaceae	10	13
Asparagaceae	11	18
Asteraceae	13	18
Bartramiaceae	1	1
Bryaceae	2	2
Campanulaceae	3	3
Caryophyllaceae	1	1
Casuarinaceae	2	2
Celastraceae	1	1
Centrolepidaceae	7	10
Cephalotaceae	1	1
Ceramiaceae	1	2
Chenopodiaceae	4	7
Colchicaceae	1	1
Crassulaceae	1	1
Cyperaceae	25	40
Dasypogonaceae	1	3
Dennstaedtiaceae	1	1
Dilleniaceae	7	24
Ditrichaceae	1	1
Droseraceae	8	15
Elaeocarpaceae	3	8
Ericaceae	10	35
Euphorbiaceae	2	5
Fabaceae	64	131
Fissidentaceae	1	1
Funariaceae	1	1
Gentianaceae	3	3
Geraniaceae	1	1
Goodeniaceae	10	37
Haemodoraceae	9	17
Haloragaceae	4	6
Hemerocallidaceae	7	11
Hydatellaceae	2	4
Isoetaceae	1	1
Juncaceae	7	14
Lamiaceae	1	1
Lauraceae	2	3
Lentibulariaceae	2	2
Lindsaeaceae	1	2
Loganiaceae	4	4
Malvaceae	6	9
Menyanthaceae	3	12
Myrtaceae	40	120
Olacaceae	1	3
Onagraceae	1	1
Orchidaceae	44	83
Orobanchaceae	1	1
Oxalidaceae	1	1
Phyllanthaceae	2	2
Pittosporaceae	1	2
Plantaginaceae	1	3
Poaceae	15	21
Polygalaceae	6	7
Polygonaceae	1	1
Polyphysaceae	1	1
Potamogetonaceae	1	1
Pottiaceae	1	1
Primulaceae	2	4
Proteaceae	20	40
Restionaceae	17	40
Rhamnaceae	2	2
Rubiaceae	1	1
Rutaceae	11	23
Santalaceae	3	7
Scapaniaceae	1	1
Scrophulariaceae	2	2
Sematophyllaceae	1	1
Solanaceae	1	1
Splachnaceae	1	1
Stylidiaceae	34	64

Thymelaeaceae	11	32
Xanthorrhoeaceae	5	5
Xyridaceae	1	1
Zamiaceae	1	1
TOTAL	**508**	**982**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acrobolbaceae					
1.		*Goebelobryum unguiculatum*			
Aizoaceae					
2.	2823	*Tetragonia implexicoma (Bower Spinach)*			
Anarthriaceae					
3.	1058	*Anarthria gracilis*			
4.	1060	*Anarthria laevis*			
5.	1062	*Anarthria prolifera*			
6.	1063	*Anarthria scabra*			
7.	1067	*Lyginia barbata*			
8.	18049	*Lyginia imberbis*			
Aneuraceae					
9.		*Riccardia aequicellularis*			
10.		*Riccardia bipinnatifida*			
Apiaceae					
11.	6203	*Actinotus glomeratus*			
12.	6206	*Actinotus omnifertilis*			
13.	6211	*Apium prostratum (Sea Celery)*			
14.	12040	*Apium prostratum var. prostratum (Sea Celery)*			
15.	6214	*Centella asiatica*			
16.	6253	*Platysace filiformis*			
17.	6263	*Schoenolaena juncea*			
18.	18453	*Xanthosia eichleri*		P4	
19.	6280	*Xanthosia huegelii*			
20.	6292	*Xanthosia rotundifolia (Southern Cross)*			
Asparagaceae					
21.	24020	*Asparagus scandens*	Y		
22.	1302	*Laxmannia jamesii (James' Paperlily)*		P4	
23.	1304	*Laxmannia minor*			
24.	1222	*Lomandra brittanii*			
25.	1236	*Lomandra pauciflora*			
26.	1240	*Lomandra purpurea (Purple Mat Rush)*			
27.	1246	*Lomandra suaveolens*			
28.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
29.	1333	*Thysanotus glaucifolius*			
30.	1339	*Thysanotus multiflorus (Many-flowered Fringe Lily)*			
31.	1354	*Thysanotus tenellus*			
Asteraceae					
32.	8016	*Angianthus platycephalus*			
33.	7851	*Asteridea pulverulenta (Common Bristle Daisy)*			
34.	7945	*Cotula coronopifolia (Waterbuttons)*	Y		
35.	20504	*Helichrysum luteoalbum (Jersey Cudweed)*			
36.	12741	*Hyalosperma cotula*			
37.	12717	*Hyalosperma pusillum*			
38.	8133	*Olearia elaeophila*			
39.	8143	*Olearia paucidentata (Autumn Scrub Daisy)*			
40.	18352	*Pithocarpa pulchella var. melanostigma*			
41.	13300	*Rhodanthe citrina*			
42.	13312	*Rhodanthe pyrethrum*			
43.	8225	*Siloxerus humifusus (Procumbent Siloxerus)*			
44.	8257	*Vellereophyton dealbatum (White Cudweed)*	Y		
Bartramiaceae					
45.	32327	*Breutelia affinis*			
Bryaceae					
46.	32417	*Ptychostomum angustifolium*			
47.	32426	*Rosulabryum campylothecium*			
Campanulaceae					
48.	9289	*Lobelia anceps (Angled Lobelia)*			
49.	7406	*Lobelia rhombifolia (Tufted Lobelia)*			
50.	7408	*Lobelia tenuior (Slender Lobelia)*			
Caryophyllaceae					
51.	2801	*Corrigiola litoralis (Strapwort)*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Casuarinaceae					
52.	1728	*Allocasuarina fraseriana (Sheoak, Kondil)*			
53.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
Celastraceae					
54.	4737	*Tripterococcus brunonis (Winged Stackhousia)*			
Centrolepidaceae					
55.	1117	*Aphelia cyperoides*			
56.	1121	*Centrolepis aristata (Pointed Centrolepis)*			
57.	1123	*Centrolepis caespitosa*		P4	
58.	1125	*Centrolepis drummondiana*			
59.	1129	*Centrolepis glabra (Smooth Centrolepis)*			
60.	1132	*Centrolepis mutica*			
61.	1134	*Centrolepis polygyna (Wiry Centrolepis)*			
Cephalotaceae					
62.	3148	*Cephalotus follicularis (Albany Pitcher Plant)*			
Ceramiaceae					
63.	27310	*Spyridia filamentosa*			
Chenopodiaceae					
64.	2462	*Atriplex hypoleuca*			
65.	2471	*Atriplex prostrata (Hastate Orache)*	Y		
66.	2483	*Chenopodium album (Fat Hen)*	Y		
67.	2503	*Sarcocornia quinqueflora (Beaded Samphire)*			
Colchicaceae					
68.	1385	*Burchardia multiflora (Dwarf Burchardia)*			
Crassulaceae					
69.	3142	*Crassula natans*	Y		
Cyperaceae					
70.	743	*Baumea juncea (Bare Twigrush)*			
71.	749	*Bolboschoenus caldwellii (Marsh Club-rush)*			
72.	768	*Cyathochaeta avenacea*			
73.		*Cyperus sp.*			
74.	815	*Cyperus tenellus (Tiny Flatsedge)*	Y		
75.	834	*Evandra aristata*			
76.	20216	*Ficinia nodosa (Knotted Club Rush)*			
77.	17744	*Gahnia sclerioides*		P4	
78.	907	*Gahnia trifida (Coast Saw-sedge)*			
79.	20200	*Isolepis cernua var. setiformis*			
80.	912	*Isolepis cyperoides*			
81.	917	*Isolepis marginata (Coarse Club-rush)*			
82.	925	*Lepidosperma angustatum*			
83.	937	*Lepidosperma longitudinale (Pithy Sword-sedge)*			
84.	945	*Lepidosperma squamatum*			
85.	957	*Mesomelaena tetragona (Semaphore Sedge)*			
86.	970	*Schoenus acuminatus*			
87.	974	*Schoenus benthamii*		P3	
88.	985	*Schoenus discifer*			
89.	1004	*Schoenus nitens (Shiny Bog-rush)*			
90.	1005	*Schoenus obtusifolius*			
91.	1006	*Schoenus odontocarpus*			
92.	17614	*Schoenus plumosus*			
93.	1021	*Schoenus sublaxus*			
94.	1023	*Schoenus tenellus*			
Dasypogonaceae					
95.	1218	*Dasypogon bromeliifolius (Pineapple Bush)*			
Dennstaedtiaceae					
96.	57	*Pteridium esculentum (Bracken)*			
Dilleniaceae					
97.	5114	*Hibbertia commutata*			
98.	5117	*Hibbertia cuneiformis (Cutleaf Hibbertia)*			
99.	5118	*Hibbertia cunninghamii*			
100.	5126	*Hibbertia furfuracea*			
101.	5132	*Hibbertia grossulariifolia*			
102.	5144	*Hibbertia microphylla*			
103.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Ditrichaceae					
104.	32351	*Eccremidium pulchellum*			
Droseraceae					
105.	13218	*Drosera erythrogyne*			
106.	3112	*Drosera myriantha (Star Rainbow)*			
107.	3113	*Drosera neesii (Jewel Rainbow)*			
108.	11768	*Drosera neesii subsp. neesii*			
109.	3118	*Drosera pallida (Pale Rainbow)*			
110.	3122	*Drosera platypoda (Fan-leaved Sundew)*			
111.	3124	*Drosera pulchella (Pretty Sundew)*			
112.	13186	*Drosera roseana*			
Elaeocarpaceae					
113.	4524	*Platytheca galioides*			
114.	4525	*Platytheca juniperina*			
115.	4520	*Tetratheca affinis*			
Ericaceae					
116.	6306	*Andersonia caerulea (Foxtails)*			
117.	25844	*Andersonia caerulea subsp. caerulea*			
118.	41730	*Andersonia sp. Amabile (N. Gibson & M. Lyons 355)*		P3	
119.	6321	*Andersonia sprengelioides*			
120.	6325	*Astroloma drummondii*			
121.	6352	*Cosmelia rubra (Spindle Heath)*			
122.	40805	*Dielsiodoxa lycopodioides*			
123.	6300	*Leucopogon australis (Spiked Beard-heath)*			
124.	6306	*Leucopogon glabellus*			
125.	6417	*Leucopogon obovatus*			
126.	40941	*Leucopogon obovatus subsp. revolutus*			
127.	35400	*Leucopogon paradoxus*			
128.	6428	*Leucopogon pendulus*			
129.	6430	*Leucopogon propinquus*			
130.	6441	*Leucopogon reflexus (Heart-leaf Beard-heath)*			
131.	6454	*Leucopogon verticillatus (Tassel Flower)*			
132.	6457	*Lysinema conspicuum*			
133.	31031	*Sphenotoma capitata*			
134.	31051	*Sphenotoma parviflora*			
Euphorbiaceae					
135.	4585	*Amperea ericoides*			
136.	10403	*Calycopeplus oligandrus*			
Fabaceae					
137.	15420	*Acacia alata var. alata*			
138.	3282	*Acacia cyclops (Coastal Wattle)*			
139.	3331	*Acacia extensa (Wiry Wattle)*			
140.	3303	*Acacia hastulata*			
141.	3428	*Acacia luteola*			
142.	3453	*Acacia myrtifolia*			
143.	35624	*Acacia pentadenia subsp. pentadenia*			
144.	3502	*Acacia pulchella (Prickly Moses)*			
145.	15482	*Acacia pulchella var. goadbyi*			
146.	30030	*Acacia saligna subsp. stolonifera*			
147.	3602	*Acacia willdenowiana (Grass Wattle)*			
148.	3680	*Aotus intermedia*			
149.	3707	*Bossiaea dentata*			
150.	3713	*Bossiaea linophylla*			
151.	10801	*Callistachys lanceolata (Wonnich)*			
152.	3754	*Chorizema diversifolium*			
153.	3757	*Chorizema glycinifolium*			
154.	12705	*Chorizema nanum*			
155.	3760	*Chorizema reticulatum (Showy Flame Pea)*			
156.	3791	*Daviesia alternifolia*			
157.	3811	*Daviesia flexuosa*			
158.	3815	*Daviesia horrida (Prickly Bitter-pea)*			
159.	3817	*Daviesia inflata*			
160.	3867	*Dipogon lignosus (Dolichos Pea)*	Y		
161.	3872	*Euchilopsis linearis (Swamp Pea)*			
162.	3876	*Eutaxia epacridoides*			
163.	20214	*Eutaxia myrtifolia*			
164.	3880	*Eutaxia virgata*			
165.	3891	*Gastrolobium bilobum (Heart Leaf Poison)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
166.	10100	*Gastrolobium cuneatum*			
167.	20511	*Gastrolobium minus*			
168.	20500	*Gastrolobium sericeum*			
169.	3048	*Gompholobium capitatum*			
170.	10000	*Gompholobium confertum*			
171.	3054	*Gompholobium polymorphum*			
172.	11083	*Gompholobium scabrum*			
173.	3057	*Gompholobium tomentosum (Hairy Yellow Pea)*			
174.	3058	*Gompholobium venustum (Handsome Wedge-pea)*			
175.	11115	*Gompholobium villosum*			
176.	3061	*Hardenbergia comptoniana (Native Wisteria)*			
177.	3065	*Hovea elliptica (Tree Hovea)*			
178.	3092	*Isotropis cuneifolia (Granny Bonnets)*			
179.	4017	*Jacksonia horrida*			
180.	4028	*Jacksonia spinosa*			
181.	4036	*Kennedia carinata*			
182.	4037	*Kennedia coccinea (Coral Vine)*			
183.	4039	*Kennedia glabrata (Northcliffe Kennedia)*		T	
184.	4048	*Latrobea brunonis*			
185.	4049	*Latrobea diosmifolia*			
186.	4050	*Latrobea genistoides*			
187.	17757	*Latrobea sp. South Coast (A.M. Ashby 1040)*			
188.	4063	*Lotus uliginosus (Greater Lotus)*	Y		
189.	4114	*Ornithopus pinnatus (Slender Serradella)*	Y		
190.	4140	*Phyllota barbata*			
191.	4155	*Psoralea pinnata (African Scurfpea)*	Y		
192.	4164	*Pultenaea aspalathoides*			
193.	4181	*Pultenaea reticulata*			
194.	20348	*Sphaerolobium calcicola*		P3	
195.	17551	*Sphaerolobium drummondii*			
196.	20302	*Sphaerolobium hygrophilum*			
197.	4205	*Sphaerolobium linophyllum*			
198.	4207	*Sphaerolobium medium*			
199.	4211	*Sphaerolobium vimineum (Leafless Globe Pea)*			
200.	4256	*Templetonia retusa (Cockies Tongues)*			
Fissidentaceae					
201.	32300	*Fissidens tenellus*			
Funariaceae					
202.	32353	*Entosthodon apophysatus*			
Gentianaceae					
203.	6530	*Centaurium erythraea (Common Centaury)*	Y		
204.	6543	*Cicendia filiformis (Slender Cicendia)*	Y		
205.	41000	*Schenkia australis*			
Geraniaceae					
206.	4340	*Pelargonium littorale*			
Goodeniaceae					
207.	7411	*Anthotium humile (Dwarf Anthotium)*			
208.	17642	*Anthotium sp. Peaceful Bay (J.R. Wheeler 3772 & S.J. Patrick)*			
209.	7420	*Dampiera alata (Winged-stem Dampiera)*			
210.	7444	*Dampiera hederacea (Karri Dampiera)*			
211.	7452	*Dampiera leptoclada (Slender-shooted Dampiera)*			
212.	7462	*Dampiera pedunculata*			
213.	7487	*Diaspasis filifolia (Thread-leaved Diaspasis)*			
214.	8614	*Goodenia claytoniacea*			
215.	7523	*Goodenia leptoclada (Thin-stemmed Goodenia)*			
216.	13165	*Goodenia pusilla*			
217.	7572	*Lechenaultia expansa*			
218.	7626	*Scaevola nitida (Shining Fanflower)*			
219.	7640	*Scaevola striata (Royal Robe)*			
220.	13175	*Scaevola striata var. striata*			
221.	7651	*Selliera radicans*		P1	
222.	7665	*Velleia trinervis*			
Haemodoraceae					
223.	1406	*Anigozanthos bicolor (Little Kangaroo Paw)*			
224.	1407	*Anigozanthos flavidus (Tall Kangaroo Paw)*			
225.	1413	*Anigozanthos preissii (Albany Catspaw)*			
226.	11826	*Conostylis aculeata subsp. aculeata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
227.	11507	*Conostylis setigera subsp. setigera*			
228.	1474	*Haemodorum sparsiflorum*			
229.	1481	*Tribonanthes australis*			
230.	1483	*Tribonanthes longipetala*			
231.	1485	*Tribonanthes violacea*			
Haloragaceae					
232.	6183	*Haloragodendron racemosum (Shrubby Raspwort)*			
233.	34676	*Meionectes brownii (Swamp Raspwort)*			
234.	6195	*Myriophyllum limnophilum*			
235.	6198	*Myriophyllum salsugineum*			
Hemerocallidaceae					
236.	23474	*Agrostocrinum hirsutum*			
237.	16326	*Dianella brevicaulis*			
238.	1259	*Dianella revoluta (Blueberry Lily)*			
239.	1297	*Johnsonia lupulina (Hooded Lily)*			
240.	1299	*Johnsonia teretifolia (Hooded Lily)*			
241.	1260	*Stypandra glauca (Blind Grass)*			
242.	1362	*Tricoryne humilis*			
Hydatellaceae					
243.	33019	*Trithuria australis*		P4	
244.	1141	*Trithuria submersa*			
Isoetaceae					
245.	11	*Isoetes drummondii (Quillwort)*			
Juncaceae					
246.	1177	*Juncus articulatus (Jointed Rush)*	Y		
247.	1179	*Juncus caespiticius (Grassy Rush)*			
248.	1180	*Juncus capitatus (Capitate Rush)*	Y		
249.	1184	*Juncus holoschoenus (Jointleaf Rush)*			
250.	11922	*Juncus kraussii subsp. australiensis*			
251.	1187	*Juncus oxycarpus*	Y		
252.	1190	*Juncus planifolius (Broadleaf Rush)*			
Lamiaceae					
253.	6639	*Hemiandra pungens (Snakebush)*			
Lauraceae					
254.	2057	*Cassytha racemosa (Dodder Laurel)*			
255.	11709	*Cassytha racemosa forma racemosa*			
Lentibulariaceae					
256.	7148	*Utricularia multifida*			
257.	7157	*Utricularia violacea (Violet Bladderwort)*			
Lindsaeaceae					
258.	59	*Lindsaea linearis (Screw Fern)*			
Loganiaceae					
259.	6515	*Logania vaginalis (White Spray)*			
260.	40255	*Orianthera campanulata*			
261.	40315	*Orianthera serpyllifolia subsp. serpyllifolia*			
262.	16177	*Phyllangium paradoxum*			
Malvaceae					
263.	40803	*Commersonia corylifolia (Hazel-leaved Rulingia)*			
264.	40920	*Commersonia grandiflora*			
265.	5033	*Lasiopetalum floribundum (Free Flowering Lasiopetalum)*			
266.	5091	*Thomasia paniculata*			
267.	5097	*Thomasia rhynchocarpa*			
268.	5105	*Thomasia triphylla*			
Menyanthaceae					
269.	36180	*Liparophyllum latifolium*			
270.	36181	*Ornduffia parnassifolia*			
271.	36200	*Ornduffia submersa*		P4	
Myrtaceae					
272.	5315	*Actinodium cunninghamii (Albany Daisy)*			
273.	17203	*Agonis flexuosa var. latifolia*			
274.	10780	*Agonis theiformis*			
275.	20361	*Astartea arbuscula (Minute Astartea)*			
276.	48100	*Astartea arbuscula x corniculata*			Y
277.	20125	*Astartea corniculata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
278.	20127	*Astartea glomerulosa (Early Astartea)*			
279.	20240	*Astartea leptophylla (River-bank Astartea)*			
280.	45213	*Astartea pulchella*			
281.	5304	*Baeckea pygmaea*			
282.	5302	*Beaufortia sparsa (Swamp Bottlebrush)*			
283.	5415	*Calothamnus lateralis*			
284.	5425	*Calothamnus preissii*			
285.	10884	*Calytrix sp. Esperance (M.A. Burgman 4268A)*			
286.	5508	*Darwinia citriodora (Lemon-scented Darwinia)*			
287.	5510	*Darwinia oederoides*			
288.	5533	*Darwinia vestita (Pom-pom Darwinia)*			
289.	5005	*Eucalyptus cornuta (Yate, Yeid)*			
290.	5015	*Eucalyptus decipiens (Limestone Marlock, Moit)*			
291.	13547	*Eucalyptus marginata subsp. marginata (Jarrah)*			
292.	5709	*Eucalyptus megacarpa (Bullich, Pulidj)*			
293.	5703	*Eucalyptus rudis (Flooded Gum, Kuluda)*			
294.	5810	*Homalospermum firmum*			
295.	43120	*Hypocalymma minus*			
296.	13106	*Hypocalymma scariosum*			
297.	5832	*Kunzea ericifolia (Spearwood, Pondil)*			
298.	17506	*Kunzea ericifolia subsp. ericifolia*			
299.	5841	*Kunzea recurva*			
300.	18184	*Melaleuca croxfordiae*			
301.	5900	*Melaleuca cuticularis (Saltwater Paperbark)*			
302.	5902	*Melaleuca densa*			
303.	5921	*Melaleuca incana (Grey Honeymyrtle)*			
304.	13274	*Melaleuca ordinifolia*		P2	
305.	5940	*Melaleuca pauciflora*			
306.	5952	*Melaleuca preissiana (Moonah)*			
307.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
308.	5966	*Melaleuca spathulata*			
309.	5980	*Melaleuca thymoides*			
310.	5987	*Melaleuca viminea (Mohan)*			
311.	6006	*Pericalymma ellipticum (Swamp Teatree)*			
312.	15501	*Pericalymma spongiocaule*			
313.	20100	*Taxandria angustifolia*			
314.	20114	*Taxandria fragrans*			
315.	20115	*Taxandria juniperina*			
316.	20134	*Taxandria marginata*			
317.	20133	*Taxandria parviceps*			
Olacaceae					
318.	2366	*Olax phyllanthi*			
Onagraceae					
319.	6130	*Oenothera glazioviana (Evening Primrose)*	Y		
Orchidaceae					
320.	15328	*Caladenia applanata subsp. applanata*			
321.	15329	*Caladenia applanata subsp. erubescens*			
322.	15335	*Caladenia brownii*			
323.	1580	*Caladenia cairnsiana (Zebra Orchid)*			
324.	1581	*Caladenia corynephora*			
325.	11105	*Caladenia falcata*			
326.	1590	*Caladenia ferruginea (Rusty Spider Orchid)*			
327.	15348	*Caladenia flava subsp. flava*			
328.	15353	*Caladenia heberleana*			
329.	1599	*Caladenia latifolia (Pink Fairy Orchid)*			
330.	1603	*Caladenia longiclavata (Clubbed Spider Orchid)*			
331.	1605	*Caladenia marginata (White Fairy Orchid)*			
332.	15372	*Caladenia nana subsp. unita*			
333.	1612	*Caladenia radiata (Ray Spider Orchid)*			
334.	1627	*Cryptostylis ovata (Slipper Orchid)*			
335.	10040	*Disa bracteata*	Y		
336.	11040	*Diuris corymbosa*			
337.	1633	*Diuris laevis (Nannygoat Orchid)*			
338.	1636	*Diuris pauciflora*			
339.	1640	*Drakaea glyptodon (King-in-his-carriage)*			
340.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
341.	1644	*Elythranthera emarginata (Pink Enamel Orchid)*			
342.	1645	*Epiblema grandiflorum (Babe-in-a-cradle)*			
343.	15412	*Eriochilus dilatatus subsp. multiflorus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
344.	15414	*Eriochilus helonomos*			
345.	15415	*Eriochilus scaber subsp. scaber*			
346.	15418	*Leptoceras menziesii*			
347.	1050	*Lyperanthus serratus (Rattle Beak Orchid)*			
348.	15419	*Microtis media subsp. media*			
349.	20460	*Pheladenia deformis*			
350.	15424	*Praecoxanthus aphyllus*			
351.	1068	*Prasophyllum brownii*			
352.	1069	*Prasophyllum cyphochilum (Pouched Leek Orchid)*			
353.	1072	*Prasophyllum fimbria (Fringed Leek Orchid)*			
354.	1080	*Prasophyllum parvifolium (Autumn Leek Orchid)*			
355.	10853	*Prasophyllum plumiforme*			
356.	18058	*Pterostylis sp. short sepals (W. Jackson BJ250)*			
357.	10908	*Pterostylis turfosa (Bird Orchid)*			
358.	16306	*Pyrorchis forrestii*			
359.	16307	*Pyrorchis nigricans (Red beaks, Elephants ears)*			
360.	10850	*Thelymitra benthamiana (Leopard Orchid)*			
361.	1706	*Thelymitra cucullata (Swamp Sun Orchid)*			
362.	1707	*Thelymitra flexuosa (Twisted Sun Orchid)*			
363.	1710	*Thelymitra mucida (Plum Orchid)*			
Orobanchaceae					
364.	7000	*Parentucellia viscosa (Sticky Bartsia)*	Y		
Oxalidaceae					
365.	4358	*Oxalis purpurea (Largeflower Wood Sorrel)*	Y		
Phyllanthaceae					
366.	4000	*Poranthera huegelii*			
367.	4001	*Poranthera microphylla (Small Poranthera)*			
Pittosporaceae					
368.	25708	*Billardiera fusiformis (Australian Bluebell)*			
Plantaginaceae					
369.	4717	*Callitriche stagnalis (Common Starwort)*	Y		
Poaceae					
370.	20830	*Agrostis castellana*	Y		
371.	104	*Amphipogon amphipogonoides*			
372.	37421	*Austrostipa sp. Marchagee (B.R. Maslin 1407)*			
373.	245	*Briza minor (Shivery Grass)*	Y		
374.	287	*Dactylis glomerata (Cocksfoot)*	Y		
375.	430	*Hemarthria uncinata (Matgrass)*			
376.	11747	*Microlaena stipoides var. stipoides*			
377.	528	*Paspalum distichum (Water Couch)*	Y		
378.	533	*Paspalum vaginatum (Salt Water Couch)*			
379.	557	*Piptatherum miliaceum (Rice Millet)*	Y		
380.	578	*Poa porphyroclados*			
381.	583	*Polypogon tenellus*			
382.	40431	*Rytidosperma acerosum*			
383.	40427	*Rytidosperma setaceum*			
384.	607	*Tetrarrhena laevis (Forrest Ricegrass)*			
Polygalaceae					
385.	4550	*Comesperma calymega (Blue-spike Milkwort)*			
386.	4551	*Comesperma ciliatum*			
387.	4552	*Comesperma confertum*			
388.	4554	*Comesperma flavum*			
389.	4564	*Comesperma virgatum (Milkwort)*			
390.	4566	*Comesperma volubile (Love Creeper)*			
Polygonaceae					
391.	2437	*Rumex frutescens*	Y		
Polyphysaceae					
392.	13146	*Acetabularia peniculus*			
Potamogetonaceae					
393.	44402	*Stuckenia pectinata*			
Pottiaceae					
394.	32450	*Trichostomum eckelianum*			
Primulaceae					
395.	6483	*Samolus junceus*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
396.	6484	*Samolus repens (Creeping Brookweed)*			
Proteaceae					
397.	1791	*Adenanthos obovatus (Basket Flower)*			
398.	1830	*Banksia littoralis (Swamp Banksia, Pungura)*			
399.	1837	*Banksia occidentalis (Red Swamp Banksia)*			
400.	1841	*Banksia praemorsa (Cut-leaf Banksia)*			
401.	1844	*Banksia quercifolia (Oak-leaved Banksia)*			
402.	15010	*Conospermum caeruleum subsp. caeruleum*			
403.	16854	*Conospermum capitatum subsp. capitatum*			
404.	2052	*Grevillea occidentalis*			
405.	15001	*Grevillea pulchella subsp. pulchella*			
406.	2137	*Hakea ceratophylla (Horned Leaf Hakea)*			
407.	2101	*Hakea oleifolia (Dungyn)*			
408.	2107	*Hakea prostrata (Harsh Hakea)*			
409.	2212	*Hakea sulcata (Furrowed Hakea)*			
410.	12006	*Isopogon buxifolius var. buxifolius*		P2	
411.	16880	*Isopogon formosus subsp. formosus*			
412.	2282	*Petrophile acicularis*			
413.	2293	*Petrophile diversifolia*			
414.	17705	*Petrophile squamata subsp. squamata*			
415.	12011	*Synaphea obtusata*			
416.	2324	*Synaphea petiolaris (Synaphea)*			
Restionaceae					
417.	17085	*Chaetanthus aristatus*			
418.	1065	*Chaetanthus leptocarpoides*			
419.	17087	*Chaetanthus tenellus*			
420.	17089	*Chordifex laxus*			
421.	17091	*Desmocladus fasciculatus*			
422.	16505	*Desmocladus flexuosus*			
423.	1070	*Hypolaena exsulca*			
424.	1071	*Hypolaena fastigiata*			
425.	1078	*Leptocarpus coangustatus*			
426.	16833	*Leptocarpus laxus*			
427.	46382	*Leptocarpus roycei*			
428.	46377	*Leptocarpus scoparius*			
429.	1082	*Leptocarpus tenax (Slender Twine Rush)*			
430.	1084	*Lepyrodia drummondiana*			
431.	14015	*Sporadanthus strictus*			
432.	15827	*Taraxis grossa*			
433.	17084	*Tremulina tremula*			
Rhamnaceae					
434.	33438	*Trymalium odoratissimum subsp. trifidum*			
435.	15145	*Trymalium venustum*			
Rubiaceae					
436.	7346	*Opercularia hispidula (Hispid Stinkweed)*			
Rutaceae					
437.	4413	*Boronia crenulata (Aniseed Boronia)*			
438.	11503	*Boronia crenulata var. crenulata*			
439.	4416	*Boronia denticulata*			
440.	4422	*Boronia gracilipes (Karri Boronia)*			
441.	16630	*Boronia juncea subsp. laniflora*			
442.	16631	*Boronia juncea subsp. micrantha*			
443.	4429	*Boronia molloyae (Tall Boronia)*			
444.	4441	*Boronia spathulata (Boronia)*			
445.	4447	*Boronia virgata*		P4	
446.	18532	*Philotheca nodiflora subsp. lasiocalyx*			
447.	18547	*Rhadinothamnus anceps*			
Santalaceae					
448.	10705	*Exocarpos sparteus (Broom Ballart, Djuk)*			
449.	2350	*Leptomeria pauciflora (Sparse-flowered Currant Bush)*			
450.	2355	*Leptomeria squarrulosa*			
Scapaniaceae					
451.		*Chaetophyllopsis whiteleggei*			
Scrophulariaceae					
452.	7205	*Myoporum tetrandrum (Boobialla)*			
453.	7107	*Verbascum virgatum (Twiggy Mullein)*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Sematophyllaceae					
454.	32483	*Sematophyllum subhumile var. contiguum*			
Solanaceae					
455.	6040	*Anthocercis littorea (Yellow Tailflower)*			
Splachnaceae					
456.	32440	*Tayloria octoblepharum*			
Stylidiaceae					
457.	7670	*Levenhookia dubia (Hairy Stylewort)*			
458.	7676	*Levenhookia pusilla (Midget Stylewort)*			
459.	7678	*Stylidium adnatum (Common Beaked Triggerplant)*			
460.	30880	*Stylidium angustifolium subsp. glaucifolium*			
461.	7695	*Stylidium caespitosum (Fly-away Triggerplant)*			
462.	7699	*Stylidium calcaratum (Book Triggerplant)*			
463.	7699	*Stylidium carnosum (Fleshy-leaved Triggerplant)*			
464.	7708	*Stylidium crassifolium (Thick-leaved Triggerplant)*			
465.	7712	*Stylidium despectum (Dwarf Triggerplant)*			
466.	7713	*Stylidium dichotomum (Pins-and-needles)*			
467.	7718	*Stylidium diversifolium (Touch-me-not)*			
468.	7719	*Stylidium ecorne (Foot Triggerplant)*			
469.	19251	*Stylidium eriopodum*			
470.	7725	*Stylidium fasciculatum (Pale Beaked Triggerplant)*			
471.	7733	*Stylidium glaucum (Grey Triggerplant)*			
472.	7734	*Stylidium guttatum (Dotted Triggerplant)*			
473.	7735	*Stylidium hirsutum (Hairy Triggerplant)*			
474.	7742	*Stylidium inundatum (Hundreds and Thousands)*			
475.	7745	*Stylidium junceum (Reed Triggerplant)*			
476.	7747	*Stylidium lepidum (Redcaps)*		P3	
477.	7757	*Stylidium luteum (Yellow Triggerplant)*			
478.	25851	*Stylidium nymphaeum*			
479.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
480.	7778	*Stylidium pritzelianum (Royal Triggerplant)*			
481.	7782	*Stylidium pulchellum (Thumbelina Triggerplant)*			
482.	7784	*Stylidium pygmaeum (Pygmy Triggerplant)*			
483.	7785	*Stylidium repens (Matted Triggerplant)*			
484.	7791	*Stylidium roseonanum*		P3	
485.	7796	*Stylidium scandens (Climbing Triggerplant)*			
486.	7798	*Stylidium schoenoides (Cow Kicks)*			
487.	7799	*Stylidium spathulatum (Creamy Triggerplant)*			
488.	7802	*Stylidium squamosotuberosum (Fleshy-rhizomed Trigger Plant)*			
489.	25804	*Stylidium thryonides*			
490.	7808	*Stylidium violaceum (Violet Triggerplant)*			
Thymelaeaceae					
491.	5231	*Pimelea angustifolia (Narrow-leaved Pimelea)*			
492.	5242	*Pimelea erecta*			
493.	5240	*Pimelea hispida (Bristly Pimelea)*			
494.	5251	*Pimelea imbricata*			
495.	11533	*Pimelea imbricata var. imbricata*			
496.	11402	*Pimelea imbricata var. piligera*			
497.	5252	*Pimelea lanata*			
498.	5255	*Pimelea longiflora*			
499.	5261	*Pimelea rosea (Rose Banjine)*			
500.	18117	*Pimelea rosea subsp. rosea*			
501.	5269	*Pimelea sylvestris*			
Xanthorrhoeaceae					
502.	14544	*Xanthorrhoea brunonis subsp. brunonis*			
503.	14545	*Xanthorrhoea brunonis subsp. semibarbata*			
504.	1255	*Xanthorrhoea platyphylla*			
505.	1256	*Xanthorrhoea preissii (Grass tree, Palga)*			
506.		*Xanthorrhoea sp.*			
Xyridaceae					
507.	1150	*Xyris lanata*			
Zamiaceae					
508.	85	*Macrozamia riedlei (Zamia, Djiridji)*			

