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# Capricorn Yanchep

## Foreshore Management Plan

Prepared for  
Capricorn Village Joint Venture  
by Strategen

August 2018



# Capricorn Yanchep

## Foreshore Management Plan

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## **Client: Capricorn Village Joint Venture**

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- Appendix 9 Coastal node adaptation plan
- Appendix 10 Coastal node and POS landscape plans (concept plans subject to future approvals)

## Acronyms and abbreviations

|          |   |
|----------|---|
| ASP      | Agreed Structure Plan   |
| AHD      | Australian Height Datum   |
| BoM      | Bureau of Meteorology   |
| CBC      | Carnaby's Black Cockatoo  |
| CoW      | City of Wanneroo  |
| CVJV     | Capricorn Village Joint Venture                                 |
| DEE      | Department of the Environment and Energy                        |
| DPLH     | Department of Planning, Lands and Heritage                      |
| DSP      | District Planning Scheme  |
| DWER     | Department of Water and Environment Regulation                  |
| EP Act   | Environmental Protection Act 1986                               |
| EPBC Act | Environmental Protection and Biodiversity Conservation Act 1999 |
| FMP      | Foreshore Management Plan                                       |
| GPS      | global positioning system                                       |
| IBRA     | Interim Biogeographic Regionalisation for Australia             |
| ILUA     | Indigenous Land Use Agreement                                   |
| LPP      | Local Planning Policy   |
| MNES     | matter of national environmental significance                   |
| MRA      | MP Rogers and Associates  |
| MRS      | Metropolitan Region Scheme                                      |
| PCPS     | Perth Coastal Planning Strategy                                 |
| PEC      | Priority Ecological Community                                   |
| POS      | Public Open Space   |
| PPGGP    | Perth and Peel Green Growth Plan                                |
| PR       | Parks and Recreation  |
| ROS      | Regional Open Space   |
| SPP      | State Planning Policy   |
| TEC      | Threatened Ecological Communities                               |
| VT       | Vegetation Type   |
| WAPC     | Western Australian Planning Commission                          |



# 1. Introduction

## 1.1 Background

Capricorn Village Joint Venture (CVJV) is developing the Capricorn Coastal Village and Coastal Node Precinct, located in Yanchep, Western Australia, approximately 51 km north of the Perth Central Business District (CBD). The Capricorn Coastal Village and Coastal Node (the Project), incorporates Part Lot 312 and Lots 2, 303 and 304, Two Rocks Road, Yanchep, in the City of Wanneroo (CoW).

The Project will deliver approximately 2 500 dwelling units and include a primary school, shopping precinct, tourism accommodation facility and a retirement village. The *Capricorn Coastal Village Agreed Structure Plan No. 44* was adopted by the CoW and Western Australia Planning Commission (WAPC) in 2012 and development works have commenced with around 1 400 titled lots already developed.

The Capricorn Foreshore Reserve (herein referred to as 'the Study Area') (Figure 1) provides a link between the Indian Ocean and urban development and as such provides opportunity for conservation, recreation and development purposes. As the developer, CVJV are required to prepare a Foreshore Management Plan (FMP) to the satisfaction of the CoW, in accordance with Condition 13 of WAPC 155520 (Figure 2). The FMP will outline future development and management of the Study Area (Figure 1).

## 1.2 Study Area

The Study Area is approximately 1.3 km in length, 23.8 ha in area and includes the following reserves, as shown on Figure 3:

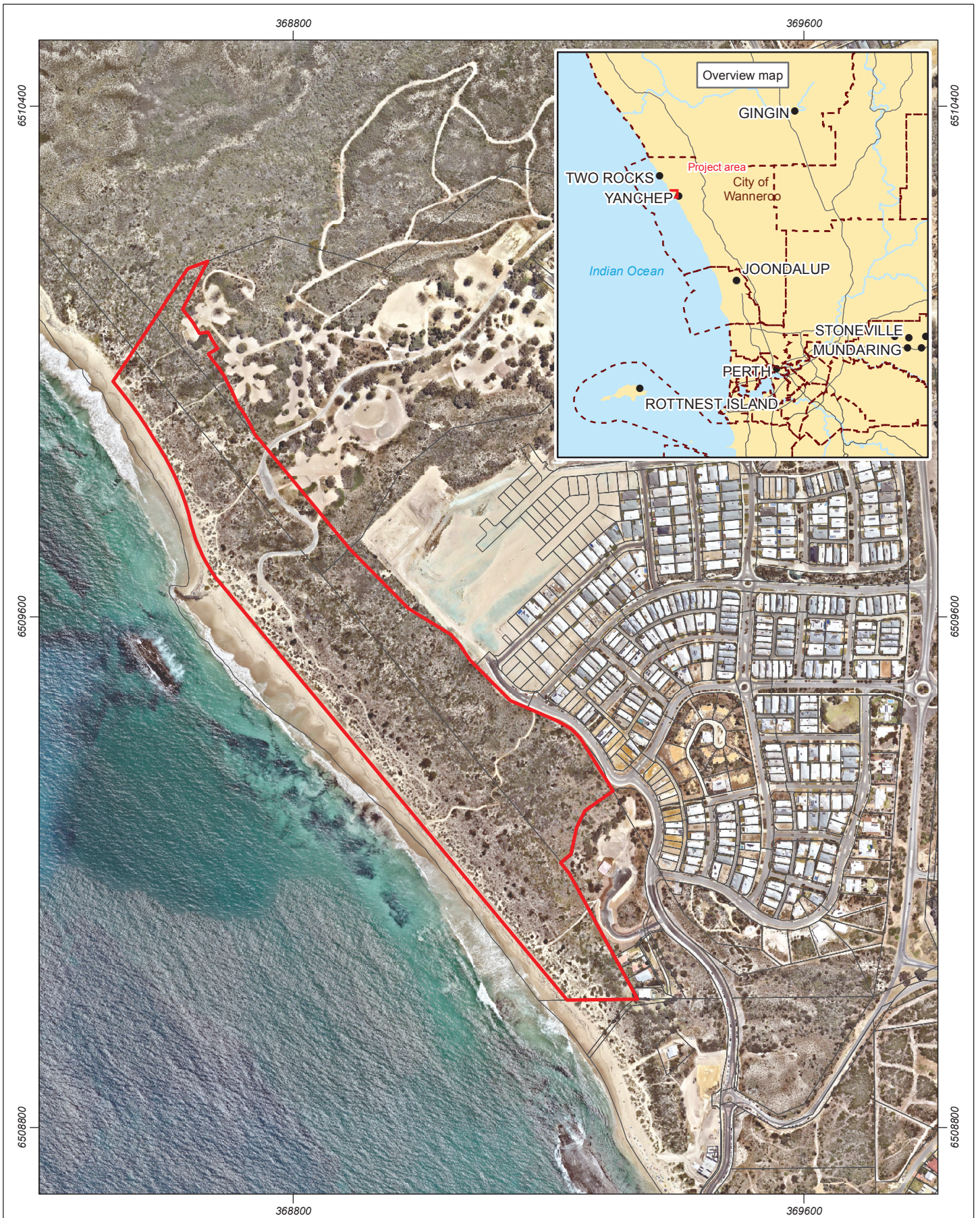
1. R 32510 – north-east portion of the Study Area identified as 'Parks and Recreation' under MRS zoning and 'Regional Parks and Recreation' under District Planning Scheme No. 2 (DPS 2).
2. Part Lot Reserve 20561 – western boundary of the Study Area identified as 'Parks and Recreation' under MRS zoning and 'Regional Parks and Recreation' under DPS 2.
3. Part Lot Reserve 48603 – Southeast portion of the Study Area identified as 'Parks and Recreation' under MRS zoning and 'Regional Parks and Recreation' under DPS 2.
4. Additional foreshore reserve as per WAPC155520 (reserve number to be determined).

The Study Area is bound to the east, by both existing and proposed areas of the Capricorn Coastal Village and to the west by the Indian Ocean. The northern boundary of the Study Area extends to the Regional Open Space (ROS) reserve 32510 boundary (comprising Lot 8999), while the southern boundary is bound by Newman Park 'A' Reserve, comprising Yanchep Lagoon, and excludes Lot 661, comprising the Mary Lindsay Homestead, freehold lots 132-135, Lots 8026 and 500 in reserve 4806 and Lots 501-502 in reserve 29352.

The western portion of the CVJV landholding, which is reserved for Parks and Recreation under the Metropolitan Region Scheme will be ceded to the Crown as a Foreshore Reserve at the time of subdivision of the abutting land in accordance with WAPC policy DC 2.3 (WAPC 2002). Upon the transfer of the foreshore to the Crown, the Study Area will be vested with the CoW. The CVJV recently received conditional subdivision approval (WAPC 155520; Figure 2; Appendix 1) which provides for the transfer of the western portion of the CVJV landholding to be transferred to the Crown as additional foreshore reserve.

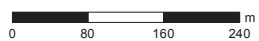
A large portion of the Study Area comprises of Bush Forever Site 397. Bush Forever Site 397 extends beyond the Study Area, from Mindarie to north of Two Rocks (Figure 3).







**Figure 1: Study area**

Scale 1:8,000 at A4



**Legend**

-  Cadastre
-  Study area

Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 18/12/2017

Author: JCrute

Source: NearMap: Aerial imagery - 2017; Landgate: Cadastre - 20171218.



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**Figure 2: Surrounding planning approval boundaries**

Scale 1:100,000



**Legend**

- Study area
- Capricorn Yanchep
- Cadastral

Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 18/12/2017

Author: JCrute  
 Source: Aerial image: nearma, flown 01/2017.  
 Existing cadastral: SLIP, Landgate 2017. Master plan: Client 03/2017.

Path: Q:\Consult\2016\ADS\ADS16184\ArcMap\_documents\ADS16184\_G007\_RevA.mxd



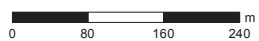
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**Figure 3: Tenure of the Study area and Bush Forever site**

Scale 1:8,000 at A4



Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 22/01/2018

Author: JCrute  
 Source: Aerial image: nearmap, flown 01/2017.  
 Existing cadastre: SLIP, Landgate 2017. Master plan: Client 03/2017. Bush Forever sites: DoP, 2012.  
 Path: Q:\Consult\2016\ADS\ADS16184\ArcMap\_documents\ADS16184\_G008\_RevD.mxd

**Legend**

- Study area
- Cadastre
- MRS parks and recreation reserve
- Bush Forever



### 1.3 Purpose and scope

The purpose of this FMP is to guide the management of the Study Area. The FMP identifies opportunities for facilities and amenities to be developed in the foreshore reserve to allow interaction with the coastline, whilst providing a management framework to ensure the ecological features of the foreshore reserve are conserved and protected.

The FMP has specifically been prepared to fulfil the requirement of Local Structure Plan 75 (ASP 75), Local Structure Plan 44 (ASP 44) and existing subdivision approvals, as summarised in section 3.4.

This FMP provides an overview of the proposed foreshore development and outlines key management measures to be implemented to protect values of the Study Area. The FMP has been set out with the following structure:

- Project overview (Section 2)
- Statutory and policy context (Section 3)
- Existing environment (Section 4)
- Coastal facilities demand (Section 5)
- Foreshore development, design and function (Section 6)
- Coastal hazard risk management (Section 7)
- Management framework and responsibilities (Section 8)
- Foreshore management considerations (Section 9)
- Reporting and review (Section 10).

### 1.4 Objectives

The overarching objective of this FMP is to protect and conserve the existing environmental values of the Study Area whilst facilitating the development of complementary recreational facilities and providing controlled access to and within the foreshore reserve. The following key objectives underpin this FMP:

1. Ensure the Study Area is developed in accordance with relevant planning and environmental approvals, planning policies and guidelines.
2. Retain and conserve vegetation and habitat of high environmental value where possible.
3. Manage places of environmental and heritage significance to the satisfaction of the community and key stakeholders.
4. Introduce infrastructure and recreational facilities while ensuring ecological features of the Study Area are not compromised.

### 1.5 Document status

An FMP was initially prepared by ATA Environmental (now Coffey Environments) in 2004 to support the Capricorn Coastal Village Structure Plan (ASP 44). The document was then revised and updated in May 2007 by the CoW, incorporating foreshore management for the Two Rocks Yanchep area. The document was adopted by the CoW, however was not approved by the WAPC (as previously required under expired subdivision approval WAPC 138089). The Department of Planning, Lands and Heritage (DPLH) provided comments on the *Two Rocks Yanchep FMP* in June 2010; however, despite ongoing consultation, the document was not formally updated and approved due to a number of concerns not being able to be addressed at the time.

The FMP was then updated in March 2017, following a series of discussions with DPLH (held on 10 May 2016) and CoW (held on 10 May 2016; 21 September 2016; 15 March 2017). The revised FMP considered previous comments and considerations on the FMP, the latest relevant planning policies and guidelines including SPP 2.6 (WAPC 2013a) and additional environmental, planning and social investigations undertaken in support of the Capricorn development.

Following submission of the FMP a series of comments were provided by DPLH and CoW on 2 May 2017 and 5 May 2017 and 9 May 2017 respectively. This version of the FMP has been prepared in consideration of all DPLH and CoW comments to date.

Since the time that the above-mentioned comments were received, the CVJV have received subdivision approval (WAPC 155520; Figure 2; Appendix 1). As outlined in Section 1.2 the subdivision approval provides for the transfer of the western portion of the CJVJ landholding to be transferred to the Crown as additional foreshore reserve. The FMP has been updated to include this additional area, which has included an additional flora and vegetation survey to capture the ecological values of this area.

## 2. Project overview

The proposed foreshore development comprises the Coastal Node Public Open Space (POS), which represents the key infrastructure component to be developed within the foreshore reserve. In addition to the POS, existing beach access points will be formalised within the Study Area as part of the Coastal Node POS development.

Structural and design elements of the POS and beach access points have been developed based on several key considerations, including the following:

- demand associated with regional and local context of the site
- coastal hazard and risk management
- environmental site characteristics, including vegetation, flora, fauna, topography and landform function
- maximising previously disturbed areas
- management considerations.

The proposed Foreshore Masterplan and Foreshore Concept Plan that underpin the FMP are described in detail in the supporting Development Application. An overview of foreshore design, development and function is detailed further in Section 6.

### 2.1 Foreshore planning and environmental approvals

The FMP will require the approval of CoW in accordance with the current subdivision approval (WAPC 155520).

The proposed development works within the Study Area will be subject to the following planning and environmental approvals:

1. Development Application (CoW and WAPC).
2. Engineering/landscape construction design drawings (CoW).
3. Purpose Permit clearing application approval (Department of Water and Environmental Regulation [DWER]).
4. Section 18 clearance if development is proposed within a registered Aboriginal Heritage site (Department of Aboriginal Affairs).

The Study Area will be zoned as 'Parks and Recreation' reserve and vested to the Crown as agreed by CVJV and the WAPC. Upon transfer of the foreshore to the Crown, the foreshore will be vested in the CoW.

### 3. Statutory and policy context

Key statutory and policy documents relevant to the Project are described in detail in the following sections.

#### 3.1 Strategic context

The requirement to prepare and implement an FMP is established by the following statutory and policy mechanisms at the Commonwealth, State and Local Government levels:

- *Environmental Protection and Biodiversity Conservation Act (EPBC Act) 1999*
- *MRS Amendment 975/33*
- *State Coastal Planning Policy 2.6*
- *State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region*
- *Perth Coastal Planning Strategy*
- *City of Wanneroo District Planning Scheme No. 2*
- *Yanchep – Two Rocks District Structure Plan*
- *Capricorn Coastal Village Agreed Structure Plan No 44*
- *Capricorn Coastal Node Structure Plan No. 75*
- *City of Wanneroo Local Biodiversity Strategy*
- *City of Wanneroo Coastal Management Plan*
- *WAPC subdivision approval 155520 (Condition 13).*

These mechanisms are described in further detail below.

#### 3.2 Commonwealth government

##### 3.2.1 Environmental Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of national environmental significance (MNES), require approval from the Commonwealth Minister for the Environment (DEE 2016).

Development within the Study Area will result in the clearance of approximately 1.72 ha of vegetation that comprises some foraging habitat but a lack of suitable plant species for Carnaby's Black Cockatoo (CBC), a MNES. The fauna assessment (Bamford Consulting Ecologists 2017) suggested that CBC is an irregular non-breeding visitor to the area.

The proponent has considered their obligations under the EPBC Act through consultation with an environmental consultant in consideration of the *Referral guidelines for three threatened black cockatoo species* (DSEWPac 2012) (including the draft revised version DEE 2017). The proposed clearing is not expected to result in a significant impact to CBC; therefore, the proposed foreshore development will not be referred to the Department of the Environment and Energy (DEE) for assessment under the EPBC Act.

##### 3.2.2 Perth and Peel Green Growth Plan

The Perth and Peel Green Growth Plan (PPGGP) is a joint initiative between the Commonwealth and State Government of Western Australia initiated in 2011 by the Western Australian Ministers for Planning and Environment and the Commonwealth Minister for the Environment. As communicated at the time and reiterated by the Department of Premier and Cabinet at the release of the PPGGP, one of the primary motivations for the State Government to undertake the Strategic Assessment was to remove the Commonwealth from decision making on small projects within the Perth and Peel regions. This was particularly relevant to projects impacting black cockatoo habitat, where, at the time, the Commonwealth were requiring referral, and in some cases assessment, of projects with as little impact as 1 ha of habitat.

The proposed foreshore development is unlikely to result in an impact to MNES and the anticipated impact to vegetation within the Study Area is not considered to be significant, therefore consideration under the EPBC Act and PPGGP will not be required. In accordance with current draft PPGGP mapping, the Study Area does not comprise any urban, industrial or rural residential 'classes of actions' and currently no 'broad commitments' have been identified from within the Study Area boundary.

As the PPGGP is currently in draft format, the proposed foreshore development will be assessed via the current planning and environmental approvals pathways, including planning approval from CoW and WAPC and approval to clear under the provisions of the EP Act, as detailed in Section 2.1.

### 3.3 State government

#### 3.3.1 Metropolitan Region Scheme Amendment 975/33

In 1996, the Yanchep Two Rocks (St Andrews) MRS Amendment 975/33 rezoned approximately 4 200 ha of land owned by the Tokyu Corporation to Urban and Urban Deferred zones to facilitate future development and give effect to the Yanchep Structure Plan.

A key part of this amendment, involved reserving coastal foreshore land as Parks and Recreation (PR) and the ceding of land by Tokyu Corporation to the Crown free of charge. The foreshore reserve boundary was determined in 1996 by the amendment, based on the Coastal Planning Strategy prepared for the Yanchep-Two Rocks area. The Yanchep precinct and associated foreshore reserve requires the provision of well-considered and adequate coastal facilities and access, which is acknowledged in the Perth Coastal Planning Strategy (PCPS), detailed further in Section 3.3.4.

The MRS outlines a number of clauses under which reserved land owned or vested in a public authority can be developed without the written approval of the Commission (WAPC). Given that the proposed foreshore area is Bush Forever, representing regionally significant vegetation, this clause does not apply and approval by the WAPC is required via a Development Application (as discussed in section 2.1).

#### 3.3.2 State Coastal Planning Policy 2.6

*State Coastal Planning Policy 2.6* (SPP 2.6; WAPC 2013b) applies to coastal planning proposals from broad structure planning through to detailed development proposals throughout Western Australia. The objectives of SPP 2.6 are to:

- ensure that the location of coastal facilities takes into account coastal processes, landform stability, coastal hazards, climate change and biophysical criteria
- ensure the identification of appropriate areas for the sustainable use of the coast for housing, tourism, recreation, ocean access, maritime industry, commercial and other activities
- provide for public coastal foreshore reserves and access to them on the coast
- protect, conserve and enhance coastal zone values, particularly in areas of landscape, biodiversity and ecosystem integrity, indigenous and cultural significance.

Coastal land is required to be set aside for public use including conservation, management, public access and recreation, in accordance with SPP 2.6. SPP 2.6 also states that coastal Foreshore Management Plans or strategies are required at an appropriate phase of planning or development approval (dependant on the scale of development) for the reserved land and any adjacent freehold land with conservation value.

To reduce the risk of damage as a result of coastal processes, SPP 2.6 outlines the requirements in terms of the application of coastal foreshore reserves and development setbacks from coastal features or physical processes.

SPP 2.6 recognises that in some circumstances development may need to occur in areas potentially impacted by physical coastal processes within certain planning time frames. These circumstances may include:

- public recreation facilities with finite life spans
- coastally dependent and easily relocatable development
- Department of Defence
- industrial and commercial development
- coastal nodes
- surf life saving clubs.

The proposed works for the Study Area are consistent with three of the circumstances listed above and is therefore able to proceed (pending relevant approvals once adequate management and adaption planning measures have been included, which are consistent with the policy provisions of SPP 2.6 (WAPC 2013a), as detailed in Section 6 and 7.

### 3.3.3 State Planning Policy 2.8 and Bush Forever

*State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region* (SPP 2.8, WAPC 2010) aims to provide a policy and implementation framework that ensures bushland protection and management issues throughout the Perth Metropolitan Region are adequately addressed and integrated with broader land use planning and decision-making (WAPC 2010). The policy predominantly deals with two distinct subjects, Bush Forever areas and local bushland areas.

The majority of the Study Area comprises Bush Forever Site 397. A small portion of native vegetation within the Study Area will be cleared to facilitate construction of access and commercial facilities within the foreshore reserve. A native vegetation clearing permit has been lodged with the DWER for the clearing of approximately 2.4 ha of native vegetation as outlined in Section 3.3.5. The native vegetation clearing permit application includes an assessment of potential impacts to the Bush Forever site under Schedule 5 of the EP Act, namely 'principle h'. DWER will determine if the impacts to the Bush Forever site resulting from the coastal node development are considered significant, and will advise on any requirements to offset these impacts. No clearing will be undertaken within the Bush Forever site until DWER have granted the clearing permit. It is noted that the native vegetation clearing permit will not be formally granted by DWER until both the FMP and associated Development Application have been approved by CoW.

In accordance with SPP 2.8, proposals must recognise regionally significant bushland and outline methods by which it will avoid, minimise and offset any likely adverse impacts it will have on regionally significant bushland. Opportunities to rehabilitate disturbed areas within the Study Area have been identified, as discussed in Section 9.4.

### 3.3.4 Perth Coastal Planning Strategy

The *Perth Coastal Planning Strategy* (PCPS) was developed to encourage better planning and protection of the Perth Metropolitan Coastline. The strategy promotes integrated coastal zone management and provides guidance for the location, scale and density of developments appropriate for the Perth coastline over the next 10 to 15 years.

The strategy applies to the coastal zone in the MRS from Two Rocks to Singleton, extending from 500 m offshore to the first main road running parallel to the coast. The WAPC endorsed amendments to the PCPS in January 2010 and resolved to endorse PCPS as an input into the next phase of Directions 2031, including structure planning, ensuring the centres contained within PCPS precincts are appropriate and complementary to the Directions 2031 activity centres hierarchy. The Study Area is located within Precinct 5 of the PCPS and identified as 'mixed use'.



### 3.3.5 Environmental Protection Act 1986 (EP Act)

Clearing of native vegetation is regulated under Part V of the EP Act. Prior to clearing native vegetation, a clearing permit must be obtained from the Department of Water and Environment Regulation (DWER) unless a valid exemption applies.

Clearing proposed within the Study Area requires CVJV to obtain a clearing permit, with the exception of clearing associated with the proposed 'dual use path', for which a valid exemption applies. Clearing associated with the dual use path is considered to be exempt via the subdivision approval (WAPC 155520) as the DUP is depicted on the plan of subdivision, and is required to be constructed by the Commission under Condition 18 of the approval which states:

*'Engineering drawings and specifications are to be submitted, approved, and subdivisional works undertaken in accordance with the approved plan of subdivision, engineering drawings and specifications, for the provision of shared paths through and connecting to the application area in accordance with the plan dated 20 November 2017 (attached). The approved shared paths are to be constructed by the landowner/applicant. (Local Government).'*

A native vegetation clearing permit application, for clearing within the Study Area (associated with the Coastal Node development) was lodged with DWER on 11<sup>th</sup> October 2017 and is currently being assessed. No clearing will be undertaken in the Study Area until the clearing permit has been granted or alternatively a valid exemption applies.

