

# Foreshore Management Plan Burns Beach

Prepared for: Burns Beach Property Trust

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## DOCUMENT ISSUE AUTHORISATION

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6	a	Mar 06	Final version adopted by the City of Joondalup and Department of Planning and Infrastructure	SJP	JDH

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## DOCUMENT RELEASE SUMMARY

The Foreshore Management Plan (FMP) for the Burns Beach Foreshore was first prepared in November 2004. The number of Issues and Revisions of this document has been based on key stakeholder's feedback including the City of Joondalup, the Department of Planning and Infrastructure and the City of Joondalup's Conservation Advisory Committee.

Issue 6 - Revision A is the final version of the FMP that was endorsed by both the City of Joondalup and the Department of Planning and Infrastructure in March 2006. Correspondence from the City of Joondalup is contained in **Appendix B** and correspondence from the Department of Planning and Infrastructure is contained in **Appendix C**.

Issue 6 – Revision A is the latest version of the document that will guide the future development and management of the Burns Beach Foreshore as part of the Burn Beach residential development. This latest document will satisfy the requirement for the proponent to prepare a FMP for all future stages of the development (at the time of subdivision and clearance).

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## **1. INTRODUCTION**

### **1.1 BACKGROUND**

The coastal zone is a dynamic environment. Western Australia has approximately 12,500 kilometres of coastline exposed to different and dynamic processes. Natural cycles build and erode dune and foreshore areas, and the ability of the natural environment to adapt is dependant on the appropriate protection and management of the coastal environment. The Western Australian lifestyle is heavily reliant on the coastline, which necessitates the protection of natural areas whilst also allowing beach access and fostering an appreciation of the natural environment. This is a significant challenge facing both land developers and Local Governments alike.

The Burns Beach Property Trust owns Lot 9017 Burns Beach, referred to herein as “the Burns Beach site”. The Burns Beach site is located north of Burns Beach Road, west of Marmion Avenue, and immediately north of the existing Burns Beach townsite. The Trust comprises 807 units, held by approximately 640 investor families. There has been a long history with the site in terms of the Trust’s intention to pursue urban development. Following a lengthy Metropolitan Region Scheme and City of Joondalup District Planning Scheme amendment process, and environmental approvals (with two proposals formally assessed, firstly at Public Environmental Review level in 1995 and subsequently Environmental Review in 1999), the Burns Beach Structure Plan was lodged with the City of Joondalup in October 2004 in order to facilitate subdivision and for development to proceed at the Burns Beach site. The document *Burns Beach Structure Plan* (DPS, 2004) outlines the nature and extent of the proposed urban development for the entire Burns Beach site.

The Western Australian Planning Commission (WAPC) adopted the Burns Beach Structure Plan in 2005, and a Subdivision Approval for Stage 1 of the Burns Beach development was issued in June 2005. This document is therefore intended to provide the linkage between the development of the urban cell and the management of the adjacent foreshore reserve, and provide a management framework during the development process and beyond.

### **1.2 THE BURNS BEACH STRUCTURE PLAN FORESHORE**

Of the total 290 hectares comprising the total site, 147.5 hectares is zoned “Urban” and proposed for a significant urban development. The remaining 144 hectares is reserved as “Parks and Recreation” under the Metropolitan Region Scheme (MRS), which will be retained in the long term for conservation purposes. This latter area is situated both to the west and north of the future development area, and includes a length of foreshore that is aligned along the entire western boundary of the Burns Beach site of approximately 2.6 kilometres in length. This significant parcel of land was “given-up” free of cost to the State by the Burns Beach Property Trust as a conservation reserve in order that the EPA’s environmental objectives could be met and facilitate the development of the remainder of the site.

The foreshore reserve for the purposes of this Foreshore Management Plan (FMP), however, is the 1.2 kilometre length of southern foreshore directly adjacent to the urban development area. The extent of this area is shown in **Figure 1**. It ranges between 97 and 160 metres wide, and supports natural dunal features and vegetation. West of this is the beach and strand area, which is subject to changes based on dynamic seasonal and inter-annual cycles.

The width of the foreshore reserve was set by the Western Australian Planning Commission WAPC during the Metropolitan Region Scheme (MRS) amendment process and conforms to the policy requirements of the WAPC. It has been agreed by the Minister for Environment and Minister for Planning, following advice from the Coastal Planning Section within the Department of Planning and Infrastructure (DPI). Therefore, the boundary and extent of the foreshore reserve for the Burns Beach site has assumed to be given during the preparation of the Burns Beach Structure Plan (DPS, 2004) and this FMP. It is important to note that the purpose of the Structure Plan and the FMP has not been to determine an appropriate width of the foreshore reserve for the purposes of progressing development at the site.

The northern coastal area within the Burns Beach site (the remaining 1.4km length of foreshore area) has not been addressed in this report, as it is included in a larger pocket of land reserved for Parks and Recreation. It is envisaged that any works and management measures proposed in this FMP will be implemented through the staged development and subdivision process and funded by the subdivider. While consideration has been given towards aspects of the northern foreshore area (the potential provision of a surf club, associated facilities and car park area), this has not been addressed in detail as this may not be developed in the same time period, and would be funded and implemented by a separate third-party.

### **1.3 PURPOSE OF THIS REPORT**

This FMP has been prepared to detail the actions proposed to address management of the foreshore reserve adjacent to the Burns Beach development area, in order to ensure the appropriate management and preservation of this area, and to address Condition 23 of the Burns Beach Stage 1 Subdivision Approval, which states: *“A foreshore management plan for the foreshore abutting the application area being prepared and approved prior to the commencement of subdivisional works to the satisfaction of the Western Australian Planning Commission (LG) (WAPC)”*

The FMP has been prepared in a manner so as to integrate sustainable community use of the coastal area with the conservation of the coastline and associated natural features. Recreational focus areas (referred to as “recreation nodes”) have been designated within the foreshore reserve for use by the community and to facilitate the preservation of the surrounding conservation areas. These have been located in areas where degradation of foreshore vegetation has already occurred and to ensure the retention and protection of higher priority conservation areas (based on sensitivity and vegetation condition). The remaining degraded areas have been targeted for rehabilitation/restoration and maintenance as part of this FMP.

The primary outcome of the plan has been to address coastal/foreshore management issues such as beach access, location and accessibility of car parks and other public amenities, fencing, educational/interpretive and directional signage and public art, and the requirements for the rehabilitation and ongoing management of the reserve. A key feature will be a dual use path and beach path access network that will link the community areas and beach, providing an integrated conservation and recreation focus, and allowing an appreciation of the existing environment while at the same time protecting natural areas.

The expected audience for this FMP is likely to include:

- Clearing agencies for Subdivision Condition 23 (including the City of Joondalup, and the Department for Planning and Infrastructure’s Coastal Management and Bush Forever Sections);
- Community reference groups including the City of Joondalup’s Conservation Advisory Committee (CAC) and Joondalup Coastcare Group;
- The wider community through the City of Joondalup’s advertising of the FMP and compilation of submissions regarding its contents; and
- Following the plan’s acceptance, the designated landscape designer/architect who will be responsible for preparing detailed design drawings and works specifications to cover both the construction of infrastructure and detailed implementation of the required management works (seedling planting, seeding, weed control etc.).

The multidisciplinary project team responsible for providing input for the preparation of this plan, includes the following:

<b>Role</b>	<b>Company</b>	<b>Personnel</b>
Project Manger	Peet & Company	Nelson Hinchcliff Craig Graham
Town Planner/Urban Design	Development Planning Strategies	Graham Meridith Candice Halleen
Environmental Consultant	Cardno BSD	Jason Hick Kelly Freeman Kylie Del Fante
Landscape Architect	McNally Newton	Chris Newton Paul Broderick
Civil Engineer	TABEC	Chris Bitmead



## **2. THE APPROVAL AND DEVELOPMENT PROCESSES AND SUMMARY OF RELEVANT POLICIES IN RELATION TO FORESHORE MANAGEMENT**

### **2.1 THE APPROVALS PROCESS**

In 1994 a proposal to develop 260 ha of the 290 ha Burns Beach site for residential purposes was referred to the Environmental Protection Authority, pursuant to the *Environmental Protection Act 1986*. The EPA assessed the proposal at the level of Public Environmental Review. In January 1998 the EPA recommended (Bulletin 880) that the proposal could not be managed to meet the EPA's objectives, but that a modified proposal to develop 55ha of land could be managed to meet their objectives. After a lengthy appeal process the Minister approved the development (Statement 487) of 55ha in November 1998 and considered that development of the balance of land should be considered through a future Metropolitan Region Scheme Amendment process.

In May 1997 the Western Australian Planning Commission (WAPC) initiated the Clarkson-Butler Amendment (992/33) and referred it to the EPA. Subsequently the EPA resolved to assess the Amendment pursuant to Section 48A of the *Environmental Protection Act*. Taking on board the previous findings of the EPA (Bulletin 880), the Minister's statement of approval (Statement 487), and following discussions with the Bush Forever office, the Burns Beach Property Trust submitted a revised plan which proposed 170 ha of land for residential purposes and 120 ha for Parks and Recreation. In June 1999 the WAPC resolved to modify the Amendment in accordance with the revised plan submitted by the Trust.

After the Environmental Review was released for public comment the EPA considered the revised plan and recommended (Bulletin 971) to the Minister for Environment that the scheme could not be managed to meet the EPA's objectives, but the development of 55ha of land could be managed to meet their objectives.

After considering appeals for over two year years the Minister for Environment and Minister for Planning approved (Statement 629) Metropolitan Region Scheme Amendment 992/33 in July 2003. As a condition of approval and as part of the appeals determination process, the Trust agreed to provide an additional 24 ha for Parks and Recreation, and as a result the final approved amendment provides 144 ha for Parks and Recreation (approximately 50% of the site) and 146 ha for residential purposes. No other conditions were applied to the Urban Zone at Burns Beach.

In March 2004 the consequential local town planning scheme amendment (No.21) to the City of Joondalup's District Planning Scheme No.2 was referred by the City to the EPA pursuant to Section 48A of the *Environmental Protection Act*. In April 2004 the EPA advised that the amendment could not be assessed because in accordance with section 48A(a) of the *Environmental Protection Act* the scheme was 'deemed assessed' by the EPA.

The *Burns Beach Structure Plan* (DPS, 2004) was submitted to the City of Joondalup for comment following prior consultation with the City. The City of Joondalup Commissioners endorsed the Structure Plan on 2 November 2004, at which point the Structure Plan was released for public advertising for 28 days. Following Council's recommendations and advice the Structure Plan was adopted by the WAPC in 2005.

A Subdivision Application to cover Stage 1 of the Burns Beach development was lodged with the WAPC, and subsequently a Subdivision Approval was issued in June 2005. Condition 23 of the Subdivision Approval requires the preparation of an FMP to cover the area of foreshore adjacent to the Stage 1 subdivision area. On this basis this FMP has been prepared to address this requirement specifically for the foreshore adjacent to the Stage 1 area, but also to provide the framework for the management of the remainder of the Burns Beach foreshore reserve. This FMP, once endorsed by the City of Joondalup and the WAPC, will be used to satisfy all future requirements for foreshore management for all stages of the Burns Beach Estate that are adjacent to the foreshore reserve.

## 2.2 PREVIOUS STUDIES

Historically, the general area has been discussed in planning strategies and documentation since the early 1970s.

These reports include:

- Corridor Plan for Perth (Metropolitan Region Planning Authority 1970);
- Planning Structure for North-West Corridor (Metropolitan Region Planning Authority, October 1977);
- System 6 Report (Department of Conservation and Environment, October 1983);
- Draft North West Corridor Structure Plan, Background Report (Department of Planning and Urban Development, February 1991);
- North West Corridor Structure Plan (Department of Planning and Urban Development, February 1991);
- Coastal Planning Study – Burns Beach to Jindalee (Hames Sharley Australia 1992); and
- Perth's Bushplan and Bush Forever (Government of Western Australia, 1998, 2000).

Additionally, the area has been the subject of a number of botanical assessments including:

- V & C Semenuik Research Group (1989);
- Halpern Glick Maunsell (1991);
- Keighery (1991);
- Trudgen (1991);
- Keighery and Keighery (1991);
- Griffin and Trudgen (1994);
- Trudgen (1996); and
- Alan Tingay and Associates (Van Der Mozel, 1999).

Botanical assessments have also been carried out in the nearby Alkimos area and Lot 17 Tamala Park. The outcomes of the above reports and assessments combined with more recently acquired information (aerial photograph interpretation and condition mapping) and associated field assessments have been incorporated into the preparation of this FMP.

### 2.3 THE BURNS BEACH STRUCTURE PLAN AND PUBLIC CONSULTATION

As discussed above, the *Burns Beach Structure Plan* (DPS, 2004) has been lodged with the City of Joondalup and released for public advertising. As outlined in these documents, “*the overall vision embraced by the Structure Plan is to create a development which is environmentally, socially and economically sustainable. The design philosophy was to create a high quality residential environment with a strong community focus and a real sense of identity.*”

It is intended that this vision be carried into the FMP such that the foreshore represents a real and valuable asset for the local community, it provides a mechanism to protect, conserve and enhance the unique coastal environment and its associated vegetation, and also is mindful of the ongoing maintenance requirements that will ultimately be taken on by the City of Joondalup.

As part of the Structure Plan preparation process, Estill & Associates (on behalf of the project manager Peet & Company) undertook an extensive public consultation program. This program involved local residents, key stakeholder groups, and relevant authorities, and the documented outcomes are contained within *Appendix 6 Community Consultation Report* of the *Burns Beach Structure Plan* (DPS, 2004).

One of the issues raised during the public consultation program was beachfront conservation and recreation, which the focus group participants believed was “very important”. From focus group rating exercises, the following were rated “important” or “very important” by more than 80% of the participants:

- Use of boardwalks to protect sensitive areas (100%);
- Toilets along the coast (100%);
- Provision of cycling and pedestrian paths (93%);
- Preserving dunes by managing access (93%);
- Providing access to a suitable swimming beach (93%);
- Provision of a dual use path (92%); and
- Creation of small beachside parks (86%).

Accordingly these issues have been incorporated into the FMP as outlined in **Section 5**. The *Burns Beach Structure Plan* (DPS, 2004) contains a full description of the public consultation process, methodology, and outcomes achieved.

Subsequent to the Structure Plan preparation and adoption process, a draft version of this FMP was released for public comment by the City of Joondalup. The City received a wide range of comments and where appropriate these comments have been addressed in this revised version of the FMP. In addition to this the City of Joondalup’s Conservation Advisory Committee (made up entirely of

community representatives) provided specific comments regarding the contents of the FMP and the document amended accordingly to address any concerns. The City of Joondalup provided advice to the WAPC that they were satisfied the FMP addressed their requirements and that they were happy to clear the condition. As part of the final stage of the process the draft FMP was provided to DPI for comment and amendments were made regarding future management roles and responsibilities (beyond the Trust ceding the reserve areas) and revisions to the road design in relation to batters. The “Document Issue Authorisation” at the front of this document captures the revisions made to the FMP as part of the overall consultation process.

