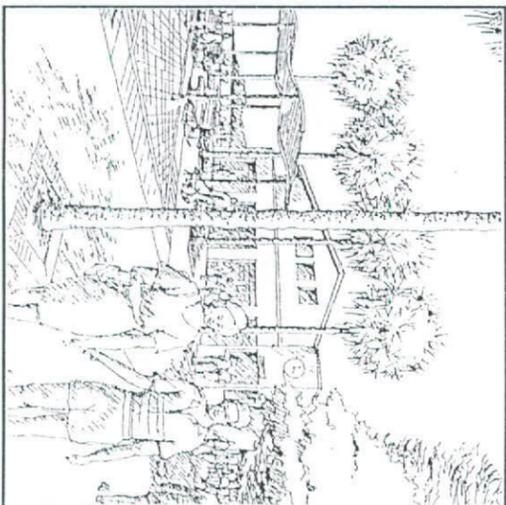
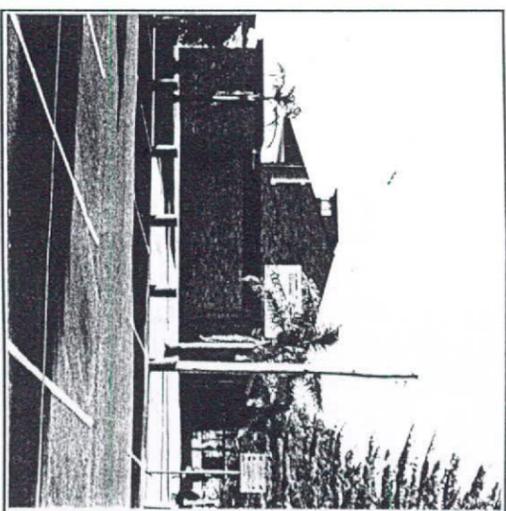
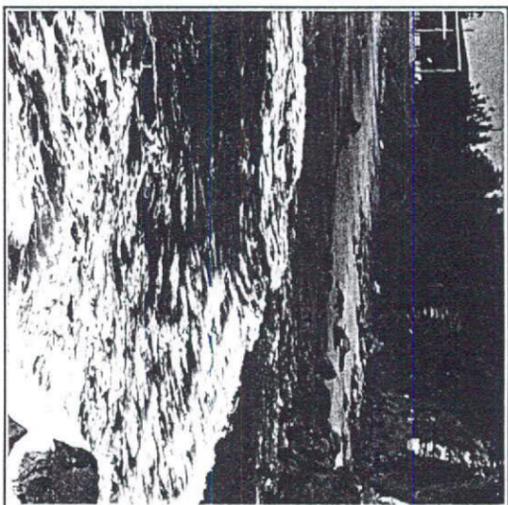
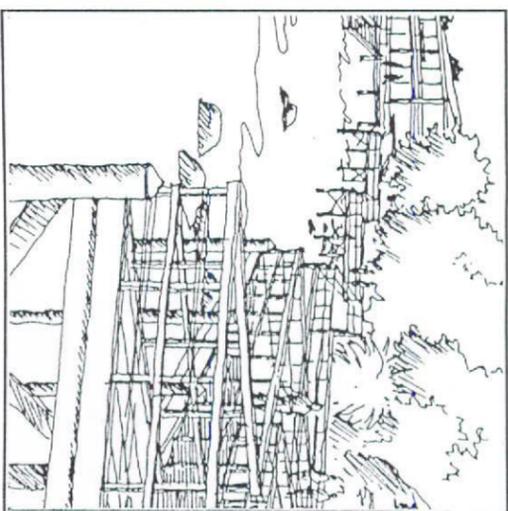


# TERRIGAL FORESHORE IMPROVEMENTS

## *Landscape Masterplan Report*



Prepared for  
**Gosford City Council**

by  
CONTEXT Landscape Design • CONYBEARE MORRISON & PARTNERS  
346 Kent Street Sydney 2000 • Ph (02) 299 5711 • Fax (02) 262 4785

March 1996  
94.531

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## 1.0 INTRODUCTION

Terrigal is one of the Central Coast's prime holiday and tourist destinations and is also a local commercial, recreational and cultural centre. Enormous potential exists to promote and develop Terrigal's waterfront experience and further enhance the amenity and setting of this coastal, public asset.

This study has been prepared for Gosford City Council in response to the Consultant's Brief entitled "Terrigal Foreshore Improvements Landscape Masterplan" dated 15th April 1994. It has been prepared by CONTEXT Landscape Design in association with Conybeare Morrison & Partners, Architects and Urban Designers, and Patterson Britton & Partners, Engineers.

The Brief requires the preparation of a Landscape Masterplan for the waterfront area from Terrigal Lagoon to The Haven and detailed design for Stage 1, including the sketch design drawings for the Boardwalk Link, Promenade Link, Gateway to Ash Street and upgrading of The Foreshore Promenade.

The Landscape Masterplan focuses on the development of the environmental, recreational and tourism potential of the Terrigal Waterfront for the benefit and enjoyment of the local residents, the business fraternity and tourists. It aims to conserve the inherent beauty of the natural setting and capitalise on the existing cultural landscape to create a revitalised waterfront befitting Terrigal's landmark status as a desirable residential location and tourist destination.

This masterplan report outlines the objectives, strategies and design opportunities for the development and enhancement of Terrigal Foreshore. It also includes funding and implementation strategies and an estimate of probable costs for the development opportunities identified.

A Steering Committee was established to determine the parameters and direct the study. It was comprised of representatives from each of the following:

Gosford City Council  
Central Coast Regional Development Board  
Terrigal Chamber of Commerce  
NSW Public Works - Coastal Engineering Works  
Dept. of Conservation and Land Management

Regular meetings were held to ensure that balanced and comprehensive viewpoints were obtained in the evaluation of the masterplan options and all issues involved.

Numerous background studies have been reviewed to assist in establishing the directions for the masterplan. These include:

- *Terrigal Waterfront Principles Plan - An Integrated Landscape*  
CONTEXT Landscape Design, 1992
- *Terrigal Haven Landscape Masterplan Report*  
Tract Consultants, 1991
- *Terrigal Haven Plan of Management*  
Tract Consultants, 1990
- *Terrigal Centre Study*  
Forsite, 1989
- *Draft Terrigal Trunk Drainage Study / Management Study / Management Plan*  
Webb, McKeown and Associates, 1993
- *Geotechnical Study Cliff Face 1994*  
Coffey Engineers

- *Terrigal Town Centre Workshop 1991*  
The Terrigal Chamber of Commerce in October 1991, with the support of Gosford City Council sponsored a workshop related to control over the future development of the Town Centre and other urban design issues. The workshop was attended by representatives of community groups and organisations, residents, architects, planners, landscape architects, representatives of Council and the Chamber of Commerce.

A major unanimous finding of the workshop was for the development of a landscape masterplan for the waterfront that integrated and linked the foreshores from the western edge of Terrigal Lagoon to the beachfront and Haven.

A working group comprising representatives from the above was formed to define the parameters of the Landscape Masterplan. These parameters were subsequently incorporated in the *Terrigal Waterfront Principles Plan - An Integrated Landscape* prepared by CONTEXT Landscape Design in 1992.

This masterplan is compatible with the recommendations of the *Development Control Plan, 1992* for the Terrigal Town Centre.

#### **Study Limitations**

The study was undertaken in a six week period from May to June 1994. This resulted in the Draft Landscape Masterplan Report. The Draft Report and associated drawings were placed on public display and were submitted to various authorities and interested groups for comment. Final comments and amendments were incorporated into the document in March 1996.

The study base plan was derived from orthophoto maps as detail surveys were not yet available for the area.

No additional studies related to the Town Centre, such as traffic or parking, were undertaken as part of this Landscape Study.



## 2.0 OBJECTIVES OF THE MASTERPLAN

In 1992, CONTEXT Landscape Design prepared a set of Landscape Objectives in the *Terrigal Waterfront Principles Plan - An Integrated Landscape*. These objectives and principles amalgamated the updated recommendations resulting from previous Council commissioned studies for the Town Centre and The Haven and acknowledged the recommendations of the *Terrigal Town Centre Workshop, 1992*, and the *Development Control Plan 1992* for the Terrigal Town Centre, which was adopted by Council on 9th February, 1993.

The following Masterplan objectives are based on those landscape objectives, with some minor modifications.

1. CREATE AN INTEGRATED LANDSCAPED WATERFRONT FOR TERRIGAL  
that will lay the foundations for an enhanced town centre and reinforce its role as coastal residential and tourist focus as well as a local commercial, recreational and cultural centre.
2. PROVIDE A CONTINUOUS WATERFRONT PEDESTRIAN LINK  
from the western edge of Terrigal Lagoon to the Beachfront and The Haven.
3. CREATE A LANDSCAPED GATEWAY  
leading into Terrigal Town Centre.
4. INTEGRATE THE WATERFRONT AND TOWN CENTRE  
by establishing access links and appropriate landscape and urban design treatment.
5. DEVELOP AND ENHANCE THE RECREATION OPPORTUNITIES  
in the waterfront precinct, promoting appropriate beach side activities. This would include upgrading the promenade and strengthening foreshore links; expanding and improving the picnic areas with new seating and shelter structures; enlarging the Rockpool and providing seating and shelter; and developing a dynamic 'nautical' themed children's play area.
6. UPGRADE AND UNIFY THE IMAGE AND IDENTITY OF TERRIGAL PRECINCT  
through the establishment of new signage, lighting, paving, street furniture and street tree planting.
7. UPGRADE THE HAVEN  
and sensitively enhance its potential as a major local recreational facility.
8. RESTORE AND REINFORCE THE INDIGENOUS COASTAL HEATH LANDSCAPE  
to The Haven and foreshore cliff escarpments, creating an attractive, harmonious setting which is environmentally stable.