It is noted that the native vegetation clearing permit will not be formally granted by DWER until both the FMP and associated Development Application have been approved by CoW.

## 3.4 Local government

### 3.4.1 City of Wanneroo District Planning Scheme No. 2

The *CoW District Planning Scheme* (DPS) was amended in 2000 (Amendment No. 787), resulting in reclassification of the majority of the DPS land to 'Urban Development' to facilitate urban growth in an orderly and managed way. Section 48 of the *Environmental Protection Act 1986* (EP Act) required an Environmental Review to be prepared for the amendment to be assessed by the EPA. The Environmental Review identified a number of management conditions to be implemented at various stages of the planning process.

Environmental conditions imposed through Amendment No. 787 are set out under Schedule 9 of the CoW DPS 2. DPS No. 2 describes the zoning of land within CoW, specifying where certain land uses are permitted and sets standards for development. The Study Area is zoned 'Regional Parks and Recreation' in accordance with the CoW DPS No. 2. In accordance with Schedule 9 of the CoW DPS 2, a coastal foreshore management plan is required to be prepared.

### 3.4.2 Yanchep – Two Rocks District Structure Plan

The *Yanchep–Two Rocks District Structure Plan* (Roberts Day 2010) provides a framework for the development of urban villages, centres for education, industry, technology and enterprise, regional open spaces and city centres, all connected via a network of paths and roads.

Section 7.2 of Part 1 (Statutory Provisions) of the Yanchep – Two Rocks District Structure Plan states that:

*The precise size, nature and location of the development nodes and coastal setback zones and the provision of recreation facilities and amenities will be address as part of the LSPs. Foreshore Management Plans will also be prepared as part of the LSP's to ensure that development adjacent to the coast provides a balance between protection of the environment and sustainable development.*

The foreshore will be developed in consideration of the Yanchep-Two Rocks DSP, including the requirement to prepare an FMP.

### 3.4.3 Capricorn Coastal Village Agreed Structure Plan No. 44

Part 8 (special provisions) of Part 1 of the *Capricorn Coastal Village Agreed Structure Plan No. 44* (CoW 2012) (ASP 44) states that:

*Lots 303 and 304 within the Project Area are subject to Environmental Conditions which require the preparation of the following relevant Environmental Management Plans:*

*Drainage, Nutrient and Water Management Plan  
Foreshore Management Plan.*

In accordance with the Structure Plan, ATA Environmental prepared a draft Foreshore Management Plan in 2004 which was updated in 2007 by the CoW. This current FMP has been prepared in place of the draft FMP and will be implemented to the satisfaction of the CoW.

### 3.4.4 Capricorn Coastal Node Agreed Structure Plan No. 75

The *Capricorn Coastal Node Agreed Structure Plan No. 75* (TBB 2015) (ASP 75) provides the planning framework to guide subsequent detailed urban design and development of the Capricorn Coastal Node. The Structure Plan has been prepared pursuant to the CoW DPS 2. The Capricorn development occurs adjacent to the eastern boundary of the Study Area, as detailed in Figure 2.

In accordance with Section 1.12 of ASP 75, a Foreshore Development Concept must be prepared as a condition of subdivision, where public access to the coastal foreshore reserve is made available, specifically:

*Foreshore Management Plan – Lodgement of subdivision or development within the Mixed Use Zone where adjacent to the Coastal Foreshore Reserve.*

Furthermore, ASP 75 requires an FMP as a condition of subdivision approval where public access to the Coastal Foreshore Reserve is made available. The main purpose is therefore to provide a development concept for a coastal activity node in the foreshore reserve for the use of existing and future residents (as provided for in the approved adjacent structure plans) and provide for the management of this coastal activity node, prior to public access being provided through subdivision or development adjacent to it.

ASP 75 details the type of development permissible immediately adjacent to the Study Area and that it must:

- maintain public accessibility to the Study Area
- maintain a visual connection to the coast from the foreshore road and in strategic locations
- be sympathetic to the coastal environment and landscape.

This FMP has been prepared to satisfy this requirement.

### 3.4.5 City of Wanneroo Local Biodiversity Strategy

The CoW *Local Biodiversity Strategy* (2011) was developed to guide the planning of growth within the CoW, with specific targets to reduce the loss of natural areas and improve biodiversity protection. The report sets out a number of targets and strategies for CoW to implement, guiding development and biodiversity in CoW over the years from 2011–2016. The strategy is currently being updated by the CoW.

The development of the Study Area contributes to the objectives of the Local Biodiversity Strategy through the contribution of additional foreshore reserve as PR reserve, as well as increased protection of ecological values through conservation fencing, rehabilitation, weed control and formalisation of access-ways.

### 3.4.6 City of Wanneroo Coastal Management Plan

Part 1 of the *CoW Coastal Management Plan (CoW 2012)* provides an overview of current and future coastal land use from Tamala Park to Two Rocks. The plan enables CoW to focus on research and ultimately allow for effective planning, implementation and management of recreation and conservation of coastal areas and coastal assets now and into the future (CoW 2012).

The Coastal Management Plan outlines potential future uses for the Capricorn coastal region. These include:

- two picnic/recreation areas
- dual use path parallel to the foreshore/board walk and beach access
- beach access ways including associated car parking, lookouts, signage, bins and bike racks
- investigations into proposed uses of the Lindsay Homestead
- Capricorn Boulevard extension
- proposed boardwalk and beach access
- extra access from Lindsay homestead.

Requirements detailed in Part 1 of the Coastal Management Plan have either been developed or are proposed to be constructed as detailed further in Section 6 of this FMP and the supporting DA.

Part 2 of the CoW Coastal Management Plan is yet to be finalised however intends to provide additional information on the potential adaption of existing management regimes as the CoW evolves and guide future development to ensure the sustainable use of the coastline (CoW 2016b).

### 3.4.7 WAPC Subdivision approval

In accordance with subdivision Condition 13 of WAPC 155520, CVJV is required to prepare a Foreshore Management Plan as follows:

*Prior to the commencement of subdivision works a foreshore management plan for the coastal foreshore reserve is to be prepared and approved to ensure the protection and management of the sites environmental assets with satisfactory arrangements being made for the implementation of the approved plan (Local Government).*

This FMP has been prepared to satisfy the above subdivision condition.

### 3.4.8 Local Planning Policy 4.21

The CoW *LPP 4.21 Coastal Assets Policy (CoW 2016)* is a key guiding document utilised in the preparation of this FMP and supporting DA. The policy complements SPP 2.6 and associated guidelines and has been utilised in conjunction with these documents to inform the assessment and adaptation planning for the proposed coastal assets.

The relationship between the proposed foreshore infrastructure and LPP 4.21 has been summarised further in Section 3.4.8 and the supporting DA.

## 4. Existing Environment

### 4.1 Physical environment

#### 4.1.1 Climate

The Yanchep locality experiences a Mediterranean climate characterised by mild, wet winters and warm to hot, dry summers. The nearest Bureau of Meteorology (BoM) weather station at Gingin Aero weather Station (Station No. 009178) provides average monthly climate statistics for the Yanchep locality (Figure 4). Average annual rainfall recorded at Yanchep since 1996 is 620.2 mm (BoM 2016). Rainfall may occur at any time of year; however, most occurs in winter in association with cold fronts from the southwest. Highest temperatures occur between December and March, with average monthly maximums ranging from 30.6°C in December to 33.3 in February (BoM 2016). Lowest temperatures occur between June and September, with average monthly minimums ranging from 6.2°C in July and August to 7.5°C in September (BoM 2016).

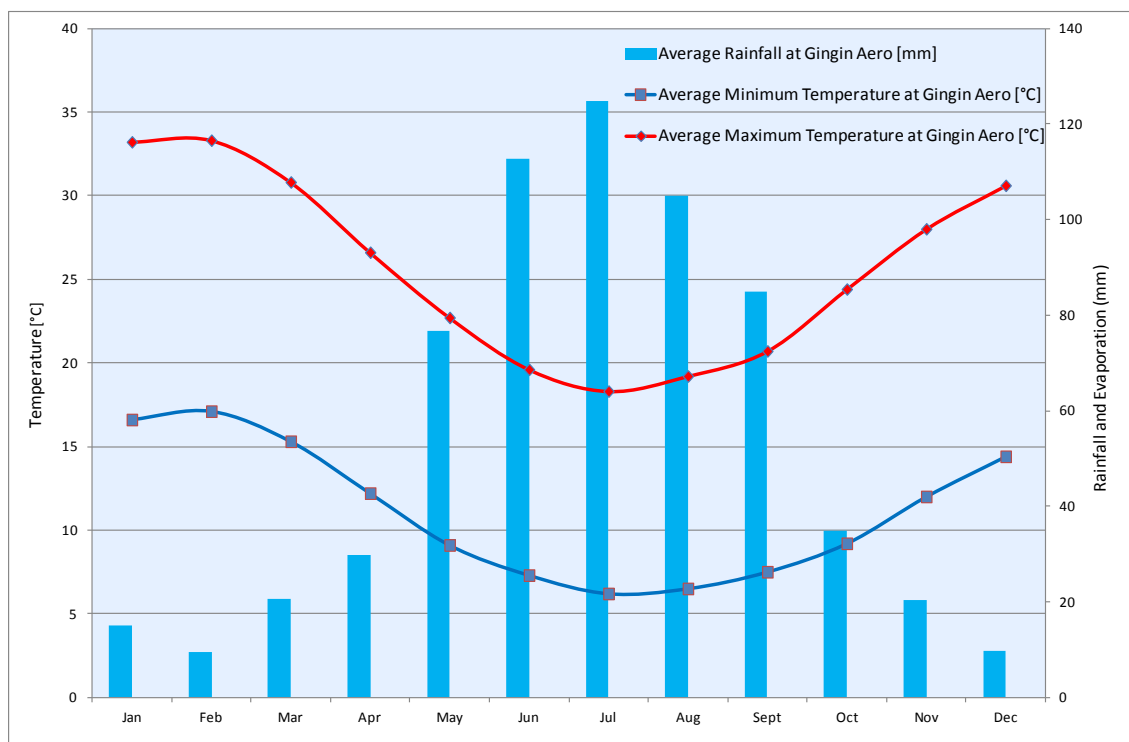


Figure 4: Mean monthly climatic data (temperature and rainfall) for Gingin Aero Centre

#### 4.1.2 Geology, landform and soils

##### *Geology*

The Study Area is located within the Perth Basin, a geological formation that spans from the southern boundary of the Carnarvon Basin in the north and Cape Leeuwin in the south and extends to approximately 10 km thick (ATA 2007).

The surface geology of the Study Area is dominated by Safety Bay Sand overlying Tamala Limestone. Safety Bay Sand is comprised of a mixture of coastal dune sand and shallow marine eolian sands with its distribution aligning with the Quindalup Dunal System. Safety Bay sand is still productively accumulating along the coastline. Tamala Limestone is a unit of friable to hard, medium grained eolian calcarenite composed of wind-blown shell fragments with variable amounts of quartz sand (ATA 2007).

### ***Landform***

The Study Area is characterised by an undulating dunal system running discontinuously parallel to the coast which consists primarily of a large primary dune fronted by a reasonably sized foredune. The primary dune maintains a typical elevation of 15–20 mAHD (MRA 2014). The foredune has a typical elevation of 5–6 mAHD with a maximum width of approximately 75 m in the northern boundary of the Study Area, becoming narrower further south. Between the beach and tall dunal system lies a foredune areas consisting of low, narrow beach ridges and swales. Two ridges are also present running east–west from the frontal primary dune creating a broad, deep valley between them (ATA 2004).

### ***Karst risk***

A karst risk desktop study was undertaken by Galt Geotechnics (Galt 2016; Appendix 2) in accordance with *Local Planning Policy 4.13: Caves and Karstic Features* (CoW 2016c) to support the FMP. The objectives of the study were to:

- conduct a karst risk desk study along the foreshore of the Capricorn Yanchep project (area nominated on provided plans), in line with City of Wanneroo planning requirements, including a map showing areas of karst risk
- provide advice on further geotechnical investigations (if required) to support a Karst Risk Management Plan.

The CoW karst risk mapping identifies the Study Area as occurring within a 'low karst risk' zone (Galt 2016). The study concluded that a Karstic Features Management Plan is not required to support the proposed development, however notes that geotechnical studies will be required within the Study Area where structures, such as changerooms, toilet facilities etc are proposed to certify that the land is capable of development (Galt 2016). The requirement for a geotechnical investigation is not specifically related to karst risk, but is required as part of standard pre-development requirements (Galt 2016).

### ***Soils***

The Study Area features an undulating coastal Quindalup dune system which extends from Geographe Bay in the south to Dongara in the north and features a series of large scale, elongated and coalescent parabolic dunes (ATA 2007).

Soil mapping undertaken for the Perth Metropolitan Region (Gozzard 1982), identified one soil type within the Study Area:

- S<sub>2</sub>: Calcareous Sand – white, fine to medium grained, sub-rounded quartz and shell debris, of eolian origin.

The soil mapping of the Study Area is presented in (Figure 5).

### ***Contamination risk***

Strategen Environmental (Strategen) undertook an assessment of soil beneath the historic Club Capricorn infrastructure to determine if residual pesticide is present as a result of regular application of white ant treatment (Strategen 2016a).

The assessment included sampling of soil from three chalets and former kiosk area. Results of the assessment found that persistent organochlorine (OC) and organophosphate (OP) pesticides were not present in shallow samples, excluding the following in low concentrations:

- Aldrin
- Chlordane
- Dieldrin
- Heptachlor
- Oxychlordane.

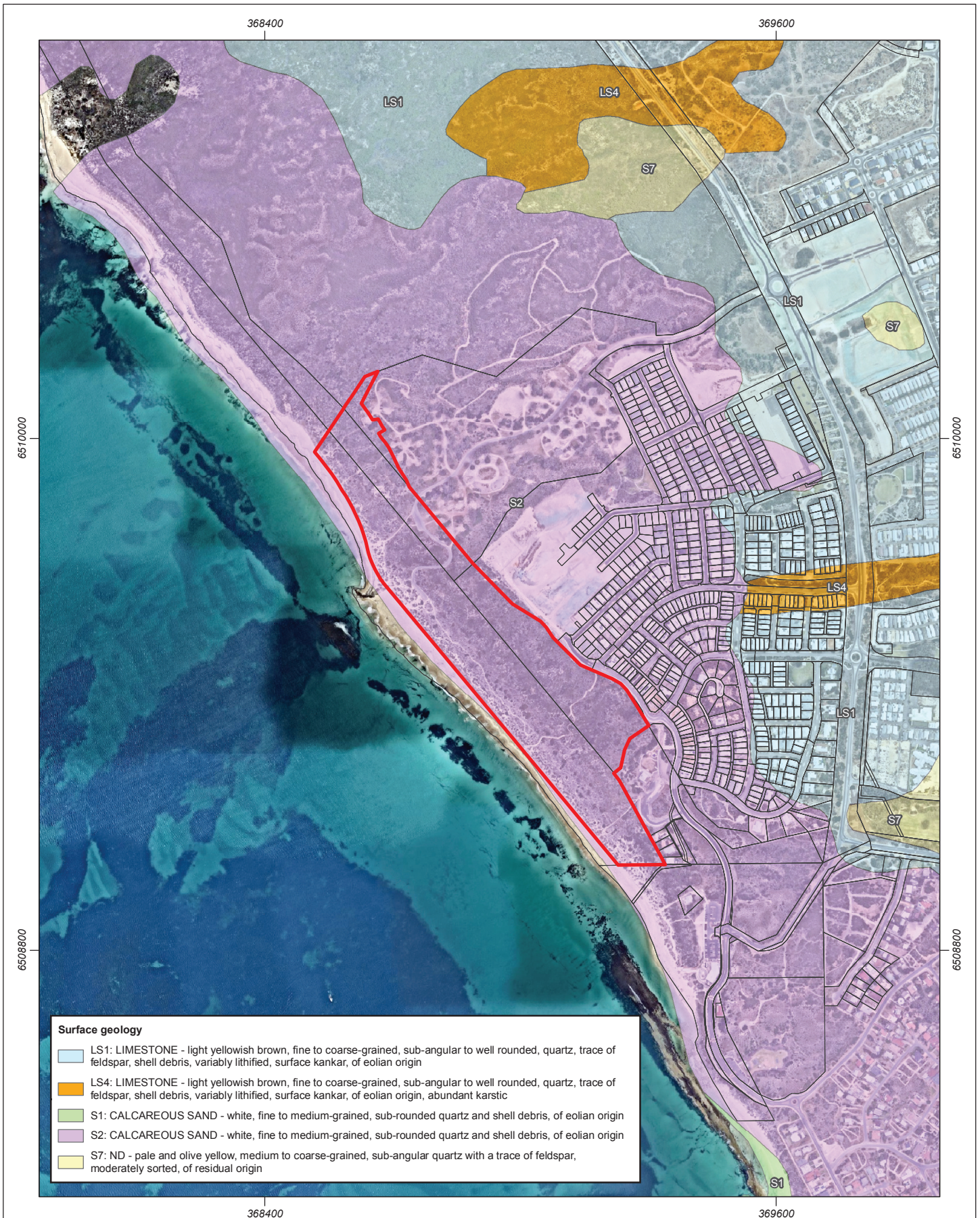
The quantities of the OC/OP pesticides described above were compared to the National Environmental Protection Council (2013) *National Environmental Protection (Assessment of site contamination) Amendment Measure* (NEPM) which found that the concentrations did not exceed the guidelines. In consideration of the results, the assessment concluded that no specific contamination management was required during demolition of the buildings (Strategen 2016a).

#### 4.1.3 Hydrology

A review of the Department of Water Perth Groundwater Mapping (2016) indicates that groundwater flows is in a westerly direction towards the coastline. Groundwater in the Study Area ranges from 0 m Australian Height Datum (AHD) along the coastline to a maximum of 1 mAHD in the east of the Study Area.

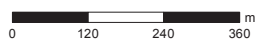
A search of the Swan Coastal Plain geomorphic wetlands map (Landgate 2016 [search conducted 26 August 2016]) did not identify any wetlands within the Study Area. The nearest wetland is found is approximately 5 km to the east of the Study Area.





**Figure 5: Geology, soils and landform of the study area**

Scale 1:12,000 at A4



**Legend**

Study area

Existing cadastre

Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 18/12/2017

Author: JCrute

Source: Aerial image: nearmap, flown 01/2017. Existing cadastre: SLIP, Landgate 2017.  
 Master plan: Client 03/2017. Geology: Yanchev map sheet, 1:50000, DMP, 2014.  
 Path: Q:\Consult\2016\ADS\ADS16184\ArcMap\_documents\ADS16184\_G009\_RevA.mxd



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#### 4.1.4 Flora and Vegetation

##### *Desktop assessment*

##### Regional vegetation

Vegetation of the region has been mapped at a broad scale as part of regional mapping undertaken since the 1970s, notably as part of Beard (1990) mapping. The Beard mapping has formed the basis of several regional mapping systems, including physiographic regions defined by Beard (1981) which led to the delineation of botanical districts as described in Beard (1990); the biogeographical region dataset (Interim Biogeographic Regionalisation for Australia, IBRA) for Western Australia (DEE 2015a) and System 6 Vegetation Complex mapping undertaken by Heddle *et al.* (1980).

A summary of the regional vegetation mapping comprising the Study Area is presented in Table 1.

Table 1: Regional vegetation mapping

| Regional mapping                                   | Vegetation system                             | Description  |
|--|---|--|
| Beard 1990   | Drummond Botanical Subdistrict                | Low <i>Banksia</i> woodlands on leached sands; <i>Melaleuca</i> swamps on poorly-drained depressions; and <i>Eucalyptus gomphocephala</i> (Tuart), <i>Eucalyptus marginata</i> (Jarrah) and <i>Corymbia calophylla</i> (Marri) woodlands on less leached soils.                              |
| IBRA   | Swan Coastal Plain 2 IBRA subregion           | <i>Banksia</i> or Tuart on sandy soils, <i>Casuarina obesa</i> on outwash plains and paperbark ( <i>Melaleuca</i> ) in swampy areas.   |
| System 6 and vegetation system association mapping | Quindalup Complex                             | Coastal dune complex consisting mainly of two alliances – the strand and fore dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of <i>M. Lanceolata</i> – <i>Callitris preissii</i> and the closed scrub of <i>Acacia rostellifera</i> . |
|  | Guilderton 1007 vegetation system association | Mosaic: Shrublands; <i>Acacia lasiocarpa</i> and <i>Melaleuca acerosa</i> heath / Shrublands; <i>Acacia rostellifera</i> and <i>Acacia cyclops</i> thicket.  |

##### Threatened and Priority flora

A desktop survey for Threatened and Priority flora that may potentially occur within the Study Area was undertaken using NatureMap (Parks and Wildlife 2007-), the Western Australian Herbarium (Western Australian Herbarium 1998-), and the DEE Protected Matters Search Tool (DEE 2015c).

Table 2 shows the Threatened and Priority flora potentially occurring within the Study Area based on the desktop search results. The desktop assessment identified one Threatened flora and three Priority flora species that have been recorded in the regional area. Of these, based on specific habitat requirements, no Threatened flora species and two Priority flora species have the potential to occur within the Study Area, including:

- *Leucopogon maritimus* (P1)
- *Stylidium maritimum* (P3).



Table 2: Threatened and Priority flora potentially occurring within the Study Area

| Species  | Conservation status     |            | Description  | Potential to occur  |
|--|-------------------------|------------|--|---|
|  | EPBC Act                | WC Act     |  |   |
| <i>Eucalyptus argutifolia</i> (Wabbling Hill Mallee) | Threatened – Vulnerable | Threatened | Mallee to 4 m tall with smooth bark. Flowers are white and visible March to April. Habitat for this species occurs within shallow soils over limestone, on slopes or gullies of limestone ridges and outcrops (Western Australian Herbarium 1998-).  | <b>Unlikely</b> – Preferred soil type/habitat does not occur within the Study Area. |
| <i>Leucopogon maritimus</i> (Coast Beard-heath)      | Not listed              | Priority 1 | A low, spreading shrubs to 40 cm tall and 60 cm wide, often multi-stemmed close to the base but single-stemmed at ground level with a fire-sensitive rootstock. <i>Leucopogon maritimus</i> is restricted to near-coastal Quindalup dunes, from a small area of coastline about 40–70 km north of Perth. It occurs in deep, calcareous sands, on the mid to upper slopes of dunes or in shallow sand over limestone, but avoiding the thicker vegetation of the swales. It grows in low heathland communities often dominated by <i>Melaleuca systema</i> , <i>Acanthocarpus preissii</i> , <i>Acacia lasiocarpa</i> and <i>Olearia axillaris</i> , sometimes in close proximity to the common coastal epacrids <i>Leucopogon parviflorus</i> and <i>L. insularis</i> (Hislop 2011). | <b>Possible</b> – Preferred habitat exists within the Study Area.                   |
| <i>Leucopogon</i> sp. Yanchep                        | Not listed              | Priority 3 | An erect shrub, 0.15-1 m tall, to 0.6 m wide. Flowers are white/pink, occurring from April to June or September. This species occurs in light grey-yellow sand, brown loam, limestone, laterite or granite on coastal plain, breakaways, valley slopes or low hills (Western Australian Herbarium 1998-).  | <b>Unlikely</b> – Preferred soil type/habitat does not occur within the Study Area. |
| <i>Stylidium maritimum</i>                           | Not listed              | Priority 3 | Caespitose perennial herb to 70 cm tall. Leaves tufted, linear to narrowly oblanceolate. Flowers are white or purple and visible September to November. Habitat for this species is sandy soils over limestone on dune slopes and flats, typically growing within coastal heath and shrubland or open Banksia woodland (Western Australian Herbarium 1998-).   | <b>Possible</b> – Preferred habitat exists within the Study Area.                   |

### Threatened and Priority Ecological Communities

Three Threatened Ecological Communities (TECs) and one Priority Ecological Community (PEC) were identified as part of the database searches as occurring within 5 km of the Study Area, including:

- *Banksia dominated woodlands of the Swan Coastal Plain IBRA region* (Endangered – EPBC Act<sup>1</sup>; Priority 3 PEC)
- SCP01: *Aquatic Root Mat Community Number 1 of Caves of the Swan Coastal Plain* (Endangered – EPBC Act, Critically Endangered – WC Act)
- FCT 26a: *Melaleuca huegelii - Melaleuca acerosa (currently M. systema) shrublands on limestone ridges* (Endangered – WC Act)
- FCT19b: *Woodlands over sedgeland in Holocene dune swales of the southern Swan Coastal Plain* (Endangered – EPBC Act, Critically Endangered – WC Act).

