

**City of Fremantle**

# Port and Leighton Beaches Management Plan



**Strategic Planning and Corporate Development**

**October 2001**



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## 1.0 INTRODUCTION AND BACKGROUND

### 1.1 BACKGROUND

The control and management of Port and Leighton beaches (reserve 43311, shaded area on the plan) was vested in the City of Fremantle in 1995. The Fremantle Port Authority (FPA) previously managed the reserve. The reserve extends from Rudderham Drive in the south through to the municipal boundary in the north (see Figure 1 below).

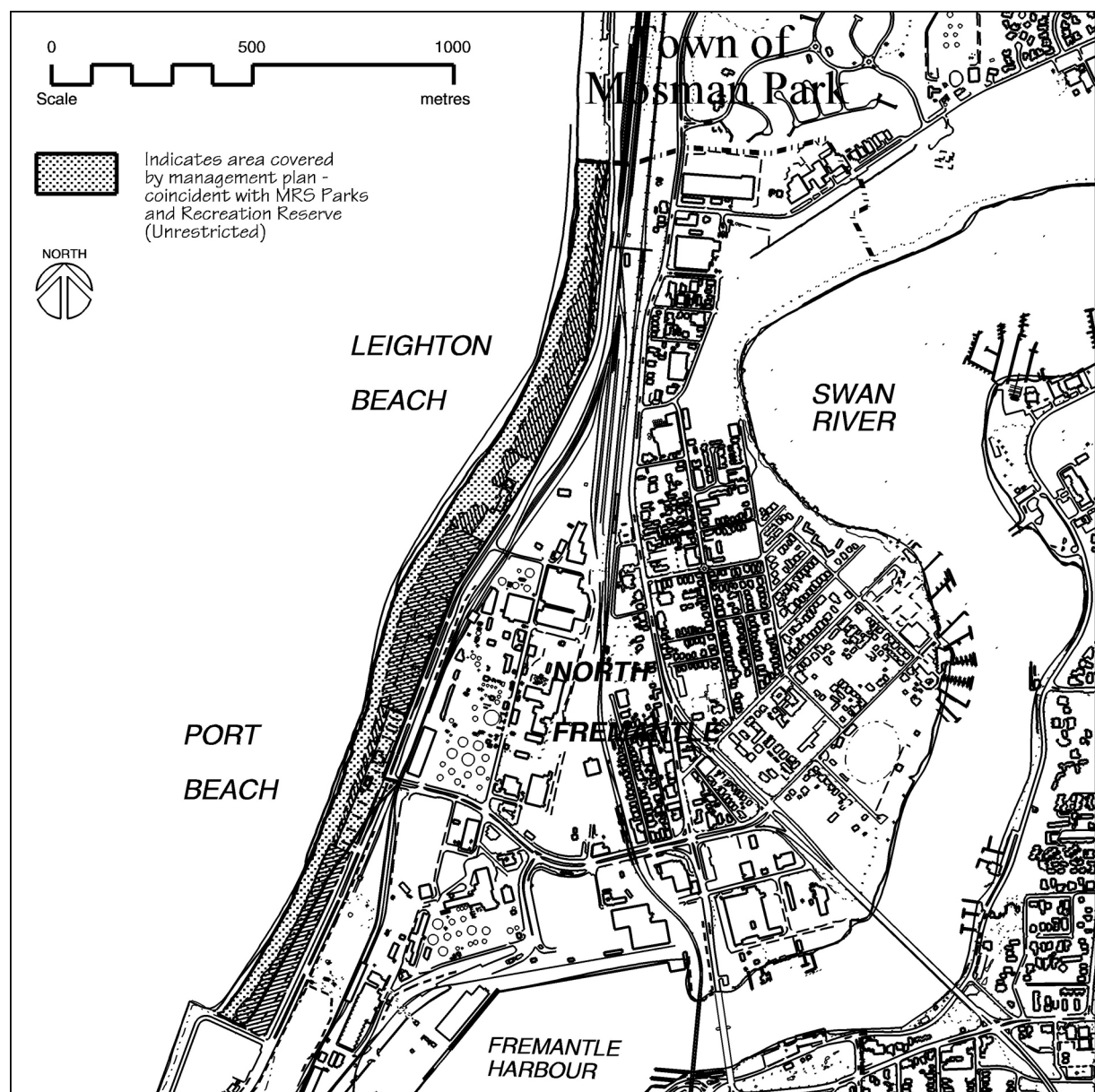


Figure 1 – Port & Leighton beaches and area covered by management plan

Prior to the preparation of this report, the City of Fremantle commissioned Alan Tingay and Associates to undertake a study of the area, as stage 1 in the preparation of this management plan. Copies of the Tingay report (February 1999) are available for viewing at the City of Fremantle Library, 8 William St, Fremantle.

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This document was put together by Council officers under the guidance of the Port and Leighton Beaches Steering Committee. The committee included local resident, interest group and industry representatives.

### 1.2 AIM

The management plan has been prepared to guide the ongoing maintenance, as well as the future planning and development, of the Port and Leighton beaches. The document focuses on the existing coastal reserve, although the identified principles, in conjunction with Council policy D.G.N12 (Leighton Marshalling Yards Land Use and Development Policy), clearly outline Council's requirements for use and development within and adjoining the coastal reserve.

**The aim of this management plan is to make the coastal reserve a natural dune setting, with native species, catering to the community's recreational needs while minimising annual maintenance costs.**

The management plan will be reviewed every two years and/or in response to any major development that will impact on the coastal reserve. This will ensure the management plan is responsive to new pressures on the coastal reserve, incorporates changes to the reserve width and has appropriate strategies to manage development, such as that proposed on the Leighton Marshalling Yards.

### 1.3 REGIONAL CONTEXT

Council has prepared the management plan with the knowledge that the proposed redevelopment of the Leighton Marshalling Yards raises a number of critical issues for the Port and Leighton coastal reserve that have yet to be fully resolved. Where appropriate, the plan includes relevant material from the Leighton Regional Planning Guidelines (MfP, September 2000) adopted by the state government in December 2000. These issues include: coastal management, including coastal setbacks; open space – local and regional recreation requirements; road and rail access; buffers required to existing industry; remediation of contaminated land; heritage; protection of views; land use planning; and parking.

The Leighton Regional Planning Guidelines will be used as the basis for the preparation of amendments to the Metropolitan Region Scheme and any amendments required to the City of Fremantle planning scheme. The guidelines also recognise a structure plan is required for the Leighton Marshalling Yards site and adjoining properties. Foreshore management plans are suggested for the beach reserves. The guidelines superceded the relevant sections of the Fremantle Regional Strategy (DPUD, December 1994) and The Vlamingh Parklands report (WAPC, October 1998).

Port and Leighton beaches also adjoin the working port of Fremantle. Port requirements will be considered in the future planning of the coastal reserve.

### 1.4 STUDY AREA

The Port and Leighton Beaches coastal reserve has been divided into five management nodes (see Figure 2). These divisions group the coastal reserve into sections that have similar management requirements. The nodes are as follows:

- Sandtracks
- Port Beach
- South Leighton
- Surf Lifesaving Club

- North Leighton

### 1.5 REPORT STRUCTURE

This report is divided into 4 key sections:

#### **Principles and Guidelines**

This section is issue based and incorporates the Leighton Regional Planning principles and guidelines, as well as the local level guidelines. It sets the basic criteria for defining what we want on the coastal reserve and how it should be managed in the future.

#### **Concept Design and Nodal Action Plans**

This section identifies for each of the nodes identified in 1.4 above, the constraints at each location, plus the opportunities or actions that could be undertaken to better manage and enhance the area. More detailed work has been completed for Sandtracks and Port Beach nodes at the current time. This level of detail requires to be completed for all locations.

#### **Implementation Strategy and 5 Year Plan**

This section provides an overview of implementation of the plan plus a detailed listing of all actions required on the ground within each node, to ensure the coastal reserve is managed in order to achieve the objectives of the concept design.

#### **Field Specifications**

This section provides detailed specifications for facilities that will be located in the coastal reserve such as fencing, signage and showers.

### 1.6 HISTORICAL AND CULTURAL SIGNIFICANCE

Port and Leighton Beaches are located in North Fremantle and have played an important part in Fremantle's history. A brief summary of the historical and cultural significance of the area to indigenous and European peoples is outlined below.

#### **Aboriginal Heritage**

In 1975, an archaeological dig at Minim Cove discovered materials to suggest Aboriginal inhabitation of the area over 10,000 years ago. This is thought to be the earliest record of occupation in the region (Tingay & Associates, 1999).

The Whadjug, who are a clan group of the Nyungar tribe, occupied the Fremantle area. Spiritual significance was associated with, hills, caves, trees and sources of fresh water. North Fremantle was a desirable summer camping place because of the variety in microclimate from sea to estuary and the limestone geology provided caves for habitation, close to food sources of a predominantly maritime source (Burton, 1994).

There are several registered sites of significance to Aboriginal people located in close proximity to Port and Leighton beaches. The coastal area however, is not formally recognised as culturally significant except that it is the point of egress for the rainbow snake entering the 'tunnel' at Rocky Bay (Ecoscape, 1992). In addition, the Indian Ocean is recognised as an area of ethnological importance to Aboriginal peoples.

#### **European Heritage**

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Approval to blast the limestone bar at the river mouth was granted by Parliament in 1892 and initiated the development of port facilities at Fremantle and construction of breakwaters at Rous Head and Arthur Head (north and south moles) in 1897. These initiatives resulted in the establishment of North Fremantle as an industrial location.

Some of the relevant historical developments in the vicinity of the current reserve, taken from the North Fremantle Heritage Study (Burton, 1994) and Fremantle's landscape: a study for the Municipal Heritage Inventory (Michal Bosworth, April 2001) are detailed below:

- Perth Road quarried and levelled in 1851;
- Earthworks for the Guildford to Fremantle railway commenced in 1879 and completed by mid 1880;
- Ocean Beach (Port Beach) was vested in North Fremantle Council in 1905 (noting that this was the time in which beaches assumed new significance as recreation and swimming locations);
- Government Abattoirs at Port Beach 1907;
- West of the railway line large portions of land was used for railway uses, stores, future expansion etc;
- 1915-1916 the wool stores were constructed;
- A nightsoil depot was located close to the assumed landing of Vlamingh, adjacent to old Perth Road alignment;
- 1924-1925 the State abattoirs moved to Midland and replaced by woolstore buildings (later used for grain storage);
- Brown's Dairy was located close to the beach near the Leighton Railway Station;
- In the 1930s Leighton crossing and Leighton Street led to the beach beside the woolstores, which was characterised by a surf club, shops, fun fair (called Uglieland before it moved to the site opposite the Fremantle railway station) and a focus for recreational activities.
- 1926 oil storage tanks along Port and Leighton beaches were installed;
- anti aircraft units were stationed at Leighton Beach (and South Beach) during World War 2;
- between 1946 and 1972 in a phase of industrial expansion, the dunes along Leighton Beach were flattened for new industrial development and to accommodate new railway alignments; and
- 1967 dredge spoil from the harbour extensions was piped directly to Leighton Beach.

The bulk fuel storage tanks located on Port and Leighton beaches were decommissioned and removed in 1993 and 1995 respectively.

Future works at the beach should incorporate artworks and signage to interpret the Aboriginal and European heritage.



### 2.0 PRINCIPLES AND GUIDELINES

The principles and guidelines in this section include both regional and local perspectives. The regional guidelines are taken from the Leighton Regional Planning Guidelines adopted by the state government in December 2000. The City of Fremantle (FCC) guidelines were determined through the Port and Leighton Beaches Steering Committee.

The principles and guidelines should be used in the preparation of more detailed plans for the coastal reserve or adjoining properties, in the assessment of development/redevelopment proposals and capital works projects and the ongoing management of the reserve.

*Note in the sections titled the Leighton Regional Planning Guidelines, the figure references relate to the Guidelines document, not the figures in this plan. **The regional principles are denoted by a P• and the guidelines, by G and a number (G1).***

#### 2.1 COASTAL PROCESSES

The overall aim of this plan is to create a sustainable coastal reserve in a natural dune setting, with native species, catering to the community's recreational needs while minimising annual maintenance costs. Council and community recognise that to achieve this, a reserve of sufficient width is required to cater for physical and biological coastal processes, as well as to accommodate the regional and local recreational needs.

This section looks at the coastal processes at work in the study area and recommends a management response in terms of setback distances for new development. It also incorporates the findings of the Ministry for Planning in determining the regional reserve width.

The erosion and deposition of the beach (ie. Sand transported towards or away from the beach) occurs by three fundamental mechanisms (adapted from Alan Tingay and Associates, 1999):

- Longshore sediment transport occurs in the surf zone, where wave action moves sand into suspension and the current transports the sand along the beach. The suspended sand is accompanied by a 'bed load', where sand is rolled over the bottom by the water motion. In general terms, sand movement is likely to be from the north to south during winter and south to north in summer. The net annual movement of sand may be northerly one year and southerly the next, depending on seasonal variation and differences between calm and stormy years.
- Onshore/offshore movement (or cross-shore sediment transport) occurs during storm events where steep waves and high water levels cause rapid erosion of the beach and sand is carried offshore. Between storm events, long, low amplitude swells that persistently arrive at the coast, shifts the sand back onto the beach. It may take months or years for swells to move sand back onto the beach, which only took hours to erode.
- Wind blown sediment transport – wind action moves sand from the beach into the fore and mobile dunes.

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Coastal processes are also influenced by the construction of structures along the coastline, such as seawalls and groynes. The erosion and deposition patterns of Port Beach are influenced by Rous Head and the recent extension of Rous Head in 1995. "The Rous Head extension may be causing sand transported south during winter (longshore sediment transport) to be moved further offshore and into deeper water. Because of this and the sheltering effects of the breakwater, the background swell (cross-shore sediment transport) during summer may be unable to fully replenish the sand lost during winter" (Alan Tingay and Associates, 1999).

The City of Fremantle and Fremantle Port Authority are presently discussing the short and long term options to manage the erosion of Sandtracks-Port Beach.

To understand how these processes have influenced the study area historically, an analysis of aerial photographs for the years 1965, 1980, 1989 and 1998 was conducted and the position of the vegetation line recorded (MP Rogers and Associates, October 1998). This analysis indicated that the 1998 vegetation line is forward of the 1965 vegetation line by approximately 40metres in some locations, indicating net accretion of the shoreline. It is uncertain if the accretion is through the natural movement of sand along the coastline or sand placement by the Fremantle Port Authority. The exception is the southern section of Port Beach (Sandtracks), parallel to Rudderham Drive, where the vegetation line has eroded approximately 10 metres between 1989 and 1998.

To determine an appropriate setback distance for possible future developments, the long term vegetation line movement trends, severe storm erosion and potential sea levels changes due to climate change (30-year period) were assessed. In addition, a safety factor was included to account for any limitations in the data.

The Port and Leighton Beach Management Study recommended two setback distances for development, of 25 metres and 65 metres from the 1998 vegetation line. Infrastructure within 25metres of the 1998 vegetation line has a high risk of being lost during a major storm event (ie. 1 in 100 year storm event), between 25 and 65 metres the risk is reduced and outside 65metres, the risk is very reduced (Tingay & Associates, 1999).

Therefore it is recommended that no major new infrastructure (eg. buildings, roads, formal car parks, etc) should be constructed closer than 65 metres to the 1998 vegetation line, as there is a risk it may be damaged or lost in a major storm event. Minor infrastructure (eg. Fences, access paths, small informal limestone car parks, lightweight structures, etc) may be located within 65 metres and Council recognises there is a higher risk that these structures could be damaged or lost in a major storm event. It is important to note that the setback distances are based on a sea level rise over a 30 year timeframe which is considered a realistic planning timeframe. Council will review this work in the future. It should be noted that the Ministry for Planning and Department of Transport considers setback distances based on a sea level rise over a 100 year period more appropriate.

The Leighton Regional Planning Guidelines concluded a reserve width of 95 metres was required to accommodate storm events, the historic erosion trend, sea level change and a safety factor. Coastal recreation demand was also analysed with the result that an overall increase in the reserve width of between 95 metres, up to 150 metres is recommended. To increase the reserve width, an amendment to the Metropolitan Region Scheme is required. There is currently no timetable for this action. This plan will need to be amended and updated when this occurs.

It should be noted that the Leighton Regional Planning Guidelines only apply to the area north of Walter Place. The same analysis needs to be undertaken for the area between Walter Place and Rudderham Drive.

The WAPC is in the process of developing a new coastal planning policy for the metropolitan region. This management plan will be reviewed as required to incorporate the policy when released.

### 2.1.1 Leighton Regional Planning Principles and Guidelines

*The regional principles are denoted by a P• and the guidelines, by G and a number (G1).*

P• To establish and formalise a coastal reserve of sufficient width at Leighton to accommodate shoreline changes due to natural coastal processes and to accommodate regional recreation demand and management of beachside facilities and amenities for the medium to long-term needs of the community.

G1. The Metropolitan Region Scheme (MRS) be amended to accommodate a widened Parks and Recreation (P & R) Reserve along the length of the Leighton Marshalling Yards site as shown on Figures 6 & 10 (note figure references relate to the Leighton Regional Planning Guidelines).

*The beach reserve is proposed to increase from 40 metres to 125 metres in the northern section (near the Beehive Montessori School), 95 metres in the middle section (opposite Vlamingh Parade/Buckland Hill) and 150 metres in the south (around the Fremantle Surf Life Saving Club).*

G2. The respective Local Governments in consultation with the local communities and user groups should develop Foreshore Management Plans for the P & R reserve.

### 2.1.2 FCC Principles

The following are principal management objectives for coastal processes:

- I. The coastal reservation should be a minimum of 100 metres in width along the whole coastal reserve, which is the guideline width identified by the WAPC Policies DC2.3, DC 6.1 and Council policy DGN.12. This setback is to be measured from the 1998 vegetation line (as shown in the concept design and the Port and Leighton Beaches Management Study, 1999).
- II. A minimum dune width of 100 metres is required to:
  - create a more stable and self sustaining dune environment;
  - minimise dune maintenance costs;
  - assist in reducing maintenance costs behind the 65 metre zone; and
  - reduce capital expenditure after a severe storm event by maximising dune width.
- III. Port Beach Road should be relocated outside the 65metre setback.
- IV. No major new infrastructure (eg. formal car parks, roads, buildings, etc) should be constructed within 65 metres of the 1998 vegetation line.
- V. Minor infrastructure (eg. fences, paths, small informal limestone car parks, lightweight structures, etc) may be located within 65 metres of the 1998 vegetation line. Council recognises there is a risk of losing structures located closer than 65 metres from the 1998 vegetation line.
- VI. Over time, the relocation of existing buildings to a minimum of 65 metres from the 1998 vegetation line is recommended. Major refurbishment of buildings within the 65 metre zone is not recommended, as relocation is preferred. The acceptability of refurbishment of a building closer than 65 metre will need to be assessed on an individual basis.
- VII. Erosion and accretion are natural processes that occur on an annual basis. The coastal reserve will be managed to accommodate these natural processes.
- VIII. Ongoing management of the dune system is required to increase vegetation cover, stabilise the dunes and reduce the erosion risk to buildings and structures within the reserve. A commitment to annual resources by Council is required for this ongoing management.
- IX. Stormwater outlets should not discharge directly onto the beach or into the marine environment.