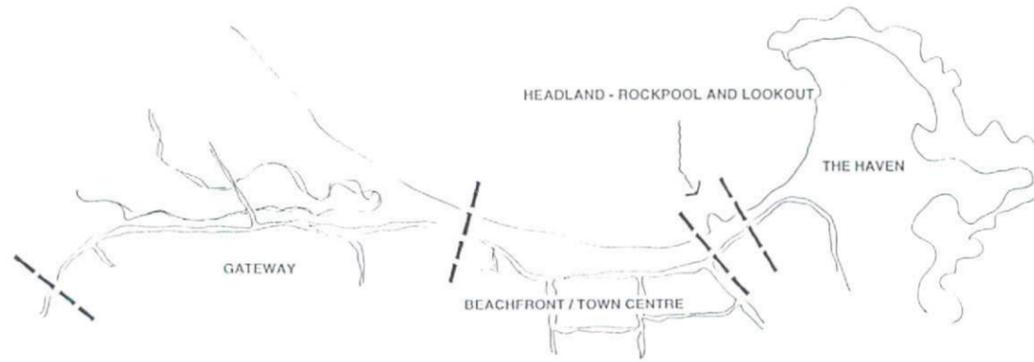
### 3.0 OPPORTUNITIES AND CONSTRAINTS

Terrigal represents a unique combination of natural and cultural features. The most notable is the dramatic and unique landmark, The Skillion. Others include the beachfront, lagoon, cliff escarpments and rock platforms. Cultural features include the formal avenue of Norfolk Island Pines along the Esplanade, the Crown Plaza Holiday Inn and the dynamic interaction between the Town Centre and beachfront promenade. The interaction of these features presents a number of opportunities and constraints which must be assessed for successful redevelopment. It is essential to conserve and enhance the inherent qualities of the natural setting, and capitalise on the cultural landscape to ensure a dynamic and unique waterfront revitalisation.

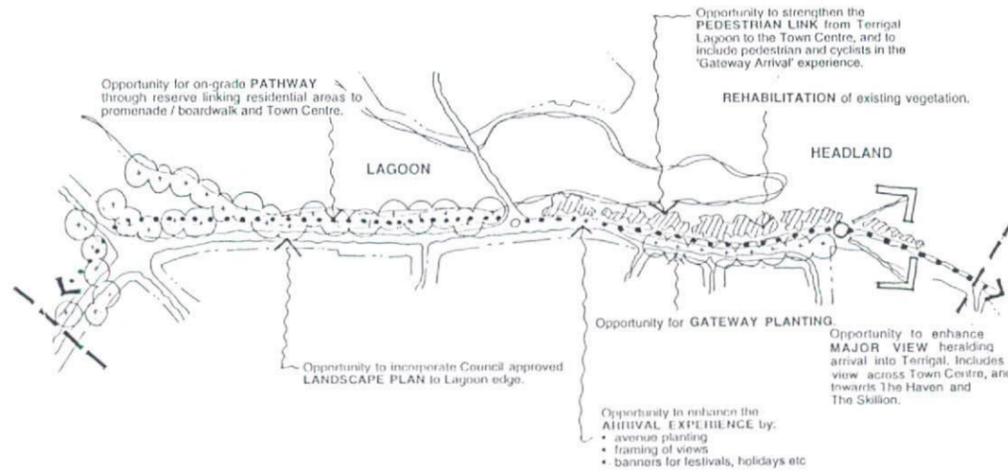
To assess opportunities and constraints within the study area, four major zones have been identified:

- 1. Gateway - Terrigal Lagoon to Painters Lane**  
Opportunities exist to improve the pedestrian link from the residential areas west of Terrigal Lagoon into Terrigal Town Centre. The motorist arrival experience can also be improved, creating a Gateway arrival which maximises the lagoon edge and headland experiences and enhances views to the ocean and The Haven. Constraints include the existing road width, traffic speed and proximity of the road and cliff.
- 2. Beachfront and Town Centre**  
Opportunities exist to significantly upgrade the waterfront experience, relocating inappropriate or redundant elements and maximising views, recreation space and community activities. Boardwalks, promenades and pedestrian ways can link the town beach to both Terrigal Lagoon and The Haven creating a continuous waterfront pedestrian experience. Engineering requirements for possible storm and wave action, and potential sand loss must be considered. The visual and pedestrian amenity of the streetscape can be improved and links from the commercial areas to the beachfront can be strengthened. The continued health and wellbeing of existing trees is an essential consideration.
- 3. The Headland - Rockpool and Lookout**  
Opportunities exist to upgrade and link The Rockpool and lookout, and to rehabilitate the headland cliff vegetation. A new boardwalk around the headland, can provide a valuable and exciting link between Terrigal Beach and The Haven. Constraints include possible cliff instability and any engineering requirements for the boardwalk.
- 4. The Haven**  
Opportunities exist to upgrade The Haven in accordance with the *Waterfront Principles Plan, 1992*. Some rationalisation of existing roads and carparks would improve the visual amenity of the area. The waterfront can be upgraded by creating a new promenade and enlarging the existing beachfront picnic areas. Rehabilitation of native coastal heath vegetation and the creation of lookouts and coastal walks can further enhance The Skillion and headland experience.

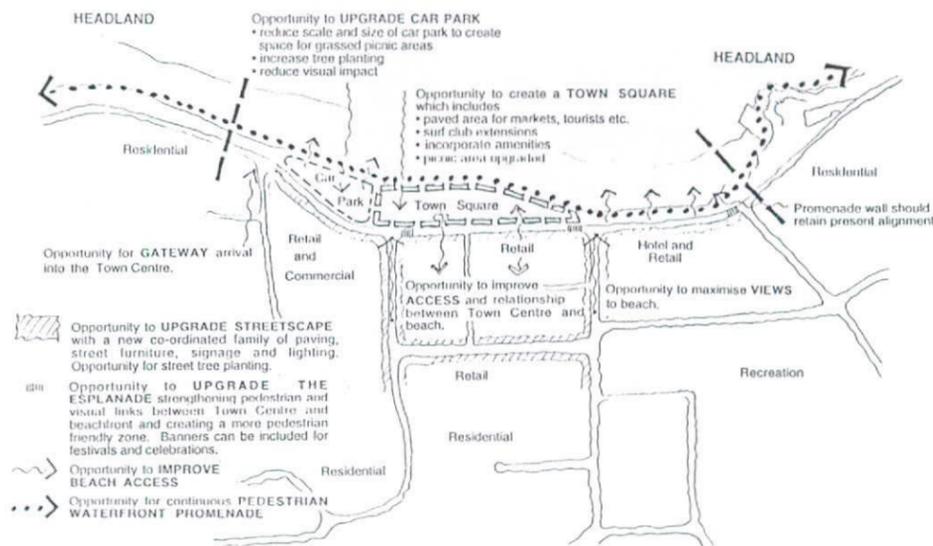
The following diagrams illustrate these opportunities and constraints in more detail.



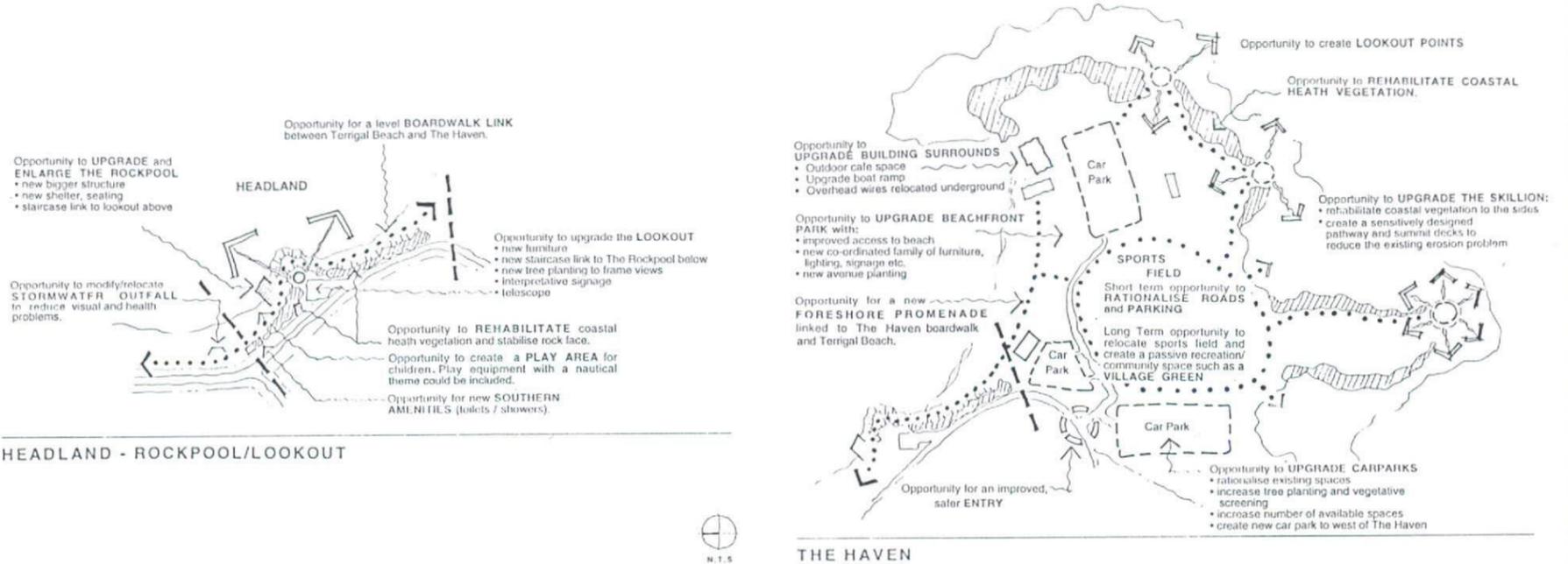
KEY PLAN



GATEWAY



BEACH FRONT / TOWN CENTRE



HEADLAND - ROCKPOOL/LOOKOUT

THE HAVEN

OPPORTUNITIES & CONSTRAINTS

Drawing No. SK-02

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Figure 4: Opportunities & Constraints

**LIGHTING STRATEGY**

- night lighting will be installed to Town Square, promenades, boardwalks and picnic areas.
- uplights will highlight features. eg: Norfolk Island Pines, cliff above Rockpool.