Conservation Codes
T - Rare or likely to become extinct

Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area

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 C Definitions of Conservation Codes

Under the Wildlife Conservation Act 1950, the Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection. Schedules 1 and 2 deal with those that are threatened and that are presumed extinct, respectively.

- ***T: Threatened Flora (Declared Rare Flora — Extant)***

  Taxa1 which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the Wildlife Conservation Act 1950).

  Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using International Union for Conservation of Nature (IUCN) Red List criteria:

  CR: Critically Endangered - considered to be facing an extremely high risk of extinction in the wild

  EN: Endangered – considered to be facing a very high risk of extinction in the wild

  VU: Vulnerable – considered to be facing a high risk of extinction in the wild.

- ***X: Presumed Extinct Flora (Declared Rare Flora — Extinct)***

  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 (Schedule 2 under the Wildlife Conservation Act 1950).

Taxa that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora List under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Taxa 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 for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. "Conservation Dependent" species are placed in Priority 5.

- ***Priority 1*** *- Poorly known Taxa. Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey;*
- ***Priority 2*** *- Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey;*
- ***Priority 3 -*** *Poorly Known Taxa. Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey;*
- ***Priority 4 -*** *Rare Taxa. Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years; and*
- ***Priority 5 -*** *Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years*

APPENDIX D: Structural Classification used for Vegetation Mapping (Keighery 1994)

Life form/ height class	Canopy Cover			
	100-70%	70-30%	30-10%	<10%
Trees > 30	Tall Closed Forest	Open Forest	Tall Woodland	Tall Open Woodland
Trees 10-30	Closed Forest	Open Forest	Woodland	Open Woodland
Trees < 10m	Low Closed Forest	Low open Forest	Low Woodland	Low Open Woodland
Tree Mallee	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Shrub Mallee	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs >2m	Closed Tall Scrub	Tall Open Scrub	Tall Shrubland	Tall Open Shrubland
Shrubs 1-2m	Closed Heath	Open Heath	Shrubland	Open Shrubland
Shrubs <1m	Closed Low Heath	Open Low Heath	Low Shrubland	Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

Table 9.1 Structural Classification (Keighery 1994)

Life form / height class	Canopy cover			
	100-70%	70-30%	30-10%	10-2%
Trees over 30 Trees 10-30m Trees under 10 m	Tall Closed Forest Closed Forest Low Closed Forest	Open Forest Open Forest Low Open forest	Tall woodland Woodland Low Woodland	Tall Open Woodland Open Woodland Low Open Woodland
Tree Mallee Shrub Mallee	Closed Tree Mallee Closed Shrub Mallee	Tree mallee Shrub Mallee	Open Tree Mallee Open Shrub Mallee	Very Open Tree Mallee Very Open Shrub Mallee
Shrubs over 2m Shrubs 1-2m Shrubs under 1m	Closed Tall Scrub Closed Heath Closed Low Heath	Tall Open Scrub Open Heath Open Low Heath	Tall Shrubland Shrubland Low Shrubland	Tall Open Shrubland Open Shrubland Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

APPENDIX E

Criteria Used in the Environmental Weed Strategy for Western Australia

- Invasiveness ability to invade bushland in good to excellent condition or ability to invade waterways. (Score as yes or no).
- Distribution - wide current or potential distribution including consideration of known history of wide-spread distribution elsewhere in the world. (Score as yes or no).
- Environmental Impacts - ability to change the structure, composition and function of ecosystems. In particular, an ability to form a monoculture in a vegetation community. (Score as yes or no).

The rating of each weed was then determined by the following scoring system:

- High - a weed species would have to score yes for all three criteria. Rating a weed species as high would indicate prioritising this weed for control and/or research i.e. prioritising funding to it.
- Moderate - a weed species would have to score yes for two of the above criteria. Rating a weed species as moderate would indicate that control or research effort should be directed to it if funds are available, however it should be monitored (possibly a reasonably high level of monitoring).
- Mild - a weed species scoring one of the criteria. A mild rating would indicate monitoring of the week and control where appropriate.
- Low - a weed species would score none of the criteria. A low ranking would mean that this species would require a low level of management.

HERRING STORER ACOUSTICS

EMAIL TRANSMITTAL

REF:	23111-1-18098
TO:	LANDFORM RESEARCH
TO:	Lindsay Stephens
ADDRESS:	landform@iinet.net.au
FROM:	Tim Reynolds
DATE:	21 May 2018
SUBJECT:	**LIMESTONE QUARRY - NULLAKI** **ENVIRONMENTAL NOISE – TRUCK MOVEMENTS**

Lindsay,

As requested, we have undertaken a review of the noise that would be received at the Nullaki Campsite from trucks travelling to and from the proposed quarry, with regards to the requirements of the *Environmental Protection (Noise) Regulations 1997*.

CRITERIA

The allowable noise level at the surrounding locales is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 & 8 stipulate maximum allowable external noise levels at noise sensitive premises. These allowable noise levels at a "highly sensitive area" of a noise sensitive premises are determined by the calculation of an influencing factor, which is then added to the base levels shown below. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern. For other areas of a noise sensitive premises, the assigned noise levels are fixed. These baseline and fixed assigned noise levels are listed in Table 1.

TABLE 1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises : highly sensitive area	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day Period)	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35 + IF	45 + IF	55 + IF
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

Rochdale Holdings Pty Ltd A.B.N. 85 009 049 067 trading as:
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P.O. Box 219, Como, W.A. 6952
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hsa@hsacoustics.com.au

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

"impulsiveness" means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax\ Slow}$ is more than 15 dB when determined for a single representative event;

"modulation" means a variation in the emission of noise that –

(a) is more than 3dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;
(b) is present for more at least 10% of the representative assessment period; and
(c) is regular, cyclic and audible;

"tonality" means the presence in the noise emission of tonal characteristics where the difference between –

(a) the A-weighted sound pressure level in any one-third octave band; and
(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 2 below.

TABLE 2 – ADJUSTMENTS TO MEASURED MUSIC NOISE LEVELS

Where **tonality** is present	Where **modulation** is present	Where **impulsiveness** is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

For the campsite, there are a number of considerations. These being :

- whether the camp ground is considered as being noise sensitive ; and

- if noise sensitive, would it be considered as a "highly sensitive area".

Under the Regulations, a "highly sensitive area" :

Means that area (if any) of noise sensitive premises comprising –

(a) a building, or part of a building, on the premises that is used for a noise sensitive purpose; and
(b) any other part of the premises within 15m of that building or that part of the building;

We note that under Part C – "Noise sensitive premises" of Schedule 1, a premises used for the purpose of a camping ground is considered as noise sensitive. However, also under the Regulations a camp ground is defined as :

> *(a) a caravan park or camping ground licensed or taken to be licensed under the Caravan Parks and Camping Grounds Act 1995; or*
>
> *(b) a caravan park or camping ground that is operated by a public sector body as defined in the Public Sector Management Act 1994 section 3(1); or*
>
> *(c) a camping area as defined in the Conservation and Land Management Regulations 2002 regulation 2;*

Thus, we are unsure whether the camp ground would firstly, be considered as being "noise sensitive" and secondly, if it is noise sensitive, whether it would be considered as "highly noise sensitive" or "other than highly noise sensitive".

As the proposed operation of the quarry would be 0700 to 1700 hours. Noise received at the camping ground would need to comply with the assigned day period noise levels. The Influencing factor for the camp site would be 0 dB, thus the applicable day period assigned noise levels are listed in Table 3.

TABLE 3 - ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises : highly sensitive area	0700 - 1900 hours Monday to Saturday	45	55	65
Noise sensitive premises: any area other than highly sensitive area	All Hours	60	75	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

For information, a plan showing the truck access road and the Nullaki campsite is shown as Figure 01.

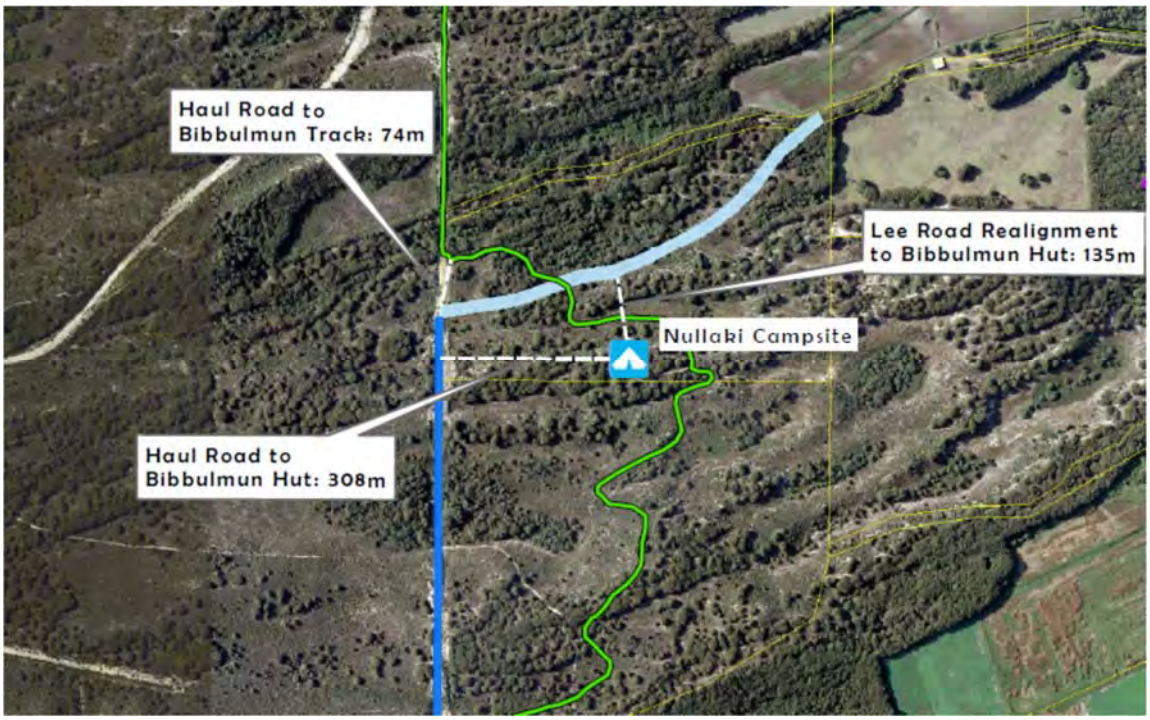

Figure 01 – Truck Access

Finally, it is noted that the Regulations do not apply to vehicles travelling on a road. Thus, noise emissions from a truck travelling along Lee Road are exempt from the Regulations. Additionally, if the access road to the quarry was a road, then noise from the trucks travelling on this road would also be exempt.

PROPOSAL

From information supplied, we understand that :

- the quarry would only operate Monday to Friday (excluding Public Holidays) between 0700 and 1700 hours. Therefore, if applicable, noise emissions from the trucks needs to comply with the applicable day period assigned noise levels.

- based on the production of 50 000 tonnes per year, there would be 10 trucks per day (assuming 125 production days and using 40 tonne trucks).

With only 10 trucks per day (ie 20 movements, with 10 entering and 10 exiting), noise received at the camp site would need to comply with the assigned L_{A1} noise level.

NOISE MODELLING / ASSESSMENT

To assess noise received at the Nullaki Campsite, noise modelling was undertaken using the computer program 'SoundPlan'. Calculations were carried out using the DER standard weather conditions as stated in the Department of Environment Regulation *"Draft Guidance on Environmental Noise for Prescribed Premises"*.

The sound power noise level of 97 dB(A) was used for the truck.

From the noise modelling, the highest noise received at the campsite from a truck, in the worst case location was calculated at 40 dB(A). Thus, this would represent to maximum noise level received at the campsite from trucks moving along the access road to the quarry.

We note that, even with the addition of a +5 dB(A) penalty for a tonal component, the worst case noise received at the camp site would comply with the assigned L_{A10} noise level of 45 dB(A) for a "highly sensitive area".

Thus, regardless of the interpretation or status of the Nullaki campsite, noise received at the campsite would for the worst case noise level, comply with the most stringent criteria applicable under the Environmental Protection (Noise) Regulations 1997.

Yours faithfully,
for **HERRING STORER ACOUSTICS**

Tim Reynolds

EXTRACTIVE INDUSTRY – 9005 Eden Road, Nullaki

OVERVIEW OF SUBMISSIONS

Issue	Comment
• Lime is a required resource within the region • There is a demand for lime within the region • High quality lime is not ready available in the Denmark area	It is acknowledged the availability lime is key resource for construction and soil management. DAFWA has provided correspondence reinforcing the importance of Lime within the agricultural sector. In respect to the Denmark area, it is understood the Denmark lime pit is in the process of re-opening. However, whether the Denmark facility is operating or not is not a consideration for the matter. While it is acknowledged the availability lime is key resource for construction and soil management, the shortage or abundance and quality of a commodity is not a consideration within the planning framework.
• The proposal will have detrimental amenity impacts on adjoining properties	Amenity is defined within Local Planning Scheme No.1 as; *"All those factors which combine to form the character of an area and include the present and likely future amenity"* The Department of Environmental Regulation has advised that depending on operational output, the proposal may be a prescribed activity and require a licence. It should be noted that screening and crushing are subject to a separate licence and assessment through the Department of Environment Regulation. The Extractive Industry and Mining Policy requires that buffer distances are to be in accordance with the setbacks outlined within the Environmental Protection Authority requirements - *the Environmental Protection Authority's Separation Distances between Industrial and Sensitive Land Uses guidelines*. The closest dwelling is approximately 1200 from haul road on the subject site.

Issue	Comment
	Any operations would be subject to ongoing compliance with the Environmental Protection (Noise) Regulations 1997. In addition to the above, the Department of Environment Regulation is the responsible body for the assessment of the emissions and buffers for screening and crushing plants. The applicant is therefore responsible and obligated to ensure that they have the required licences from DER prior to any activity onsite.
• Impact on property value	Property value in itself is not a valid planning concern. However, a number of the underlying factors which lead to this concern are, for example, consistency within the conservation zone and amenity. Residents have advised they have purchased properties (at a significant cost) within the conservation zone, on the reasonable expectation of a high level of amenity, and on the basis that the zone would not be shared with an extractive industry or similar uses.
• Health impacts of lime dust • Impact on adjoining agriculture activities	The *Extractive Industry and Mining Policy* requires that buffer distances are to be in accordance with the setbacks outlined within the Environmental Protection Authority requirements. The Department of Environment Regulation is the responsible body for the assessment of the emissions and buffers for screening and crushing plants. The applicant is responsible for ensuring that they have the required licences from DER prior to undertaking this activity onsite. The applications for screening and crushing are subject to process by DER whereby the potential impact on Dust on either dwellings or nearby agricultural uses (outside of the CZ1 zone) A dust and noise management plan have been submitted. The Department of Health state that unless adequately treated, rainwater is not reliably safe to drink, it is almost impossible to completely protect rainwater from contamination. However, our advice is that installing screens, filters and first flush devices will reduce contamination if people are using rainwater for this purpose.

Issue	Comment
• The Nullaki wilderness association is not a suitable organisation to distribute funds	Noting the officer recommendations. In the event that approval was to be granted, and a monetary contribution as seen as an acceptable situation, the allocation of funds to a body which has the expertise to expend the funds in a suitable matter would be a matter for consideration. It is acknowledged that there may be more suitable and qualified organisations.
• The existing road network is not suitable and is dangerous • The extension of Lee Road is unsuitable • There will be passing issues • Who pays for the infrastructure improvements and maintenance resulting from the proposal?	If the applicant was to be granted approval they would be required to fully construct Lee road and upgrade associated roads/infrastructure along the route to accommodate trucks. Upgrades may be substantial as it could potentially involve bridges and road widening. If approved, it is recommended the applicant be required to undertake a road infrastructure audit to identify roads and infrastructure that require upgrading to accommodate the proposal. It is acknowledged that trucks on the proposed route would be shared with other users, and create and additional safety risk for cyclists and road users. However, as it is a public road, all users, be it pedestrians, cyclist, or trucks, are required to use the road in a safe manner in accordance with relevant legislation. Associated issues with the extension of Lee Road has also been submitted by DPAW; • The extension of Lee Road comes to within approximately 140m of an overnight track Shelter, 80 metres from the emergency helicopter extraction point and will cross over the Bibbulmun Track; • If the proposal was to proceed the Bibbulmun Track Shelter would need to be relocated. Relocation of the Bibbulmun Shelter and possible track re-alignments would be at a significant cost due to not only the physical removal and relocation but the rehabilitation of existing site and alteration of associated publications (maps, guidebooks). If the applicant was to be granted approval they would be required to fully construct Lee road and upgrade associated roads/infrastructure along the route to accommodate trucks. Upgrades may be substantial as it could potentially involve bridges and road widening. If approved, it is recommended the applicant be required to undertake a road infrastructure audit to identify roads and infrastructure that require upgrading to accommodate the proposal.

Issue	Comment
• The proposal will impact on the Bibbulmun track and nearby overnight stay shelter • The proposal would disturb the secluded experience of the track • Moving the shelter would be a significant cost	These comments were confirmed an elaborated further on in the referral response from DPAW, reaffirming concerns raised with; • Proximity of the proposal to the Bibbulmun track • Potential impact on the Bibbulmun track and the amenity of the users, noting that there is a campsite in the proximity of the proposed haulage road. • The Bibbulmun Track Foundation also raised similar concerns in respect to the trail being a world class long distance
• The Munda Bidi Trail travels along sections of the proposed haul route and would increase the risk to users.	It is acknowledged that trucks on the proposed route would be shared with the Munda Bidi trail, and create and additional safety risk for cyclists and road users. However, as it is a public road, all users, be it pedestrians, cyclist, or trucks, are required to use the road in a safe manner in accordance with relevant legislation. The Bibbulmun track foundation also raised these matters. If the applicant was to be granted approval they would be required to fully construct Lee road and upgrade associated roads/infrastructure along the route to accommodate trucks. Upgrades may be substantial as it could potentially involve bridges and road widening. If approved, it is recommended the applicant be required to undertake a road infrastructure audit to identify roads and infrastructure that require upgrading to accommodate the proposal.
There are a number of errors within the proposal, including the distance to the closest dwelling	It is noted that there were a number of discrepancies within the report. When the proposal was assessed, the dwelling on Lee Road which was omitted was included. DPAW has advised the Bibbulmun alignment shown was incorrect.
The proposal has not considered Aboriginal Heritage	The Department of Aboriginal Affairs (DAA) has advised that there are no reported Aboriginal sites or heritage places within the area of the proposal. However, the DAA

Issue	Comment
	recommend the developers utilise the Aboriginal due diligence guideline when undertaking developments.
Department of Planning While the applicant does have the right, under cl 9.1.1 of LPS1, to apply for planning approval for a use not listed and for the application to be advertised in accordance with cl 9.4.3, the proposal fails to meet the land use provisions of Cl 4.2.18(a), cl 5.5.14 and Schedule 12. The primary objective of the zone is for Residential uses. The secondary objective (b) (iii) directs the local government to provide for land use and development provisions which prevent impacts to the zone's conservation purpose. The proposal also fails to meet the following development provisions of Schedule 12: • it proposes a maximum of 4ha development area which exceeds the 1ha maximum allowable development footprint (cl 3.4 (e) and 4.3) • the flora study is not a targeted flora or fauna survey and has not surveyed the proposed lime pit site for rare, endangered and/or threatened flora or fauna species (cl 4.5) • proposed pit #4 is within the 200m exclusion area of the foreshore reserve (cl 4.6(i)); and • the pits are located along a significant ridgeline (cl 4.6(v)). In summary the proposal does not meet the land use and development provisions for the zone and the Department of Planning recommends that the development application be refused in order for LPS1 to be effectively enforced and for the	Submission noted. The Department of Planning submission is discussed within the item. The Department of Planning comments regarding the acceptability of the proposal has been given significant weight in the consideration of the matter. .

Issue	Comment
local government to avoid any representations made against it under s211 of the Planning and Development Act 2015 . Other matters to note • The land use is not supported within the Albany Local Planning Strategy ; The Lower Great Southern Strategy notes environmental or conservation considerations may have a higher priority than resource extraction in the region. It notes basic raw material and agricultural mineral extraction areas need to be identified in local planning strategies and protected in local planning schemes, with consideration given to neighbouring land uses, visual impact issues and buffer areas to accord with acceptable environmental and amenity standards. The development application area is not identified in the local planning strategy and does not comply with local planning scheme provisions. The proposal does not comply with cl 6.2.3 of State Planning Policy 2.4 'Basic Raw Materials' as it does not comply with planning and environmental requirements of LPS1. The proposal does not comply with State Planning Policy 2.5 'Rural Planning' . The policy identifies Conservation zones within the 'Rural living' zone definition . Basic raw material extraction is a use associated with 'Rural land uses' of a 'Rural land' zone. The definition explicitly excludes rural land use in the 'Rural living' zone . The policy also reiterates that basic raw material resources and sites should be identified in local planning strategies and schemes as required. The proposal does not comply with cl 6.5 of SPP 3.7 'Planning in Bushfire Prone Areas' as no bushfire assessment has been included with the application. It should also be noted that Lot 9005 is the subject of two subdivision planning applications (WAPC 151916 and WAPC 152952) which were recently considered by the WAPC Statutory Planning Committee and subsequently refused because the proposals failed to prove that	

Issue	Comment
bushfire risk to life and property could be appropriately mitigated . Approval would set an undesirable precedent for similar uses within all other lots within the Conservation zone ; There is no mechanism that can guarantee proposed royalties from the sale of lime extracted will be reinvested across the whole of the Nullaki Peninsula Conservation zone; The DAFWA letter should only be considered regarding its comments on lime quality and resources within a greater context of the region and the State . It is not a letter of support for this particular proposal as more detail was requested on impacts of the proposal over the life of the project; and The original amendment over area CZ1 from Rural zone to Conservation zone was supported by the Environmental Protection Authority on the proviso that 'Extractive Industry' uses were removed from the permissible uses. The Department encourages the City of Albany to undertake a strategic assessment of limestone and lime sand locations within the local government area as soon as possible, as recommended in the Albany Regional Basic Raw Material Study (1996), in order for the identification and long term planning of extractive industries in suitably zoned areas.	
Department of Water The DoW has no objection to the proposal. As the extractive site is located high on the coastal ridge, there will be no impact on groundwater, nor is there any waterways at this location. It is not anticipated that the stockpile activities will have any impacts on water resources.	Submission noted.