<sup>1</sup>This community was identified during the database search and is also recognised as the recently listed TEC – *Banksia woodlands of the Swan Coastal Plain* (Endangered – EPBC Act). There has not been sufficient time since the listing of the EPBC Act TEC to update State records to reflect the new community name and conservation status.

The field survey identified two potential PECs within the Study Area, as discussed further in the field survey results below.

### ***Field survey***

Strategen undertook a Level 2 flora and vegetation survey (Strategen 2016b; Appendix 3) of the proposed foreshore disturbance area and buffer area on 25 November 2016, in accordance with Level 2 survey requirements of *Guidance Statement 51 Terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia* and *Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2004a). The survey included a detailed assessment of the proposed disturbance area and the balance of the Study Area was traversed to confirm vegetation types of the Study Area.

A supplementary survey was undertaken within the southern portion of the foreshore reserve on 23 May 2017; to the south of the 2016 survey area, including detailed quadrat analysis (Strategen 2017; Appendix 3). The field survey was conducted according to standards set out in recently revised *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016). A summary of the findings of the surveys are detailed in the following sections.

Following the recent inclusion of additional foreshore reserve (subdivision approval WAPC 155520; Appendix 1), further supplementary flora and vegetation assessment was completed to capture the ecological values of the additional area. This data has been included in a revised version of the Level 2 flora and vegetation survey report (Appendix 3).

### **Threatened and Priority flora**

A total of 46 native vascular plant taxa from 37 plant genera and 25 plant families were recorded within the Study Area. The majority of native taxa were recorded within Myrtaceae (5 taxa), Fabaceae (5 taxa) and Chenopodiaceae (6 taxa) families.

No Threatened flora species as listed under section 178 of the EPBC Act or pursuant to Schedule 1 of the WC Act and as listed by Parks and Wildlife (2015) or Priority flora species as listed by Western Australian Herbarium (1998) were recorded within the Study Area at the time of assessment. The survey was conducted during the prime flowering time for these conservation significant species (spring), therefore during the optimum time for correct identification.

### **Vegetation of the Study Area**

Five native vegetation types (VTs) were defined and mapped within the Study Area (Figure 6) and are summarised in Table 3. Areas containing vegetation in parkland cleared or highly degraded state have not been counted as unique native VTs but have been included in Table 3 for area calculation purposes. Total areas occupied within the Study Area by each of the identified VTs are set out in Table 4.

Table 3: Vegetation Types

| Vegetation Type | Description  |
|-----------------|--|
| 1               | <i>Olearia axillaris</i> , <i>Atriplex isatidea</i> , <i>Spinifex hirsutus</i> , * <i>Cakile maritima</i> and * <i>Thinopyrum distichum</i> low shrubland on sandy soils.  |
| 2               | <i>Olearia axillaris</i> , <i>Acacia rostellifera</i> , <i>Rhagodia baccata</i> and <i>Scaevola crassifolia</i> heath over <i>Spinifex longifolius</i> , <i>Acanthocarpus preissii</i> , <i>Cassytha flava</i> , * <i>Pelargonium capitatum</i> and exotic grasses including on sandy soils.   |
| 3               | <i>Scaevola crassifolia</i> , <i>Olearia axillaris</i> , <i>Acacia rostellifera</i> , and <i>Spyridium globulosum</i> heath on dune crests and <i>Lepidosperma gladiatum</i> closed heath in dune swales over <i>Acanthocarpus preissii</i> , * <i>Pelargonium capitatum</i> * <i>Arctotis stoechadifolia</i> and exotic grasses on sandy soils.                     |
| 4               | <i>Olearia axillaris</i> , <i>Scaevola crassifolia</i> , <i>Acacia rostellifera</i> and <i>Acacia truncata</i> heath with emergent <i>Agonis flexuosa</i> over <i>Acanthocarpus preissii</i> , <i>Spinifex hirsutus</i> , * <i>Pelargonium capitatum</i> , and exotic grasses on sandy soils.  |
| 5               | <i>Allocasuarina humilis</i> and <i>Spyridium globulosum</i> mid shrubland over <i>Rhagodia baccata</i> , <i>Olearia axillaris</i> and <i>Scaevola crassifolia</i> heath on dune crests over <i>Lepidosperma gladiatum</i> closed heath in dune swales over <i>Acanthocarpus preissii</i> , <i>Cassytha flava</i> and * <i>Pelargonium capitatum</i> on sandy soils. |
| Planted         | Planted palms (* <i>Phoenix</i> sp.) and Japanese Pepper (* <i>Schinus terebinthifolius</i> ).   |
| C               | Cleared areas.   |

#### Vegetation type coverage

The area covered by each VT identified within the Study Area is listed below in Table 4 along with their percentage coverage. The dominant native VT within the Study Area is VT 3.

Table 4: Area (ha) covered by each VT within the Study Area

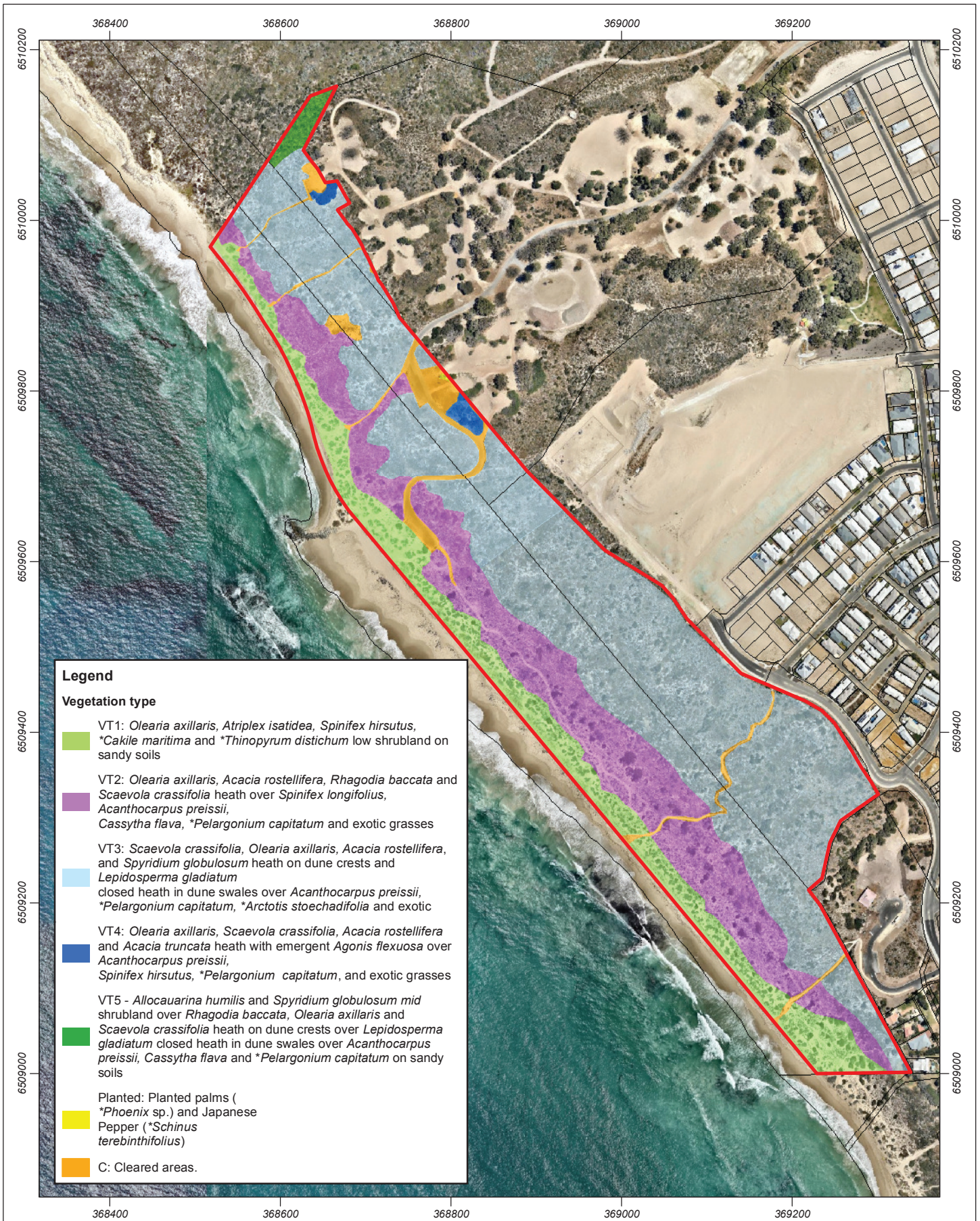
| VT           | Area (ha)    | Percentage of the Study Area |
|--------------|--------------|------------------------------|
| 1            | 3.29         | 13.8                         |
| 2            | 5.63         | 23.7                         |
| 3            | 12.95        | 54.5                         |
| 4            | 0.16         | 0.7                          |
| 5            | 0.23         | 1.0                          |
| Planted      | 0.01         | 0.03                         |
| Cleared      | 1.50         | 6.3                          |
| <b>TOTAL</b> | <b>23.77</b> | <b>100</b>                   |

#### Introduced (exotic) taxa

A total of 22 introduced (exotic) taxa were recorded within the Study Area. None of these species are Declared Plant species in Western Australia pursuant to section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM Act) according to the Western Australian Department of Agriculture and Food (DAFWA 2017).

Weed density within the Study Area was mapped and is presented in Figure 5 of Appendix 3. This information will inform the implementation of weed management, as discussed in Section 9.1.





**Figure 6: Vegetation types mapped within the survey area**

Scale 1:6,000 at A4



Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 19/12/2017

Author: JCrute

Source: Aerial image: Nearmap, flown 01/2017. Existing cadastre: SLIP, Landgate 2017. Master plan: Client 03/2017.

Path: Q:\Consult\2016\ADS\ADS16184\ArcMap\_documents\ADS16184\_G010\_RevA.mxd



**Legend**

- Study area
- Existing cadastre



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### Vegetation condition

Vegetation condition within the Study Area is generally in a 'Good' to 'Very Good' condition, however shows some signs of having been degraded for a long period of time due to anthropogenic disturbance (e.g. trampling dune vegetation for access to the beach). As such, vegetation condition within the survey ranged from 'Completely Degraded' to 'Very Good' and generally aligned with the VT boundaries (Keighery 1994; Table 5).

Table 6 gives a numerical breakdown of the area occupied by each vegetation condition rating within the Study Area.

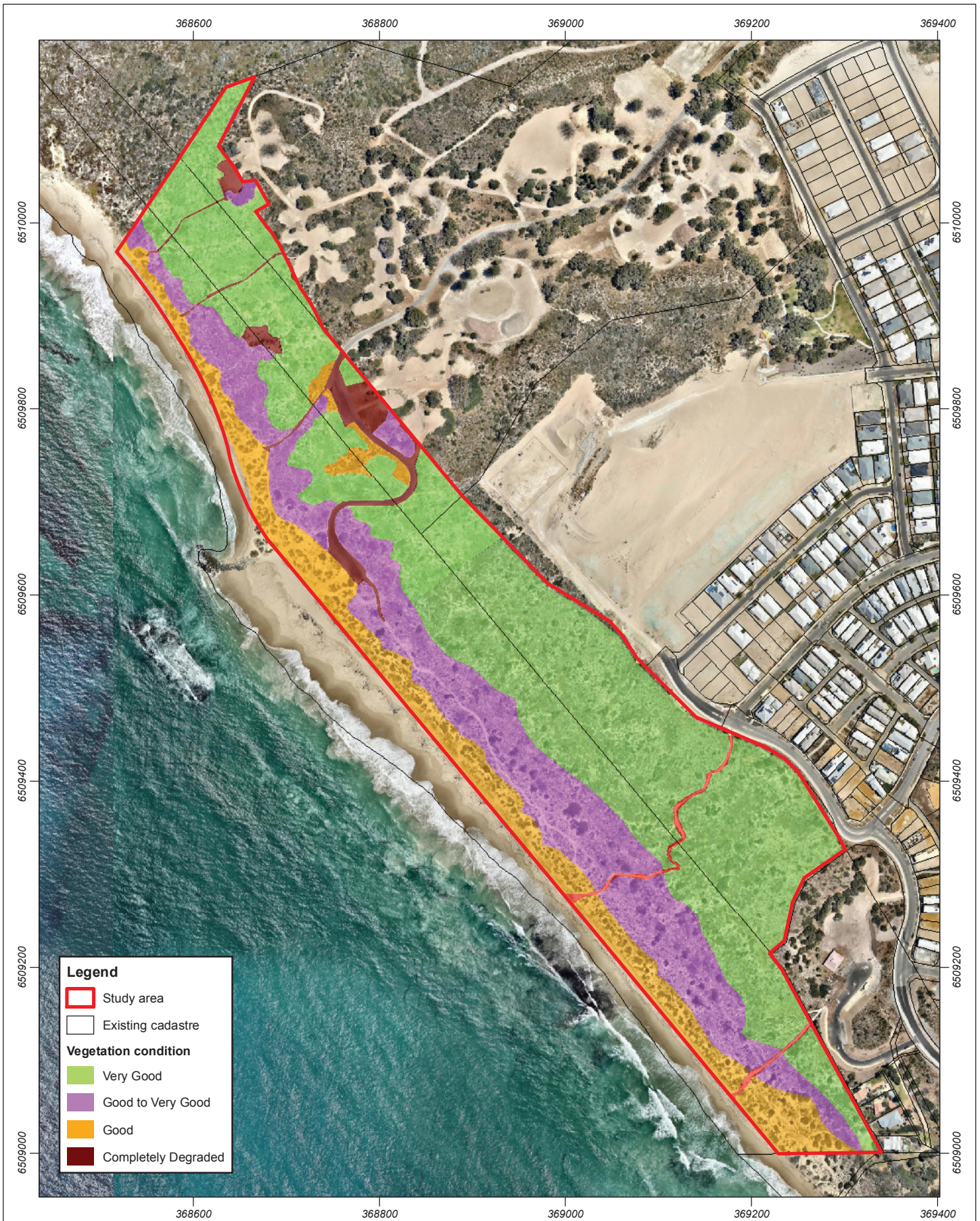
Table 5: Vegetation condition scale (Keighery 1994)

| Condition rating        | Description  |
|-------------------------|--|
| Pristine (1)            | Pristine or nearly so, no obvious sign of disturbance.   |
| Excellent (2)           | Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.  |
| Very Good (3)           | Vegetation structure altered obvious signs of disturbance.<br>For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.   |
| Good (4)                | Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.<br>For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback, grazing. |
| Degraded (5)            | Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.<br>For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.         |
| Completely Degraded (6) | The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.   |

Table 6: Area (ha) covered by each vegetation condition category within the Study Area

| Vegetation Condition | Area (ha)    | Percentage of the Study Area |
|----------------------|--------------|------------------------------|
| Very Good            | 11.30        | 47.54                        |
| Good to Very Good    | 7.20         | 30.29                        |
| Good                 | 3.76         | 15.82                        |
| Completely degraded  | 1.51         | 6.35                         |
| <b>Total</b>         | <b>23.77</b> | <b>100</b>                   |





**Figure 7: Vegetation condition mapped within the survey area**

Scale 1:5,500 at A4



Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 19/12/2017

Author: JCrute

Source: Aerial image: Nearmap, flown 01/2017. Existing cadastre: SLIP, Landgate 2017. Master plan: Client 03/2017.

Path: Q:\Consult\2016\ADS\ADS16184\ArcMap\_documents\ADS16184\_G011\_RevA.mxd



### Threatened and Priority Ecological Communities

The vegetation within the Study Area did not resemble a known TEC, however the vegetation within VT 2 and VT 3 may resemble two Priority 3 PECs; FCTs 29a (Coastal Shrublands on shallow sands) and 29b (*Acacia* Shrublands on taller dunes). These FCTs were recorded in the previous vegetation surveys within the region (ATA 2007).

FCT 29 is largely restricted to the Quindalup System and contains two distinct subgroups. FCT 29a comprises mostly heaths on shallow sands over limestone close to the coast and occurs between Seabird and Garden Island. FCT 29a does not have a single dominant species but important species include *Spyridium globulosum*, *Rhagodia baccata* and *Olearia axillaris*. FCT 29b is dominated by *Acacia* Shrublands or mixed heaths of the larger dunes and ranges from Seabird to south of Mandurah. There is no consistent dominant species in FCT 29b, however species such as *Acacia rostellifera*, *Acacia lasiocarpa* and *Melaleuca systema* are important. A total of 3.8 ha of FCT 29a and 9.1 ha of FCT 29b identified within the FMP foreshore reserve area surveyed during the flora and vegetation surveys (Strategen 2017, Strategen 2017a; Appendix 3).

FCT 29a is inferred to potentially occur within VT2 based on the dominant species recorded during the survey (e.g. *Rhagodia baccata* and *Olearia axillaris*) while VT 3 may represent FCT 29b as it comprises *Acacia rostellifera* and *Melaleuca systema*. These FCTs are also restricted to the Quindalup complex within which the Study Area occurs (GoWA 2000).

Therefore, it is considered likely that FCT 29a and FCT 29b occur within the Study Area based on previous survey results (ATA 2007), the known vegetation complex within the Study Area and dominant taxa recorded. The proposed foreshore development will result in the removal of 0.22 ha of VT 2 and 1.47 ha of VT 3. These FCTs are well represented within surrounding Bush Forever Site 397, under existing protection.

### *Summary of flora and vegetation values*

Vegetation within the Study Area was assessed as ranging from Completely Degraded to Very Good condition.

No Threatened flora species as listed under section 178 of the EPBC Act or pursuant to Schedule 1 of the WC Act and as listed by Parks and Wildlife (2015) or Priority flora species as listed by Western Australian Herbarium (1998) were recorded within the Study Area. The flora and vegetation surveys were conducted during the prime flowering time (Spring) for the Swan Coastal Plain region, to ensure identification of conservation significant species potentially occurring within the Study Area. The southern portion of the Study Area was also subject to an Autumn survey (in addition to Spring). As such, it is unlikely that occurrences of conservation significant species are present within the Study Area.

The vegetation within the Study Area did not resemble a known TEC; however, the vegetation within VT 2 and VT 3 may resemble two Priority 3 PECs; FCT 29a and FCT29b, comprising 5.63 ha and 12.95 ha of the Study Area respectively, of which 0.22 ha and 1.47 ha are proposed to be cleared to facilitate the Coastal Node works. These FCTs however are well represented within surrounding Bush Forever Site 397: Coastal Strip from Wilbinga to Mindarie.

#### **4.1.5 Fauna and fauna habitat**

##### *Desktop review*

A Naturemap search and Commonwealth Protected Matters search within a 1 km radius of the Study Area was undertaken to determine Threatened and Priority Fauna species known to occur in the broader area (Parks and Wildlife 2007, DotE 2016).

The database searches identified the following as potentially occurring within the Study Area:

- 31 listed Threatened fauna species protected under the EPBC Act
- 35 listed Migratory fauna species protected under the EPBC Act
- five rare or likely to become extinct species identified by nature map search
- three other specially protected fauna identified by nature map search
- four priority fauna identified by nature map search.

### ***Level 1 fauna survey***

Bamford Consulting Ecologists (Bamford) was commissioned to undertake a Level 1 fauna survey within the Study Area in accordance with EPA *Guidance Statement No. 56 Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004b; Appendix 4). The field component of the survey was undertaken in December 2016 and focussed on a 'values and impacts' approach to impact assessment with respect to fauna (Bamford 2017).

The Study Area is characterised by Quindalup dunes which are steeply undulating with soils of pale calcareous sands over limestone with vegetation comprising coastal heath with areas of sedgeland (Coastal Sword-Sedge *Lepidosperma gladiatum*) in some valleys (Bamford 2017). The Bush Forever site to the north includes similar vegetation and landforms to the Study Area, and is continuous with Yanchep National Park to the east (Bamford 2017).

The coastal heath on calcareous sand can be considered a single vegetation substrate association (VSA) that is well-represented to the north and south. The lack of variety in VSAs with the separation of the coastal heaths from more inland VSAs such as shrublands and woodlands will result in a slight reduction to the number of species present in the Study Area.

### **Fauna assemblage characteristics**

The fauna assemblage is largely determined by the vegetation, soils and landforms of the Study Area. The fauna assemblage includes approximately 166 potential vertebrate species, however all of these species are unlikely to occur, due to the limited range of environments present in the Study Area. Key features of the fauna assemblage expected in the Study Area are:

- Uniqueness: The assemblage is typical of heathland on coastal dunes, located throughout the Swan Coastal Plain Bioregion
- Completeness: A slightly depauperate fauna assemblage is likely to occur in the coastal heathland as some reptile, mammal and bird species are expected to be locally extinct
- Richness: The assemblage in the Study Area contains a moderate level of richness to be expected in relatively undisturbed intact heathland vegetation.

The likely composition of the major taxonomic groups is described in Table 7.

Table 7: Fauna assemblage

| Taxonomic group | Anticipated species numbers   |
|-----------------|---|
| Frogs           | Four species of frog may occur in the Study Area. Frog species are likely to be locally common, regionally widespread and can be expected to breed in seasonal wetlands in the region.  |
| Reptiles        | 53 species of reptile are known from the general area. The majority of reptile species that may occur in the area are common and regionally widespread on the coastal plain north of Perth.   |
| Birds           | 92 species of bird may occur in the Study Area, however species that may occur include species that fly over the Study Area occasionally and therefore do not strictly use the Study Area.  |
| Mammals         | 17 mammal species could be present in the Study Area, including five introduced species and several species are considered to be locally extinct.<br>Approximately half of the native species potentially occurring in the Study Area are bats, known from the general region north of Perth. |
| Invertebrates   | Some species of conservation significance are known from the region.  |



### Conservation significant species

Based on the likely fauna assemblage of the Study Area, as described above, a total of 38 species of conservation significance may occur in the Study Area. Species of conservation significance have been divided into three categories including:

1. Conservation significance (CS) 1 - listed under legislation (EPBC Act; WC Act).
2. Conservation significance (CS) 2 - listed as Priority by Department of Parks and Wildlife (Parks and Wildlife).
3. Conservation significance (CS) 3 - locally significant or otherwise of note in the area.

A summary of the key conservation significant species, comprising CS 1 and CS 2, recorded or with the potential to occur within the Study Area is presented in Table 8.