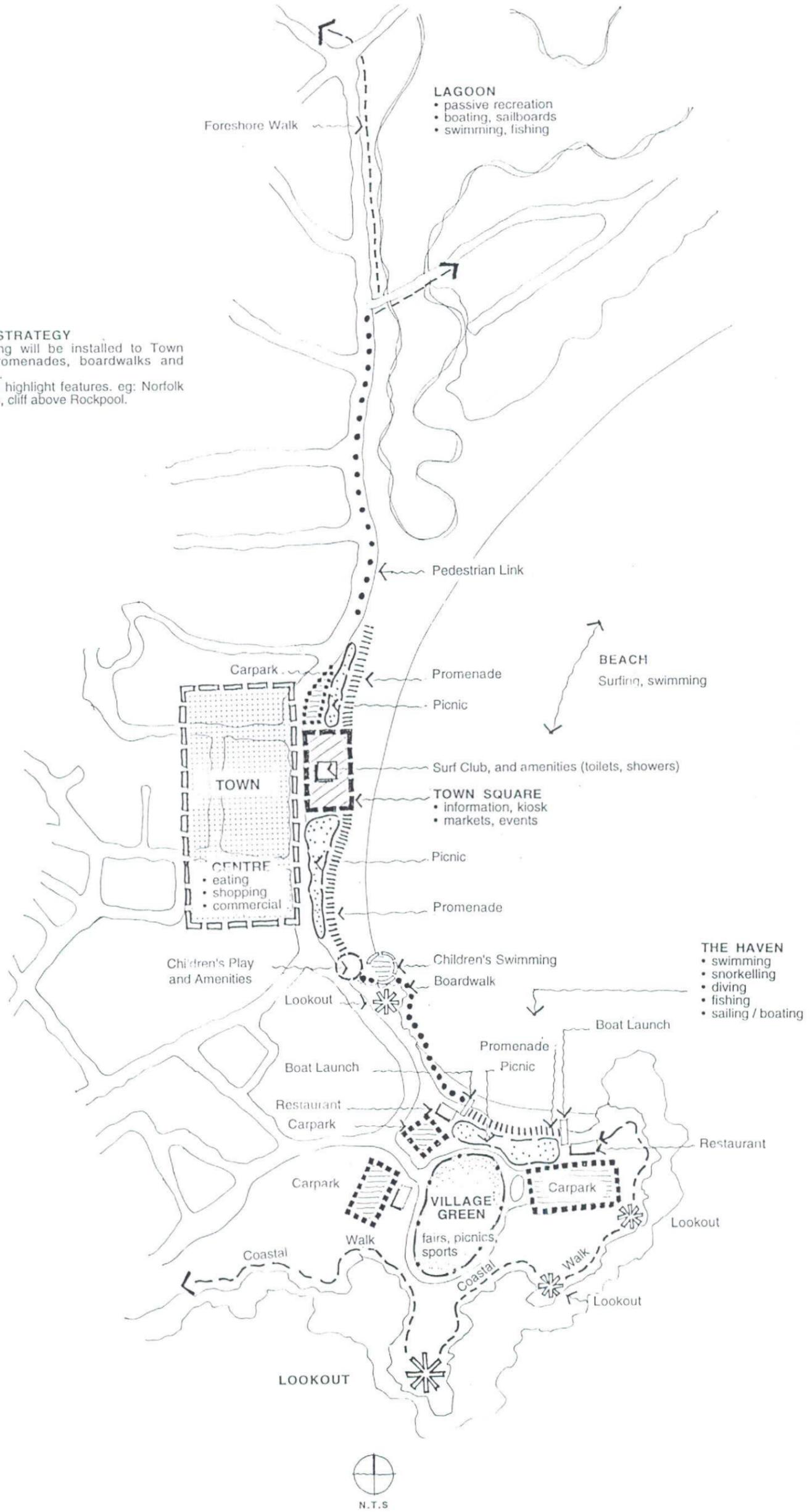


Figure 5: Activities Plan

**ACTIVITIES PLAN**

Drawing No. SK-03

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#### 4.0 DESCRIPTION OF THE MASTERPLAN

##### 4.1 THE MASTERPLAN CONCEPT

The Masterplan Study seeks to develop the environmental, recreational and tourism potential of Terrigal Waterfront for the benefit and enjoyment of the local residents, the business fraternity and tourists. In doing so, it also seeks to control the nature and scale of future development and so maintain the local "village" character of Terrigal.

Terrigal is composed of a number of urban and natural zones lying adjacent to the waterfront. These consist of one urban zone: the **Town Centre**, and three natural zones: the **Gateway, Headland and Haven**. The essential concept of the masterplan is to upgrade all the zones, enhancing and reinforcing their unique features, and to forge connections between them, maximising the waterfront experience.