Issue	Comment
The DoW also supports the rehabilitation management plan, and recommends that should be extractive industry be approved, there should be strict compliance with this plan to ensure that the conservation values of the Nullaki Peninsula are not compromised by the extractive industry.	
Department of Mines and Petroleum In September 2016, the Geological Survey of Western Australia (GSWA) commented on a town planning scheme amendment over this area that would facilitate this proposal. supported in principle because a continuing supply of these materials is important for agriculture and infrastructure purposes.	Submission noted.
Department of Aboriginal Affairs The Department of Aboriginal Affairs (DAA) advises there are no reported Aboriginal sites or Aboriginal heritage places within the areas of the Proposal. The DAA recommends that developers take into consideration the DAA's Aboriginal Heritage Due Diligence Guidelines when planning specific developments associated with the Proposal. These have been developed to assist proponents to identify any risks to Aboriginal heritage and to mitigate risk where heritage sites may be present.	Submission noted.
Department of Parks and Wildlife The Department of Parks and Wildlife South Coast Region objects to this development application for the following reasons.	Submission noted.

Issue	Comment
The Nullaki Peninsula represents a key ecological linkage point in the coastal Macro Corridor as identified in the Western Australian South Coast Macro Corridor Network (Wilkins et al. 2006). This report forms a bioregional strategy for ensuring landscape scale connectivity between the forested south west of Western Australia and the intact rangeland vegetation and Great Western Woodlands. Corridors of native vegetation provide ecological linkages that assist the retention and maintenance of the keys components of biodiversity such as genetics, species and ecosystems. Bibbulmun Track alignment as shown on Figure 2 of proposal is incorrect and does not indicate the location of the Bibbulmun Track Nullaki Shelter (Overnight Shelter and tent camping) which is a critical piece of recreational infrastructure that will be affected by the lime pit haul road proposal • Proposed road extension of Lee Road comes to within approximately 140m of the Shelter, -80m from the emergency Helicopter extraction point and will cross over the Bibbulmun Track; • Ambience, sense of place, solitude, sensation of wilderness experience is what people are looking for as part of the Bibbulmun Track experience. These values will be impacted by haul road being so close (-140m, noise and dust), the stockpile management noise levels (-400m away from Shelter with loading/unloading operations), hours of operation being proposed as Mon-Sat 6:30am-5:00pm and increased campsite security issues from access by opportunistic road users along Lee Road extension; If the proposal was to proceed the Bibbulmun Track Shelter	

Issue	Comment
would need to be relocated. Relocation of the Bibbulmun Shelter and possible track re-alignments would be at a significant cost due to not only the physical removal and relocation but the rehabilitation of existing site and alteration of associated publications (maps, guidebooks). Relocating the shelter is problematic in terms of finding a new appropriate location that would be positioned within the necessary parameters of meeting distance requirements for walkers heading south or north from the previous shelter location. City of Albany approvals for a new location would need to be sought along with potential Aboriginal Heritage assessments being undertaken for any proposed re-location site.	REPORT ITEM DIS106 REFERS

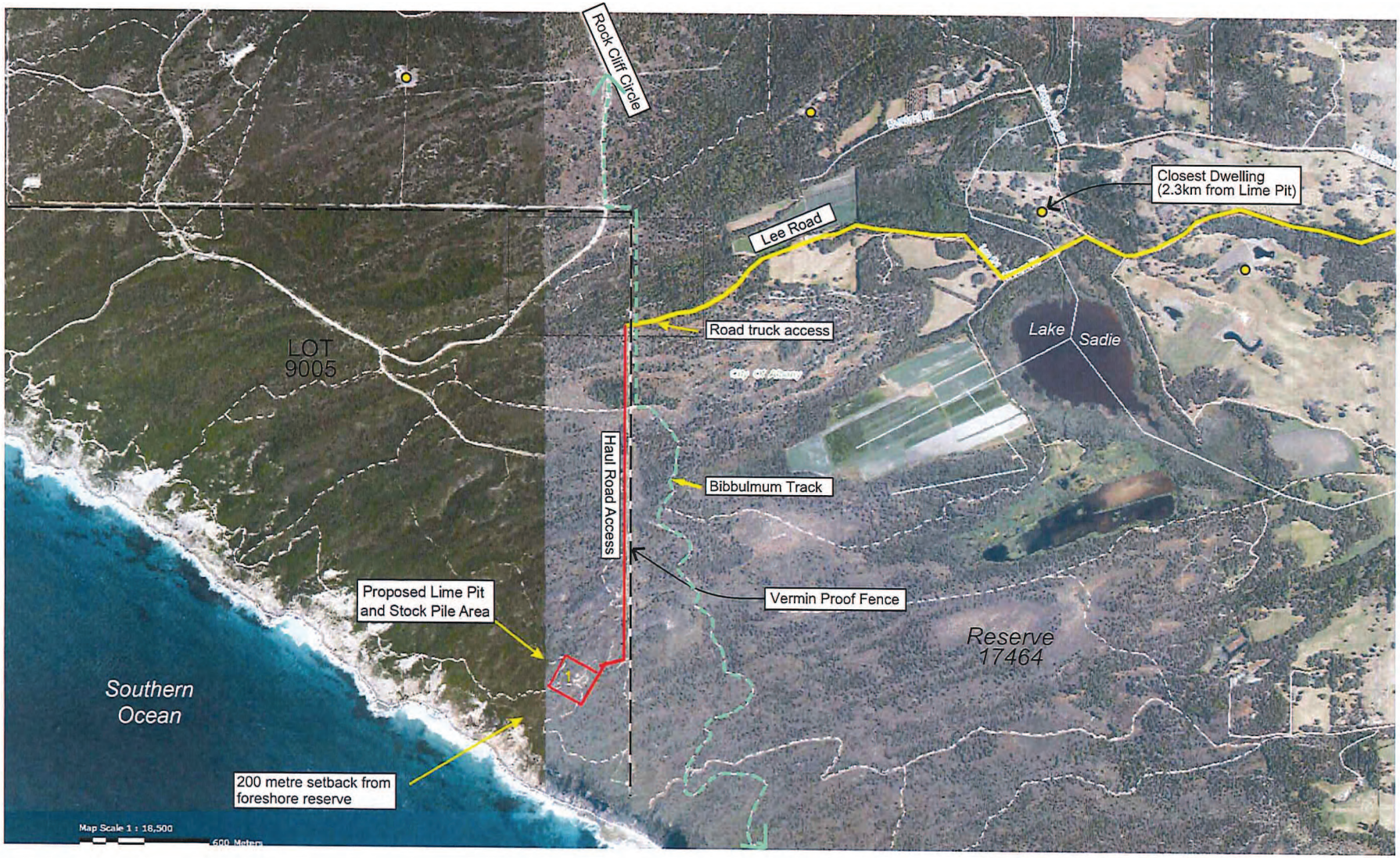

FIGURE 2 - SURROUNDING LANDUSE
LOT 9005 NULLAKI PENINSULA, NULLAKI ALBANY

N

SAM WILLIAMS | TOWN PLANNER
ph: 0418 116216 | email: samwilliams@westnet.com.au

date - 1 May 2018
plan no.16-003-002D1

0m 600m

ALL AREAS, DIMENSIONS & CONTOUR LEVELS DISPLAYED ARE SUBJECT TO DETAIL SURVEY

HERBERT SMITH FREEHILLS

David Nicholson
Partner
McLeods | Barristers & Solicitors
Stirling Law Chambers
220 Stirling Highway Claremont 6010
dnicholson@mcleods.com.au

10 May 2018
Matter 82655824
By Email

Dear Sir

Graeme Robertson v City of Albany DR 354 of 2017

We refer to the Agreed Statement of Issues and Facts dated 6 April 2018 (**Agreed Statement**).

We are instructed that:

(a) the land proposed for lime extraction will cover an area of, in total, 8 ha which will be opened for extraction in three stages of 4 ha, 2 ha and 2 ha respectively, such that at any one time a maximum of 4 ha will be open for mining, rather than 10 ha of total land to be cleared in four stages of about 2.5 ha as mentioned in paragraph 19 of the Agreed Statement.

(b) the lime pit and associated transport will operate between December and March, rather than between January and April as mentioned in paragraph 24 of the Agreed Statement.

(c) per day there will be 8 truck movements in to and 8 truck movements out of the lime pit.

Yours sincerely

Konrad de Kerloy
Partner
Herbert Smith Freehills

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Doc 71559739.1

Response to Appeals to the State Administrative Tribunal (SAT) Policy

Objective

The objective of this policy is to clarify the role, responsibility and accountability of the Council and City Officers in respect to decisions it makes which are the subject of an application for review to the SAT.

Policy Statements

Council decision consistent with Officer's recommendation:

- Where a Council decision is the same or essentially the same as an Officer's recommendation, or corrects or improves the content of an Officer's recommendation, then the responsible Officer or another Officer nominated by an Executive Director or the Chief Executive Officer, shall provide a written response to an application for review on behalf of the Council or attend a mediation or tribunal hearing as required in order to represent the Council's position.
- Elected Members attending mediation sessions do so on a voluntary basis as community members and as observers; not as a representative of Council.
- The outcome of any mediation relating to a decision made at a Council meeting conducted as part of an application for review is to be reported to Council so that a formal response to the SAT on the mediation can be made.

Council decision contrary to the Officer's recommendation: Where a decision of the Council is the subject of an application for review to the SAT and that decision was contrary to the Officer's recommendation then, in the interests of the Council and the Officer:

- Unless otherwise determined by Council, the mover and seconder of the motion will have first option to represent Council.
- Council will be represented by a private consultant or a person appointed by the relevant Executive Director.
- Council's elected member representatives will prepare the brief for the appointment of the consultant or advocate, with the assistance of Council officers, as determined appropriate by the Chief Executive Officer.
- City officers shall provide all necessary information to the nominated Members of the Council, consultant or advocate to assist in the compilation of a response or a witness statement.
- In the event of City officers being subpoenaed, Council acknowledges that officers will be required to give evidence at a SAT hearing in support of the officer's recommendation, acknowledging that the evidence given may be contrary to the Council decision the subject of the appeal.

Scope

This policy applies to decisions of Council.

Review

This policy and procedure is to be reviewed by the document owner every two years.

Legislation Relating to this Policy

- *Local Government Act 1995*
- *Local Government (Administration) Regulations 1996* Regulation 11

Document Approval	
Document Development Officer:	Document Owner:
Manager Governance & Risk (MGR)	Chief Executive Officer

Document Control	
File Number - Document Type:	CM.STD. 7 – Council Policy
Document Reference Number:	NP1767021
Meta Data: Key Search Terms	Council Policy Position, Decision, Appeal, State Administrative Tribunal.
Status of Document:	Council decision: Adopted & Reviewed.
Quality Assurance:	Executive Management Team Corporate Services & Finance Team
Distribution:	Public Document

Document Revision History

Version	Author	Version Description	Date Completed
1.0	MGR	Adoption Ref: OCM 24/06/2014 Item CSF092. NP1437872.	27/06/2014
2.0	MGR	Review Ref: OCM 23/05/2017 Resolution CCCS028	20/06/2017
2.1	MGR	Review.	

Road Project Grant

	Descriptions	Details	Budget	Funding Sought	Running Total Funding	Roads 2030
2019/20 Submissions	Collingwood Road 1.05 - 1.67	Mill and Fill 40mm Asphalt	231.0	154.0	154.0	Yes
	Frenchmans Bay Road 7.64 - 18.05	Bitumen spray reseal	536.8	357.9	511.9	Yes
	Kojaneerup West Road 0.0 - 13.5	Bitumen spray reseal	567.0	378.0	889.9	Yes
	Lower Denmark Road 0.73 - 1.46	Reconstruct and Widen	411.0	246.6	1,250.1	Yes
	Lower Denmark Road 1.68 - 4.4	Bitumen spray reseal	170.5	113.7	1,003.5	Yes
	Lower Denmark Road 19.29 - 20.97	Bitumen spray reseal	52.8	35.2	1,038.7	Yes
	Millbrook Road 0 - 1.43	Reconstruct and Widen	537.2	322.3	1,361.1	Yes
	Millbrook Road 1.43 - 10.6	Reseal	489.5	293.7	1,654.8	Yes
Priorities for future years 2020/21 - 2023/24	Sanford Road	Reconstruct, Seal and Asphalt	900.0	540.0	2,194.8	No*
	South Stirling Road 0-4.47	Bitumen spray reseal and part Reconstruct	450.0	270.0	2,464.8	No*
	North Road 2.76-2.99	Asphalt Overlay and Partial Kerbing	63.8	38.3	2,503.0	Yes
	North Road Left 0.33-0.5	Mill and Fill 40mm Asphalt	64.5	38.7	2,541.7	Yes
	Mermaid Avenue 0-0.52	Mill and Fill 25mm Asphalt	128.8	77.3	2,619.0	No*
	Norwood Road 0-3.5	Reseal	132.0	79.2	2,698.2	Yes
	Lancaster Road 1.34-1.95	Widen and Asphalt Overlay	137.3	82.4	2,780.6	No*
	Chillinup Road 0-4.8	Reseal	180.0	108.0	2,888.6	No*
	Redmond Hay River Road 0-8.1	Reseal	260.0	156.0	3,044.6	No*
	Campbell Road 0.12-0.82	Mill and Fill 40mm Asphalt	270.0	162.0	3,206.6	Yes
	Redmond West Road 0-4.8	Bitumen spray reseal	300.0	180.0	3,386.6	No*
	Middleton Road 1.7-End	Mill and Fill 40mm Asphalt	500.0	300.0	3,686.6	Yes
	Rufus St slk slk 0.00-0.62	Reconstruct, widen & improve drainage	360.0	216.0	3,902.6	Yes
	Millbrook Rd slk 10.6 - 12.5	Reconstruct and widen through bends	750.0	450.0	4,352.6	Yes

*Requires endorsement for Roads 2030 - earliest eligibility 2020/21

Black Spot

	Descriptions	Details	Budget	Funding Sought	Running Total Funding	Roads 2030
2019/20 Submissions	South Coast Hwy/Belmore Rd Intersection	Widening and improve sight lines	32.0	16.0	16.0	No
	North Rd/Ulster Rd/Lockyer Ave Roundabout	North Rd entry predeflection and approach angles	50.0	25.0	41.0	Yes
	Stirling Tce/Spencer St Intersection	Median realignment and parking nibs	43.0	21.5	62.5	Yes
	St Emilie Way Roundabout Approach	Dual lane on approach to Middleton Rd Roundabout	25.0	12.5	75.0	Yes
	South Coast Hwy/Stanley Rd Intersection	Widening and improve sight lines	32.0	16.0	91.0	No

Commodities

	Descriptions	Details	Budget	Funding Sought	Running Total Funding	Roads 2030
2019/20 Submissions	Mindijup Road 0 - 5.73	Widen and Reseal	350.0	233.3	233.3	No**
	Mettler Road 3.38 - 14.00	Gravel Resheet	370.0	246.7	480.0	No**
	Homestead Road 0 - 4.98	Widen and Reseal	195.0	130.0	610.0	No**

**Must not be on roads 2030 to be eligible for Commodoties Funding

Council Report

Mount Elphinstone to CBD Cycle Link

Feasibility Study

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1 Introduction

City of Albany published the Cycle City Albany 2014-2019 Strategy (CCA) in October 2014. The Strategy has a bold vision "to transform Albany into one of Australia's best cycling destinations, including both on and off road cycling". To achieve this the Strategy "aims to improve cycling infrastructure, encourage cycling as a legitimate mode of transport, improve the culture surrounding cycling by encouraging 'sharing the road' and provide more cycle tourism".

As part of the plan, extensive stakeholder consultation was undertaken including the formation of a Project Control Group (PCG), blank slate community consultation comprising surveys and community workshops, as well as a public submission period following the adoption by Council of a draft Bike Plan in February 2014.

Appendix C – Bike Plan Community Engagement Report of the CCA Strategy provides a detailed summary of the stakeholder consultation. Appendix C states that 90% of respondents to the Draft Bike Plan (approximately 130 submissions received in total) believed that the Princess Royal Drive/wool stores missing link is one of the most significant areas for improvement.

The Strategy also includes a detailed schedule of recommended bicycle infrastructure improvements which have been prioritised for implementation over the short, medium and long term.

The issue of Princess Royal Drive is discussed in detail in section 1.5.9 of the Strategy report and is reproduced in Appendix A of this study.

The Strategy recognised that "The ultimate solution for this section requires significant engineering investigation and is therefore outside the scope of this Strategy" and recommended that "a comprehensive feasibility study" is undertaken "to determine a preferred suite of short term and long term improvements".

2 Study Area

The area covered by the Feasibility Study is shown in Figure 1. It is discussed in detail in Sections 1.5.9 and 1.5.11 of the Strategy (also project numbers 28, 28a, 56, 57 and 58 which can be found in Appendix F of the Strategy) and Appendix A of this study.

The study area includes the following roads:

- Hanrahan Road from the end of the existing sealed shoulders, north of the entrance to CSBP fertiliser works, to Frenchman Bay Road;
- Princess Royal Drive from Frenchman Bay Road to Residency Road;
- Frenchman Bay Road from Woolstores Place to Princess Royal Drive;
- Lower Denmark Road from Frenchman Bay Road to a point 500m west;
- Woolstores Place from Frenchman Bay Road to its end.
- Arterial roads into the CBD for which we have included:
    - Carlisle Street;
    - Festing Street;
    - Grey Street West, up to the intersection with Collie Street;
    - Vancouver Street.

STUDY AREA

FIGURE 1

CITY OF Albany
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3 Existing Situation

3.1 Existing Road Network

The existing road network within the study area is shown in Figure 2. A detailed description of each road is given below and summarised in Table 1 at the end of this section.

3.1.1 Hanrahan Road – Princess Royal Drive

Hanrahan Road and Princess Royal Drive form the main access route to the Albany Port and are the responsibility of Main Roads WA (MRWA). They are part of the MRWA Restricted Access Vehicle Network having a network 7 classification. This allows for vehicles up to 107.5 tonnes mass and 36.5m in length to use the road.

Traffic data provided by MRWA shows that at the intersection with Frenchman Bay Road Hanrahan Road currently carries 6,770 vehicles per day (vpd) with 9% heavy vehicles and Princess Royal Drive carries 8,150 vpd with 6% heavy vehicles. The number of heavy vehicles accessing the port can vary considerably depending on shipping movements and seasonal requirements.

The length of Hanrahan Road within the study area is 250m from the intersection with Frenchman Bay Road to the start of the sealed shoulders just north of the entrance to the CSBP fertiliser works. The road has lane widths of between 3.5m and 4.5m, is kerbed both sides and has a large chip seal surface finish. The speed limit on this section of road is 70km/h.

There are no existing pedestrian or cyclist facilities along this section of Hanrahan Road

Princess Royal Drive is a continuation of Hanrahan Road, starting at the intersection of Frenchman Bay Road through to Residency Road, a distance of 2.2km. The road heads east from Frenchman Bay Road with intersections at Carlisle Street and Festing Street before passing over the rail line on a bridge. It then continues along on an embankment for approximately 1km before diverting around the northern edge of the Anzac Peace Park.

The road has a speed limit of 70km/h from Frenchman Bay Road to a point 260m west of Residency Road where it drops to 60km/h.

The Munda Biddi Trail utilises the northern verge of Princess Royal Drive between the Grey Street West Road reserve and Festing Street as discussed in Section 3.4.

The road varies in width from approximately 9.5m west of the rail line to 7.0m along the embankment section. At the intersections with Frenchman Bay Road and Carlisle Street median islands create pinch points and are of great concern for cyclists.

Also the bridge over the railway forms another squeeze point with a width of only 9.5m between the faces of the safety barrier creating a further hazard for cyclists.

Main Roads WA have recently completed construction of cycle lanes, 1.5m wide, on both sides of Princess Royal Drive from a point 180m east of Frenchman Bay Road to Festing Street as shown in Figure 3. The work involved alteration to the existing kerb lines and median islands to provide adequate lane widths as well as installing green lane treatments at the intersection with Carlisle St and the access driveway to the railway land to the south.

Cyclists have raised concerns over the rough surface finish, the level difference between the road surface and drainage grates as well as the height of the new kerb.

3.1.2 Carlisle Street

Carlisle Street runs west to east from Princess Royal Drive for 630m where it becomes Grey Street West. The road has a speed limit of 60km/h and carries approximately 2,700 vpd. The road is a main connector for traffic from Frenchman Bay Road to the CBD. Over its length, the road climbs 29m in height with a maximum gradient of 9%. The road has a constant width of 8 metres, is kerbed both sides and is surfaced with chip seal. There are no existing pedestrian or cycle facilities along Carlisle Street.

3.1.3 Festing Street

Festing Street runs from Princess Royal Drive through to Parade Street, a distance of 1.2km, where it becomes Stirling Terrace. The road is used as part of the route of the Munda Biddi Trail.

The road varies in width from a minimum of 7.1m to a maximum of 8m and has a fairly gentle grade for most of its length apart from the section between Melville Street and Parade Street where the road rises by 15m with a maximum gradient of 10%.

The road has a speed limit of 50km/h and has an asphalt surface finish.

Traffic flows of 800vpd were recorded on Festing Street, west of Parade Street, with an 85% speed of 58km/h. An 85% speed of 64km/h was recorded on Festing Street 200m east of the intersection with Princess Royal Drive.

There are no existing cycle facilities along the road. There is a footway along the north side of Festing Street westward from Parade Street for 110m which then becomes a gravel verge through to Melville Street.

3.1.4 Frenchman Bay Road

Frenchman Bay Road is an important corridor in the Albany road network providing the only link between the suburbs and tourist areas around Princess Royal Harbour with Albany, with a total length of 18km.

It runs south from the intersection with Hanrahan Road/Princess Royal Drive across the rail line before intersecting with Lower Denmark Road, all within the space of 100m. This section has 2 lanes in each direction separated by a 1.2m wide median with each carriageway being 7.2m wide and kerbed.

The road then reduces to a single lane carriageway 7.0m wide with unsealed shoulders through to Woolstores Place, a total distance of 590m.

This section of Frenchman Bay Road has a 70km/h speed limit with traffic flows of 6,400vpd although this can increase significantly during the peak tourist season. It is also part of the MRWA Restricted Access Vehicle (RAV) Network and has a Network 2 classification. This allows access for trucks up to 27.5m in length and 87.5 tonnes to use the road.

The road is fairly level for most of its length but rises about 8 metres on the approach to the Hanrahan Road/Princess Royal Drive intersection. There have been 21 recorded crashes along this road in the 5 years from 2009-2013, none involving cyclists.

The road is popular with cyclists of all confidence levels with an existing 2.0m shared path running south from Woolstores Place through to Little Grove. There are plans to continue this path through to Goode Beach and Frenchman Bay as part of the Albany Harbours Dual Use Path Planning Strategy.

There are no on-road cycle facilities along its entire length.

3.1.5 Grey Street West

The Grey Street West road reserve runs from Princess Royal Drive, 150m southeast of the Frenchman Bay Road intersection, through to Collie Street, a total distance of 1.97km.

- ***Princess Royal Drive to Spearwood Road***

  This section is 310m long and forms part of the Bibbulmun Track. It consists of a rough track currently suitable for use only by walkers and mountain bike riders. The track climbs steeply with gradients of up to 16% with a total height difference of 26m.

- ***Spearwood Road to Carlisle Street***

  This section consists of a formed gravel road with widths ranging from 3m to 11m. Over its distance of 580m the road climbs up to 13m in height. The Bibbulmun Track continues along this section of road before using existing bush tracks, joining Grey Street West again at Bay Street.

- ***Carlisle Street to Collie Street***

  Here Grey Street West is a continuation of Carlisle Street and maintains a similar width of 8m until it widens out west of Melville Street to 11m through to Collie Street, a total distance of 1.08km.

  The road carries around 2800vpd and is surfaced with asphalt. The gradient between Carlisle Street and Mill Street is fairly level. This then rises to around 3% from Mill Street to half way between Parade Street and Collie Street, before increasing to 7% for the final 80m to Collie Street.

  Between Parade Street and Collie Street there are marked parking bays on both sides of the road. These bays are rarely fully utilised as they are located just outside of the CBD in a predominately residential area. There are existing footpaths on both sides of Grey Street West from Collie Street out to Melville Street with the path on the south side continuing through to Bay Street. No pedestrian facilities exist west of Bay Street and there are no existing cycle facilities for the entire length of Grey Street West. The Bibbulmun Track uses this section of Grey Street West from Bay Street through to Parade Street.

  The speed limit along Grey Street West from Carlisle Street to a point 70m west of Parade Street is 60km/h; this then reduces to 50km/h through to Collie Street.

3.1.6 Lower Denmark Road

Lower Denmark Road runs westward from Frenchman Bay Road through to South Coast Highway east of Denmark, a total distance of 37km. The road is a popular tourist route between Albany and Denmark via Cuthbert, Elleker, Torbay and Youngs Siding. The section within the study area is the first 500m from Frenchman Bay Road which is covered by a 70km/h speed limit and carries 3,100 vpd.

The road has recently been upgraded along this section and now has a 7.0m wide asphalt seal and is kerbed both sides.

The road is level for most of its length but does rise at the western section by 4m with a gradient of 4%.

Lower Denmark Road is also part of the Main Roads Restricted Access Vehicle Network and has a Network 2 classification allowing trucks up to 67.5 tonnes and 20m in length to use it.

There are no pedestrian or cyclist facilities along this section of Lower Denmark Road although the road is a popular route with local cycle groups/clubs. There have been a number of requests for this section of road to be widened to included sealed shoulders/cycle lanes.

3.1.7 Vancouver Street

Vancouver Street runs parallel to and south of Grey Street West between Festing Street and Collie Street, a distance of 820m. Vancouver Street is relatively narrow with a road reserve width of only 10m and a road carriageway width of 6.2m. It is kerbed on both sides and has a mixture of asphalt and chip seal surface finish. The road is subject to a speed limit of 50km/h and traffic volumes of 930vpd. The road is within a residential area with limited off-street parking resulting in on-street parking being commonplace.

From Festing Street, the road rises at an 8% gradient with gentle grades for the remainder of its length. There is a narrow footpath on the north side for the entire length of the road and a footpath on the south side between Parade Street and Cuthbert Street as well as between Melville Street and the Vancouver Arts Centre, 80m east of Festing Street. There are no existing cycle facilities along Vancouver Street.

3.1.8 Woolstores Place

Woolstores Place is a 250m long cul-de-sac providing access to the redundant wool stores warehouse complex.

The road is gated at the entrance to the wool stores with the road reserve continuing a further 130m up to the railway reserve.

The gradient of the road is less than 3% and is between 6.0m and 6.5m in width with a chip seal surface finish up to the gate. Beyond the gate the surface is rough and uneven, petering out to an unsealed track before the railway reserve. Traffic volumes are low with less than 100 vpd using the road. The speed limit is 50km/h.

The existing shared path on the south side of Frenchman Bay Road terminates at Woolstores Place but there are no existing pedestrian or cyclist facilities along Woolstores Place itself.

As can be seen in Figure 2, both the Munda Biddi Trail and Bibbulmun Track utilise Woolstores Place as part of their route between Frenchman Bay Road and the CBD.

Woolstores Place is also proposed to be used for the route of the Grange Resources slurry pipeline from their Southdown Magnetite Mine as discussed in Section 4.3.