Table 8: Conservation significant species recorded or with the potential to occur in the Study Area

| Species  | Conservation status                            | Likelihood of occurrence within the Study Area  |
|--|--|---|
| <i>Species of conservation significance level 1</i>            |  |   |
| Carnaby's Black-Cockatoo<br><i>Calyptorhynchus latirostris</i> | Endangered<br>EPBC Act<br>Schedule 2<br>WC Act | The species is likely to be an irregular non-breeding visitor to the Capricorn area; it is common and with some pairs breeding slightly inland around Yanchep National Park. It is known to feed on seeding Banksia and Eucalyptus as well as proteaceous heaths (Johnstone and Storr 1998), which does not occur in the Study Area.<br><br>The coastal heathland present within the Study Area provides minimal foraging value for the species. Due to the lack of suitable plant species, the foraging value ranges from a score of 1 to 2 out of 6.<br><br>No evidence of roosting or nesting was recorded during the site inspection, and based on the lack of suitable habitat is unlikely to occur. |
| Rainbow Bee-eater<br><i>Merops ornatus</i>                     | EPBC Act<br>Marine<br>Schedule 5<br>WC Act     | The Rainbow Bee-eater has recently been delisted as a Migratory species under the EPBC Act, however is listed as a Marine species under the Act. The Schedule 5 listing under the WC Act is likely to change as a result.<br><br>The Rainbow Bee-eater was not recorded during the site inspection, but is likely to nest in the area during spring and was recorded at Burns Beach.  |
| Eastern Osprey<br><i>Pandion cristatus</i>                     | EPBC Act<br>Marine<br>Schedule 5<br>WC Act     | The Eastern Osprey has recently been delisted as a Migratory species under the EPBC Act, however is listed as a Marine species under the Act. The Schedule 5 listing under the WC Act is likely to change as a result.<br><br>The Eastern Osprey was not recorded during the site inspection. The species may be an infrequent visitor to the Study Area.   |
| Fork-tailed Swift<br><i>Apus pacificus</i>                     | EPBC Act<br>Migratory<br>Schedule 5<br>WC Act  | This species occurs as a spring to autumn, non-breeding migrant to Australia, and is widespread but infrequently observed in coastal and subcoastal areas between Augusta and Carnarvon, including nearshore and offshore islands. This species was not recorded during the survey but may occur occasionally on site, although it is a largely aerial species mostly independent of terrestrial ecosystems.  |
| Peregrine Falcon<br><i>Falco peregrinus</i>                    | WC Act<br>Schedule 7                           | This species is known to occur over a wide range of environments across Australia. Preferred nesting locations include a range of elevated locations with steep topography such as rocky hills, breakaways, cliffs and high artificial structures. The Peregrine Falcon may be a regular foraging visitor to the site, but the area would represent a very small proportion of a pair's range.  |
| <i>Species of conservation significance level 2</i>            |  |   |
| Black-striped Snake<br><i>Neelaps calonotos</i>                | Priority 3                                     | The Black-striped Snake is restricted to the west coast from just north of Lancelin to Mandurah and, although locally common in some environments on the Swan Coastal Plain, its persistence is threatened by continuing loss of habitat due to urban development throughout its range. The species may be locally extinct at Capricorn and Yanchep due to habitat fragmentation.<br><br>The species was not recorded during the survey but can be difficult to find.   |

| Species   | Conservation status | Likelihood of occurrence within the Study Area   |
|---|---------------------|--|
| Quenda, Southern Brown Bandicoot<br><i>Isoodon obesulus fusciventer</i> | Priority 5          | The Quenda occurs in the south-west coast from Guilderton north of Perth to east of Esperance. This species previously occurred north to Geraldton but like many mammals in the region has undergone a large range reduction (Maxwell et al. 1996). It is commonly associated with dense, low vegetation, so may be present in heathland habitats within the Study Area. No evidence (diggings or tracks) of the species was recorded. |
| Brush Wallaby<br><i>Notamacropus irma</i>                               | Priority 4          | The Brush Wallaby occurs in a range of shrublands and woodlands across much of the south-west of Western Australia, but is at risk from clearing and Foxes. The species was not recorded during the site inspection.   |

Source: Bamford 2017

### **Summary of fauna values**

Overall, the fauna assemblage is constrained by the limited range of environments present in the Study Area and the adjacent development areas (Bamford 2017). Few species of conservation significance are present, however locally significant birds and mammals may utilise the site. The fauna assemblage is affected by the long, narrow shape of the Study Area and its relationship to areas of protected native vegetation to the north and south. A total of eight conservation significant species comprising five EPBC Act listed species and 3 Priority species were recorded or have the potential to utilise the Study Area. None of the species recorded or with the potential to occur are considered to be restricted or rely solely on the Study Area; therefore, any impacts are expected to be minor and can be readily managed through the implementation of avoidance measures, including relocation of fauna species prior to clearing activities commencing. Fauna management is discussed in Section 9.2.

#### **4.1.6 Social environment**

##### **Land-use history**

The land use history for the Study Area and the lagoon adjacent to the southern boundary of the Study Area is detailed in Table 9.

Table 9: Land use past and present for the Study Area

| Timeframe | Land use  |
|-----------|---|
| Past      | <ol style="list-style-type: none"> <li>1. The Yanchep Lagoon (located south of the Study Area) was historically used as an anchorage for the fishing and crayfishing industries until the 1970s when the Two Rocks Marina was constructed. Mary Lindsay (original owner of the Mindsay Homestead) who settled in the area in 1926 was actively involved in protecting the natural dune environmental and assisting the fishing industry. Mary Lindsay built a hostel and store providing water, food and tackle to campers and fishermen within the area (inHerit 2015).</li> <li>2. Fishermans Hollow and Yanchep Lagoon (immediately south of the Study Area) have been used recreationally by holiday makers since the early 1900s (inHerit 2015).</li> <li>3. The Study Area was utilised up until June 2015 as guests and visitors of the Club Capricorn chalets, hotel and caravan park.</li> </ol> |
| Present   | The Study Area is currently utilised for recreational activities such as walking, surfing, swimming, recreational fishing and other beach usage. Access to the Study Area is currently via existing boardwalk access points and historic beach access points that will be upgraded as part of the foreshore development.  |

##### **Aboriginal heritage**

A search of the Department of Aboriginal Affairs (DAA; now DPLH) site register on 5 September 2016 identified one registered mythological site within the Study Area. The site is identified as:

- Yanchep Beach - Site ID 17599.

This heritage site is located within land subject to an Indigenous Land Use Agreement (ILUA) with the Whadjuk People. As the proposed development within the Study Area has the potential to impact on the heritage site, a s 18 clearance to enable disturbance within the Study Area may be required in accordance with provisions of the *Aboriginal Heritage Act 1972* (AH Act). CVJV will consult with relevant parties to determine the requirement for approval prior to commencing development within the Study Area as detailed further in Section 9.8.

### *European heritage*

A search of the City of Wanneroo Heritage Sites Register and the State Heritage Council Register on 5 September 2016 identified three and five heritage listed sites respectively. The three heritage sites listed on the CoW Heritage List are:

- Lindsay Homestead (Site No. 67) – southeast of the Study Area
- Yanchep Lagoon (Site No. 106) – south of the Study Area
- Fishermans Hollow (Site No. 35) – south of the Study Area.

The five heritage sites listed on the State Heritage Register include:

- Club Capricorn (Club Capricorn Resort) (Heritage Place No. 17527) – east of the Study Area
- Fishermans Hollow (Heritage Place No. 17532) – south of the Study Area
- Mary Lindsay Homestead (Well and Sheep Dip) (Heritage Place No. 14280) – southeast of the Study Area
- Well & Sheep Dip (Lindsay Homestead) (Heritage Place No. 14297) – southeast of the Study Area
- Yanchep Lagoon (Heritage Place No. 17949) – south of the Study Area.

The Mary Lindsay Homestead was the first building in the Yanchep–Two Rocks area and is located on private land vested to the Crown and managed by the CoW, immediately south of the Study Area. Recent works have been undertaken at the Mary Lindsay Homestead, including construction of beach access boardwalks, redevelopment of the POS component of the homestead, including the installation of play and picnic areas and a carpark. The works undertaken at Mary Lindsay Homestead continue to be undertaken by CoW. The Mary Lindsay Homestead, whilst occurring in close proximity to the Study Area, does not form part of the foreshore area and is being managed separately by the CoW.

Yanchep Lagoon is a popular destination for residents from both Yanchep and Two Rocks. It is located just south of the Study Area and provides a sheltered lagoon for family swimming due to the protection provided by the offshore reef. It is also used for snorkelling, recreational fishing and windsurfing and has a number of facilities provided to facilitate these activities including car parking, picnic areas, a kiosk, toilets and a surf club (ATA 2004). The Yanchep Lagoon heritage site will not be impacted by any development within the proposed foreshore area.

Fisherman's Hollow is seen as historically significant due to its associations with Mary Lindsay, the original owner of Lindsay Homestead. Socially, Fisherman's Hollow is significant for its associations with the early fishing industry and for the recreational pursuits undertaken there over the majority of the twentieth century (InHerit 2012). The Fisherman's Hollow heritage site will not be impacted by any development within the proposed foreshore area.

The Club Capricorn facility historically incorporated a group of accommodation chalets, a caravan park and manager's quarters and a two storey rendered brick and terracotta tiled roofed lodge. Club Capricorn is viewed as historically significant due to its associations with Alan Bond, aesthetically significant as it includes a group of buildings in the West Australian Vernacular style and socially significant to people who have enjoyed it recreationally throughout its lifetime (inHerit 2012). As part of the development at Capricorn the CVJV are redeveloping the historic Club Capricorn area, as detailed further in Section 6.

#### 4.1.7 Social values

##### *Population Growth*

The proposed development of the Yanchep–Two Rocks area is expected to support an ultimate population of 155 000 expected over the next 40 years to accommodate 2–3% of the national population growth (Roberts Day 2010). A total population of approximately 13 600 people resided in Yanchep as of 2015, a growth of approximately 1700 people or 14.1% between 2014 and 2015 (ABS 2016). The Capricorn Coastal Node Structure Plan for the Capricorn Coastal Node provides a guiding framework for the detailed urban design and development of the Capricorn Centre. Approximately 2700 residential lots for approximately 7300 residents alone are proposed for the Capricorn Coastal Node and include a primary school, shopping precinct, resort/hotel and a Retirement Village.

Yanchep's population growth will create a number of opportunities for the foreshore reserve. The introduction of appropriate facilities and infrastructure will enhance the social and recreational use within the Study Area, providing commercial, tourism and recreational possibilities. Conversely, the increase in Yanchep's population and the use of the Study Area has the potential to increase pressure on the natural environment. The potential increased levels of infrastructure and facilities will result in potential vegetation clearing and conflict between groups of recreational users may be encountered. Additionally, actions such as unauthorised access, the introduction of weeds, illegal littering and pollution have the potential to damage the natural environment.

##### *Recreation Use*

The main focus of the proposed development is to enhance and increase the recreational uses of the Study Area. Currently, the Study Area is utilised by residents for recreational activities including swimming, walking, recreational fishing, snorkelling, its scenic value, windsurfing and kitesurfing. Existing facilities include two boardwalks providing access from Capricorn Esplanade to the beach and general public access is also provided via the historic Club Capricorn driveway.

The Yanchep Lagoon, to the south of the Study Area, is the main focus of recreational activity in the Yanchep area. The sheltered waters of the lagoon provide families with a safe swimming environment, while still being popular for snorkelling, recreational fishing, windsurfing and kitesurfing.

##### *Anticipated Future Beach Use*

In order to facilitate the future recreational demands on the Study Area, the types of activities likely to occur must be determined and required infrastructure and facilities planned for. This will ensure the future recreational demands can be met and the natural environment is conserved. Potential recreational activities likely to occur within the Study Area include:

- swimming, sunbathing, snorkelling and wading
- surfing, boogie boarding and bodysurfing
- windsurfing and kitesurfing
- surf lifesaving
- fishing
- walking, jogging, dog exercising, exercising
- picnicking, viewing scenery and environmental and heritage education.

The above activities can be enhanced by infrastructure and facilities of some description to cater for the increasing population. Potential infrastructure and facilities include beach access, car parking space, toilets, bike racks, change rooms, a kiosk, a dual use path, rubbish bins, signage, picnic areas, grassed areas and surf lifesaving facilities.

The proposed foreshore development (Section 6) aims to provide ample and appropriate infrastructure and facilities to meet the future recreational demands for the Study Area while protecting the natural environment.

## 5. Coastal facilities demand

A review of the planning context relating to the Yanchep area including the demand for coastal facilities was undertaken to inform the FMP. The review was based on an assessment completed by MP Rogers and Associates (MRA), for the Yanchep-Two Rocks Project '*Predicted Future Demand for Coastal Facilities - Yanchep-Two Rocks Project*' (MRA 2008) and utilised methodology discussed in the approved Alkimos Beach Foreshore Management Plan (RPS 2015). Additionally, key CoW policy documents have been utilised to inform infrastructure and facilities required within the foreshore reserve.

### 5.1 Predicted Future Demand for Coastal Facilities

To confirm the level of demand for coastal access within the Study Area, and therefore the information to inform the coastal access infrastructure required; the assessment included a review of population predictions. Population predictions were based on staging plans identified in the St Andrews DSP (2007) and the Yanchep-Two Rocks DSP (Roberts Day 2010) as detailed in Table 10.

Table 10: Yanchep-Two Rocks population predictions

| Year | Population |
|------|------------|
| 2021 | 21 560     |
| 2033 | 56 296     |
| 2046 | 110 628    |
| 2058 | 154 091    |

Source: MRA 2008

MRA undertook a preliminary assessment of the Perth Metropolitan coastline in 2005 in order to determine a conservative physical processes setback for the coastline (MRA 2008). The physical processes lines determined as part of the 2005 study were used as part of the 2008 coastal facilities demand assessment.

As part of the 2008 study, the level of beach use within the Yanchep-Two Rocks area was determined based on a review of the beach usage from Ocean Reef to Fremantle. The length of coast at Yanchep - Two Rocks is approximately 14 km, in comparison to the Ocean Reef to Fremantle length of coastline of 32 km. Peak usage of Ocean Reef to Fremantle is approximately 14 000 people (during a peak use day), therefore it is expected that peak use for Yanchep - Two Rocks will see around 6 400 people using the beaches, when utilising the same ratio. This corresponds to a level of beach usage of around 4% of the local population (MRA 2008). Based on the beach usage estimates, predictions of beach patronage at regional, district and local beaches were made, as summarised in Table 11.

Table 11: Beach usage by classification

| Beach classification | Predicted no. People per metre of beach |
|----------------------|---|
| Regional             | 2                                       |
| District             | 1.2                                     |
| Local                | 0.7                                     |

Source: MRA 2008

Considering the possible level of beach usage along the Yanchep - Two Rocks coast and the planned suburb growth, it is apparent that the demand for coastal access will be significant in the future. The predicted urbanisation must therefore be reflected in the provision of facilities along the foreshore. Associated with this increase in facilities, the beach capacity must be strategically maximised so that the supply of beach access at least meets demand (MRA 2008).



A beach hierarchy plan was prepared by MRA as part of the 2008 study which classified the Study Area as a district beach (MRA 2008). The facilities usually associated with a district beach include:

- 150 car parking bays
- provision of toilets
- grassed areas
- shade/shelter
- picnic facilities
- kiosk/deli
- playground
- lighting.

A total of five district beaches were identified as part of the coastal facilities study to inform the Yanchep-Two Rocks DSP (MRA 2008). The study estimated that once developed, the length of beach that receives regular use for each district would be approximately 800 m, with the combined patronage anticipated to be 4 800 people (MRA 2008). One of the key recommendations from the study was to develop the regional beach on the southern section of the shoreline in close proximity to the regional activity centre and associated public transport routes. In addition, that the regional beach should be adjacent to a coastal activity centre to ensure integration of foreshore development (MRA 2008).

## 5.2 Local Planning Policy 4.21

The CoW Local Planning Policy 4.21 (LPP 4.21) released in August 2016 provides guidance as to the type of permanent and temporary assets that the CoW will consider within foreshore reserves and in relation to the location of proposed assets in relation to coastal processes as determined in accordance with SPP 2.6.

Consistent with the provisions of the LPP 4.21, the Study Area was classified as a district beach as part of the 2008 MRA assessment detailed in Section 5.1 above, prepared in support of the endorsed ASP 75. Accordingly, infrastructure proposed within the Study Area has been determined consistent with permitted infrastructure for a district beach as per LPP 4.21; as described further in the supporting DA.

Adaptation planning measures for the proposed foreshore infrastructure have been developed, consistent with SPP 2.6, supporting management guidelines and LPP 4.21 as detailed in Section 7 and the supporting DA.

## 6. Foreshore development, design and function

### 6.1 Design vision

The overarching vision for the Capricorn Beach development, comprising the Capricorn Village and Coastal Node is to create an intrinsically Australian coastal hamlet where residents and visitors feel like they are in a serene environment, despite the nearest convenience being only a short distance away. The design vision capitalises on the natural environment within the development area and surrounds, for example, the large number of mature trees to be retained within the Coastal Node.

The development has been designed to provide residents with a relaxed coastal, resort-like lifestyle. The established parklands, pristine beach, and quality design, aim to make Capricorn Village and Coastal Node and the north of Perth a more desirable place for people to establish a home.

The design vision and concept has been developed based on a number of key considerations including:

1. Regional and local context and demand factors - the Capricorn Beach development is currently underway and will provide approximately 3500 dwelling units, including the provision of the Coastal Node area providing tourism and accommodation facilities. In addition, based on the increased population predicted within the area, beach usage and pressure on the foreshore reserve is likely to increase, therefore resulting in the requirement for a considered and appropriate foreshore design and management strategy.
2. Coastal hazard and risk management - *State Coastal Planning Policy (SPP) No. 2.6: Coastal Hazard Risk Management and Adaption Planning* and the Coastal Hazard Risk Management and Adaption Planning Guidelines are key policy documents utilised in developing the Concept Plans and Masterplan, as detailed further in Section 7.
3. Environmental site characteristics - the Study Area comprises important environmental values for the Capricorn precinct and larger Yanchep area and therefore requires careful management. Access control is a key management measure to assist in controlling disturbance to areas outside of the proposed development areas. The Study Area, particularly the foreshore park area comprises unique topography associated with the dune system. This topography and landform function has been enhanced as part of park design to recreate a distinctive landscape design.
4. Maximising previously disturbed areas - the Study Area and surrounds have been subject to historic disturbance associated with the Club Capricorn infrastructure and existing beach access infrastructure. The foreshore concept plans have been designed to maximise development within previously disturbed areas and minimise disturbance to areas not subject to previous clearing.
5. Management considerations - to ensure the continued and improved condition of the foreshore area, a number of management strategies for key environmental and planning factors have been developed, including, flora, vegetation and weeds, fauna, fire, revegetation, Aboriginal heritage, access and public awareness, information and safety.

In consideration of the above, foreshore design and function promotes the enhancement and ongoing management of the environment within the Study Area, whilst facilitating various land uses of the Capricorn area, including tourism development.

### 6.2 Current foreshore and surrounding infrastructure

Development adjacent to the Study Area has been undertaken over a number of years. Development has included a range of works primarily related to the provision and upgrade to beach access points and redevelopment works associated with the Mary Lindsay Homestead (located to the south of the Study Area). Table 12 includes a summary of the works completed to date.

Table 12: Current foreshore infrastructure

| Infrastructure                               | Responsibility | Status   | Location within the Study Area |
|--|----------------|--|--------------------------------|
| Beach access 2, Capricorn Esplanade, Yanchep | CVJV           | Construction complete. Handover to the CoW accepted (24 April 2015). | Not within the Study Area.     |
| Mary Lindsay Homestead redevelopment works   | CoW            | Construction underway.   | Not within the Study Area.     |

### 6.3 Design concept - structural elements

The Capricorn Village Coastal Node is classified as a District Level Beach Node that will provide open space and recreational facilities adjacent to a dedicated tourism site and urban development. This Coastal Node is proposed to be constructed on a portion of the old Club Capricorn tourism site which was originally internal roads, informal carpark and managed landscaped areas adjacent chalets (now removed). Located at the western end of old Club Capricorn with access off Two Rocks Road, the retention of existing trees and meandering road to this node creates a unique landscape not found in developments in the northern corridor.

The POS character will reflect that of the Capricorn and Yanchep region, and will have higher specification treatments adjacent to the tourism site as a way of blending the landscape between public and private domains. Facilities proposed have been considered in relation to the future Mary Lindsay Homestead node and the Yanchep Lagoon node, and in addition, review the current usage of the northern beach area. The diversity of surrounding future development including lifestyle lots, high density living, tourism and possible commercial development requires this coastal node to allow full flexibility for the range of end users, which will extend to the existing Yanchep residents.

The Coastal Node will deliver the following key facilities:

1. Two beach access points located along existing tracks. Minor disturbance will be required within the Study Area to facilitate required upgrades to current beach access points.
2. Conservation of the foreshore reserve, retention of existing dune formations and vegetation with restricted access via fencing.
3. Consideration of the coastal processes with the majority of amenities located outside of the 100 year coastal processes line.
4. Provision of a range of activities including open grass kick-about, viewing areas with decks, resting areas with shade, playground, barbeques, drink fountains and public art catering for a range of beach users.
5. Provision of best practice sustainable planting and tree species that will maximise site stabilisation, provide shade and protection from winds. The potential to transplant trees from within the Club Capricorn site for shade within the Coastal Node POS will be also be investigated.
6. Use of local provenance species in all areas on the opposite of the conservation fencing to the development / landscaped areas.
7. Universal access along pathways, provision of ACROD parking, and disability access to facilities.
8. Use of existing lower car park area as a temporary asset.
9. Toilet and change room facilities.

Construction of various components of the coastal node will be undertaken over a staged timeline. Rehabilitation planting will be proposed to soften the boundary between the developed and managed parkland area and the foreshore dunes.

The key structural and design elements within the Study Area, including the Coastal Node POS and beach access points have been developed consistent with requirements of SPP 2.6 and the CoW *LPP 4.21 Coastal Assets Policy* (CoW 2016), as detailed in the supporting DA documentation. The Coastal Node and POS area comprises 2.38ha and is classified as a 'District/Potential Future Regional Beach' adjacent to a 'Coastal Tourist Activity Centre' in the Yanchep -Two Rocks District Structure Plan (2009). The Coastal Node POS forms part of an expanded Foreshore Reserve which is in addition to the minimum 10% POS provided in the adjacent Capricorn Yanchep development, as outlined in ASP 75 and ASP 44. The Coastal Node and POS utilises previous disturbance areas where possible, however will involve some areas of new disturbance including approximately 1.68 ha, which represents approximately 7.5% of the 22.41 ha Study Area.

The Coastal Node POS has been divided into categories, as detailed in the Capricorn Village: Coastal Node POS park assets table (refer to supporting DA), including:

- key facilities
- minor fixtures
- play area
- lookout structures.

A detailed summary of POS park assets is presented in the supporting DA and summarised in the following sections. Indicative cost estimates for life cycle/asset management for the works proposed within this FMP have been developed in accordance with the CoW asset template as discussed below and provided in the supporting DA.

### 6.3.1 Proposed key facilities

The proposed key facilities for the Study Area comprise of the following:

- shade structure
- picnic settings
- various seating (moonstone curved sculpture seat; treeline bench seat)
- directional and sculptural signage
- electric barbecues
- drink fountain
- outdoor showers
- pole top lights
- concrete and rock sea stack structures.

In addition, the supporting DA details the coastal vulnerability of each of the key facilities. Importantly, the majority of key infrastructure is located outside of the 100-year coastal vulnerability line as shown on Figure 8.

### 6.3.2 Proposed minor fixtures

The proposed minor fixtures for the Study Area comprise of the following:

- tree grille/grates
- bike racks
- beach safety signage
- in ground decking.

All proposed minor fixtures will be constructed outside the 50-year coastal vulnerability line, with the exception of beach safety signage that is required within these zones to assist in maintaining a safe beach environment.

### 6.3.3 Proposed play area

The proposed play area within the Study Area comprise of the following:

- shade sails over play items
- ocean theme
- lookout tower
- large embankment slide
- embankment wave slide
- net play
- swing
- boat/dinghy play component
- hand grips
- toddler springers/rockers.

All infrastructure within the play areas are outside of the 100-year coastal vulnerability lines as presented in Figure 8.

### 6.3.4 Lookout structures

The lookout structures will be constructed from lightweight and recyclable materials making it easier to disassemble and reassemble to a new location if necessary. The lookout structures are outside of the 50 year and 25 year coastal vulnerability lines as presented in Figure 8 and the supporting DA.

### 6.3.5 Access paths and carpark

SPP 2.6 requires the provision of public access to the coast that is consistent with the values and management objectives of the area including, the interests of security, safety and protection of coastal resources as well as the recreational opportunities, both on and offshore, of that section of coast. The main beach access pathway comprises seated resting areas, showers and drink taps. A 3 m wide universal and maintenance access pathway also traverses the site providing direct access from the car park to open space areas.