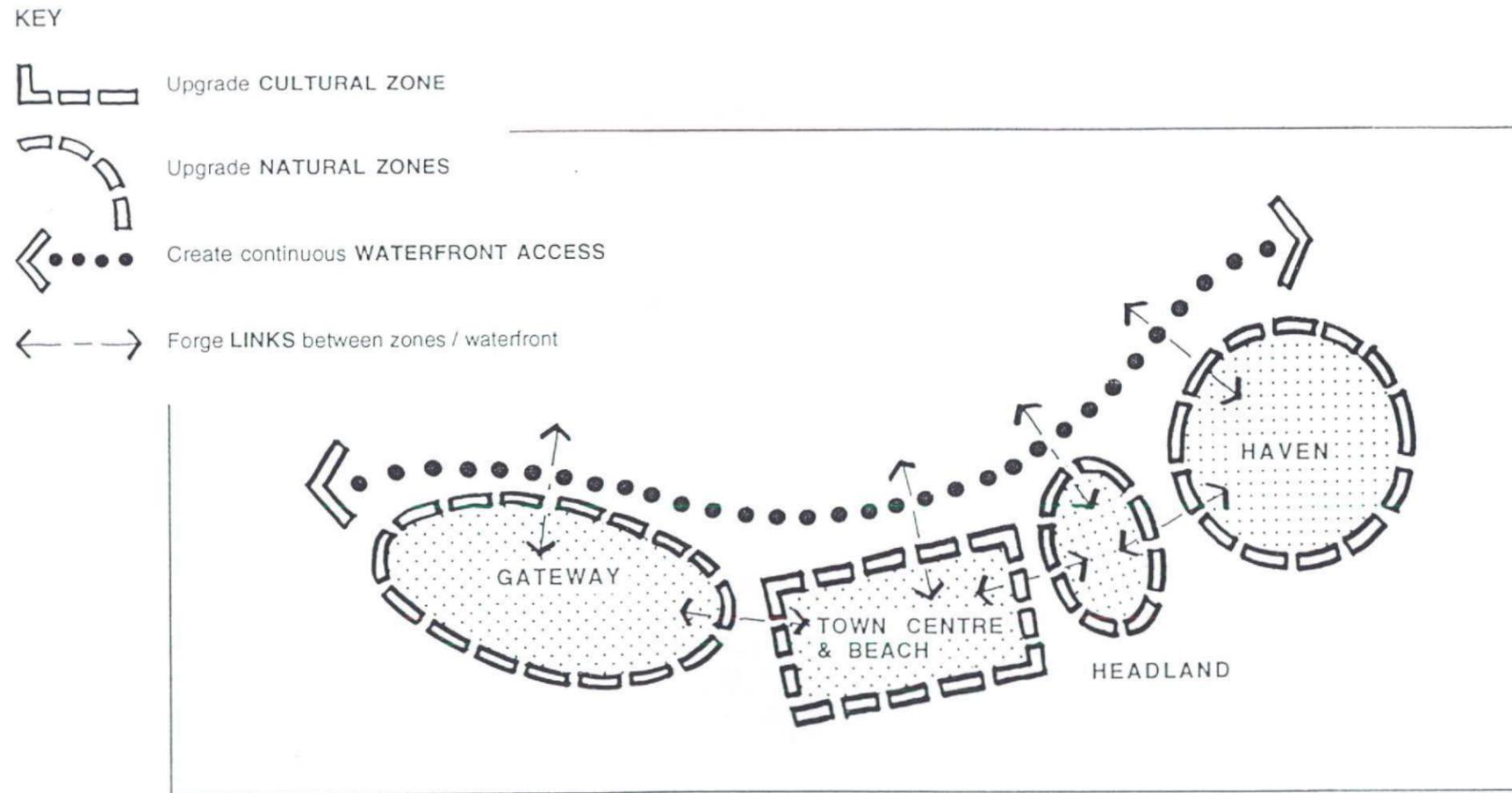


Figure 6: Masterplan Diagrammatic Concept

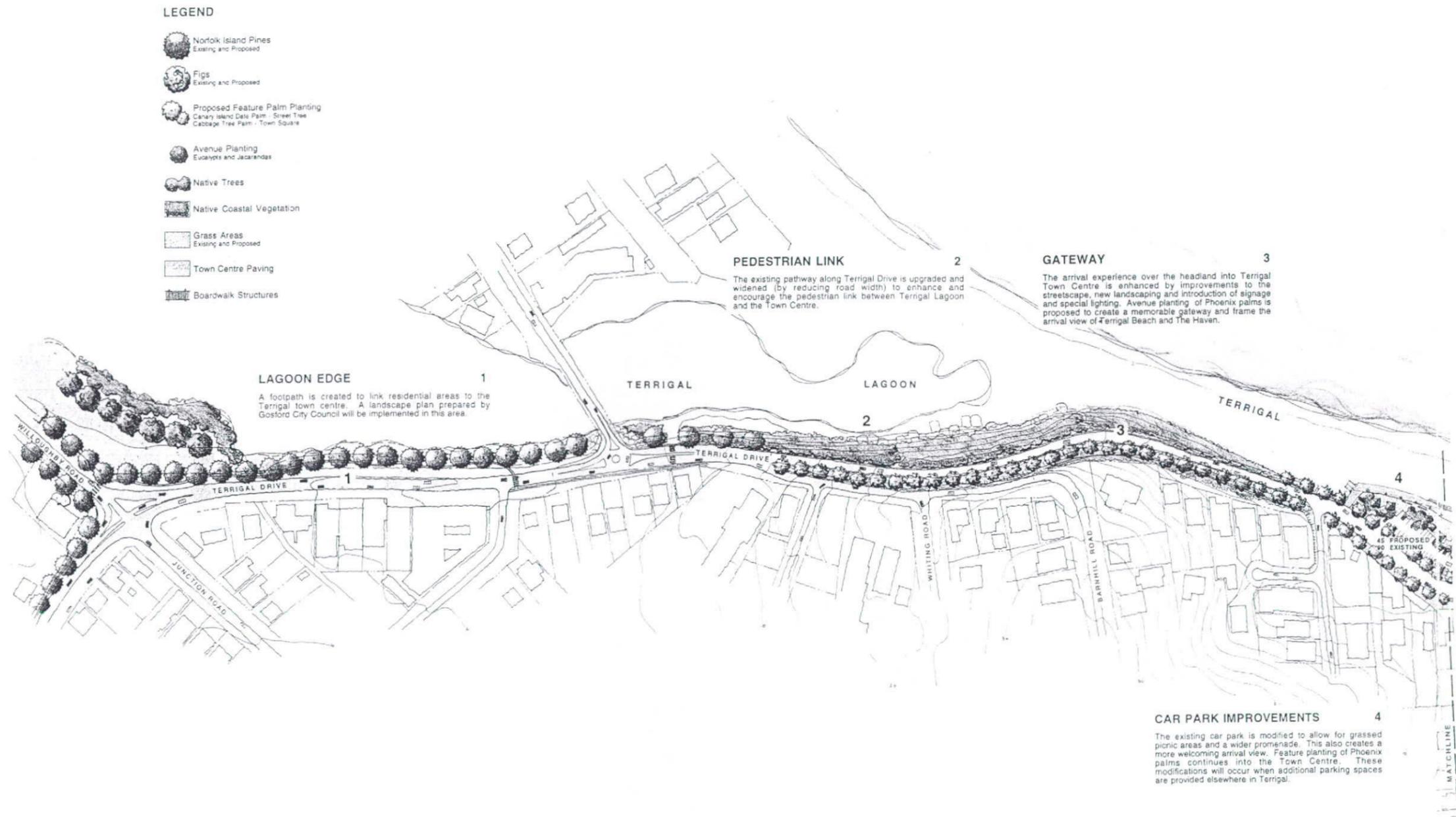
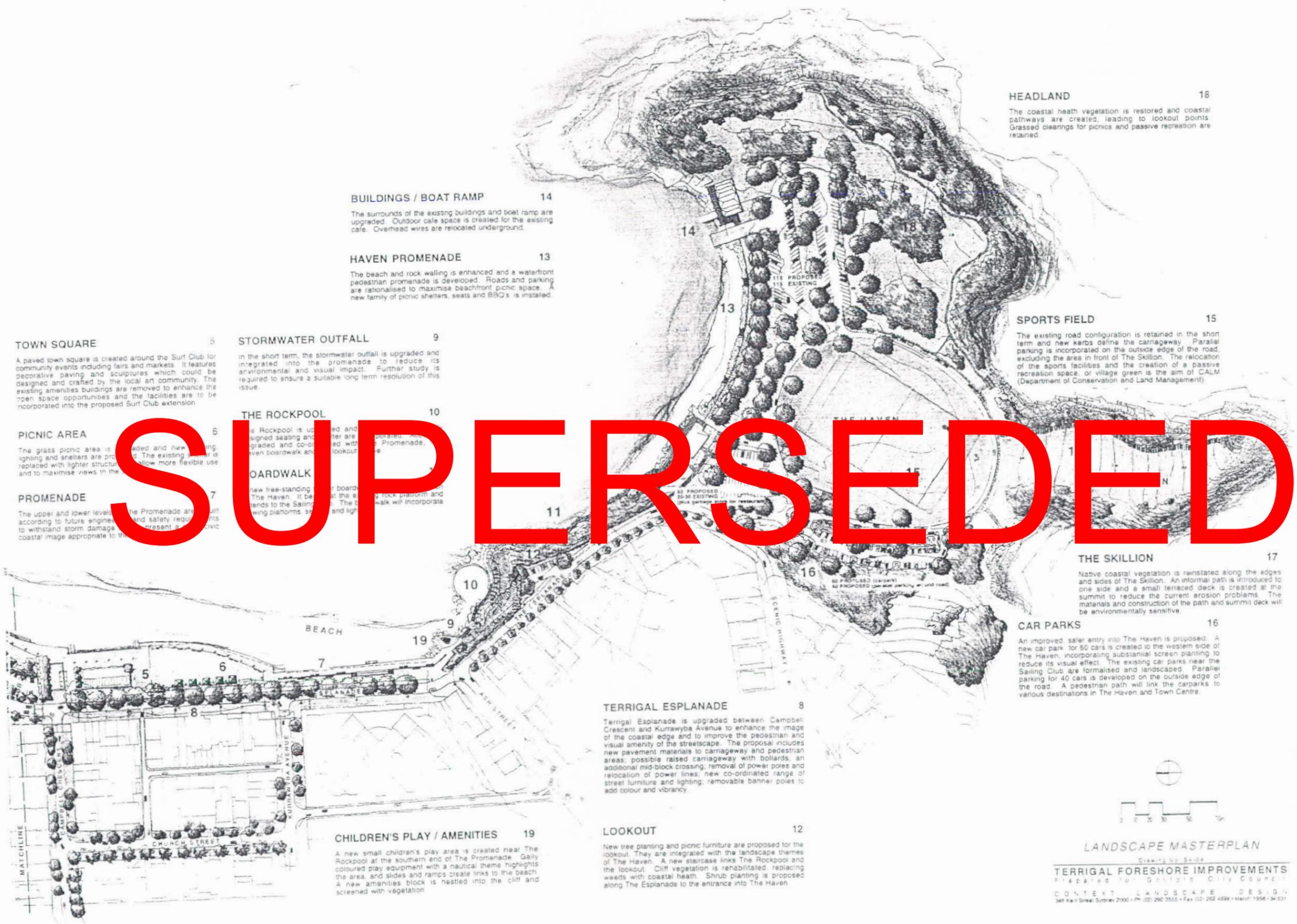


Figure 7: The Landscape Masterplan



**SUPERSEDED**

Figure 8: The Landscape Masterplan

#### 4.2 GATEWAY

The Gateway is the area of Terrigal Drive and its environs defined by the Willoughby Road intersection and the carpark to the north of Terrigal Town Centre. It is the main arrival road into Terrigal yet currently it fails to highlight existing features and create a significant Gateway experience.

From Willoughby Road, Terrigal Drive runs adjacent to Terrigal Lagoon, then climbs a small headland to provide panoramic views of Terrigal Beach, the ocean and The Haven, before descending into the Town Centre. The masterplan maximises the opportunities presented by these features to create a dynamic and varied arrival experience.

From Willoughby Road to Ocean View Drive a landscape plan has been prepared by Council and includes planting of Norfolk Island Pines (*Araucaria heterophylla*) and a footpath along the lagoon edge.

In this masterplan the arrival experience over the headland into Terrigal Town Centre is enhanced by improvements to the streetscape, additional landscaping, footpath widening and the introduction of signage, banners and special lighting. Avenue planting of *Phoenix canariensis* (Canary Island Date Palms) is proposed to create a memorable Gateway and frame the arrival views of Terrigal Beach, the Town Centre and The Haven. The road lanes are narrowed to 3.3m each way. This permits a cycle lane of 1.2m each way and the pedestrian footpath to be widened by 1m to 3m. The existing crash barrier along the entrance road should eventually be phased out to allow more environmentally friendly and less visually intrusive traffic control measures. Stabilisation of the cliff on the lagoon side and rehabilitation of the coastal cliff vegetation is also recommended.

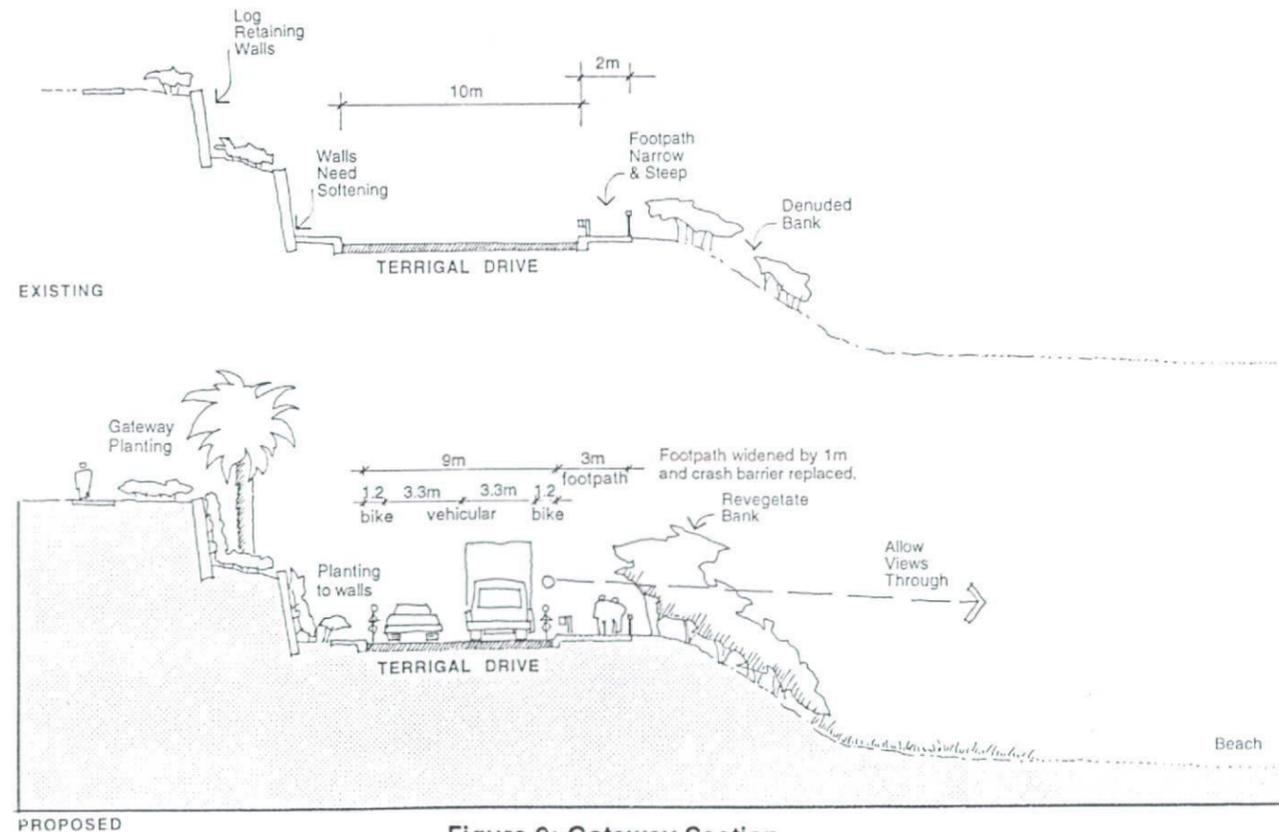


Figure 9: Gateway Section



Figure 10: Gateway

#### 4.3 BEACHFRONT AND TOWN CENTRE

Terrigal Town Centre and beachfront are the focal point for the identity and street life of the Terrigal community. The masterplan seeks to revitalise this area, recognising the needs and desires of the community, and enhancing the amenity and setting of this asset. The masterplan strengthens the link between the waterfront and Town Centre. The Town Centre is upgraded with street tree planting and a unified theme of street furniture, paving and lighting.