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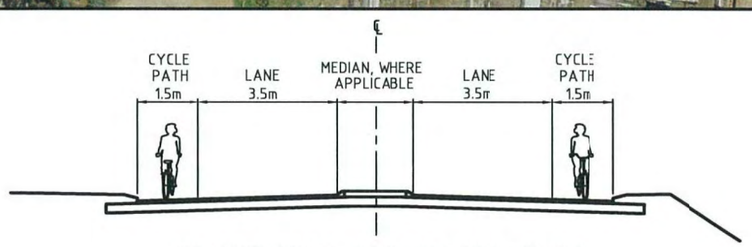
EXISTING ROAD NETWORK, CYCLE INFRASTRUCTURE AND LONG DISTANCE TRAILS

NOT TO SCALE

FIGURE 2

CENTER LINE SHIFT
SEAL WIDENENED & KERB RE-ESTABLISHED FOR CYCLE PATH
PAINT CYCLE PATH GREEN THROUGH INTERSECTION
MODIFY TRAFFIC ISLAND
CARLISLE STREET
LINE BELOW
CYCLE PATH
PORT ROAD
H40
MATCH JOINS
ABOVE LINE
JOINS MATCH
SEAL WIDENENED & KERB RE-ESTABLISHED FOR CYCLE PATH
PORT ROAD
ADJUST SEPARATION LINE.
PAINT CYCLE PATH GREEN THROUGH INTERSECTION
CENTER LINE SHIFT
FESTING STREET
H40

MAIN ROADS WA.
RECENTLY CONSTRUCTED CYCLE LANES.
PRINCESS ROYAL DRIVE



ALBANY PORT RD – PROPOSED CYCLE PATHS
TYPICAL CROSS SECTION

790

SCALE (AT A3) **1:1000**

0 10m 20 30 40 50 60 70 80 90 100 110 120 130 140 150

LEGEND
- CYCLE PATH EDGE
- GREEN PAINTED CYCLE PATH
- MODIFIED CENTER LINE
- NEW KERB LINE

FIGURE 3

Table 1 - Existing Road Infrastructure.

Road name	From / To	Road Authority	Length (within study area)	Widths	Elevation (m AHD)			Surface finish	Max Gradient	Traffic Volume (7 day average)	85th Percentile speed	Crashes. Total No. (involving cycles) 2009-2013 inclusive	Existing cycle facilities	Existing footpaths	Speed Limit
					start	end	max								
Hanrahan Road	Frenchman Bay Road to end of existing sealed shoulders	Main Roads WA	250m	9.4m - 12.3m	12	17	17	Large chip seal	4%	6180 vpd	None available	36 (0)	None	None	70km/h
Princess Royal Drive	Frenchman Bay Road to Residency Road	Main Roads WA	2220m	8.0m - 11.0m	12	15	3	Large chip seal	5%	7300 vpd	66km/h		None	None	70km/h [1)] 60km/h [2)]
Carlisle Street	Princess Royal Drive to Grey Street West	City of Albany	630m	8.0m	11	40	40	Chip seal	9%	2700vpd	None available	1 (0)	None	None	60km/h
Festing Street	Princess Royal Drive to Stirling Terrace	City of Albany	1170m	7.1m - 8.0m	16	8	22	Asphalt	10%	800 vpd	58km/h	2 (0)	None	North (110m)	50km/h
Frenchman Bay Road	Hanrahan Road/Princess Royal Drive to Woolstores Place	City of Albany	590m	7.0m - 14.0m	12	3	12	Asphalt / chip seal	<3%	6400 vpd	None available	21 (0)	None	None	70km/h
Grey Street West	Princess Royal Drive to Spearwood Road	City of Albany	310m	Not applicable	11	35	37	Unformed	16%	Not applicable	Not applicable	N/A	None	Track	Not applicable
	Spearwood Road to Carlisle Street	City of Albany	530m	3m - 11m	35	39	48	Gravel	10%	None available	None available	0 (0)	None	None	None
	Carlisle Street to Collie Street	City of Albany	1080	8.0m - 11.0m	40	25	42	asphalt	7%	2670 vpd	68km/h in 60km/h zone. 58km/h in 50km/h zone.	10 (0)	None	North (500m) South (750m)	60km/h [3)] 50km/h [4)]
Lower Denmark Road	Frenchman Bay Road to a point 500m west	City of Albany	500m	7.0m	10	11	14	Asphalt	4%	3110 vpd	85km/h	7 (0)	None	None	70km/h
Vancouver Street	Festing Street to Collie Street	City of Albany	820m	6.2m	21	18	30	Asphalt / chip seal	8%	927 vpd	45km/h	4 (0)	None	North (810m) South (300m)	50km/h
Woolstores Place	Frenchman Bay Road to gate	City of Albany	310m	6.0m - 6.3m	3	3	3	Chip seal	<3%	None available	None available	0 (0)	None	None	50km/h

Notes:
1) From Frenchman Bay Road to a point 260m west of Residency Rd
2) From a point 260m west of Residency Road to York Street
3) Carlisle Street to a point 70m west of Parade Street
4) From a point 70m west of Parade Street to Collie Street

3.2 Existing Cycle Facilities

As mentioned in section 3.1.1 Main Roads WA have recently completed construction of cycle lanes, 1.5m wide, on both sides of Princess Royal Drive from a point 180m east of Frenchman Bay Road to Festing Street. There are no other existing cycle facilities within the study area. There are cycle facilities that link to the study area as shown in Figure 2, as follows:

- There is a 2.0m wide shared path along the eastern side of Frenchman Bay Road that terminates at Woolstores Place. This path forms part of the route proposed in the Albany Harbours Dual Use Path Planning Strategy as detailed in Section 4.1, and continues around to the suburb of Little Grove, some 5km to the south. This is a popular route for cyclists and walkers and also forms part of the Munda Biddi trail and Bibbulmun Track as discussed in Section 3.4.
- A 2.5m wide shared path runs along the south side of the ANZAC Peace Park between the jetty and the performance space adjacent to the memorial wall.
- There are sealed shoulders (1.5m wide) along both sides of Hanrahan Road from Menzies Street through to a point just north of the entrance to the CSBP fertiliser works.

3.3 Crash History

Crash data has been obtained from the Main Roads WA Crash Analysis database for all of the roads within the study area. This data covers the 5 year period from 2009-2013 inclusive and is summarised in Table 1.

It can be seen from Table 1 that there have been a total of 81 recorded crashes within the study area but there have been no recorded crashes involving cyclists. However, this is more likely to be due to the relatively low number of cyclists riding through the area rather than a reflection of the adequacy of some of the roads in regard to their provision for cyclists.

3.4 Existing Cycle / Pedestrian Trails

Both the Munda Biddi Trail and Bibbulmun Track pass through the study area. The alignments of both trails are shown in Figure 2.

The Munda Biddi Trail is a 1000km off/on road cycle trail between Mundaring and Albany. The trail passes through the study area utilising Frenchman Bay Road and Woolstores Place before crossing the rail line and Princess Royal Drive. It then continues east along the northern verge of Princess Royal Drive, Festing Street and Stirling Terrace.

The Bibbulmun Track is a long distance walking trail between Kalamunda and Albany, a distance of nearly 1,000km. The track uses Frenchman Bay Road and Woolstores Place before crossing the rail line and Princess Royal Drive. It then climbs the lower part of Mount Melville using the unconstructed section of the Grey Street West road reserve to Maxwell Street where it then follows a bush track to the north of the road reserve before rejoining Grey Street West at Bay Street through to Parade Street. The track then continues down Parade Street, crosses Festing Street and the rail line before continuing eastward along the northern verge of Princess Royal Drive.

Comments have been received from the Department of Parks and Wildlife (DPAW) regarding issues with the existing alignment of both the Munda Biddi Trail and the Bibbulmun Track through the study area.

Comments include:

- Pedestrian only rail crossing at the end of Woolstores Place has not been upgraded by Brookfield Rail to include for cyclists.
- Brookfield Rail is seeking to have the crossing at the end of Woolstores Place closed and combined with adjacent road crossing (assumed to be Frenchman Bay Road).
- A 2-way cycle facility along Princess Royal Drive would be preferred to what is currently in place.
- Future plans for the upgrade of Princess Royal Drive and Frenchman Bay Road as part of the Albany Ring Road should cater for users of both long distance trails.

3.5 Rail Corridor

The rail line that passes through the study area provides access for freight trains carrying grain and woodchip to Albany port.

The line is single track narrow gauge and is managed by Brookfield Rail on a 50 year lease from the WA State Government.

The rail line runs parallel to Lower Denmark Road before crossing over Frenchman Bay Road as shown in Figure 2. It then runs between Princess Royal Drive and the wool stores before passing through a steep sided cutting and under Princess Royal Drive. It continues eastwards on an embankment to the south of Festing Street, crossing Parade Street, Residency Road and York Street before entering the port area.

Existing road and path crossing locations within the study area are detailed below in Table 2.

Table 2 - Existing Rail Crossing Facilities

Crossing location	At-grade or grade separated	Road or path	Pedestrian / cyclist facilities provided	Level of protection
Frenchman Bay Road	At-grade	Road	No	Boom gates
170m east of Frenchman Bay Road [1)]	At-grade	Path	Yes	Pedestrian maze
Princess Royal Drive	Grade separated	Road	No	Over bridge
Parade St [2)]	At-grade	Path	Yes	Pedestrian maze
Residency museum - 50m west of Residency Road	At-grade	Path	Yes	Pedestrian maze
Residency Road	At-grade	Road	No	Boom gates

Notes
1) Route of Munda Biddi Trail and Bibbulmun Track.
2) Route of Bibbulmun Track.

As can be seen in Table 2 crossing facilities for pedestrians and cyclists are limited. There are no specific facilities at any of the existing road crossings.

The existing path crossing, located 170m east of Frenchman Bay Road, is used by the route of both the Munda Biddi Trail and the Bibbulmun Track. The crossing is accessed from the south via a rough grassed track from the end of Woolstores Place. On the north side of the crossing users have to negotiate a steep unconstructed path to gain access to Princess Royal Drive.

As mentioned in Section 3.4 advice from the Department of Parks and Wildlife who manage both the Munda Biddi Trail and Bibbulmun Track suggests that Brookfield Rail intend to close this crossing point and combine it with the existing Frenchman Bay Road crossing to the west.

Recent feedback provided by Public Transport Authority (PTA) and Brookfield Rail indicates that any proposal to utilise the rail corridor as a route for cycle/pedestrian infrastructure, including the cutting under Princess Royal Drive as recommended in the Albany Harbours Dual Use Path Planning Strategy (discussed in Section 4.1), can no longer be considered feasible. Consideration will be given for any new/amended crossing points.

4 Previous & Current Proposals

4.1 Albany Harbours Dual Use Path Planning Strategy (DUPPS)

The Albany Harbours DUPPS was published in 1996 and aimed to produce a strategic plan for the construction of a dual-use (shared) path around the shores of the Albany Harbours, from Lower King to Whale World, a total distance of some 35km.

A number of alignments between York Street and the wool stores were considered and are shown in Figure 4. Extracts from the Albany Harbours DUPPS relevant to this section are reproduced in Appendix B.

As can be seen in Figure 4 the preferred alignment runs along Woolstores Place and along the south side of the rail reserve all the way through to Amity Quays. The route then passes between the Amity replica and the museum before crossing Residency Road and continuing through to York Street using the vacant land between the rail line and Princess Royal Drive.

Where the rail line passes under Princess Royal Drive, through a steep sided cutting, at Melville Point the proposal was to take the path through the cutting alongside the rail line. The Strategy states that “preliminary investigations carried out by the Town of Albany staff in conjunction with civil engineers and Westrail indicates that it is feasible for a path, with necessary safeguards, to be constructed through the cutting”.

It should be noted that the option of aligning a path through the railway cutting is no longer considered feasible and that even having a path alignment within the rail reserve is unlikely. This is discussed in more detail in Section 3.5.

An alternative alignment around the wool stores was also suggested in the strategy. This would utilise a “narrow band of vacant crown land on the foreshore side of the reclaimed land upon which the wool stores are situated”. However recent investigations show that this strip of land is not wide enough to accommodate a path and that the existing sea wall upon which it is built on is in poor state of repair.

Two other alignments were considered for the section between York Street and Melville Point. These were along the north side and south side of Princess Royal Drive. The alignment on the north side would follow the same route through the railway cutting and east of Amity Quays as the preferred alignment. The alignment along the south side of Princess Royal Drive required widening of the existing road embankment and the construction of a section of boardwalk before passing across Melville Point.

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ALBANY HARBOURS D.U.P.P.S.
PREFERRED AND ALTERNATIVE PATH ALIGNMENTS

NOT TO SCALE

FIGURE 4

The report dismisses the option to the south of Princess Royal Drive as being not feasible due to the great expense involved in widening the road embankment and associated sea wall. However, it should be noted that this alignment is identical to the one proposed to be constructed as part of the Grange Resources slurry pipeline project. It should now be considered an option as the widening of the road embankment and construction of a shared path between the Anzac Peace Park and a point west of Melville Point will be funded by Grange Resources as discussed in Section 4.3.

4.2 Main Roads WA

As mentioned in Section 3.1.1 Main Roads WA (MRWA) are responsible for both Hanrahan Road and Princess Royal Drive and have provided the following information regarding provision for on-road cyclists:

- Minimum road width requirements for the provision of on-road cycle lanes are 3.5m traffic lanes and 1.5m wide cycle lanes giving a total minimum carriageway width of 10.0m.
- A cycle lane on the existing bridge over the railway is not feasible.
- Support the use of Carlisle Street or Festing Street as an alternative to using Princess Royal Drive east of Festing Street

As discussed in Section 3.1.1 Main Roads WA have recently completed construction of cycle lanes, 1.5m wide, on both sides of Princess Royal Drive from a point 180m east of Frenchman Bay Road to Festing Street. A future extension of these cycle lanes, westward, through to the existing sealed shoulders on Hanrahan Road is also being considered by MRWA. This extension is somewhat more involved than the recently completed section as it requires alteration to the existing intersection with Frenchman Bay Road.

Discussion has also taken place regarding a suitable location for a crossing point for a shared path within the vicinity of the Princess Royal Drive, Frenchman Bay Road intersection. The preferred location is at the end of the Grey Street West road reserve 130m east of Frenchman Bay Road, although a crossing point at the intersection is also being investigated as an alternative.

There are long standing proposals for the construction of a ring road around Albany. This would provide direct access to the port for road trains removing the need for them to use the Chester Pass Road – North Road – Albany Highway – Hanrahan Road roundabout. So far the only section to have been completed is Menang Drive from Chester Pass Road through to Albany Highway. The remaining sections from Albany Highway through to South Coast Highway, and South Coast Highway through to Princess Royal Drive, are still in the early stages of design. The proposal also includes for the upgrade of Princess Royal Drive, through to the port, to a four lane divided road. Figure 5 shows the current proposal for the intersection of the Ring Road with Frenchman Bay Road and Hanrahan Road which would become a grade separated intersection. This would see Frenchman Bay Road passing over the Ring Road and continuing on to become Hanrahan Road. Roundabouts on Frenchman Bay Road and Hanrahan Road would provide access down onto the Ring Road and Carlisle Street, which would be realigned to intersect directly with Hanrahan Road.

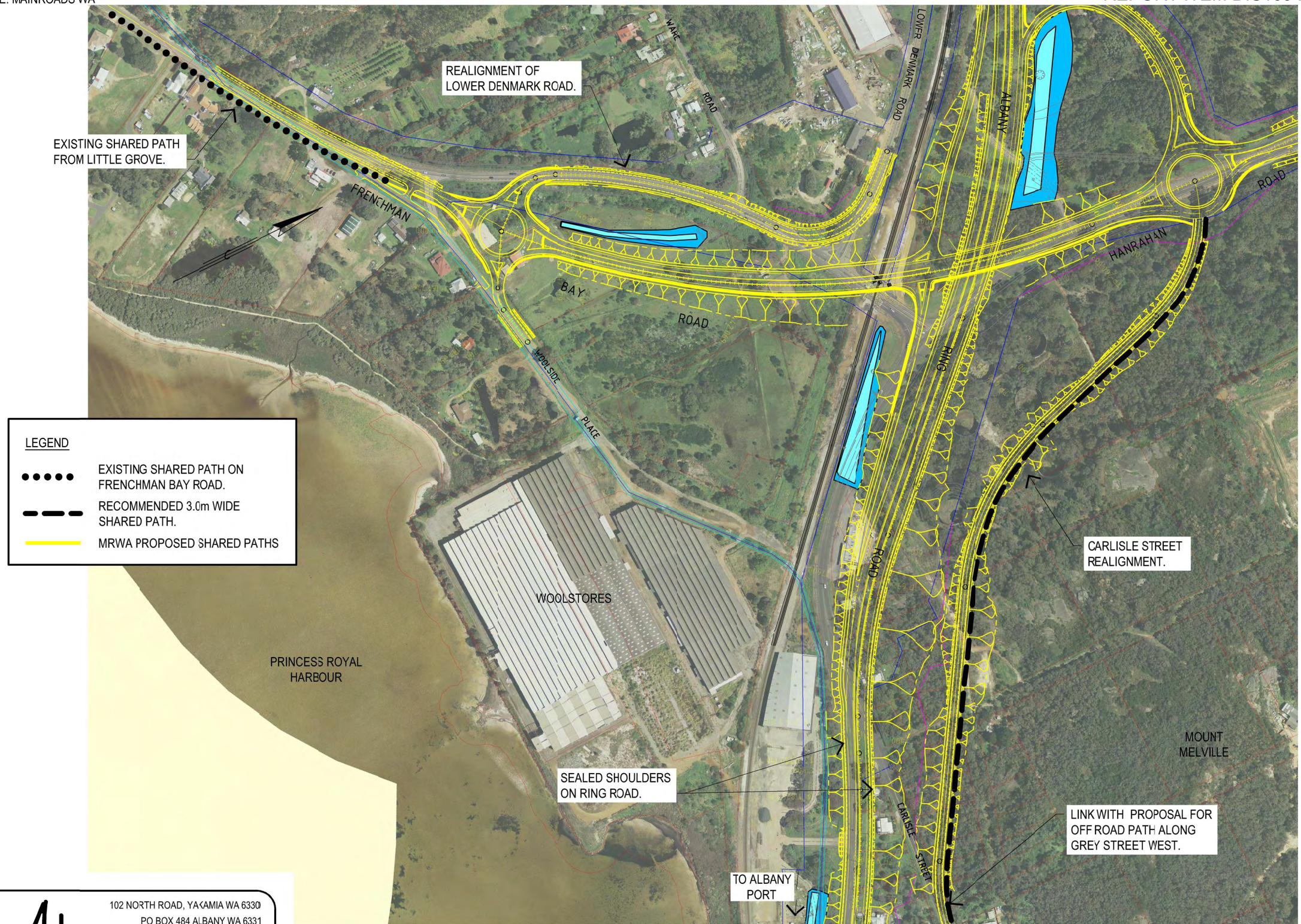
As can be seen in Figure 5 there are proposals for the construction of an off-road shared path, continuing from the existing shared path along the eastern side of Frenchman Bay Road through to the sealed shoulders on Hanrahan Road. Also proposed is the construction of sealed shoulders (2m wide) along the Ring Road itself.

The widening of Princess Royal Drive would also include the construction of a new bridge over the railway, replacing the existing one at Melville Point, which would also include sealed shoulders providing confident cyclists with a high quality continuous route.

MRWA are currently progressing with the design of the Ring Road although there is no proposed timeline for its construction and so it shouldn't be relied upon for providing a short or medium term solution to the existing cycling issues within the study area.

SOURCE: MAINROADS WA

REPORT ITEM DIS109 REFERS



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ALBANY RING ROAD PROPOSED ALIGNMENT AND RECOMMENDED MODIFICATIONS

NOT TO SCALE

FIGURE 5

4.3 Grange Resources Pipeline

There are plans for the construction a Magnetite mine approximately 70km east of Albany near Wellstead. Part of the proposal is for the magnetite to be transported to the port of Albany as slurry via buried pipelines.

The proposed route for the pipeline is shown in Figure 6 and utilises Frenchman Bay Road and Woolstores Place before crossing the rail line. It then runs along the northern boundary of the rail reserve behind the salvage yard before crossing back across the rail line and through Melville Point. The pipelines then continue eastward along the south side of Princess Royal Drive within a proposed widened road embankment.

In 2008, Wood and Grieve Engineers were commissioned by Grange Resources to produce a report investigating options for the construction of the slurry pipelines on the south side of Princess Royal Drive between Albany Peace Park and Melville Point. The report includes concept drawings for 2 options to widen the embankment on the south side of Princess Royal Drive. The preferred embankment widening option (Option A) is shown in Figure 7. This would involve moving the existing seawall southwards by 5m to accommodate the slurry pipelines.

As part of the proposals Grange Resources would also construct a 3m wide shared path from the ANZAC Peace Park through to where the pipelines cross over the rail line west of Melville Point as shown in Figure 6. The shared path would be separated from the adjacent road by a 1m wide vegetated buffer as shown in Figure 7. It is understood that the construction of a shared path west of this point would not be the responsibility of Grange Resources.

Even though the proposal to construct the magnetite mine has been around for a number of years there is no fixed date as to when project will commence and it should not be relied upon to provide the sole solution.

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GRANGE RESOURCES.
PROPOSED ALIGNMENT OF SLURRY PIPELINE

NOT TO SCALE

FIGURE 6

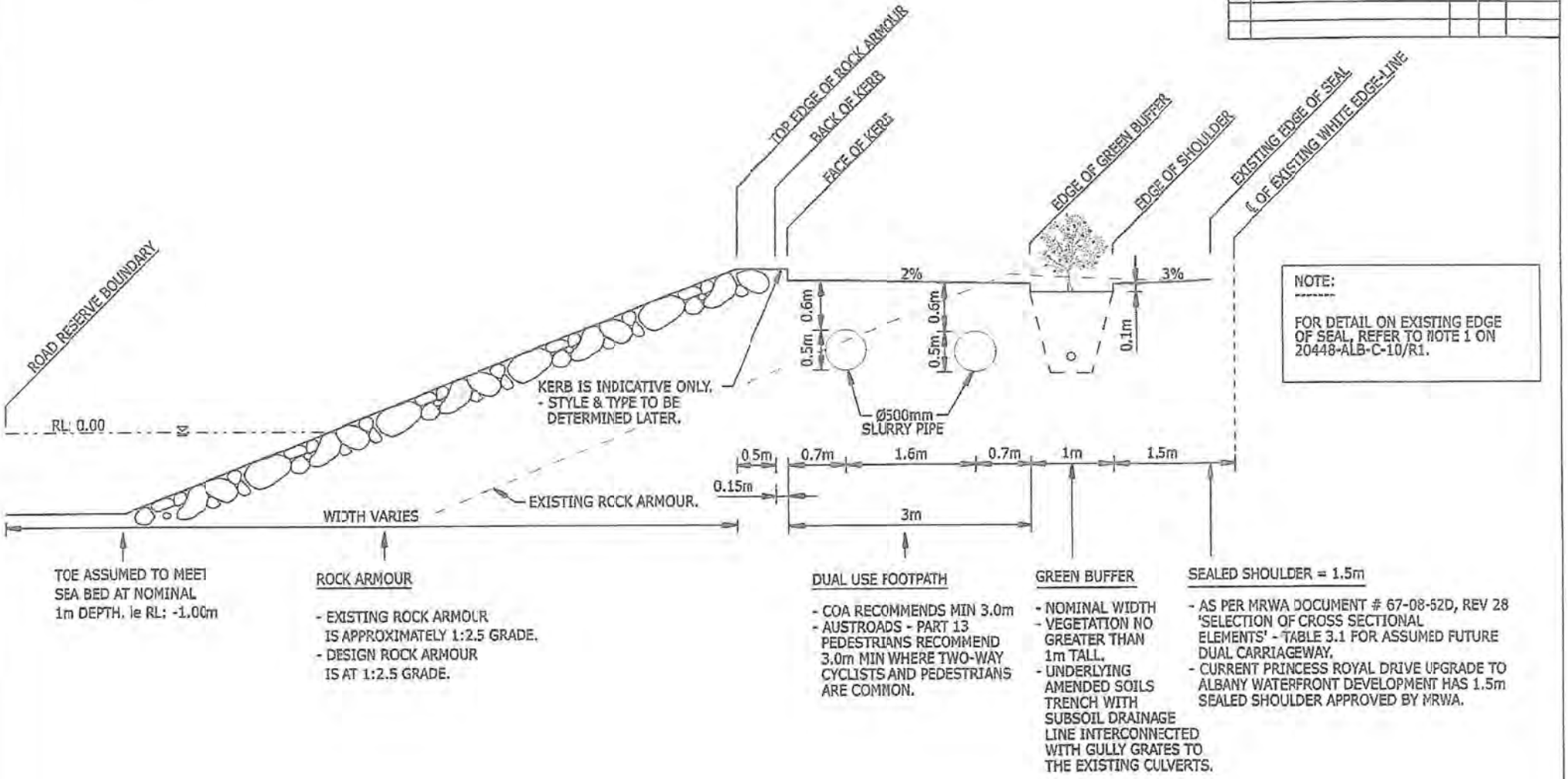

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FIGURE 7

SLURRY PIPELINE PREFERRED EMBANKMENT WIDENING OPTION (OPTION A)

WOOD & GREEVE ENGINEERS

CLIENT: GRANGE RESOURCES

PROJECT: PROPOSED SLURRY PIPELINE - PHASE 2

TITLE: APPENDIX A
TYPICAL BATTER CROSS SECTION

20448-ALB-C-10/R4 A

REPORT ITEM DIS109 REFERS

5 Suitability of existing roads and opportunities for cycle infrastructure improvements

This section provides an assessment of the existing roads with regards to their suitability for cyclists of different confidence levels as well as exploring opportunities and constraints for the provision of on-road and off-road cycle infrastructure.

These are then graphically represented in Figures 8 and 9 giving an overall picture of the opportunities and constraints within the study area for providing routes for both confident and less confident cyclists.

This then forms the basis for the development of the proposed options in Section 6.

5.1 Hanrahan Road – Princess Royal Drive

Apart from the section with the recently completed cycle lanes the existing road is clearly unsuitable as a proposed route for cyclists of all confidence levels with even the most experienced and confident feeling unsafe.

It would be possible to extend the recently constructed cycle lanes westward up to the existing sealed shoulders on Hanrahan Road. This would require some further modification to the existing kerb lines as well as the median islands at the intersection with Frenchman Bay Road. Relocation of some power poles may also be required.

Providing for cyclists east of Festing Street where Princess Royal Drive crosses the rail line would require the widening of the existing bridge, or construction of separate cycle bridges and approach embankments, and is not considered feasible due to the great cost of such works.

Along the embankment between the rail bridge and Anzac Peace Park the existing road shoulder could be sealed to provide 1.5m cycle lanes.

The opportunities discussed above are relevant for confident cyclists only. Provision for less confident ones is discussed below.

A shared path could be constructed along either verge of Hanrahan Road from north of the entrance to the CSBP fertiliser works to the intersection with Frenchman Bay Road. This could then be continued along the northern side of Princess Royal Drive through to Carlisle Street. Between Carlisle Street and Festing Street the steep drop offs on the south side of the road make the provision of an off-road path not feasible. On the north side the ground rises steeply in places and would require the construction of some sizeable retaining structures as well as the need to place the existing power lines underground. Although feasible the cost of this work would be expensive and the path would be located up against the kerb with little separation from adjacent traffic.

East of Festing Street the rail line again provides a barrier to the provision of facilities for less confident cyclists as described above.

East of the rail line a shared path could be constructed along either side of Princess Royal Drive with little modification required to provide one on the north side of the road reserve. However substantial widening of the existing embankment and sea wall would be required for a path on the south side of the road. This proposal was investigated as part of the Albany Harbours Dual Use Path Planning Strategy as discussed in Section 4.1. However it was not considered feasible due to the great expense involved.
As discussed in Section 4.3, a path to the south side of Princess Royal Drive will be provided by Grange Resources as part of the construction of the slurry pipelines.