The existing carpark comprises 34 bays, this carpark will act as the temporary carpark until the permanent carpark is required. The temporary carpark is located seaward of the 50-year coastal processes line and therefore is proposed to be subject to a retreat management approach. The permanent carpark as shown on Figure 8 comprises 74 bays including 4 ACROD bays and is located behind the 100-year coastal processes line.

In addition to the proposed access points within the POS area, existing beach access paths will be upgraded to facilitate controlled access of the site.

In accordance with the recent subdivision approval (WAPC 155520), a dual use path (DUP) will be installed inside of the northern Study Area boundary.

### 6.3.6 Conservation fencing

Physical barriers to prevent pedestrian and vehicular access to conservation areas will be installed around the entire coastal node and POS boundary, as shown indicatively in Appendix 5. Conservation fencing will be installed to the City's standards and will be easy to disassemble to allow for coastal processes.



### 6.3.7 Surveillance

The Capricorn Village Coastal Node has been designed in accordance with Crime Prevention Through Environmental Design (CPTED) principles. The general design provisions ensure ample opportunity for passive and active surveillance and include:

- footpaths through the site from one end to the other which provide regular pedestrian traffic, with associated regular passive surveillance, to all parts of the park, particularly the play area
- a lookout deck within the dunes which has two access points to allow users to access and leave the deck, so they cannot be 'trapped' in a dead end
- always two ways out of a space, with no dead ends generally
- all spaces are open to a footpath to prevent hidden undesirable behaviour
- all shrubs adjacent to the footpaths are low groundcovers for a width of at least 1m to prevent 'hiding areas'
- many seating points at the play area to allow parents to sit within close active surveillance of their children playing
- shade structures with picnic facilities, positioned within close proximity of the play area or kick about area to again provide close active surveillance of children playing
- toddler play items are placed close to the shade structures for easy active surveillance
- all of the play is designed to prevent dark, hidden corners or places where children could be trapped
- shrub planting is mainly to the periphery of the park to allow long cross views from one side of the park to the other for long range passive surveillance
- any shrubs within the play area are low to allow views across the area
- all entry points to the toilets are open to view from the park.

In terms of lighting, there is plenty of debate relating to lighting in relation to parks as lighting can extend the duration of evening use which may be desirable, but this can also lead to extended periods of use of certain items such as play, which can be undesirable due to safety aspects and noise. As such we have allowed for pole lighting to key footpaths across the park only to enable safe walking from the foreshore road to the beach and car park to the beach.

### 6.3.8 Stormwater infrastructure

#### *Road and carpark*

Currently, stormwater runoff from the existing road and carparks within the foreshore reserve is not managed and is directly discharged to the surrounding environment. The coastal node development proposes to install flush kerbing, and formalised stone-pitched "v" drains for scour protection (as shown in cross-section in Appendix 6).

Groundwater recharge will be maximised through the adoption of 'Best Management Practices' that promote the dispersion and infiltration of runoff as close to source as possible. The proposed stormwater infrastructure is also designed to provide scour protection for existing natural hydrological flows.

The foreshore area has free draining soils with adequate separation to ground water, which is conducive to infiltration of water at source. In order to aid nutrient stripping of stormwater, prior to infiltration, the batters adjacent to the carpark and road infrastructure will be vegetated with selective species known to act as a biofilter, as shown in the detailed drawings in Appendix 10. It is noted that these drawings are for contextual purposes only and are subject to future approvals, including appraisals with the DA.

The proposed drainage design is consistent with Water Sensitive Urban Design Principles (WSUD) and will prevent any direct, uncontrolled drainage to the surrounding Bush Forever site. In accordance with WSUD principles, the proposed drainage design will:

- improve the water quality of water draining from the road and carpark through nutrient stripping, and
- reducing peak flows and runoff from the urban environment through scour protection kerbing, simultaneously providing for infiltration and groundwater recharge.

The dispersion of stormwater will maximise the area of recharge through the soil profile to the shallow aquifer, thereby maximising the potential for nutrient stripping and water quality improvements.

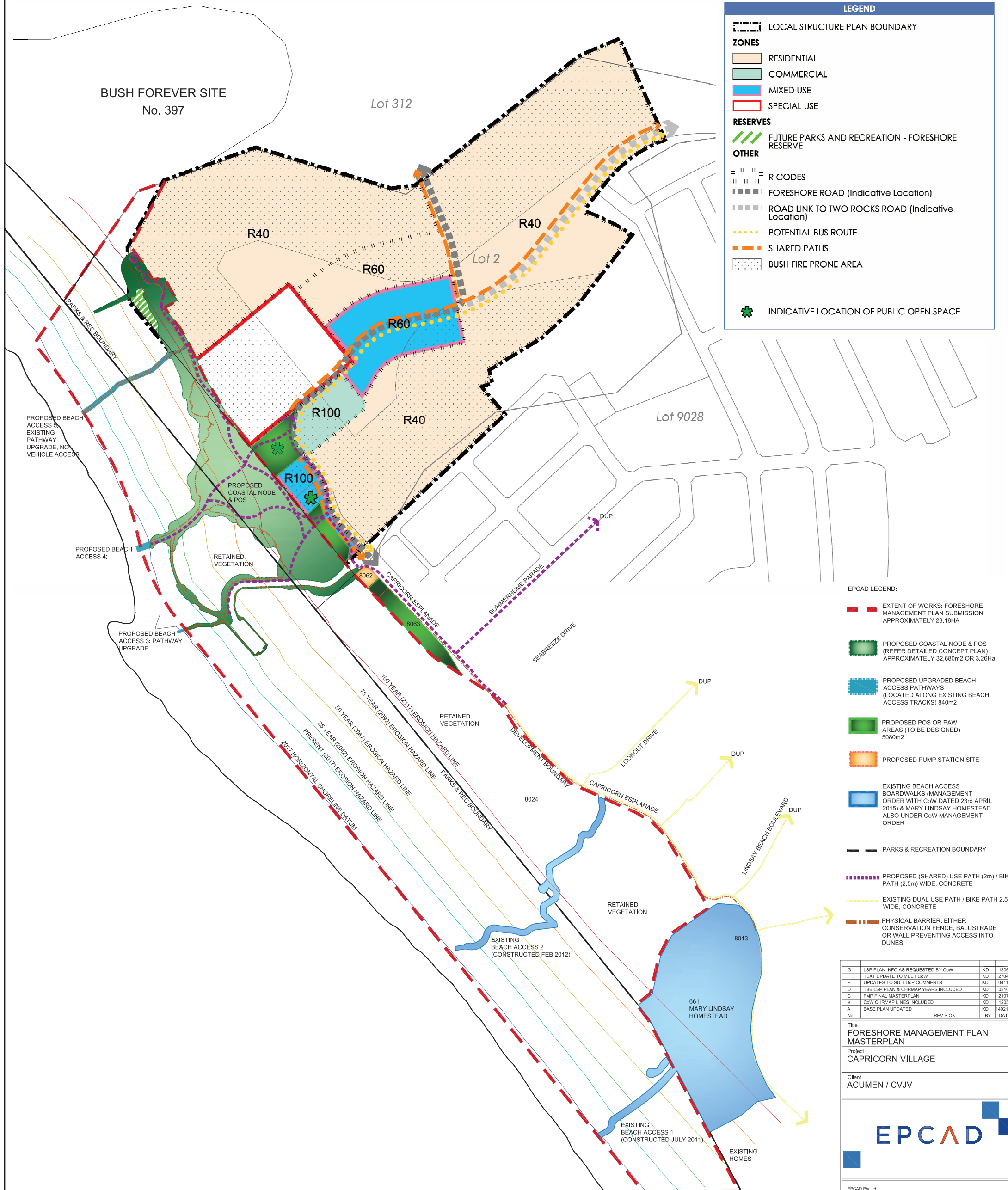
In accordance with SPP 2.6 development will not substantially alter the existing natural drainage patterns, nutrient and organic matter cycling processes, near shore sediment transport patterns or water quality. The proposed drainage design will result in an improvement to the existing infrastructure which currently allows direct drainage into the surrounding environment, without any scour protection.

The drainage infrastructure proposed for the access road and carpark is expected to be adequate for the life of the carpark and access road. At closure of the access road, at the end of the 50-year planning timeframe, scour protection will be provided at the terminal end of the access road (if retained). The close-off point of the access road coincides with the edge of the catchment (a high point), resulting in stormwater being channelled through a catchment to the north and into associated drainage infrastructure (see Appendix 6).

#### ***Other Coastal Node infrastructure***

The infrastructure proposed within the Coastal Node has been designed to allow natural infiltration and scour protection including:

- boardwalks designed with 5 mm gaps between decking to avoid collection of water and allow natural water infiltration
- paths will be installed at a gentle 2% cross slope to ensure sheeting runoff into surrounding areas and avoidance of scouring
- landscaping will be undertaken adjacent to infrastructure to prevent erosion
- all hard treatments within the Coastal Node will be designed and constructed to have gentle cross falls to prevent ponding or significant collection of water, whilst avoiding scouring.



**LEGEND**

- LOCAL STRUCTURE PLAN BOUNDARY
- ZONES**
  - RESIDENTIAL
  - COMMERCIAL
  - MIXED USE
  - SPECIAL USE
- RESERVES**
  - FUTURE PARKS AND RECREATION - FORESHORE RESERVE
- OTHER**
  - R CODES
  - FORESHORE ROAD (Indicative Location)
  - ROAD LINK TO TWO ROCKS ROAD (Indicative Location)
  - POTENTIAL BUS ROUTE
  - SHARED PATHS
  - BUSH FIRE PRONE AREA
  - INDICATIVE LOCATION OF PUBLIC OPEN SPACE

**EPCAD LEGEND:**

- EXTENT OF WORKS: FORESHORE MANAGEMENT PLAN SUBMISSION APPROXIMATELY 23.18HA
- PROPOSED COASTAL NODE & POS (REFER DETAILED CONCEPT PLAN) APPROXIMATELY 32,680m<sup>2</sup> OR 3.26Ha
- PROPOSED UPGRADED BEACH ACCESS PATHWAYS (LOCATED ALONG EXISTING BEACH ACCESS TRACKS) 840m<sup>2</sup>
- PROPOSED POS OR PAW AREAS (TO BE DESIGNED) 5080m<sup>2</sup>
- PROPOSED PUMP STATION SITE
- EXISTING BEACH ACCESS BOARDWALKS (MANAGEMENT ORDER WITH CoW DATED 23rd APRIL 2015) & MARY LINDSAY HOMESTEAD ALSO UNDER CoW MANAGEMENT ORDER
- PARKS & RECREATION BOUNDARY
- PROPOSED (SHARED) USE PATH (2m) / BIKE PATH (2.5m) WIDE, CONCRETE
- EXISTING DUAL USE PATH / BIKE PATH 2.5m WIDE, CONCRETE
- PHYSICAL BARRIER: EITHER CONSERVATION FENCE, BALUSTRADE OR WALL PREVENTING ACCESS INTO DUNES

| No. | REVISION                             | BY | DATE   |
|-----|--------------------------------------|----|--------|
| G   | LSP PLAN INFO AS REQUESTED BY CoW    | KD | 180616 |
| F   | TEXT UPDATE TO MEET CoW              | KD | 270418 |
| E   | UPDATES TO SUIT DUP COMMENTS         | KD | 041113 |
| D   | TBB LSP PLAN & CHRMAP YEARS INCLUDED | KD | 031017 |
| C   | FMP FINAL MASTERPLAN                 | KD | 210717 |
| B   | CoW CHRMAP LINES INCLUDED            | KD | 120517 |
| A   | BASE PLAN UPDATED                    | KD | 140217 |

**Title**  
FORESHORE MANAGEMENT PLAN MASTERPLAN

**Project**  
CAPRICORN VILLAGE

**Client**  
ACUMEN / CVJV



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Project No. Category Drawing No.  
**B0494/FMP/M01**

Date FEB 2017 Revision  
Scale 1:2000 @ A1  
Issue FMP  
Drawn KD Checked G

Figure 8: Foreshore Masterplan



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## 7. Coastal hazard risk management

In accordance with *State Coastal Planning Policy (SPP) No. 2.6: Coastal Hazard Risk Management and Adaption Planning* is required in any areas that may be at risk from coastal hazards. SPP 2.6 and the Coastal Hazard Risk Management and Adaption Planning Guidelines are required to be utilised in conjunction to manage potential coastal risks along the Western Australian coastline.

### 7.1 Coastal Aquatic Risk Assessment

A Coastal Aquatic Risk Assessment (CARA) of the Study Area was undertaken by Surf Life Saving Western Australia (SLSWA 2017) to support the FMP (Table 13). The purpose of the assessment was to assess the suitability of the beach as a recreational aquatic activity and swimming beach and review existing signage and determine required signage to ensure a safe beach is maintained.

The CARA determined that Capricorn Beach, adjacent to the Study Area is suitable for continued usage for recreational aquatic activity, particularly Capricorn Beach north of the groyne, due to the absence of rock/reef platforms, however recommendations to improve the safety of the beach were provided. The infrastructure recommended to support safe aquatic recreation in the area, includes:

- defined access tracks
- emergency vehicle access points
- safety signage.

The CARA study report (Appendix 7) provided 11 recommendations relating to the signage and access to the Study Area. Table 13 below lists these recommendations and how each of these will be addressed.

Table 13. Implementation of CARA report recommendations

| CARA recommendation reference | Recommendation  | Implementation of recommendation   |
|-------------------------------|---|--|
| Recommendation 1              | Formal pedestrian access points and emergency vehicle access should be provided to the designated beach and recreational areas. Identified hazards specific to access tracks should be removed where appropriate. Access to unsuitable or hazardous areas should be restricted or removed.  | Formal pedestrian and emergency vehicle access points have been proposed including a pedestrian path from the POS area to the beach, and a pedestrian path and vehicular access-way from the coastal node car park to the beach. These access-ways are shown indicatively on Figure 8 and will be finalised through the Development Application process. |
| Recommendation 2              | The party responsible for implementing and maintaining access points and therefore communication of risk (i.e. safety signage) should implement an inspection regime to assess the installation, adequacy and visibility of in-situ aquatic and recreational safety signage. Records of the inspections and actions should be maintained. | The proponent will implement and maintain access points (including safety signage) for a period of five years, including maintaining records of inspections and actions. Following this period, the City of Wanneroo will be the responsible party. The proponent will provide copies of any associated records to the City upon handover.               |
| Recommendation 3              | The party responsible for implementing and maintaining aquatic safety signage should ensure the number of individual signs at any one location is maintained to a minimum, wherever possible. A single point of information for warning, regulation and information signage reduces confusion and visual pollution.                       | The proponent will install informative and hazard signage at all beach access points. Signage locations will be determined through the development application process and will generally be in accordance with Appendix H of the CARA.  |

| CARA recommendation reference | Recommendation   | Implementation of recommendation   |
|-------------------------------|--|--|
| Recommendation 4              | <p>The party responsible for implementing and maintaining safety signs adopts and maintains emergency location signage identifiers, as shown in the National Aquatic and Recreational Signage and Style Manual (NARSSM).</p> <p>These should be incorporated into any new safety signage in the Capricorn Development. This should be done in consultation with relevant emergency services agencies and the City of Wanneroo. A numbering system will need to be developed and adopted by the party responsible for maintaining access tracks and signs. Future municipal/residential developments need to be taken into account to avoid out of sync codes/location identifiers associated with future developments.</p> | <p>In consultation with relevant emergency services agencies and the City of Wanneroo, the proponent will adopt and maintain (for five years) emergency location signage identifiers, as shown in the National Aquatic and Recreational Signage and Style Manual (NARSSM). Following this period, the City of Wanneroo will be responsible for this maintenance.</p> |
| Recommendation 5              | <p>The party responsible for implementing and maintaining aquatic safety strategies should consider the installation of an operational, storage and first aid facility and associated surveillance station at Capricorn Beach. These facilities will provide a base for lifesaving services to operate as required.</p>  | <p>SLSWA storage annex facility is proposed in the Capricorn Beach amenity building.</p>   |
| Recommendation 6              | <p>The party responsible for implementing and maintaining aquatic safety strategies should develop, implement and review Emergency Action Plans (EAPs). This activity is to assure a planned and coordinated response to the range of potential and localised aquatic and recreation emergencies that may occur along the foreshore reserve.</p> <p>The EAPs should take into account the difficulties in accessing locations, delay of response and the inherent risks of the locations.</p>  | <p>The proponent will consider the preparation of an Emergency Action Plan where required by the City of Wanneroo.</p>   |
| Recommendation 7              | <p>The party responsible for implementing and maintaining aquatic safety strategies should, in association with other water safety and emergency response organisations, develop a planned and adequately resourced approach to improving long term awareness and education opportunities as they relate to safer aquatic recreation at Capricorn Yanchep.</p>   | <p>The proponent will work with the SLSWA Yanchep branch to develop education and awareness of aquatic safety at Capricorn Beach.</p>  |
| Recommendation 8              | <p>Land Manager to consider an awareness program that develops a resident's safety booklet/flyer or similar to be distributed or promoted to new home owners, businesses and tourists in the Capricorn Yanchep Development.</p> <p>This booklet should contain general beach safety information and messages in addition to safety information which is specific to the Yanchep area.</p>  | <p>As above.</p>   |



| CARA recommendation reference | Recommendation   | Implementation of recommendation  |
|-------------------------------|--|---|
| Recommendation 9              | The party responsible for implementing and maintaining aquatic safety strategies should implement the use of Quick Reader (QR) codes on aquatic and recreational safety signage. Users of this technology are taken to safety information and in languages and translations that are relevant to their culture and language. The use of QR codes should form part of any aquatic awareness and education programs. | The proponent will consider the use of Quick Reader (QR) codes are used on aquatic and recreational safety signage.   |
| Recommendation 10             | The party responsible for implementing and maintaining aquatic safety strategies to consider, and where practicable, implement engineered options to minimise the risks associated with dune and beach scarping and discourage access to these areas.  | Development of the coastal node includes measures to restrict access including conservation fencing (see fencing strategy Appendix 5) and formalised pathways. These measures are detailed on landscape concept plans which have been submitted with the Development Application. |
| Recommendation 11             | The party responsible for implementing and maintaining aquatic safety strategies should review and continue to enhance aquatic recreation public safety injury data and information collection. This should include the collation and analyses deemed necessary to underpin accurate risk assessment and effective risk treatment plans and actions.   | The proponent will review and continue to enhance aquatic recreation public safety injury data and information collection where requested by the City of Wanneroo.  |

The risk assessment found that the current overall risk level for Yanchep and Capricorn Beach was a low risk level and planning priority. The CARA identified as part of a hazard identification and risk assessment a range of key risk treatments that could be applied to the proposed foreshore development, based on hazards and their individual risk to public safety.

The CARA noted that the risk treatments identified should be reviewed to determine which risk treatments are appropriate and can feasibly be implemented at the Capricorn Beach. Risk treatments to be applied, consistent with SLSWA recommendations as summarised in the following sections.

### 7.1.1 Access and ongoing maintenance (Recommendation reference 1 and 2)

The following recommendations were made in relation to access and ongoing maintenance:

- consider wider emergency access for vehicles and other approved users
- remove hazards associated with access tracks and recreational areas where possible
- restrict access to areas not suitable for swimming or recreational use
- major access points should direct swimmers to more 'friendly areas for swimming, including patrolled areas
- Consider development of a sufficient vehicle access track between Yanchep Beach and Capricorn Beach, ideally behind the groyne, to allow for potential roving patrols from Yanchep Beach SLSWA.

Pedestrian access points and emergency vehicle access details are provided in the detailed landscaping drawings provided in the supporting DA. Management recommendations in relation to access and maintenance are detailed in Section 0.

### 7.1.2 System of safety signage (Recommendation reference 3, 4 and 9)

Appropriate signage was noted during the CARA within the Study Area, however some signage has been removed as part of the Club Capricorn demolition works and damaged and out of date temporary signage was also observed. SLSWA recommends that once access tracks, roads and carparks are developed or upgraded, appropriate signage should be installed, including:

- beach and aquatic safety signage
- location signage
- aquatic zoning signage
- signage relating to location of toilets/disabled access
- signage relating to location of nearest lifesaving service
- local government regulation signage
- environmental and conservation signage
- community information signage including safety, security and crime prevention.

An inspection regime for signage was also recommended as part of the CARA. Details regarding the proposed signage inspection are included in the supporting DA and Section 0.

### 7.1.3 System of supervision (Recommendation reference 5)

The CARA included an assessment of the lifesaving service level requirements. The assessment concluded that a lifesaving service is not required at Yanchep or Capricorn Beach, comprising the Study Area, however the requirement for lifesaving services will need to be reassessed as development progresses within the Coastal Node.

Activity zoning should be considered as required by the final land manager (CoW) as development in the area progresses and conflicting aquatic and recreation activities occur, i.e. surfing and swimming.

### 7.1.4 Existence of emergency action plans (Recommendation reference 6)

The SLSWA CARA assessment recommends that the party responsible for implementing and maintaining aquatic safety strategies should develop, implement and review Emergency Access Plans (EAP) to ensure a planned and coordinated response to the range of potential and localised aquatic and recreation emergencies that may occur along the foreshore reserve.

### 7.1.5 Education and awareness (Recommendation reference 7 and 8)

A recommendation of the CARA was to promote awareness for beach safety within the Yanchep area through communication with residents. In order to promote safety awareness, a range of measures have been proposed as detailed in Section 9.9.

### 7.1.6 Dune vegetation maintenance (Recommendation reference 10)

The CARA noted some erosion along the dune faces and near informal access points, however the remaining dunes were identified as being stable and well vegetated and unlikely at this stage to promote any hazards in terms of erosion and sand collapse.

The proposed development of the Coastal Node will further reduce the potential for erosion by ensuring dedicated access points are constructed and revegetation of tracks no longer used and informal tracks is undertaken. Details relating to beach access are included in the supporting DA and revegetation management is discussed in Section 9.4.

## 7.2 Coastal hazard risk

As part of the planning undertaken for the proposed Capricorn development, MRA were engaged to complete a review of the coastal erosion hazard allowances for the North Yanchep development areas including:

- North Yanchep Coastal Setback Assessment (MRA 2013)
- North Yanchep – North of Groyne Assessment of Setback (MRA 2014).

Both assessments were completed in accordance with Schedule 1 of SPP 2.6; noting that the 2013 assessment was completed in January, prior to the most recent amendment to SPP 2.6 in July 2013. Notwithstanding this, as noted with the 2013 study, a draft of the proposed 2013 revision to SPP 2.6 was available at the time, therefore an assessment of coastal setbacks (now termed coastal erosion hazard allowance) was made in accordance with the proposed amendments to the policy. These proposed amendments have subsequently been adopted as policy, therefore the assessment presented within this report was consistent with requirements of the 2013 version of SPP 2.6.

It is noted that the assessment was completed for the extent of sediment cell 30a (as illustrated in Figure 3.1 of the 2013 MRA report) in order to demonstrate compliance with SPP2.6. However, areas outside of the FMP development area are associated with future proposals and controls and as such, are outside of the scope of this FMP.

As approximately 5 years has passed since completion of the assessments (using shoreline movement information up until 2012), an update to the assessment was completed using aerial imagery from February 2017. Results of the 2017 are summarised in the following sections and the complete report is provided in Appendix 8. The string files associated with the assessment have been provided to CoW and DPLH.

### 7.2.1 North of the Capricorn Village Groyne

Assessment of the shoreline position in 2017 shows a continuation of the trends observed prior to 2012. Essentially, the shoreline north of the Capricorn Village groyne has accreted markedly since 1965. As a result, the allowance for long term shoreline movement (S2) that were made remain appropriate. Likewise, the allowances for severe storm erosion (S1) and coastal recession due to sea level rise (S3) also remain appropriate.

### 7.2.2 South of the Capricorn Village Groyne

Assessment of the shoreline position in 2017 for the shoreline south of the Capricorn Village groyne also shows a continuation of the trends observed prior to 2012. The shoreline immediately south of the Capricorn Village groyne has accreted markedly since 1965, however the extent of ongoing accretion reduces with distance south. In fact, since 1996 the shoreline just south of the Mary Lindsay Homestead shows an erosion trend of around 0.3 m/year.