New Gateway planting of *Phoenix* palms defines the arrival into Terrigal Town Centre and is a reference to the man-made impact on the Terrigal environment. The existing carpark is modified, reducing its visual impact and increasing space for grassed picnic areas.

The existing promenade is upgraded and incorporates a co-ordinated range of street furniture and lighting. It is linked to the pedestrian pathway from The Lagoon and to The Haven boardwalk, strengthening the waterfront links. Connections between the beach and Town Centre are also reinforced.

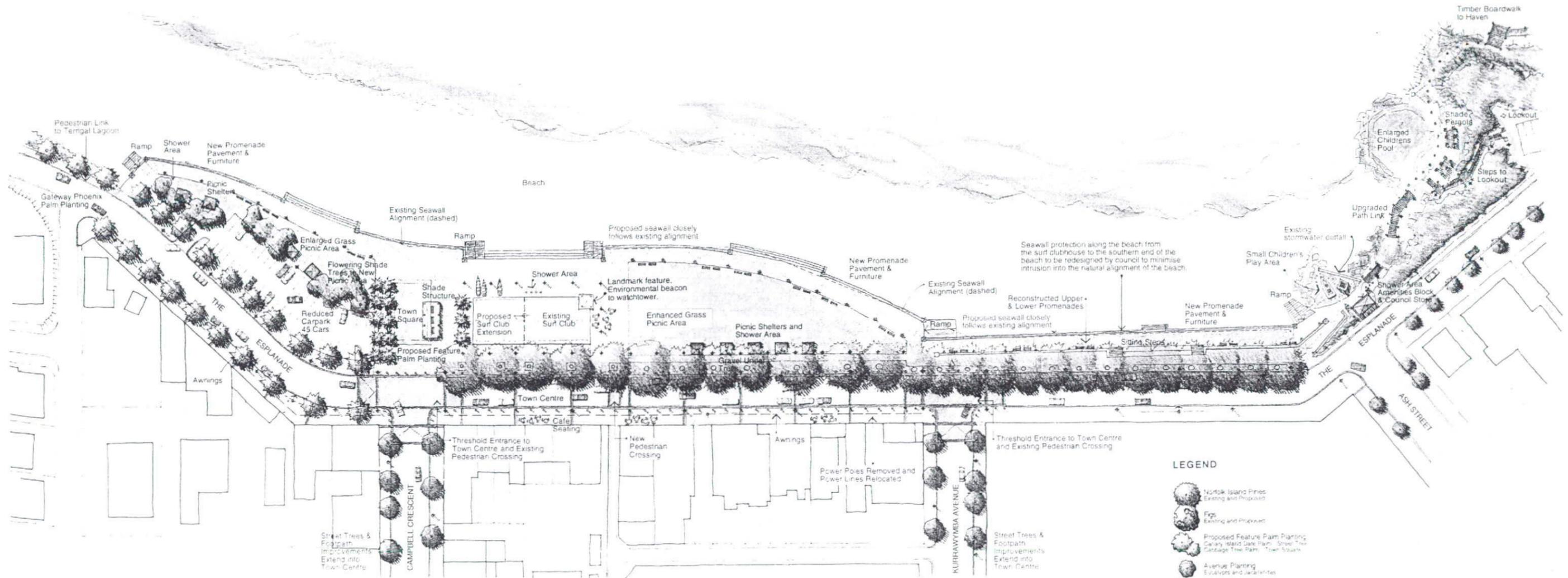
A paved Town Square is created around the Surf Club for community events, including fairs and markets. A new paved area is proposed which is patterned with motifs. These could be a simple geometric pattern, or a more fanciful nautical pattern with sea creatures, waves and nautical themes. These paving patterns and other sculptural elements could be designed and crafted by community art groups. The existing amenities buildings are demolished and the facilities are incorporated into the proposed surf club extension. The existing war memorial in the Town Square is relocated to Rotary Park.

South of the Surf Club the existing grassed picnic area is enlarged and five smaller picnic structures replace the existing shelter. The existing garden bed to the south of the picnic area is removed allowing the promenade and upper level footpath to be widened. Broad stairs provide access to the lower promenade and also provide informal seating.

Terrigal Esplanade is upgraded between Campbell Crescent and Kurrawyba Avenue to enhance the image of the coastal edge and improve the pedestrian and visual amenity of the streetscape and commercial area. All traffic flow and parking lanes are retained, with new pavement materials defining these uses. Possibilities exist to either retain the kerbs, or raise the road surface, with bollards defining pedestrian and vehicular areas. Possible footpath widening, as recommended in the *Development Control Plan, 1992* could occur in the long term. An additional mid-block pedestrian crossing is proposed, in addition to two crossings at Campbell Crescent and Kurrawyba Avenue. All power poles are removed, and the power lines relocated either underground or aerial bundle cabled and mounted to shop facades above the awnings. These measures will strengthen the links between the commercial shop fronts and the beachfront, reduce visual clutter, create a more pedestrian friendly zone, and improve the visual amenity of the streetscape.

Footpath widening is possible along the western side of Church Street, creating space for increased cafe/pedestrian uses. Street tree planting of *Phoenix* palms, Eucalypts and Jacarandas, and upgraded brick paved footpaths are proposed in Campbell Crescent, Church Street and Kurrawyba Avenue to create a unified, pedestrian oriented Town Centre zone.

Removable festival banners are installed for festivals, celebrations and holidays, and add colour and vibrancy to the streetscape. They are mounted on existing streetlights from Ocean View Drive to the northern carpark. Through the Town Centre to the entrance into The Haven locations for removable banner poles and banners will be identified.