5.2 Carlisle Street

Although it is the most direct route between Frenchman Bay Road and the CBD, avoiding continuing along Princess Royal Drive, its steep grade combined with relatively high traffic volume and 60km/h speed limit make Carlisle Street unattractive for all but the most confident cyclists.

Between Princess Royal Drive and the Castle Street road reserve, the ground slopes steeply on either side making it unfeasible to widen the road to provide cycle lanes or off-road cycle facilities. Between Castle Street and Grey Street West the road levels out and an opportunity exists to construct an off-road path along the verge/bush on the north side of the road.

Most of the land to the north of Carlisle Street is unallocated Crown Land. It would be feasible to construct an off-road path through this Crown Land, as well as utilising a section of the Carlisle Street verge at the top of the hill, down to the intersection of Princess Royal Drive and the unconstructed section of the Grey Street West road reserve, a distance of 600m. The level difference between these two points is 29m resulting in a constant grade of about 5%. This is slightly steeper than what would be considered acceptable.

However, to the north of the Grey Street West road reserve is Lot 893 Hanrahan Road. Located within this lot are a number of decommissioned oil storage tanks. By utilising Lot 893 the shared path could be taken through to the intersection of Princess Royal Drive and Frenchman Bay Road. This would extend the length of the path to 700m reducing its grade to a more acceptable 4%. As Lot 893 is privately owned an agreement with the landowner would need to made if a path is to be constructed through the lot.

5.3 Festing Street

With low traffic volumes and gentle grade for most of its length the existing road is suitable for cyclists with higher confidence levels without modification. The steep grade west of Parade Street makes the section between Parade Street and Melville Street unsuitable for less confident riders. A reduction in the speed of traffic more in line with the existing speed limit would also be beneficial.

5.4 Frenchman Bay Road

The Cycle City Albany 2014-2019 Strategy recommended installing 1.5m wide cycle lanes along both sides of Frenchman Road (Sections 1.5.12 and project no.32 in Appendix F of the Strategy). This would provide an ideal facility for more confident riders. For the first 300m north from Woolstores Place providing the lanes is a simple case of widening and sealing the existing road shoulders. Where the lanes approach the intersection with Lower Denmark Road and Hanrahan Road the existing kerbs will need moving to provide adequate width for cycle lanes as well as the traffic lanes. Reducing the number of traffic lanes to accommodate the cycle lanes shouldn't be considered feasible as this would impact on the capacity of the intersections to function adequately. Amendments to the rail crossing would also be required.

For less confident cyclists there is ample room within the verge on the eastern side of Frenchman Bay Road to continue the existing shared path from south of Woolstores Place up to Princess Royal Drive. A suitable rail crossing would need to be provided adjacent to the existing road level-crossing. With Woolstores Place having such low traffic volumes and with the existing path terminating some 35m from the hold line with Frenchman Bay Road there would be an opportunity to provide a priority shared path crossing across Woolstores Place.

5.5 Grey Street West

- ***Princess Royal Drive to Spearwood Road***

  The steep grade means this section of Grey Street is unsuitable as a cycle route even if a road or surfaced path were to be constructed.

- ***Spearwood Road to Carlisle Street***

  The existing gravel surface makes the current road unsuitable as a route for cyclists of all confidence levels. Even if sealed the steep grade would not suit less confident cyclists and should not be considered suitable as an option.

- ***Carlisle Street to Collie Street***

  With its fairly level grade and generous widths, this section of Grey Street West provides an ideal environment for confident cyclists but less confident ones may find the higher traffic speeds west of Parade Street intimidating.

  The Cycle City Albany Strategy recommends that cycle lanes be provided in both directions between York Street and Collie Street and that a westbound only cycle lane is installed between Collie Street and Melville Street to allow cyclists to climb the hill with protection from vehicle conflicts.

  The generous road and verge width between Collie Street and Bay Street coupled with the lack of parking demand provides an opportunity for the construction of an off-road shared path or two-way separated cycle path for use by less confident cyclists along the northern side of this section of Grey Street West.

  West of Bay Street the Cycle Strategy proposes using the service road along the south side of Grey Street West as a two-way cycle route. Although feasible it requires east bound cyclists to cross over Grey Street West twice creating a discontinuous route. Although no other option exists within the road reserve along this section, due to the steep topography of the land either side, there is an opportunity for a path through the existing bushland immediately to the north. Behind the embankment upon which the power poles are located are what appear to be three old pits, possibly used for quarrying rock. By connecting these pits together a shared path of suitable width and level gradient could be constructed all the way through to Maxwell Street. The path would need to pass over the existing above ground water main near Bay Street on a suitable structure or the main be placed underground.

5.6 Lower Denmark Road

The relatively high speed limit and traffic volumes result in the existing road being unsuitable for all but the most confident cyclists.

Scope exists to widen the road to provide 1.5m wide cycle lanes or sealed shoulders as recommended in section 1.5.11 (project 28 in Appendix F) of the Cycle City of Albany Strategy. Widening on the north side only would remove the need to construct piped drainage on the south side, which would be an expensive exercise over such a distance.

5.7 Vancouver Street

With low traffic volumes and speeds, along with gentle gradients Vancouver Street in its existing form is suitable for cyclists of all confidence levels.

5.8 Woolstores Place

The low traffic volumes and flat grade make Woolstores Place, between Frenchman Bay Road and the gate at the entrance to the wool stores ideal for cyclists of all confidence levels. Beyond the gate, reconstruction of the road or construction of a shared path would be required to provide a suitable running surface.

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OPPORTUNITIES AND CONSTRAINTS ROUTES FOR CONFIDENT CYCLISTS

NOT TO SCALE

FIGURE 8

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OPPORTUNITIES AND CONSTRAINTS ROUTES FOR LESS CONFIDENT CYCLISTS

NOT TO SCALE

FIGURE 9

6 Options for cycle infrastructure improvements

This section details the possible options for routes for cyclists of different confidence levels which are also shown in Figures 10 and 11.

6.1 Route for confident cyclists

Figure 10 illustrates a proposed route for confident cyclists including modifications to the existing road network where required.

Proposals include:

- Cycle lanes (1.5m wide) on both sides of Lower Denmark Road between Frenchman Bay Road and the end of the kerbed section. These would then tie into the sealed shoulders that are proposed for Lower Denmark Road within the Cycle City Albany Strategy.
- Cycle lanes (1.5m wide) along both sides of Frenchman Bay Road from a point south of Woolstores Place up to Princess Royal Drive with “green lane” treatments across the intersections of Woolstores Place, Ware Road and Lower Denmark Road. Adjustments to the existing rail crossing will be required to accommodate the additional carriageway width. Where there are 2 traffic lanes in either direction these could be reduced to 3.25m each meaning that the resulting carriageway widening would be less than 1m.
- Cycle lanes (1.5m wide) along Hanrahan Road and Princess Royal Drive from the end of the existing sealed shoulders, north of the entrance to CSBP fertiliser works, to a point 180m east of Frenchman Bay Road. These would tie in with the recently constructed cycle lanes on Princess Royal Drive.
- Utilising the existing Festing Street roadway to avoid the narrow bridge on Princess Royal Drive. This route along Festing Street should be signed from Princess Royal Drive at its intersection with Festing Street and Residency Road to encourage cyclists, especially those unfamiliar with the area to use it.
- Sealed shoulders (1.5m-2.0m wide) on Princess Royal Drive between Residency Road and a point to the east of the bridge approach ramp. It would be possible to designate these as cycle lanes. However, this is not being proposed as it would promote the use of this section of Princess Royal Drive by all cyclists and bring them to a point where they had no option but to run the gauntlet of crossing the rail line on the narrow bridge. Sealed shoulders however will provide a safer road for those riders who choose to use this section of Princess Royal Drive without encouraging its use as a recommended cycle route.

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RECOMMENDED ROUTE FOR CONFIDENT CYCLISTS

NOT TO SCALE

FIGURE 10

6.2 Route options for less confident cyclists.

6.2.1 Option 1

This option is 2.6km in length and is shown in its entirety in Figure 11. It is then illustrated in more detail in Figures 12, 13 and 14. It proposes the construction of an off-road shared path along the southeast side of Frenchman Bay Road from the end of the existing shared path at Woolstores Place, across the rail line and up to Princess Royal Drive. This then crosses Princess Royal Drive, runs through the existing Wesfarmers/CSBP land (Lot 893 Hanrahan Road) and unallocated crown land up to the top of Carlisle Street at a gradient of 4%. It then continues along the verge/bush on the north side of Carlisle Street and Grey Street West through to Melville Street. From here, the path continues along the north side of Grey Street West through to Collie Street but becomes a separate cycle/pedestrian facility rather than a shared one. Beyond Collie Street the path would tie into cycle routes being considered for the CBD although further work is required regarding their development.

Option 1 provides a direct link to the heart of the CBD, terminating close to the library, Town Hall and newly developed Town Square. It also compliments proposals to relocate the Visitors Centre from the current location at the old railway station to the Library.

The alignment provides a route that is sheltered from the elements where it passes through the bushland to the north of Grey Street West and Carlisle Street, where there are also opportunities to provide scenic views over Princess Royal Harbour.

Careful design of the section from Princess Royal Drive to the top of Carlisle Street is essential to ensure a constant gentle grade is achieved. The City has undertaken a topographical survey of this section to confirm that a constant grade of 4% can be achieved avoiding residential properties and rock outcrops. A retaining structure would be required where the route passes in front of 273 Grey Street West and over the existing water main.

The alignment of the route provides an opportunity for it to be used by both the Munda Biddi Trail and Bibbulmun track avoiding the less than desirable current alignments along Woolstores Place and Princess Royal Drive as well as a much improved rail crossing.

The alignment of Option 1 does require the crossing of both the rail line and Princess Royal Drive and careful selection of crossing type and location is required to achieve the best outcome for path users. Discussions are ongoing with Main Roads WA and Public Transport Authority / Brookfield Rail regarding these issues.

Where the route runs along the north side of Grey Street West between Collie Street and Parade Street there would be a loss of 13 parking spaces. These spaces are rarely fully utilised and drivers could still park within the parking bays on the south side of Grey Street West.

6.2.2 Option 2

This option is similar to one of the routes investigated as part of the Albany Harbours Dual Use Path Planning Strategy and is 2.5km in length. It was originally considered as being unfeasible due to the great expense of widening the embankment and sea wall south of Princess Royal Drive. However, as discussed in Section 4.3, Grange Resources have committed to constructing a 3.0m wide shared path on top of the route of the pipeline between the ANZAC Peace Park and a point west of Melville Point.

The remainder of the route would need to be constructed / funded separately to the Grange Resources section but should be built at the same time so as to provide a continuous route between Frenchman Bay Road and the Peace Park.

Between the Grange Resources pipeline section and Woolstores Place, the path would run to the south of the existing rail line outside the rail corridor and then around the south side of the wool stores. It would continue along the western side of the wool stores, within the unconstructed road reserve, before joining Woolstores Place west of the existing gate. The section along Woolstores Place could use the existing roadway between the gate and the existing path along Frenchman Bay Road. The section along the southern edge of the wool stores would require the widening of the existing embankment and reconstruction of the sea wall which is in poor condition. However, any future development of the wool stores site should include for a shared path to be provided.

The alignment of option 2 maintains a level grade except for the section over Point Melville. It is a desirable route for tourists as it provides outstanding views of Princess Royal Harbour to the south, although the section past the wool stores is unsightly in its current state, and links in to the ANZAC Peace Park at its western end. However, its location along the shores of the harbour mean it will be exposed to the worst of the weather and even moderate winds will make riding more challenging.

The route doesn't require a crossing of the rail line or Princess Royal Drive, although path users travelling to/from the CBD will need to cross both at some point. Also the alignment doesn't provide good connectivity for cyclists travelling to/from CBD locations west of Parade Street as they have to back track to the east.

It should be noted that if Grange Resources do not construct the slurry pipeline then the cost of building this option will be prohibitive.

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ROUTE OPTIONS FOR LESS CONFIDENT CYCLISTS

NOT TO SCALE

FIGURE 11

NEW RAIL CROSSING IN CONSULTATION WITH RAIL AUTHORITY.

CROSSING OF PRINCESS ROYAL DRIVE. EXACT LOCATION TO BE DETERMINED IN CONSULTATION WITH MRWA

LOWER DENMARK ROAD

HANRAHAN ROAD

4% GRADE

<3% GRADE

3.0m WIDE SHARED PATH. GRADIENT 4%.

WARE ROAD

BAY ROAD

PRINCESS ROYAL DRIVE

JOIN LINE - JOINS FIGURE

3.0m WIDE SHARED PATH.

PATH THROUGH PRIVATE LAND. EASEMENT OR ACQUISITION REQUIRED.

FRENCHMAN

EXISTING 2.0m WIDE SHARED PATH TO LITTLE GROVE.

PRIORITY CROSSING TREATMENT ACROSS WOOLSTORES PLACE.

WOOLSTORES PLACE

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OPTION 1 - DETAILED ASSESSMENT
(SHEET 1 OF 3)

SCALE 1:2500

FIGURE 12

3.0m WIDE SHARED PATH THROUGH CROWN LAND. GRADIENT 4%.

JOIN LINE - JOINS FIGURE 3

GREY STREET WEST

MAXWELL STREET

START OF 4% GRADE

<3% GRADE

CARLISLE STREET

SHARED PATH PRIORITY CROSSING ACROSS MAXWELL STREET.

3.0m SHARED PATH THROUGH CITY OF ALBANY LAND.

SHARED PATH PRIORITY CROSSING TREATMENT OR CLOSE ROAD.

PRINCESS ROYAL DRIVE

RETAINING STRUCTURE REQUIRED IN FRONT OF PROPERTY.

GREY STREET WEST

JOIN LINE - JOINS FIGURE 5

GREY

PATH TO CROSS OVER WATER MAIN. STRUCTURE REQUIRED OR MAIN PLACED UNDERGROUND.

BAY STREET

FESTING STREET

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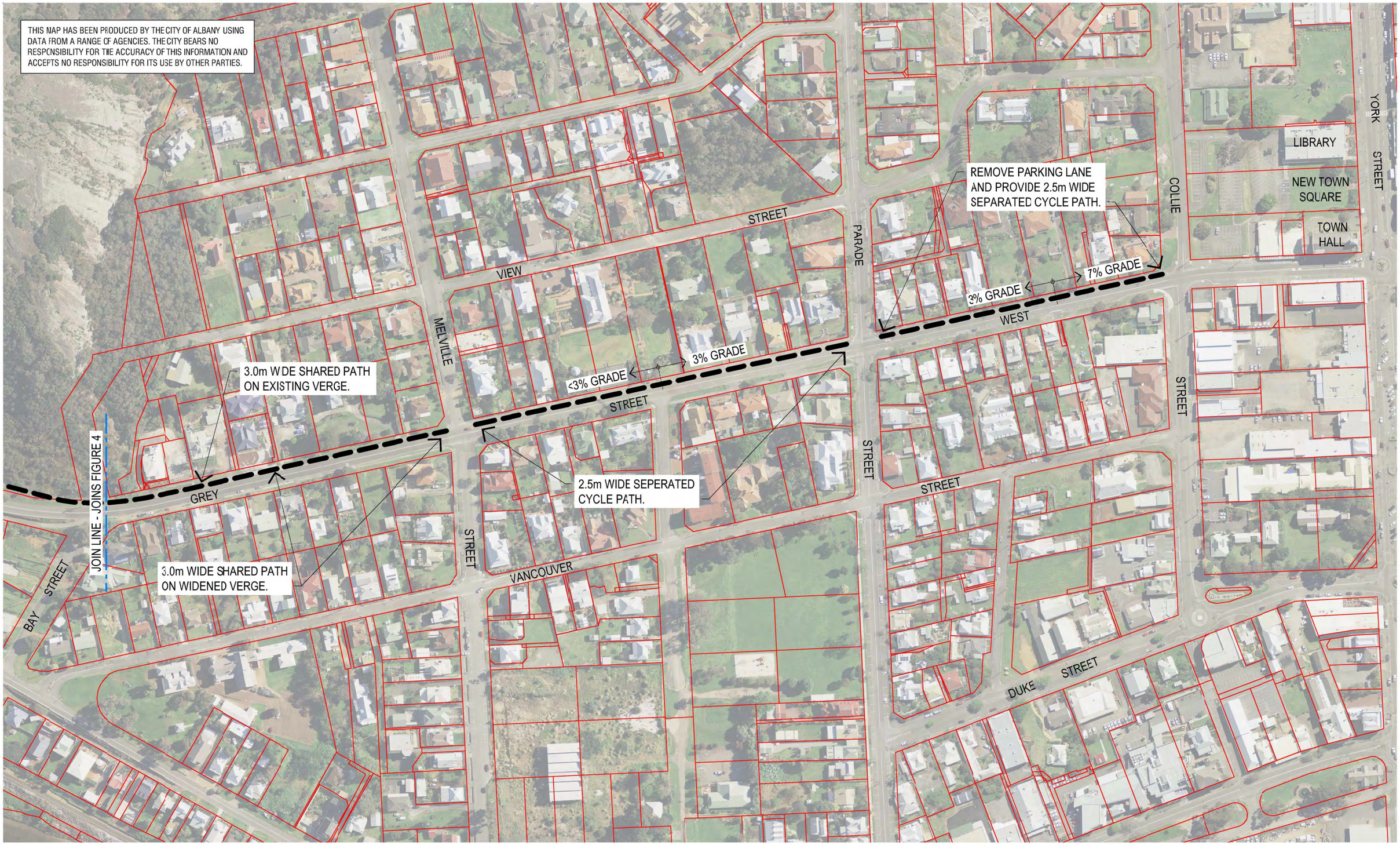
OPTION 1 DETAIL ASSESSMENT
(SHEET 2 OF 3)

SCALE 1:2500

FIGURE 13



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OPTION 1 DETAIL ASSESSMENT
(SHEET 3 OF 3)

SCALE 1:2500

FIGURE 14

7 Stakeholder Engagement

In May 2015 City of Albany formed a Working Group with representatives from a variety of stakeholders including:

- Albany Bicycle User Group (ABUG)
- Albany Cycle Club (ACC)
- Brookfield Rail
- Department of Transport
- Grange Resources
- Main Roads WA (MRWA)
- Over 50's Cycle Group

The Working Group was tasked with providing advice for the feasibility study and was responsible for:

- Providing local advice to the City of Albany on proposed strategies for improvements.
- Ensuring all views are appropriately represented during the developmental phase.
- Providing guidance and assistance in regards to communication and consultation with stakeholders.
- Providing advice and assist with the collection of data and local contextual information, as requested.

A workshop/presentation was held at the City of Albany offices on 12 May 2015 and the group was presented with, and discussed, the various draft options and recommended routes. Plans were provided for comment and the group also undertook a site visit. Feedback was received and incorporated into a draft report.

The working group met once again in June 2015 and were presented with the draft report for further comment. The feedback from the various stakeholder groups is included in Appendix C.

8 Recommendations

The recommendations listed below are subject to any necessary approvals and funding and being made available.

8.1 Route for Confident Cyclists

8.1.1 Short Term (within 12 months)

It is recommended that:

- Signage is installed on Princess Royal Drive at the intersections of Festing Street and Residency Road to encourage cyclists to use Festing Street as an alternative to crossing the rail line using the narrow bridge on Princess Royal Drive.
- City of Albany undertake design of cycle lanes (1.5m wide) on Frenchman Bay Road from Princess Royal Drive up to and including the intersection of Woolstores Place.
- City of Albany liaise with Public Transport Authority and Brookfield Rail regarding modifications to the existing rail crossing that will be required from widening Frenchman Bay Road to accommodate proposed cycle lanes.
- City of Albany undertake design of cycle lanes (1.5m wide) on Lower Denmark Road from the intersection of Frenchman Bay Road to the end of the kerbed section (500m).

8.1.2 Medium term (1-3 years)

It is recommended that:

- MRWA construct cycle lanes (1.5m wide) on both sides of Hanrahan Road, from the end of the existing sealed shoulders through to the recently constructed cycle lanes on Princess Royal Drive shown in Figure 3.
- MRWA provide sealed shoulders (1.5m-2.0m wide) between Residency Road and the start of the rail bridge approach embankment.
- MRWA review the existing 70km/h speed limit on Princess Royal Drive following implementation of the cycle lanes.
- City of Albany construct cycle lanes (1.5m wide) along Frenchman Bay Road from Princess Royal Drive up to and including the intersection with Woolstores Place.
- City of Albany constructs cycle lanes (1.5m wide) on both sides of Lower Denmark Road from Frenchman Bay Road up to the end of the kerbed section (500m).

8.1.3 Long Term

It is recommended that:

- MRWA include on-road sealed shoulders / cycle lanes in the design and construction of the Albany Ring Road as shown in Figure 5 and that these are continued along Princess Royal Drive through to York Street.
- MRWA include cycle lanes (1.5m wide) on the realigned sections of Lower Denmark Road, Frenchman Bay Road and Hanrahan Road as part of the Albany Ring Road construction.

8.2 Routes for Less Confident Cyclists

8.2.1 Short Term (within 12 months)

It is recommended that:

- City of Albany undertake design and obtain necessary approvals for route Option 1 as shown in Figure 11 and in more detail in Figures 12,13 and 14.

8.2.2 Medium Term (1-3 years)

It is recommended that:

- (2016-17) City of Albany undertakes construction of route Option 1 from Woolstores Place through to Castle Street, a distance of 1.3km.
- (2017-18) City of Albany undertakes construction of route Option 1 from Castle Street through to Collie Street, a distance of 1.3km.
- City of Albany investigates designs for the section of route Option 2 from Frenchman Bay Road through to the section being undertaken by Grange Resources.

8.2.3 Long Term

It is recommended that:

- MRWA include shared paths in the construction of the Albany Ring Road as shown in Figure 6.
- A shared path is included alongside the realignment of Carlisle Street, as shown in Figure 6, to tie in with the shared path shown in route Option 1.
- Grange Resources construct a 3m wide shared path at the same time as, and along the alignment of, the proposed slurry pipeline from Anzac Peace Park through to where the pipeline crosses to the north of the rail line, west of Melville Point as shown in Figure 11 (route Option 2).
- City of Albany construct the remaining section of route Option 2 as shown in Figure 11.

Appendices

Appendix A – Extracts from Cycle City Albany 2014-2019 Strategy

1.5.9 Hanrahan Road/Princess Royal Drive

Hanrahan Road and Princess Royal Drive form the current road train route to/from the Port. However they also form part of popular cycling routes. Princess Royal Drive, between Frenchman Bay Road and Carlisle Street, is also the only cycling access between Albany Central Area and Lower Denmark and Frenchman Bay Roads, making it a critically important link in the network. It is traversed by a wide range of cyclists – mountain bikers, medium confidence level riders (e.g. the Over 50's cycle club), experienced cyclists (e.g. road riders) as well as walkers following the Bibbulmun Track and more recently Munda Biddi riders.

Currently, some cyclists use informal routes to avoid the risk of interacting with heavy vehicle traffic. Informal routes used by less confident cyclists include the use of Woolstores Place and private land to cross the railway line and enter Princess Royal Drive via the driveway east of Carlisle Street. These routes, aside from traversing private property, involve dismounting to cross the railway line and the risk of injury and damage to bicycles.

The community consultation process identified that Princess Royal Drive/Hanrahan Road was one of the most significant areas for improvement and an additional 66 responses specifically commented on safety issues on Princess Royal Drive/ Woolstores/Frenchman Bay Road. (See Appendix A and C)

East of Carlisle Street, cyclists are forced to ride on the road carriageway. This section is narrow, with an unbroken centreline, and a crest at the railway bridge, which creates a significant pinch point.

Hanrahan Road has sealed shoulders along most of its length and, whilst rougher than desirable, these are generally adequate. However, at the northern end of Hanrahan Road, the shoulders disappear, leaving cyclists to mix with traffic in very wide lanes

At the southern end of Hanrahan Road, the cycle lanes disappear at the entrance to the CSBP plant. From this point onwards, cyclists are required to ride in the traffic lane, mixing with road trains and general traffic. In many locations, e.g. between Carlisle Street and Festing Street, and at the railway bridge, there is insufficient width for vehicles to pass safely, particularly road trains, which results in a very dangerous situation for cyclists.

Project	Hanrahan Road / Princess Royal Drive
Responsibility	Main Roads
Reference	56,57,58
Links to Objectives	Cycle Tourism, Cycling Network, Safety and Respect for all Users
Possible Solutions / Treatments	It is recommended that the northbound sealed shoulders on Hanrahan Road be continued through the Menzies Street intersection as far as Parker Street, where an optional path transition should be provided. For southbound cyclists, the existing sealed shoulders should be extended north from Menzies Street as far as Parker Street, with a 45 degree connection provided from the existing path Both these recommendations could be achieved by adjustments to line-marking only. Fixing the section of road, particularly between Frenchman Bay Road and Festing Street, is considered to be one of the highest priority cycling works due to the inherent risks associated with the existing environment. There is no easy fix solution, though some short term improvements are possible. Short term improvements may include the provision of paths, changes to line-marking, and/or signage to manage conflicts between road users until an ultimate solution can be implemented. The ultimate solution for this section requires significant engineering investigation, and is therefore outside of the scope of this Strategy. However, several preliminary options have been considered at a strategic level and an indicative solution at this time consists of: Mixed traffic operation along Woolstores Place New shared path along the western boundary of the Woolstores site 3.5m wide shared path, on a combined bridge/pontoon structure, from Woolstores to Anzac Peace Park. This structure should have several lookout bays constructed at particularly scenic locations to cater for pedestrians admiring the scenery Investigation into the most appropriate route to cater for less confident cyclists between Anzac Peace Park and the beginning of the shared path at Bridges Street. This option is expected to accommodate most cyclist types, however very experienced road riders may continue using Princess Royal Drive.
Recommendations	
Short	A comprehensive Feasibility Study, lead by the City to determine a preferred suite of short term and long term improvements, with a view to commencing short term improvements in the 2015/16 FY. The study to include the arterial roads into the CBD. On Hanrahan Rd, northbound sealed shoulders be continued through the Menzies Street intersection as far as Parker Street, by adjustments to line-marking only On Hanrahan Rd, southbound, the existing sealed shoulders should be extended north from Menzies Street as far as Parker Street, by adjustments to line-marking with a 45 degree connection provided from the existing path.
Medium	
Long	

1.5.11 Lower Denmark Road

Lower Denmark Road is a popular recreational road riding route, ridden by experienced road cyclists, and recreational cyclists (such as the Over 50s Cycling Club) as well as being a commuter corridor for residents of Elleker and beyond.

The recent installation of kerbing along Lower Denmark Road westward for 500m from Frenchman Bay Road has generated significant feedback from cyclists. They have commented on safety issues as they felt it prevented cyclists from being able to leave the roadway onto the unsealed shoulder. It is noted that the seal is now significantly wider than previously and has been asphalted.

Project	Lower Denmark Road
Responsibility	City of Albany/Main Roads
Reference	27,28,29, 289
Links to Objectives	Cycling Network Safety and Respect for all Users Cycle Participation Cycle Tourism
Possible Solutions / Treatments	Given the number of complaints received about this section of road, and the safety risks due to high traffic volume and high cyclist volume, widening of the carriageway to provide minimum 1.5m wide sealed shoulders is recommended. This work should be extended beyond the end of the kerbed section, taking advantage of the existing unsealed shoulders, as funding permits. Improvement of the George and Robinson Road section would enable cyclists to avoid the section of Lower Denmark Road east of George Street, travelling via Robinson Road instead, until such time that the section east of George Street can have its safety issues addressed. Long term, combined with the previous described work on South Coast Highway, this would open up a long loop ride, as well as potential cycling tourism synergies with the Shire of Denmark. At present the route is generally not suitable for use by all but the most confident cyclists.
Recommendations	
Short	Investigate, as part of the Hanrahan/Princess Royal Drive Feasibility Study, options to improve cycling safety along Lower Denmark Road for 500m. Widening of the carriageway to provide minimum 1.5m wide sealed shoulders between George and Robinson Road, As part of the new Signage Strategy consider: Review of the existing signage along Lower Denmark Road and 'Share the Road' type signage at intervals no greater than 5km, particularly on the approach to pinch points (e.g. uphill grades)
Medium	As part of the Ring Road, Main Roads to consider as per their policy, including cycling infrastructure.
Long	Beyond Robinson Road, and beyond Elleker, it is recommended that Lower Denmark Road progressively be widened to provide a minimum 1.5m wide sealed shoulders in both directions. With the completion of Albany Ring Road, review the use of existing road for local access and encourage cycling from George Street to Frenchman Bay Road.