## **2.4 RELEVANT POLICIES**

### **2.4.1 *Statement of Planning Policy No. 2.6: State Coastal Planning Policy***

*Statement of Planning Policy No. 2.6: State Coastal Planning Policy* (SPP 2.6) was gazetted in June 2003, and is a Statement of Planning Policy made under Section 5AA of the *Town Planning and Development Act (1928)*.

SPP 2.6 provides for the designation of setbacks from the coast in order to protect development from coastal processes, and to provide an adequate coastal foreshore reserve. It additionally specifies the need to prepare and implement a coastal strategy/management plan to facilitate development in proximity to the coast.

Based on this policy, the coastal planning strategy or foreshore management plan should set out requirements for (WAPC, 2003):

- Coastal foreshore reserves and development setbacks;
- Location and extent of public use, access and facilities;
- Integration of coastal/marine planning and land use planning;
- Protection of significant views and vistas;
- Protection of significant natural landscapes;
- Protection of significant indigenous heritage;
- Protection of ecological systems; and
- Protection of threatened species and ecological communities.

In addition to the above, guidelines and criteria for development should be provided regarding the following:

- Form and scale of development;
- Foreshore tenure and management;
- Location, form and land use within development nodes;
- Waste and stormwater disposal and the use of water sensitive urban design best management practice; and
- Financial responsibilities for ongoing maintenance and management of foreshore areas including any foreshore protection structures.

This FMP has been prepared in accordance with the requirements of SPP 2.6, both in terms of the specified coastal setback and the contents of the plan itself. It is important to note that the extent of the coastal setback was determined previously by the WAPC during the Metropolitan Region Scheme amendment process, and was not part of the preparation of either the Burns Beach Structure Plan or the FMP.

#### **2.4.2            *Bush Forever and Bush Forever Practice Note 14***

The land adjoining the development area and within the foreshore reserve has been identified broadly as regionally significant vegetation, and this was recognised through its inclusion in Bush Forever (as Bush Forever Site No. 322 - Government of Western Australia, 2000). Since the foreshore reserve is contained within an existing Parks and Recreation Reserve under the Metropolitan Region Scheme, the planning and implementation of the foreshore management plan needs to be considered with regard to *Bush Forever Practice Note 14* (Government of Western Australia, 2000).

This practice note applies to Bush Forever sites currently reserved in the MRS for Parks and Recreation. In selecting sites for protection, Bush Forever's starting position was that vegetation in Parks and Recreation reserves was to be regarded as regionally significant and included as protected sites (Government of Western Australia, 2000). Practice Note 14 acknowledges that a number of these reserves did not undergo comprehensive vegetation assessment and may include degraded areas that, on verification, may not meet the regional significance criteria. Therefore, future recreation, servicing or community objectives may be appropriate in cleared or degraded portions of existing reserved lands forming part of a Bush Forever Site as determined through management planning but subject to a comprehensive vegetation assessment and justification.

This approach has been undertaken in the siting of recreation nodes within the Burns Beach foreshore, and is documented further in **Section 5.2.1**, and additional information regarding the regional significance of the vegetation on the Burns Beach site and specifically within the foreshore reserve is contained within **Section 4.6**.

#### **2.4.3            *Draft Statement of Planning Policy No. 2.8: Draft Bushland Policy for the Perth Metropolitan Region***

As outlined above, since the foreshore reserve falls within Bush Forever Site No. 322, the policy measures outlined in the *Draft Statement of Planning Policy No. 2.8: Draft Bushland Policy for the Perth Metropolitan Region* (SPP 2.8), and specifically *Section 5.2.1 - Bush Forever Reserves (Proposed and Existing)* should be considered during the preparation of the FMP.

This policy indicates that there should be a general presumption against the clearing of regionally significant bushland, however provisions are made for exceptions to this presumption on the basis of a number of key considerations. Associated with the siting of the recreation nodes within the Burns Beach Foreshore will be the need for some vegetation clearing and disturbance within the Bush Forever Site. Based on SPP 2.8 and in the case of the Burns Beach foreshore recreation nodes it is important to note:

- The location of the recreation nodes is consistent with the overall purpose and intent of the Parks and Recreation Reserve. Given the existing zoning of the site and the approval of the Stage 1 Subdivision Application and assuming that subdivision approval is granted for the various stages of the Burns Beach development, it is also consistent with existing approved uses.
- The provision of recreation nodes within the foreshore reserve can be justified with regard to wider environmental, social, economic and recreational needs. Environmentally, the purpose of the recreation nodes is to focus recreational activities to areas that have been identified as having lower conservation significance than other areas within the foreshore reserve. This will therefore minimise degradational effects arising from uncontrolled access and recreational use of the foreshore. Additionally, the provision of the recreation nodes is part of a wider approach involving substantial restoration and rehabilitation of the foreshore reserve area, which will bring about an overall “net environmental gain”. There are obvious social and recreational benefits associated with the provision of recreation nodes within the foreshore reserve, in terms of creating a sense of place and community, and providing opportunities for active and passive recreation (both essential for any community). Finally, and in terms of economic justification, the development of the adjacent land to the foreshore and the implementation of the associated foreshore management plan will provide substantial resources from the developer to provide facilities, access control, and a significant allowance for restoration and rehabilitation.
- A central and critical proposition of this FMP is the undertaking of extensive restoration and rehabilitation across the full foreshore reserve, in combination with access control and community facilities, this will offset any loss of vegetation associated with either the implementation of the recreation nodes or construction cut and fill areas.

### **3. AIM, PRINCIPLES AND OBJECTIVES OF FORESHORE MANAGEMENT PLAN**

#### **3.1 AIM, VISION AND OBJECTIVES**

***Aim:***

- The aim of this FMP is to provide a practical and prescriptive framework to restore, rehabilitate and provide controlled access and recreation facilities within, and adjacent to, the foreshore reserve at Burns Beach.
- The FMP has been prepared to satisfy Condition 23 of the Subdivision Approval for Stage 1 of the development and to provide a basis for foreshore management for subsequent stages of the Burns Beach development.
- A draft version of this FMP has been reviewed by the DPI (Coastal Planning and Bush Forever Section) and the City of Joondalup, and these agencies will act as clearing authorities for current and future FMP subdivision conditions.

***Vision:***

- A sustainably managed foreshore reserve that is treasured by the Burns Beach community for its environmental, recreation and social values.

***Objectives:***

- Create a context from which detailed construction and rehabilitation plans can be progressively prepared and implemented.
- Provide pedestrian and emergency access through the foreshore to the coast and along the coast.
- Provide designated recreation nodes and entry points to the foreshore.
- Consider future integration with access and facilities to the northern swimming beach.
- Protect, enhance and rehabilitate coastal vegetation.
- Educate and manage foreshore users with interpretative signs.
- Provide functional facilities to maximise the sustainable use of the foreshore and coast by the community.
- Encourage the involvement and participation of the community in foreshore/bushland management.

#### **3.2 OPPORTUNITIES AND CONSTRAINTS**

A number of opportunities and constraints within the foreshore reserve were considered in preparing this FMP:

***Opportunities:***

- ✓ The coastline is stable and in a long-term context is not accreting or eroding.
- ✓ Offshore limestone reefs/ricks (particularly in the southern portion of the foreshore reserve) act to reduce wave energy and potential for coastal damage.

- ✓ The majority of the foreshore is well vegetated and relatively stable. This is in reference to physical stability as the quality and condition of the vegetation has been variably impacted in places by historic grazing and weed invasion (primarily in the southern areas).
- ✓ The foreshore reserve is a minimum of 97 metres wide (and varies up to 160 metres wide) it therefore provides an adequate buffer for coastal protection and opportunities for recreation facilities.
- ✓ Clearing of native vegetation within the development area (outside but adjacent to the foreshore reserve) will provide a ready supply of seed, topsoil, brush and mulch for rehabilitation purposes.
- ✓ Existing tracks through the foreshore can be consolidated and improved to provide designated access to the coast.
- ✓ Rehabilitation of degraded areas will increase the conservation value of the foreshore.

***Constraints:***

- \* Approximately 35% of the foreshore contains vegetation in excellent condition. It will be necessary to protect these areas from degradation and inappropriate access.
- \* Approximately 65% of the foreshore vegetation is subject to some form of degradation (either in terms of stability or weed invasion). In particular coastal instability has the potential to escalate with increased use pressure. It will be necessary to stabilise, restore and rehabilitate these areas, and restrict inappropriate access.
- \* Two dune blowouts in the foreshore have developed over many years and currently form attractive areas for sand boarding and uncontrolled four wheel drive access. These areas require access control, stabilisation and rehabilitation.
- \* The primary dune system of the foreshore consists of steep dunes and deep swales. The ease of access to the beach is greatly impeded by the dune formations in the area and it will be necessary to create safe and controlled access through the dunes to the beach.
- \* The swimming beach in the area is to the north of the Structure Plan area by approximately (100-300 metres). This beach is within the Regional Open Space and outside the foreshore immediately west of the development. Given this beach will create a natural attraction to the community, particularly those who wish to swim, controlled access and facilities will need to be provided. The exact nature and scale of facilities at this swimming beach will need to be discussed further with the City of Joondalup, DPI and CALM.



## **4. THE BURNS BEACH FORESHORE ENVIRONMENT**

The area defined as foreshore reserve for the purposes of this FMP is the 1.2 kilometre length of foreshore directly adjacent to the Burns Beach development area (Urban zoned land). The foreshore reserve is a minimum of 97 metres wide and supports natural dune features and vegetation, its extent is shown in **Figure 1**.

The coastline is subject to dynamic processes of erosion (removing sand) and accretion (storing sand). A coastal dune and shoreline stability analysis was carried out as part of two formal Environmental Protection Authority (EPA) assessments. This analysis revealed that the coastline of the site has been relatively stable over the last 46 years, showing no consistent, significant erosional processes (HGM, 1995 and HGM, 1999).

The foreshore of the site supports a number of dune formations including an accretionary cusped foreland and perched dune fields and dune blowouts. The nature of the geological formations leads to steep primary dunes and deep swales. The soils of the area consist of shallow quartz sands over limestone with numerous limestone outcrops. Coastal vegetation is typical of the southwest of Western Australia.

### **4.1 REGIONAL LOCATION**

Burns Beach is located on the coast within the Perth Metropolitan area, approximately 28 kilometres northwest of Perth. The foreshore reserve, for the purposes of this FMP extends from the existing Burns Beach townsite north approximately 1.2 kilometres into the 144 hectares Parks and Recreation reserve ceded by the owners to the Government.

### **4.2 PREVAILING CLIMATIC CONDITIONS**

The Perth Metropolitan Region experiences a “Warm Mediterranean” climate with average winter precipitation between 600 – 1000 mm per annum with 5 to 6 dry months per year.

In this coastal region, significant winter storms occur most years that will cause beach erosion and a net sediment loss in these high-energy situations. In extreme cases this can extend to the primary dune and result in a significant reduction in the width of the beach. This effect is largely minimised in the section beach adjacent to the foreshore reserve due to the presence of limestone reef and platform that has a significant stabilising effect on the beach profile.

In summer, strong southwesterly winds occur in afternoons when the beach and dune sands are dry and mobile. This can result in significant sand movement that results in dune instability and vegetation smothering. This is exacerbated when dune vegetation is disturbed or removed, and emphasises the importance of establishing and maintaining dune vegetation in currently disturbed areas of the foreshore.

### **4.3 LOCAL GEOLOGY**

The Swan Coastal Plain is generally flat, approximately 20 to 30kms wide and consists of a series of geomorphic entities running parallel to the coastline, these include the Pinjarra Plain and three dune systems (Quindalup, Spearwood and Bassendean) of differing ages of deposition whose soils are at different stages of leaching and formation. The coastal plain is low lying, often swampy with sand hills and therefore the soils predominately consist of recent sands or swampy deposits.

The site is located on the coastal belt, which consists of the white Quindalup dune systems. The Quindalup dune system is young calcareous sands formed from marine deposits as both fixed and mobile sand dunes that lie in a north-south orientation.

On this site the Quindalup dune system overlays Tamala limestone. This is particularly evident along the southern two thirds of the foreshore reserve where there is a significant and sheer fall (almost a “step” in some places) from the primary dune onto the beach. In these areas the limestone is exposed on the beach, intertidal zone and further into the ocean.

HGM (1995) referred to work undertaken by McArthur and Bartle (1980) and Semeniuk et al., (1989) in terms of describing the dune systems, soil types and landforms present in the Burns Beach Western Cell. This identified two significant dune systems occurring across the Burns Beach site, namely the Quindalup and Spearwood Dune Systems. Four phases of the Quindalup Dune System commence from the Cuspate Foreland, and progress eastward and inland (in order from west to east):

- Youngest phase – steep irregular dunes;
- Third phase – irregular dunes;
- Second phase – moderate dunes; and
- Oldest phase –dunes.

Interspersed within these dune phases are more general patches of deep and shallow calcareous sands over limestone. Further inland from the Quindalup Dune System lies the Spearwood Dune System, this area comprises of Karakatta sands, and these occur over the south-east half of the Burns Beach site. A significant parabolic dune formation occurs to the north of the development area and partly within the Burns Beach site, and two substantial blowouts extend from the coast inland immediately north of the development area. Two less substantial (but still requiring management attention) dune blowouts occur within the foreshore immediately adjacent to the development area.

### **4.4 LOCAL TOPOGRAPHY**

A steeply rising vegetated primary dune dominates the foreshore area. The topography in the foreshore area varies from 3 metres RL to 24 metres RL on scattered peaks and is representative of undulating and mobile dunes of the Quindalup dune system.

### **4.5 LOCAL COASTLINE STABILITY**

Assessment of coastal stability of was undertaken by HGM (1999) using aerial photography from 1941 to 1990. This analysis revealed that the coastline of the site has been relatively stable over the

last 46 years, showing no consistent, significant erosional processes. The general coastline stability is consistent with well-developed foredune vegetation present within the foreshore reserve.

## 4.6 LOCAL FLORA AND VEGETATION

### 4.6.1 *Regional Flora*

The foreshore reserve lies on the Swan Coastal Plain Subregion of the Drummond Botanical Subdistrict within the Southwestern Botanical Province as described by Beard (1990). Flora composition of the Swan Coastal Plain Subregion has been described by Beard (1990) as predominantly consisting of *Banksia* Low Woodlands on leached sands with *Melaleuca* swamps where ill-drained and Woodlands of *Eucalyptus* spp. on less leached soils.