Photograph 1: Showing infrastructure, housing and recreational facilities are set well back (approximately 200 metres from the beach at Scarborough Beach).



Photograph 2: Coastal facilities in Scarborough set back from the beach. Scarborough is perceived as being located right on the beach, however, this photograph shows a reasonable frontal dune (~80m), recreation area (~30m) and then car parking (~80m) before any buildings.

## 2.2 VEGETATION

Port and Leighton Beaches are characterised by foredune and mobile dune vegetation communities that are typical of the metropolitan coastline. The vegetation within the Port and Leighton Beach coastal reserve varies in its condition and coverage, with sections of the reserve characterised by stable healthy vegetation, other sections by bare ground.

The foredune and mobile dune is a very hostile environment, which requires vegetation highly adapted to mobile sands, high salt levels and strong onshore winds. Vegetation suited to this dune environment has been divided into three categories, which are outlined below. A fourth category has been added to identify vegetation that is

suitable for use in landscape plantings around buildings and for shade purposes. These are detailed in Appendix 2.

### 2.2.1 Leighton Regional Planning Principles and Guidelines

*The regional principles are denoted by a P• and the guidelines, by G and a number (G1).*

P• To identify significant views and vistas which need long-term protection to conserve the high scenic values and landscape attributes of the area.

G19. The identified Zone of Highest Visual Prominence coincides with a range of important physical, visual and social criteria.

For these reasons, this zone should be considered as an appropriate location for public open space of a predominantly landscape nature. Tree and shrub planting, as well as structures, should be designed to minimise obstruction of views across the site from all vantage points.

G20. The identified Zones of Moderate Visual Prominence are important in the context of views to and across the (Leighton Marshalling Yards) site. In particular, they fall within views across the site to the ocean, from the ocean to important buildings and from within the site to the Port of Fremantle. Development within these zones shall be sufficiently sparse and small in scale to preserve these views to an appreciable extent. Development proposals should be required to demonstrate that this requirement will be met.

See also Protecting Views and Landscape Character below.

### 2.2.2 FCC Principles

The following are principal management objectives for vegetation:

- I. Increase and improve the vegetation cover on the dune system
- II. Create a species rich dunal system
- III. Utilise local endemic species, where possible
- IV. Create a vegetation sequence from west to east that represents a natural dune system. This consists of tolerant Category 1 species, such as *Spinifex spp* in the west through to densely vegetated swales of *Acacia spp* and other Category 3 species to the east (see Figure 3)
- V. Exotic species will be restricted to the development nodes. Use of exotics in other nodes will be assessed on an individual basis, but will not be permitted within 65 metres of the 1998 vegetation line
- VI. Minimise weed species on the dunes
- VII. Lawn areas are to be focussed within the development nodes. Additional lawn areas will be assessed on an individual basis and should be at least 65 metres from the 1998 vegetation line (Sandtracks node may be the exception to the 65 metre rule)
- VIII. Protect the dune vegetation from informal access by beach users
- IX. Brush dunes, when and where required, to stabilise dunes and protect the vegetation



Photograph 3: Showing typical coastal vegetation found in the Perth metropolitan area.



Photograph 4: Typical swale found in the coastal dunes of Perth

### 2.3 ACCESS

Access to Port and Leighton beaches is provided through the following means:

- Private vehicle
- Train services
- Buses
- Walking
- Cycling



Vehicle access provides the main means by which people travel to Port and Leighton Beaches. The Brooks Laughton study (1991) identified that 65% of beach users live within 10 kilometres of the coastal reserve, with others travelling over 20 km to visit the beaches. Port Beach Road currently provides access to all parking areas along the coastal reserve.

The Perth to Fremantle electric rail has trains operating on a regular timetable running seven days a week. The only station servicing Port and Leighton Beaches is North Fremantle railway station. Access to the beach from this station is poorly marked and pedestrians must pass through an industrial area. The route is not pedestrian friendly or visually pleasing.

Regular bus services travel along Stirling Highway and stop at a number of locations. On departing a bus, access to the beaches from Stirling Highway is restricted to three locations, Tydeman Road, Walter Place/North Fremantle railway station and the footbridge at Leighton Beach. All these routes require people to cross Port Beach Road which is a safety concern to pedestrians. No bus service operates along Port Beach Road.

Cycling and walking to the beaches is possible using footpaths and multi-use paths. A purpose built multi-use path links Fremantle and surrounding suburbs to the beaches and provides access to Mosman Park and Cottesloe to the north. The existing multi-use path at the Surf Life Saving Club and to the south is less than ideal in some locations where it crosses with entrances to car parking areas.

The multi-use path serves a number of different user groups such as pedestrians, dog walkers, joggers, cyclists and in-line skaters. All these groups need to be catered for when considering the design and location of multi-use paths. There may be a need to create a single path to cater for all these groups or provide two paths, one to handle the slower more passive recreational requirements and the other to accommodate the faster more active users, such as cyclists. Improved pathway(s) linking the beaches to North Fremantle and Fremantle City centre, that are well signed, would be appropriate and consistent with the Vlamingh Parklands Study (WAPC, 1998).

Port Beach Road is not pedestrian friendly and crossing to the beach is difficult and dangerous at times. The road north of Tydeman Road, needs to be traffic calmed and landscaped to improve pedestrian movement to and from the beaches. The timing and extent of traffic calming will depend in part on the final regional road network plans for the Leighton peninsula. This is currently being looked at by the Department of Transport in the Fremantle to Cottesloe Transport Plan. Provision for cyclists' needs to be formalised with correct marking of cycle lanes on roadways in all future works.

The location and orientation of beach access paths to the beach is detailed in Section 3.

### 2.3.1 Leighton Regional Planning Guidelines

*The regional principles are denoted by a P• and the guidelines, by G and a number (G1).*

P• To provide convenient, safe and environmentally sustainable access to the beach and foreshore areas for all members of the public.

P• To ensure safe and efficient access to the site and coastal foreshore via the existing and proposed regional road and rail infrastructure.

P• To facilitate increased use of public transport use by:

- providing direct access to the beach from railway stations adjacent to the northern and southern ends of the site;

- ensuring that visual links are created between the Leighton beaches and proposed railway station locations;
- establishing land uses adjacent to railway stations that generate frequent and regular public transport trips.

P• To provide for safe and convenient movement of pedestrians and cyclists throughout the area.

G5. Realignment of Port Beach Road eastward should be considered in detailed design work for the future development and enhancement of the coastal foreshore reserve.

Once the Curtin Avenue extension is in place this could be implemented. In the interim, opportunities for improved pedestrian access and safety across Port Beach Road may be limited to signalised pedestrian crossings at the intersection of Port Beach Road and Walter Place, noting also that Port Beach Road is grade separated on two levels at this location.

G6. Port Beach Road should remain open at both ends in any redesign or realignment to maintain public accessibility and to facilitate traffic movement through the proposed reserve. Traffic calming and a reduction in speed limit is recommended in the long-term for Port Beach Road on the grounds of safety, functional definition and pedestrian accessibility to the beach.

G7. A highly visible, direct and safe pedestrian corridor from North Fremantle railway station to the beach as indicated on Figure 10 should be incorporated in the redevelopment of the Leighton Marshalling Yards and coastal foreshore reserve.

### 2.3.2 FCC Principles

The following are principal management objectives for access:

- I. Recognise the beaches are a regional asset and access should be designed to cater for this demand
- II. Ideally, Port Beach Road is located outside the 65 metre erosion setback and east of land required for recreational purposes
- III. Port Beach Road is traffic calmed where possible and landscaped to provide for safer access to the beach area
- IV. Vehicle access to small nodal carparks is maintained
- V. Improve public transport (improved and/or additional train stations and bus services) to the coastal reserve
- VI. Separation of path users, if possible. Uses divided into scenic walking paths and multi-use paths. The multi-use paths are designed to cater for faster moving user groups, eg. Cyclists, in-line skaters, joggers, etc
- VII. Multi-use and walking paths are allowed between the 25 and 65 metre setback. Paths are to be designed to blend with the dune environment
- VIII. Improve vehicle, pedestrian and cycle access across Stirling Highway
- IX. Provide safe, well signed and direct pedestrian and cycle access from the railway stations and surrounding suburbs
- X. Enable safe crossing of Port Beach Road to the beaches



Photograph 5: An example of a multi-use path along the Perth coastline at North Trigg.



Photograph 6: An example of a dual-use path along the Perth coastline at Woodman's Point.

### 2.4 PARKING

Current parking provisions for Port and Leighton beaches are characterised by small nodal car parks distributed along the length of the coastal reserve. There are two major bitumen car parks located at the Surf Club Café/Port Tearooms (approximately 303 bays) and the Fremantle Surf Lifesaving Club (approximately 228 bays).

The City of Fremantle has developed two temporary car parking areas on lands previously occupied by industrial uses. These parking areas are mainly used during peak summer periods when demand for parking is high. The first temporary carpark (approximately 90 car bays) is just north of Rudderham Drive and provides access to Sandtracks beach. This temporary carpark will be lost if Port Beach Road is relocated closer to the beach in the Sandtracks area. The other temporary carpark is located just north of the Port Tearooms and has a capacity of approximately 200 cars.

During the summer months, observations by City of Fremantle staff have concluded that Port and Leighton beaches are at capacity approximately 8 weekends (16 days) per year. All designated car parking areas are at capacity and vehicles park along the edge of Port Beach Road, for at least part of the day. The number of cars in total during these peak periods is estimated at 1,850 vehicles. Of these, approximately 940 cars would be located in parking bays (either temporary or permanent) with the remainder using the Port Beach Road verge and Fremantle Port Authority land, south of Tydeman Road.

Concern has been expressed about the safety of the existing road access and parking arrangements for vehicles, pedestrians and cyclists. Improved parking facilities may also be required in the future in the vicinity of the coastal reserve to cater for the increased demand by people using this regional recreation area. The redesign and/or allocation of additional parking will need to consider coastal management, recreational needs, safety and vehicle movement etc. These principles contained in this document will guide this work.

Promoting use of other modes of access to the beaches is also required.

### 2.4.1 Leighton Regional Planning Principle and Guidelines

*The regional principles are denoted by a P• and the guidelines, by G and a number (G1).*

P• To provide a responsible balance between the need for access and parking at the beach and for dune restoration and conservation of the natural vegetation.

G8. Detailed planning of the foreshore reserve, including the preferred location and provision of car parking areas should be carried out by the respective Local Governments in consultation with their local communities and user groups.

G9. Car parking areas should be located within and alongside activity nodes and in selected smaller nodal areas through the length of the coastal reserve.

G10. Existing car parking areas that are susceptible to sand drift or located on contaminated landfill could be relocated and additional areas provided as part of the future redevelopment and enhancement of the expanded coastal reserve.

### 2.4.2 FCC Principles

The following are principal management objectives for parking:

- I. To recognise Port and Leighton Beach is a regional recreation area
- II. Retain parking in small nodal areas along coastal reserve
- III. The larger carparks should be located at the activity/service nodes (SLSC and Port Beach) or outside of the coastal reserve
- IV. The number and location of parking areas should consider increasing user-demand but should be controlled by limitations of the coastal dune system (i.e. should not be determined by user demand)
- V. Future car parks must be located at least 65metres from the 1998 vegetation line
- VI. Existing carparks located closer than 25metres from the 1998 vegetation line should be relocated to a minimum of 65 metres in the medium to long term. Council assumes the risk that a carpark located closer than 65 metres may be lost or damaged in a major storm event
- VII. Pursue opportunities for parking to be located outside of the coastal reserve (could double as commuter 'park and ride' facilities also)

- VIII. Shade trees to be planted in carparks, where appropriate, using Category 4 species identified in Appendix 2
- IX. Run-off waters from carparks should be directed to vegetated swales (sumps), where possible. Waters should not directly enter the marine environment through a stormwater outlet



Photograph 7: Example of a nodal car park set back behind the dunes, South Scarborough. Natural surface to minimise visual impact of the car park and allow infiltration of rainfall.



Photograph 8: Nodal car park set back behind the dunes, surrounded by vegetation, Woodman's Point. The area is degraded but provides an insight into the benefits of nodal car parks instead of large bituminised car parks.

### 2.5 RECREATION

Sixty-five per cent (65%) of Port and Leighton beaches users live within 10 kilometres of the beach, another 34% of users live between 10 to 20 kilometres and 2% live more than 20 kilometres away (Brookes Laughton, 1991).

A survey of beach use in Fremantle conducted on Sunday, 7 February 1999 between 11:30 am and 12:00 noon by Coastwise found that 2,459 people were on the beach or in the water. This compares to 1,540 people in 1988, recorded in a similar survey.

These figures confirm the beaches are an important regional recreation area. This was also confirmed in the Leighton Regional Planning Guidelines.

These figures, and anecdotal evidence, show the number of people using Port and Leighton beaches has increased over the years. New land releases and housing developments, south of the river (within the 10 to 20 kilometre zone) may result in an increase in the number of beach users. User demand will continue to be focussed during the summer, with peak capacity reached on a number of these summer weekends.

The most popular existing recreational activities on Port and Leighton Beaches are sunbathing/relaxing, swimming, walking, running, fishing, surfing and sailboarding.

The current coastal reserve has restricted recreational opportunities due to its long narrow configuration, the location of existing facilities and infrastructure (ie. roads, buildings and car parks) and lack of recreation facilities such as lawn areas. This view was supported by the Ministry for Planning in the Leighton Regional Planning Guidelines.

In the future, the greatest opportunity for improving active recreation areas is in the vicinity of the Surf Lifesaving Club node, where the coastal reserve is proposed to be widened under the Leighton Regional Planning Guidelines. This location is also easily accessible by both private vehicle and public transport (bus or rail to North Fremantle).

Currently there is expressed demand for a new parking and lawn area to the south of the SLSC primarily for sailboarders to set-up on. The redevelopment of this area would assist in meeting the regional recreational needs of sailboarders. More detailed planning is required to identify activities and facilities required and appropriate locations. This work will be guided by the principles stated in 2.5.1 and 2.5.2 below.

It should be noted, that any applications for development in the coastal reserve will be determined by the Western Australian Planning Commission. Whilst the coastal planning framework is still being developed at the state level, the Commission's existing policy 5.3 Use of Land Reserved for Parks and Recreation, will be used to assess applications.

#### 2.5.1 Leighton Regional Planning Principles and Guidelines

*The regional principles are denoted by a P• and the guidelines, by G and a number (G1).*

P• To refine and facilitate implementation of the objectives of The Vlamingh Parklands concept in relation to foreshore recreational space and east west access links across the site.



P• To sustain opportunities for multi purpose use of the beach and coastal foreshore in the planning and development of facilities and amenities within and alongside the coastal foreshore reserve.

G3. Recreational facilities should be located in nodes rather than being spread along the length of the coastline.

G4. Only those facilities that enhance the public's use and enjoyment of the coast should be accommodated within the coastal foreshore (P & R) reserve.

G15. The history of the area includes a number of historic themes that can be interpreted in any future development. These include

### *Beach and Surf Club Culture*

*Throughout its history the Leighton area has been used for recreational purposes associated with the beach, whilst industrial uses have continued adjacent. This aspect requires interpretation in future development of the area through signage and artworks.*

### 2.5.2 FCC Principles

The following are principal management objectives for recreation:

- I. Port and Leighton Beaches are recognised as a regional recreation area
- II. Improve and manage the coastal reserve to cater for a diverse range of recreational activities, both active and passive. The SLSC node is likely to provide the best opportunity (based on existing reserve width and potential development of the Leighton Marshalling Yards) for active recreation areas such as basketball, volleyball, skateboarding, in-line skating, grass areas for informal games
- III. Match the facilities provided to the width of reserve and the type of user to encourage lower usage activities at Sandtracks, Port Tearooms, South Leighton and North Leighton nodes, and higher usage activities at the SLSC node
- IV. Retain and enhance the natural dune environment
- V. Manage the coastal reserve to encourage a range of recreational activities while minimising impact on the dune system



Photograph 9: Grassed recreational area behind a wide dune system, Scarborough Beach. Vegetated wind barrier to protect the playground and grassed area for active and passive recreation.



Photograph 10: Recreational area set back from the beach in the dunes that offer some protection from the winds, Trigg Beach

### 2.6 COMMERCIAL DEVELOPMENT

Port and Leighton Beach is characterised by two main activity and service areas, the Port Tearooms/Surf Club Café located at Port Beach, and the Fremantle Surf Life Saving Club (SLSC) and kiosk, located at Leighton Beach (see Figure 2). The café, SLSC and associated facilities, are located on land leased from the City of Fremantle.

The Council provides toilets and change rooms at Port Beach, just south of the Surf Club Café. These facilities are in poor condition and require rebuilding or upgrading, subject to the principles outlined in section 2.1. Council will need to undertake more detailed analysis of this issue and develop time lines for this work.

The SLSC was redeveloped and extended in 1993 and has a membership of approximately 600 people. The toilets and kiosk in this node are managed by the Council and are also in need of rebuilding or upgrading (as above, more detailed analysis of this is required). No major redevelopment works should be undertaken in the SLSC node until more detailed planning for the Leighton Marshalling Yards is completed. This will enable a coordinated and combined approach to the design and location of these facilities.

It should be noted, that any applications for development in the coastal reserve will be determined by the Western Australian Planning Commission. Whilst the coastal planning framework is still being developed at the state level, the Commission's existing policy 5.3 Use of Land Reserved for Parks and Recreation, will be used to assess applications.

The potential for additional commercial development is restricted due to the narrow nature of the existing reserve, but some redevelopment of the existing commercial nodes may be appropriate. The Leighton Marshalling Yards should provide additional opportunities for coastal dune systems, recreational spaces and commercial development.