Reference Number	Details	Indicative Cost at 2014
26 	Street Name: South Coast Hwy; From: George St; To: City Boundary Type: On-road; Surface: Chip seal; Width: 2.0; Length: 35,000.0; Area: 70000; Rating %: 48.00 Priority: Long; Comments/Actions: Widen and seal shoulders (MRWA)	$7,000,000
27 	Street Name: Lower Denmark Rd; From: George St; To: Robinson Rd Type: On-road; Surface: Chip seal; Width: 1.5; Length: 1,000.0; Area: 1500; Rating %: 58.00 Priority: Short; Comments/Actions: Widen and seal shoulders	$180,000
28 	Street Name: Lower Denmark Rd; From: Frenchman Bay Rd; To: George St Type: On-road; Surface: Chip seal; Width: 1.5; Length: 4,400.0; Area: 6600; Rating %: 58.00 Priority: Short; Comments/Actions: Widen and seal shoulders	$800,000
28a	Street Name: Lower Denmark Rd; From: Frenchman Bay Rd; To: 5km west Type: On-road; Surface: ; Width: ; Length: 5,000.0; Area: ; Rating %: Priority: Short; Comments/Actions: Review signage, install symbols,	$10,000

Reference Number	Details	Indicative Cost at 2014
55a	Street Name: Albany Hwy; From: Chester Pass Rd; To: York St Type: On-road; Surface: Asphalt; Width: 1.5; Length: 2,500.0; Area: 3750; Rating %: 76.00 Priority: Medium; Comments/Actions: Investigate on road cycle lanes	
55b	Street Name: Albany Hwy; From: Chester Pass Rd; To: York St Type: Shared; Surface: Asphalt; Width: 2.5; Length: 2,500.0; Area: 6250; Rating %: 80.00 Priority: Short; Comments/Actions: Construct 2.5m wide asphalt shared path	$710,000
56 	Street Name: Hanrahan Rd; From: Albany Hwy; To: Frenchman Bay Rd Type: On-road; Surface: ; Width: ; Length: ; Area: ; Rating %: 78.00 Priority: Short; Comments/Actions: Linemark to provide sealed shoulder for cyclists MRWA)	$12,000
57 	Street Name: Princess Royal Dr; From: Frenchman Bay Rd; To: York St Type: Shared; Surface: ; Width: ; Length: 800.0; Area: 0; Rating %: 66.00 Priority: Short; Comments/Actions: Feasibility Study into best options (MRWA)	$80,000

Reference Number	Details	Indicative Cost at 2014

58

Street Name		From		To	
Princess Royal Dr		Railway Bridge		York St	
Type	Surface	Width	Length	Area	Rating %
On-road			1,200.0	0	56.00
Priority	Comments/Actions				
Short	Feasibility Study into best options MRWA)				

60

Street Name		From		To	
Elizabeth St		Paul Terry Dr		The Esplanade	
Type	Surface	Width	Length	Area	Rating %
Shared	Asphalt	2.5	900.0	2250	62.00
Priority	Comments/Actions				
Long					

$260,000

61

Street Name		From		To	
Paul Terry Dr (future extension)		Berliner St		Flinders Park Primary	
Type	Surface	Width	Length	Area	Rating %
Shared	Asphalt	2.5	2,000.0	5000	61.00
Priority	Comments/Actions				
Long	Condition of subdivisional development				

63

Street Name		From		To	
Warden Ave		Collingwood Rd		Hardie Rd	
Type	Surface	Width	Length	Area	Rating %
Shared	Asphalt	2.5	650.0	1625	69.00
Priority	Comments/Actions				
Short	Construction of shared path - western side				

$185,000

Appendix B – Extracts from Albany Harbours Dual Use Path Planning Strategy

Page	Section No and title	Extract
7	2 Background	*This report is not about the selection of a route for commuter cyclists. It is about selecting the best alignment for a path which will have a multitude of users. Therefore the width, grade, elevation, alignment, surface material and 'all-weather useability' of the path needs to be appropriate for the range of probable users.*
8	3.1 Community Consultation	*A public workshop held in Albany on 23 August 1994 (under the auspices of the Albany Regional Alternative Transport Taskforce) elicited many comments about walking and cycling in Albany, from the 70+ residents who attended. As a result of that public workshop, a list of proposals, suggestions and ideas about new facilities was compiled, including:* *• greater education needed for all road users (motorists and cyclists) and dual use path users (pedestrians and cyclists)* *• better parking facilities required for cyclists* *• better signage needed along dual use paths and other trails* *• need to establish a comprehensive network of dual use paths, including the continuation of the establishment of the dual use path from Lower King through the town to Frenchman Bay (ie. around the harbours)* *• wider paths needed* *• high speed commuter cyclist routes needed on major roads* *• rest areas along paths are required* *• all further work should be properly planned, with more community involvement in the planning* *• concern over impact that future dual use paths may have on wildlife habitat at Rushy Point*
21	4.10 Issues	*Alternative routes should be provided for certain users (eg. 'commuter' type cyclists) who have the potential for high speed, which may not be appropriate in an environment more suited for recreational pursuits. High speed cyclists require high standard, direct routes and will usually not use a foreshore dual use path or trail if a better (usually on-road) alternative exists.*
22	4.12 Issues	*Though the path will be constructed close to the foreshore of the harbours, and will be many kilometres in length, the alignment and location of the path should service nearby educational, commercial and residential activities - both existing and proposed. The foreshore dual use path should connect with the existing dual use path network, other (on-road) cycle routes and pedestrian paths, and should take into account dual use paths proposed within future urban development areas.*
25	5.3 Environmental Review	*The consultants concur with AWMA's recommendations for DUPs and pathways in foreshore areas and concluded that:* *(i) a multi-use Trail can be constructed between the Wool Stores and Harding Road with minimal environmental impacts along the foreshore and wildlife; and* *(ii) (ii) a commuter-style DUP should be developed along Frenchman Bay Road and Woolstores Place as the obvious extension of the existing DUP.*

27	5.4 Environmental Review	*Foreshore Area 2 - The **Wool Stores to the Town Centre*** *The consultants noted that most of the foreshore vegetation has been cleared in this area and almost all of that remaining is Salt-marsh vegetation. In recommending an alignment for a dual use path through this area, the consultants believe the obvious west to east alignment for a DUP, 2.5 m wide and commencing at the eastern end of Woolstores Place, is along the rear of the Wool Stores, through Reserve 22837 (for Railway Purposes) and parallel to Princess Royal Drive to the Albany Town Centre. This alignment is fairly direct, involves only small gradients and over most of its route offers attractive vistas south across Princess Royal Harbour.* *The consultants made the following observations:* • *Reserve 22837 appears to include at least two railway tracks which are overgrown by bush and grass. Much of the reserve is bordered on the south side by a narrow strip of bush, up to 3mhigh;* • *the railway line cutting, which is crossed by Princess Royal Drive, offers a more direct and easier alignment than an alternative to the south around Melville Point;* • *the feasibility of constructing a DUP, fully protected by a strong mesh fence from railway traffic, on the south side of the cutting should be investigated, with consideration being given, if necessary, to widening of the cutting or raising the DUP well above the railway line;* • *the foreshore, which adjoins Princess Royal Drive on the eastern side of the cutting, is very exposed to the elements between Melville Point and Residency Road and hence a DUP aligned to the north of that major road would provide more protection;* • *the land on both sides of the two foreshore lakes appears suitable for development of a DUP, with most of that on the northern side of the larger lake being Vacant Crown Land, Reserve 6791 and Road Reserve, and freehold areas being Exempt for Sale (presumably available for acquisition, in whole or part, through the planning process); and* • *a DUP, if aligned next to the two foreshore lakes and close to the replica of the Brig Amity near Residency Road, would have a most attractive setting and provide many superb vistas across the foreshore, over Princess Royal Harbour and towards the Town Centre.*
39	6.8 Alternative Alignments	***York Street to Wool Stores*** *Between York Street and the Wool Stores three alternative alignment options exist, each with components which could be included in other options.*
39 & 40	6.8.1 Alternative Alignments	*South side Princess Royal Drive* *This alignment utilises the (currently) narrow section of road shoulder between Princess Royal Drive and Princess Royal Harbour. This option makes good sense if the DUP around the northern side of Foreshore Redevelopment Project is used as an integral component of the Albany Harbours DUP. Rather than crossing over to the north side of Princess Royal Drive, it would be logical to keep the DUP on the southern side. Much of the southern verge of Princess Royal Drive, between York Street and the railway cutting, is too narrow in its present state for a dual use path to be*

		constructed along it. As the causeway, upon which Princess Royal Drive is constructed, is fill retained by a rock wall on the Princess Royal Harbour side, it would be possible for the rock retaining wall to be relocated 2 - 3 metres out into Princess Royal Harbour, and backfilled, to create a wider verge upon which a DUP could be constructed. *The DUP would require some structures (eg. boardwalk) through portions of Melville Point. Beyond Melville Point, the alignment would utilise a corridor currently occupied by disused railway tracks on the foreshore side of the operating railway. Minimal clearing of foreshore vegetation would be required along this stretch of the foreshore. The environmental consultants report (for Foreshore Area 2) indicates that two overgrown railway tracks exist in this location.* *It is feasible to follow the railway reserve all the way to Woolstores Place or, alternatively, to utilise a narrow band of vacant crown land on the foreshore side of the reclaimed land upon which the Wool Stores are situated.* *This option of using the southern verge of Princess Royal Drive would be expensive, and the lower costs associated with other possible alignments from York Street to the Wool Stores make this option not feasible.*
41 & 42	6.8.2 Alternative Alignments	*North side Princess Royal Drive* *Between York Street and the Amity replica the DUP alignment would be on the southern side of the Residency Museum, using the wide, grassed forecourt of the Museum grounds, and passing between the Amity and the Museum buildings themselves. Between the Amity and the western-most lake, the path would follow the recently built service road north of Princess Royal Drive, and follow through vacant land up to the eastern edge of the lake.* *The Town of Albany has plans for the modification of the lakes along Princess Royal Drive. It would be possible for works involved in the modifications of the lakes to incorporate a formation / embankment for a dual use path.* *In its current state the northern verge of Princess Royal Drive is sufficiently wide for much of the distance between the lake and the railway cutting for a DUP. At the railway cutting, a structure would be required to swing the path around the embankment to the cutting. Preliminary investigations carried out by Town of Albany staff, in consultation with civil engineers and Westrail, indicates that it is feasible for a path, with necessary safeguards, to be constructed through the cutting.* *On the southern side of the cutting, the DUP would follow the alignment set out is Section 6.8.1. Again, there are choices around the Wool Stores, using either the narrow foreshore reserve (vacant crown land), or following the railway reserve through to Woolstores Place.* *Though not confirmed, there are reports that Main Roads WA has plans for the duplication or widening of Princess Royal Drive (on its northern side). The proposals are, however, long term and would not preclude this option (as any path or structure built now would be available for use for many years until the road project was implemented).*

42	6.8.3 Alternative Alignments	*South side of Railway Reserve* *This option proposes the use of land on the south side of the railway between the eastern end of the lake, and the railway cutting. As the environmental consultants report indicates, the land on the north side of the lake appears suitable for development of a DUP. Most of the land immediately south of, and abutting, the railway reserve is Vacant Crown Land, Reserve 6791 and Road Reserve, and some portions of privately owned land. The freehold areas are Exempt for Sale (presumably available for acquisition, in whole or part, through the planning process).* *As discussed in Section 6.8.2, the Town of Albany has plans for the modification of the lakes along Princess Royal Drive. It would be possible for works involved in the modifications of the lakes to incorporate a formation / embankment for a dual use path on the northern reaches of the lake, to avoid land which is privately owned.* *The environmental consultants also state that this alignment would have a most attractive setting and provide many superb vistas across the foreshore, over Princess Royal Harbour and towards the Town Centre.* *Modification of the lake to create an embankment upon which a dual use path could be constructed would be the most cost effective solution to establishing a path between the Amity and the railway cutting and through the railway cutting.*
52	7 Preferred Alignment	***Preferred Alignment*** *York Street to Wool Stores* *An alignment which utilises the vacant crown land and reserves on the south side of the railway tracks, north of the lake, is the preferred route. The proposed modifications to the lake will provide an opportunity to create a suitable alignment for a DUP on Council controlled land to avoid some private land holdings which exist on the south side of the railway. This alignment provides the best approach and simplest route for utilising the railway cutting under Princess Royal Drive. From the cutting, the preferred route would follow the disused railway tracks to the vicinity of the Wool Stores. At the Wool Stores the DUP should continue following the railway reserve to Woolstores Place.*

Appendix C - Stakeholder Feedback

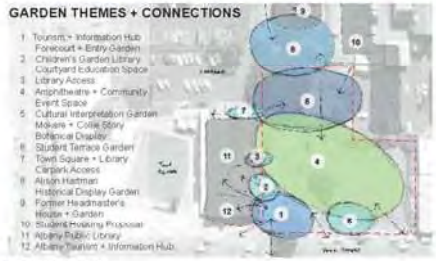
Respondent	Comments
ABUG	ABUG response to the City of Albany, on their report "Mount Elphinstone to CBD Cycle Link Feasibility Study", based on feedback received from ABUG members. ***8.1.1 Confident Cyclists : Short Term (within 12 months)*** 1. *MR extend the proposed 1.5m wide cycle lanes on PRD, eastward to Festing St intersection and include appropriate signage.* Strong support for the improvement of facilities for cyclists who choose to ride on the road. Preference for wider cycle lanes (and associated traffic lane where applicable) where possible, to provide sufficient safe room for cyclists and separation from heavy vehicles, although general acceptance that "something is far better than nothing". Strong Support for review of speed limit to reduce impact of 'buffeting' from heavy vehicles, improve heavy vehicle tracking within lane maximizing offset from cyclist and reduce risk of collision. 2. *Signage be installed on PRD at Festing St and Residency Rd to encourage alternative route to crossing railway line and narrow bridge on PRD.* Strong Support. 3. *COA undertake design of cycle lanes (1.5 m) wide on FBR from PRD up to and including intersection of Woolstores Place.* Strong Support. 4. *COA liaise with PTA and Brookfield regarding modifications to rail crossing to accommodate cycle lanes.* Supported. See additional comments regarding crossing location for less confident cyclists. 5. *COA undertake design of cycle lanes (1.5m wide) on LDR from intersection of FBR for 500m.* Support for rectification of current hazard posed by narrow pavement surface width and high barrier kerb. ***8.1.2 Confident Cyclists : Medium Term (1-3 years)*** 6. *MR construct cycle lanes (1.5m wide) on both sides of Hanrahan Rd from end of existing sealed shoulders through to the currently proposed cycle lanes.* Strong support for the improvement of facilities for cyclists who choose to ride on the road. Preference for wider cycle lanes (and associated traffic lane where applicable) where possible, to provide sufficient safe room for cyclists and separation from heavy vehicles, although general acceptance that "something is far better than nothing". 7. *MR provide sealed shoulders (1.5m-2.0m) between Residency Rd and start of rail bridge.* Support for the improvement of facilities for cyclists who choose to ride on the road. 8. *MR review existing 70km/hr speed limit on PRD following implementation of cycle lanes.* Strong support for review of speed limit through the narrow sections of PRD (FBR to CBD) to reduce impact of 'buffeting' from heavy vehicles, improve heavy vehicle tracking within lane thereby maximizing offset from cyclists and reduce risk of collision.

ABUG (cont...)	9. *COA construct cycle lanes (1.5m wide) along FBR from PRD up to and including intersection with Woolstores Place.* Support for the improvement of facilities for cyclists who choose to ride on the road. Preference for wider cycle lanes (and/or wider associated traffic lane) where possible, to provide sufficient safe room for cyclists and separation from heavy vehicles, although general acceptance that "something is far better than nothing". 10. *COA construct cycle lanes (1.5m wide) on both sides of LDR from FBR to for 500m.* Support for the improvement of facilities for cyclists who choose to ride on the road. Preference for wider cycle lanes (and/or wider associated traffic lane) where possible, to provide sufficient safe room for cyclists and separation from heavy vehicles, although general acceptance that "something is far better than nothing". ***8.1.3 Confident Cyclists : Long Term*** 11. *MR include sealed shoulders/cycle lanes on Albany Ring Road.* Support. Preference for wider cycle lanes (and associated traffic lane where applicable) where possible, to provide sufficient safe room for cyclists and separation from heavy vehicles, although general acceptance that "something is far better than nothing". 12. *COA include cycle lanes (1.5m wide) on both sides of LDR.* Support for the improvement of facilities for cyclists who choose to ride on the road. Preference for wider cycle lanes (and associated traffic lane where applicable) where possible, to provide sufficient safe room for cyclists and separation from heavy vehicles, although general acceptance that "something is far better than nothing". Other Comments: Support for the "confident/less confident cyclist" approach. Some difference of opinion about the naming, but general agreement that; (1) the optimum solution (reflected in international best practice) is for cycle paths that are totally/physically separated from vehicular traffic (where speed is over 30km/h or comprising of high number of heavy vehicles) and pedestrians, but an acknowledgment that; (2) on-road infrastructure (cycle lanes/sealed shoulders) are still required as some cyclists will always choose to ride on-road even if there is a high quality alternative. ***8.2.1 Less Confident Cyclist Short Term (within 12 months)*** 13. *COA undertake design and obtain approvals for Option 1*. Strong support. ABUG recommends the crossing of PRD be separated from the intersection of LDR/PRD (moved east) to reduce risk of car on bike collisions. Also, to achieve the safest crossing of PRD an alternative crossing point over the railway may be desirable (perhaps in the location of the current Munda Bidi crossing). Brookfield Rail should be pressured to accommodate reasonable requests which provide clear net safety gains.

ABUG (cont...)	***8.2.2 Less Confident Cyclist Medium Term (1-3 years)*** 14. *(2016/17) COA undertake construction of Option 1 from Woolstores to Castle St.* Strong Support. 15. *(2017/18)COA undertake construction of Option 1 from Castle St to Collie St.* Strong Support. 16. *COA investigate designs for Option 2 from FBR to the section being undertaken by Grange.* Strong Support and suggestion that the investigation cover Option 2 all the way to the Peace Park. The Grange Project is uncertain and an alternative funding plan should be developed. Even with Option 1 constructed, Option 2 remains a highly desirable link with major tourism (and safety) benefits. Preliminary work should be completed to facilitate the pursuit of funding should the opportunities arise, and allow appropriate development conditions on relevant properties. ***8.2.3 Less Confident Cyclist Long Term*** 17. MR *include shared path construction in Albany Ring Rd.* Strong Support. Cycle paths may also be appropriate. 18. A shared path be included alongside the realignment of Carlisle St, to tie in with the shared path in Option 1. Strong Support. Cycle paths may also be appropriate. 19. *Grange Resources construct a 3m wide shared path at the same time as, and along the alignment of the proposed slurry pipeline from Anzac PP to the north of the rail line.* Strong Support. Furthermore and as per point 16, the Grange Project is uncertain and an alternative funding plan should be developed. Even with Option 1 constructed, Option 2 remains a highly desirable link with major tourism (and safety) benefits. Preliminary work should be completed to facilitate the pursuit of funding should the opportunities arise, and allow appropriate development conditions on relevant properties. 20. *COA construct the remaining section of Option 2.* Strong Support, and further comments about connection to Anzac PP as per 16 and 19.
Albany Cycle Club	We had our committee meeting on Monday night and the committee were fine with everything in the draft report and appreciative for the recommendation in the report to MRWA to provide sealed shoulders between Residency Rd and the start of the Railway bridge approach embankment on Princess Royal Drive. I explained that is only a recommendation and then it'd be up to MRWA to source funding amongst other priorities and the committee understood that. One question was raised however in relation to the signage. In the list of recommendations there is only mention of signage to be installed on the corner of Princess Royal Drive and Festing St & Residency Rd. From my recollection of what you or Andrew Greenwood said at the meeting it was advised that signage was to be recommended to be put in place along the lines of a "Share the Road" message. That is not noted in the recommendations section. Would you please advise where in the draft report that is mentioned or did I get the wrong impression?

Albany Cycle Club (cont...)	In relation to the signage recommended as per the report – there was some concern expressed amongst the committee that with the signage "encouraging cyclists to use Festing St as an alternative to using Princess Royal Drive" that there is potential for motorists to direct abuse at individual cyclists and groups who continue to use Princess Royal Drive after Festing St, as the club proposes to do so re our Thursday morning club rides and other unofficial group & individual rides that occur during the week. We therefore request that the Albany Cycling Club, & other local cycling groups, to be consulted re the wording & look of these proposed signs. If you have any questions in relation to this feedback then please contact me. Regards Paul Terry C/- Albany Cycling Club
Brookfield Rail	The main point which was stated at the Workshop, is that there can be no cycle path within any section of the rail corridor in Albany. All other options which are outside of the rail corridor could be supported. Greater detail would be require if/and when, path routes are agreed and may need to cross rail at dedicated road crossings. At that point BR would consider how this may work and provide all the safety information. Regards Laura Adair Manager Network Lease & Property
Department of Transport	The Department of Transport is very pleased to see community involvement in the process and reasoning behind the design and alignment of paths the community will be using. Subject to receiving favourable response from the community groups the Department has no objections with the projects progressing to the next stage. Regards Noel Chambers Operations Manager | Regional Services | Department of Transport
Grange Resources	As cycling is not our area of expertise, I don't think it would be appropriate for me to comment on any of the concepts apart from where they interface with our project, and I'm very comfortable, from the workshop, that those interfaces are fine. I hope that helps. Kind regards Glenda Stirling B.Com(Acc) CPA CMC | Community Liaison Manager | Grange Resources

Main Roads WA	Main Roads supports the concept / alignments presented and, as always, will work with the City of Albany to manage the implementation (ie delivery of works on PRD and the review of signage and speed zones on the various routes etc). Regards. Andrew Duffield Regional Manager Great Southern Region
Over 50's Cycle Group	Thanks for organising the meeting on 3 June and presenting the draft feasibility study document, which is comprehensive and makes interesting reading. I confirm that the Albany Over 50s Cycle Group supports the recommendations in the study. Our group is also supportive of the suggestions from Albany Cycle Club regarding cyclist-specific signage. I'm pleased to note that work that has started on the Princess Royal Drive cycle lane and commend the City of Albany and Main Roads WA for attending to this so promptly. Kind regards Denis Sawers Albany Over 50s Cycle Group representative



COMMUNITY ACTIVITY HUB @

ALISON HARTMAN GARDENS

GREAT SOUTHERN CIVIC PLACE

'An intergenerational activity hub, a gathering place for the local and regional community, to be enjoyed by all'.

KEY PARTNERS:
Great Southern Development Commission
Lotterywest

INTERGENERATIONAL ACTIVITY HUB

The Community Hub will deliver much needed gathering and activity spaces in the city entre. This project will provide high quality public amenity, including interactive child, youth and family play elements as well as passive recreation spaces. A key aim will be to create enjoyable functional spaces that are able to host regular community and special events, informal gatherings, and cultural exchanges.

SOCIAL COHESION + INCLUSION

The project will focus on the creation of a comfortable, welcoming and safe place that attracts and engages people. Its design will aim to instill a renewed sense of civic pride in the precinct, and promote social inclusion, community cohesion, 'open to all', regardless of ethnic origin, age or gender. The project aims to improve the social wellbeing of Albany residents and foster cultural tourism outcomes by providing a vibrant, attractive urban environment with a strong sense of place and history.

LOCAL CULTURE + STORYTELLING

Connected to the public library, the gardens will be a place for creative learning, and encouraging the exploration of enquiring minds. The gardens will articulate, embrace and celebrate local history and 'living' culture, unearthing and telling stories from the local community and environment. FORM will help facilitate the engagement of Aboriginal community and other stakeholders as an opportunity to build community and explore integrated art outcomes.

DESTINATION + MEETING PLACE

This Community Hub will reinforce Albany's city centre as a destination hub, a central place that promotes connections to local and regional visitor destinations, attractions and activities. The gardens celebrate the start and finish of the iconic Munda Biddi and Bibbulman trails, connected to the Albany Visitors Centre.

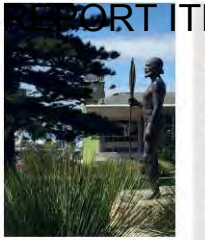
CONNECTIONS + ALIGNMENT

Open, equitable access and visual transparency are important principles in any good city environment. The gardens provide critical connections between York Street, Town Hall, Town Square, Library, Visitor Centre, and Student Housing developments. The accessibility and legibility of pedestrian and cycling links, public transport and vehicle circulation will be a key focus throughout the site. Facilities and public functions will be located to maximise and encourage social interaction, movement, functionality and use.

BACK TO NATURE

The South West of WA is one of the most unique and diverse botanical regions in the world and is identified as an international biodiversity hotspot. The Community Hub provides an opportunity to reference prevailing regional themes including wilderness, adventure, heritage and nature through local planting, materials and interpretation. The showcase of botanical diversity and engaging public art elements in a contemporary garden setting.

Great Southern Civic Place Plan – extract from Lotterywest Funding Submission, 2017



LEGEND

1. Mokare Statue
2. Central Pathway
3. Norfolk Island Pine Tree
4. Oak Tree
5. Open Lawn Areas + Gardens
6. Retaining Walls + Steps
7. Albany State School Heritage Site
8. Former Headmaster's House

Cadastral Boundary

Alison Hartman Gardens Reserve Boundary

0 5 10 20m N

ITEMS OF HERITAGE SIGNIFICANCE

MOKARE STATUE
The sculpture of noted Aboriginal, Mokare, was placed on the site in 1997, created by sculptor Terry Humble, and includes terracotta tiles fixed into the garden kerbing made by local children. The sculpture, although a relatively recent addition to the site, makes reference to cultural heritage values of the broader Town Hall/ Town Square site, where Mokare is believed buried, and therefore contributes to our understanding of the significance of Albany's civic centre.

CENTRAL PATHWAY
The long central pathway that extends from the northeast corner of Headmasters House down to York Street is evident in the earliest available photographs of the site (albeit with a gravel or cementitious finish originally)and was previously lined with a fence (no longer extant). There is evidence of a brick-lined spoon drain along certain sections of the path, likely an early site drainage device which, along with the pathway, has some significance. The existing modern asphalt finish of the pathway is not significant however, and likely conceals the earlier ground finishes below. The small curved pathway that forms a dog-leg off the main York Street footpath, near the Norfolk Pine Tree, is a recent addition and does not have identified cultural heritage significance.

EARLY TREE PLANTINGS
The two distinctive trees (oak and Norfolk Island pine) relate to the early layout of the grounds and have both historic value and aesthetic value for their contribution to the setting. It would be desirable to retain the distinctive plantings on the site and to interpret their significance in relation to their links with Headmasters House and the Albany State School.

OPEN LAWN AREAS + GARDENS
The site has continued in use as a garden plot since the original allocation of Town Lots in Albany, and features in many historic photographs as one of the key landscaped elements in the urban setting of York Street. It would be desirable to maintain some sense of the original expression of the gardens, particularly where early formal elements/ devices can be identified and possibly reinterpreted. With the exception of the mature trees, the current garden plantings themselves do not relate to any particular early landscape scheme, and those shrubs and trees growing immediately in front of the former Headmasters House in particular, obscure views to its primary elevation and are likely to be contributing to maintenance issues affecting the verandah structure. The existing garden edging comprises mostly concrete kerbing, the fabric and alignment of which is of little significance.

RETAINING WALLS + STEPS
The stone retaining walls appear to date from the development of the Albany State School site in 1895/6 when the upper terraces were formalised, and the stone steps were likely designed to allow pupils access between the main school terrace (now a carpark) and lower garden areas. The retaining walls and steps are significant elements and should be retained and conserved where possible.