This trend is consistent with the shoreline movement noted within the CHRMAP Part 1 works (MRA 2015) completed for the City of Wanneroo. As a result, the allowances for long term shoreline movement (S2) will need to vary across the expanded assessment area.

A long-term shoreline movement allowance (S2) of 0 m/year will be appropriate for the shoreline from the Capricorn Village groyne extending south 600 m (MRA 2013; chainages 1,500 to 2,100 m). From this location, the S2 allowance will need to transition to 0.3 m/year at a location around 900 m south of the groyne (MRA 2013; chainage 1,200 m).

Consideration of the severe storm erosion (S1) and coastal recession due to sea level rise (S3) allowances suggests that the values outlined in the MRA report (2013) will be appropriate over the expanded assessment area given the similar aspect, exposure and form of the coastline.

Total coastal erosion hazard allowances for a variety of planning horizons are subsequently provided in Tables 2 and 3 of the MRA (2017) report for the area immediately south of the groyne (MRA 2013; chainages 1,500 to 2,100 m) and the location 900 m south of the groyne (MRA 2013; chainage 1,200 m) respectively. These allowances are measured in a landward direction from the Horizontal Shoreline Datum (HSD) which has been updated based on the 2017 information.

### 7.2.3 Concluding comments

It is noted that the locations of the coastal hazard lines determined as part of the assessment are slightly different to those prepared for CoW as part of the CHRMAP Part 1 works. The reason for this difference is as follows:

1. The CHRMAP Part 1 works used data up to and including 2015. This investigation for the CVJV has used data up to and including 2017. Some small differences in the location of the shoreline between 2015 and 2017 are noted (generally up to 2-3 m) and will affect the locations of the coastal hazard lines.
2. The CHRMAP Part 1 works required consideration of different timeframes, including a 105 year planning horizon to 2120. As a result, the S3 Allowance for sea level rise was slightly bigger than required for this CVJV study (due to the extended planning horizon of 105 years versus 100 years). Furthermore, the Allowance for Uncertainty was also 1 m greater given the extended planning horizon.

The coastal hazard lines between the CVJV and CoW assessments are slightly different, however MRA have advised that the coastal erosion hazard lines determined by the MRA (2017) report prepared for CVJV are the most appropriate coastal hazard lines to be used to guide coastal planning within the Study Area, given that the assessment includes the most recent data and planning horizon of 100 years, as required in SPP 2.6.

## 7.3 Coastal Hazard Risk Management and adaptation planning

SPP 2.6 requires proponents to consider the potential risk to development associated with coastal hazards. Where risk assessments identify a level of risk that is unacceptable to the affected community or proposed development, adaptation measures need to be prepared to reduce those risks to acceptable or tolerable levels. The hierarchy, presented in a sequential and preferential basis with regard to the coastal hazard risk requires:

- avoid - the presence of new development in an area affected by coastal hazards
- planned or managed retreat - relocation or removal of assets within an area identified as likely to be subject to intolerable risk damage from coastal hazards over the planning timeframe
- accommodation - If sufficient justification can be provided for not avoiding development of land that is at risk from coastal hazards then accommodation adaptation measures should be provided that suitably address the identified risks
- protection - where sufficient justification can be provided for not avoiding the use or development of land that is at risk from coastal hazards and accommodation measures alone cannot adequately address the risks from coastal hazards, then coastal protection works may be proposed for areas where there is a need to preserve the foreshore reserve, public access and public safety, property and infrastructure that is not expendable.

All significant public assets and private properties proposed to be developed are located outside of the 100 year coastal processes line, resulting in an 'avoidance' management strategy from coastal hazards. Some infrastructure occurs within the 50 year coastal processes line including:

- temporary carpark (consistent with its current location)
- existing beach access points.



The proposed location of these facilities in closer proximity to the coast provides for improved amenity for the users and ensures connection to the coast is maintained. However, a reduction in the north-south alignment of the foreshore will occur over time resulting in a reduction in the need for certain infrastructure with eventual removal; including the temporary carpark, the north-south connecting boardwalk and emergency vehicle access. As such, a managed retreat approach is proposed for this infrastructure.

With the exception of the carpark, the north-south boardwalk and emergency vehicle access may no longer be required in the future as the shoreline decreases. In addition, existing north-south linkages will remain within the Coastal Node area, including the 2.5 m wide dual use path and 3 m wide reinforced access pathways which are located further landward.

The temporary carpark will be removed as required as part of the managed retreat approach and the proposed carpark servicing the coastal node will cater for the loss of the temporary carpark, as detailed in the supporting DA.

As the foreshore reserve width is reduced, beach access points will be reduced and relocated if required, to coincide with the rate of coastal movement. To ensure the risk of coastal hazards impacting within the Study Area is contemporary and appropriate for the infrastructure, it is recommended that ongoing monitoring and review of structures is undertaken. Future reassessment of coastal vulnerability may be required in future to determine appropriate new locations for infrastructure.

Infrastructure within the Study Area will continue to be managed for a period of 5 years by CVJV following practical completion prior to handover to the CoW as discussed in Section 8.

A summary of the proposed 'Coastal Hazard Risk Management and Adaptation' measures is provided in Table 14 and Appendix 9.

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Table 14: Summary of Coastal Hazard Risk Management and Adaptation Measures

| Planning timeframe | Structural element                       | Monitoring  | Proposed Risk Management and Adaptation   |
|--------------------|--|---|---|
| 0 to 25 years      | Beach access (northern)                  | Inspected following severe storms or swell events.                              | Fencing and sand pathway to be regraded and reinstated should sand build up or damage occur. West- east path allows for retreat over time.  |
|                    | Beach access (central)                   |   | Fencing and concrete pathway to be regraded and reinstated should sand build up or damage occur. West- east path allows for retreat over time.  |
|                    | Beach access (southern)                  |   | Fencing and sand pathway to be regraded and reinstated should sand build up or damage occur. West- east path allows for retreat over time.  |
|                    | Safety signage                           | Monitoring undertaken as part of standard maintenance inspections.              | Safety signage to relocated eastward as coastline shifts. Materials easily dissembled.  |
|                    | Pathway connection                       | Prior to removal, inspected following severe storms or swell events.            | Pathway to be regraded and reinstated should sand build up or damage occur, until requiring complete removal. Pathway connection will be removed and permanently closed. Access available along beach front as sand will cover existing groyne.   |
|                    | Lower carpark (12 car bays only)         | Inspected following severe storms or swell events.                              | Sand build up will be removed and damage repaired. At 25 years, 12 car bays permanently removed. Area will be rehabilitated to prevent erosion until shoreline approaches.  |
| 25 to 50 years     | Beach access (northern)                  | Inspected following severe storms or swell events.                              | Redesigned to suit new levels. Concrete to be removed and reinstalled with step access and fencing. Remove all new structures and replace. West- east path allows for retreat over time.  |
|                    | Beach access (central)                   |   | Redesigned to suit new levels. Concrete to be removed and reinstalled with graded landings. Fencing to be removed where damaged. West- east path allows for retreat over time.  |
|                    | Safety signage                           | Monitoring undertaken as part of standard maintenance inspections.              | Safety signage to relocated eastward as coastline shifts. Materials easily dissembled.  |
|                    | Retaining walls                          | Inspected for natural degradation, and following severe storms or swell events. | Retaining wall to be removed and rehabilitated with planting.   |
|                    | Concrete pedestrian footpath             |   | Concrete to be removed in lieu of natural sand beach pathway with fencing realigned.  |
|                    | Lower carpark                            |   | Carpark will be permanently closed and removed after natural degrading or coastline intrusion occurs. Additional parking will be provided to the east of coastal node as shown in Appendix 9. Detailed information regarding these parking bays will be provided in a relevant DA for the adjoining site in the location of the proposed bays. Drainage infrastructure (swale) may need to be relocated to terminus end of access road. |
| 50 to 75 years     | Beach access (northern)                  | Inspected for natural degradation, and following severe storms or swell events. | Redesigned to suit new levels. Reinstalled with step access and fencing. Remove all new structures and replace.   |
|                    | Concrete pathway (beach access-central)) |   | Removed, regraded and reinstated should sand build-up or damage occur.  |
|                    | Retaining walls and fencing              |   | Retaining wall to be removed and rehabilitated with planting.   |
|                    | Access to lookout                        |   | Fencing, steps and path to be removed and regraded should sand build up or damage occur.  |
|                    | Road to lower car park                   |   | At 50 years, when carpark permanently closed, road will be removed unless retained for emergency vehicle access to the beach. Pedestrian footpath retained.   |
|                    | Built lookout access                     |   | Southern end permanently removed. Sand track can be provided should levels allow.   |
|                    | Safety signage                           | Monitoring undertaken as part of standard maintenance inspections.              | Safety signage to relocated eastward as coastline shifts. Materials easily dissembled.  |
| 75 to 100 years    | Beach access (northern)                  | Inspected for natural degradation, and following severe storms or swell events. | Redesigned to suit new levels. Reinstalled with step access and fencing. Remove all new structures and replace.   |
|                    | Bench seats                              | Monitoring undertaken as part of standard maintenance inspections.              | Replaced or relocated as needed.  |
|                    | Seated and shaded resting area           | Inspected for natural degradation, and following severe storms or swell events. | Removed and rehabilitated with native planting.   |
|                    | Retaining walls                          |   | Retaining wall to be removed and rehabilitated with planting.   |
|                    | Lookout access                           |   | Fencing, steps and path to be removed and regraded should sand build up or damage occur. A new lookout location provided east of 100 year coastal processes line, as shown in Appendix 9. Lookouts would be included only if a lack of surveillance due to coastal infrastructure being damaged or threatened by coastal processes. The details of this infrastructure will be included in future DAs.                                  |
|                    | Outdoor shower                           | Monitoring undertaken as part of standard maintenance inspections.              | Relocated or replaced at 100 years.   |
|                    | Safety signage                           | Inspected for natural degradation, and following severe storms or swell events. | Safety signage to relocated eastward as coastline shifts. Materials easily dissembled.  |
|                    | Southern road                            |   | Road will be removed unless retained for emergency vehicle access to the beach.   |
|                    | Concrete and soft landscaping            |   | Concrete and soft landscaping removed. Access will be closed through native planting.   |

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## 8. Management framework and responsibilities

### 8.1 Implementation

Construction of the Coastal Node infrastructure within the Study Area will be undertaken over two broad stages as described further in the supporting DA, with implementation of the FMP taking place over five years as described in Section 9. The DA documentation provides a greater level of detail, including detailed landscaping, engineering and drainage design as required. Notwithstanding this, the CoW will have regard to this FMP when considering future development of the Study Area.

This FMP will be implemented by the proponent and relevant contractors engaged to undertake individual works programs. Implementation and management responsibilities are discussed further for each factor detailed in Section 9.

### 8.2 Maintenance and practical completion

Maintenance works within the foreshore reserve are planned to continue for five years following practical completion, prior to being handed over to the CoW for management in perpetuity. Practical completion as defined in this FMP is 'sign-off' from the CoW when development (landscaping, construction or revegetation works) have been undertaken in accordance with detailed landscaping/engineering drawings and plans and the Capricorn FMP. The CoW practical completion process requires that the following documentation be provided to the CoW prior to sign-off:

- 'As constructed' landscape plans in PDF format, in DWG format
- bore installation details, controller manuals and software
- 'As constructed' electrical plans in PDF format, in DWG format
- electrical certification for lights, BBQ, bore cabinet etc
- copy of current bore licenses (license to take water).
- certification for playground and playground audit (required upon installation prior to practical completion and on an annual basis thereafter)
- building permits where required for structures
- 'As constructed' irrigation plans in PDF format, in DWG format
- o-spec documentation.

Following a final inspection by CoW additional detail will be required including:

- capital costs of all physical assets for inclusion in the CoW asset register
- 12-month maintenance schedule and estimate of annual maintenance costs.

Maintenance requirements for the foreshore area will be similar to the maintenance expectations for POS outlined in the CoW LPP 4.3: POS (2010) and *CoW Public Open Space Landscape Design Specification*; whereby:

- the City being satisfied that the maturity of vegetation, density of planting, species selection and standard of infrastructure are consistent with that specified in the landscaping plan approved by the City, as being acceptable for handover to the City
- for at least 12 consecutive months prior to handover, the developer maintaining the POS to the same standard as it would otherwise be maintained by the City post-handover
- the developer providing the City with annual metered bore water usage data for any irrigated public open space during the term of their maintenance period, to demonstrate compliance with the water licence allocation for that area
- the developer providing the City with as-constructed drawings and asset management data for the public open space and any facilities/infrastructure contained therein

- the developer undertakes a playground equipment audit (as per Australian Standards) after the installation of the play equipment, prior to the City's practical completion inspection and prior the park opening to the public by and independent auditor
- the developer undertakes any remediation work required as a consequence of the audit (as deemed by the City) is to be undertaken by the developer and approved by the City prior to the park opening to the public.

The City's maintenance service level includes:

- shade structure, inspect 3 weekly
  - picnic settings maintained 6 monthly
  - moonstone sculpture seat 6 monthly
  - bench seat 6 monthly
  - BBQ varied- dependent on park use
  - drink fountain – repair as required
  - outdoor shower – repair as required
  - pole top lights – check operational monthly - 6 monthly RCD check
  - bike racks – 6 monthly
  - beach signage – as required
  - in ground decking – as required
  - slide tower 3 weekly
  - nets – 3 weekly
  - swing – 3 weekly
  - row boat – see-saw, basket swing, rubber soft fall 3 weekly
  - balustrade as and when damaged
  - granite clad walls as and when damaged
- concrete walls as and when damaged.

In addition to the above, the developer is required to maintain the Study Area for five years following practical completion, in accordance with SPP 2.6. Where the developer has not adequately addressed the conditions of Clause 8.1 of LPP 4.21, an extended handover period will be required as per Clause 8.2 of LPP 4.21, in accordance with the relevant DA condition.

### 8.3 Handover

Handover of the Study Area to the CoW after the five-year maintenance period will include provision of documentation to the specifications of the City of Wanneroo.

### 8.4 Timing

Timing for development of infrastructure within the foreshore area is proposed to commence mid- 2018 and be completed by 2020. A more detailed schedule of development has been included in the supporting DA. The Study Area will be created as a 'Parks and Recreation' reserve and vested to the Crown as agreed by CVJV and the WAPC. Upon the transfer of the foreshore to the Crown, the foreshore will be vested to the CoW.

## 9. Foreshore management considerations

This section provides a summary of key considerations for the management of the Study Area, focussing on management of environmental and social values associated with all aspects of the Project. Key factors relevant to the management of the foreshore values include:

- flora, vegetation and weeds
- fauna
- fire
- revegetation
- Aboriginal heritage
- access
- public awareness information and safety.

### 9.1 Flora, vegetation and weed management

A total of 2.44 ha of native vegetation comprising two Priority 3 PECs; FCT 29a (0.22 ha ) and FCT29b (1.47 ha), is proposed to be cleared within the Study Area to facilitate construction of foreshore infrastructure. It is noted however that these PECs are well represented throughout the region and in conservation as part of Bush Forever 397. Furthermore, development within the Study Area has been designed to minimise the clearing footprint, whilst maximising use of previously disturbed areas for the placement of assets and infrastructure.

Weed density within the Study Area was mapped and is presented in Figure 5 of Appendix 3. This mapping identifies areas where weed density is high and will inform the implementation of weed management.

Development within the Study Area has the potential to impact on flora and vegetation through the following:

- accidental clearing of vegetation outside of the agreed clearing footprint
- degradation of vegetation as a result of edge effects in areas adjacent to the clearing footprint
- spread of weeds and pathogens as a result of clearing
- disturbance to vegetation as a result of unauthorised third-party access.

The introduction and spread of weed species or diseases has the potential to occur through a number of means, particularly associated with spread from vehicles and machinery entering the Study Area. The key activities which may result in the introduction and spread of weed and diseases include the following:

- movement of vehicles, machinery and people onto the Study Area
- movement of vehicles, machinery and people along tracks and roads from the development area may spread weeds and diseases
- importation of material containing weeds or diseases may cause introduction of new diseases or weed infestations to the Study Area.

#### 9.1.1 Objectives, targets and key performance indicators

Environmental objectives, targets and key performance indicators for the management of flora, vegetation and weeds are detailed in Table 15.

Table 15: Environmental objectives, targets and key performance indicators for flora, vegetation and weed management

| Objective   | Target   | Key performance indicator  |
|---|--|--|
| To minimise and manage disturbance to vegetation  | No unauthorised clearing of vegetation.  | All construction activities undertaken within the approved footprint.  |
| Minimise the spread of existing weed populations and introduction of new weed species within the Study Area | Prevent unauthorised movement of vehicles from spreading weeds.                                | All vehicles and machinery clean-on-entry to site <sup>2</sup> .<br>No incidents relating to non-compliance with weed management procedures. |
|   | To avoid spreading weeds through inappropriate use or storage of potentially infested topsoil. | No soil or vegetation matter that has the capability of introducing weeds will be brought into the Study Area by CVJV contractors.           |
| Minimise weed presence within the Study Area  | Prevent the introduction and dispersal of weeds, pathogens and pest species.                   | Weed cover is no more than 10% prior to handover.  |

### 9.1.2 Management actions

Management of flora, vegetation and weeds will be undertaken in accordance with actions detailed in Table 16.

Table 16: Management actions for flora, vegetation and weed management

| Item                                     | Action   | Timing                           | Responsibility          |
|--|--|----------------------------------|-------------------------|
| Induction                                | Induct all contractors working within the Study Area in relation to flora and vegetation protection and weed management.   | Prior to entering the Study Area | CVJV Project Manager    |
| Vegetation clearing                      | Provide GPS coordinates of areas to be cleared and areas to be retained to all contractors entering the Study Area.  | Prior to clearing                | Clearing contractor     |
|  | Clearing boundaries will be clearly demarcated using distinctive markers (flagging tape, fencing, signage etc).  | At all times                     | Clearing contractor     |
|  | Comply with any conditions of the native vegetation clearing permit.   | At all times                     | Clearing contractor     |
| Fencing/flagging                         | Install fencing/flagging in accordance with the proposed fencing strategy (detailed in the supporting DA) to prevent access to vegetation to be retained and/or protected.   | At all times                     | CVJV Project Manager    |
| Access and vehicular /machinery movement | Inspect vehicles and machinery to ensure they are clean on entry to the Study Area.  | At all times                     | All personnel           |
|  | If vehicles are found to contain soil/weed material, clean-down vehicles and machinery outside of the Study Area if found to contain weeds and/or soil material and dispose of material at an appropriate waste receptacle off site. | At all times                     | All personnel           |
|  | Ensure vehicles remain on designated roads and access tracks and do not go beyond the approved clearing footprint and/or approved locations.   | At all times                     | All personnel           |
| Weed control                             | Determine weed species requiring targeted and prioritised control measures.  | Completed (see Appendix 3)       | Weed control contractor |

<sup>2</sup> Once vehicles/equipment are mobilised to site, inspected and determined to be clean, they are then defined as clean for the project unless they are deployed to another work area.



| Item         | Action  | Timing  | Responsibility          |
|--------------|---|---|-------------------------|
|              | Undertake weed control at least twice or as deemed appropriate by the revegetation contractor prior to commencing revegetation works.                                   | Prior to revegetation (indicative timeframe is Spring and following the first winter rains)                       | Weed control contractor |
|              | Undertake ongoing maintenance weed control.   | Biannually for five years from the initial planting completion date, or as advised by the revegetation contractor | Weed control contractor |
| Dust control | Avoid implementing construction activities or other activities with the potential to generate dust during dry and windy weather conditions.                             | Ongoing   | Construction Manager    |
|              | Undertake clearing progressively to minimise the potential for exposed surfaces resulting in dust lift-off.   | During clearing   | Construction Manager    |
|              | Water carts will be used in conjunction with earth moving/clearing activities and as required based on prevailing weather conditions at the time of construction works. | During clearing/earthmoving   | Construction Manager    |

### 9.1.3 Monitoring

Monitoring and reporting requirements for flora, vegetation and weeds are detailed in Table 17.

Table 17: Flora, vegetation and weed management monitoring and reporting requirements

| Parameter  | Purpose  | Location  | Frequency / Timing  | Responsibility          |
|--|--|---|---|-------------------------|
| Photographic evidence and/or GPS coordinates of proposed clearance areas | To record incidences of clearing of vegetation and/or flora outside approved construction areas.   | All areas of proposed disturbance of native vegetation. | Prior to ground disturbance.<br>Following each clearing campaign.                               | Clearing contractor     |
| Induction records  | To ensure compliance with induction requirements for all personnel.  | Study Area.   | Annually.   | CVJV Project Manager    |
| Fencing / flagging   | To monitor integrity of fencing and/or flagging within the Study Area.   | All areas delineated by fencing and/or flagging.        | Fortnightly during construction.  | CVJV Project Manager    |
| Weed species presence  | <ul style="list-style-type: none"> <li>to monitor weed occurrence, density and type</li> <li>to monitor weed growth and compare against targets and KPIs.</li> </ul> | Study Area.   | Annually in Spring.   | Weed control contractor |
| Vehicle/machinery register   | To ensure equipment and machinery is free from soils, weed and weed material on entry to the Study Area.   | Study Area.   | Prior to entering the Study Area.   | CVJV Project Manager    |
| Visual observations of dust generation                                   | Monitor dust emissions.  | Within and adjacent to the Study Area boundary.         | Opportunistically during clearing, construction and other potential dust generating activities. | All personnel           |

### 9.1.4 Contingencies

Contingency measures to be implemented for flora, vegetation and weeds are detailed in Table 18.

Table 18: Flora, vegetation and weed management contingency measures

| Trigger  | Action  | Responsibility                           |
|--|---|--|
| Clearing occurs outside approved areas   | <ol style="list-style-type: none"> <li>1. Determine extent of clearing.</li> <li>2. Determine activity that caused the clearing.</li> <li>3. Advise DWER and CoW of breach in approved clearing area.</li> <li>4. Implement rehabilitation measures/proposed mitigation measures as soon as practicable following consultation with DWER.</li> </ol>  | CVJV Project Manager                     |
| Flagging and fencing not sufficient or not maintained  | <ol style="list-style-type: none"> <li>1. Repair or reinstate flagging and/or fencing.</li> <li>2. Review frequency of monitoring.</li> </ol>   | CVJV Project Manager                     |
| New infestation of weed(s) identified and/or spread of existing weed species in the Study Area | Investigate source of weed infestation.   | Weed control contractor                  |
|  | Undertake weed control immediately and follow up weed control during to monitor success.  | Weed control contractor                  |
|  | Review weed management procedures including contractor training.  | Weed control contractor                  |
| Disturbance to areas outside of designated tracks/clearing areas observed                      | <ol style="list-style-type: none"> <li>1. Determine extent of disturbance.</li> <li>2. Identify cause of disturbance.</li> <li>3. Identify mitigation measures that may include revegetation, increased contractor and staff awareness and training.</li> <li>4. Monitor success of remediation measures.</li> </ol>  | CVJV Project Manager                     |
| Reporting  | Any breaches of the weed management procedures shall be reported to CVJV and investigated.  | Clearing Contractor / Utilities provider |
| Excessive ambient dust levels observed and/or excessive dust deposition noted on vegetation    | <ol style="list-style-type: none"> <li>1. Investigate cause, including nature of activities and appropriateness, in relation to weather conditions.</li> <li>2. Determine additional dust measures to be implemented, including the use of water carts or dust stabilisation measures.</li> <li>3. Implement appropriate additional dust measures.</li> <li>4. Continue monitoring (visual observations) to determine success.</li> </ol> | Construction Manager                     |

## 9.2 Fauna

Based on the review of available literature and the field survey completed by Bamford (2016) the number of significant fauna species that may use the Study Area is considered to be low. In addition, the proposed disturbance area is small within the context of the larger Study Area; therefore, impacts are expected to be minimal. The key impacting processes are summarised below:

1. Habitat loss leading to population decline and fragmentation – there is the potential for fragmentation of habitat as the development will reduce the width of the foreshore reserve at one point associated with Coastal Node POS clearing; reducing the width of the belt of vegetation along the secondary dunes.
2. Degradation of habitat due to weed invasion, trampling and general vegetation degradation leading to population decline.
3. Fauna injury as a result of construction activities – fauna injury and/or death may occur through foreshore construction activities and future use of the area, including fauna death from new parking areas. Fauna injury and/or death, whilst potentially resulting in localised impacts is unlikely to be an impacting process of concern with respect to the project.
4. Species interactions including feral and overabundant native species – the development and in particular pathway development will improve access into the foreshore reserve for feral species such as foxes and cats.
5. Altered fire regime– there will be an increased fire risk with increased access; and if grassy weeds become established.
6. Disturbance as a result of dust, light, and noise – unlikely to be of concern as it is small scale compared with the adjacent urban development.