### 2.6.1 Leighton Regional Planning Guidelines

*The regional principles are denoted by a P• and the guidelines, by G and a number (G1).*

G3. Recreational facilities should be located in nodes rather than being spread along the length of the coastline.

G4. Only those facilities that enhance the public's use and enjoyment of the coast should be accommodated within the coastal foreshore (P & R) reserve.

G25. Commercial land uses within this area should be related to coastal activities to encourage increased use of public transport to and from the beach or provide services and facilities for residents within the village and the existing residential area to the south on the eastern side of the railway line.

### 2.6.2 FCC Principles

The following are principal management objectives for commercial development:

- I. Any future development will be restricted to the identified activity/service nodes (Port Beach node and Surf Life Saving Club node) and be designed with respect to site conditions, solar passive design, energy efficiency etc
- II. No major new infrastructure (eg. Formal carparks, roads, buildings, etc) should be constructed within 65 metres of the 1998 vegetation line (see Section 2.1)
- III. Approval to operate a business on the beach will not be approved until a review of D.B.U5 Trading in Public Places policy is undertaken
- IV. Redevelopment of existing buildings/structures located closer than 65 metres from the 1998 vegetation line should only occur if relocation of these buildings is not possible. Should redevelopment proceed, the owner must recognise and accept the insurance risk that they may be lost or damaged in a severe storm event
- V. Any new development located on the reserve must be approved by the Minister for Lands and West Australian Planning Commission and be consistent with the City of Fremantle Port and Leighton Beaches Management Plan for the reserve
- VI. Any new development or upgrading of facilities will be restricted in height to ensure development has a low visual impact on the coastal reserve and to minimise obstruction of views from significant vantage points.

## 2.7 SITE CONTAMINATION AND ENVIRONMENTAL ISSUES

Portions of the coastal reserve have historically been used for industrial purposes, including bulk fuel storage facilities, grain handling and boat building. The main areas of concern in respect to contamination (soil and groundwater) are the former bulk fuel storage areas.

Caltex Australia operated a bulk fuel storage facility at Lot 50a (lease lot), located south of the Surf Club Café. The site was decommissioned in late 1993 and all infrastructure removed soon after. Field investigations were undertaken to determine the type and extent of contamination and two "hot spots" (concentrated areas of contamination) have been removed.

When the coastal reserve was vested with the City of Fremantle for the purposes of 'foreshore management', additional monitoring was commenced to ensure the site met the guidelines for a parks and recreation reserve, not industrial use, as previously required. To meet the new guidelines, additional impacted soil was excavated and 'land farmed' on the site. Landfarming uses the sun and tilling to break down the hydrocarbons. Validation sampling is undertaken to ensure the impacted soil meets the parks and recreation guidelines prior to the material being placed back into the pits.

The second site (Golden Fleece, located south of the Surf Life Saving Club carpark) was also operated by Caltex Australia for bulk fuel storage and was decommissioned in 1995. Field investigations were undertaken to determine the type and extent of contamination that led to the remediation of the soil by landfarming. On completion, the soil was returned to the excavations and the site planted with native vegetation. Contaminated soil located under the dune system was not excavated because it would have required the removal of the existing dune system and will slowly breakdown over time.

Caltex Australia is liaising with the City of Fremantle and the Department of Environmental Protection in respect to cleaning up these sites to the required standards.

The Mid West Fodder site, immediately north of the car park adjacent to Surf Club Café was used for the handling and storage of grain and decommissioned in 1992. The site was used for boat building over a short period before the on-site buildings were demolished. The hardstand areas will remain until more detailed planning is completed for this location. There is little information available on site activities and therefore potential contamination. Based on anecdotal evidence the most likely contamination is from pesticides and insecticides used to control insect infestation while storing grain. The City of Fremantle contracted PPK environmental consultants (December 1998) to target the most likely areas on the site to contain signs of contamination, three samples were collected and tested for organochlorine and organophosphates. The laboratory analysis results showed that no organochlorine and/or organophosphates were present at the three sample locations. More detailed testing may be required in the future.

### 2.7.1 Leighton Regional Planning Principles and Guidelines

*The regional principles are denoted by a P• and the guidelines, by G and a number (G1).*

P• To identify the extent and impact of environmental constraints to development on the site including contamination, industrial land use risk, noise, vibration, odour, and groundwater quality and availability.

P• To determine the procedures required for site remediation, risk reduction, noise, vibration and odour mitigation, and control on groundwater extraction to achieve sustainable development and land use options for the site and foreshore reserve.

G42. Prior to handing over that part of the site to the respective Local Governments for Parks and Recreation purposes, all site contamination be removed or otherwise remediated consistent with proposed future uses.

### 2.7.2 FCC Principles

The following are principal management objectives for site contamination:

- I. Contaminated sites will be cleaned up to a standard suitable for their end land use
- II. Contaminated soil and groundwater may be left in-situ if it is shown it will naturally degrade over time and/or the removal of the contaminated soil would result in extensive damage to the dune system
- III. The clean up of a site will be performed to the satisfaction of the Department of Environmental Protection and the City of Fremantle

### 2.8 PROTECTING VIEWS AND LANDSCAPE CHARACTER

#### 2.8.1 Leighton Regional Planning Principles and Guidelines

*The regional principles are denoted by a P• and the guidelines, by G and a number (G1).*

P• To protect places of cultural heritage significance within and around the site.

P• To identify significant views and vistas which need long-term protection to conserve the high scenic values and landscape attributes of the area.]

G16. Development within the Zone of Highest Visual Prominence as shown on Figure 8 should be restricted to forms and scales that do not adversely affect views to and across the site from any direction. This does not preclude all development, but limits the degree to which development is visible from vantage points and the degree to which it obscures views across the site to a minor level.

G17. Development within Zones of Moderate Visual Prominence as shown on Figure 8 should be of forms and scales that are visible within views to and across the site, but that do not visually dominate or obscure them. Such development should be sufficiently low that there can be views over it, and sufficiently open that there can be views through it.

G18. Development within Zones of Low Visual Prominence as shown on Figure 8 may be of forms and scales that are visible within views to and across the site. Intrusion into views is acceptable. However, development should be of forms and scales that are visually compatible with the surrounding area.

G19. The identified Zone of Highest Visual Prominence coincides with a range of important physical, visual and social criteria:

- the railway, highway and adjoining land to the east are level with it for much of its eastern frontage;
- there are views across it to the ocean from all levels, and from the ocean and Port Beach Road to culturally important structures such as the Dingo Flour Mill and Matilda Bay Brewery;
- it coincides with a visual “dip” in the foreground elements of distant views from the east, thus contributing to particularly deep fields of view from this aspect;
- it is an historic point of access across the site to the beach.

For these reasons, this zone should be considered as an appropriate location for public open space of a predominantly landscape nature. Tree and shrub planting, as well as structures, should be designed to minimise obstruction of views across the site from all vantage points.

G20. The identified Zones of Moderate Visual Prominence are nonetheless, important in the context of views to and across the site. In particular, they fall within views across the site to the ocean, from the ocean to important buildings and from within the site to the Port of Fremantle. Development within these zones shall be sufficiently sparse and small in scale to preserve these views to an appreciable extent. Development proposals should be required to demonstrate that this requirement will be met.

### 2.9 IMPLEMENTATION OF REGIONAL GUIDELINES

#### 2.9.1 Leighton Regional Planning Principles and Guidelines

*The regional principles are denoted by a P• and the guidelines, by G and a number (G1).*

P• To ensure that implementation provides certainty for the community and government, that it occurs in a timely manner, is environmentally responsible and minimises long-term financial liability for all concerned.

P• To identify priorities and mechanisms for implementation of recommended strategies for the beach and foreshore area, including a preferred process for the development of a detailed recreation plan for the area by the relevant Local Governments and the community.

P• To achieve these objectives the Guidelines set out specific requirements for:

- the reservation of land for recreational areas and coastal foreshore protection, and the procedures required to formalise the reservation;
- the reservation of land for the extension of Curtin Avenue along the eastern side of the Leighton Marshalling Yards as proposed under the draft *Fremantle to Cottesloe Transport Plan*;
- the preparation of a Structure Plan for the site and the coastal foreshore reserve setting out detailed planning requirements and proposals for the area
- procedures leading to remediation of contamination on the site and coastal foreshore commensurate with proposed uses;
- procedures to be followed prior to approval of development adjacent to the fuel storage facilities south of the site;
- procedures to be followed for any development on or adjacent to the former Cable Station building (McCall Centre) and former North Fremantle Primary School (Stirling House) which are listed on the State Register of Heritage Places.

And policies on:

- the protection of significant views and vistas over the site from recognised public places;
- measures to mediate potentially adverse noise, vibration and odour impacts from external sources on future uses within the site;
- the control of groundwater extraction for irrigation and watering on the site to avoid saline intrusion to the underground freshwater lens;
- the location of the main activity nodes within the coastal foreshore reserve;
- the principle access points to the coast;
- preferred land use options adjacent to the North Fremantle and (proposed) Wellington Street railway stations and access routes from the stations to the beach.

The Guidelines supercede the relevant sections of the Fremantle Regional Planning Strategy and The Vlamingh Parklands report relating to the Leighton Marshalling Yards site.

G41. The following sequence of planning tasks be undertaken by the respective agencies to achieve outcomes consistent with the Guidelines.

- Preparation and adoption of amendments to the MRS to formalise the revised coastal foreshore (P & R) and regional road (Curtin Avenue) reservations (Ministry for Planning/Western Australian Planning Commission);
- Preparation of a Structure Plan by the respective Local Governments for the detailed planning of the site and coastal reserve (City of Fremantle/Town of Mosman Park/Town of Cottesloe/landowner and developer);
- Preparation of amendments to each of the local town planning schemes by the respective Local Governments to bring local scheme zones and reservations in line with the amendments made under the MRS (City of Fremantle/Town of Mosman Park/Town of Cottesloe);



- Preparation or review of Foreshore Management Plans by the respective Local Governments for future management, coastal restoration and recreational development of the coastal reserve (City of Fremantle/Town of Mosman Park/Town of Cottesloe).

### 3.0 CONCEPT DESIGN AND NODAL ACTION PLANS

#### COASTAL RESERVE CONCEPT DESIGN

Based on the guidelines and principles outlined in section 2 and the identified constraints and opportunities for each node, a concept design (see Figure 2) for the coastal reserve has been prepared.

The concept design is largely restricted to the existing coastal reserve, with the exception of an area containing the new Port Beach Road reserve and FPA land west of the existing Port Beach Road and south of the Surf Club Café. Restricting the concept design to the existing coastal reserve does not resolve many of constraints identified but aims to manage them within the area currently under Council control. The plan does suggest that some facilities should be relocated when the coastal reserve is finalised, consistent with the Leighton Regional Planning Guidelines.

To illustrate how the concept design will improve the dune environment and recreational facilities for beach users, cross-sections through the coastal reserve are provided in Figure 3.

A second concept design option has been prepared for the Sandtracks and Port Beach nodes. This option seeks to manage the erosion in this area through the creation of a wider dune system. Portions of the bituminised area (car parks) will be returned to dunes and any loss in car parking will be offset with the creation of new informal nodal car parking to the immediate south. The alternative concept design for this area is presented on Figure 4.

Both of the concept designs focus on maintaining the natural and undeveloped feeling of Port and Leighton Beaches, while trying to improve both the dunal environment and stability and the recreational facilities provided at the two existing activity/service nodes.

The key features of the proposed plans for each node are as follows:

Node	Features (from figures 2, 3,4,5)
Sandtracks Node	Informal recreation area with reshaped dunes, indigenous trees and shrubs, and fenced access paths. Existing steps and rock wall (armouring) should be removed. Overflow parking is proposed along Port Beach Road. Detailed design and new work will not be completed until the realignment of Port Beach Road has been finalised.
Port Beach Node	Continue as a focus for beach activity. Create grassed/lawn area, with shade trees between Café and change rooms, to reduce maintenance of the area, improve drainage and provide picnic space/beach viewing. A visual link with planting on Tydeman and Port Beach Road is also possible. Increase dune area over time and revegetate. Realign and fence all access paths. Improve and rationalise existing parking areas, provide shade planting and limit access points. Provide delivery area for Café. Provide drainage swale beneath wide boardwalk connecting recreation and beach access paths. Provide shade canopy between change rooms and surf club annexe.  In the medium to long term, remove and resite toilet block outside risk

	zones. Increase the dune width over time by reducing the car park.
South Leighton Node	Extend dunes to the east to create fore and secondary dunes. Revegetate as natural area. Remove existing hardstand areas and restrict parking to adjacent to PBR. Sailboard rigging area proposed in this location. Review potential for raised viewing platforms or boardwalk through the area to protect the vegetation.
Surf Life Saving Club Node	Continue as a focus area for beach activity. Extend dunes, revegetate and maintain fencing for protection. Fence access paths. Volleyball courts to be maintained for surf club use. Provide separate kiosk delivery and surf club parking areas. Provide shade canopy and grassed area between the surf club and kiosk. Review car parking layout, provide shade trees and limit access to Port Beach Road, including a safer exit into the south bound lane. Improve access from North Fremantle railway station to the beach – including pedestrian access across Port Beach Road.  In the longer term, relocate the change rooms and kiosk outside the 65 metre risk zone.
North Leighton Node	Examine requirements for sailboarding and determine most appropriate location for rigging area. Continue to rehabilitate and vegetate the dunes. Maintain fencing to the access paths to protect the dunes. As water becomes available in the area, provide showers and drinking water. Review and maintain the small car parks to improve safety and minimise maintenance.

Other features of the plan include a consistent design for bollards, fencing and signage to provide a linkage along the beaches. See section 5.

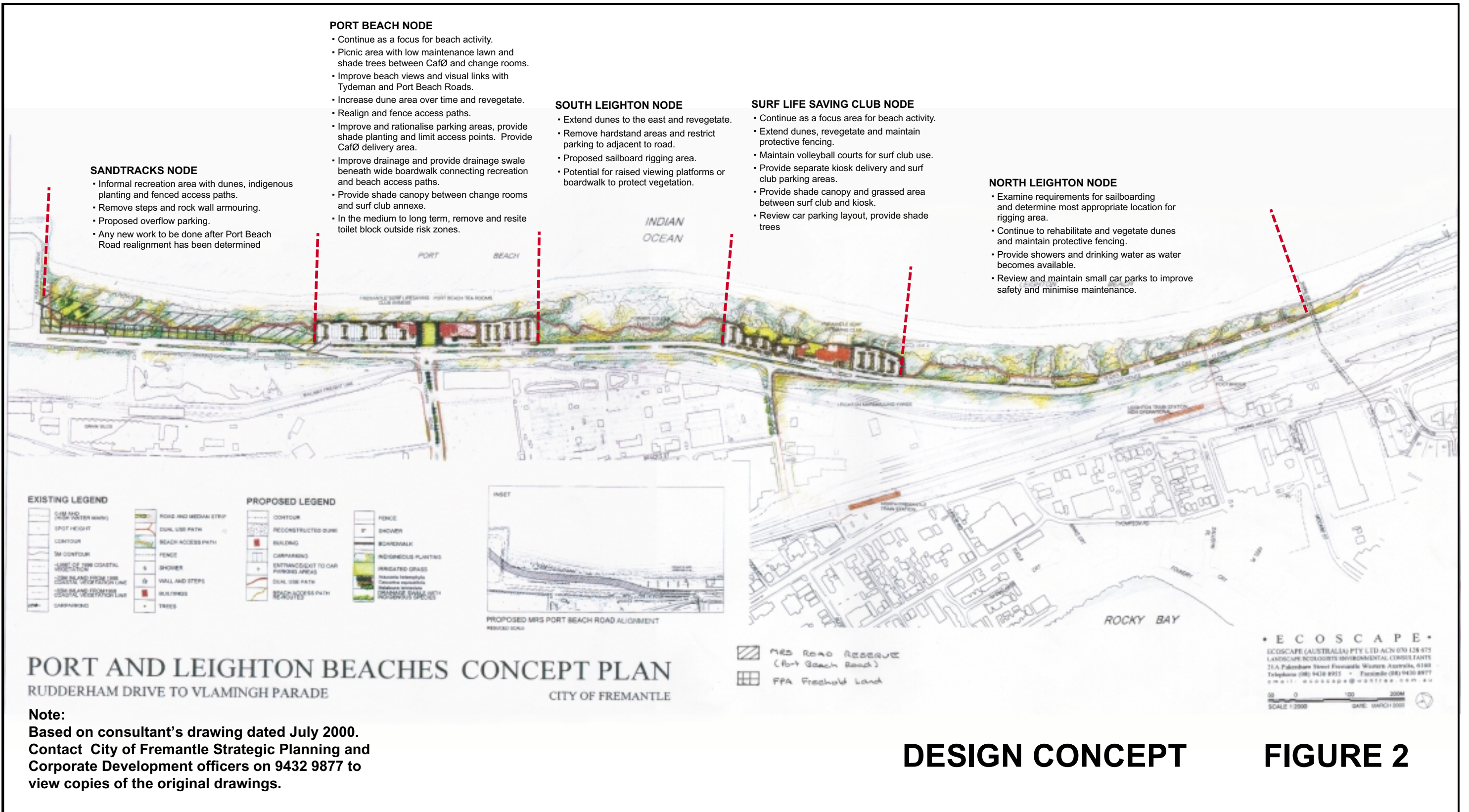
The following sections outline the management works/actions recommended for each of the various nodes based on the above plans. The management nodes have been divided into sectors to better differentiate recommended ground treatments (see Figure 5). The works focus on the existing reserve and include revegetation treatments, dune rehabilitation, access paths, fencing, signage, stormwater management, recreational needs and provision of basic amenities. Further information on suitable vegetation for the beaches is contained in Appendix 2.

This section does not detail any of the major capital works such as building refurbishment, relocation of car parks and dual use path construction. These major works require further investigation and integration with the more detailed planning required for the Leighton Marshalling Yards development. These works will require funding from Council or other sources.

Implementation of the plan is dealt with in section 4. Appendix 1 summarises all the actions and recommendations contained in this section, in the form of a 5 year plan to help Council identify and prioritise actions.

### 3.1 Sandtracks

The Sandtracks node extends from Rudderham Drive to the southern boundary of the Port Beach car park and is divided into two sectors.



**SANDTRACKS NODE**

- Informal recreation area with dunes, indigenous planting and fenced access paths.
- Remove steps and rock wall armouring.
- Proposed overflow parking.
- Any new work to be done after Port Beach Road realignment has been determined.