Beard (1990) describes an open grass community as the first stable vegetation community on a foredune. \**Cakile maritima* and \**Arctotheca populifolia* are ephemeral species of the area and *Spinifex longifolius*, *Spinifex hirsutus*, \**Tetragonia decumbens* and \**Ammophila arenaria* are perennial colonisers. In the area on the peak and behind foredunes, species such as \**Tetragonia decumbens*, *Isolepis nodosa*, *Scaevola crassifolia*, *Lepidosperma gladiatum* and *Olearia axillaris* occur.

Previous soil-based vegetation mapping for the region by Heddle *et al.* (1980) describes the vegetation complex as Quindalup Complex with associated vegetation mosaic of woodland or open forest of tuart-jarraah-marri or woodland of jarrah with *Banksia* species. Heddle *et al.* (1980) describes the vegetation of the Quindalup Complex as consisting predominantly of *Angianthus cunninghamii*, \**Arctotheca populifolia*, *Atriplex isatidea*, \**Cakile maritima*, *Carpobrotus virescens*, \**Pelargonium capitatum*, *Spinifex longifolius* and *Tetragonia implexicoma* in the strand and foredune alliance.

The Quindalup Complex vegetation of the mobile and stable dune alliance consists of *Acacia cyclops*, *Anthocercis littorea*, *Lepidosperma gladiatum*, *Myoporum insulare*, *Nitraria billardierei*, *Olearia axillaris*, *Scaevola crassifolia*, *Scaevola nitida*, *Spyridium globulosum* and *Westringia rigida*.

The flora and vegetation of the foreshore reserve and general area has been investigated over several years. Four Priority Flora species were located in the overall Burns Beach site, namely; *Conostylis pauciflora* subsp. *euryrhipis* (P3), *Stylidium maritimum* ms (P3), *Jacksonia sericea* (P4) and *Sarcozona bicornata* (P3). Two of these species are potentially within the northern section of the foreshore reserve associated with the *Melaleuca systena/Lomandra maritima* Low Shrubland to Low Open Heath. No Declared Rare Flora were located within the Burns Beach site, the foreshore reserve, or in studies of adjacent and floristically similar areas to the north.

#### 4.6.2 *Vegetation*

Thirteen vegetation units have been described in the general area (Alan Tingay and Associates, 1999), with five of these units indicated as occurring within the foreshore reserve. These are outlined below in **Table 1**.

**Table 1: Vegetation units occurring within the foreshore reserve.**

<u>Quindalup Vegetation Units</u>
<i>Olearia axillaris/Scaevola crassifolia</i> Low to Open Heath. This vegetation unit occurs on the west of the subject site and is mostly protected by the foreshore reserve.
<i>Spyridium globulosum/Olearia axillaris</i> Open to Closed Heath. One large and three small associations of this vegetation unit occur in the area, also to the west.
<i>Pelargonium capitatum</i> Low Open to Closed Heath. This vegetation unit occurs to the south of site, close to the current Burns Beach townsite. <i>Pelargonium capitatum</i> is an introduced species and is indicative of disturbance.
<i>Melaleuca systena/Lomandra maritima</i> Low Shrubland to Low Open Heath. The vegetation unit occurs along the boundary of the Burns Beach townsite and in a larger block to the north of the site.
<i>Acacia rostellifera</i> Closed Heath. <i>Acacia rostellifera</i> vegetation unit is scattered along the interface of the Quindalup and Spearwood Dune System, extending west.

None of the vegetation units described above are recognised as Threatened Ecological Communities (TEC) by State (English and Blythe 1997) or Commonwealth listings (*Environment Protection and Biodiversity Conservation Act 1999*).

A more recent reconnaissance vegetation survey to ground truth the existing vegetation community mapping indicated that four of the above five currently occur within the foreshore reserve. These are detailed below in **Table 2**.

**Table 2: Vegetation units confirmed as occurring within the foreshore reserve.**

<u>Quindalup Vegetation Units</u>
<i>Olearia axillaris/Scaevola crassifolia</i> Low to Open Heath. This vegetation unit occurs widely throughout the foreshore reserve.
<i>Spyridium globulosum/Olearia axillaris</i> Open to Closed Heath. This vegetation unit occurs widely throughout the foreshore reserve.
<i>Lepidosperma gladiatum/Scaevola crassifolia</i> Open to Closed Heath. This vegetation unit occurs in the depressions behind the primary and secondary dune formations.
<i>Melaleuca systena/Lomandra maritima</i> Low Shrubland to Low Open Heath. This vegetation unit occurs on the higher areas, on the west side of the reserve. <i>Lomandra maritima</i> occurs in a larger block to the north of the site.

There remains evidence of the *Pelargonium capitatum* community in the southern areas of the foreshore reserve, in the form of significant amounts of residual vegetative material and younger plants, however it does not currently exist as an “Open to Closed Heath”.

#### **4.6.3            *Vegetation Condition and Weeds***

Some cleared areas and bare sand currently occur along the foreshore reserve. One particularly large patch extends some 200 metres east. Generally the condition of the vegetation within the foreshore reserve is variable, with approximately 65% being subject to some form of historic degradation, and 35% in “Excellent” condition, which was determined during a field based condition survey undertaken during July 2004.

A large section of the southern foreshore reserve appears to have been previously dominated by *\*Pelargonium capitatum*, which is an introduced species and is indicative of significant historic disturbance. It has been speculated that the historic dominance of this species during the vegetation survey undertaken by Alan Tingay & Associates (1999), may have been attributable to a recent fire disturbance in that section of the site. *\*Pelargonium capitatum* was present throughout the foreshore reserve, but particularly in the southern areas. Two other dominant weed species occur throughout the foreshore reserve area *\*Tetragonia decumbens* and *\*Trachyandra divaricate*, also with higher occurrence in the southern portion of the reserve area.

#### **4.6.4            *Bush Forever Site***

As discussed earlier, the Burns Beach site has been nominated as Bush Forever Site No. 322 (Government of Western Australia, 2000). In finalising Bush Forever, it was acknowledged that while the entire Burns Beach site was originally identified, there was an agreement proposed whereby the area outside the development zone would be protected for conservation and the area within the development area was to be subject to an “Urban Negotiated Planning Solution”.

It was noted that the site met all six specific coastal reserve criteria, and all of the Bush Forever selection criteria including:

- Diversity;
- Rarity;
- Maintaining ecological processes or natural systems;
- Scientific or evolutionary importance;
- General criteria for protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation; and
- Criteria not relevant to determination of regional significance but which may be applied when evaluating areas having similar values.

It is important to note that based on the existing condition of the foreshore reserve, and the nature of the FMP, the implementation of this FMP will not compromise any of these criteria, and this is discussed further in **Section 5.2.1**.

#### **4.7 FAUNA**

One species of rare fauna was located in the general area. Carnaby's Black-Cockatoo is a Schedule 1 species, which is described as "fauna which are rare or likely to become extinct, are declared to be fauna in need of special protection". Carnaby's Black-Cockatoo is classified as Endangered under the EPBC Act, the W.A. Wildlife Conservation Act and by Garnett and Crowley (2000). The main threats to the species are the loss of both breeding (Wheatbelt) and non-breeding (coastal South-West) habitat.

Four priority fauna species were listed by CALM as potentially occurring in the area but were not located during field survey associated with the formal environmental impact assessments, including; Southern Brown Bandicoot (P4), Carpet Python (Schedule 4), Western Brush Wallaby (P4), and Native Bee (P3).

Alan Tingay and Associates (1998) found that the *Acacia* Shrubland of the Quindalup system was also important in terms of species richness and abundance. The *Pelargonium capitatum* Heath indicated a disturbed habitat and had the lowest habitat value, while the extent to which this community remains is substantially less than when the vegetation mapping was undertaken, the reduction in dominance of this species has not increased its fauna habitat values

#### **4.8 HERITAGE VALUES**

No known sites of Aboriginal or European heritage are located in the foreshore reserve.

#### **4.9 SURROUNDING AND PROXIMATE LAND USES**

Approved land uses close or adjacent to the foreshore reserve include:

- Residential lots;
- Commercial uses;
- Public Open Space;
- Roads; and
- Pedestrian pathways.

## 5. FORESHORE MANAGEMENT PLAN

Broadly speaking it was acknowledged that the FMP needed to address a number of significant issues, which included:

- Pedestrian access to beach;
- Pedestrian (dual use) and emergency access along and through the foreshore reserve;
- Dune recontouring, rehabilitation and restoration;
- Weed control and fire control;
- Recreation nodes;
- Fencing, signage, public art, seating, lookouts, rubbish bins, shelter, toilets, car parking and landscaping (formal);
- Commercial opportunities (e.g. beachside café);
- Development – foreshore interface (eg. batters, retaining walls and fencing); and
- Consideration of access and facilities at the swimming beach to the north.

The FMP as outlined below in **Section 5** has been subdivided into five main sections, including:

- The broad rationale behind the FMP design philosophy layout;
- A description of the structural elements to be provided through the FMP;
- Descriptions of how the construction process (both within the foreshore and at the interface) will be managed to minimise disturbances to the foreshore reserve;
- Descriptions of how the various natural areas within the foreshore reserve will be managed and/or restored to maximise its conservation value; and
- A summary of the maintenance activities that will be carried out between the commencement of works and the handover to the WAPC.

### 5.1 DESIGN PHILOSOPHY AND FMP LAYOUT

The basic design philosophy that has driven the preparation of the FMP has been the need to balance multiple objectives: the need to provide for recreational activities and to provide a sense of place for local residents and coastal area users, and; the need to ensure that the fragile coastal landforms and vegetation within the foreshore reserve are protected and maintained.

The starting point for this is to ensure that the foreshore reserve was an appropriate width to contain the naturally dynamic coastal processes that prevail, and to ensure that there is sufficient area to provide appropriately located access paths and other facilities. The width of the foreshore reserve had been set through the Metropolitan Region Scheme Amendment process, and was based on the outcomes of the previous two formal EPA assessments. During these assessments it was determined that the coastline of the site has been relatively stable over the past 46 years, and that no consistent, significant erosion process had taken place that would warrant a wider foreshore reserve than that provided.

The next progressive step taken during the formulation of the FMP was an assessment of the foreshore condition, including the degree of historic disturbance, dune stability, weed infestation, and intensity

of management required to restore foreshore areas to stable vegetation communities. The foreshore assessment was carried out using high-resolution aerial photography with mapping prepared at a scale of 1:500, followed by comprehensive ground-truthing by a qualified environmental consultant/botanist. The resultant foreshore condition mapping that was prepared is presented in **Figure 2**. From this it was determined that approximately 65% of the foreshore area has been subject to variable degrees of degradation, and 35% remains in “Excellent” condition.

The foreshore condition mapping has been a key input into the FMP preparation process, and has provided the information necessary to:

- Understand the areas of the foreshore that currently retain conservation value such that these areas can be protected and managed into the future;
- Identify areas that have been subject to degradation over time so that these can be restored and managed; and
- Determine the most appropriate location for built-form features (e.g. dual use paths) and/or recreational areas (recreation nodes) so as to avoid high conservation areas to assist in the immediate protection and long-term maintenance of such areas.

Based on the above, the general layout for the FMP is shown in **Figure 3** for the northern section and **Figure 4** for the southern section of the foreshore reserve. The key features shown in these plans include:

- The areas of vegetation to be retained, protected and managed;
- The location of managed recreation nodes (as consistent with the Burns Beach Structure Plan);
- The location of the dual use path and beach access paths (which have been located on areas of existing tracks where possible to minimise future disturbance in the foreshore reserve);
- The proposed location of lookouts (based on strategic viewing locations);
- Fencing and access control measures; and
- Locations of roadside parking.

The specific descriptions of these features (including construction details where relevant) and other structural elements associated with the FMP are provided below in **Section 5.2**.

In order to satisfy the multiples objectives identified earlier, the FMP adopts a “coastal node” approach to providing recreational areas for the coastal area users. The FMP shows that two recreation nodes (POS 6 and POS 3 as identified in the Structure Plan) will be developed in and adjacent to the foreshore reserve to encourage community use of the foreshore area. These recreation nodes are considered to be a critical element of the FMP and will facilitate the dual objectives of providing for community use and ensuring conservation of other parts of the foreshore reserve. The recreation node areas that are situated within the foreshore reserve have been located in such a manner so as to avoid high conservation value areas. By providing areas within the foreshore reserve that are specifically for recreational use allows for an interface between the Public Open Space and foreshore reserve, and provides a hard boundary for recreational use and guided channels into the beach access paths provided through the foreshore reserve.



While it is expected that there will be some disturbances in the foreshore reserve to facilitate the provision of the recreation nodes (earthworks and construction activities) these have been specifically designed to be relatively minor. The clearing of the node areas and loss of any remnant vegetation is to be adequately mitigated and offset through:

- The location of the nodes being in areas that have been historically degraded and disturbed;
- The considerable restorative and rehabilitative works that will be carried out in other partially and significantly degraded foreshore areas (approximately 65% of the foreshore reserve as shown in **Figure 2**); and
- The positive effect that the provision of focussed recreation areas will have on the protection of the conservation foreshore areas (approximately 35% of the foreshore reserve).

The nodes have been located in the central and southern portions of the foreshore reserve. Given that, the existing grades allow for their placement, with the least amount of earthworks and disturbance, within the foreshore reserve and are located away from areas of higher conservation value. The northern portion of the foreshore reserve contains vegetation mostly in “Excellent” condition, and the landforms tend to be more steeply undulating when compared to the southern and central portions this would mean that the earthworks for any recreation nodes would cause considerable disturbance. On this basis the area of POS in the northwest corner of the Urban area (POS 1) is wholly within the development area rather than within the foreshore reserve.

Additional details regarding the recreation nodes (POS 6 and POS 3) are provided below.

## **5.2 FMP STRUCTURAL ELEMENTS**

### **5.2.1 *Recreational Nodes***

The node areas are anticipated to be a focal point for community and tourist use. They will be used as a channel to the beach and allow people to picnic or pursue active and passive activities. Similar turfed or manicured recreation nodes have been used along foreshore reserves in the northern metropolitan area (e.g. Trigg Beach and Mullaloo) and are greatly valued community assets. The Burns Beach recreation node areas are envisaged to be landscaped and manicured spaces, and not natural vegetation retention areas, as the primary aim of the nodes are to provide recreational facilities.

The provision of recreation nodes within the foreshore reserve is essential for the following reasons:

- Community engagement with the coast;
- Provision of a strong community focus point;
- Creation of a healthy and physically active community with high levels of social interaction;
- Facilitating a strong relationship to the natural coastal environment;
- Provide the spaces and places for people to recreate and socially interact;
- They are integral elements for the creation of a sense of place, a sense of identity, and sense of community; and
- They are essential for a socially sustainable community.