Source: Alison Hartman Gardens, Heritage Impact Statement, ---- Architects 2015

Items of Heritage Significance – extract from Community Engagement, November 2017

IMAGE 1.
In front of the headmaster's house in York Street. Boys and girls took part in gardening at school and were expected to show that they could grow fourteen different vegetables. The 1910 Education Department Circular stated: "Gardening at school is a different thing entirely from gardening at home. At school, the average boy likes gardening he enjoys using his hands in the manual process of digging and planting. He enjoys the attention to detail and becomes handy in the use of tools. Gardening provides training and is character forming. It is a preparation for the afterlife of a boy, gives him a taste for work, and brings out ingenuity. "Well, the photograph shows plenty of girls also.

IMAGE 2.
View of Albany c1890. Albany Local History Collection. 0917. The site of the gardens can be seen just north of Fife House, forming the gardens to the then residence of Charles Drew.

IMAGE 3.
View of the gardens and playing fields (c1909) that were then part of the Albany State School. Albany Local History Collection, 2332. Note the juvenile Norfolk Pine tree planted within the gardens, near York Street.

IMAGE 4.
Further up York Street from the Town Hall (detail) c1890. The handsome residence (top centre) still survives, after a long life as the home of Charles Drew, then as a Governor's summer residence until the Rocks was purchased, and as a headmaster's house.

IMAGE 5.
1950 View of school children assembled in the upper level quadrangle at Albany State School. Headmasters House can be seen to the right of the photo, and beyond the gardens with Oak, pine trees and Acacias all present. Albany Local History Collection, 3900.

HERITAGE SIGNIFICANCE

Alison Hartman Gardens has historic value for its association with the Albany State School, which operated on the adjoining site from 1896 until 1974. The gardens were originally established as a productive garden plot for the school, as a site for nature study and also horticulture, which was then part of the school curriculum. Many archival news articles from the time refer to the value the community placed on this aspect of learning, particularly due to Albany's location as a hub for agriculture, and when a new school site was established on Perth Road (Albany Highway) in 1915, it was criticized for not providing sufficient grounds for gardens or playgrounds for the children. The garden plot eventually evolved into playing grounds, separated internally with a central fence dividing boys (on the south side) and girls (on the north side), which is still evident as marked by the alignment of the central pathway.

The former Headmasters House was first constructed in 1880 to a design by George Temple Poole as a residence for local businessman, Charles Drew, and was later the governor's summer residence (until the Rocks was purchased) and then became the Headmasters House for the nearby State School, until later becoming the Education Resources Centre it remains today. The gardens have continued to provide a landscaped setting to the Headmasters House, which in its earliest configuration, consisted of a formal garden with an oval-shaped planter bed positioned centrally in front overlooking York Street. The existing pathway marks the alignment of the original pathway that lead up to the house from York Street(pictured in photos dating back as early as 1890) and along with the remaining brick-lined spoon drain, are the only built elements which appear to remain from the earliest garden layout.

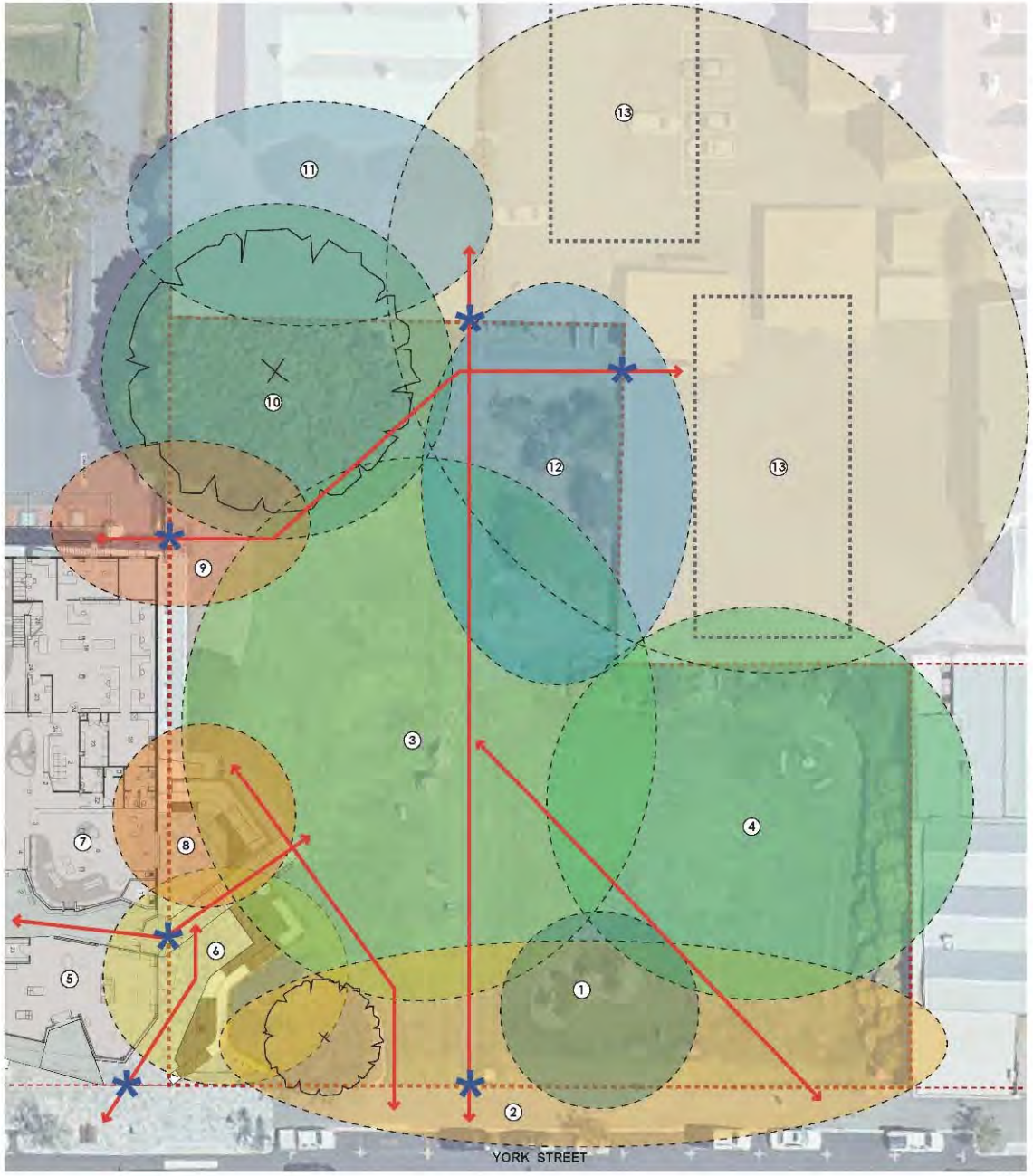
Alison Hartman Gardens namesake, Miss Edith Alison Hartman, a well renowned and dedicated school teacher and former Headmistress of Albany State School for over 30 years. Alison Hartman was born in Albany in 1906 and went to a teachers training college in Claremont before taking up her first position at Jingalup School near Kojonup. She then worked at schools atKwilalup (in Denmark) and Cherry Tree Pool (near Katanning) before joining Albany State School, where she taught until 1966. As a young woman, Miss Hartman was an accomplished hockey player and later coached local girls' hockey teams, and was also noted for her abilities in art instruction and dance instruction. Miss Hartman worked at Albany State School until 1966, when forced to retire due to illness. The gardens were named in her honour in 1979.

The long-standing garden plot has contributed to the streetscape of York Street for over 130 years and was an important part of the curriculum of the Albany State School as a school garden for nature study and later a playground for school children. The gardens were frequently the site of annual Arbor Day events hosted by the Albany State School, which placed a strong focus on the symbolism of tree planting and nurturing of nature as important life lessons for children.

Alison Hartman Gardens has some historic value for its association with local indigenous leader, Mokare, whose contribution to the peaceful co-existence between Noongar people and the first European settlers in the Albany region is recognized with a sculpture of his likeness which has been incorporated into the gardens. Mokare is believed to be buried in the vicinity of the nearby Albany Town Hall, where he was interred with great ceremony in 1831 alongside his friend, Dr Alexander Collie (NB: Dr Collie was later exhumed and reinterred at the Albany Cemetery). The placement of the Mokare sculpture was decided through close engagement with the Noonar community and is intrinsically linked with his nearby gravesite, although no mention is made of this on the plaque.

Sources: Alison Hartman Gardens, Heritage Impact Statement', HHT Architects 2015

Heritage Significance Statement – extract from Community Engagement, November 2017



ALISON HARTMAN GARDENS : LOCATION PLAN

PROJECT AIMS

- Strengthen ties between community, education & tourism
- Enhance community safety, services and amenities
- Improve potential for events, interactive play, and intergenerational participation
- Interpret local cultural heritage through art and landscape
- Integrate the Munda Biddi Trail and Bibbulmun Track
- Enhance community safety, services and amenities

LEGEND

1. Mokare Memorial + Interpretation Garden
2. York Street Link Zone
3. Performance + Community Event Space
4. Small Event + Flexible Program Space
5. Tourism + Information Hub | Visitor Centre
6. Tourism + Information Hub Courtyard
7. Albany Regional Public Library
8. Library Courtyard
9. Library Carpark Link
10. Oak Tree Garden
11. Headmasters House Garden
12. Forecourt + Garden Terrace
13. Proposed Student Housing Development

Entry Point
Pedestrian Circulation
Cadastral Boundary
Alison Hartman Gardens Site Boundary

0 5 10 20m N

Our vision: To create 'An intergenerational activity hub, a gathering place for the local + regional community, to be enjoyed by all'

KEY DRIVERS

INTERGENERATIONAL ACTIVITY HUB

Alison Hartman Gardens enhancement will provide much needed high quality, adaptable and accessible gathering spaces that enable enhanced community exchange and help foster community ties. This project will provide high quality public amenity, including interactive child, youth and family play elements as well as passive recreation spaces. A key aim will be to create enjoyable functional spaces that are able to host regular community and special events, informal gatherings.

SOCIAL COHESION + INCLUSION

A key aim is to create a comfortable, welcoming, safe place that draws people in to engage with each other and instil a sense of community ownership & pride. The design will promote social inclusion and community cohesion, open to all culture. The project aims to improve the social wellbeing of Albany's residents and foster cultural tourism outcomes by providing the building blocks for a vibrant, attractive urban environment with a strong sense of place.

LOCAL CULTURE + STORYTELLING

Connected to the public library, the park will be a place for creative learning, the exploration of enquiring minds, finding information, and unfolding learning opportunities. The gardens will articulate, embrace and celebrate local history, local culture and a 'living' culture, local stories and tales and the environment. Specialists will help facilitate the engagement of Aboriginal community and other key stakeholders as an opportunity to build community and deliver integrated art outcomes.

DESTINATION + MEETING PLACE

The community focussed space will help create a vibrant civic common in combination with the Town Square for year round activities and use, optimising existing assets and connecting to adjacent sites. This community hub will contribute further to reinforcing Albany's City centre as a destination place, a place that promotes local and regional visitor destinations, attractions and activities. In particular the potential to start and finish the iconic Munda Biddi and Bibbulmun trails will be explored.

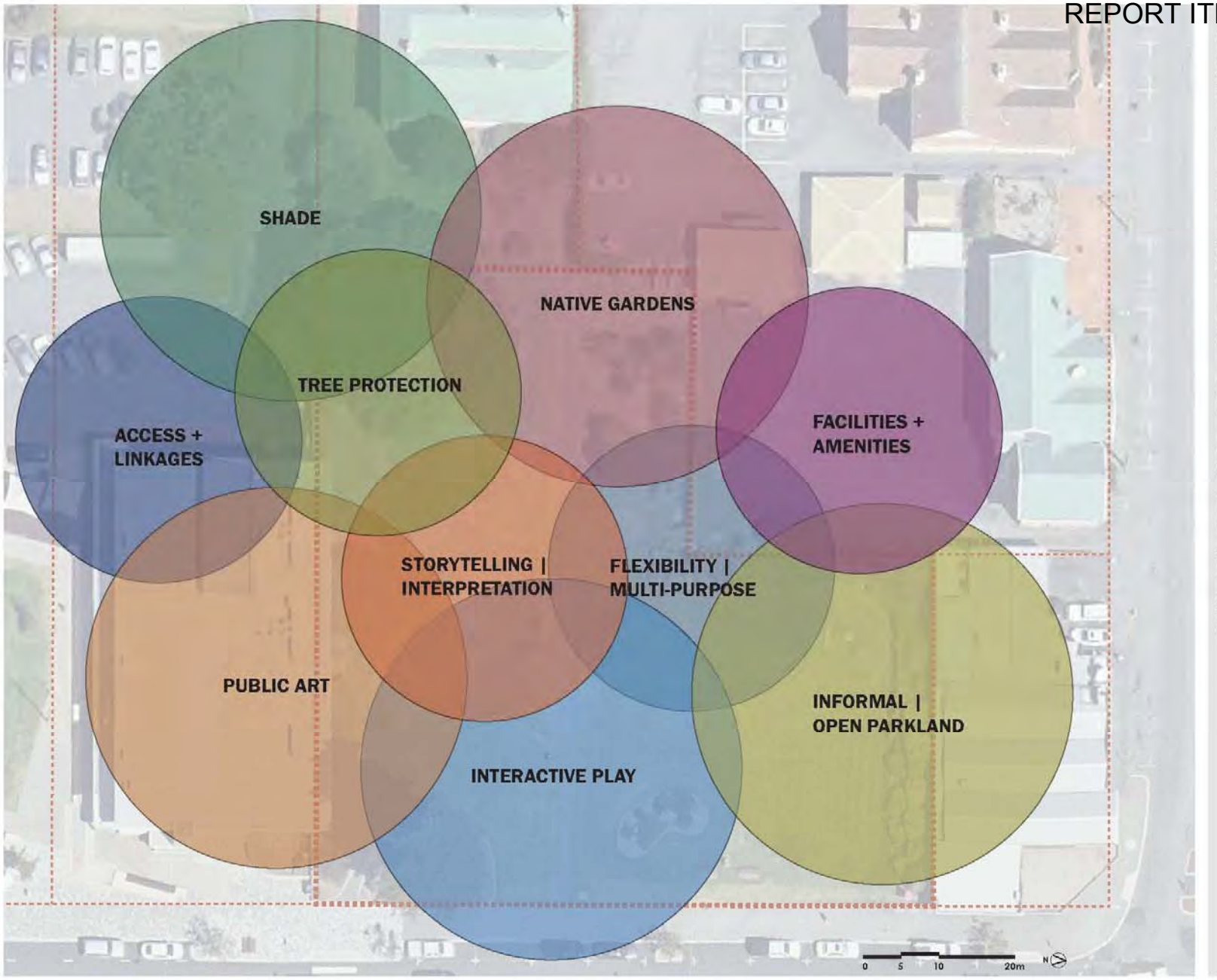
CONNECTIONS + ALIGNMENT

Good access and transparency are important principles in any city centre. Natural, cultural and visual connections between the Town Hall, Library, Visitor Centre, Student Housing and car parking areas will be addressed, in a way which maximises active frontage to York Street and managing legible access ways through the site. The transitions between facilities and functions will be carefully considered to maximise and encourage social interaction, movement, functionality and use.

BACK TO NATURE

The South West of WA is one of the most unique and diverse botanical regions in the world and is identified as an international biodiversity hotspot. This project provides an opportunity to showcase the unique wilderness, adventure, heritage and in our city and region, through planting to achieve botanical diversity and the design and installation of engaging public art elements in a contemporary garden setting.

Project Parameters & Opportunities - extract from Community Engagement material, November 2017



ALISON HARTMAN GARDENS - COMMUNITY ENGAGEMENT
KEY THEMES

NATIVE GARDENS
More local native planting species, and some non-native species to celebrate European heritage, to create interest, colour, life.

INFORMAL | OPEN PARKLAND
Creating a green, open, relaxed and informal parkland feel, which is safer, more welcoming and attractive.

PUBLIC ART
To draw people in, introduce colour and creativity, make interactive elements for children, engage all ages in interesting ways.

STORYTELLING | INTERPRETATION
Engage locals and visitors with more local stories, and recognize the history and heritage of the old school, and Mokare, and local plants.

FACILITIES + AMENITIES
More benches and seating for picnicking and lunch breaks, some under cover, provision for night time activities, and drinking fountains.

INTERACTIVE PLAY
Encourage children and youth to use and enjoy the space by creating a variety of opportunities to discover and play.

ACCESS + LINKAGES
More links around the park and to the Town Square, and creating a hub for local and regional trails such as Munda Biddi & Bibbulmun Track.

FLEXIBILITY | MULTI-PURPOSE
Host large and small performances and community events, and create areas for stalls and food vendors.

SHADE
Create more shaded areas through a mixture of tree and built canopies.

TREE PROTECTION
Retain & Protect the heritage listed Oak & Norfolk Island Pine, and heritage areas of the old school.

Key Community Themes - Community Engagement outcomes, December 2017

ALISON HARTMAN GARDENS ENHANCEMENT PROJECT

CONCEPT PLAN

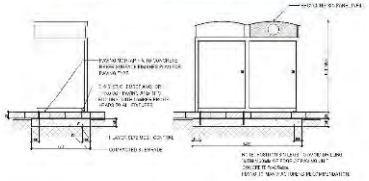
LEGEND

1. Oak Tree (existing)
2. Pine Tree (existing)
3. Primary Event & Open Space
4. Terraces
5. Secondary Event & Open Space
6. Mokare Commemorative Artwork & Statue Garden
7. Old school path Interpretation
8. Hub Courtyard (existing)
9. Children's Courtyard (existing)
10. Interactive Garden & Trailhead
11. Proposed Stair Link (future)
12. Proposed Student Housing Courtyard & Access (future)
13. Proposed Boardwalk link (future)
14. Proposed Mokare Burial Site Commemorative Garden (future)

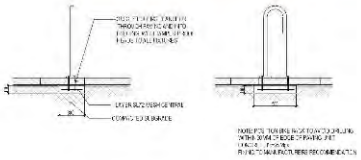
Project Boundary

Alison Hartman Gardens Concept Plan, June 2018

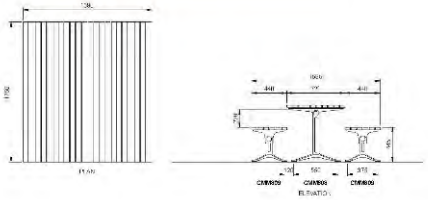
RECYCLING STATIONS | LITTER



BIKE RACK -
STAINLESS STEEL



PARK TABLE + BENCHES
ALUMINIUM FRAME + TIMBER BATTENS



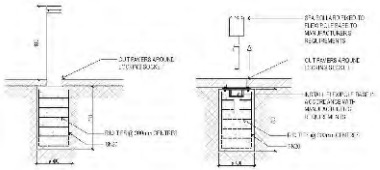
FURNITURE SUITE

Furnishing for the Albany Civic Precinct will be selected for quality, durability, comfort and consistency. Selection and placement will be designed to encourage a broad range of social interactions, help to guide people through the site, and cater for the flexibility required for community gatherings and events.

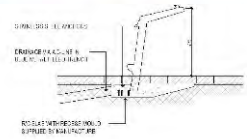
Proprietary street furnishings - including bicycle stands, seats, bollards, signage, bins and lighting - will be consistent with the systle and language of the York Street and Town Square enhancements.

The proprietary furniture range will be supplemented by a range of informal devices such as planter edges, retaining walls and granite boulder which provide perching spots and seating opportunities.

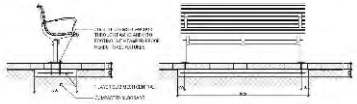
BOLLARDS -
FIXED + REMOVABLE



DRINKING FOUNTAIN -
STAINLESS STEEL + DOG BOWL



SEAT| BENCH -
ALUMINIUM FRAME + TIMBER BATTENS

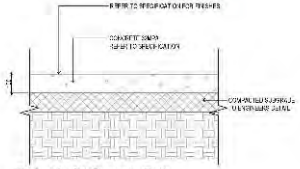


TREE GRATE -
CAST ALUMINIUM

MASS GRANITE SEAT -
EDGE OF TERRACES

PATH

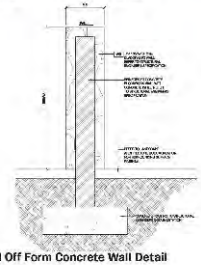
Name: Insitu Coloured Concrete Path
Finish: Exposed Aggregate



Typical Insitu Concrete Path

RETAINING WALLS + PLANTER WALLS

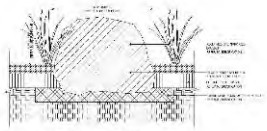
Name: Granite Wall - Local Stone
Finish: Drystone
Dimensions: 450 High Typical



Typical Off Form Concrete Wall Detail

FEATURE ITEMS

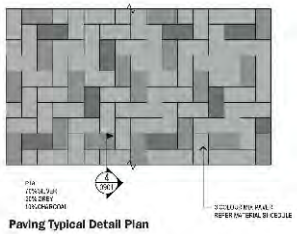
Name: Granite Boulders
Finish: Local Natural Stone
Dimensions: 1000 - 1500 dia



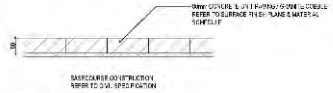
Boulder In Edge of Garden

CONCRETE UNIT PAVING

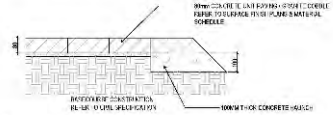
Name: Concrete Segmental Pavers
Finish: Exposed Aggregate
Colour: Silver, Grey and Charcoal



Paving Typical Detail Plan



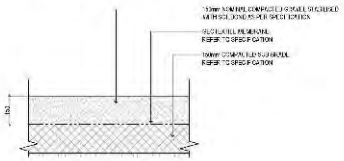
Typical Trafficable Unit Paving



Typical Unit Paving To Concrete Haunch

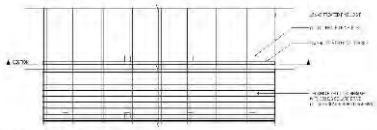
GRAVEL

Name: Gravel
Finish: Rainbow Stone Grit
Dimensions: 3 - 6mm Nom. particle size (no fines)

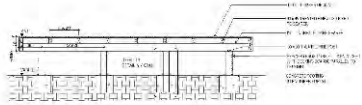


DECKING

Name: Jarrah Timber Decking
Finish: Dressed and Oiled
Dimensions: 140 x 25 Planks



Typical Timber Deck - Plan

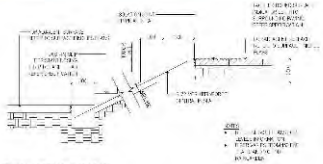


Typical Timber Deck Raised - Section

FEATURE INSERTS

Stainless steel inserts to timber furniture

TACTILE PAVING



Typical Stairs Detail

HARDSCAPE MATERIALS

A simple, durable, safe and distinctive palette of hard landscape materials will be employed consistent with the precinct. Concrete will be used a variety of colours, textures and formats as well as hardwood decking, local stone, stainless steel and corrosion-resistant aluminium.

Materials will be arranged to emphasise the hierarchy of public spaces and key amenity areas. Complementary materials will be installed using simple, coordinated detailing and a high quality of workmanship. Natural granite has been selected as a signature material making reference to the underlying outcrops of the locale.

Materials have been made on the basis of the following sustainability considerations:

- Low embodied energy
- Low water footprint
- High durability (offset against cost)
- Low maintenance requirements
- High recyclability
- Natural local origin

In situ concrete and unit pavers with an exfoliated, nonslip finish have been selected to match existing streets and public spaces, with high contrast tactile pavers designed to be consistent with universal access standards such as AS1428 for luminance contrast against a variety of finishes.

Local hardwood decking will provide a level of warmth, comfort and amenity not offered by stone and concrete in Albany's cool wet winters, and in reference to the seaside boardwalks and jetties and maritime history on this coast.


Anigozanthos manglesii


Dianella tasmanica 'TASRED'


Myoporum parvifolium


Eremaea ferruginea


Festuca glauca


Boronia crenulata


Carpobrotus virescens


Dianella revoluta 'Little Rev'


Casuarina glauca 'Cousin It'


Lepidosperma calcicola


Macfarlanea sclerosa

All species shown indicative of proposed planting strategy

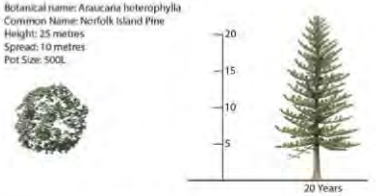
UNDERSTOREY

Understorey planting design will reference the geomorphic structure of the landscape that characterises Albany's low-lying coastal heath and elevated bushland and granite outcrops of Mt Melville and Mt Clarence.

Understorey planting at streetscape interfaces will be populated with local ground covers and bushland species that will maintain clear sight lines for traffic and pedestrian crossings, and complement existing streetscape designs.

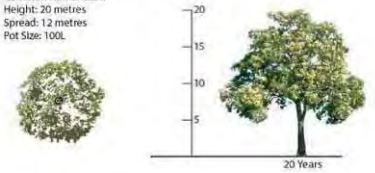
As a key urban green space the garden planting scheme will provides a bio-diverse, vibrant, dynamic and seasonally-rich. The understorey planting provides opportunities for the public to interact with nature. Its variety of species and structure will enhance the overall habitat range within the civic precinct. The planting will be carefully designed to ensure that there are clear sight lines into and out of the park and will be structured in a relaxed and informal arrangement.

Botanical name: Araucaria heterophylla
Common Name: Norfolk Island Pine
Height: 25 metres
Spread: 10 metres
Pot Size: 500L



Botanical name: Corymbia ficifolia
Common Name: Red Flowering Gum
Height: 10 metres
Spread: 10 metres
Pot Size: 200L

Botanical name: Corymbia calophylla
Common Name: Marri
Height: 20 metres
Spread: 12 metres
Pot Size: 100L



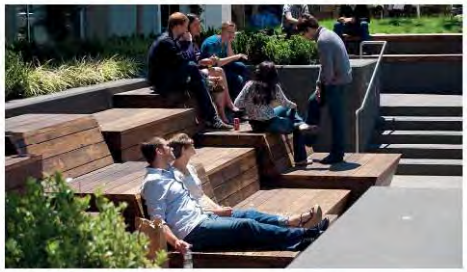
Botanical name: Agonis flexuosa
Common Name: WA Peppermint
Height: 8 metres
Spread 8 metres
Pot Size: 100L

All species shown indicative of proposed planting strategy

TREES

The tree planting strategy aims to instill a strong landscape structure for the streetscape and surrounding developments. Species will be selected appropriate in scale to that of the proposed surroundings and heritage values of the site. Open spaces will be defined by larger specimen trees and deciduous trees employed where solar access to built form will be enhanced.

Tree planting is used to unify spaces and routes, frame views and highlight desire lines and focal points as well as improve the local environmental conditions, and mitigate prevailing winds. Deciduous planting, flowering species and trees with distinct spring colour have been chosen to provide seasonal change and interest relating back to the local environs and character of the place.



STORYTELLING

LEARNING

PLAY

INTERGENERATIONAL

ART

COMMUNITY EVENTS

ARTWORKS, PLAY + INTERPRETATION

The park enhancement seeks to develop and deliver important local stories within the landscape, art and heritage strategies. Key engagement with the Noongar community is planned, and will help drive a range of initiatives aimed at engaging people with local culture, history and environment.

Initiatives will take an integenerational approach to increasing social and cultural participation and levels of outdoor activity and amenity in Albany's busy city centre. These initiatives are also designed to capitalise on the adjacent upgrade and reorientation of the library's junior learning area. the relocation of the Albany Visitors Centre, future proposed student housing development, and new direct links to the Town Square and Town Hall.

Art and interpretation features will be developed and designed in ways which engage and stimulate the senses, and respect recognised cultural heritage aspects on the site.