**PORT BEACH NODE**

- Continue as a focus for beach activity.
- Picnic area with low maintenance lawn and shade trees between CafØ and change rooms.
- Improve beach views and visual links with Tydemann and Port Beach Roads.
- Increase dune area over time and revegetate.
- Realign and fence access paths.
- Improve and rationalise parking areas, provide shade planting and limit access points. Provide CafØ delivery area.
- Improve drainage and provide drainage swale beneath wide boardwalk connecting recreation and beach access paths.
- Provide shade canopy between change rooms and surf club annexe.
- In the medium to long term, remove and resite toilet block outside risk zones.

**SOUTH LEIGHTON NODE**

- Extend dunes to the east and revegetate.
- Remove hardstand areas and restrict parking to adjacent to road.
- Proposed sailboard rigging area.
- Potential for raised viewing platforms or boardwalk to protect vegetation.

**SURF LIFE SAVING CLUB NODE**

- Continue as a focus area for beach activity.
- Extend dunes, revegetate and maintain protective fencing.
- Maintain volleyball courts for surf club use.
- Provide separate kiosk delivery and surf club parking areas.
- Provide shade canopy and grassed area between surf club and kiosk.
- Review car parking layout, provide shade trees

**NORTH LEIGHTON NODE**

- Examine requirements for sailboarding and determine most appropriate location for rigging area.
- Continue to rehabilitate and vegetate dunes and maintain protective fencing.
- Provide showers and drinking water as water becomes available.
- Review and maintain small car parks to improve safety and minimise maintenance.

**EXISTING LEGEND**

- CLM AND CURB WATER MARK
- SPOT HEIGHT
- CONTOUR
- TM CONTOUR
- LINE USE FROM COASTAL RECRETION LINE
- LISE INLAND FROM USE COASTAL RECRETION LINE
- LISE INLAND FROM USE CONCRETE VEGETATION LINE
- CARPARKING

**PROPOSED LEGEND**

- ROAD AND MEDIAN STRIP
- DUAL USE PATH
- BEACH ACCESS PATH
- FENCE
- SHOWER
- WALL AND STEPS
- BUILDINGS
- TREES
- CONTOUR
- RECONSTRUCTED DUNE
- BUILDING
- CARPARKING
- ENTRANCE/EXIT TO CAR PARKING AREAS
- DUAL USE PATH
- BEACH ACCESS PATH REROUTED
- FENCE
- SHOWER
- BOARDWALK
- INDIGENOUS PLANTING
- IRRIGATED GRASS
- DRAINAGE SWALE WITH INDIGENOUS SPECIES



- MRS ROAD RESERVE (Port Beach Beach)
- FFA Freehold Land

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 SCALE 1:2000 DATE: 15/10/2011

**PORT AND LEIGHTON BEACHES CONCEPT PLAN**  
 RUDDERHAM DRIVE TO VLAMINGH PARADE  
 CITY OF FREMANTLE

**Note:**  
 Based on consultant's drawing dated July 2000.  
 Contact City of Fremantle Strategic Planning and Corporate Development officers on 9432 9877 to view copies of the original drawings.

**DESIGN CONCEPT**                                  **FIGURE 2**



Car Park    Surf Lifesaving Club Annex    Shade Canopy area    New Toilet Block    Grassed Recreation Area    Port Tea Rooms    Car Park    Port Tea Rooms    CAR PARK



SECTION ONE PORT BEACH TEA ROOMS NODE

Sandtracks Beach    Beach Pioneer Vegetation    Reinstated Dune With Dune Heath And Thicket Revegetation    Multi Use Path or Dual Use Path    Drainage Swale    Parallel Overflow Parking    Port Beach Road    Median    Port Beach Road



SECTION TWO SANDTRACKS NODE

Port Beach    Beach Pioneer Vegetation    Reinstated Dune With Dune Heath And Thicket Revegetation    Grass Sailboard Rigging Area    Boardwalk    Car Park    Island    Port Beach Road    Median    Port Beach Road



SECTION THREE SURF LIFESAVING CLUB NODE



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**PORT AND LEIGHTON BEACHES CONCEPT PLAN**  
 RUDDERHAM DRIVE TO VLAMINGH PARADE    CITY OF FREMANTLE

**Note:**  
 Based on consultant's drawing dated July 2000.  
 Contact City of Fremantle Strategic Planning and  
 Corporate Development officers on 9432 9877 to  
 view copies of the original drawings.

**DESIGN CONCEPT    FIGURE 3**

**SANDTRACKS NODE**

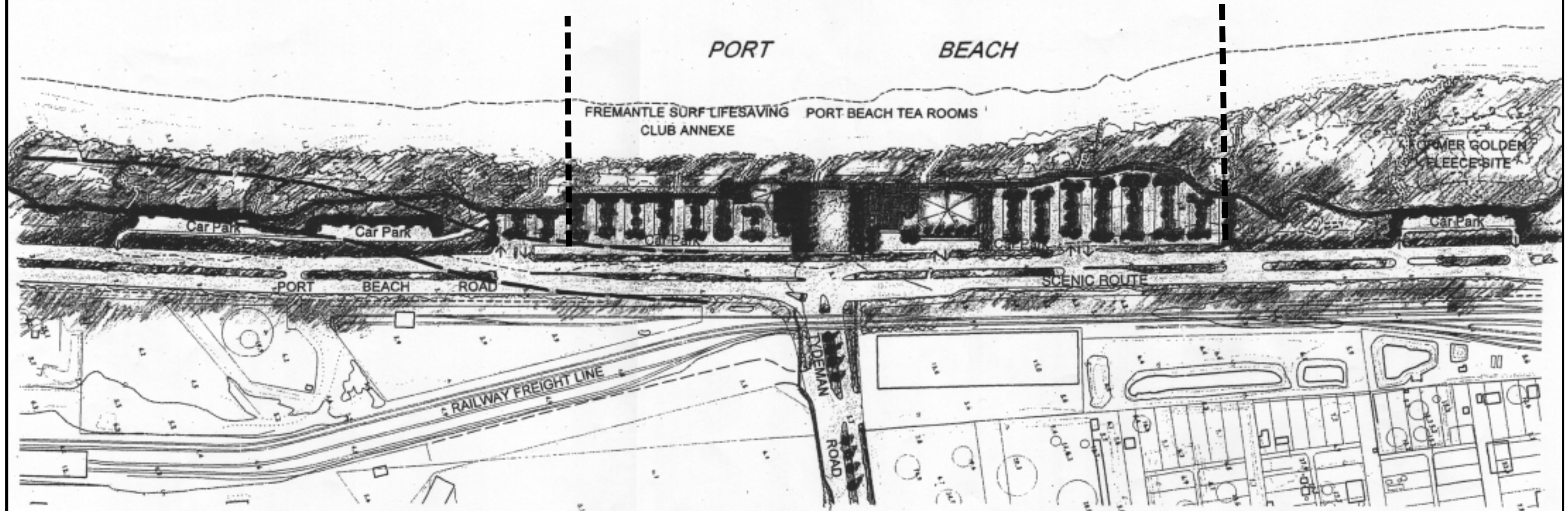
The carparks previously shown near Rudderham Drive are removed and located further north. Entrance to the two informal nodal carparks is through the existing Port Beach carpark entry. A one way track provides entry to the informal (limestone) nodal carparks and minimises conflict with heavy vehicles.

**PORT BEACH NODE**

Reclaim western 10 metres of the carpark for dunes and the boardwalk. No parking is lost as this area is presently "no standing". The dunes are further expanded in the southern portion of the carpark to provide a greater buffer against erosion also enabling the carpark run-off to be managed. Some parking bays will be lost.

**SOUTH LEIGHTON NODE**

An informal nodal carpark set back from the beach to allow maximum dune development while increasing parking capacity for the coastal reserve.



**PORT AND LEIGHTON BEACHES  
CONCEPT PLAN - ALTERNATIVE OPTION**

PORT BEACH AREA

CITY OF FREMANTLE

**EXISTING LEGEND**

- [Symbol] LOW AND HIGH WATER MARK
- [Symbol] SPOT HEIGHT
- [Symbol] CONTOUR
- [Symbol] 1M CONTOUR
- [Symbol] LIMIT OF 100M COASTAL VEGETATION
- [Symbol] LIMIT OF 500M COASTAL VEGETATION
- [Symbol] LIMIT OF 1000M COASTAL VEGETATION
- [Symbol] CARPARKING

- [Symbol] ROAD AND MEDIAN STRIP
- [Symbol] DUAL USE PATH
- [Symbol] BEACH ACCESS PATH
- [Symbol] FENCE
- [Symbol] SHOWER
- [Symbol] WALL AND STEPS
- [Symbol] BUILDINGS
- [Symbol] TREES

**PROPOSED LEGEND**

- [Symbol] CONTOUR
- [Symbol] RECONSTRUCTED DUNE
- [Symbol] BUILDING
- [Symbol] CARPARKING
- [Symbol] ENTRANCE/EXIT TO CAR PARKING AREAS
- [Symbol] DUAL USE PATH
- [Symbol] BEACH ACCESS PATH
- [Symbol] REQUIRED

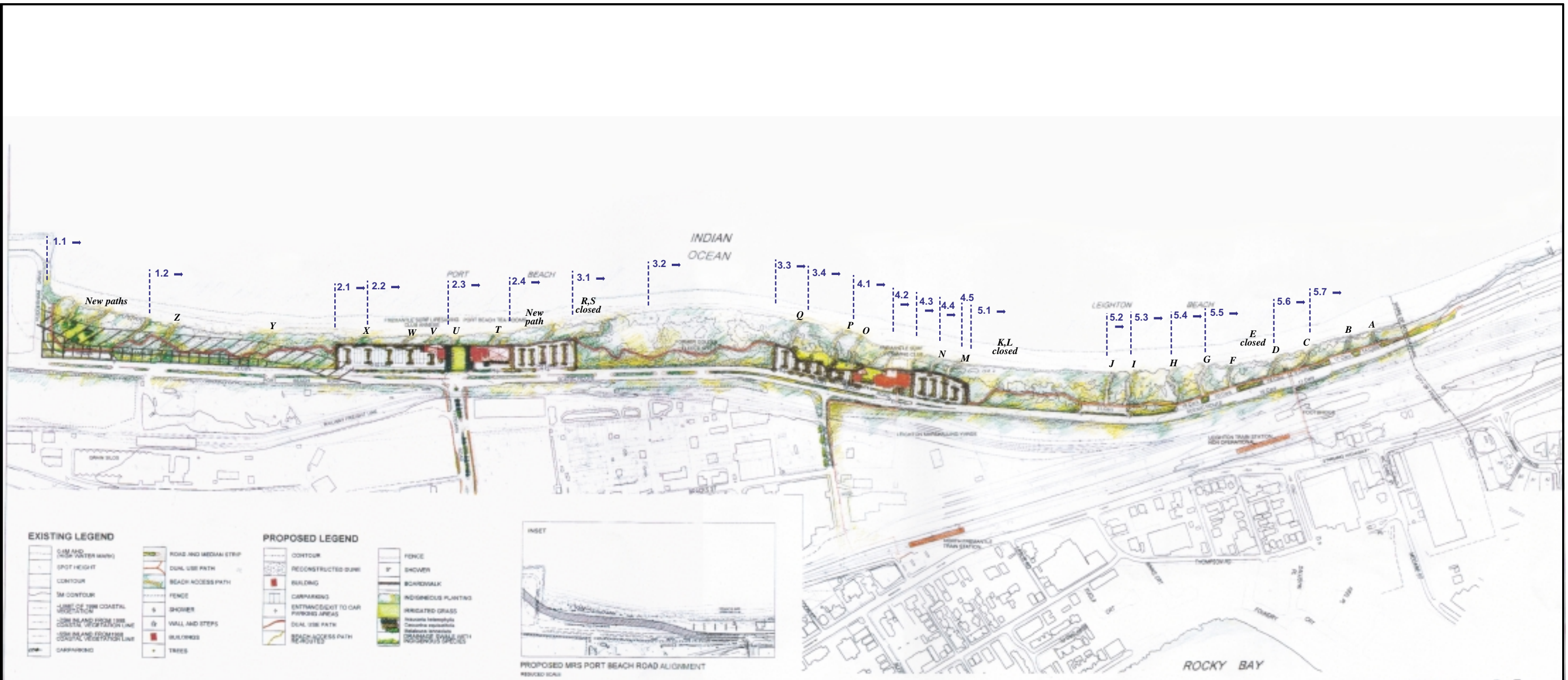
- [Symbol] MRS PORT BEACH ROAD ALIGNMENT
- [Symbol] FENCE
- [Symbol] SHOWER
- [Symbol] BOARDWALK
- [Symbol] INDIGENOUS PLANTING
- [Symbol] PAVED GRASS
- [Symbol] TREES
- [Symbol] COVERAGE FRAME WITH ROUGHENED SURFACE

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 SCALE 1:2000 DATE: JULY 2000

**Note:**  
 Based on consultant's drawing dated July 2000.  
 Contact City of Fremantle Strategic Planning and  
 Corporate Development officers on 9432 9877 to  
 view copies of the original drawings.

**FIGURE 4**





EXISTING LEGEND		PROPOSED LEGEND	
[Symbol]	CLIM AND OVER WATER MARK	[Symbol]	ROAD AND MEDIAN STRIP
[Symbol]	SPOT HEIGHT	[Symbol]	DUAL USE PATH
[Symbol]	CONTOUR	[Symbol]	BEACH ACCESS PATH
[Symbol]	5M CONTOUR	[Symbol]	FENCE
[Symbol]	LINE OF NEW COASTAL PROTECTION LINE	[Symbol]	SHOWER
[Symbol]	LINE INLAND FROM LINE OF NEW COASTAL PROTECTION LINE	[Symbol]	WALL AND STEPS
[Symbol]	LINE INLAND FROM LINE OF EXISTING COASTAL PROTECTION LINE	[Symbol]	BUILDINGS
[Symbol]	CARPARKING	[Symbol]	TREES
[Symbol]		[Symbol]	CONTOUR
[Symbol]		[Symbol]	RECONSTRUCTED DUNE
[Symbol]		[Symbol]	BUILDING
[Symbol]		[Symbol]	CARPARKING
[Symbol]		[Symbol]	ENTRANCE TO CAR PARKING AREAS
[Symbol]		[Symbol]	DUAL USE PATH
[Symbol]		[Symbol]	BEACH ACCESS PATH REROUTED
[Symbol]		[Symbol]	FENCE
[Symbol]		[Symbol]	SHOWER
[Symbol]		[Symbol]	BOARDWALK
[Symbol]		[Symbol]	INDIGENOUS PLANTING
[Symbol]		[Symbol]	IRRIGATED GRASS
[Symbol]		[Symbol]	Indigenous Intermittent
[Symbol]		[Symbol]	Coastline vegetation
[Symbol]		[Symbol]	Shrubland vegetation
[Symbol]		[Symbol]	GRASSLAND SABLE WITH INDIGENOUS SPECIES



# PORT AND LEIGHTON BEACHES CONCEPT PLAN

RUDDERHAM DRIVE TO VLAMINGH PARADE  
CITY OF FREMANTLE

**Note:**  
Based on consultant's drawing dated July 2000.  
Contact City of Fremantle Strategic Planning and Corporate Development officers on 9432 9877 to view copies of the original drawings.

- [Symbol] MRS Road Reserve (Port Beach Beach)
- [Symbol] FFA Freehold Land
- [Symbol] Management sector identification
- [Symbol] Beach access path identification

**ECOSCAPE**  
ECOSCAPE (AUSTRALIA) PTY LTD ACN 070 128 875  
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SCALE 1:2000 DATE: 15/10/09

**FIGURE 5**

### 3.1.1 Constraints

- Existing coastal reserve is too narrow.
- Part of the land west of Port Beach Road is owned freehold by the Fremantle Port Authority.
- Includes a known contaminated site. The site is presently being remediated to a standard suitable for parks and recreation.
- Uncertainty created by the proposed re-alignment of Port Beach Road to the west of its current location.
- Narrow or no dune system.
- Seawall contributes to the loss of the beach during the winter months and is detrimental to the establishment of a natural dune system. A rising sewer main is located behind the seawall.
- Influence of Rous Head, reclaimed land area on beach stability.
- No permanent carpark is available, currently temporary.
- Limited access to the beach.
- Wave action is causing the seawall to settle, resulting in movement of the rocks (unstable) and potentially dangerous voids to be created.
- The infrastructure of the FPA stormwater outlet present on the beach. The Fremantle Port Authority have blocked the outlet and waters enter a detention basin on their land, east of Port Beach Road.
- The brick/concrete steps are being undercut by wave action and are unstable – should be removed.

### 3.1.2 Opportunities/Actions

- The aim in this location is to provide an accessible and safe beach during summer and winter months to take advantage of the surf break and protection from the sea breeze. The emphasis will be on creating a stable, wider dune system, planted with indigenous trees and shrubs, that provide a natural setting for informal recreation activities.
- Increase coastal reserve to the 100 metre guideline width as stipulated by WAPC Policies DC2.3 and DC6.1.
- Request the Ministry for Planning to undertake a study of the coastal zone south of Walter Place to Rudderham Drive to determine an adequate reserve width.
- Subject to relocation of the sewer main, remove the seawall.
- Rebuild dune system and revegetate with appropriate dune vegetation for the location (see appendix 2).
- Replace fencing.
- Potential to create some lawn and shade areas.
- Improve access to the beach (through formalised access paths).
- Create viewing area of the beach and waters.
- Provide permanent parking consistent with 65 m set-back distances.
- Infrastructure of the stormwater outlet to be removed

See figures 2, 3, 4 and 5.

### Sector 1.1

This sector comprises a small area of dunes that appear to have stabilised over the last two years and are approximately 50 metres wide at the Rudderham Drive end. The dunes narrow towards the north to about 10

metres wide at the northern extremity of the sector. Stabilising cover is dominated by *Trachyandra divaricata* (onion weed), *Tetragonia decumbens* (sea spinach) and *Oenothera drummondii* (evening primrose).

It is proposed to expand these dunes east towards Port Beach Road, to increase the width of the dune system, which would be still well short of the WAPC 100 metre guideline width. It is noted that Port Beach Road is proposed for realignment westwards. Any work on the dunes in this area should consider the proposed realignment of the road.

The vegetation cover of these dunes is degraded and includes a high proportion of weeds and a few shrubs. There is evidence of pedestrian traffic from the beach into the dunes in this area.