The southern recreation node extends into the foreshore reserve as a circular area of Public Open Space (POS 6) from the development zone. It is part of a corridor of Public Open Space areas that extend from the entrance to the proposed urban development, along an access boulevard, and terminate at the foreshore recreation node. Just under half of the overall recreation node is designed to be within the foreshore reserve. The area has been historically degraded with the invasion of exotic weed species (*\*Pelargonium capitatum*) and does not support a full compliment of native species. **Figure 5A** shows a plan view indication of the proposed nature of the southern recreation node, and **Figure 5B** demonstrates indicative vertical sections taken through the node in east-west directions. This recreation node would ideally include a café (situated immediately adjacent to the POS, not within the foreshore reserve, and not included within the POS area calculations), shade structures, a playground, and architectural features/lookout towers. It would also provide a point of controlled entry into the foreshore reserve through the dual use path network. The recreation node at POS 6 does not extend all the way through the foreshore reserve, and given the significant amount of restoration and rehabilitation of the surrounding areas, it is not envisaged that the location of the recreation node will compromise the existing north-south natural linkages through the foreshore reserve.

The location of POS 6 and the coastal node was considered an appropriate location for the following reasons:

- It is located at the termination of the main east-west boulevard through the estate;
- It is located centrally with regard to the entire estate; and
- It is located over an area of the foreshore that is within the southern portion of the reserve, which is less undulating and less pristine than areas to the north.

The northern node is planned to be a manicured turfed area linking to POS 3 within the development area. Some earthworks in the foreshore reserve would be required to facilitate the construction of this recreation node, however this would be limited to the area broadly depicted on **Figure 3**. **Figure 6A** shows a plan view indication of the nature of the northern recreation node, and **Figure 6B** demonstrates an indicative vertical section taken through the node in an east-west direction. This recreation node would include an elevated lookout tower and provide a point of controlled entry into the foreshore reserve through the beach access path network that links into the nodes and the dual use path along the boundary road.

The location for POS 3 was selected for the following reasons:

- It provides a local open space function to nearby residents;
- It was a low point and therefore able to play a stormwater drainage function as well as to avoid stormwater entering the foreshore reserve; and
- The area is sheltered from the prevailing winds and would provide a comfortable and protected area of POS for residents to enjoy.

In relation to the degree to which POS 6 and POS 3 will impact on the foreshore reserve:

- POS 6 has a total area of approximately 10,285m<sup>2</sup>, of which approximately 3,604m<sup>2</sup> is within the foreshore reserve (just less than one third); and
- POS 3 has a total area of approximately 5,782m<sup>2</sup>, of which approximately 424m<sup>2</sup> is within the foreshore reserve (less than one sixth).

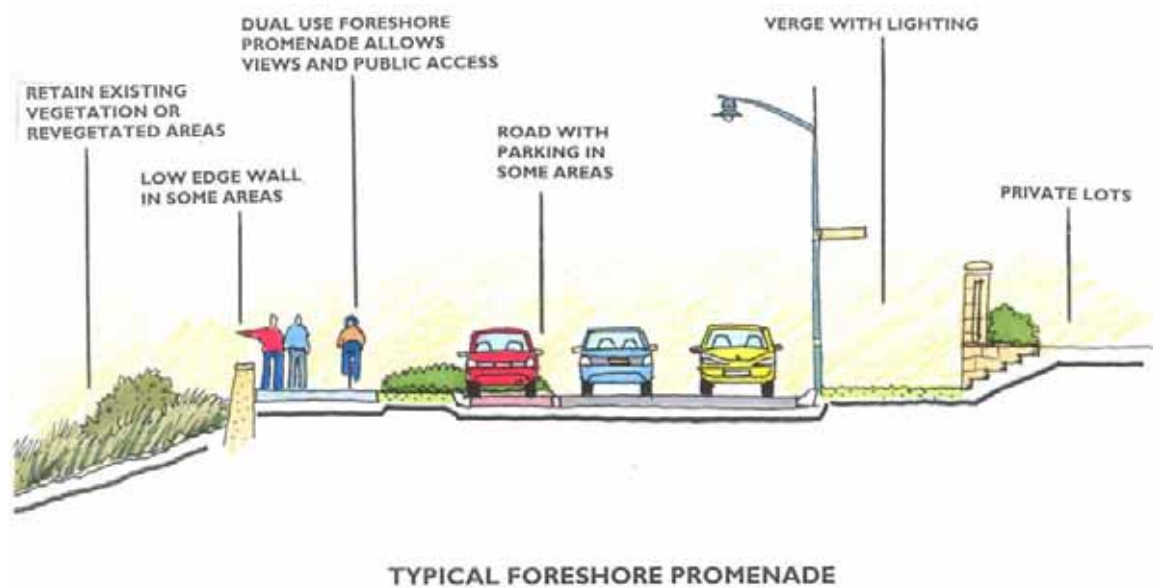
In the context of the rehabilitation and restoration works, of the 191,426m<sup>2</sup> within the foreshore reserve, approximately 63,318m<sup>2</sup> of this (or close to one third) has been classified as being in “Excellent” condition. The remaining 128,108m<sup>2</sup> has been identified as being subject to varying degrees of historic degradation and would be subject to rehabilitation and restoration works in accordance with this FMP (see **Section 5.4**). This considerable works program should be considered in relation to the 4,028m<sup>2</sup> of foreshore reserve vegetation that would be cleared to facilitate recreation node earthworks.

## **5.2.2**            *Access to Foreshore Reserve*

Access to the foreshore reserve will be channelled and controlled to prevent dune and vegetation destabilisation. The key feature to achieve this will be the dual use path network and fencing. Historic unrestricted access to the foredune at Burn Beach has resulted in a number of uncontrolled access tracks to the beach. The beach access paths have been located on exiting tracks where possible, and existing tracks not required for pedestrian access will be rehabilitated to return the areas to a stable vegetation community.

### **5.2.2.1**            *Fencing and Signage*

Fencing will be installed along the western edge of the foreshore reserve and on either side of the beach access path network. Fencing specifications will follow current City of Joondalup requirements/specifications. The alignment for foreshore fencing is indicated in **Figure 3** and **Figure 4**. Fencing along the eastern boundary of the foreshore reserve (along the boundary with the development area) will consist of low limestone wall in some areas (as depicted below in the typical foreshore promenade illustration) or where this does not occur standard access control fencing will be installed. It was originally anticipated that access control fencing would be installed on the foot of the primary dune on the beach side, however it was suggested by the City of Joondalup’s Conservation Advisory Committee that this fencing would be most likely damaged by storm surge and therefore it has been removed from the FMP.



Educational Coastcare signage will be incorporated into the pedestrian access network at strategic locations within the foreshore reserve (mostly along the dual use path and beach access path network), highlighting the importance of maintaining access control and managing the coastal environment. It is considered important to educate the community regarding the extent to which the developer has aimed to rehabilitate and restore degraded foreshore reserve areas. In addition to this there will be a range of directional and interpretive signage adopted which will provide information of local/regional destinations and integrate with other themes of the Burn Beach development area. All signage will follow current City of Joondalup specifications for design, placement and materials.

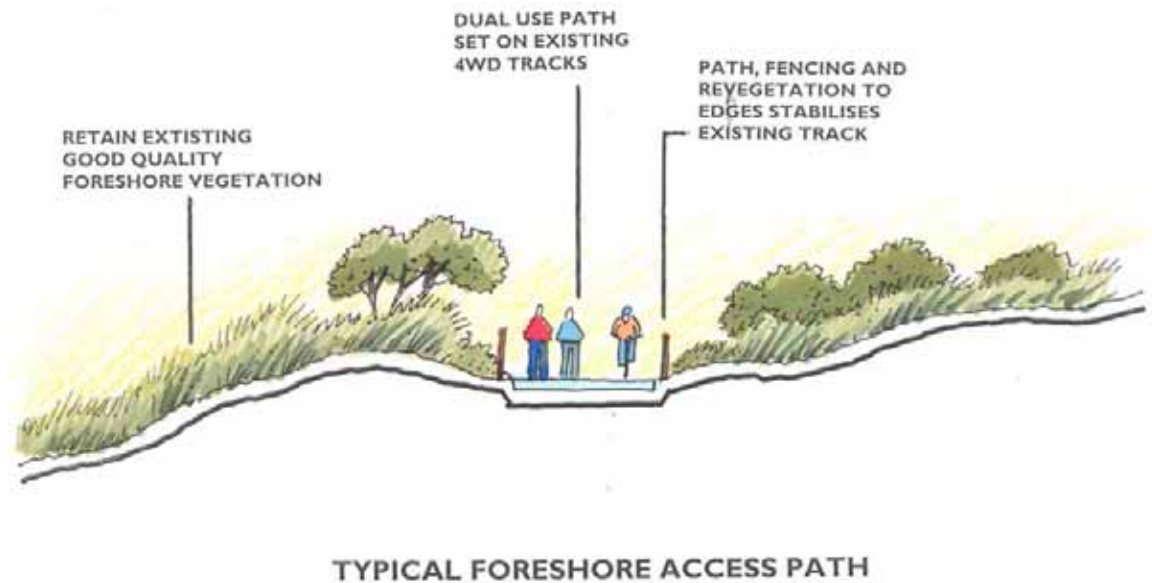
#### 5.2.2.2 *Dual Use Path and Boardwalks*

The Dual Use Path will follow the road (on the foreshore reserve side) that is aligned along the eastern boundary of the foreshore reserve (within the development area) and provide a hard edge between the foreshore and the development area and act as a channel to guide pedestrians to formal beach access routes. The proposed dual use path alignment is indicated in **Figure 3** and **Figure 4**.

The dual use path will link into the future northern swimming beach facilities to the north and the existing dual use path extending to the current Burn Beach townsite to the south of the Structure Plan area. The manner in which the dual use path network will be integrated into the proposed northern swimming beach facilities is shown in **Figure 7**, and the to the south of the development within the existing network in **Figure 8**.

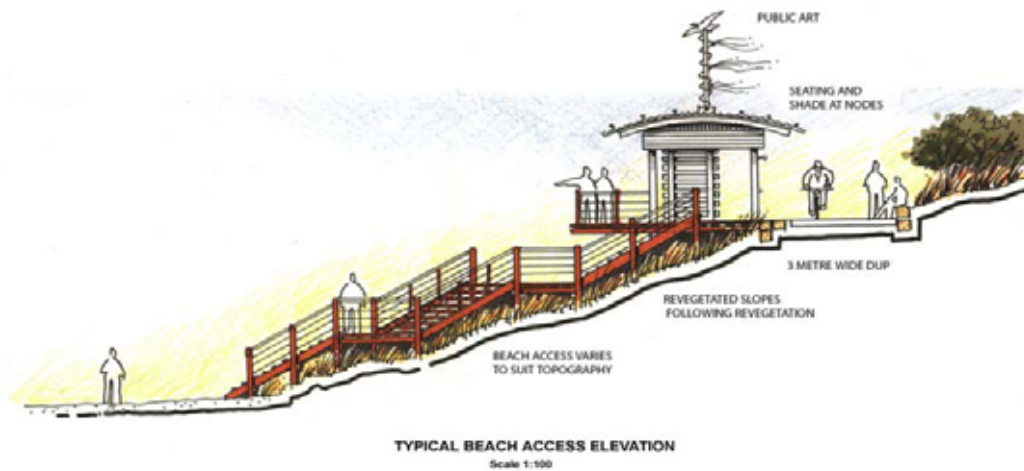
### 5.2.2.3 Beach Access from Dual Use Path

The majority of the proposed beach access paths (with east-west alignment paths) will be constructed on existing access tracks. Along the full length of the foreshore reserve (1.2km), seven beach access points are proposed, the locations of which are shown in **Figure 3** and **Figure 4**. These have been spaced so as to achieve a maximum distance of 300 metres between beach access paths. Where existing grades allow these access paths will be constructed from coloured bitumen.



In some areas that are less disturbed or existing grades are more extreme, the construction of concrete paths would require significant earthworks and therefore impacts on the foreshore reserve. In these areas elevated boardwalk type paths will be adopted in order to be sensitive to these constraints and minimise construction impacts. Conceptual elevations of these boardwalks are shown below in **Section 5.2.3.5**. Boardwalks will be adopted in areas where foreshore condition or grades require sensitive approaches, and these will be determined at the point of preparing detailed works plans for the development.

Sections of bitumen path will be used for these where appropriate, however it is envisaged that the traversing of the foredune down to the beach will be achieved through a boardwalk structure in order to minimise disturbances and provide a structure that will withstand this dynamic environment. Seating and shade structures will be provided at the point where the beach access extends from the dual use path, and where appropriate will incorporate public art (see **Section 5.3.3.6** below). A conceptual cross-section indicating how the beach access and junction points will be constructed is shown below.



#### 5.2.2.4 *Emergency and Maintenance Access to Foreshore Reserve*

Based on discussions with the City of Joondalup, emergency access is an important consideration for beach areas within the area. Emergency access to the beach will not be possible from the existing Burns Beach site (to the south of the Structure Plan area). Based on analysis of the grades within the foreshore and the degree of undulation, a four wheel drive emergency access will be provided immediately north of POS 3 (see **Figure 3**, **Figure 4**, and **Figure 6A**). This access point was selected following a field visit, with the City of Joondalup Conservation Advisory Committee, based on its relatively flat grades and it already being a significantly established four wheel drive access track. This access would be provided alongside a pedestrian beach access path, and would be fitted with a “log and chain” structure to provide long-term stability. It is also envisaged that direct beach access for emergency vehicles will be provided at the northern swimming beach at the time that this facility is developed.

Emergency and maintenance access into the foreshore reserve will not be possible along beach access paths given the elevated boardwalk section which will not be able to support the weight of a normal maintenance vehicle.

#### 5.2.2.5 *Northern Swimming Beach*

Based on the reconnaissance surveys of the area, the stakeholder consultation process, and discussions with the City of Joondalup it is acknowledged that the beach immediately adjacent to the foreshore reserve is not suitable for a swimming beach. Extensive limestone ricks and platform lines this beach, and it is not suitable from an amenity or public safety point-of-view. On this basis, this section of coast will not be promoted as a swimming beach as part of this FMP in the longer term by the City of Joondalup.

The consultation process and the City of Joondalup has identified the section of beach immediately north of the foreshore reserve and the development area as the most appropriate local swimming beach. On this basis it is assumed that swimming beach facilities will be provided at this location, however it is not addressed as part of this FMP.

It was considered important, however, that the FMP consider the northern swimming beach and the linkages that are relevant to this plan. **Figure 7** shows a conceptual layout of what facilities may be provided at the northern swimming beach.