TOWN SQUARE & WATERFRONT DETAIL PLAN

TOWN SQUARE & WATERFRONT

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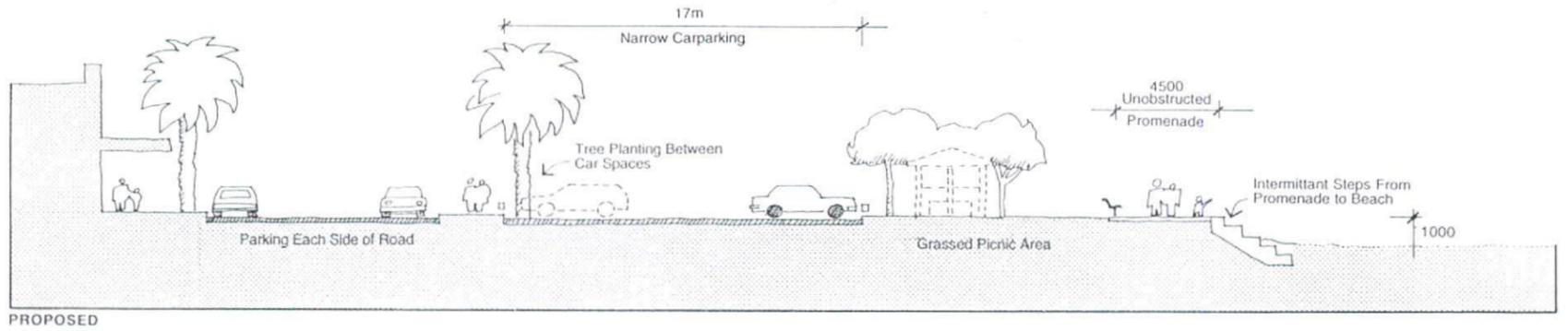
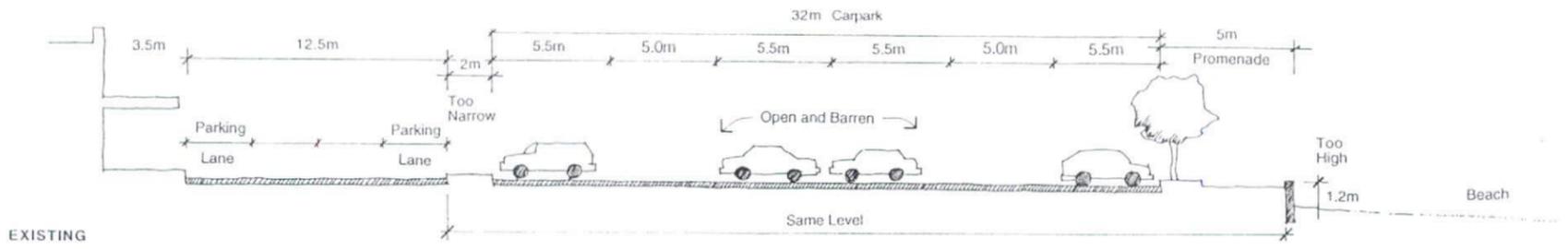
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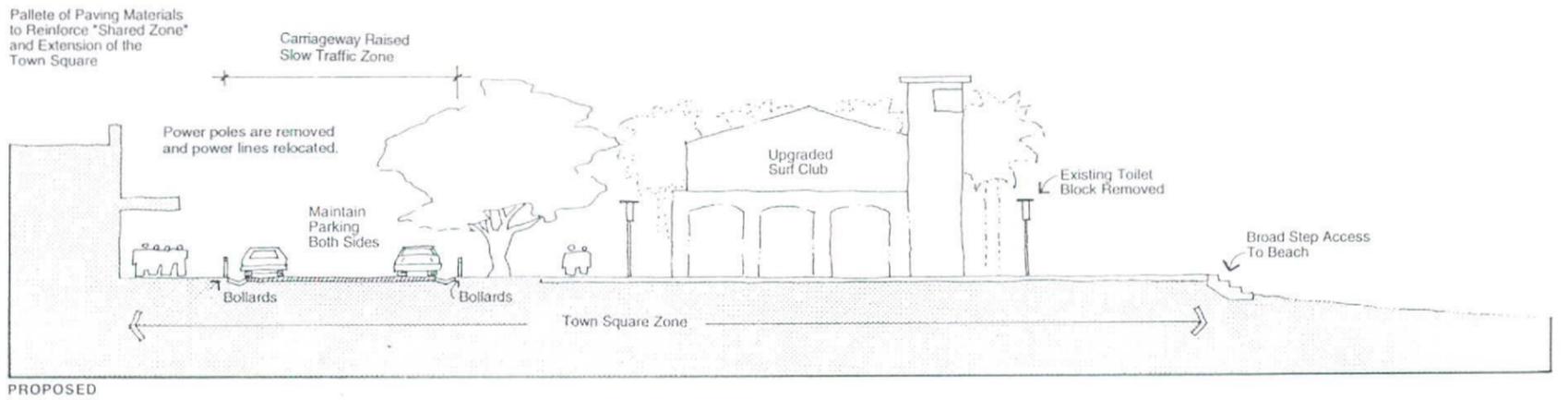
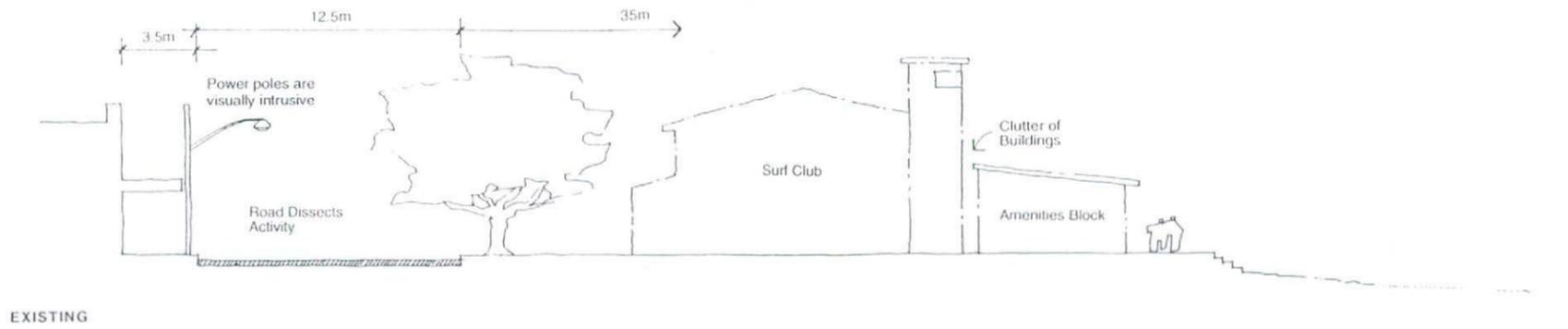
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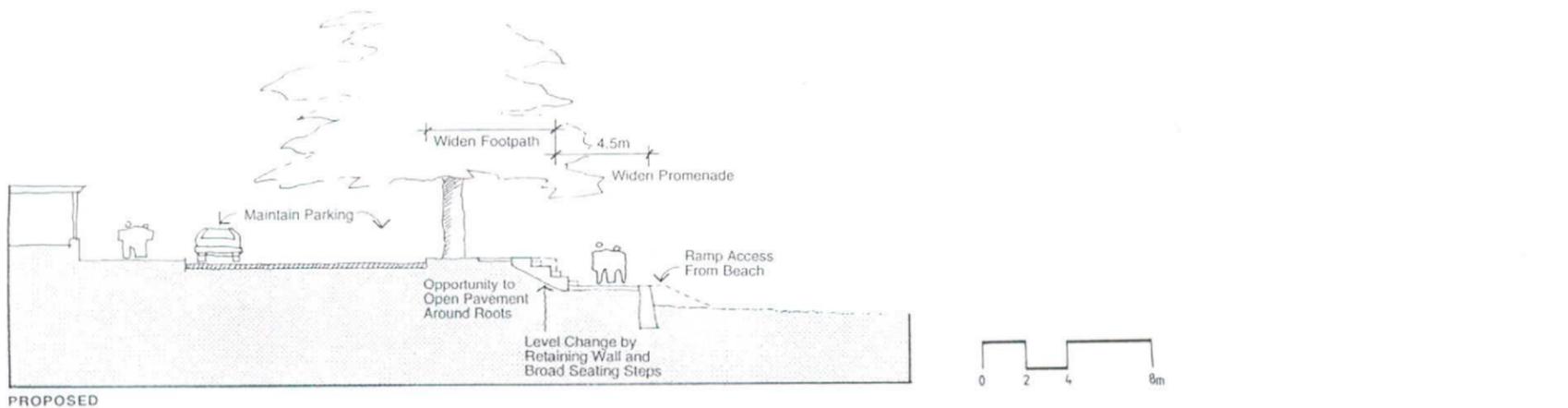
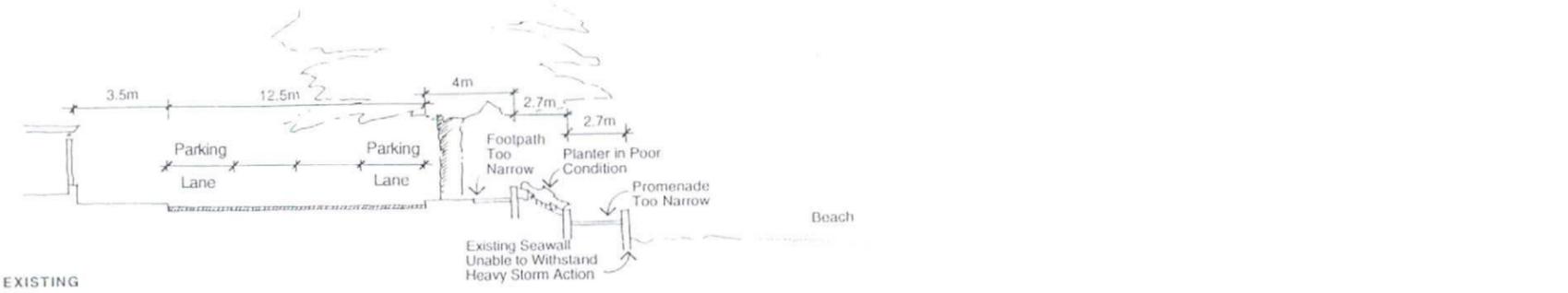
Figure 11: Town Square and Waterfront Plan



SECTION THROUGH CARPARK



SECTION THROUGH "TOWN SQUARE"



SECTION THROUGH SOUTH PROMENADE  
Possible Option subject to future engineering and safety requirements