It is recommended:

- brushing placed to afford temporary protection over 50% of the surface which is exposed ground
- planting of *Spinifex hirsutus* into more extensive bare patches, together with Category 2 species to establish a shrub community
- the frontal face of the dune leading down to the beach is substantially bare and requires about 80% brushing followed by planting of Category 1 grasses and groundcovers
- control pedestrian access through establishing a fence at the back of the beach on the lower frontal face. For the purpose, pine posts supporting three PVC-coated wires is recommended

### Sector 1.2

There is rock armouring throughout this sector to prevent coastal recession that has already removed what dunes may have existed. Minor works are proposed in conjunction with the remediation of the hydrocarbon impacted soil at this location. The management plan recognises the proposed Port Beach Road realignment, but based on sound coastal management principles, the realignment of the road closer to the beach is considered unacceptable.

Current studies by MP Rogers into options for managing the erosion in this area will directly influence any future works in this location. In conjunction with the Port Beach node recommendations, the following actions should be taken:

- One or two informal nodal carparks should be constructed adjacent to Port Beach Road to replace bays proposed to be removed at the Port Beach Node
- Re-establish dune and vegetation in front nodal carparks

### **3.2 Port Beach Node**

Port Beach is one of two activity and service nodes in the study area and is characterised by the Surf Club Cafe, Surf Life Saving Club annexe, change rooms, large bituminised carpark and a narrow dune system. Enhancement of the existing built facilities and the natural environment, subject to the principles outlined in section 2, are objectives for this area. It should be noted all existing facilities in this location are between the 25 metre and 65 metre risk zones. For future management, it is divided into four sectors. See figures 2, 3, 4, and 5.

There is no evident problem of pedestrians moving into the dunes from the beach along the length of this node and the access paths are well used. Accordingly, fencing at the back of the beach, on the western side of the frontal dune, is not recommended at present. The situation should be monitored. If tracks into the dunes become a problem in the future, installation of a beach fence may be necessary. In that event, because the dunes appear to be subject to regular winter erosion, a movable tripod fence similar to that used at Cottesloe may be appropriate, lifting it back onto the dune face in winter and reinstating it on the beach in summer.

While the frontal face along the length of this node is bare sand, brushing and planting of the face is not proposed while there is a continuing problem of winter erosion. In the event this problem is remedied (ie. through engineering measures) revegetation of the frontal face might then be considered.

### 3.2.1 Constraints

- Existing coastal reserve is too narrow and the dune system is subject to severe erosion during winter.
- Sections of the formal car park are within 25m of the vegetation line. Car park and Port Beach runoff, causes failure of the western extremity of the car park each winter.
- Buildings and the remainder of the formal carpark are located within the 25 and 65 m setback zone.
- No public area areas are protected from the elements i.e. there is no shade.
- Car park is poorly set-out.
- Toilets are in poor condition.
- Poor pedestrian and cycle access from and along Port Beach Road and Tydeman Road.
- Dune vegetation is in a degraded state.
- Regular maintenance is required to remove sand from car park.
- Existing grassed area is poorly designed and maintained.
- Conflict between vehicles, cyclists and pedestrians.
- Facilities are serviced by septic tanks.

### 3.2.2 Opportunities/Actions

- Increase coastal reserve to the 100 metre guideline width, as identified by WAPC Policy DC2.3 and DC6.1 to cater for recreational needs and coastal erosion.
- Request the Ministry for Planning to undertake a study of the coastal zone south of Walter Place to Rudderham Drive to determine an adequate reserve width.
- Improve the built environment and surroundings of this node. A lawn area (with shade trees) between the café and change rooms is recommended to reduce the maintenance of the existing area, provide a passive seating area and improve the vista along Tydeman Road.
- Relocate and improve shower and change room facilities.
- Rebuild and revegetate dune system.
- Landscape and provide more shade in the car park areas.
- Improve and redesign car parks, including reduction of conflicts between pedestrians/cyclists and vehicles entering the carpark
- Replace fencing.
- Improve pedestrian and cycle access from Tydeman Road and links to Sandtracks .

### Sector 2.1

The dune within this sector is receding and has been reduced to a width of little more than 5 metres and totally removed in a small section at the southern end. The dune supports patchy cover dominated by *Tetragonia* and *Olearia axillaris* (smoke bush), but with a large barren section in the centre, immediately north of path X.

The short term management option for the eroded dune is to replenish the sand on an ongoing basis. In the short to medium term the aim will be to increase the dune width through reclaiming portions of the carpark. Additional parking may be created through one or two small nodal carparks in the Sandtracks node, set back

against Port Beach Road. This would effectively provide a greater setback distance in the Port Beach node, provide improved parking and a more natural dunal environment (see Figure 4).

It is recommended:

- the dune is extended eastwards through reclaiming a portion of the carpark behind. Nodal carparks would be created in the Sandtracks node to provide access to this popular beach and assist in alleviating any parking issues.
- Path X is realigned to incorporate a dogleg when the dunes are enlarged, to reduce the problem of sand blowing into the carpark.

### Sector 2.2

The narrow dune of this sector is also receding but, unlike that in Sector 2.1, supports a healthy cover dominated by *Thinopyrum distichum* (sea wheat) and *Tetragonia*, with *Spinifex longifolius* (sand spinifex) and in places, *Oenothera* and *Spinifex hirsutus* (sand spinifex) also prominent.

The dune vegetation is sufficient, but it is recommended:

- a shrub storey is established in the swale behind the dune to add to limited numbers of *Olearia* already present. For the purpose, Category 2 and 3 shrubs might be introduced;
- the planting of a row of *Casuarina equisetifolia* (horsetail oak) along the swale, for aesthetic benefit and for the shade and shelter they might afford;
- the pine post and ringlock fence between the dune and the swale be removed, as there does not appear to be any problem of people trafficking across the dune. The fence is unsightly and the concrete wall at the edge of the carpark provides an obstruction to movement into the dunes.
- realignment of Paths V and W to a north-east axis at their eastern end, incorporating a dog-leg, that reduces the propensity for sand to blow up them onto the carpark.
- repair the fence on path W.

### Sector 2.3

While the dunes in this sector again support reasonable cover, it is patchier than that in Sector 2.2. *Tetragonia*, *Thinopyrum* and *Trachyandra* are dominant, with *Spinifex longifolius* and *Pelargonium capitatum* (geranium) also notable in places.

It is recommended:

- the dunes would benefit by spreading brush over about 20% of their surface where there is bare ground, planting Category 1 and 2 species beneath this brush.
- the swale behind is bare and total brushing should be undertaken, combined with planting of Category 1, 2 and 3 species;
- planting of casuarinas might again be considered in the swale, if the modest impact these will have on views from the Surf Club Cafe is not unacceptable. In this respect, discrete planting might enhance rather than detract from the ocean view.
- realign Paths T and U in similar manner to the proposals for V and W above, with concurrent repairs to the fence on path U.

- discharge from a stormwater outlet at the head of path U might be directed into a sump created in the swale when the path is realigned; and
- the eastern fence line here as in Sector 2.2 is not warranted and should be removed.

### Sector 2.4

The dune here supports a healthy cover, with *Tetragonia* and the two spinifex species dominant, while *Oenothera*, *Trachyandra* and *Ammophila arenaria* (marram grass) are also prominent. The dune requires no revegetation, but it is recommended:

- the planting of a row of casuarinas on the 2 metres of sand surface at the back of the dune, unless plans to extend the dune eastwards are likely to be implemented in the short term. In that event, there would be little merit in planting the casuarinas now. Rather, when the expansion of the dune occurs, the casuarinas would be planted along the eastern toe of the extension.
- removal of the fence at the back of the dune, as it is unsightly and dilapidated. Traffic across the dune is not expected to be a problem.
- realigned Path R in the manner proposed for the paths in the preceding sectors to reduce the problem of sand blowing up it into the carpark; and
- repair the western end of the fence on this path.

### **3.3 South Leighton Node**

South Leighton node extends from Port Beach carpark to Path P. It is divided into four sectors. See figures 2, 3, 4 and 5.

The emphasis in this area is to return the node to a natural state, through removing the remaining industrial infrastructure, encouraging dune extension and revegetation. Recreation needs in the area are proposed to be met through informal low key parking, adjacent to Port Beach Road, limited east-west paths and a new north – south access path. Further assessment is required of a proposal to provide a lawn area that could be used for passive recreation (e.g. picnics) and as a sailboard rigging area.

Currently, there does not appear to be significant pedestrian movement off the beach into the dunes through the length of this node. Accordingly, installation of a fence at the back of the beach is not proposed at present. The situation should be monitored so that, if movement into the dunes become a problem in the future, installation of a beach fence is reconsidered at that time.

The exception to this is Sector 3.1 where fence posts are already in place. Stringing three PVC-coated wires through these posts is a simple measure that will make the fence functional.

#### **3.3.1 Constraints**

- Existing coastal reserve is too narrow.
- Part of the area is a remediated contaminated site, currently being monitored.
- Dune vegetation is poor.
- Poor cycle/pedestrian access along Port Beach Road
- The area is aesthetically degraded, with remnants of former industrial use left on site, including hardstand areas and broken fencing.

### 3.3.2 Opportunities/Actions

- Increase coastal reserve to the 100 metre guideline width as identified by WAPC Policies DC2.3 and DC6.1 to cater for recreational needs and coastal erosion.
- Request the Ministry for Planning to undertake a study of the coastal zone south of Walter Place to Rudderham Drive to determine an adequate reserve width.
- Rehabilitation of the old industrial sites to a natural dune setting by removing old fencing and other scrap materials.
- Potential to create a nature reserve that is a showcase dune system of Cat 1 species, such as *Spinifex spp* in the west through to densely vegetated swales of *Acacia spp* and other Category 3 species to the east.
- Potential for a new north-south multi-use path to wind through this node close to Port Beach Road to maximise the size of the nature reserve.
- Potential for additional nodal car parking at the north end of the node outside the 65 m risk zone.
- Potential for a sailboarding rig-up area if need and practicality can be demonstrated.
- Minimise the number of east-west links across the dunes and parking to enable a relatively low usage beach to be maintained and facilitate the creation of a nature reserve.

### Sector 3.1

The dunes in this sector are large and well vegetated under a cover dominated by *Spinifex hirsutus*, *Tetragonia* and *Trachyandra*, with *Thinopyrum*, *Ammophila* and *Spinifex longifolius* also prominent in places.

It is recommended:

- a shrub storey of Category 2 and 3 species is introduced, although it is not required to enhance dune stability
- moving north through this sector, the problem of frontal erosion evident throughout Port Beach node appears to moderate. Accordingly, brushing of the upper 2 to 3 metres of the frontal face and planting of Category 1 groundcovers and grasses beneath this brush might be considered
- realign Path Q1 in its eastern half to a north-eastern axis, providing a dogleg as proposed for previous paths, to check wind funnelling and sand movement

### Sector 3.2

This sector has similar healthy vegetative cover to Sector 3.1 and a similar treatment is recommended, establishing a shrub storey with introduction of Category 2/3 species on the eastern half of the dune.

The frontal face here appears stable and supports good vegetative cover, requiring no treatment.

### Sector 3.3

The cover in this sector, while reasonable, is not as vigorous as that in Sectors 3.1 and 3.2. *Trachyandra* dominates it, with the two spinifexes, *Tetragonia*, *Thinopyrum* and *Pelargonium* also widespread. There is a limited shrub storey of *Olearia* and *Scaevola crassifolia* (fan flower).

It is recommended:

- that approximately 30% brush cover is warranted over this sector
- planting of Category 1 grasses and groundcovers to improve surface cover
- planting of Category 2 and 3 shrubs to establish a shrub community

- bare areas, which account for about 70% of the frontal face in this sector, are to be brushed and planted with Category 1 species

### Sector 3.4

This sector supports a healthy cover dominated by *Tetragonia*, *Trachyandra* and *Oenothera*, with *Ammophila* and the two spinifexes also notable in places.

It is recommended:

- the limited shrub storey of *Scaevola* and *Olearia* be enhanced by planting Category 2/3 shrubs across the area generally
- complete the brushing of Path Q that has been closed and partially brushed and plant Category 1, 2 and 3 species beneath the brush
- brush and plant the frontal face of the dune that is about 70% bare (as with Sector 3.3) with Category 1 species

*Windsurfing WA has requested the establishment of a designated sailboarding set-up area at the rear of Sector 3.4, adjacent to Path P. It is proposed to have an irrigated lawn area close to the carpark. This designated area would replace three existing set-up areas in Sectors 5.4 and 5.6.*

### **3.4 Surf Life Saving Club Node**

Surf Life Saving Club node extends from Path P to Path L and is divided into five sectors. See figures 2, 3 and 5.

This area is a focus for beach activities, accommodating the Fremantle Surf Life Saving Club, change rooms, kiosk and major car parks. The area is intensively used in the summer months for informal and formal (surf carnivals) activities. The SLSC have advised it is one of the few metropolitan locations with sufficient parking for major events. The intent of the management plan in this location is to enhance the recreation experience whilst improving the natural setting and minimising maintenance requirements. No major works are planned in this location until the coastal reserve has been amended in the line with the Leighton Regional Planning guidelines.

New fencing was recently installed in this area (June 2001) due to the intensity of public use, coupled with evidence of people tracking into the dunes. A pine post fence with three PVC-coated wires was used rather than a movable tripod-type fence.

#### **3.4.1 Constraints**

- Existing coastal reserve is too narrow.
- Car parks are too close to the beach, within 65 m of the 1998 vegetation line.
- Surf Club within 25 and 65 metre erosion risk zones.
- Insufficient parking during peak times.
- Poor parking layout and landscape.
- Vegetation is degraded and the dunes unstable.
- Limited views of the beach and ocean from behind the dunes.
- High maintenance to remove sand from car parks etc



- Limited commercial facilities and the kiosk and change rooms are run-down
- Poor aesthetics and integration of built environment
- No public areas are protected from the elements
- Poor north/south linkages for pedestrians and cyclists
- Conflict between vehicles and beach users
- Facilities are serviced by septic tanks (nutrient loading)

### 3.4.2 Opportunities/Actions

- Increase coastal reserve as per the Leighton Regional Planning Guidelines (LRPG).
- Develop additional recreation facilities in this node, subject to more detailed needs assessment and when the LRPGs are implemented ie. lawn areas, new café/kiosk, volleyball, skateboarding, playgrounds, basketball and in-line skating. Additional recreation facilities should be placed east of the SLSC to create an east-west corridor to the railway station.
- In the medium to long term, existing facilities should be relocated outside of the 65 metre risk zone.
- Redesign of carpark to be located outside the 65 m setback zone and to allow for further recreational opportunities. Landscaping of the carpark and facilities area.
- Install small timber structures to assist in viewing of the beach.
- Improve/replace/redesign fencing in car parks.
- Improve the linkage from the beach to the railway station.

### Sector 4.1

This sector supports a reasonable cover dominated by *Trachyandra* and *Tetragonia*, with *Oenothera*, *Arctotis stoechadifolia* (Swanbourne daisy), *Ammophila* and the two spinifexes also prominent in places. There is also a developing shrub storey of *Olearia*.

It is recommended:

- bare ground which accounts for about 30% of the sector, should be brushed
- category 1 and 2 species planted
- towards the east of the dune, Category 3 species are planted, to improve existing cover and to establish a shrub community

There is good cover of the frontal face by spinifex and no work is required on it at present.

### Sector 4.2

The foredune to the SLSC was extended in July 2001 to protect the area from wind and wave action.

It is recommended:

- the volley ball court may be relocated behind this dune
- vehicle access to the beach, if required, can be provided at the northern end of the new dune. The track would emerge on a northwestern axis and curving around the end of the existing dune to emerge at the surf club on a north eastern axis
- a stormwater sump is provided within the swale behind the new dune, adjacent to the hard stand area in front of the surf club. This swale should also be brushed and planted to Category 1, 2 and 3 species, except for the area where the volley ball court is to be located

### Sector 4.3

This is a high dune supporting a good cover of *Tetragonia*, with *Trachyandra* and occasional *Spinifex hirsutus* and *Ammophila* also present, while *Cakile maritima* (sea rocket) is evident towards the frontal face.

It is recommended:

- the frontal face of the dune is bare and should be brushed and planted with Category 1 species
- the eastern portion of the dune and its rear face are partially bare and require 50% brush cover complemented by planting of Category 1 and 2 species
- the swale between the dune and the concrete wall should be similarly brushed and planted with Category 1, 2 and 3 species
- planting a row of casuarinas might also be considered in this swale for shade and aesthetic benefit. As the dune is high, these trees will not affect any ocean view
- remove the dilapidated ringlock fence at the back of the dune
- realign Path N to a north-east axis at its eastern end, to reduce the problem of wind funnelling up it to blow sand into the carpark behind

### Sector 4.4

This sector is similar to Sector 4.3, but with *Spinifex longifolius* dominant towards the west.

It is recommended:

- approximately 50% brushing is required, with planting of Category 1 and 2 species beneath the brush
- planting of Category 3 shrubs towards the east
- planting a row of casuarinas be considered at the eastern toe of the dune, and the fence here could be removed
- the frontal face should be entirely brushed and planted with Category 1 species

### Sector 4.5

The same species are found here as in Sector 4.4, although *Trachyandra* is also prominent. Cover is less than on the preceding sectors.

It is recommended:

- about 70% brushing is required combined with planting of Category 1 and 2 species
- planting Category 3 species towards the east
- complete the brushing and replanting of path L, which has been closed
- frontal face of the dune should be brushed and planted with Category 1 species
- planting a row of casuarinas along the eastern toe of the dune might be considered, and the fence here can be removed
- realign Path M at its eastern end to a north-east access and its fence should be repaired towards the western end
- repair and raise the fence around the lookout off this path, as it has been partially buried

## **3.5 North Leighton Node**

North Leighton node extends from Path L to the Fremantle City boundary. It is divided into seven sectors. See figures 2, 3 and 5.

This area has minimal formal facilities and the goal is to retain this node as a low key and informal recreation area, in an enhanced natural setting. The northern section adjoins the beach area managed by the Town of Mosman Park. The area is currently constrained by the narrow coastal reserve, with Port Beach Road falling within the 65 metre risk zone in the north.

Pedestrian traffic off the beach into the dunes appears to be a problem in certain parts of this node. Accordingly, fencing at the back of the beach is recommended for these sectors, but not for the remainder. Access to the beach through the dunes should be monitored and a fence installed, if required.

Fencing was replaced throughout this sector in July 2001.

Casuarinas might be planted along the dual use path through this node for shade, shelter and aesthetic benefit. These can be planted on both sides where possible, and on the western side only where the path abuts Port Beach Road or carparks.