It is ultimately envisaged that the City of Joondalup will progress the detailed planning and implementation for the northern swimming beach facilities, which will progress through consultation with the Department of Planning and Infrastructure and potentially the Department of Conservation and Land Management.

### **5.2.3 Public Facilities**

In keeping with the philosophy of integrated living on the coast, a number of public amenities are proposed in and adjacent to the foreshore reserve. In some cases these have been mentioned previously in the document, however they are described in more detail below.

#### **5.2.3.1 Food Outlet/Cafe**

A beachside café/kiosk is proposed on the boundary of the structure plan area, immediately adjacent to the proposed recreation node (POS 6). The building will be north facing with alfresco areas. It is envisaged that this will be privately operated and therefore has not been included in POS area calculations. The location of this facility is shown in **Figure 5A**, and an indicative cross-section of this facility is shown in **Figure 5B**.

#### **5.2.3.2 Toilets**

Toilet facilities will be provided where practical and in consultation with the City of Joondalup. At least one toilet block is planned for the foreshore reserve in conjunction with the southern recreation node (POS 6). It is also likely that there would be toilet facilities located at the northern swimming beach located to the north of the Burns Beach Structure Plan area, however this would not be implemented as part of this FMP.

#### **5.2.3.3 Car Parking**

A significant number of car parking bays will be provided along the length of the road (parallel parking) adjacent to the boundary of the foreshore (see **Figure 3** and **Figure 4**). Based on an analysis of likely demand and comments received from the City of Joondalup, a minimum of 120 parking bays can be provided along the length of the road. This includes approximately 12 bays immediately adjacent to POS 6. Considering that the beach adjacent to the foreshore reserve is not considered to be a significant swimming beach, and that the foreshore area will be used more so by pedestrians and cyclists rather than beach users, this amount of parking is considered to be ample. A significantly larger car parking area would be provided at the northern swimming beach at the time that facility is developed by the City of Joondalup, which would cater for the more intense beach use in that area.

#### 5.2.3.4 Lookouts

Areas with lookout potential will be developed in consultation with the City of Joondalup. A number of potential sites have been identified from topography and landform (as shown in **Figure 3** and **Figure 4**). Educational signage highlighting natural features of the area will be developed in these areas.

At this stage lookouts are proposed:

- Within the southern recreation node/POS 6 (two – see **Figure 5A** and **Figure 5B**);
- Within the northern recreation node/POS 3 (one – see **Figure 6A** and **Figure 6B**);
- At locations within the foreshore reserve linked with the dual use path network (four – see **Figure 3** and **Figure 4**); and
- At strategic locations along the beach access paths (see **Figure 3** and **Figure 4**, and **Section 5.2.2.3** above).

These lookouts will also incorporate shade structures where appropriate, and construction materials will be considered mindful of the windy and salty environment.

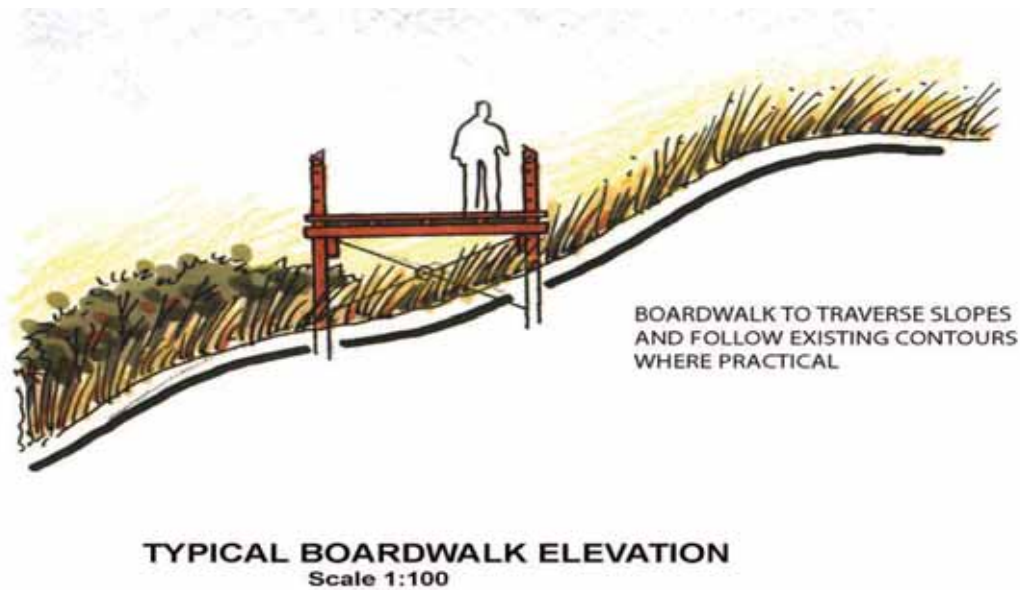
#### 5.2.3.5 Boardwalks

Elevated boardwalks have been envisaged for some parts of the dual use path network to provide pedestrian access over sensitive conservation areas. Boardwalks facilitate pedestrian traffic to pass over sensitive areas with less impact (either during construction or during ongoing use) to the area than traditional paths.

As indicated previously, boardwalks will be adopted in sensitive areas and will be used in combination with traditional paths where appropriate. Boardwalks will not be designed to cater for emergency or maintenance vehicles, and alternate access will be provided that do not involve boardwalk sections (see **Section 5.2.2.4**).







#### 5.2.3.6 *Street Furniture and Public Art*

Bench seat rest areas will be provided at appropriate lookout areas and at various locations along the dual use path, and will also include shade structures where required.

Public art is envisaged for lookout areas, and within the recreation nodes (POS 6 and POS 3) integrating themes carried through from the Structure Plan promenade. Public art may be designed to be responsive to elements including wind and solar energy.

#### 5.2.3.7 *Rubbish Bins*

Rubbish bins will be provided and maintained by the City of Joondalup within the Public Open Space component of the recreation nodes (POS 1, POS 6 and POS 3). There are no bins proposed within the foreshore reserve due to service vehicle access limitations.

### 5.3 CONSTRUCTION MANAGEMENT AND IMPACT MINIMISATION

While the various structural elements of the FMP are outlined above, it will be important to ensure that the construction of all of these elements is conducted in such a manner so as to avoid or minimise any disturbances and impacts on the foreshore reserve area. When taking into account the considerable restoration and rehabilitation program that the developer is proposing to undertake, it is in their best interests to ensure that the areas requiring ongoing works are minimised, and therefore that construction impacts are tightly monitored and controlled.

#### 5.3.1 *Construction Design Principles*

In finalising the earthworks required for the boundary road, attempts have been made to avoid batters or cutting as much as possible. However, based on the topography and the pre-determined location of the road (which was fundamental in determining the boundary of the Parks and Recreation Reserve),

this has not been possible in all cases. In situations where batters or cutting into the foreshore reserve could not practically be avoided, further investigation was carried out along the full length of the road to determine how these impacts could be minimised.

Initially, and based on standard engineering design and practice, all batter slopes were planned to be 1 in 3 slopes. By adopting these batter angles, batters and cutting extended significantly into the foreshore reserve. By increasing the batter angles to either 1 in 2 or 1 in 1, the extent to which batter disturbances extend into the foreshore reserve was significantly reduced. The most recent planning has resulted in a combination of 1 in 2 and 1 in 1 batter slopes (where the length of the batter is relatively short), and is shown in **Figure 9**. Any areas impacted by batters would be treated in accordance with **Section 5.4** to ensure rapid stabilisation and long-term stability and revegetation. All batter slopes will be shaped irregularly to promote a more natural looking landscape feature, and short-term stability will be achieved using jute matting and biodegradable fastening pins.

One of the factors driving the need for batter slopes within the foreshore reserve was the need to keep the boundary road at a relatively constant grade so as to be able to ensure that stormwater generated from the road surface or adjacent path or verge areas can be retained within the development area and not directed to the foreshore reserve. All stormwater (for up to a 100 year ARI event) will be directed to the three areas of POS (POS 6, POS 3 and POS 1), whereby stormwater will be infiltrated into the sandy permeable soils within the POS areas. Without keeping the road at such a relatively constant grade it would not have been possible to ensure that stormwater was directed away from the foreshore reserve. It is also important to note that the design for the drainage swales within the POS areas ensures that the design event for the 100-year ARI is retained entirely within the Urban component of the POS and not within the foreshore reserve. This is shown on **Figure 5A** and **Figure 6A**.

### **5.3.2 Construction Planning**

Before any works are carried out in the foreshore reserve area, detailed plans and specifications will be prepared by the developer to guide the construction process (during the subdivision application and subsequent condition clearing process). These detailed plans and specifications will be consistent with the contents of the FMP. It is during this process that specific details of infrastructure facilities will be determined, and factors such as the placement of boardwalk paths instead of hard pavement will be finalised.

As part of the construction process, areas will be surveyed and verified before any ground disturbing activities commence, which will ensure that construction will be limited to those areas to which they are required and intended. Also during this process, factors such as ensuring that drainage is appropriately managed (there will be no discharge of stormwater into the foreshore reserve) and the minimisation of road/path/construction batters will be incorporated into the designs, and will be consistent with the above principles.

### **5.3.3                    *Construction Vehicle and Personnel Access***

During the foreshore works period, vehicles and personnel access will be restricted to the direct works areas, and not allowed to have uncontrolled access into other areas of the foreshore reserve. Any machinery required for works within the foreshore reserve (access path/boardwalk construction) will be brought into the reserve via existing tracks, and there will not be any clearing outside the works areas to facilitate vehicle stand-by or equipment lay down areas. Where possible all vehicles and construction materials will be stored within the development area and not within the foreshore reserve.

### **5.3.4                    *Construction Dieback Management***

In some coastal areas, dieback management during works has proved to be a significant issue, particularly if the coastal reserve includes Banksia species.

In this situation, there are no Banksia woodland areas contained within the foreshore reserve area, however, there are Banksia woodland areas in the wider development area. Therefore it will be important to maintain an appropriate level of access control and vehicle hygiene procedures during the subdivision and foreshore works program to ensure that any vehicles that have been used in the development area are cleaned of potentially contaminated soil before entering the foreshore reserve.

### **5.3.5                    *Post-construction Rehabilitation***

As mentioned previously, all areas disturbed during the works program will be rehabilitated as part of the foreshore restoration and rehabilitation program. Construction areas and batter slopes will be dealt with in accordance with the treatments as outlined below in **Section 5.4** for “Batter and Construction Disturbance Areas”. On this basis it will be in the developer’s best interests to minimise the areas disturbed during the works program.

## **5.4                      FORESHORE RESTORATION, REHABILITATION & CONSERVATION**

The vegetation of coastal areas plays an important role in dune stabilisation however it can be readily disturbed by human activities and significant erosion by strong winds can occur. Vegetation naturally occurring on foredunes has adapted to the harsh coastal environment. A succession of vegetation communities is found in these areas reflecting the changing environment from the foredune to the leeside of dunes and through the secondary and tertiary dune systems.

Rehabilitation on foredunes has historically involved access control, control of erosion, and revegetation. Brushing is the most common stabilisation techniques used in conjunction with revegetation and uses woody material (commonly Melaleuca or Eucalypt branches) laid down perpendicular to the onshore winds to slow erosion potential while providing some protection for either germinating plants or seedlings. It is proposed to use brushing material from clearing operations on site such as *Acacia* sp. and Tuart, as well as making use of cleared vegetation as mulch.

The restoration and rehabilitation plan has been proposed in six separate treatments (as depicted in **Figure 2**), which has been based on the comprehensive foreshore assessment described in **Section 5.1**. These treatments are described in more detail below in **Section 5.4.4**.

#### **5.4.1            *Rehabilitation Techniques Proposed for the Foreshore Reserve***

The following actions comprise the major rehabilitation works proposed for the foreshore reserve:

- Track rationalisation and associated earthworks to allow rehabilitation of unnecessary tracks (as required and detailed above in **Section 5.3**);
- Dune blowout stabilisation (without earthworks or re-contouring);
- Weed control;
- Brushing;
- Direct seeding and tubestock planting;
- Monitoring; and
- Ongoing maintenance.

#### **5.4.2            *Seed Collection***

A bushland rehabilitation professional will be engaged to collect seed from site to conserve biodiversity and for use in rehabilitation where possible. Seed from the site will be used in foreshore rehabilitation as much as practically possible. At this stage it is envisaged that an independent contractor will handle both the sourcing of seed and tubestock propagation, the need to use this locally sourced material will be specified in works contracts.

Annual seed collection programs will commence in 2005 and will continue for the life of the Burns Beach project and the FMP works program.

#### **5.4.3            *Blowouts***

Localised disturbance and degradation of the foreshore dune vegetation can alter the beach sand cycle and strong onshore winds can contribute to large sand movement known as ‘blowouts’. To arrest the degradation of the area, management controls can be implemented to allow revegetation of disturbed areas, restrict access and control pedestrian access.

Three major dune blowouts were identified during site examination of the southern foreshore reserve. It was noted that the opportunity existed to rework the blowouts to a more natural landform as much of the sand was still in the general area and could be moved seawards to fill in the depression and the area stabilised and revegetated. However, following consultation with the City of Joondalup Conservation Advisory Committee it has been decided that these blowouts will not be re-contoured or earthworked. The approach to treating these blowouts will be as follows:

- Restrict access to prevent vehicle access and discourage pedestrian access;
- Provide sand-trap fencing at the beach opening to the blow-out to encourage the reestablishment of the primary dune formation;

- Provide sand-trap fencing mid-distance along the blow-out to prevent sand migration through the blow out during strong winds;
- Install brushing on the upper sides of the blow out bowl formations (adjacent to existing dune vegetation); and
- Revegetate upper sides of blow out bowl with suitable vegetation species.

The works proposed for blowout areas are described below in **Section 5.4.4**.

#### **5.4.4**            *Restoration and Rehabilitation*

The foreshore reserve presents significant opportunities for conservation and rehabilitation in the longer term. As previously mentioned, approximately 65% of the foreshore has been subject to varying degrees of degradation and 35% is in “Excellent” condition. The following treatments have been developed to preserve areas identified being in “Excellent” condition and to rework and revegetate degraded areas to achieve an overall environmental gain. Access control and fencing have been outlined above in **Section 5.4** will be assumed to be in place to protect rehabilitation and conservation areas.

**Figure 2** shows the location and extent of the various restoration/rehabilitation and conservation areas within the foreshore reserve. These areas are described in detail below.

##### *5.4.4.1*            *Batter Slopes and Construction Disturbance Areas*

“Batter slopes and Construction Disturbance” areas are those areas where significant disturbance will result in the foreshore reserve primarily from the construction of the batters associated with the boundary road located within the Urban zoned land. As discussed previously these areas have been designed to be steeper than the standard 1 in 3 batter slope, specifically to reduce the aerial (horizontal) extent of batter intrusion into the foreshore reserve.