Figure 12: Town Square and Waterfront Sections

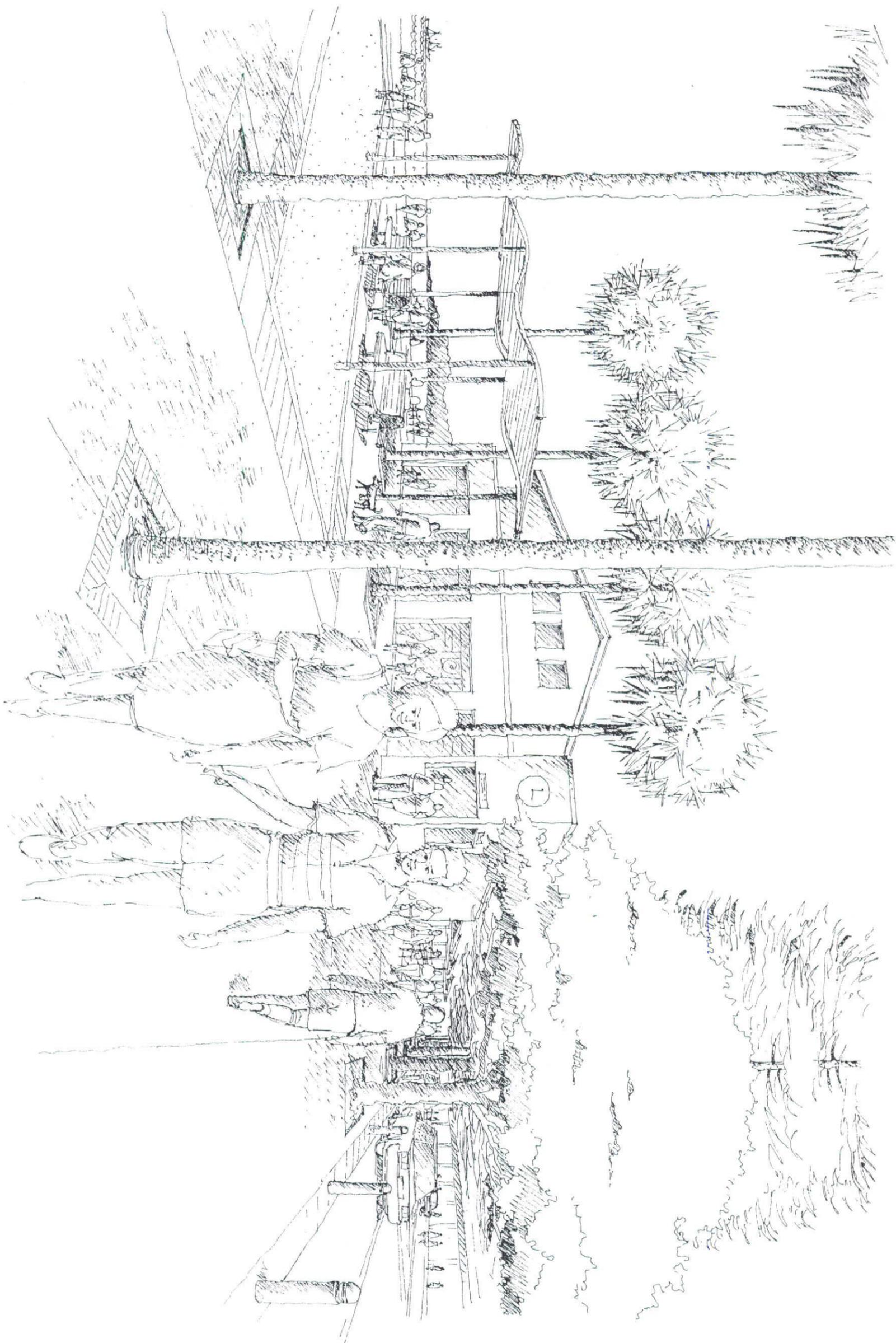


Figure 13: Town Square

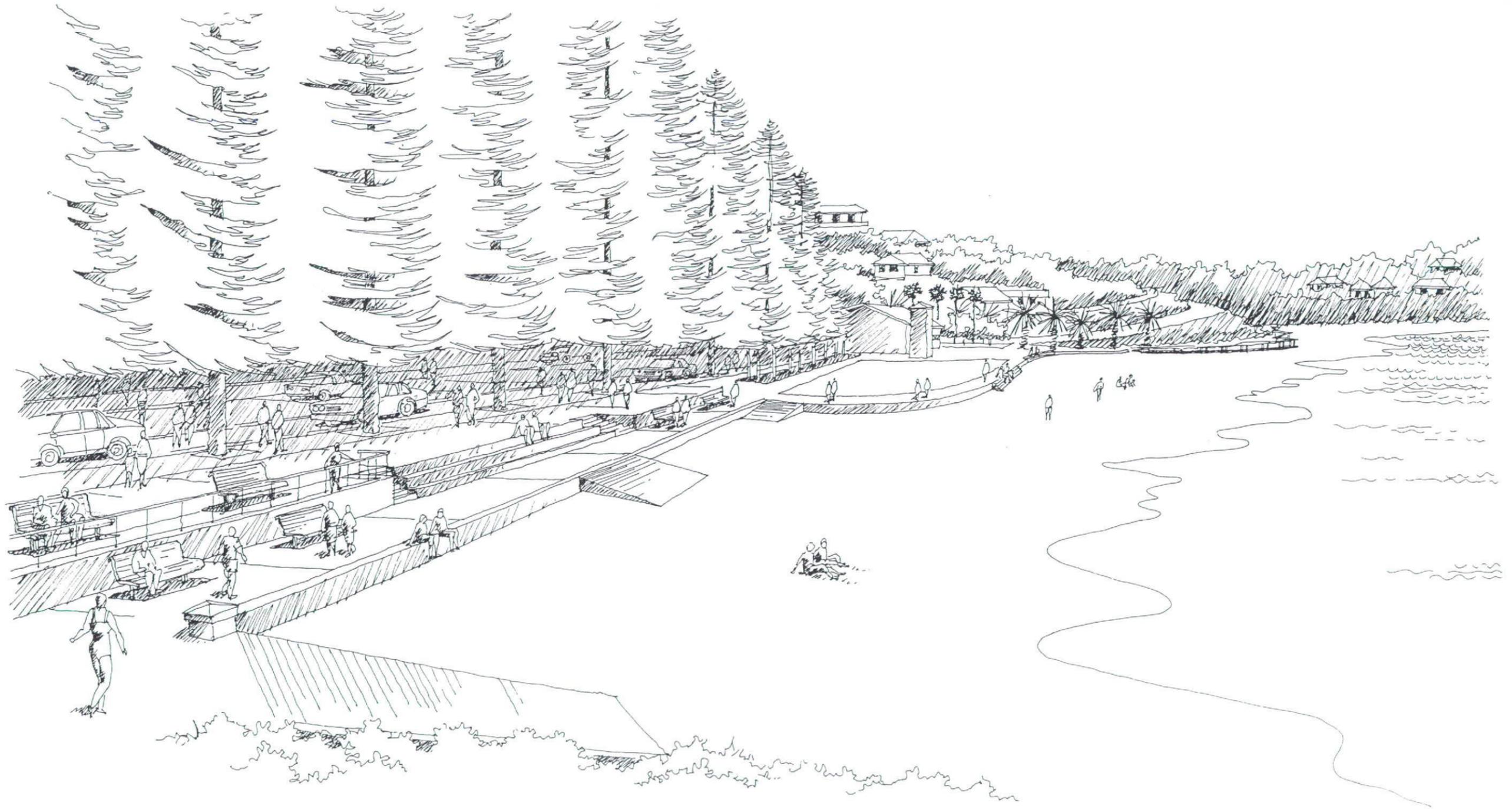


Figure 14: Terrigal Promenade

Possible Promenade Option subject to future engineering and safety requirements

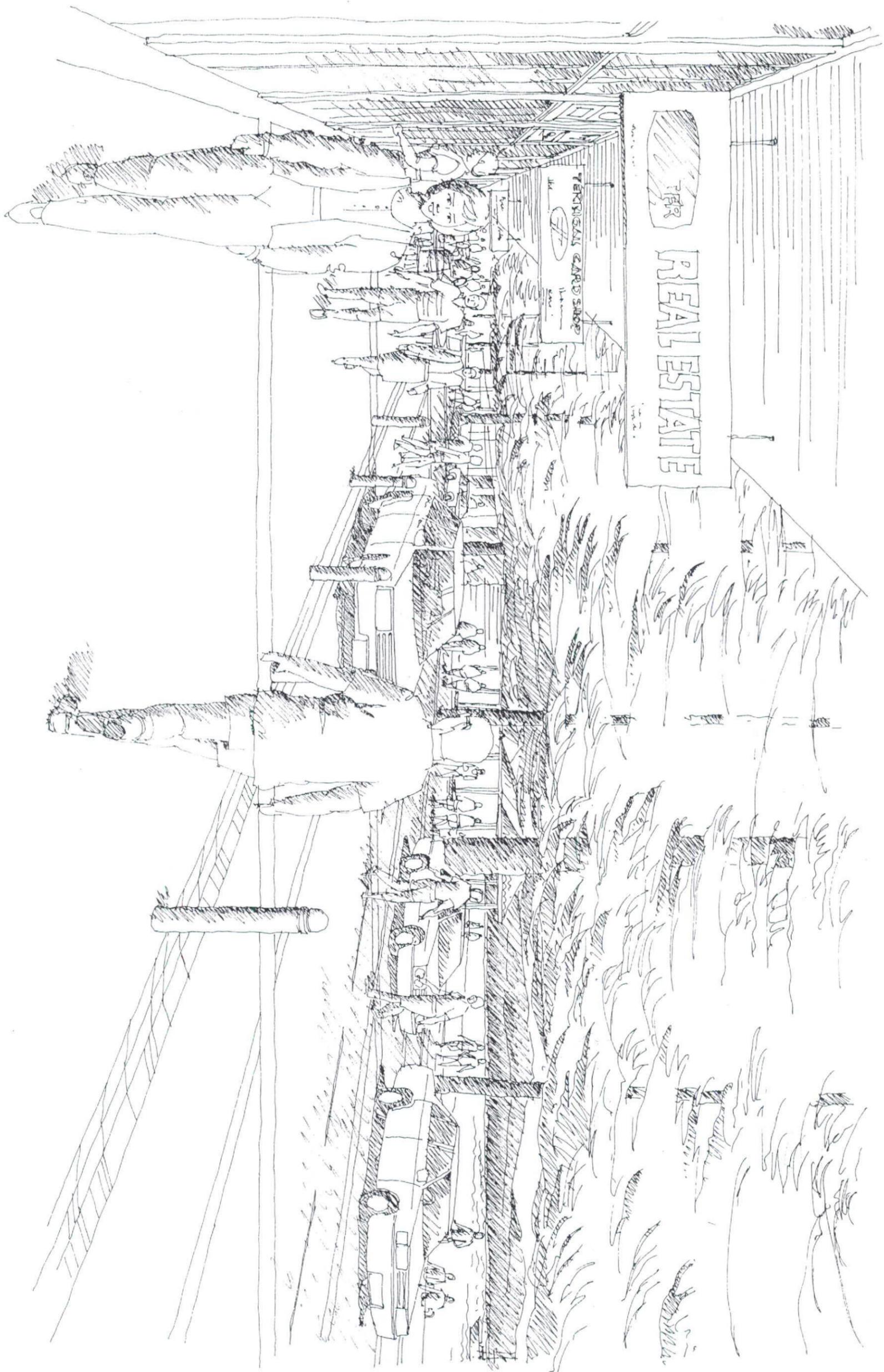


Figure 15: The Esplanade

#### 4.4 THE HEADLAND - ROCKPOOL AND LOOKOUT

The natural features of this small headland are outstanding. From the lookout are panoramic views to Terrigal Beach and The Haven. Below, the small Rockpool nestles into the rocks and is popular with children and families. The rock platform also affords outstanding views of Terrigal Beach and the Haven. The masterplan proposes enhancing these qualities for greater public use, accessibility and enjoyment.

In the short term, the stormwater outfall is integrated within the proposed upgrading of the beachfront promenade to reduce visual impact. Further study is required to ensure a suitable long term resolution of this issue. A small grassed children's play area is created near the Rockpool and brightly coloured play equipment with a nautical theme is proposed. A new, well lit amenities block is nestled into the cliff and screened with vegetation. The link from the beach promenade to the pool area is upgraded with a 2.3m wide timber boardwalk replacing the existing concrete path. The Rockpool is upgraded and enlarged, to reduce overcrowding in summer. Sensitively designed seating and shelter are provided. A new timber cliff stairway links the Rockpool to the lookout above subject to future environmental and geotechnical considerations.

A new self supporting timber boardwalk is proposed to link Terrigal Beach to The Haven and provide a level pedestrian connection between the two. It begins at the existing rock platform adjacent to the Rockpool and extends to the sailing club. The boardwalk incorporates viewing platforms, seating and lighting. It stands away from the cliff to reduce the risk from any falling rocks. This new link will be an exciting feature of Terrigal's waterfront experience. Detailed reviews of environmental and geotechnical considerations would be required at the detail design stage of the boardwalk.

The cliff will undergo stabilisation and rehabilitation with native heath vegetation. Shrub planting is proposed along The Esplanade to the entrance into The Haven.