### 3.5.1 Constraints

- Existing coastal reserve is too narrow.
- Port Beach Road is within the erosion risk zone.
- Poor species diversity in dune system, especially Category 2 and 3 species.
- Dune vegetation in a degraded condition.
- Wind erosion (dune blow-outs) on sections of the dunes and along paths to the beach.
- Some conflict between users on dual use path.
- Port Beach Road, the existing dual-use path and parking areas are all very close to each other creating conflict between users.
- Limited car parking.
- Fencing and paths in poor/degraded condition.
- Pedestrian overpass delivers people to the east side of Port Beach Road, resulting in dangerous access to the beach.

### 3.5.2 Opportunities/Actions

- Increase coastal reserve as per the Leighton Regional Planning Guidelines.
- Close informal beach access pathways and rehabilitate.
- Revegetate dune system from west to east with Category 1 species through to Category 3 species respectively.
- Replace broken fencing and re-establish required beach access paths.
- Retain informal nodal car parking and link this to any neighbouring developments.
- Improve/replace/redesign fencing in car parks.
- Potential for additional informal nodal car parking at least 65 m from the 1998 vegetation line.
- Improve cycling and pedestrian facilities, and separation between pathways and roads.
- Review provision of rigging area for sailboarders.

## PORT AND LEIGHTON BEACHES

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- Relocate Port Beach Road outside the 65 metre risk zone and to enable users of the overpass to arrive directly onto the coastal reserve.

### Sector 5.1

The dunes of this sector support a healthy and adequate cover, dominated by *Tetragonia* and *Trachyandra*, with *Spinifex hirsutus*, *Thinopyrum*, *Oenothera* and *Ammophila* also prominent, and scattered *Olearia*.

The frontal face of the dune through this sector supports a good cover of *Spinifex hirsutus*, with *Thinopyrum* also evident in one area. Otherwise, the cover on the frontal face is generally in good condition.

It is recommended:

- patch brushing is warranted over about 30% of the western half of this sector, with planting of Category 1 and 2 species beneath it
- general planting of Category 2 and 3 shrubs in the eastern half, to establish a shrub community
- Path K is no longer in use and should be closed, brushed and planted
- brushing and replanting of frontal face of the dune should occur over the northern-most 20 metres, where vegetation has been destroyed by the entry to Path J
- fencing at the western toe of the frontal face using pine posts supporting three PVC-coated wires. Fence required, as there is some evidence of people walking into the dunes

### Sector 5.2

The species mix here is similar to that in Sector 5.1, but the cover is thinner and in poorer condition.

Cover of *Spinifex hirsutus* is good over the dune frontal face and there is little evidence of people moving off the beach into the dunes, so a fence on the western face of the dune is not warranted.

It is recommended:

- 50% brush cover is required across the area
- planting of Category 1 and 2 species
- planting Category 3 species towards the east
- realign Path J at the southern edge of this sector to provide a dog-leg to reduce the sand blow that presently occurs along it
- reinstate portion of fence along Path J

### Sector 5.3

There is reasonable cover of vegetation in this sector, although it is dominated by the weed *Trachyandra*, with *Oenothera* also prominent in the east. *Tetragonia* and *Spinifex hirsutus* are prominent in the west. Patches of *Calocephalus brownii* (cushion bush), *Ammophila* and *Scaevola* are also to be found.

Cover of *Spinifex hirsutus* is good over the frontal face and there is little evidence of people moving off the beach into the dunes, so a fence on the western face of the dune is not warranted.

It is recommended:

- 50% brush cover is required, largely in the west
- plant Category 1 and 2 species beneath the brush
- add Category 3 species eastwards to improve surface cover and to establish a shrub community
- lift or increase height of fences on Paths G and H where they are partially buried

### Sector 5.4

This sector has similar cover to Sector 5.3, although *Ammophila* is more prominent in the west.

It is recommended:

- 50% brush cover is required, predominantly in the west
- plant Category 1 and 2 species beneath the brush
- add Category 3 species in eastern part of dune
- add 50% brush cover on frontal dune face over bare areas and plant Category 1 species
- fence the western toe of the frontal face using pine posts supporting three PVC coated wires, as there is some evidence of people walking into the dunes
- lift or increase the height of the fences on Path F where they are partially buried
- if a new and improved sailboarding set-up site is established at Sector 3.4, close the set-up area for windsurfers located near this path

### Sector 5.5

Cover is much the same as in the preceding sector, with *Trachyandra* dominant towards the east and *Tetragonia* and spinifex dominant westwards. Overall cover is a little thinner, and about 60% brushing is required.

It is recommended:

- 60% brushing is concentrated in the western two-thirds of the dunes
- Category 1 and 2 species planted beneath the brush
- plant Category 3 species in eastern part of the dune
- close Path E and brush and plant
- bare areas on frontal face of dune require 50% brush cover and plant with Category 1 species
- extend the fence at the back of the beach into this sector

### Sector 5.6

*Tetragonia* and *Thinopyrum*, the two spinifexes, dominate the dune vegetation cover and *Trachyandra* is also prominent. There is a small clump of *Acacia cyclops* (red eyed wattle) in a swale. The frontal dune face has reasonable cover of *Spinifex hirsutus* with some brushing required.

Paths C and D require realignment to reduce the propensity for wind to blow up them and deposit sand on the carparks behind.

It is recommended:

- 50% brush is applied over this area, predominantly in the west
- plant Category 1 and 2 species beneath the brush
- plant Category 2 and 3 species in the eastern part of the dune
- 30% brush cover on the frontal dune face, complemented by planting of Category 1 species
- extend the fence at the back of the beach into this sector

## PORT AND LEIGHTON BEACHES

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- realign Paths C and D at their eastern end to provide a dog-leg in each
- reinstatement portions of the fences along paths C and D
- if a new and improved sailboarding set-up site is established at Sector 3.4, close the sailboard set-up areas at the eastern end of these two paths

### Sector 5.7

The southern half of this sector is dominated by *Ehrharta villosa* (pyp grass), with *Tetragonia* of secondary dominance beneath it, and a large clump of *Scaevola* also present. In the northern half, *Tetragonia* is dominant, with *Trachyandra* scattered through it, and pockets of *Spinifex hirsutus*.

No planting is proposed here in light of the thick existing cover, and the degree of exposure that will inhibit development of a shrub community.

It is recommended:

- 60% brush cover overall, on the frontal dune face. The north of the dune is substantially exposed and moderately exposed in the south;
- plant Category 1 species to improve its cover; and
- install a fence on the lower frontal dune face, as there is evidence of pedestrian traffic into the dunes.

### 4.0 IMPLEMENTATION STRATEGY

#### 4.1 COMMUNITY GROUPS AND OTHER ORGANISATIONS

An important component of the success of the management plan will be the ongoing community input into the planning and implementation of the on the ground works. It is envisaged that a Port and Leighton Coastcare or 'Friends' group will be formed to assist in management of the coastal reserve. Council would support the group through administrative assistance and facilitation by Council staff, as well as joint funding applications and possible financial assistance to implement projects. The group should be made up of community members, Council staff and other interested organisations (i.e. Greening Australia, Coastcare).

The City of Fremantle will continue to work with industry adjacent to the site to improve its condition and stability. For example, liaising with Caltex Australia Pty Ltd over the remediation and rehabilitation of the old bulk fuel storage areas located at Port and Beach and providing input into the Fremantle Port Authority's plans in the area.

#### 4.2 FUNDING ONGOING WORKS

In general, Council funds most of its activities and works through the following sources, or combination, of sources:

- municipal funds – combination of rates and revenue;
- revenue is earned from fees and charges, the main source being car parking plus return on investments – primarily from our property portfolio; and
- grants from state or federal government agencies.

The future expenditure required at Port and Leighton Beaches, can be divided into maintenance and capital items.

##### **Maintenance**

Since assuming responsibility for the coastal reserve from the Fremantle Port Authority in 1995, maintenance works at Port and Leighton beaches have been undertaken on contract. This may change in the future as works become core duties of the Council's City Works department (i.e. works would be done 'in house').

Maintenance of Port and Leighton Beaches currently costs in the order of \$125,000 per annum. This money funds such activities as rubbish removal, toilet cleaning, beach cleaning, dual use path and car park sweeping, verge maintenance and storm damage repair.

##### **Capital Expenditure**

Council puts together a budget for each financial year comprised of recurrent or ongoing expenditures and new projects. The budget process includes assessment of competing new project bids which come from the different business units of Council and the elected members. Assessment of projects includes consistency with the City Plan (Council's overall strategic plan) or as agreed in a management plan (or policy). Preparation of this management plan will provide clearer direction to Council on the needs and priorities in this location.

##### **Other Sources of Funds**

## PORT AND LEIGHTON BEACHES

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For authorities such as Fremantle, the costs associated with maintaining a regional asset such as Port and Leighton beaches, is borne by local ratepayers. No mechanism exists by which non ratepaying users of the beach contribute towards either maintenance or upgrading of facilities. Council will continue to raise this issue with the state government and seek assistance for this. In other locations local authorities have suggested moving to a 'user pays' system, by introducing parking charges. Council is not considering this as an option.

The following additional possible sources of assistance have been identified for Port and Leighton beaches:

**Trust Account** - With the handover of the beaches in 1995, from the Fremantle Port Authority, \$250,000 was provided to Council to upgrade facilities \$123,000 remains. Expenditure of the remaining funds has not been determined.

**Grants** – Council, with the Leighton Action Coalition, were successful in winning a Coastcare Grant in 2001. In the future, Council will continue to apply for grants from the state and federal governments. Possible sources include Coastcare, Sport and Recreation???. Natural Heritage???

**Other Government Agencies** – Both the Fremantle Port Authority and Main Roads WA have assets in the coastal reserve, impacting on management and maintenance of the reserve. No formal structures for sharing maintenance currently exists. This needs to be examined in the future and an equitable system for sharing maintenance costs developed.

**Sponsorships** – This could include donations of money or materials from local or regional companies or individuals to undertake works in the coastal reserve. This could include trees, shrubs, bbqs and furniture items. Council will not support advertising or billboards in the reserve, however, small and discrete plaques identifying the source of the donation could be considered.

**Community Pledges** – The Fremantle and regional community have already demonstrated a strong interest and willingness to participate in activities such as planting days. Use of community labour and expertise could reduce the cost of undertaking works in the future and should be considered.

**Adopt a Dune/School Education** – Local schools, universities or other education facilities should be invited to participate in projects at the beaches, or undertake their own research projects. In some areas, programs such as 'adopt a dune' by school students are underway. Supervision would be required from FCC, however, the benefit is broader education of the community into coastal management issues and assistance with labour intensive tasks such as dune planting.

**Joint Ventures with Developers** – In some locations, facilities such as restaurants have been developed in reserves to meet a demand for refreshments, combined with public amenities such as toilets, showers and drinking fountains. In return, a lease is provided to the operator and at the end of the agreed period the asset would fall to Council.

**Allocation of Funds from Existing or Proposed Development** – In order to create a direct link between development (existing and proposed) and beach funds, Council could decide to allocate any rents or revenues earned from the beach reserve to maintenance and/or capital improvement budgets for the reserve.



### 4.3 IMPLEMENTATION STRATEGY

As section 3 notes, this plan focuses on actions within the existing coastal reserve. Lack of resolution of the plans for the adjoining Leighton Marshalling Yards constrains the extent of detailed planning that can be included in this management plan, especially around the Surf Life Saving Club node. Similarly, lack of resolution of the proposed relocation of Port Beach Road south of Tydemans Road, means no major works or expenditure can be undertaken in this location.

All actions outlined in this report have been tabulated in Appendix One, as a Five Year plan for the reserve. This table will form the basis for Council's ongoing maintenance within the reserve. It will be used to identify day to day and ongoing maintenance work plus, new capital projects for which more detailed work and separate funding will need to be obtained (through Council and/or grants and/or other sources).

### 5.0 FIELD SPECIFICATIONS

#### INTRODUCTION

This section provides detailed specifications on facilities that will be located within the coastal reserve, such as fencing, signage and showers. At this stage of planning the detail and number of specifications is limited, but as the detailed design stages are progressed, the specifications will be added to.

#### 5.1 SIGNAGE

There is a proliferation of signs through the dunes, many of them dilapidated and ugly. The City of Fremantle is currently developing a signage policy that can be applied across the municipality. The draft 'City of Fremantle public signage style manual, March 2000 should be consulted prior to development of any signage, as it provides details on appropriate fonts etc. Signs should be restricted to a few strategic locations that will be dependent on the changing priorities of managing the coastal reserve.

The following signage pattern shall be adopted throughout the reserve:

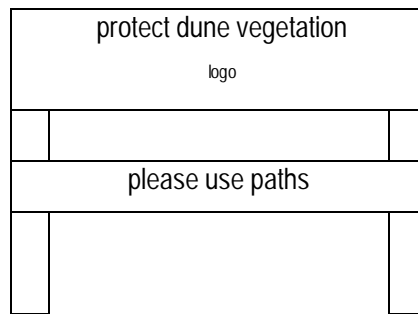
- 'dune rehabilitation' or 'dune under repair' signs shall be located in active revegetation areas or where people are disturbing the dune system. These should include an educative element;
- Remove all negative signage, where possible and replace with positively worded signs e.g. 'dogs allowed 100m north', 'sailboard area south of SLSC'.
- Incorporate signs as part of the fencing, existing poles or pathways wherever possible. Signs should be consolidated wherever possible to minimise clutter.
- Erect two detailed signs outlining the proposed concept design and information on the proposed rehabilitation works for the coastal reserve.
- Major signs should be made from recycled materials or plantation timber, where possible
- Signs to be designed to reflect and locate the industrial heritage of the area i.e. sign to locate the bulk fuel storage tanks, Mid-West fodder site.

Detailed specifications for signage will be prepared during the detailed design stages.

An example, of a rehabilitation or dune under repair sign is provided below - treated pine with routed black lettering. The signs should be located in the rehabilitated area and easily seen from the beach access paths or carparks.

Wording such as 'protect dune vegetation' or 'access path closed for rehabilitation' would be appropriate, with the City logo clearly visible. The Port and Leighton Beaches Concept Plan - Figure 3, provides illustration of the types of rehabilitation signage and fencing that could be utilised within the coastal reserve.

## Signage Detail



## 5.2 FENCING

The aim will be to have consistent fencing throughout the coastal reserve, to prevent informal access to the dunes.

### 5.2.1 Dune fencing

Post and 3 wire fencing has been selected to fence off the dunes from the multi-use path, Port Beach Road and along the beach access paths (see photograph 11). This type of fencing has been selected as it has a low visual impact and will allow the dune vegetation (on maturing) to also act as a physical barrier into the dunes.



Photograph 11: An example of post and wire (3 strands) to be used throughout the coastal reserve.

### Material Specifications

- 125mm (RR5) x 1.8m treated pine log
- 3 strands of wire
- strainer wire for box assembly

### Construction specifications

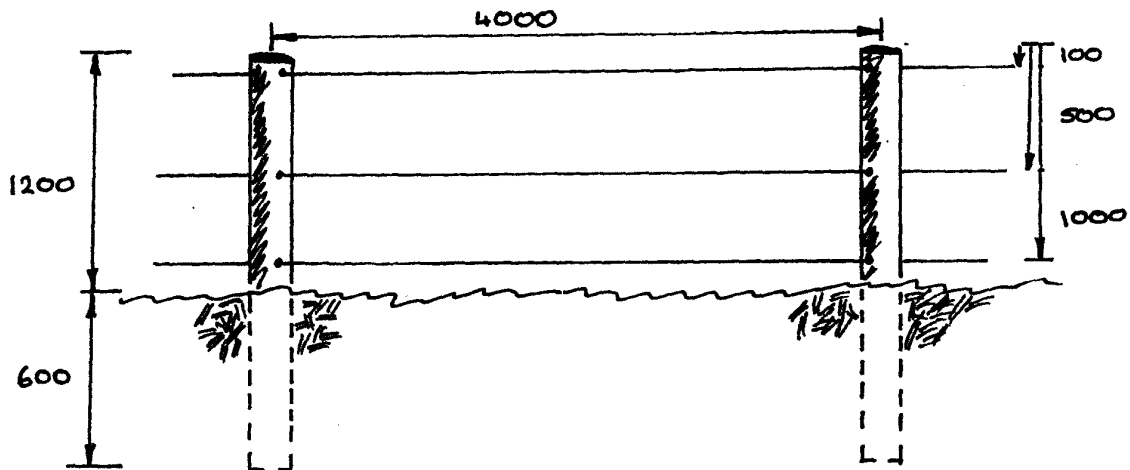
- Treated pine logs are to be vertical at 4m centres
- Logs to be buried to a depth of 600mm

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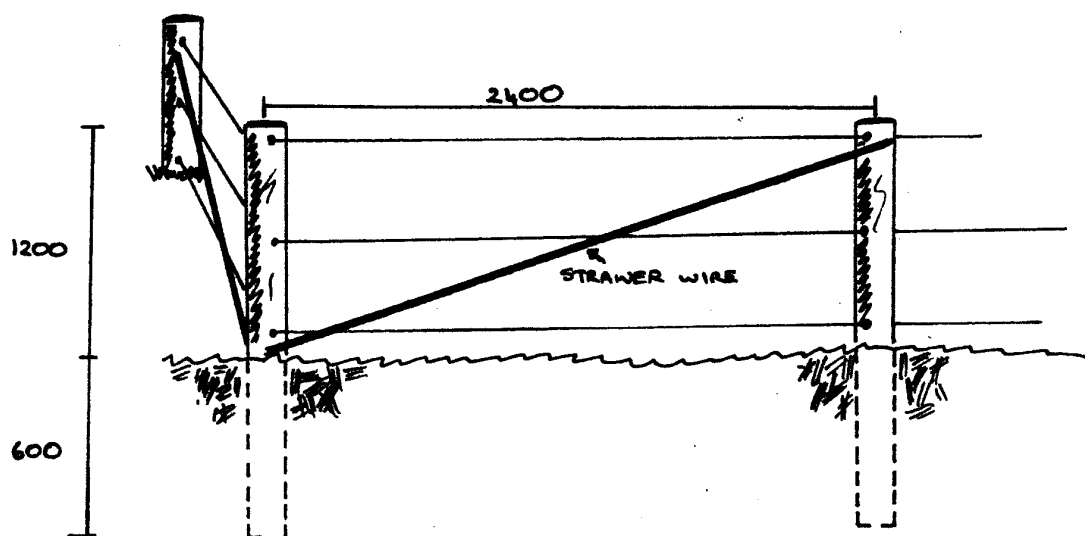
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- Holes drilled through the treated pine log at the following vertical spacings
  - 1<sup>st</sup> hole 100mm from the top of log
  - 2<sup>nd</sup> hole 500mm from the top of the log
  - 3<sup>rd</sup> hole 1m from the top of the log
- A single strand of wire is passed through each of the drilled holes
- Boxed assemblies to be placed at minimum 200m intervals along the fence
- Boxed assembly to be placed at each beach access path
- Top of the fence is to run parallel with the general contour of the ground
- All ends, joins and ties to be neatly finished with no wire protrusions

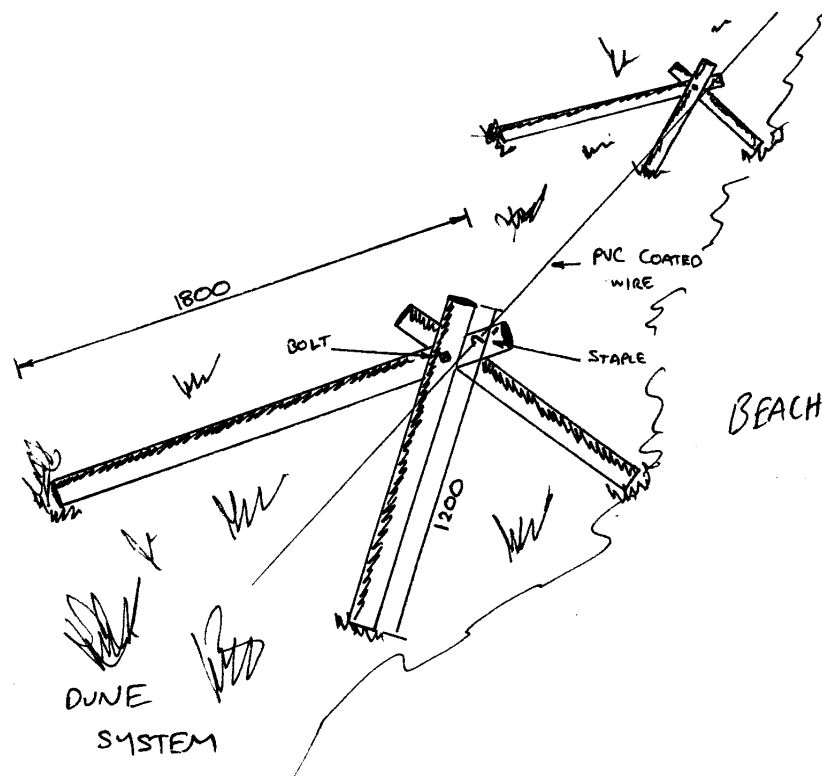
### Dune fence detail



### Box assembly detail



## Tri-Pod fencing detail



### 5.2.3 Bollards

Informal car parks will be characterised by treated pine log bollards and/or post and wire fencing (3 strand), dependent on the site. The bollards/fencing will prevent unauthorised access to the coastal reserve.