Subtle Interpretation

Creation Stories - Waugal

Shared Song Lines

Pathway of Stories

Dual Naming

Welcome to Country






Multipurpose

Seating, Shade + Sculptural Elements Integrated with Information|Stories

Soft Surfaces

Public Artworks

Interactive + Engaging

Indigenous Story Telling/Sharing

Noongar Images - historic + new







AHRGAC
Albany Heritage Reference Group Aboriginal Corporation

Colour, Light + Digital Projection

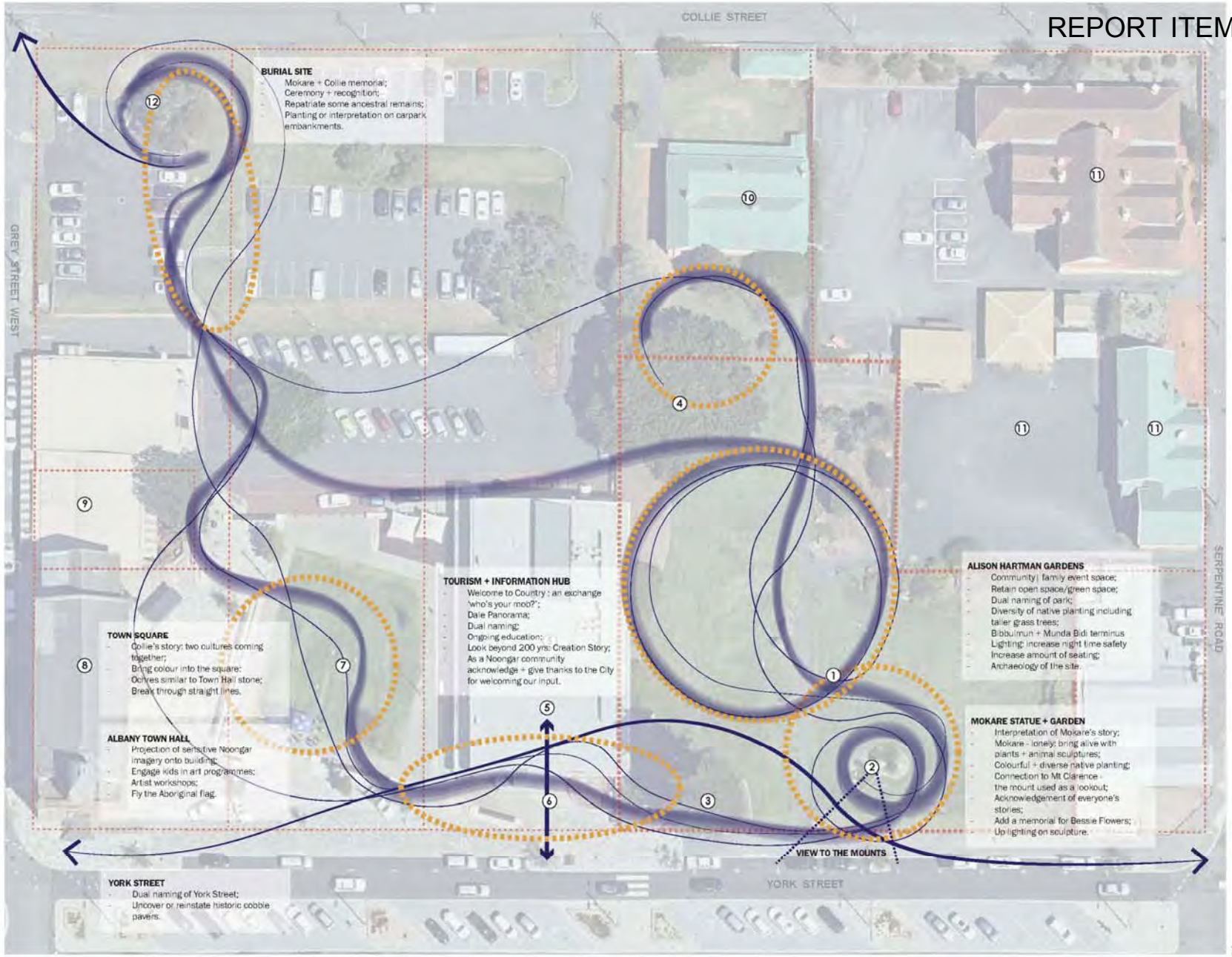
Water, Movement + Sound|Audio

Colourful Native Planting









OVERARCHING THEMES:

- **Friendship**
- **Relationship**
- **Coming Together**
- **Journey Between Two Cultures**
- **Personal Gifts**
- **Friendly Frontier**
- **Re-establish Connections**
- **Cultural Perspective**
- **Establish Links to Country**
- **Dual Naming**

AHRGAC
Albany Heritage Reference Group Aboriginal Corporation

LEGEND

1. Alison Hartman Gardens
2. Mokare Statue + Garden
3. Norfolk Island Pine Tree
4. Oak Tree
5. Albany Regional Public Library
6. Tourism + Information Hub Site
7. Town Square
8. Albany Town Hall
9. Senior Citizens Centre
10. Former Headmaster's House
11. Albany District Education Site
12. Burial Site

--- Cadastral Boundary
▪▪▪ Alison Hartman Gardens Site Boundary

0 5 10 20m N

Alison Hartman Gardens Precinct – Engagement Workshop Outcomes, Nov 2017

EXEMPLAR IMAGERY

Radial paving patterns using local granite stone

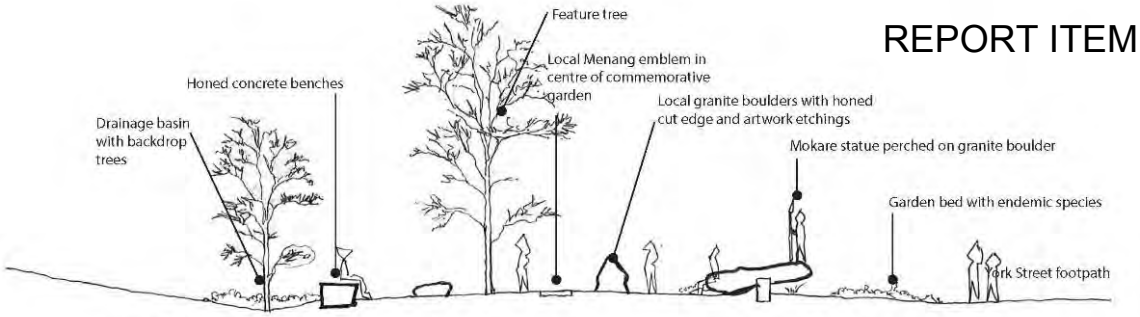
Integrated art work in centre of memorial with inclusion of local indigenous group emblem

Local granite boulders with honed cut edge for etching artwork opportunities

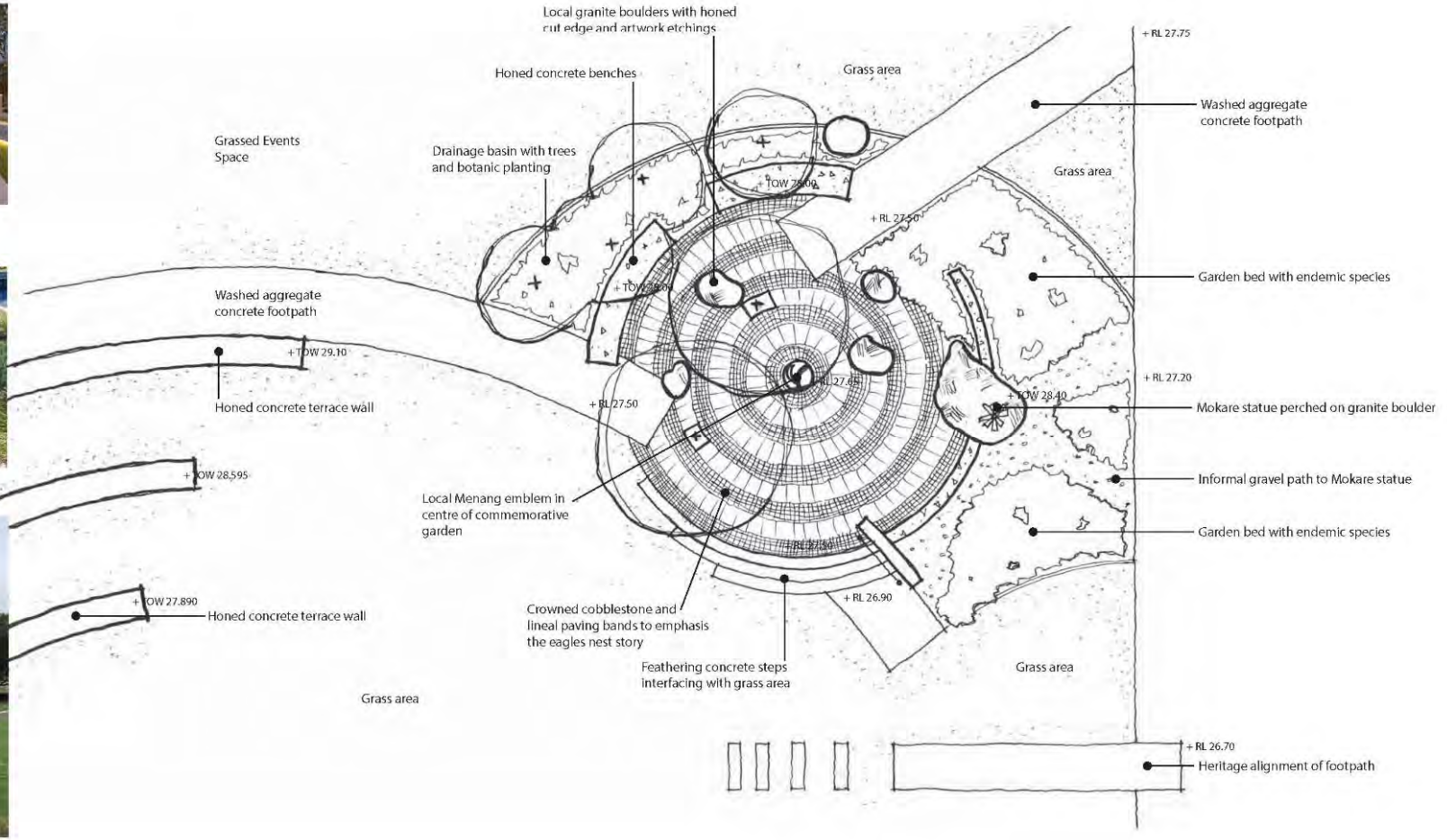
Honed concrete terrace walls in broader AHG precinct

Feathering steps from memorial interfacing with grassed areas

Drainage swales utilising endemic species



SECTION A



Alison Hartman Gardens Concept Plan – Mokare Commemorative Artwork & Statue Garden, June 2018

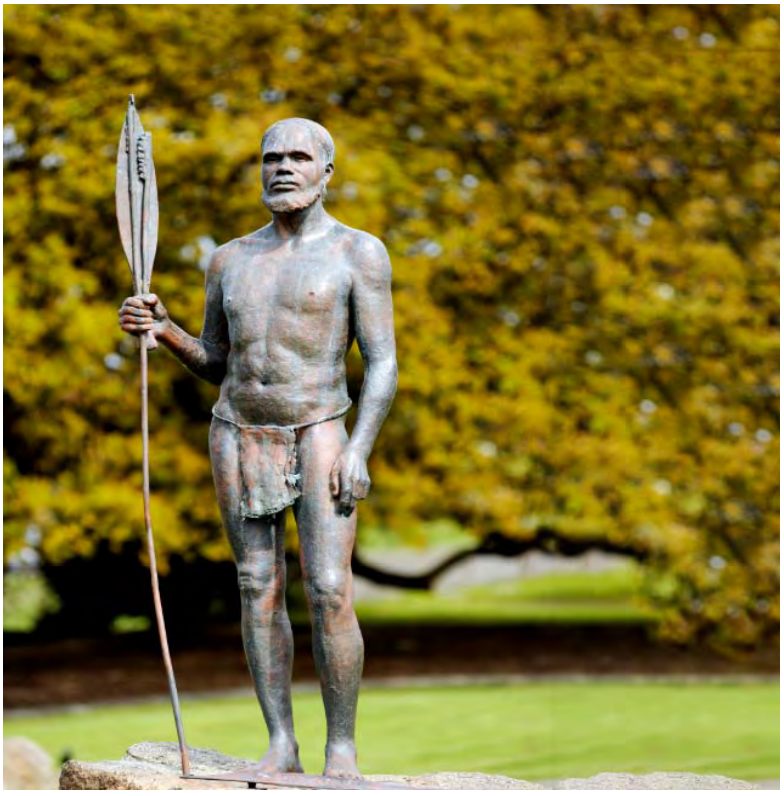
Community Engagement Record

www.albany.wa.gov.au

Alison Hartman Gardens

York Street, Albany

Community Engagement Record, November 2017



1. OVERVIEW

ALISON HARTMAN GARDENS

City staff have worked closely with the precinct users groups to reach an agreed concept plan. To assist with finalising the concept master plan the City has undertaken a community engagement process to gain broader community feedback on the plan. This record provides the following:

- An overview of key participation trends;
- Community consultation previously undertaken – has already identified the need for creating a contemporary public open space that meets the current & future community needs.
- The methodology and results from the recent consultation period.

2. COMMUNITY ENGAGEMENT

Community engagement forums took place from 1 November to 14th November 2017. A community engagement plan was developed and endorsed by the City of Albany with the focus on engaging the public and ensuring the broader community and surrounding businesses were provided with an opportunity to provide comment and suggestions.

Community members were informed of the consultation period in the following ways:

- 2 week public notice display in the Albany Advertiser advertising Community Engagement and how to submit feedback.
- A community bulletin assisted the community to stay informed and connected through the process. Approximately 200 Community Update newsletters were distributed during the consultation period.
- City of Albany Website links to the Community information update and feedback form.
- Community Update leaflets were distributed to all of the Elected Members and other key business and group stakeholders
- Staffed community displays in Town Square and at the Albany Show.
    - Town Square Wed 1 Nov 2017
    - Town Square Thurs 2 Nov 2017
    - Town Square Fri 3 Nov 2017
    - Town Square Sat 4 Nov 2017
    - Albany Show Fri 10 Nov 2017
    - Albany Show Sat 11 Nov 2017
- Community members were invited to submit comment by any of the following methods:
    - Written feedback forms;
    - Social Media comment;
    - Verbal engagement at the staffed community displays
- Key elements of the project were flagged as historical and of heritage significance and therefore noted to stay “as is” - including Mokare’s Statue, Oak tree, Norfork Pine tree and original path alignment leading to the former Headmasters House.

Community Reach - over 300 feedback forms were also distributed with a total of 38 forms received at the time of community engagement. Many of the community chose to leave feedback as comments on social media.

Feedback Forms Received	
Town Square	106
Library	10
Albany Show	35
Facebook	40
City of Albany	2
Community Notification	
Email	186
Elected Members & Executive	20
City of Albany – Staff Meeting	50
Total	**449**

3. ENGAGEMENT RESULTS

Community Engagement results and analysis identified 10 prevailing themes – these themes will be used to further develop and finalise the design for Council approval and implementation.

NATIVE GARDENS
More local native planting species, and some non-native species to celebrate European heritage, to create interest, colour, life.

INFORMAL / OPEN PARKLAND
Creating a green, open, relaxed and informal parkland feel, which is safer, more welcoming and attractive.

PUBLIC ART
To draw people in, introduce colour and creativity, make interactive elements for children, engage all ages in interesting ways.

STORYTELLING / INTERPRETATION
Engage locals and visitors with more local stories, and recognize the history and heritage of the old school, and Mokare, and local plants.

FACILITIES & AMENITIES
More benches and seating for picnicking and lunch breaks, some under cover, provision for night time activities, and drinking fountains.

INTERACTIVE PLAY
Encourage children and youth to use and enjoy the space by creating a variety of opportunities to discover and play.

ACCESS & LINKAGES
More links around the park and to the Town Square, and creating a hub for local and regional trails such as Munda Biddi & Bibbulmun Track.

FLEXIBILITY / MULTI-PURPOSE
Host large and small performances and community events, and create areas for stalls and food vendors.

SHADE
Create more shaded areas through a mixture of tree and built canopies.

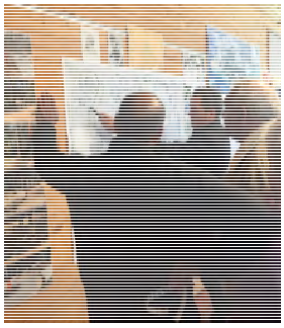
TREE PROTECTION
Retain & Protect the heritage listed Oak & Norfolk Island Pine, and heritage areas of the old school.

4. EXTERNAL WORKSHOPS

Albany Heritage Reference Group Aboriginal Corporation Workshop 2 November 2017
Location: WA Museum, Albany
Attendees:

- Albany Heritage Reference Goup Aboriginal Corporation
- Katanning & Tambellup Students
- City of Albany
- Specialist Interpretation Consultant





Albany Heritage Reference Group Aboriginal Corporation Information Session 24 January 2018
Location: Aboriginal Corporation Hall, Albany
Attendees:

- Albany Heritage Reference Goup Aboriginal Corporation
- Invited Community Members
- City of Albany
- Specialist Facilitator

Albany Heritage Reference Group Aboriginal Corporation Mokare Workshop 15 March 2018
Location: Aboriginal Corporation Hall, Albany
Attendees:

- Albany Heritage Reference Goup Aboriginal Corporation
- Invited Community Members
- City of Albany + Facilitator

Appendix 1: Workshop Outcomes Summary

Key themes identified:
Friendship, Relationships, Coming Together, Journey Between Two Cultures, Personal Gifts, Friendly Frontier, Re-establish Connections, Cultural Perspective, Establish Links to Country, Dual Naming.

Items for Consideration:

- Embed Noongar culture in the whole precinct using cultural infrastructure to represent the 60,000 years of culture. The bigger story, of which Mokare is one part.
- Originally the burial site and area behind the Library and Town Hall was the proposed location for the Albany Entertainment Centre.
- The whole precinct to be recognised as a memorial to Mokare
- Connection and flow from Mokare burial site to statue through the Town Square and Visitor Centre, using the creation story and Waugal.
- Site concepts may have to be staged, with consideration to resuming some car parking at the Burial Site in the long term. Currently a community issue with parking within the CBD. Identify realistic outcomes in the short term.
- Burial site ground penetrations have been undertaken in the past, with no outcomes/findings of remains.
- Pathway represented in reference images to connect burial to statue and through visitors centre. Also connection to Munda Biddi trail and Bibbulmun track. Link to Dreamtime.

Burial Site & Mokare Statue:
Incorporation of Cultural Elements, Landscape Elements (seating, walls and lighting), Interpretation and Art, Landscape and Planting.

Major Theme: Inclusion & Belonging

- Integrated Art Overlay
  - Overarching art strategy
  - Specific projects will open up expressions of interest for artists to the community.
  - Children's artwork in the town centre – the next generation being included
  - Timeline of Noongar culture - visual understanding how long Aboriginal people have been here.
- Mokare Grave Site | Memorial
  - Reduce car parking area to make a larger memorial site
  - Potential to make a burial site for the remains discovered along Albany Hwy in 1992 at the Mokare burial site.
- Alison Hartman Gardens – Mokare Statue
  - Design similar to the Yagan Memorial with large areas of native planting and colourful flowers.
  - Incorporate rare plants from the region.
  - Up lighting to activate the space at night

Community Engagement Record

www.albany.wa.gov.au

Alison Hartman Gardens

York Street, Albany

Record of Prior Community Engagement, April 2017
Prepared for Lotterywest

GREAT SOUTHERN CIVIC PLACE

Albany | Western Australia

Lotterywest Grant Application | Community Space - Outdoor

April 2017

1. OVERVIEW

ALISON HARTMAN GARDENS

Community Consultation and Engagement for the Great Southern Civic Place under the current design has been undertaken as follows:

a. Community Strategic Plan Review.

The City's current strategic plan is under review with consultation occurring over the last 8 months. As part of this engagement process the precinct design for the Great Southern Civic Place has been included to ascertain community views and ensure that the Current direction is consistent with previous feedback received.

Over 765 community members have participated in this process with 30 community workshops held. As per previous consultation regarding the Town Hall and Alison Hartman Gardens the current designs have received strong support from the Community.

b. South Coast City Centre Development - Federal Government Submission.

As part of the City's submission to the Building Better Regions program extensive consultation was undertaken.

Letters of support were received form the following organisations for the Great Southern Civic Place current designs:

- YMCA - Family Support
- Wanslea - Child and Parent Centre My Lockyer
- MungArt Booja Art Centre
- Mix Artists collective
- Make-a scene Artist Collective
- Southern Aboriginal Corporation
- Kinjarling Indigenous Corporation
- Creative Albany
- Albany Youth Support Association
- Albany Regional Family History Society
- Albany Heritage Reference Group
- University Of Western Australia
- Art Gallery of Western Australia
- Art on The Move
- Shire of Broomehil Tambellup
- Great Southern Community Housing Association
- Discovery Bay - Whaling station
- Hon Colin Holt – Member for the South West region
- Albany Chamber of Commerce and Industry
- Australia's South West
- Discover Albany Foundation
- Great Southern Development Commission
- Shire of Jerramungup
- Lower Great Southern Economic Alliance
- Peter Watson - Member for Albany
- Regional Development Australia
- Rick Wilson - Federal Member for O'Connor
- Dr Christopher Back – Liberal Senator for WA
- Southern regional Tafe
- Terry Redman MLA
- Country Art WA

- National Gallery of Australia
- Dean Smith – Senator for Western Australia
- FORM
- Shire of Cranbrook
- Perth International Arts Festival
- Curtin University
- State Library of Western Australia
- Tourism Western Australia

c. *Tourism and Information Hub & Great Southern Civic Place (Town Hall and Alison Hartman Gardens)*

Extensive consultation and engagement was undertaken with both the Tourism and Information Hub that included the Great Southern Civic Place project elements with current designs for the Town Hall and Intergenerational Community Hub, and prior to this the York Street Enhancement project in 2015 which had a CBD and civic precinct focus. It was always intended that the Tourism Information Hub and streetscapes works would be phase 1 of the broader Precinct master-plan with the Town Hall and Alison Hartman Gardens (Intergenerational Community Hub) acting as stage 2. As such, current designs for the Great Southern Civic Place were included in this consultation process. This process included:

- Individual community members sessions with the project team
- Presentation to Frederickstown Progress Association & Lets Chat Focus Group
- Website Page for city enhancement project designs
- Project collateral with designs inc FAQ sheet
- Media releases
- Social Media links to online material
- Hard copy survey
- Letter to residents in close proximity
- Pop up stand at the Albany Public Library with project designs
- Pop up stand at Town Hall and Senior Citizens Centre with project designs
- Community Information sessions at Town Hall.
- Display advertisements in local newspapers
- Media coverage local newspaper – Front page release of Town Hall design
- Community Email newsletter
- Outdoor signage displays
- Radio awareness campaign – Gold MX and Hot FM

Over 800 Community members were engaged in this process, with 211 surveys complete and 16 submissions received from individuals and a range of Social Media conversations.

COMMUNITY CONSULTATION SUMMARY

A RECORD OF CONSULTATION CONDUCTED FOR ALBANY CITY CENTRE ENHANCEMENT PROJECTS 2015 – 2017, INCLUSIVE OF GREAT SOUTHERN CIVIC PLACE COMPONENTS
CITY OF ALBANY, APRIL 2017

GREAT SOUTHERN CIVIC PLACE

Albany | Western Australia

Lotterywest Grant Application | Community Space - Outdoor

April 2017

Albany Civic Precinct Project Enhancements
Engagement Log 2015 - 2017
City of Albany - April 2017

Date	Correspondence
15/09/2015	Presentation to Council
29/09/2015	Face to face visits
2/10/2015	Seek agreement on plan
5/10/2015	Presentation to Frederickstown Progress Association (representative of City/town ward)
6/10/2015	Staff Memo Briefing * (council, Executive, customer service/advice)
6/10/2015	Create a website presence, Major Projects page
6/10/2015	Develop materials for engagement (branded) FAQ Sheet, benefits poster and online
6/10/2015	Media Release Issued
6/10/2015	Social Media link to online survey
6/10/2015	Presentation of material for community
6/10/2015	Online Survey
6/10/2015	Hardcopy surveys at North Road Administration building and Albany Public Library, display
8/10/2015	Letter - posted to residents in proximity
8/10/2015	Face to face visits
8/10/2015	Community Consultation Pop-Up Stand located outside at the Albany Public Library (opposite Ricarda Store)
8/10/2015	Display ad advertising in Weekender Newspaper
8/10/2015	Display ad advertising in Albany Advertiser Newspaper
9/10/2015	Social Media link to online survey
10/10/2015	Community Consultation Pop-Up Stand located at the Albany Public Library (opposite Ricarda Store)
13/10/2015	Display ad advertising in Albany Advertiser Newspaper
13/10/2015	Media Coverage - Albany Advertiser
14/10/2015	Community Consultation Pop-Up Stand located at the Albany Public Library (opposite Ricarda Store)
15/10/2015	Display ad advertising in Weekender Newspaper
15/10/2015	Display ad advertising in Albany Advertiser Newspaper
15/10/2015	Media Coverage - Weekender Newspaper
16/10/2015	Community Email News Articles
18/10/2015	Corflute outdoor signage for pop-up stands, displayed
20/10/2015	Display ad advertising in Albany Advertiser Newspaper
21/10/2015	Community Consultation Pop-Up Stand located at the Albany Public Library (opposite Ricarda Store)
22/10/2015	Display ad advertising in Weekender Newspaper
22/10/2015	Public Notice advertising in Albany Advertiser Newspaper
23/10/2015	Community Email News Articles
24/10/2015	Community Consultation Pop-Up Stand located at the Albany Public Library (opposite Ricarda Store)
28/10/2015	Social Media link to online survey
29/10/2015	Community Consultation Pop-Up Stand located at the Albany Public Library (opposite Ricarda Store)
4/11/2015	Face to face visits
5/11/2015	Follow up phone calls to key stakeholders
6/11/2015	Community Email News Articles
6/11/2015	Business Community Survey undertaken
9/11/2015	Presentation and discussion with Albany Bike User Group (ABUG)
11-12/11/2015	Albany rate payers group hosted stand at Albany Show - FAQ sheet, information sheet
14/11/2015	Discussion with Lets chat Focus Group and invitation to attend Town Hall open house
9/12/2015	Presentation to Council
16/12/2015	Media Release issued
18/12/2015	Information Session Email Invitation
18/12/2015	Customer Care Flyer developed and distributed
21/12/2015	Information Session, Town Hall, York St (opposite Ricarda)
26/01/2016	Public notice Advertising in Advertiser
27/01/2016	Email update
27/01/2016	Media Release issued

28/01/2016	Public notice advertising in Advertiser Newspaper
2/02/2016	Public notice advertising in Advertiser Newspaper
4/02/2016	Community information full page editorial - Advertiser Newspaper
4/02/2016	Social Media update
4/02/2016	Community Information Page Advertising in Advertiser Newspaper
4/02/2016	Community Information Page Advertising in Weekender Newspaper
15/02/2016	Social Media update
26/02/2016	Email update
28/02/2016	Public notice advertising in Weekender Newspaper
29/02/2016	Construction signboards 2400x1200 installed top and bottom of York St
29/02/16-11/03/16	Radio awareness campaign - Gold MX/Hot FM
8/03/2016	Social Media update
9/03/2016	Email update to councillors
12/03/2016	Social Media update
24/03/2016	Social Media update
31/03/2016	Social Media update
8/04/2016	Email update
13/04/2016	Email update
26/04/2016	Email update
16/11/2016	Lets Chat Community Forum
16/9/16 - 17/9/16	Community Info / Forum - publically advertised, Councillors in attendance, surveys conduct
Oct 2016-April 17	Community Survey - ongoing
28/11/2017	Albany Chamber of Commerce & Industry - board meeting presentation
20/03/2017	CBD Business Forum - conducted at Council offices, open invite to City Centre Traders
23/03/2017	Autumn Community Update - email, website, facebook, insitu posters
24/03/2017	City Website project page updates
24/03/2017	Media release
25/03/2017	Social media upates
27/03/2017	Radio advertising and interview
3/4/17 - 28/4/17	Community Information Hub - staffed pop up stand at Town Square, project updates, FAQ's
4/04/2017	Library Community Update - email, website, facebook, insitu posters
Nov 11 - March 17	Businesses Walkarounds - Albany Central Businesses / Civic Precinct, various dates
Nov 11 - April 17	Community Feeback - logged discussions in person, conducted at Library
March 17 - April 17	Community Vision - on site forums April-May 2017