In consideration of the impacting processes described above, the following aspects of the proposed works within the Study Area have been identified as requiring management to ensure protection of fauna values:

- vegetation clearing will directly disturb terrestrial fauna habitat and may result in habitat fragmentation
- vehicle movements have the potential for mortality of individual fauna, especially less-mobile species
- disturbance associated with the proposed works may affect fauna behaviour and distribution, and potentially create conditions favourable for feral fauna
- direct and indirect disturbance from light, noise, vibration and dust may reduce habitat quality in areas within and surrounding the disturbance area.

Detailed relocation requirements have been included for native species that may occur in the Study Area (as detailed in Section 4.1.5) requiring specific relocation measures. Where specific relocation measures are not required, standard relocation measures will be implemented for all species as detailed below.

### 9.2.1 Objectives, targets and key performance indicators

The environmental objectives, targets and key performance indicators for fauna protection are detailed in Table 19.

Table 19: Environmental objectives, targets and indicators for fauna protection

| Objective  | Target   | Key performance indicator  |
|--|--|--|
| Minimise the impact of feral animals on native terrestrial fauna | No significant observed increase in feral animal abundance in the vicinity of the Study Area.                                  | Number of feral animals observed during foreshore works shows declining trend. |
| Minimise impacts to local terrestrial fauna populations          | No clearing or disturbance of habitat outside pre-defined boundaries throughout the duration of the foreshore works.           | All activities undertaken within the approved footprint.                       |
|  | To relocate fauna with the potential to be impacted by clearing through trapping and relocation immediately prior to clearing. | Number of visual observations during clearing operations.                      |

### 9.2.2 Management actions

Specific management and mitigation measures have been identified to assist in achieving the fauna management objectives detailed in Table 20.

Table 20: Management actions for fauna protection

| Parameter               | Action   | Timing                      | Responsibility       |
|-------------------------|--|-----------------------------|----------------------|
| Induction               | Induct all contractors working within the Study Area in relation to fauna protection, management and interactions including: <ul style="list-style-type: none"> <li>on-site speed limit restrictions</li> <li>rubbish disposal procedures</li> <li>fauna encounter procedures</li> <li>on-site prohibitions (e.g. pets, feeding animals).</li> </ul> | Induction                   | CVJV Project Manager |
| Clearing and earthworks | Clearing boundaries will be clearly demarcated using distinctive markers (flagging tape, signage etc).   | Prior to ground disturbance | Clearing contractor  |
|                         | Provide GPS coordinates of areas to be cleared and areas to be retained to all contractors entering the Study Area.  | Prior to ground disturbance | Clearing contractor  |
|                         | Minimise clearing by locating infrastructure in already cleared or disturbed areas where possible.   | Prior to ground disturbance | Clearing contractor  |
|                         | Comply with the native vegetation clearing permit.   | At all times                | Clearing contractor  |
| Native fauna protection | All vehicles shall remain on designated roads/tracks and shall not be permitted off designated roads unless in the case of an emergency.   | At all times                | All personnel        |
|                         | All personnel shall observe onsite vehicle speed limits (maximum of 40 km/hr) to prevent the likelihood of road kill.  | At all times                | All personnel        |
|                         | Provide signage in areas of known wildlife activity.   | Prior to ground disturbance | All personnel        |



| Parameter               | Action   | Timing  | Responsibility   |
|-------------------------|--|---|------------------|
| Native fauna relocation | <p>Undertake a Southern Brown Bandicoot trapping and translocation program by a suitably qualified fauna expert, in accordance with an appropriate licence issued by Parks and Wildlife, for all areas of vegetation containing suitable habitat within the Project area. The Southern Brown Bandicoot trapping will occur as follows:</p> <ul style="list-style-type: none"> <li>• prior to trapping an appropriate fauna relocation permit will be sought from Parks and Wildlife, including confirmation of appropriate release locations</li> <li>• site reconnaissance will be undertaken by the qualified fauna expert prior to trapping to determine where Southern Brown Bandicoot will occur</li> <li>• traps will be set accordingly across each stage of habitat to be cleared</li> <li>• traps will be set and checked for each trapping night and Southern Brown Bandicoot relocated</li> <li>• the trapping event will continue for a minimum of 3 nights, or until such time as the data indicates that the population on-site has been significantly reduced based on the advice of a fauna expert</li> <li>• following each trapping event, a report will be provided detailing the methodology, number of animals relocated and the locations to which they were released</li> <li>• the summary reports will be made available to CoW.</li> </ul>   | Within 7 days of clearing suitable habitat in each clearing stage   | Fauna Specialist |
|                         | <p>Undertake targeted reptile trapping and translocation program, specifically for Black-striped Snake a suitably qualified reptile expert during warmer months for all areas of suitable habitat within the Project area. The targeted reptile trapping will occur as follows:</p> <ul style="list-style-type: none"> <li>• prior to trapping an appropriate fauna relocation permit will be sought from Parks and Wildlife, including confirmation of appropriate release locations</li> <li>• site reconnaissance will be undertaken by the qualified reptile expert prior to trapping to determine the optimal locations for traps, and methods of trapping</li> <li>• a variety of methods will be used for capturing targeted reptiles dependent upon the habitat type present in each stage; the site conditions; and the prevailing weather conditions. These may include single pits, pit trap lines (10 litre and 20 litre pit sizes) as well as manual capture</li> <li>• each trapping event will run for a minimum of 3 days, based on the advice of a fauna expert with traps and pits checked during the day and at night for nocturnal pits</li> <li>• following each trapping phase a summary report will be provided detailing the methodology, number of animals relocated and the locations to which they were released</li> <li>• the summary reports will be made available to CoW.</li> </ul> | Within 5 weeks of clearing suitable habitat in each clearing stage (during warmer months on the advice of a qualified reptile expert) | Fauna Specialist |

| Parameter              | Action  | Timing   | Responsibility                          |
|------------------------|---|--|---|
|                        | Inspect each stage of development to be cleared for evidence of Rainbow Bee-eater presence in the form of nest burrows. If Rainbow Bee-eaters nesting burrows are identified during the survey, implement contingency actions as listed in Table 22.  | Within 7 days of clearing suitable habitat in each clearing stage (September - February) | Fauna Specialist                        |
|                        | Areas being cleared will be searched immediately prior to clearing for reptiles, mammals and birds. Species targeted will include (but not be limited to) conservation significant species potentially occurring within the area (Section 4.1.5).   | Prior to ground disturbance  | Fauna Specialist                        |
|                        | Fauna relocation will be undertaken no longer than seven days prior to clearing of adjacent vegetated areas that will not be impacted by clearing activities.   | No longer than seven days prior to clearing  | Fauna Specialist                        |
|                        | Relocation of fauna will be undertaken by suitably trained and licensed personnel or trained animal handlers.   | Prior to ground disturbance  | Fauna Specialist                        |
| Native fauna encounter | Native fauna encountered onsite shall be given the opportunity to move on if there is no threat to personnel safety in doing so.  | Ongoing  | All personnel                           |
|                        | If sick or injured animals are encountered, the nominated carer or Wildlife Hotline shall be called to rescue the animal.<br>The CVJV Manager shall escort the rescuer on and off the site and ensure they are complying with the site safety controls.   | As required  | Fauna Specialist / CVJV Project Manager |
| Feral animal species   | Feral animals control measures shall be implemented, including: <ul style="list-style-type: none"> <li>prohibiting the feeding of animals</li> <li>food scraps and other waste shall be appropriately disposed of to onsite waste disposal bins</li> <li>assisting with feral animal trapping and eradication in consultation with Parks and Wildlife.</li> </ul> | Ongoing  | Fauna Specialist / CVJV Project Manager |

### 9.2.3 Monitoring and reporting

Table 21 provides a summary of objectives and corresponding monitoring actions to enable an assessment of the effectiveness of the fauna management and mitigation measures in place.

Table 21: Monitoring actions for fauna protection

| Parameter                               | Purpose   | Location                                 | Frequency / Timing  | Responsibility       |
|---|---|--|---|----------------------|
| Feral fauna                             | Monitor feral fauna presence within the Study Area to determine further management measures that may be required. | Study Area.                              | Opportunistically during construction.  | All personnel        |
| Reports of fauna encounters/ collisions | To determine if management actions are successful in minimising fauna injury.                                     | Study Area.                              | As required - if fauna encountered or fauna collisions occur during construction. | All personnel        |
| Reports of fauna relocation activities  | To report on fauna encountered and status of fauna relocation activities.   | Study Area (where clearing is proposed). | Following completion of fauna relocation activities.                              | Fauna Specialist     |
| Delineation of retained vegetation      | To ensure retained habitat remains protected.   | Vegetation to be retained.               | Weekly inspection during clearing.  | CVJV Project Manager |
| Induction records                       | To ensure compliance with induction requirements for all personnel.   | Study Area.                              | Annually during construction.   | CVJV Project Manager |

## 9.2.4 Contingencies

Table 22 identifies the appropriate contingency actions to be initiated in the event that the objectives for fauna protection are not met.

Table 22: Contingency actions for fauna protection

| Trigger  | Action  |
|--|---|
| Increased number of feral fauna and/or native pest species   | <ol style="list-style-type: none"> <li>1. Investigate cause.</li> <li>2. Determine appropriate mitigation measures; i.e. may include improved waste management and staff awareness.</li> <li>3. Implement mitigation measures.</li> <li>4. Monitor success of mitigation measures.</li> </ol>   |
| Unauthorised access beyond, or breach of clearing boundaries   | <ol style="list-style-type: none"> <li>1. Investigate cause.</li> <li>2. Redefine boundaries if breach due to inadequate boundary marking.</li> <li>3. Reinforce all personnel of access restrictions beyond clearing boundaries.</li> <li>4. Advise DWER of breach in approved clearing area.</li> <li>5. Implement rehabilitation measures/proposed mitigation measures as soon as practicable following consultation with DWER.</li> </ol>   |
| Fauna death resulting from construction activities, including vehicle movement                                 | <ol style="list-style-type: none"> <li>1. Investigate cause.</li> <li>2. Determine if additional mitigation measures are required.</li> <li>3. Implement mitigation measures if appropriate and practical.</li> </ol>   |
| Injured animals  | <ol style="list-style-type: none"> <li>1. Injured animals shall be reported to the CVJV Project Manager.</li> <li>2. Injured fauna should be assessed by an experienced zoologist to determine whether translocation, transfer to wildlife carer or euthanasia is required.</li> <li>3. If the injured fauna is of conservation significance, Parks and Wildlife should be advised.</li> <li>4. Contact the Parks and Wildlife Wildcare Helpline 24-hour emergency hotline on (08) 9474 9055 if sick or injured animals are encountered.</li> </ol> |
| Presence of Rainbow Bee-eaters nesting burrows are identified by fauna specialist in proposed clearance areas. | <ol style="list-style-type: none"> <li>1. Mark the area with temporary bunting and signage.</li> <li>2. Retain vegetation where the nest burrow was observed for the duration of nesting season.</li> <li>3. Re-inspect the area for Rainbow Bee-eater active nest burrows at the end of nesting season or prior to clearing to confirm all birds have vacated the area.</li> <li>4. Report the status of the area to the Development Manager and Development Manager and suitability for clearing.</li> </ol>                                      |

## 9.3 Fire management

The bushland within the coastal reserve, as well as adjacent boundaries in particular to the north of Capricorn Village, represents a potential bushfire hazard to the Study Area if appropriate measures are not put in place. Land to the east is predominantly cleared and therefore does not pose a significant bush fire risk to the Study Area.

The Study Area is predominantly undulating vegetated sand dunes of varying slope, with vegetation comprised mainly of Class D (scrub) and Class C (shrubland) vegetation categories as described in *Australian Standard 3959-2009 (Construction of Buildings in Bushfire Prone Areas)*. Should a fire occur on the steeper slopes of the dunes, this will contribute to an increase in bushfire intensity.

Ignition sources for bushfires in urban reserves can be attributed to either natural causes, such as lightning etc, or human factors, such as accidental ignition and arson. Under suitable weather conditions, these ignition sources have the potential to generate a bushfire that could impact on life, property and the environment.

A separate Bushfire Management Plan has been prepared to support the Capricorn Coastal Node subdivision application and DA, including fire management requirements of the foreshore reserve in consideration of the Coastal Node development.

### 9.3.1 Objectives, targets and key performance indicators

The objective for bushfire management within the foreshore is to implement management measures that will minimise the potential occurrence and impact of bush fires occurring in the Study Area.

The intended performance management targets and indicators for bush fire protection are outlined in Table 23.

Table 23: Performance management targets and indicators for bush fire protection

| Issue  | Objective   | Performance indicator   |
|--|---|---|
| Impacts to life, property and the environment from bushfires | To ensure that should a bushfire occur within the Study Area, fire impacts on site will be minimised, and life, property and environmental assets will be protected as much as practicable. | No impacts to life, property and the environment from bushfire. |

This bushfire management plan will be divided into two sections. The first section will address hazards anticipated during the construction of the Capricorn Village coastal node, while the second section will relate to ongoing management and use of the area, in addition to any future development.

### 9.3.2 Construction stage

This section highlights the specific hazards, management responses and ongoing monitoring activities required to manage bushfire risk during the construction of the coastal node.

#### 9.3.2.1 Management measures

Management measures for mitigation of bushfire impacts, during construction, are detailed below in Table 24.



Table 24: Management measures - construction stage

| Factor                | Management measures  | Timing                                 | Responsibility                              |
|-----------------------|--|--|---|
| Bush fire prevention  | Ensure all construction personnel are aware of fire emergency contact details, site evacuation plans. This should be included in all staff inductions and training. If personnel are not trained in the site-specific bushfire and emergency plan, they should be accompanied by trained personnel.                          | During construction                    | Construction Manager                        |
|                       | Construction personnel are to provide adequate fire suppression resources on hand during the designated fire season as determined by the City of Wanneroo.   | During construction                    | Construction Manager                        |
|                       | Construction activities to be managed in association with fire hazards, e.g. no hot work, such as welding, is to occur on days of extreme or catastrophic fire danger.   | During construction                    | Construction Manager                        |
|                       | Vehicles will not operate on areas other than designated roads, access tracks and construction areas.  | During construction                    | CVJV Project Manager and CoW                |
|                       | Construction of CVJV coastal node POS is to be constructed in a low-threat fuel condition in accordance with AS3959. Additionally, all roads, carparks and walkways are to be kept free of vegetation and combustible items.   | During construction                    | Construction Manager                        |
| Bush fire suppression | Should a bushfire occur within or adjacent to the study area (as a result of the construction activities or not), construction personnel should alert the both CoW and DFES immediately.   | Immediately upon detection of bushfire | Construction Manager / CVJV Project Manager |
|                       | Any bushfires occurring within or adjacent to the study area will be contained as quickly as possible by using available suppression equipment only if it is deemed safe to do so. Upon arrival, the relevant fire authorities are to take command of suppression activities and provide additional resources (as required). | In the event of a bushfire             | CVJV Project Manager, CoW and DFES          |
| Evacuation            | All construction personnel, visitors and other occupants are to be evacuated immediately other than those undertaking suppression activities. Should it not be safe to undertake initial suppression activities on a bushfire, all personnel are to be evacuated immediately.  | In the event of a bushfire             | CVJV Project Manager                        |

### 9.3.2.2 Monitoring

Monitoring requirements for bushfire during construction are summarised in Table 25.

Table 25: Monitoring requirements - construction stage

| Parameter / purpose   | Location    | Frequency/timing  | Responsibility               |
|---|-------------|---|------------------------------|
| Monitor fire weather conditions and any DFES -issued fire bans/vehicle movement restrictions.   | Study Area. | Daily, throughout the designated bush fire season (30 November–31 May) or during any days of Extreme or Catastrophic fire danger. | CVJV Project Manager and CoW |
| During days of Extreme and Catastrophic fire danger, at the conclusion of daily construction activities and prior to leaving site, an inspection shall be conducted for evidence of fire. | Study Area. | On all days of Extreme or Catastrophic fire danger.   | CVJV Project Manager         |

| Parameter / purpose   | Location                            | Frequency/timing  | Responsibility                          |
|---|-------------------------------------|---|---|
| Monitor bush fire occurrences within and adjacent to the subject area to allow early implementation of emergency response procedures, bushfire suppression activities and evacuation. | Study Area and adjacent properties. | Opportunistically in the event of bush fire.  | CVJV Project Manager, CoW DFES          |
| Visual inspection of perimeter of retained vegetation for signs of unauthorised vehicle usage and ensure compliance with the fire break notice.                                       | Perimeter of study area.            | Weekly.   | CVJV Project Manager initially then CoW |
| Application of State Planning Policy 3.7 (Planning in Bushfire Prone Areas) and Guidelines for future/subsequent building or structures.  | Study Area.                         | All future buildings or structures are required to comply with requirements SPP 3.7, where triggered to do so at development application and/or building licence stages. This will be documented in a Bushfire Management Plan that will accompany the development application. | CVJV Project Manager and CoW            |

### 9.3.3 Post-construction stage

This section highlights the ongoing management responses required to manage bushfire risk during following construction of the coastal node (Table 26). Once operational, the risk to occupants using the Capricorn Village Coastal Node, from bushfire in surrounding land, is primarily related to evacuation to a place of relative safety, while permitting DFES and City of Wanneroo fire fighting personnel to access the area to undertake suppression activities.

Table 26: Post-construction bushfire management measures

| Management measure  | Timing and Requirements  | Responsibility                          |
|---|--|---|
| Ongoing maintenance of CVJV coastal node landscaped gardens and POS   | The landscaped gardens and POS associated with the coastal node are to be maintained in a low threat fuel condition on a regular and ongoing basis. The landscaping and gardens should meet the requirements of an Asset Protection Zone in accordance with Schedule 1 of SPP 3.7. All roads, carparks and walkways are to be kept free of vegetation and combustible items. | CVJV Project Manager initially then CoW |
| Ongoing maintenance of CVJV coastal node roads, carparks and walkways   | All roads, carparks and walkways are to be kept free of vegetation and combustible items. Additionally, all roads and walkways from the beach and coastal node POS are to be open during bushfire season (and on all days of Extreme of Catastrophic fire danger).   | CVJV Project Manager initially then CoW |
| Evacuation and access routes  | During bushfire season (and on all days of Extreme of Catastrophic fire danger), all roads and walkways from the beach and coastal node POS are to be open and in useable condition to permit occupant egress from the area, vehicular egress and firefighter access.  | CVJV Project Manager initially then CoW |
| Bushfire suppression response   | It is likely that members of the public will alert relevant fire authorities (DFES) upon detection of bushfire in the area. Upon notification of a bushfire it is anticipated that firefighting resources will be dispatched to the area to take command of the emergency response, undertake suppression activities and assist in the evacuation of the area.               | CoW and DFES                            |
| Application of State Planning Policy 3.7 (Planning in Bushfire Prone Areas) and Guidelines for future/subsequent building or structures | All future buildings or structures are required to comply with requirements SPP 3.7, where triggered to do so at development application and/or building licence stages. This will be documented in a Bushfire Management Plan that will accompany the development application.  | CoW                                     |

## 9.4 Revegetation management

Rehabilitation within the foreshore reserve will include revegetation of the decommissioned, informal access track in the northern portion of the Study Area, as shown indicatively in Figure 9. Revegetation of earth-worked areas and batters will also be undertaken, as detailed with the Development Application drawings (Appendix 10).

Prior to revegetation works in the location of the northern access track a Revegetation Management Plan will be prepared to the satisfaction of the City. The key rehabilitation activities within the nominated rehabilitation area will include (where necessary) weed control, fencing and/or access control, erosion control (discussed in Sections 9.4 to 0) and infill planting.

All areas outside of the coastal node and POS development extent (as depicted on Figure 8) will be fenced for conservation purposes, with all existing vegetation retained.

### 9.4.1 Objectives, targets and key performance indicators

Objectives, targets and key performance indicators for revegetation areas are summarised in Table 27.

Table 27: Environmental objectives, targets and indicators for revegetation

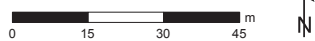
| Objective  | Target  | Key performance indicator   |
|--|---|---|
| Revegetate decommissioned access track within the Study Area (shown as indicative revegetation on Figure 9). | Five years from the commencement of revegetation vegetation communities established are representative of reference sites including: <ul style="list-style-type: none"> <li>number and type of species (overstorey and mid/understorey species)</li> <li>weed species and density.</li> </ul> | Revegetation comprises a diverse mix of species, including overstorey and mid/understorey (where bushfire management commitments permit).         |
|  |   | No or minor evidence of: <ul style="list-style-type: none"> <li>grazing on seedlings</li> <li>vegetation decline as a result of weeds.</li> </ul> |
|  |   | 80% survival rate achieved for seedlings planted within revegetation areas after 5 years.   |
|  | Planted species are local provenance species.   | Revegetation contractor records identify species used in revegetation as local provenance.  |
| Enhance vegetation health within retained areas of vegetation.   | Monitoring shows no evidence of vegetation decline as a result of stress, weeds, pests or pathogens after 5 years.  | No evidence of vegetation decline as a result of stress, significant weeds, pests or pathogens.   |








**Figure 9: Indicative rehabilitation area**

Scale 1:1,500 at A4



Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 31/07/2018  
 Author: JCrute  
 Source: Nearmap: Aerial imagery - January 2017.

**Legend**

-  Study area
-  Existing cadastre
-  Indicative rehabilitation area





## 9.4.2 Management actions

High-level management and mitigation measures have been identified to assist in achieving the rehabilitation management objectives in Table 28. These measures will be confirmed with the City and detailed within a Revegetation Management Plan prior to rehabilitation works being undertaken.