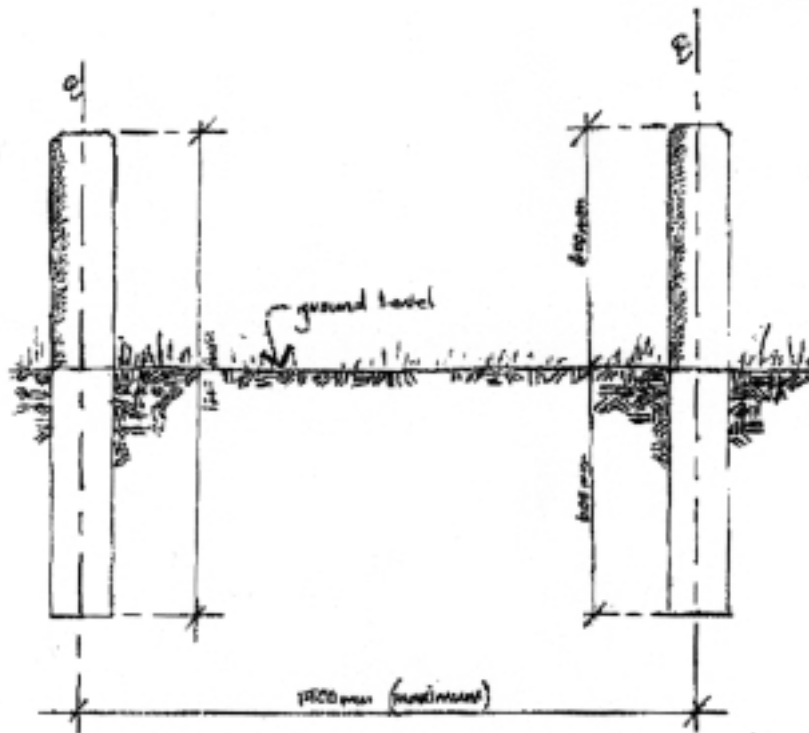
#### Material Specifications

- 125mm (RR5) x 2.4 m treated pine log, that is cut in half

#### Construction specifications

- Bollards are to be vertical at 1.5 m centres
- Log is buried to a depth of 600 mm and stand 600 mm above ground level
- Top of bollards (sight line) are to be parallel with the general contour of the ground
- Top of bollards to be chamfered at 45°

## Bollard Detail



## 5.3 AMENITIES

### 5.3.1 Rubbish Bins

Rubbish bins are already widespread through the area. Bins should be provided at each car park, adjacent to the beach access paths to handle general rubbish. The dog beach area should continue to be serviced by bins placed on the beach at each access track. Additional bins throughout the reserve should only be provided if the use and disposal patterns suggest that they are warranted. Bins should be emptied on a daily basis and dog poo bags replenished daily.

The Port Beach and SLSC node should also be serviced by recycling bins (possibly metal cage type) to promote recycling and a more sustainable Fremantle. The design of these and all bins in the reserve should be investigated in the future, to provide a design that fits with the natural dune setting.

### 5.3.2 Outdoor Showers

Additional new showers will be provided when it becomes feasible to extend the water supply outside the existing nodes. Ideally showers will be located with other facilities such as the proposed sailboard set-up area. Any new or replacement showers should meet the following requirements:

- water efficient;
- contain a foot shower also used as a dog wash;
- provision for a drinking fountain (may be located adjacent);
- foot pedal to operate water; and
- dog bowl for water attached to shower or in-situ in concrete.

### References

1. Alan Tingay and Associates, February 1999, Port and Leighton Beaches Study, prepared for City of Fremantle
2. Bosworth, Michal, April 2001, Fremantle's Landscapae: A study for the Municipal Heritage Inventory, prepared for City of Fremantle
3. Brookes Laughton, 1991, Port and Leighton Beach Development Study
4. Burton Craig, June 1994, North Fremantle Heritage Study, prepared for City of Fremantle
5. Coastwise, July 1999, Metropolitan Beach User Survey: 7 February 1999, prepared for the City of Fremantle
6. Department of Planning and Urban Development (DPUD), December 1994, Fremantle Regional Strategy
7. Ministry for Planning (MfP), September 2000, Leighton Regional Planning Guidelines, prepared by the Fremantle Regional Strategy Implementation Committee
8. MP Roger and Associates Pty Ltd, October 1998, Port and Leighton Beaches Coastal Engineering Study
9. Western Australian Planning Commission (WAPC), October 1998, The Vlamingh Parklands,

Appendix 1

5 YEAR PLAN reference with Figures 2, 3 and 5 from the Port and Leighton Beaches Management Plan

LOCATION	Principles	DESCRIPTION	TASK	TIMING	RESPONSIBILITY agency or FCC business unit	FUNDING
1. Sandtracks node – Rudderham Drive to Port Beach Car park	<ul style="list-style-type: none"> <li>Retain as low use, natural environment</li> <li>Provide an accessible and safe beach summer and winter</li> </ul>	a) Planning	<ul style="list-style-type: none"> <li>WAPC/MfP be requested to undertake coastal management study from Walter Place to Sandtracks to determine reserve width for sustainable beach and dune system.</li> </ul>	immediate	WAPC, FCC (SPCD)	No specific funds required
		b) Infrastructure	<ul style="list-style-type: none"> <li>Council to formalise view on FPA proposal to relocate Port Beach Road westward.</li> </ul>	2001/02	FCC (SPCD)	No specific funds required.
			<ul style="list-style-type: none"> <li>FCC to insist WAPC/MfP undertakes a coastal management study at Sandtracks to determine reserve width for sustainable beach and dune system.</li> </ul>	immediate	WAPC, FCC (SPCD)	No specific funds required
		seawall	<ul style="list-style-type: none"> <li>FCC to continue to liaise with FPA. FCC to request joint management agreement and funding for the port reserve, beach interface.</li> </ul>	2001/02	FCC, FPA	No specific funds required. State govt/FPA to fund any major works associated with the wall.
			<ul style="list-style-type: none"> <li>FCC to undertake essential maintenance only,</li> </ul>	2001/02 and	FCC (CW) under	FCC -



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			to ensure public safety, until road realignment determined.	ongoing	direction from AI	Maintenance
		<ul style="list-style-type: none"> <li>sewerage line/oil pipelines</li> </ul>	<ul style="list-style-type: none"> <li>FPA/MRWA to relocate as part of any road reconstruction</li> </ul>	not yet determined, depends on PBRoad	FCC (AI), FPA, MRWA	State government
		<ul style="list-style-type: none"> <li>stormwater</li> </ul>	<ul style="list-style-type: none"> <li>Remove stormwater outlet</li> </ul>	as above		FPA
Note: no discretionary work should be undertaken at Sandtracks beach until the Port Beach Road realignment has been determined	<ul style="list-style-type: none"> <li>Rebuild the dune system</li> <li>Potential to create viewing area</li> </ul>	c) Dune Reconstruction	<p>Replace fen <u>Box assembly detail</u></p> <ul style="list-style-type: none"> <li>cing.</li> </ul>	Note: no discretionary work should be undertaken at Sandtracks beach until the Port Beach Road realignment has been determined.	Seek joint arrangement with FPA	FCC, FPA.
	<ul style="list-style-type: none"> <li>Revegetate with appropriate species</li> <li>Potential to create lawn and shade areas</li> </ul>	d) Dune Revegetation and Stabilisation	<ul style="list-style-type: none"> <li>Sector 1.1 see figure 5</li> <li>Brushing to protect exposed ground</li> <li>Plant <i>Spinifex hirsutus</i> into more extensive bare patches, together with Category 2 species to establish a shrub community</li> <li>The frontal face of the dune leading down to the beach is substantially bare and requires about 80% brushing followed by planting of Category 1 grasses and groundcovers</li> <li>Sector 1.2</li> <li>Re-establish dune and vegetation in front nodal car parks</li> </ul>	Essential maintenance only. See c) above.	As above.	To be funded as part of reconstruction of Port Beach Road if it proceeds.  Upkeep would become core maintenance for FCC.
	<ul style="list-style-type: none"> <li></li> </ul>	e) Access paths	<ul style="list-style-type: none"> <li>Control pedestrian access through establishing</li> </ul>	Essential	As above.	To be funded as

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			a fence at the back of the beach on the lower frontal face. For the purpose, pine posts supporting three PVC-coated wires is recommended	maintenance only. See c) above.		part of reconstruction of Port Beach Road if it proceeds. Upkeep would become core maintenance for FCC.
	•	f) Fencing	• see above	Essential maintenance only. See c) above.	As above.	As above.
	• Provide permanent car parking outside 65 m risk zone	g) Car parking	• Construct one or two informal nodal car parks adjacent to Port Beach Road to replace bays lost through works in the Port Beach Node	Essential maintenance only. See c) above.	As above.	To be funded as part of reconstruction of Port Beach Road if it proceeds. Upkeep would become core maintenance for FCC.
2. Port Beach Node	•	a) Planning	• WAPC/MfP be requested to undertake coastal management study from Walter Place to Sandtracks to determine reserve width for sustainable beach and dune system.	immediate	FCC (SPCD)	State government to fund
	• Improve the built environment and surroundings of this node	b) Infrastructure	• Rebuild change room facilities ideally outside 65 m risk zone.	5 years+	FCC (AI)	FCC – capital and/or grant funded. Upkeep would become core maintenance for FCC.

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	<ul style="list-style-type: none"> <li>Relocate and improve shower and change room facilities</li> </ul>					
		<ul style="list-style-type: none"> <li>stormwater</li> </ul>	<ul style="list-style-type: none"> <li>Close the stormwater outlet and remove pipes. Redesign or close the access path.</li> </ul>	complete by 2003-04	FCC (AI, CW), MRWA	FCC – capital
	<ul style="list-style-type: none"> <li>Prevent further recession of the dune (reduced to 5 m in places)</li> <li>Extend dune eastward.</li> <li>Rebuild and revegetate dune system.</li> </ul>	c) Dune Reconstruction	<p>Sector 2.1 Figure 5</p> <ul style="list-style-type: none"> <li>Replenish sand in short term.</li> <li>Redesign car park including drainage and increasing the dune width. Include pedestrian access.</li> <li>Medium term, increase the dune width by reclaiming part of car park.</li> </ul>	<p>2001-02</p> <p>2001-02</p> <p>2004-05</p>	FCC (CW, AI) and MRWA	FCC – establishment and new work capital. Upkeep core maintenance.
		d) Dune Vegetation	<p>Sector 2.2</p> <ul style="list-style-type: none"> <li>Establish a shrub storey in the swale behind the dune to add to limited numbers of <i>Olearia</i> already present. Category 2 and 3 shrubs might be introduced;</li> </ul>	2002-03	FCC (AI)	FCC – establishment capital and/or grant. Up keep core maintenance

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			<ul style="list-style-type: none"> <li>Plant a row of <i>Casuarina equisetifolia</i> (horsetail oak) along the swale, for aesthetic benefit and for the shade and shelter they might afford.</li> </ul>			program
			<p>Sector 2.3</p> <ul style="list-style-type: none"> <li>the dunes would benefit by spreading brush over about 20% of their surface where there is bare ground, planting Category 1 and 2 species beneath this brush.</li> <li>the swale behind is bare and total brushing should be undertaken, combined with planting of Category 1, 2 and 3 species;</li> <li>planting of casuarinas might again be considered in the swale, if the modest impact these will have on views from the Port Beach Tea Rooms is not unacceptable. In this respect, discrete planting might enhance rather than detract from the ocean view.</li> </ul>	2002-03	FCC (AI)	FCC – establishment capital and/or grant. Up keep core maintenance program
			<p>Sector 2.4</p> <ul style="list-style-type: none"> <li>the planting of a row of casuarinas on the 2 metres of sand surface at the back of the dune, unless plans to extend the dune eastwards are likely to be implemented in the short term. In that event, there would be little merit in planting the casuarinas now. Rather, when the expansion of the dune occurs, the casuarinas would be planted along the eastern toe of the extension.</li> </ul>	2002-03	FCC (AI)	FCC – capital and/or grant, up keep core maintenance program
		e) Access paths	<ul style="list-style-type: none"> <li>Realign paths R, T, U, X, V and W to a north-east axis at their eastern end, incorporating a dog-leg, that reduces the propensity for sand to blow up them onto the carpark.</li> </ul>	2002-03	FCC – CW and AI	FCC - maintenance

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		f) Fencing	<ul style="list-style-type: none"> <li>• Repair the fence on paths R, U, W. Sectors 2.2, 2.3 and 2.4</li> <li>• Remove the pine post and ringlock fence between the dune and the swale, as there does not appear to be any problem of people trafficking across the dune. The fence is unsightly and the concrete wall at the edge of the carpark provides an obstruction to movement into the dunes.</li> </ul>	Fencing completed June 2001	FCC – CW and AI	FCC - maintenance
	<ul style="list-style-type: none"> <li>• Landscape and provide shade in car parks</li> </ul>	g) Car parking	<ul style="list-style-type: none"> <li>• Redesign to optimise car parking. Plant shade trees every x bays in line with Council policy.</li> <li>• See c) above.</li> </ul>	2001-02	FCC – AI	FCC – Capital. Upkeep would become core maintenance for FCC.
			<ul style="list-style-type: none"> <li>• Resurface and mark</li> </ul>	2001-02	FCC – AI	FCC – capital
	<ul style="list-style-type: none"> <li>• Provide good pedestrian and cycle access from Tydeman Road</li> </ul>	h) Cyclist and Pedestrian Access	<ul style="list-style-type: none"> <li>• Construct link to Sandtracks node.</li> <li>• Review design of dual use path to manage conflict between ped/cyclists and vehicles entering the carpark.</li> </ul>	<p>Subject to resolution of Port Beach Road realignment.</p> <p>Part to be completed under g) above.</p>	FCC – AI	FCC – capital or grant funded. Upkeep would become core maintenance for FCC.
		i) Recreation Needs	<ul style="list-style-type: none"> <li>• Create lawn area between change rooms and café.</li> </ul>	2001-02	FCC – AI	FCC – Capital. Upkeep would become core maintenance for

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						FCC.
3. South Leighton Node		a) Planning	<ul style="list-style-type: none"> <li>• Increase coastal reserve to the 100 metre guideline width as per WAPC policies 2.3 and 6.1.</li> <li>• Detailed design for precinct requested by Council's Port and Leighton Beaches Steering Committee (July 2001).</li> </ul>	<p>immediate</p> <p>2001-02</p>	<p>WAPC, FCC (SPCD)</p> <p>FCC (AI and SPCD)</p>	<p>No funds required.</p> <p>FCC – capital (\$4,900 in current budget)</p>
	<ul style="list-style-type: none"> <li>• Remove old fencing and other scrap materials</li> </ul>	b) Infrastructure	see under fencing below, plus need to complete detailed study as above.	<p>if supported by detailed study</p> <p>2002-03</p>	FCC (CW or contractors)	FCC – capital, upkeep core maintenance
	<ul style="list-style-type: none"> <li>• Rehabilitate former industrial sites to natural dune setting</li> </ul>	c) Dune Reconstruction	<p>Sectors 3.1, 3.3</p> <ul style="list-style-type: none"> <li>• Brushing – see below.</li> </ul>	<p>if supported by detailed study</p> <p>2002-03</p>	FCC (CW)	FCC – core maintenance
	<ul style="list-style-type: none"> <li>• Potential to create a nature reserve.</li> <li>• Potential for sailboard rigging area at north or south end of node.</li> </ul>	d) Dune Vegetation	<p>Sector 3.1</p> <ul style="list-style-type: none"> <li>• Introduce a shrub storey.</li> <li>• Brush the upper 2 to 3 metres of the frontal face and plant with Category 1 species, grasses.</li> </ul>	<p>if supported by detailed study</p> <p>2002-03</p>	FCC (AI)	FCC – establishment capital and/or grant funded. Upkeep would become core maintenance for FCC.
	<ul style="list-style-type: none"> <li>• As above</li> </ul>		<p>Sector 3.2</p> <ul style="list-style-type: none"> <li>• Introduce a shrub storey on eastern half of dune.</li> </ul>	<p>if supported by detailed study</p> <p>2002-03</p>	FCC (AI)	FCC – establishment capital and/or grant funded. Upkeep would become core