In most cases the batter slopes have been reduced to 1 in 2, although there are a number of cases where the batter slope is short and a batter slope of 1 in 1 has been recommended. In order to ensure that these landforms blend into the surrounding landscape, the batter slopes will be irregular rather than flat and artificial looking in appearance. This effect has been shown on **Figure 9** in the cross-section drawing for each cut/fill profile.

The key factor for these areas will be stabilisation immediately post the construction works being completed. Biodegradable jute matting will be fixed to these slopes with biodegradable fastener pins in order to prevent the batter slope from eroding from wind or water. Jute matting is known to bleach with exposure to rain and sunlight and will blend into the surrounding sandy soil environment. It is also generally known to biodegrade within two years after installation, which will allow sufficient time for vegetation to establish before it substantially breaks down.

These areas will be planted with tubestock at a rate of two (2) plants per square metre and direct seeded at a rate of 4kg/ha, incorporating the following species list:

- *Acanthocarpus preissii*;
- *Carpobrotus virescens*;
- *Conostylis aculeate*;
- *Lepidosperma gladiatum*;
- *Lomandra maritima*;
- *Myoporum insulare*; and
- *Spinifex longifolius*.

#### 5.4.4.2 Blow Out Areas

Three blow out areas have developed within the foreshore reserve and it was originally intended that these be re-contoured and stabilised through revegetation. However, it is now intended that these will be managed using methods that do not involve a substantial degree of landform alteration.

The opening in the primary dune to the blow outs will be fenced with sand trap fencing (shade cloth fixed to wooden fence posts) to promote the re-establishment of the primary dune barrier. This will also reduce wind velocities entering the blow out formation. Sand trap fencing will also be installed mid-distance back into the blow out (perpendicular to the longitudinal axis of the blow out) to add to this effect and prevent sand movement arising from strong winds.

The sides of the blow outs will be heavily brushed with vegetative material sourced from the development areas, particularly the upper sides adjacent to existing vegetation. In addition to this, tube stock will be planted at a density of one (1) plant per square metre from the species list below:

- *Carpobrotus virescens*;
- *Spinifex longifolius*;
- *Tetragonia implexicoma*; and
- *Spinifex hirsutus*.

#### 5.4.4.3 Primary Dune Areas

Primary dune areas are the areas situated on the primary dune that have been subject to degradation, mainly through uncontrolled access, wind erosion, and general dune instability. The key elements to addressing these areas will be heavy brushing and revegetation. The focus of this work will be on the crest and swale side of the primary dune areas, rather than beach side face of the primary dune given the degree to which this area is dynamic zone and works likely to be significantly disturbed from natural processes (and particularly given the steep scarp face on the beach side of the primary dune).

Revegetation in this area will consist of the planting of tubestock at a density of one (1) plant per square metre and comprise the following species:

- *Acanthocarpus preissii*;
- *Carpobrotus virescens*;
- *Conostylis aculeate*;

- *Lepidosperma gladiatum*;
- *Lomandra maritima*;
- *Myoporum insulare*; and
- *Spinifex longifolius*.

#### 5.4.4.4 *Tracks and Heavily Disturbed Areas*

Tracks can become compacted by human uses and require machine ripping to loosen the sand to allow good root penetration. Ripping will be confined to the designated track areas only and care will be taken to avoid disturbance to other areas.

Once this is undertaken, the area will be heavily brushed and planted with tubestock at a rate of one (1) plant per square metre with the following species and direct seeded at a rate of 4kg/ha with the following species:

- *Acacia rostellifera*;
- *Acacia saligna*;
- *Alyogyne huegelii*;
- *Calothamnus quadrifidus*;
- *Conostylis aculeate*;
- *Hemiandra pungens*;
- *Hibbertia hypericoides*;
- *Lepidosperma gladiatum*;
- *Lomandra maritima*;
- *Melaleuca systema*;
- *Olearia axillaris*;
- *Phyllanthus calycinus*;
- *Rhagodia baccata*;
- *Scaevola crassifolia*;
- *Senecio pinnatifolius*; and
- *Spyridium globulosum*.

#### 5.4.4.5 *Rehabilitation Area 1*

Rehabilitation Area 1 is primarily dune areas which have been subject to variable degrees of degradation and disturbance, but are generally grouped as a single area given their similar position within the foreshore landscape. There are some areas of dune instability that will require management and some areas of weed infestation that will also require treatment. It is important to note that these treatments will not be applied consistently across the entire area designated as Rehabilitation Area 1, but only in areas where they are deemed to be required.

Weeds will be controlled using hand applicators and sprayed with either Glyphosate or a grass specific herbicide (e.g. Fusilade) depending on the type of weed and its position within existing vegetation.

Bare areas that appear to be instable will be treated with a heavy brush application. These areas will be planted with tubestock at a density of one (1) plant per square metre and direct seeded at a rate of 4 kg/ha from the following species list:

- *Acacia rostellifera*;
- *Acacia saligna*;
- *Alyogyne huegelii*;
- *Calothamnus quadrifidus*;
- *Conostylis aculeate*;
- *Hemiandra pungens*;
- *Hibbertia hypericoides*;
- *Lepidosperma gladiatum*;
- *Lomandra maritima*;
- *Melaleuca systema*;
- *Olearia axillaris*;
- *Phyllanthus calycinus*;
- *Rhagodia baccata*;
- *Scaevola crassifolia*;
- *Senecio pinnatifolius*; and
- *Spyridium globulosum*.

#### 5.4.4.6 Rehabilitation Area 2

Rehabilitation Area 2 (R2) is at the southern end of the foreshore reserve. Historic vegetation mapping of the area records the dominant species in the area as *\*Pelargonium capitatum* (an exotic species). While this dominance of *\*Pelargonium capitatum* is not as significant as it possibly was historically, there is still a substantial presence of this species and *\*Tetragonia decumbens*, *\*Trachyandra divaricate*, and some grass species.

The vegetation condition varies within this area from “Good” to “Degraded” based on both the vegetation community structural condition and the presence of weeds. The area is, however, mostly quite stable and not requiring substantial stabilisation works or brushing. Therefore both weed control and revegetation will occur in areas where required, on a site-specific basis.

Weeds will be spot sprayed using a hand applicator and will commence in 2005. Hand (manual) clearing will also be undertaken where larger weeds exist. Care will be exercised in the short term to ensure that weed control does not lead to de-stabilisation of areas with the foreshore reserve.



Areas requiring revegetation will be planted with tubestock at a density of one (1) plant per square metre and direct seeded at a rate of 4kg/ha based on the following species list:

- *Acacia lasiocarpa*
- *Acacia saligna*
- *Carpobrotus virescens*
- *Conostylis aculeata*
- *Dryandra lindleyana*
- *Hakea prostrata*
- *Hardenbergia comptoniana*
- *Lepidosperma gladiatum*
- *Leptomeria preissiana*
- *Lomandra maritima*
- *Melaleuca systema*
- *Olearia axillaris*
- *Rhagodia baccata*
- *Scaevola crassifolia*
- *Spyridium globulosum*

#### 5.4.4.7 Conservation Areas

Conservation Areas involve maintenance of areas that are currently intact and without obvious threatening processes. No disturbance or revegetation is proposed in this area and it is assumed that the fencing undertaken as part of the FMP will provide adequate protection for the vegetation and landform. Any disturbance or reduction in vegetation quality will be given immediate attention and rectified as advised during the monitoring period. It is envisaged that annual spot spraying for minor weed incursions will be undertaken throughout the life of the foreshore management works.

#### 5.4.4.8 Signage

Areas of active rehabilitation will be marked with “Coastcare – Dune Rehabilitation” signs to encourage users to take an interest in the rehabilitation works and to further understand dune ecology. Some conservation areas will be marked with “Coastcare – Protect our Fragile Coastline” signs for education. It is also envisaged that the signs will encourage users to stay on the designated access paths to avoid impacting on the foreshore reserve restoration/rehabilitation or conservation areas.

## **6. IMPLEMENTATION AND MAINTENANCE SCHEDULE**

### **6.1 INVOLVEMENT OF LOCAL COMMUNITY AND COASTCARE GROUP**

A key aspect of the implementation of this FMP will be the involvement of the local community and the local Coastcare Group. This has started with input on the draft FMP being provided by the City of Joondalup Conservation Advisory Committee, which includes members of the Joondalup Coastcare Group.

It is envisaged that this involvement will continue for future stages and in both the planning and on-ground works components for all foreshore management activities. In order to ensure this occurs it will be essential to maintain ongoing communication between the community groups and the development project manager. This may also necessitate the formation of an area specific Coastcare Group for the Burns Beach area.

### **6.2 PLANNING FOR SEED AND TUBESTOCK**

A key component of this FMP will be securing seed and tubestock from local provenance. This will necessitate an annual seed collection and tubestock propagation program to be commenced and coordinated within the overall works program for the FMP.

This was commenced in 2005 and will continue for the life of the project to ensure the ongoing availability of the necessary seed and tubestock supplies.

### **6.3 WORKS AND CONSTRUCTION SCHEDULE**

At this stage it is envisaged that the overall works program for the foreshore reserve (associated with this FMP) will be carried out in stages. The extent of the foreshore area that will be addressed as part of Stage 1 is shown on **Figure 10**.

The subsequent stages would involve the northern areas up to the farthest north extent of the development area. The northern swimming beach, as previously discussed, will not be addressed as part of this FMP or part of the overall Burns Beach Structure Plan area development.

It is currently envisaged that the first stage of implementation (as indicated in **Figure 10**) will occur during early to mid 2006. The subsequent stages will be progressed as the first stage of the subdivision is sold and there is the need to bring additional stages forward to meet market demand.

It has been envisaged that restoration and management activities may be bought forward for the northern areas such that the developer can get a good handle on the degraded areas (in terms of both stability and revegetation) prior to the development front reaching those areas.

## **6.4 RESTORATION AND REHABILITATION SCHEDULE**

Successful rehabilitation is dependant on seasonal variations therefore absolute scheduling is not possible. All earthworks and brushing can be undertaken as required during the year however successful seeding or seedling planting will be dictated by winter rains. Early June is the likely timing for seeding or seedling planting, as it is possible that the rains would have begun and the sand is thoroughly wet.

The restoration and rehabilitation program for the entire foreshore reserve would commence mid 2005 with the commencement of the seed collection program and weed control activities. The first year of planting and direct seeding is planned for mid-2006, and this would focus on the Stage 1 area foreshore. As each stage is progressed, the restoration and rehabilitation works would be completed in the first year with active and programmed follow-up monitoring and maintenance in successive two years (see **Section 6.2.3** below). Given that the Burns Beach development is a long-term project, ongoing monitoring of foreshore areas would continue beyond the two years for the life of the project, and therefore any issues that arise beyond the two-year monitoring and maintenance period could be identified and addressed as required given that foreshore management works would be occurring in other parts of the foreshore.

## **6.5 MAINTENANCE SCHEDULE**

### **6.5.1 *Structural Elements and Recreational Areas***

#### *6.5.1.1 Monitoring*

Monitoring would be carried out on a regular basis as part of contractual obligations arising from landscaping and/or construction works. This would occur over the period for which the developer is responsible for the maintenance of public areas within the development after subdivision (two years) and be a key driver for any required maintenance works.

#### *6.5.1.2 Maintenance*

The developer will ensure that any part of the structural elements and/or recreational areas that may require attention during the maintenance period (two years following subdivision completion) receives the appropriate level of either maintenance or repair, and will be in accordance with similar provisions for other areas of Public Open Space.

### **6.5.2 *Conservation, Rehabilitation and Restoration Areas***

#### *6.5.2.1 Monitoring*

Monitoring of the site should take place once a year in summer, and would be undertaken by both the specialist contractors undertaking the restoration/rehabilitation works (to demonstrate compliance with contractual performance criteria) and independently by the developer. The timing is unusual for a botanical survey, however, as all the species to be planted are perennial, identification will not be an

issue. This timing also ensures that the annual grasses have died off and gives time to obtain replacement species, if necessary.

The rehabilitation survey will need to be undertaken by a botanist or rehabilitation professional, and will focus on the success of the rehabilitation programme and make recommendations for remedial action and maintenance, if required. Monitoring would formally continue for a period of two years after the initial works have been carried out. However, given the long-term nature of the Burns Beach development, the developer would continue less formal “reconnaissance” monitoring in completed areas beyond two years while works are continuing in other areas of the foreshore reserve.

#### 6.5.2.2 *Maintenance*

Aside from uncontrollable issues such as seedling viability and outside disturbance, it is unlikely that mass seedling deaths will take place. An amount of 20% of the initial rehabilitation budget will be set aside for repair to the brush cover and replacement of seedlings/reseeding over the maintenance period.

Weed control will be undertaken each year in winter at the same rate of application and area set out originally (see **Section 5.4**) or as revised based on the outcomes of the rehabilitation monitoring. It is possible that Fusilade® will not be used in the first maintenance year as it may have detrimental effects on seedlings. The monitoring programme should determine this. If Fusilade® cannot be used, weeds should be spot sprayed with Glyphosate 0.5%.

It is envisaged that the maintenance period will continue for a period of two years after the initial rehabilitation/restoration works have been carried out.

## 6.6 **RESPONSIBILITIES**

All works proposed within the foreshore management plan area will be the responsibility of the Burns Beach Property Trust or designated agent, who will also fund the works as part of the overall site development program. Management responsibilities for the foreshore areas will end two years after works have been carried out. The developer may choose to delay handover, however 12 months notice shall be provided to the WAPC. The scope of the FMP does not include the implantation of the northern swimming beach facilities.

The foreshore is intended to become a “Class A” reserve, and as such, will be under the control and management of the WAPC until such time as its final management is determined. The Class A reserve cannot be created, however, until the land is transferred by the Burns Beach Property Trust to the WAPC.

The foreshore and the associated foreshore management plan are to be incorporated into a broader management plan to be prepared and implemented for the abutting northern land area (Burns Beach - Mindarie Regional Open Space) by the WAPC.