Table 28: Management actions for revegetation management

| Parameter                        | Action  | Timing   | Responsibility                                    |
|----------------------------------|---|--|---|
| Contractor engagement            | Appoint an experienced revegetation contractor(s) to undertake seed collection, weed control and other site preparation, and direct seeding/seedling planting.  | Prior to the seed collection season (approximately October–April) before clearing commences. | CVJV Project Manager                              |
| Site selection / reference sites | Select revegetation sites based on indicative revegetation areas (Figure 9).  | Prior to revegetation.   | Revegetation contractor                           |
|                                  | Establish baseline vegetation monitoring quadrats within remnant vegetation of the same vegetation type as the revegetation sites (within the Study Area) to determine: <ul style="list-style-type: none"> <li>native species composition of remnant native vegetation within revegetation areas to determine suitable species for use in rehabilitation</li> <li>baseline levels of weeds including weed species within revegetation areas</li> <li>overstorey and mid/understorey species (number and species type).</li> </ul> | Prior to revegetation.   | Revegetation contractor                           |
| Completion criteria              | Following establishment of baseline vegetation monitoring quadrats, determine completion criteria to the satisfaction of the City.  | Prior to revegetation.   | Revegetation contractor                           |
| Revegetation preparation         | Obtain appropriate licences from DBCA for seed collection.  | Prior to seed collection.  | Revegetation contractor                           |
|                                  | Undertake seed collection activities from within the Yanchep area or Perth coastal region for use in revegetation.  | Prior to revegetation (indicative timeframe of October– April).                              | Revegetation contractor                           |
|                                  | Undertake weed control prior to revegetation as detailed in Table 16.   | Prior to revegetation (indicative timeframe is Spring and following the first winter rains). | Weed control contractor / Revegetation contractor |
|                                  | Revegetation activities will utilise seed propagated from seed collected from the local area or Perth coastal region.<br>Propagation will be undertaken by a NIASA (Nursery Industry Accreditation Scheme of Australia) accredited nursery.   | Indicative timing for seed propagation is September to May following seed collection.        | Revegetation contractor                           |
|                                  | Apply appropriate pre-planting treatments which may include mulch, brushing and/or coir netting to assist with erosion.   | Prior to revegetation (indicative timeframe is July).  | Revegetation contractor                           |
| Seedling planting                | Ensure seedlings (in the form of tubestock) are suitably mature, between 6 to 12 months and not root bound to enable optimal establishment and growth.  | Indicative timing is May - June depending on the first rains.                                | Revegetation contractor                           |

| Parameter          | Action  | Timing  | Responsibility                                    |
|--------------------|---|---|---|
|                    | Install grazing control measures within the revegetation area to minimise impacts to seedlings from fauna. This could include: <ul style="list-style-type: none"> <li>a minimum of three stakes and a protective guard manufactured for such purpose should be placed around the seedling to protect the vegetation from grazing and wind damage</li> <li>fencing of the revegetation areas</li> <li>feral fauna control measures such as baiting.</li> </ul> | During revegetation.  | Revegetation contractor                           |
|                    | Utilise additives to assist in plant growth if required, such as fertilisers or wetting agents.   | During revegetation.  | Revegetation contractor                           |
|                    | Ensure all plants and other materials used in revegetation are free of pathogens and weeds through appropriately accredited suppliers.  | During revegetation.  | Revegetation contractor                           |
|                    | Ensure vehicles, machinery, equipment and footwear are free of mud and soil when entering the Study Area and induct all contractors on these requirements Signed induction forms can be maintained if necessary.  | At all times.   | All personnel                                     |
|                    | Procure seedlings using species listed in 9.4.3, of suitable provenance, to conduct top-up planting in areas not meeting 80% survival rates.  | When monitoring indicates survival rates have not been met.   | Revegetation contractor                           |
|                    | Ensure earth-worked batter areas are planted with native tube stock for stabilisation.  | After earthworks completed.                                   | Revegetation contractor                           |
| Direct seeding     | Undertake direct seeding utilising seed collected during seed collection activities or other sources as appropriate.  | Indicative timing is May - June depending on the first rains. | Revegetation contractor                           |
|                    | Utilise coir netting, brushing or other stabilisation measures as appropriate based on the soil and slope of revegetation sites.  | Direct seeding.   | Revegetation contractor                           |
|                    | Ensure seed utilised in revegetation is from areas free from dieback and other pathogens.   | During revegetation.  | Revegetation contractor                           |
| Hygiene            | Implement ongoing weed control and hygiene measures as detailed in Table 16.  | As required.  | Weed control contractor / Revegetation contractor |
| Wind-break fencing | Install wind-break fencing where appropriate.   | As required.  | Revegetation contractor                           |

### 9.4.3 Species selection

Revegetation will be undertaken using native species of local provenance. A list of species recorded from vegetation types (VTs) during vegetation surveys and within the indicative revegetation area is provided in Table 29. These species will be used in revegetation where available and will be planted in accordance with the three corresponding VTs recorded within the rehabilitation area.

Table 29: Species recorded from vegetation types within indicative revegetation areas

| Species                         | VT1 | VT2 | VT3 |
|---------------------------------|-----|-----|-----|
| <i>Acacia rostellifera</i>      |     | x   | x   |
| <i>Acacia truncata</i>          |     |     | x   |
| <i>Acanthocarpus preissii</i>   |     | x   | x   |
| <i>Atriplex isatidea</i>        | x   | x   | x   |
| <i>Carpobrotus virescens</i>    |     | x   |     |
| <i>Cassutha flava</i>           | x   | x   | x   |
| <i>Clematis linearifolia</i>    |     |     | x   |
| <i>Conostylis candidans</i>     |     | x   | x   |
| <i>Ficinia nodosa</i>           | x   | x   |     |
| <i>Hardenbergia comptoniana</i> |     | x   | x   |
| <i>Lepidosperma gladiatum</i>   |     | x   | x   |
| <i>Lomandra maritima</i>        |     |     |     |
| <i>Melaleuca systema</i>        |     |     | x   |
| <i>Myoporum insulare</i>        |     |     | x   |
| <i>Olearia axillaris</i>        | x   | x   | x   |
| <i>Rhagodia baccata</i>         |     | x   | x   |
| <i>Salsola australis</i>        |     |     |     |
| <i>Scaevola crassifolia</i>     | x   | x   | x   |
| <i>Scholtzia involucreta</i>    |     |     |     |
| <i>Senecio pinnatifolius</i>    |     | x   | x   |
| <i>Spinifex hirsutus</i>        | x   |     | x   |
| <i>Spinifex longifolius</i>     | x   | x   |     |
| <i>Sporobolus virginicus</i>    |     |     |     |
| <i>Spyridium globulosum</i>     |     | x   | x   |
| <i>Threlkeldia diffusa</i>      |     | x   |     |

#### 9.4.4 Monitoring

Table 30 provides a summary of objectives and corresponding monitoring actions to enable an assessment of the effectiveness of the revegetation management and mitigation measures in place. These actions will be confirmed with the City and documented within a Revegetation Management Plan, prior to rehabilitation works commencing.

Table 30: Monitoring actions for revegetation management

| Parameter   | Purpose  | Location            | Frequency / Timing  | Responsibility                                 |
|---|--|---------------------|---------------------|--|
| Revegetation monitoring will include a review of: <ul style="list-style-type: none"> <li>• baseline levels of weeds including weed species within revegetation areas</li> <li>• overstorey and mid/understorey species (number and species type)</li> <li>• percentage cover of tubestock within the various revegetation areas</li> <li>• seedling survival rate.</li> </ul> | <ul style="list-style-type: none"> <li>• to monitor species density, richness and composition</li> <li>• to monitor establishment of vegetation in comparison to reference sites</li> <li>• to monitor seedling survival rate</li> <li>• provide CoW with results of revegetation monitoring to inform future management.</li> </ul> | Revegetation areas. | Annually in Spring. | Revegetation contractor / CVJV Project Manager |

| Parameter  | Purpose   | Location            | Frequency / Timing                 | Responsibility                                 |
|--|---|---------------------|------------------------------------|--|
| Plant health (i.e. evidence of water stress, pests, animal grazing).     | <ul style="list-style-type: none"> <li>to monitor plant health and any evidence of animal grazing</li> <li>to monitor weed occurrence.</li> </ul> | Revegetation areas. | Annually in Spring.                | Revegetation contractor / CVJV Project Manager |
| Species used in revegetation (revegetation contractor progress reports). | Ensure local provenance species have been utilised.   | NA.                 | Annual review of progress reports. | CVJV Project Manager                           |

Rehabilitation monitoring will be undertaken utilising quadrats. The location of monitoring quadrats will be determined by the appointed rehabilitation contractor, taking into account revegetation areas in relation to vegetation communities within the Study Area. It is proposed that after five years following the date of initial planting, handover to the CoW will occur if all objectives, targets and KPIs are met. In the event targets and KPIs are not met at the end of the five-year period, a number of key maintenance and specific contingency measures will be developed in consultation with the CoW.

### 9.4.5 Contingencies

Contingency actions will be initiated if monitoring indicates that management actions have not been successful or effective and/or completion criteria are not being achieved. Contingency actions for revegetation management are detailed in Table 31 below. These actions will be confirmed with the City and documented within a Revegetation Management Plan, prior to rehabilitation works commencing.

Table 31: Contingency actions

| Trigger  | Action   |
|--|--|
| Monitoring reports show survival rates of planted species are below 80%.   | <ol style="list-style-type: none"> <li>Map the extent of seedling deaths to obtain approximate percentage of dead seedlings.</li> <li>Identify potential causes of deaths.</li> <li>Implement approach to remedy cause which could include: <ul style="list-style-type: none"> <li>procure sufficient seedlings and/or seed as required to account for insufficient native plant species richness and/or cover, on advice of the Revegetation contractor</li> <li>undertaking infill seedling planting as required on advice of the Revegetation contractor</li> <li>application of additives such as seasol, water granules, soil breaker, water retainer, wetting agent or fertiliser tablets as deemed necessary by Revegetation contractor</li> <li>further weed and/or pest control if required.</li> </ul> </li> <li>Monitor success of contingency measure(s).</li> </ol> |
| Revegetation monitoring shows that the number and type of species, including overstorey and mid/understorey species are not representative of reference sites. | <ol style="list-style-type: none"> <li>Investigate cause (e.g. presence of pests, plant stress, weeds, erosion).</li> <li>Implement measures to prevent decline in species numbers.</li> <li>Conduct supplementary seeding/planting as advised by Revegetation contractor.</li> <li>Continue monitoring as required by this FMP.</li> </ol>  |
| New infestation of weed(s) identified in the Study Area.   | <ol style="list-style-type: none"> <li>Investigate source of weed infestation.</li> <li>Undertake weed control immediately and follow up weed control as advised by the Revegetation contractor.</li> <li>Review weed management procedures.</li> </ol>  |
| Increase in distribution, abundance or density/cover of a significant weed species within revegetation sites.  | <ol style="list-style-type: none"> <li>Map the revised extent of the significant weed species within the site.</li> <li>Identify activities that may have potentially increased the abundance, distribution or density/cover of significant weed species.</li> <li>Plan and implement a significant weed control program (may involve seeking advice from relevant authorities).</li> <li>Apply additional hygiene control and education measures.</li> </ol>  |

| Trigger  | Action   |
|--|--|
| Increase in abundance and/or distribution of pest grazing animals within rehabilitation areas.     | <ol style="list-style-type: none"> <li>1. Investigate cause.</li> <li>2. Review control measures and procedures.</li> <li>3. Re-inform all personnel of any changes to control procedures.</li> <li>4. Implement remedial and/or revised control measures.</li> <li>5. Implement of a pest animal control program.</li> <li>6. Monitor outcome.</li> </ol> |
| Unauthorised access (people and vehicles, unless required for emergency access) to the Study Area. | <ol style="list-style-type: none"> <li>1. Implement measures to prevent further unauthorised access (e.g. installation of temporary fencing and signage), as practicable.</li> <li>2. Monitor success of contingency measure(s).</li> <li>3. Restrict access to controlled areas already disturbed or degraded.</li> </ol>                                 |

## 9.5 Rehabilitation of earth-worked areas

In addition to the rehabilitation outlined in Section 9.4 above, earth-worked batter areas are proposed to be stabilised and revegetated with native species (depicted as 'non-irrigated tube stock planting' in contextual DA drawings; Appendix 10). These areas include:

- rehabilitation of approximately 0.3 ha of earth-worked batter areas (low-threat vegetation for bushfire management as per Strategen 2017b)
- rehabilitation of 0.4 ha of earth-worked batter areas (full revegetation).

The species proposed to be planted in these areas are listed in Appendix 10 (see drawing B0494/CV/CN/L108).

It is noted that the detailed drawings provided in Appendix 10 are for contextual purposes only and are subject to future approvals.

## 9.6 Landscaping within POS

Landscaping within the POS area will incorporate planting of some non-native species (see Appendix 10) which may require irrigation, fertiliser and soil amelioration. As such, the following testing and management is proposed:

### Fertilising and Soil Amelioration

To maintain a suitable pH level of 6.5-7.0 for growth and to optimise the fertiliser application regime, soil testing will be conducted once a year in February. The testing will include obtaining samples from locations as directed by the Superintendent and obtain full analysis with recommendations as well as keeping of records of soil test results.

Once soil analysis is complete, specialist advice will be obtained for application rates of soil ameliorants and fertilisers, to adjust the pH and nutrient levels in accordance with recommendations to ensure optimum plant health is maintained.

To ensure suitable nutrient levels in the soil are maintained the fertilising regimes will need to be adjusted to suit, however the minimum requirement shall be the application of a 12 month slow release fertiliser (Osmocote or equivalent) in September in accordance with Manufacturer's recommendations.

### Irrigation

- minimum of 5 year establishment watering for species with high irrigation needs (any tree over the 1000Litre stock size or transplant tree including *Araucaria columnaris*, *Araucaria heterophylla*, *Metrosideros excelsa*, *Olea Europaea* and *Phoenix canariensis*)
- three-monthly health checks for the first 12 months, followed by 12 monthly health checks for nutrition and irrigation requirements for mature transplant trees



- all mature trees to have a separate irrigation station to enable full monitoring of irrigation volumes (periodic adjustments of watering will be carried out by the landscape maintenance contractor in accordance with current Water Corporation regimes)
- balancing of the irrigation system, after the two year establishment watering period of native trees and plants ceases, by the landscape maintenance contractor.

Detailed irrigation plans will be submitted and approved by the City prior to the commencement of development, in accordance with the conditions of the Development Application.

## 9.7 Access and fencing

Demand for use of the Study Area will increase as a result of the Capricorn and surrounding Yanchep developments and from increased use of the area at the regional scale as part of the larger Yanchep-Two Rocks area. To ensure the natural values of the foreshore are protected, whilst fulfilling community expectations associated with access to the area, access is a key management consideration. Vehicle access will be restricted within the Study Area except for maintenance, firefighting and emergency purposes.

The Study Area will contain a mixture of passive and active recreation facilities located in areas that will minimise impact to the natural values of the area. Key access infrastructure proposed within the Study Area includes:

- two beach access points located along existing tracks
- universal access along pathways, provision of ACROD parking, and disability access to facilities
- 3 m wide reinforced access path for maintenance and emergency access
- use of existing lower car park area as a temporary asset
- fencing to CoW specifications.

Uncontrolled and unmanaged access to the Study Area can result in impacts to the integrity of the foreshore vegetation, including the promotion of weeds and increased erosion. Impacts as a result of unmanaged access to the Study Area are already evident, largely due to uncontrolled traversing of the dunes outside of designated paths and access ways. In order to manage potential impacts on the Study Area as a result of uncontrolled access a range of measures will be implemented.

### 9.7.1 Objectives, targets and key performance indicators

The environmental objectives, targets and key performance indicators for access management are detailed in Table 32.

Table 32: Environmental objectives, targets and key performance indicators for access and infrastructure

| Objective   | Target  | Key performance indicator  |
|---|---|--|
| Provide appropriate access through the Study Area for pedestrian and emergency services | No unauthorised access outside of the designated areas. | No incidence relating to unauthorised access to areas not identified for access. |
| Minimise access outside of designated access areas                                      |   |  |
| Prevent third party access during the proposed foreshore development works              | No unauthorised access to the Study Area.               | No incidents relating to unauthorised people on site.                            |

### 9.7.2 Management actions

Specific management and mitigation measures have been identified to assist in achieving the access management objectives in Table 33.

Table 33: Access management actions

| Item                | Management action   | Timing  | Responsibility          |
|---------------------|---|---|-------------------------|
| Vegetation clearing | Clearing boundaries will be clearly demarcated using distinctive markers (flagging tape, fencing, signage etc).   | Prior to clearing.  | CVJV Project Manager    |
| Permanent fencing   | Install permanent conservation fencing along the boundaries of the beach access paths and recreational open space to restrict unauthorised access to areas of retained vegetation.  | Post clearing.  | CVJV Project Manager    |
|                     | Install permanent conservation fencing along the perimeter of all roads or parking areas that adjoin the Study Area to prevent vehicles accessing areas of foreshore vegetation.<br>If necessary, access gates can be provided at appropriate locations for fire-fighting and maintenance purposes, including emergency access. | Post clearing.  | CVJV Project Manager    |
|                     | Restrict access to unwanted tracks through the use of brush material and/or fencing.  | Post clearing / revegetation.   | CVJV Project Manager    |
| Signage             | Install signage to encourage public education and awareness on: <ul style="list-style-type: none"> <li>the importance of retained bushland</li> <li>the detrimental effects of rubbish on biodiversity</li> <li>revegetation works being undertaken within the area.</li> </ul>   | Post construction of access tracks through the area of retained vegetation. | Construction contractor |
| Paths               | Formalise paths that provide beach access to prevent access to areas of retained vegetation.  | Foreshore construction.   | Construction Contractor |
|                     | Install DUP in accordance with Condition 18 of subdivision approval (WAPC15520).  | Foreshore construction.   | Construction Contractor |
| Surveillance        | Install surveillance measures as required (i.e. cameras etc).   | As required.  | CVJV Project Manager    |
| EAS                 | Develop an Emergency Access Plan to the satisfaction of the CoW and SLSWA following development of the Study Area. The EAS should include where practical and appropriate, SLSWA recommendations.   | Post development.   | CVJV Project Manager    |

### 9.7.3 Monitoring

Monitoring and reporting requirements for access are detailed in Table 34.

Table 34: Access and infrastructure monitoring and reporting requirements

| Parameter             | Purpose   | Location              | Frequency /Timing                    | Responsibility       |
|-----------------------|---|-----------------------|--------------------------------------|----------------------|
| Fencing / demarcation | To monitor integrity of fencing and/or demarcation within the Study Area. | All demarcated areas. | Fortnightly during construction.     | CVJV Project Manager |
|                       |   |                       | Monthly (during maintenance period). |                      |
| Signage               | To monitor the integrity of signage within the Study Area.                | All demarcated areas. | Fortnightly during construction.     | CVJV Project Manager |
|                       |   |                       | Monthly (during maintenance period). |                      |

### 9.7.4 Contingencies

Table 35 identifies the appropriate contingency actions to be initiated in the event that the objectives for access management are not met.

Table 35: Access management

| Trigger   | Action  |
|---|---|
| Unauthorised access outside of the formalised pathways  | <ol style="list-style-type: none"> <li>1. Investigate cause.</li> <li>2. Redefine boundaries if breach due to inadequate boundary marking.</li> <li>3. Reinforce all personnel of access restrictions beyond access boundaries.</li> <li>4. If damage has been done to the fencing or if the fencing is deemed inadequate then the fencing will be repaired or replaced.</li> <li>5. Consult with adjacent land users and the CoW as required to determine combined access management approaches.</li> <li>6. An Environmental Incident Report shall be completed.</li> </ol> |
| Emergency access resulting in destruction of vegetation | <ol style="list-style-type: none"> <li>1. Assess extent of damage.</li> <li>2. Undertake revegetation to repair damaged areas as a result on emergency access to the satisfaction of CoW.</li> </ol>  |
| Fencing not sufficient or not maintained                | <ol style="list-style-type: none"> <li>1. Repair or reinstate fencing.</li> <li>2. Review frequency of fencing monitoring.</li> <li>3. Record incident in Incident Register.</li> </ol>   |
| Infrastructure not maintained                           | <ol style="list-style-type: none"> <li>1. Repair or reinstate infrastructure.</li> <li>2. Review frequency of infrastructure monitoring.</li> <li>3. Record incident in Incident Register.</li> </ol>   |

## 9.8 Aboriginal heritage

The foreshore development will not result in any potential impacts to European heritage, therefore management of European heritage has not been considered further in this FMP.

One registered mythological Aboriginal heritage site (Yanchep Beach - Site ID 17599) occurs within the Study Area.

This heritage site is located within land subject to an ILUA with the Whadjuk People. As the proposed development within the Study Area has the potential to impact on the heritage site, a s 18 clearance to enable disturbance within the Study Area may be required in accordance with provisions of the AH Act. CVJV will consult with the Whadjuk People, South West Aboriginal Land and Sea Council (SWALSC) and DPLH to determine if a s 18 clearance is required. In the event a s 18 clearance is required, conditions of the clearance will be implemented as part of foreshore development.

If a S 18 clearance is required, the approved FMP will be amended where any inconsistencies occur with the S 18 approval conditions.

## 9.9 Public awareness and information management

In order to promote public awareness and provide information to residents and beach users, public awareness and information management is an integral component of ensuring delivery of the foreshore meets expectations of the surrounding residents and beach users.

Informative signage will be provided around the POS areas to ensure the community and visitors are informed about the values and history of the area. Informative signage will be placed at strategic resting points, pathway intersections or near sites of relevant context within the Study Area. The signage information will detail local Indigenous history, past land uses, existing and endemic flora and fauna and general site safety. Directional signage will also be installed along the path systems detailing distances for walks and providing a location map to encourage the community to interact with the site. Further interpretive sculptures, posts or the use of onsite materials such as large logs may also be considered to also assist with way finding and interaction.

Key management actions to be undertaken as part of foreshore development are provided in Table 36.

Table 36: Public awareness and information management actions

| Management action  | Responsibility                         |
|--|--|
| Incorporate Aboriginal names in the naming and signposting in consultation with representatives from the Aboriginal community prior to installation.   | CVJV/ Landscape Architect & Contractor |
| Provide educational signage on matters such as cultural history, protection of native vegetation and fauna (including venomous snakes), impacts of pets, and activities that could affect the foreshore reserve. | CVJV/ Landscape Architect & Contractor |
| Liaise with local schools, community and conservation groups to be involved in management activities.  | CVJV                                   |
| Install directional and public safety signage as required within the POS area and beach access points.   | CVJV/ Landscape Architect & Contractor |
| Provide interpretive sculptures, posts, or onsite materials to assist with way finding where possible.   | CVJV/ Landscape Architect & Contractor |

### 9.9.1 Community consultation

Section 5.8 of SPP 2.6 requires that adequate opportunity is provided to enable the community to participate in the coastal planning and management process.

In preparing and finalising the Foreshore Management Plan, the Development team invited interested local residents of the wider Yanchep area to attend a community information session to ensure that the community are informed of the key aspects and implementation of the Foreshore Management Plan initiatives.

The Developer, Capricorn Village Joint Venture (CVJV), prepared and published two articles in local print media and online media (Community News and Yanchep News Online) in September 2017 advising the community of the preparation of the Foreshore Management Plan and invited community members to register to attend a Community Information Session, where further details of the reports, studies, management plans and development proposals within and adjacent to the foreshore area would be presented and discussed.

A total of 38 residents registered interest in attending the event, a total of 22 residents attended the Community Information Session hosted by CVJV in Yanchep on 3<sup>rd</sup> October 2017 between 6:00pm and 8:00pm. The session provided a comprehensive overview of the process, studies and reports that have been completed by CVJV in preparing and finalising the Foreshore Management Plan for submission to City of Wanneroo and Department of Planning, including the Flora & Fauna studies and management plans, Coastal Processes assessment and outcomes, Surf Lifesaving WA beach safety assessment and recommendations, and Bushfire Management Plan. The residents were given an overview of the key aspects of the future development in the Capricorn Coastal Node and the management of the amenity in the precinct over the coming 100 years in accordance with the Coastal Processes assessment.

The Developer has encouraged the residents who attended the session to provide written feedback on the details discussed at the Community Information Session. This feedback will be compiled and recorded by the Developer as part of the implementation of the Foreshore Management Plan.

## 10. Reporting and review

Monitoring and reporting requirements for each key factor are summarised in Section 9. In addition to these requirements, an annual monitoring report will be provided to the CoW including reporting on the following:

- reporting against objectives, targets and KPIs for each factor
- reporting of any breaches and/or triggering of contingency measures
- other matters of note/consideration.

The annual report will be provided annually during the five-year maintenance period to provide a progress update on the foreshore management works and will assist in planning for future management requirements to be undertaken by the CoW, following the maintenance period.

In the event that the annual reports demonstrate that completion criteria are not being met, the proponent may be required to prepare and submit six-monthly reports at the request of, and to the satisfaction of the City of Wanneroo.

### 10.1 Auditing and inspections

On completion of foreshore development works, CVJV will organise an independent audit to be undertaken to certify activities and results are in accordance with concept plans and designs. Once the CoW are satisfied that the works have been completed, CVJV will commence the five year maintenance period.

CVJV will implement undertake monitoring consistent with monitoring commitments detailed in this FMP.

### 10.2 Management plan review

The implementation of management measures identified in this FMP will be reviewed in response to changes in the natural environment, recreations use and community values. CVJV will maintain accurate records of activities until transfer of management to the CoW. Changes to this FMP will be undertaken in consultation with the CoW.



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