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						maintenance for FCC.
	<ul style="list-style-type: none"> <li>As above</li> </ul>		<p>Sector 3.3</p> <ul style="list-style-type: none"> <li>that approximately 30% brush cover is warranted over this sector</li> <li>planting of Category 1 grasses and groundcovers to improve surface cover</li> <li>planting of Category 2 and 3 shrubs to establish a shrub community</li> <li>bare areas, which account for about 70% of the frontal face in this sector, are to be brushed and planted with Category 1 species</li> </ul>	<p>if supported by detailed study 2002-03</p>	FCC (AI)	FCC – establishment capital and/or grant funded. Upkeep would become core maintenance for FCC.
	<ul style="list-style-type: none"> <li>As above</li> </ul>		<p>Sector 3.4</p> <ul style="list-style-type: none"> <li>the limited shrub storey of <i>Scaevola</i> and <i>Olearia</i> be enhanced by planting Category 2/3 shrubs across the area generally</li> <li>complete the brushing of Path Q that has been closed and partially brushed and plant Category 1, 2 and 3 species beneath the brush</li> <li>brush and plant the frontal face of the dune that is about 70% bare (as with Sector 3.3) with Category 1 species</li> </ul>	<p>if supported by detailed study 2002-03</p>	FCC (AI)	FCC – establishment capital and/or grant funded. Upkeep would become core maintenance for FCC.
	<ul style="list-style-type: none"> <li>Potential for a multi-use path to wind through this node close to Port Beach Road.</li> </ul>	e) Access Paths	<ul style="list-style-type: none"> <li>Realign path Q1 to a north eastern axis, providing a dogleg to check wind tunnelling and sand movement.</li> </ul>	<p>if supported by detailed study 2002-03</p>	FCC (CW with AI)	FCC – core maintenance

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	<ul style="list-style-type: none"> <li>Minimise the number of east-west links across the dunes.</li> </ul>					
		f) Fencing	<ul style="list-style-type: none"> <li>No fence between car park and dunes at present. To be monitored. Except sector 3.1 – the fence posts here should be utilised as per specifications.</li> </ul>	monitor/review in detailed work	FCC (AI)	FCC – capital. Upkeep would become core maintenance for FCC.
	<ul style="list-style-type: none"> <li>Potential for additional car parking outside 65 m risk zone at north or south end of node</li> </ul>	g) Car parking	<ul style="list-style-type: none"> <li>Detailed plan required for precinct as above 3 a).</li> </ul>	review if coastal reserve increased	FCC, MRWA, state government	FCC and state government
	<ul style="list-style-type: none"> <li>Windsurfing WA have requested a dune rigging area. The location of this yet to be determined.</li> </ul>	i) Recreation Needs	<ul style="list-style-type: none"> <li>Assess suitability of this area as sailboarding rigging area.</li> <li>Opportunity to establish a grassed and shaded recreation/picnic area in the centre of this node between the road and existing dunes. Assess as part of detailed planning work, 3a), including ongoing maintenance requirement.</li> </ul>	further study required	FCC and Windsurfing Association	FCC – capital and/or grant funded. Upkeep would become core maintenance for FCC
4. Surf Life Saving Club Node	<ul style="list-style-type: none"> <li>Existing coastal reserve too narrow.</li> </ul>	a) Planning	<ul style="list-style-type: none"> <li>Increase coastal reserve in line with the Leighton Regional Planning Guidelines</li> </ul>	immediate	WAPC, FCC (SPCD)	no specific funds required
	<ul style="list-style-type: none"> <li>Surf Life Saving Club and change</li> </ul>	b) Infrastructure	<ul style="list-style-type: none"> <li></li> </ul>	5 years +	FCC, FLSA	FCC – capital and grant funds, or developer funded



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	<p>rooms within 25 and 65 m risk zones.</p> <ul style="list-style-type: none"> <li>• Change rooms degraded.</li> <li>• Facilities serviced by septic tank.</li> <li>• Car parks within 65 risk zone.</li> </ul>			requires increase in coastal reserve first.		
	<ul style="list-style-type: none"> <li>• Dunes degraded.</li> </ul>	c) Dune Reconstruction	<p>Sector 4.2</p> <ul style="list-style-type: none"> <li>• Rebuild/extend foredune in front of SLSC, maintaining access to the club.</li> <li>• Locate vehicle access to complement the new dunes work.</li> <li>• Construct sump within the swale behind the new dune adjacent to the hardstand area in front of the club.</li> <li>• Look at relocating volleyball court behind the dune.</li> </ul>	<p>completed July 2001</p> <p>Underway</p> <p>Underway</p>	FCC (AI)	FCC – capital and grants funds. Upkeep would become core maintenance for FCC.
	<ul style="list-style-type: none"> <li>• Vegetation degraded.</li> </ul>	d) Vegetation	<p>Sector 4.1</p> <ul style="list-style-type: none"> <li>• bare ground which accounts for about 30% of the sector, should be brushed</li> <li>• category 1 and 2 species planted</li> <li>• towards the east of the dune, Category 3 species are planted, to improve existing cover</li> </ul>	commenced 2001-02	FCC (AI)	FCC – capital and grant funded. Upkeep would become core maintenance for FCC.

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			and to establish a shrub community			
			<p>Sector 4.2</p> <ul style="list-style-type: none"> <li>Intensely brush then plant new dune works with Category 1 species, complemented by Category 2 to the rear face.</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.
			<p>Sector 4.3</p> <ul style="list-style-type: none"> <li>the frontal face of the dune is bare and should be brushed and planted with Category 1 species</li> <li>the eastern portion of the dune and its rear face are partially bare and require 50% brush cover complemented by planting of Category 1 and 2 species</li> <li>the swale between the dune and the concrete wall should be similarly brushed and planted with Category 1, 2 and 3 species</li> <li>planting a row of casuarinas might also be considered in this swale for shade and aesthetic benefit. As the dune is high, these trees will not affect any ocean view</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.
			<p>Sector 4.4</p> <ul style="list-style-type: none"> <li>approximately 50% brushing is required, with planting of Category 1 and 2 species beneath the brush</li> <li>planting of Category 3 shrubs towards the east</li> <li>planting a row of casuarinas be considered at the eastern toe of the dune, and the fence here could be removed</li> <li>the frontal face should be entirely brushed and</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.

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			planted with Category 1 species			
			<p>Sector 4.5</p> <ul style="list-style-type: none"> <li>• about 70% brushing is required combined with planting of Category 1 and 2 species</li> <li>• planting Category 3 species towards the east</li> <li>• complete the brushing and replanting of path L, which has been closed</li> <li>• frontal face of the dune should be brushed and planted with Category 1 species</li> <li>• planting a row of casuarinas along the eastern toe of the dune might be considered, and the fence here can be removed</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.
		e) Access Paths	<ul style="list-style-type: none"> <li>• realign Path N to a north-east axis at its eastern end, to reduce the problem of wind funnelling up it to blow sand into the carpark behind</li> </ul>	2002-03	FCC (CW with AI)	FCC – maintenance
			<ul style="list-style-type: none"> <li>• realign Path M at its eastern end to a north-east access and its fence should be repaired towards the western end</li> <li>• repair and raise the fence around the lookout off this path, as it has been partially buried</li> </ul>	2002-03	FCC (CW with AI)	FCC – maintenance
		f) Fencing	<ul style="list-style-type: none"> <li>• Replace fencing in car parks.</li> <li>• Fence between car parks and dunes to prevent access.</li> <li>• Remove the dilapidated ringlock fence at the back of the dune</li> </ul>	Completed	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.
	<ul style="list-style-type: none"> <li>• Car parks in 65 m risk zone.</li> <li>• Insufficient</li> </ul>	g) Car Parking	<ul style="list-style-type: none"> <li>• Relocate carpark beyond 65 m zone and to increase recreation opportunities.</li> </ul>	Can only be achieved when coastal reserve	FCC (AI)	FCC capital and grant funded. Upkeep would become core

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	<p>parking at peak times.</p> <ul style="list-style-type: none"> <li>• Poor layout in existing car parks and no landscaping.</li> <li>• Maintenance high in car parks due to sand drift.</li> </ul>		<ul style="list-style-type: none"> <li>• Landscape car parks.</li> </ul>	<p>widened.</p> <p>Prepare landscaping plans for existing car park 2001-02.</p>		<p>maintenance for FCC.</p>
	<ul style="list-style-type: none"> <li>• Poor north-south linkages.</li> <li>• Conflicts between vehicles and beach users.</li> </ul>	<p>g) Pedestrian and Cyclist needs</p>	<ul style="list-style-type: none"> <li>• Improve linkage between the beach and railway station.</li> </ul>	<p>Detailed planning required in conjunction with state government agencies re the Leighton Marshalling Yards.</p>	<p>FCC (AI)- state government agencies</p>	<p>state government, developers</p>
	<ul style="list-style-type: none"> <li>• Limited commercial facilities and kiosk run down.</li> <li>• Change rooms degraded.</li> <li>• Little integration in built environment and poor aesthetics.</li> </ul>	<p>h) Recreation Needs</p>	<ul style="list-style-type: none"> <li>• Refurbish facilities to create a node for the community.</li> <li>• Develop additional recreation opportunities – parkland, lawn, café, volleyball, skateboarding, basketball.</li> <li>• Install timber viewing platform(s).</li> </ul>	<p>Can only be achieved when coastal reserve widened.</p>	<p>State government and FCC</p>	<p>State government and FCC capital funds, grants or developer contributions</p>

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	<ul style="list-style-type: none"> <li>No protected areas.</li> </ul>					
5. North Leighton Node	<ul style="list-style-type: none"> <li>Existing coastal reserve too narrow.</li> </ul>	a) Planning	<ul style="list-style-type: none"> <li>Increase coastal reserve in line with the Leighton Regional Planning Guidelines</li> </ul>	immediate	WAPC	no specific funds required
		b) Infrastructure	Forward planning can only occur after the coastal zone has been amended in line with the Leighton regional planning guidelines. This should include the relocation of Port Beach Road outside the 65 metre risk zone and to improve the functionality of the pedestrian overpass.	2002-03	WAPC, FCC, Town of Mosman Park, other government agencies	state government funds
		c) Dune Reconstruction	See above.	2003-04	FCC (AI)	FCC capital and/or grants and state government funding
	<ul style="list-style-type: none"> <li>Revegetate dune system</li> </ul>	d) Vegetation	<p>Sector 5.1</p> <ul style="list-style-type: none"> <li>patch brushing is warranted over about 30% of the western half of this sector, with planting of Category 1 and 2 species beneath it</li> <li>general planting of Category 2 and 3 shrubs in the eastern half, to establish a shrub community</li> <li>brushing and replanting of frontal face of the dune should occur over the northern-most 20 metres, where vegetation has been destroyed by the entry to Path J</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.
			<p>Sector 5.2</p> <ul style="list-style-type: none"> <li>50% brush cover is required across the area</li> <li>planting of Category 1 and 2 species</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core

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			<ul style="list-style-type: none"> <li>planting Category 3 species towards the east</li> </ul>			maintenance for FCC.
			<p>Sector 5.3</p> <ul style="list-style-type: none"> <li>50% brush cover is required, largely in the west</li> <li>plant Category 1 and 2 species beneath the brush</li> <li>add Category 3 species eastwards to improve surface cover and to establish a shrub community</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.
			<p>Sector 5.4</p> <ul style="list-style-type: none"> <li>50% brush cover is required, predominantly in the west</li> <li>plant Category 1 and 2 species beneath the brush</li> <li>add Category 3 species in eastern part of dune</li> <li>add 50% brush cover on frontal dune face over bare areas and plant Category 1 species</li> <li>fence the western toe of the frontal face using pine posts supporting three PVC coated wires, as there is some evidence of people walking into the dunes</li> <li>lift or increase the height of the fences on Path F where they are partially buried</li> <li>if a new and improved sailboarding set-up site is established at Sector 3.4, close the set-up area for windsurfers located near this path</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.

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			<p>Sector 5.5</p> <ul style="list-style-type: none"> <li>60% brushing is concentrated in the western two-thirds of the dunes</li> <li>Category 1 and 2 species planted beneath the brush</li> <li>plant Category 3 species in eastern part of the dune</li> <li>bare areas on frontal face of dune require 50% brush cover and plant with Category 1 species</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.
			<p>Sector 5.6</p> <ul style="list-style-type: none"> <li>50% brush is applied over this area, predominantly in the west</li> <li>plant Category 1 and 2 species beneath the brush</li> <li>plant Category 2 and 3 species in the eastern part of the dune</li> <li>30% brush cover on the frontal dune face, complemented by planting of Category 1 species</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.
			<p>Sector 5.7</p> <ul style="list-style-type: none"> <li>60% brush cover overall, on the frontal dune face. The north of the dune is substantially exposed and moderately exposed in the south</li> <li>plant Category 1 species to improve its cover</li> </ul>	commenced 2001-02	FCC (AI)	FCC capital and grant funded. Upkeep would become core maintenance for FCC.
	<ul style="list-style-type: none"> <li>Close informal paths</li> </ul>	e) Access Paths	<ul style="list-style-type: none"> <li>realign Path J at the southern edge of this sector to provide a dog-leg to reduce the sand</li> </ul>	Commenced 2001, ongoing	FCC (CW with AI)	FCC – maintenance

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	and rehabilitate		<p>blow that presently occurs along it</p> <ul style="list-style-type: none"> <li>reinstatement portion of fence along Path J</li> <li>Close path K, brush and plant.</li> <li>lift or increase height of fences on Paths G and H where they are partially buried</li> <li>close Path E and brush and plant</li> <li>realign Paths C and D at their eastern end to provide a dog-leg in each</li> <li>reinstatement portions of the fences along paths C and D</li> </ul>	monitoring required		program
	<ul style="list-style-type: none"> <li>Replace broken fencing along access paths and car parks.</li> </ul>	f) Fencing	<p>Sector 5.1</p> <ul style="list-style-type: none"> <li>fencing at the western toe of the frontal face using pine posts supporting three PVC-coated wires. Fence required, as there is some evidence of people walking into the dunes</li> </ul> <p>Sector 5.5</p> <ul style="list-style-type: none"> <li>extend the fence at the back of the beach into this sector</li> </ul> <p>Sector 5.6</p> <ul style="list-style-type: none"> <li>extend the fence at the back of the beach into this sector</li> </ul> <p>Sector 5.7</p> <ul style="list-style-type: none"> <li>install a fence on the lower frontal dune face, as there is evidence of pedestrian traffic into the dunes</li> </ul>	Completed July 2001	FCC	FCC –capital  Repairs to be done under maintenance program.
	<ul style="list-style-type: none"> <li>Any additional parking should</li> </ul>	g) Car Parking	<ul style="list-style-type: none"> <li>Develop plan for management of the car parks to improve safety, reduce maintenance.</li> </ul>	2002-03	FCC (AI) , in liaison with MRWA and Town	FCC – capital, then part of maintenance



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	be 65 m from vegetation line.				of Mosman Park	program
	<ul style="list-style-type: none"> <li>Improve ped and cycling conditions and separation between pathways and roads.</li> </ul>	h) Peds and Cyclists	Increase in coastal reserve required in order to improve cycle and pedestrian facilities.	2004-05	FCC (AI and SDGD), Town of Mosman Park, potentially with Bikewest or other government assistance	FCC – capital and/or grant funded
	<ul style="list-style-type: none"> <li>Locate a sailboard rigging area.</li> </ul>	i) Recreation Needs	Sector 5.6 <ul style="list-style-type: none"> <li>if a new and improved sailboarding set-up site is established at Sector 3.4, close the sailboard set-up areas at the eastern end of these two paths.</li> </ul>	study 2002, implementation for summer 2002-03	FCC (SPGD, AI) with Windsurfing WA Association	FCC – capital and/or grant funded

## APPENDIX 2 – VEGETATION SPECIES LIST

Plants recommended for revegetation work in the Port and Leighton Beach dunes are placed in three categories below. Most of the plants listed are endemic to Perth foreshores and the South West coastline. Two non-natives that have become naturalised in the South West are also included and are marked with an asterisk.

Category 1: Beach grasses and herbaceous species suited to the most exposed locations including the foredune and the seaward face of the frontal dune.

<i>Atriplex isatidea</i>	(coastal saltbush)
<i>A. cinerea</i>	(grey saltbush)
<i>Ammophila arenaria</i>	(marram grass) *
<i>Spinifex hirsutus</i>	(sand spinifex)
<i>S. longifolius</i>	(sand spinifex)
<i>Tetragonia decumbens</i>	(sea spinach) *

Category 2: Colonisers of semi-stable dunes, suited to partially protected areas - the dune crest immediately behind the frontal face.

<i>Acacia cochlearis</i>	(rigid wattle)
<i>Calocephalus brownii</i>	(cushion bush)
<i>Carpobrotus virescens</i>	(pigface)
<i>Isolepis nodosus</i>	(club rush)
<i>Jacksonia furcellata</i>	(jacksonia)
<i>Olearia axillaris</i>	(smoke bush)
<i>Scaevola crassifolia</i>	(fan flower)

Category 3: Plants of more protected dunal situations - easterly sections of the dune crest and the rear face of the frontal dune.

<i>Acacia cyclops</i>	(coastal wattle)
<i>A. rostellifera</i>	(summer-scented wattle)
<i>Acanthocarpus preissii</i>	(prickle lily)
<i>Lepidosperma gladiatum</i>	(sword rush)
<i>Myoporum insulare</i>	(boobialla)
<i>Rhagodia baccata</i>	(berry saltbush)

Category 4 Landscape plantings around the main activity/service areas, providing visual relief and shade. Specific tree species will be selected when undertaking the detailed design for the main activity/service areas. The most appropriate tree species identified at this stage are:

- *Casuarina equisetifolia* (Horsetail Sheoak)
- *Melaleuca lanceolata* (Rottnest Island Teatree)

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- *Callitris preissii* (Rottnest Island Pine)
- *Arancaria cunninghamii* (Norfolk Island Pine)

Various weed species are present in the coastal reserve, such as *Oenothera drummondii* (Evening primrose), *Trachyandra divercarta* (Onion weed), and *Agave americana* (Century plant). The Century plant population is isolated, while Soursob is found extensively throughout the reserve.