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 TOWN PLANNERS: P.O. Box 100, Burnside  
 PROJECT MANAGER: T. HAYWARD  
 ENVIRONMENTAL COORDINATOR: FACILITATOR

PROJECT NUMBER: V01011  
 DRAWN: JCH  
 CHECKED: JCH  
 DATE: 20.12.04

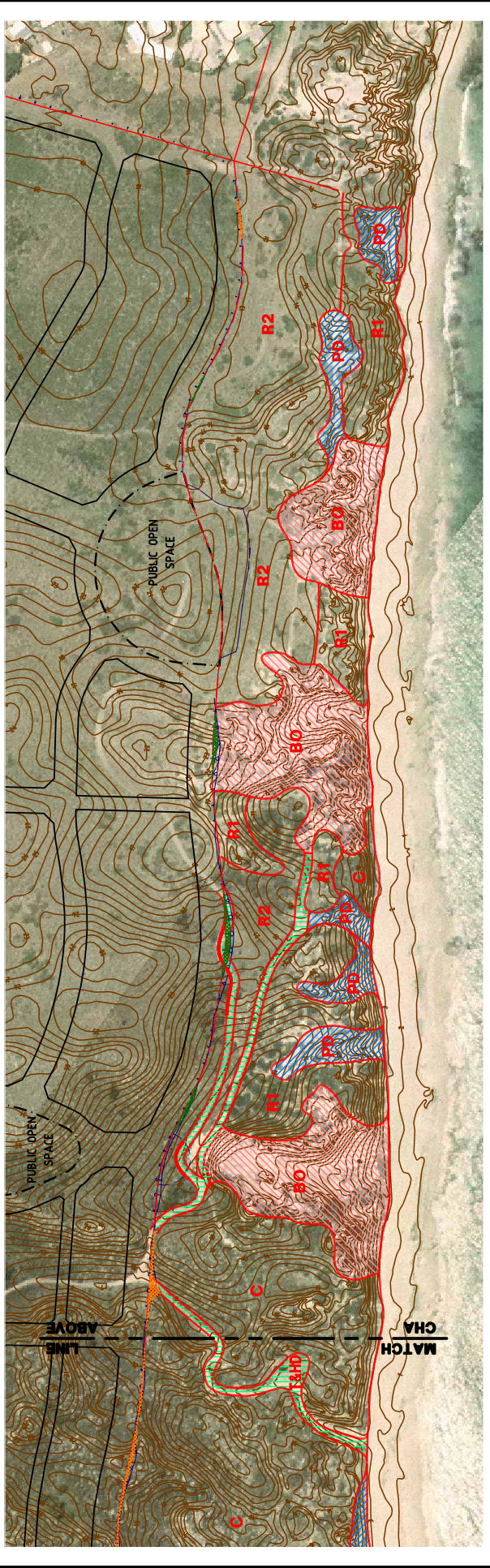
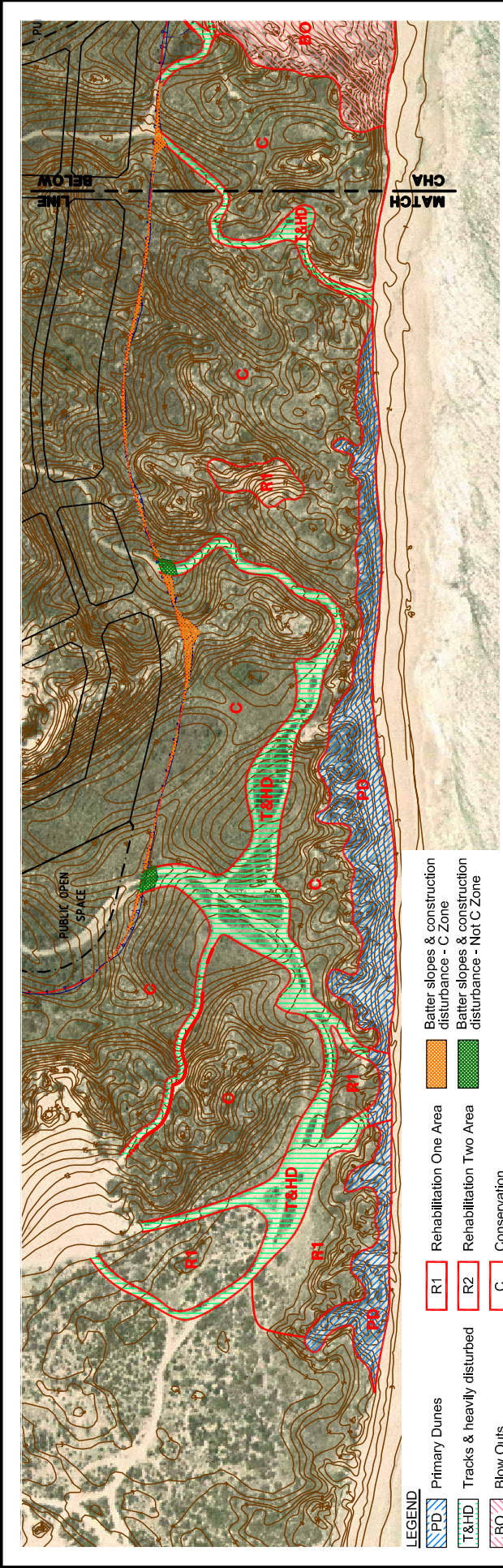
APPROVED: SP  
 LIAISON OFFICER: JCH  
 CITY OF JOONDAHUP

**BURNS BEACH FORESHORE MANAGEMENT PLAN**  
**FIGURE 1 : LOCATION PLAN & FORESHORE RESERVE BOUNDARY**  
**BURNS BEACH PROPERTY TRUST**

Source : Development Planning Strategies

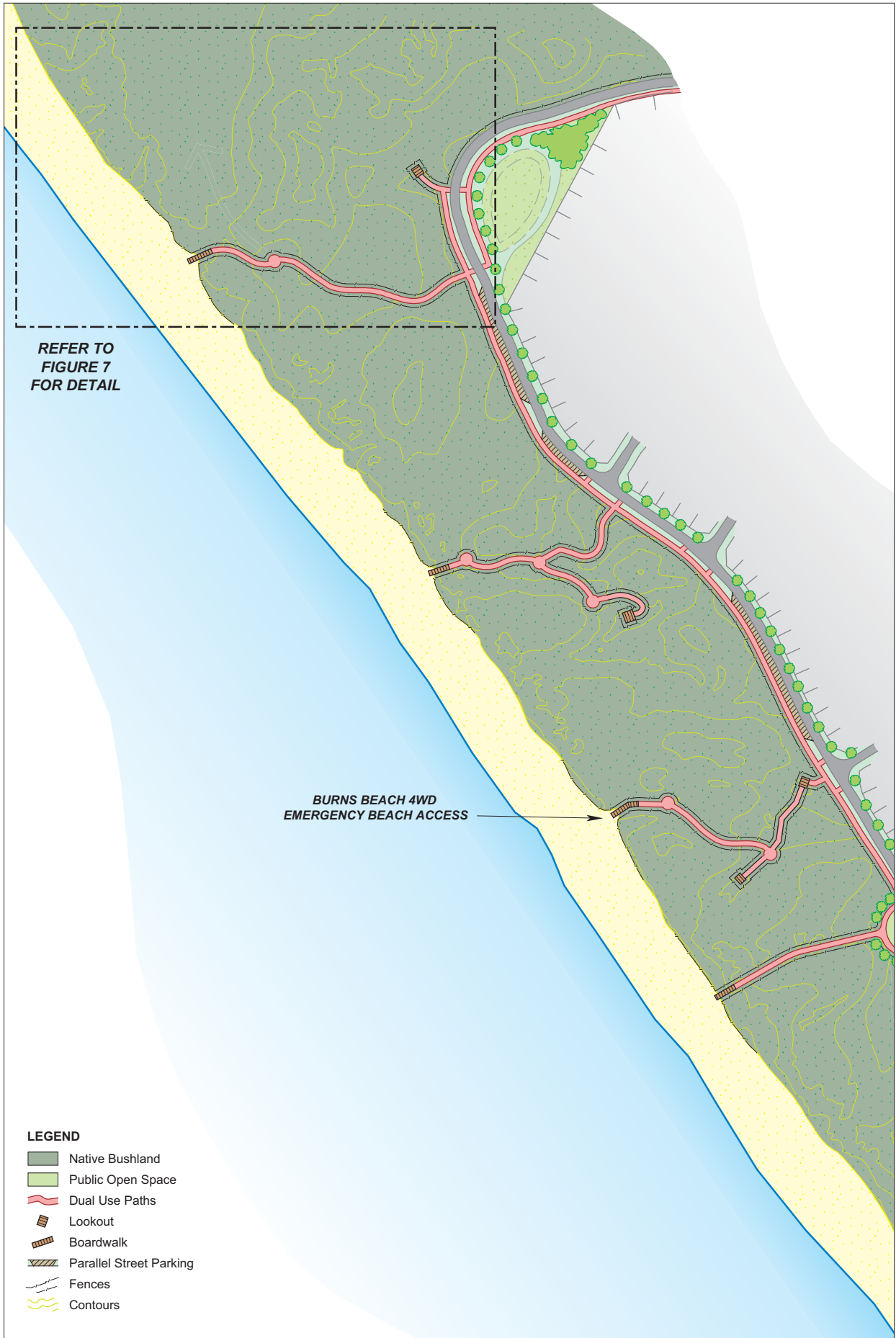
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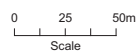


- LEGEND**
- PD Primary Dunes
  - R1 Rehabilitation One Area
  - R2 Rehabilitation Two Area
  - C Conservation
  - T&HD Tracks & heavily disturbed
  - BO Blow Outs
  - C Batter slopes & construction disturbance - C Zone
  - C Batter slopes & construction disturbance - Not C Zone

DATE	ACTIVITY / REVISION / DESCRIPTION	DES.	ENR.	CHKD.	APP'D.
<b>BURNS BEACH FORESHORE MANAGEMENT PLAN</b>					
<b>FIGURE 2 : FORESHORE CONDITION AND MANAGEMENT AREAS</b>					
<b>BURNS BEACH PROPERTY TRUST</b>					
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PROJECT: Cairns BSD Centre 2 Bight Road DRAWING TITLE: TOWN PLANNERS PROJECT MANAGER: CONSULTING ENGINEERS ENVIRONMENTAL CONSULTANTS:		PROJECT NUMBER: V01011 DESIGNER: JDH DRAWN: SP LOCAL AUTHORITY: CITY OF JOONDALUP		ORIGINAL REVISION: A3 DATE: 28.06.05 SHEET: Of	

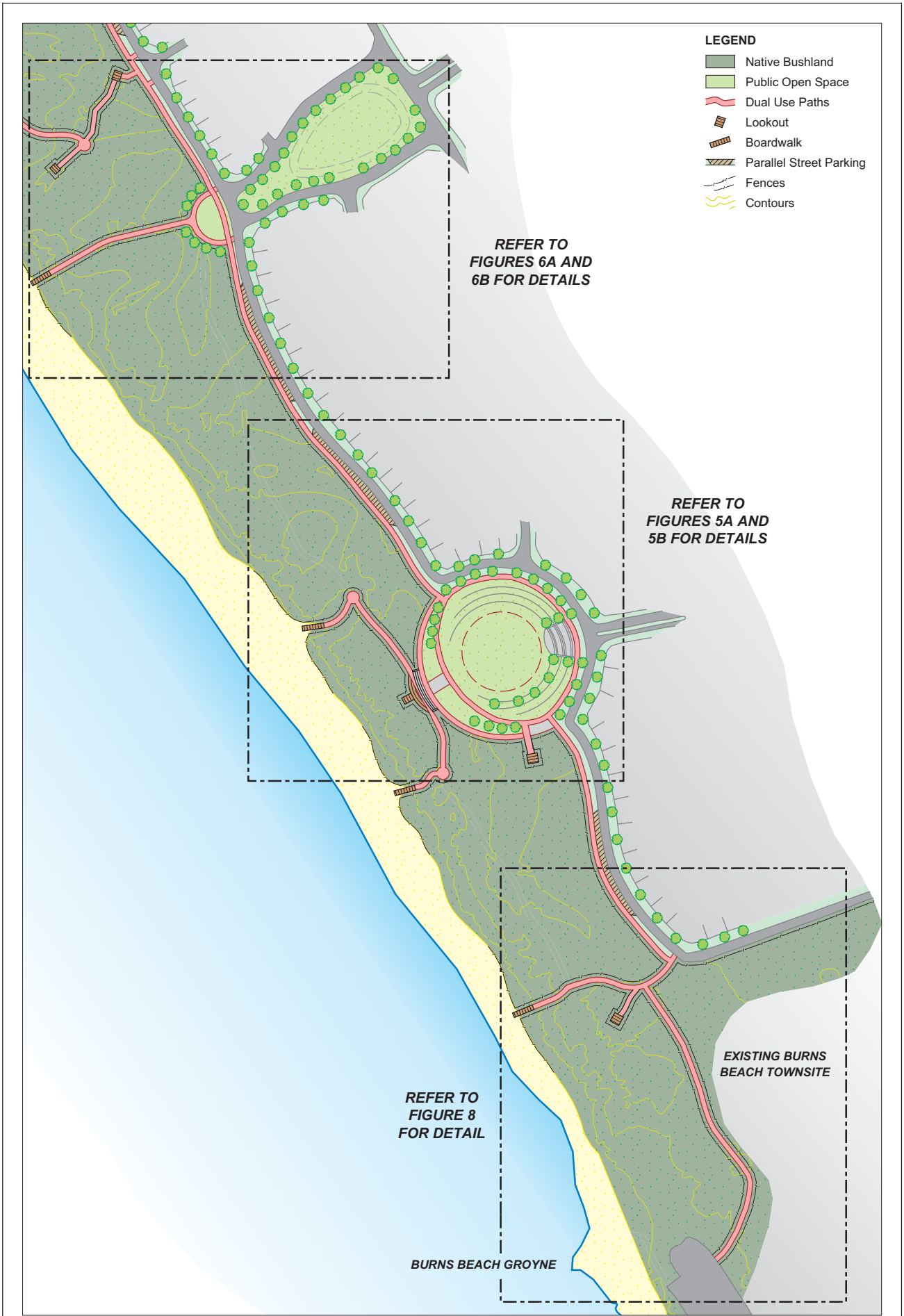


**Figure 3**  
**BURNS BEACH - WESTERN CELL**  
**FORESHORE MANAGEMENT CONCEPT PLAN - NORTH**



Project Number  
**V01011**  
 Drawing Number  
**V125-SK13B**  
 Revision

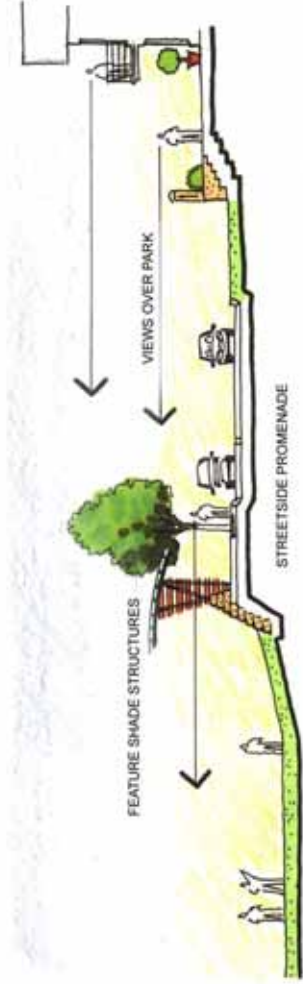




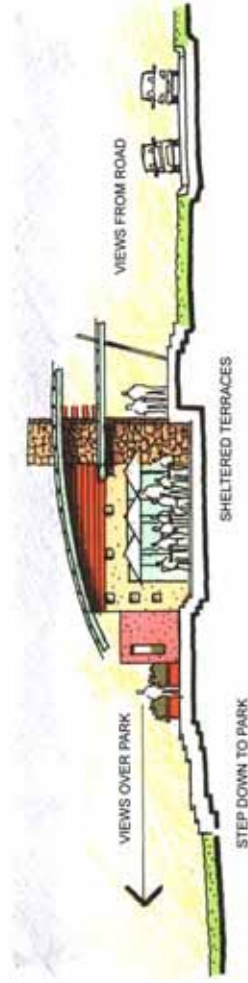
**Figure 4**  
**BURNS BEACH - WESTERN CELL**  
**FORESHORE MANAGEMENT CONCEPT PLAN - SOUTH**



FIGURE 5B  
TYPICAL ELEVATIONS ACROSS POS 6



VIEW FROM RESIDENCES  
Scale 1:200



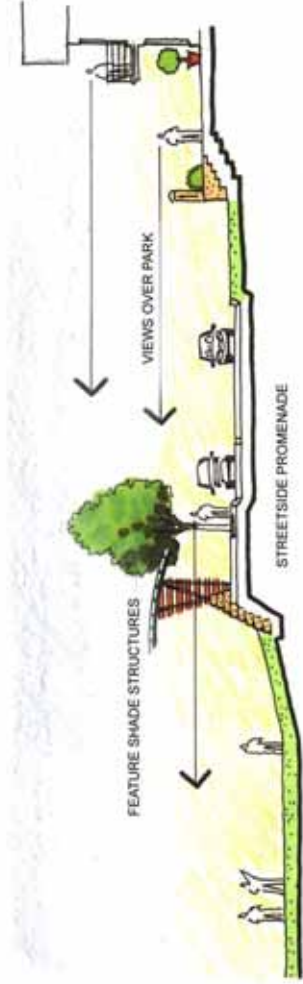
CAFE ELEVATION  
Scale 1:200



**LANDSCAPE CONCEPT PLAN**  
**LOT 9017 BURNS BEACH**  
NOVEMBER 2004



FIGURE 5B  
TYPICAL ELEVATIONS ACROSS POS 6



VIEW FROM RESIDENCES  
Scale 1:200



CAFE ELEVATION  
Scale 1:200



**LANDSCAPE CONCEPT PLAN**  
**LOT 9017 BURNS BEACH**  
NOVEMBER 2004

FIGURE 6A  
PUBLIC OPEN SPACE 3  
Scale 1:1000



LANDSCAPE CONCEPT PLAN  
LOT 9017 BURNS BEACH  
JUNE 2005

FIGURE 6B  
TYPICAL ELEVATION ACROSS  
INTERFACE WITH POS 3



FIGURE 7  
NORTHERN SWIMMING BEACH  
(INDICATIVE LAYOUT ONLY)  
Scale 1:1000

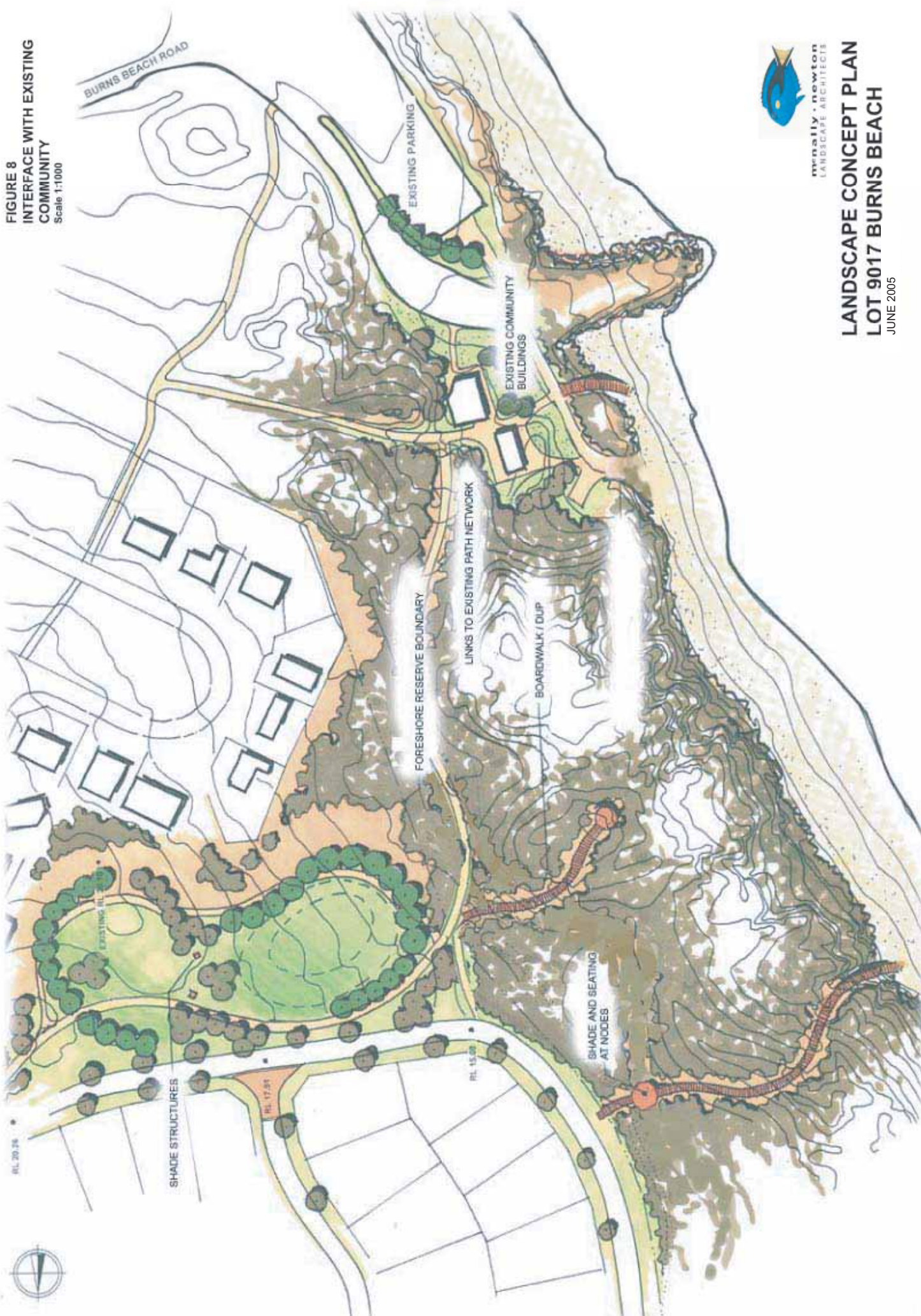


annally · newton  
LANDSCAPE ARCHITECTS

LANDSCAPE CONCEPT PLAN  
LOT 9017 BURNS BEACH  
JUNE 2005



FIGURE 8  
INTERFACE WITH EXISTING  
COMMUNITY  
Scale 1:1000



LANDSCAPE CONCEPT PLAN  
LOT 9017 BURNS BEACH  
JUNE 2005



- 1.00 Proposed Roadway
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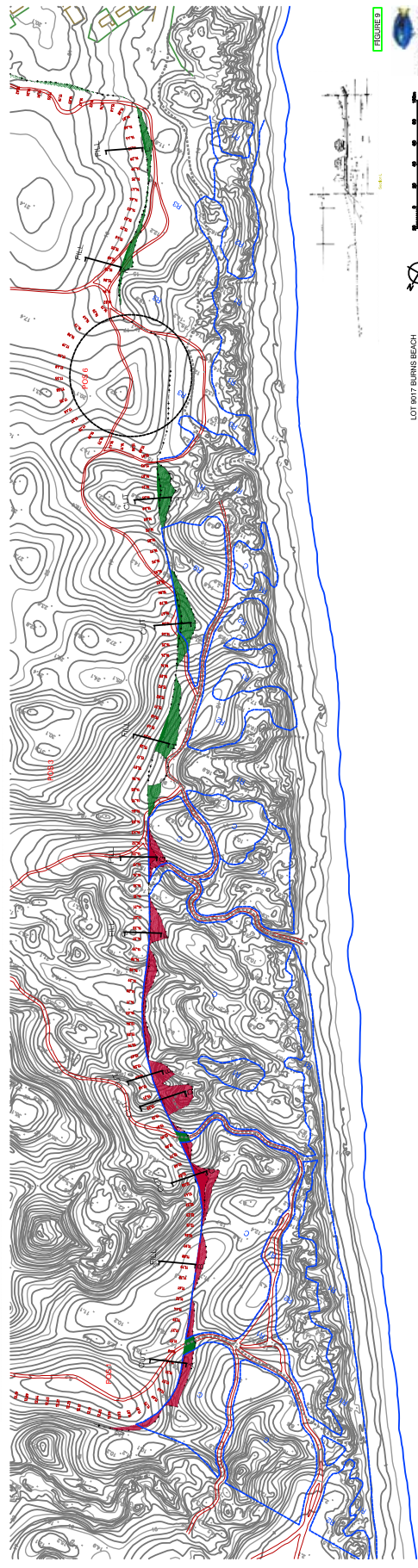


FIGURE 3

LOT 8017 BURNS BEACH  
FORESHORE RESERVE INTERFACE



Source : Development Planning Strategies

DATE	BY	ACTIVITY/REVISION DESCRIPTION	DWG.	CHKD.	APPT.

**PROJECT**  
**DRAWING TITLE**  
**PRINCIPAL**

**BURNS BEACH FORESHORE MANAGEMENT PLAN**  
**FIGURE 10 : STAGE 1 SUBDIVISION PLAN**  
**BURNS BEACH PROPERTY TRUST**

This drawing has been prepared in accordance with the BSD Coastal Management System. It remains the property of Cairns BSD Pty. Ltd. and shall not be used without permission. This drawing shall be preliminary only and subject to contractor and all agency approvals.

**SCALE: 1:2500**

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**Project Number**  
**YO1011**

**Drawing Number**  
**V125-SK15**

**Revision**  
**A3**

**Checked**  
**JDH**

**Drawn**  
**SP**

**Approved**  
**SP**

**Local Authority**  
**CITY OF JOONDALUP**

**Date**  
**20.12.04**

**Sheet**  
**OF**

**APPENDIX A**  
**FORESHORE MANAGEMENT PLAN**  
**IMPLEMENTATION SCHEDULE**

## **Appendix A - Burns Beach Foreshore Management Plan Implementation Schedule**

This attachment has been prepared to satisfy Advice to Applicant (Footnote 8) of the subdivision approval for Stage 1 of the Burns Beach development project. This footnote requires the preparation of an implementation schedule for the Foreshore Management Plan (FMP) relating to the progressive subdivision of the subject land.

The overall planning for the Burns Beach subdivision process (of which the current Stage 1 area forms the first subdividable area) and therefore the ultimate FMP implementation schedule will be based broadly on four progressive stages. These stages can be described spatially as follows:

- Stage 1 extends from the southern boundary of the Burns Beach foreshore north to and including POS 6;
- Stage 2 extends from the northern edge of POS 6 north to and including POS 3;
- Stage 3 extends the northern edge of POS 3 north to and including the second east-west beach access path (approximately half way between POS 3 and the northern-most extent of the foreshore reserve); and
- Stage 4 extends from the second east-west beach access path to the northern most extent of the Burns Beach foreshore reserve.

As outlined in **Section 6** of the FMP document, each stage will be associated with a stage of the overall subdivision (i.e. Stage 1 is associated with Stage 1 of the subdivision process). At this stage it is likely that Stage 2 of the subdivision process will not involve an adjacent section of foreshore, and then Stage 3 of the subdivision process will be associated with Stage 2 of the FMP implementation. Planning has not progressed beyond Stage 3 of the subdivision process so it is not clear how future stage of the subdivision process will relate to the stages of the FMP implementation, however it is likely that FMP works will commence for Stage 1 during 2005/06, and this will continue northward over the progressive 4 years with the FMP works for Stage 4 being undertaken during 2008/09.

Given the nature of the proposed FMP works, there are some works that can be undertaken at anytime during the year, and some works that are specifically seasonal. The construction of hard works can occur at any time during the year, whereas weed control is best undertaken in Spring (but prior to seed set) and seeding and planting activities are best undertaken at the break of season (between May and late June).

On this basis it is envisaged that the following schedule (as outlined below in **Table A1**) depicts the broad level timing of works for the various FMP stages. It should be acknowledged that this is indicative and ultimately driven by the timing of the subdivision stages. There may be times when then schedule needs to be altered to ensure the best outcomes in terms of FMP objectives.

**7.1 TABLE A1: IMPLEMENTATION SCHEDULE FOR THE BURNS BEACH FMP**

	Stage 1	Stage 2	Stage 3	Stage 4
<b>Year 1 (2005/06)</b>	Weed control (pre-planting) Hard works (paths, fencing etc.) Brushing/matting Planting/seeding	Planning for seed and tubestock Weed control (pre-planting)		
<b>Year 2 (2006/07)</b>	Weed control (post-planting) Monitoring Infill planting/seeding	Weed control (pre-planting) Hard works (paths, fencing etc.) Brushing/matting Planting/seeding	Planning for seed and tubestock Weed control (pre-planting)	
<b>Year 3 (2007/08)</b>	Weed control (post-planting) Monitoring Infill planting/seeding	Weed control (post-planting) Monitoring Infill planting/seeding	Weed control (pre-planting) Hard works (paths, fencing etc.) Brushing/matting Planting/seeding	Planning for seed and tubestock Weed control (pre-planting)
<b>Year 4 (2008/09)</b>	Monitoring	Weed control (post-planting) Monitoring Infill planting/seeding	Weed control (post-planting) Monitoring Infill planting/seeding	Weed control (pre-planting) Hard works (paths, fencing etc.) Brushing/matting Planting/seeding
<b>Year 5 (2009/10)</b>	Monitoring	Monitoring	Weed control (post-planting) Monitoring Infill planting/seeding	Weed control (post-planting) Monitoring Infill planting/seeding
<b>Year 6 (2010/2011)</b>	Monitoring	Monitoring	Monitoring	Weed control (post-planting) Monitoring Infill planting/seeding