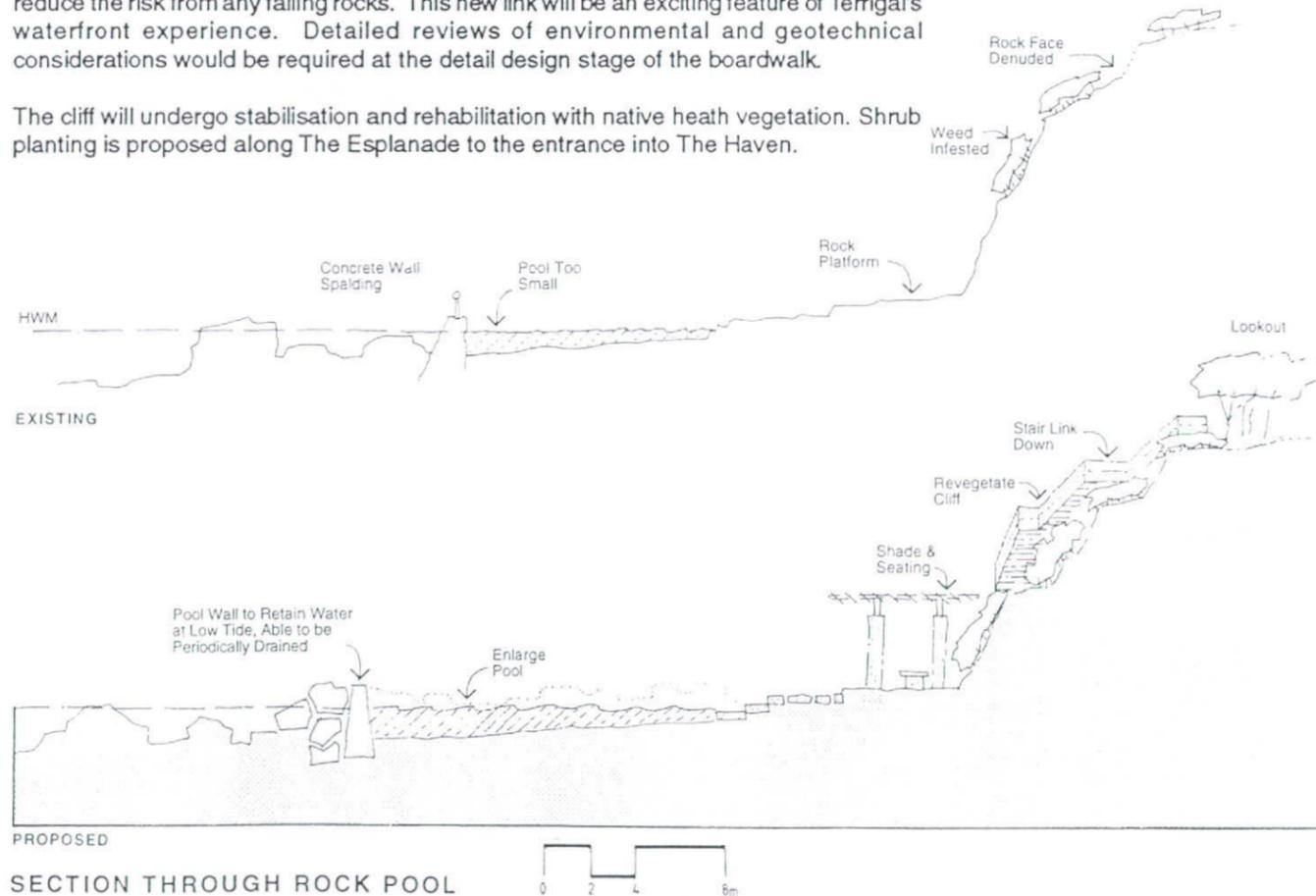


Figure 16: Rockpool Section

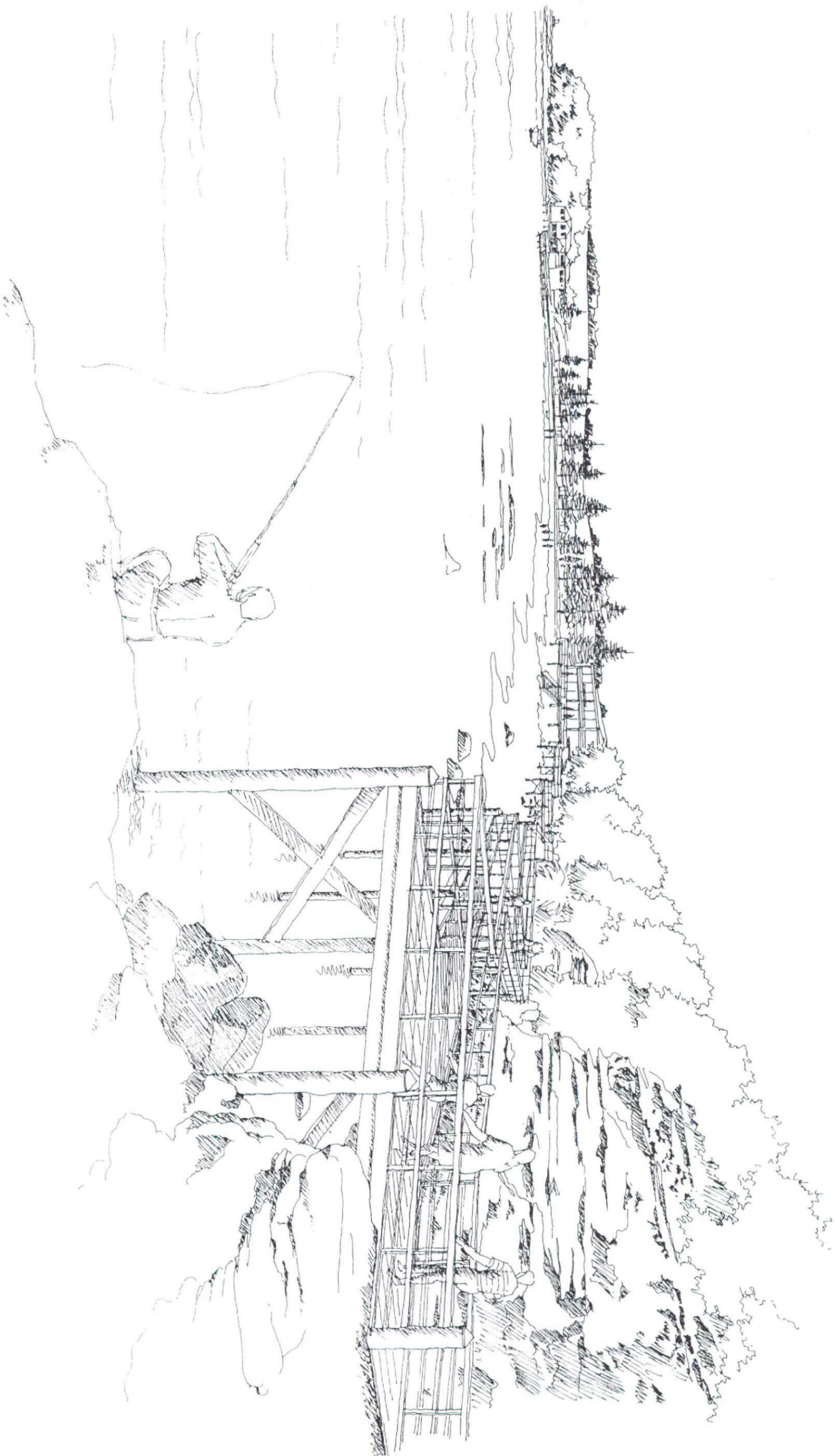


Figure 17: The Haven Boardwalk

#### 4.5 THE HAVEN

The Haven is developed as a major recreational focus consistent with the objectives of the *Terrigal Waterfront Principles Plan, 1992*. The masterplan has sought to reach a balance between the natural systems of The Haven and the provision of compatible recreation facilities. Subtle improvements have been included which are exciting but which do not overwhelm or compromise the most important natural landmark, The Skillion.

An improved, safer entry into The Haven is proposed. A new carpark for 60 cars is created to the western side of The Haven incorporating substantial screen planting to reduce its visual impact. The existing carparks near the Sailing Club are rationalised and landscaped. General upgrading of the Sailing Club environs is proposed, including facilities for outdoor eating, subject to a separate Development Application to Council.

The existing road configuration is retained and formalised around The Haven. New kerbs define the carriageway and parallel parking is incorporated along the outside edge of the road excluding the area in front of The Skillion.

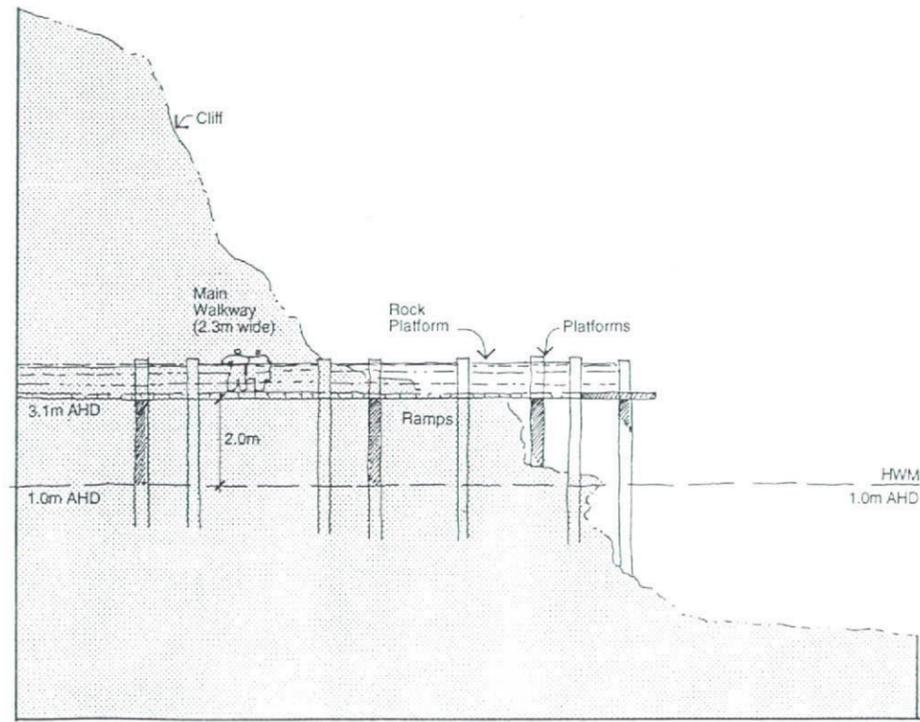
The relocation of the sports facility and the creation of a passive recreation space is the aim of CALM (Department of Conservation and Land Management). The Masterplan therefore recommends the ultimate return of this area to passive recreation. This would be in the form of parkland, incorporating a village green. Associated buildings and clubhouses would also be removed.

Native vegetation is reinstated along the edges and sides of The Skillion. An informal path is introduced to one side and a small deck is located at the summit to reduce the current erosion problem. The pedestrian pathways on The Skillion shall be constructed sympathetically to the environment and surfaced with suitable materials.

On the northern side of The Haven, the beach and existing rock walling is enhanced and a low key pedestrian promenade is proposed. The removal of the one way road between the trailer carpark and the beach is desirable as it would increase beachfront picnic space. Traffic management investigations should be carried out at the detail design stage to determine if this road is necessary for efficient traffic flows in particular the requirements for trailer access and parking. Co-ordinated picnic shelters, seats, and BBQ's are installed. This furniture range will be more 'natural' in character than the 'urban' character of the Terrigal beachfront furniture.

At the eastern end of The Haven beach, the existing buildings, their surroundings and the boat ramp are recommended to be upgraded. Any development of these buildings would be subject to a separate Development Application to Council. Outdoor cafe space could be created and the existing overhead wires relocated underground. The boat ramp needs upgrading to ensure safe use and safe public foreshore access.

Around the headland, extensive areas of coastal heath vegetation are re-established on the existing grass slopes. Some cleared areas are retained for picnicing and other passive recreation. Coastal pathways and lookout points are also established.



THE HAVEN BOARDWALK

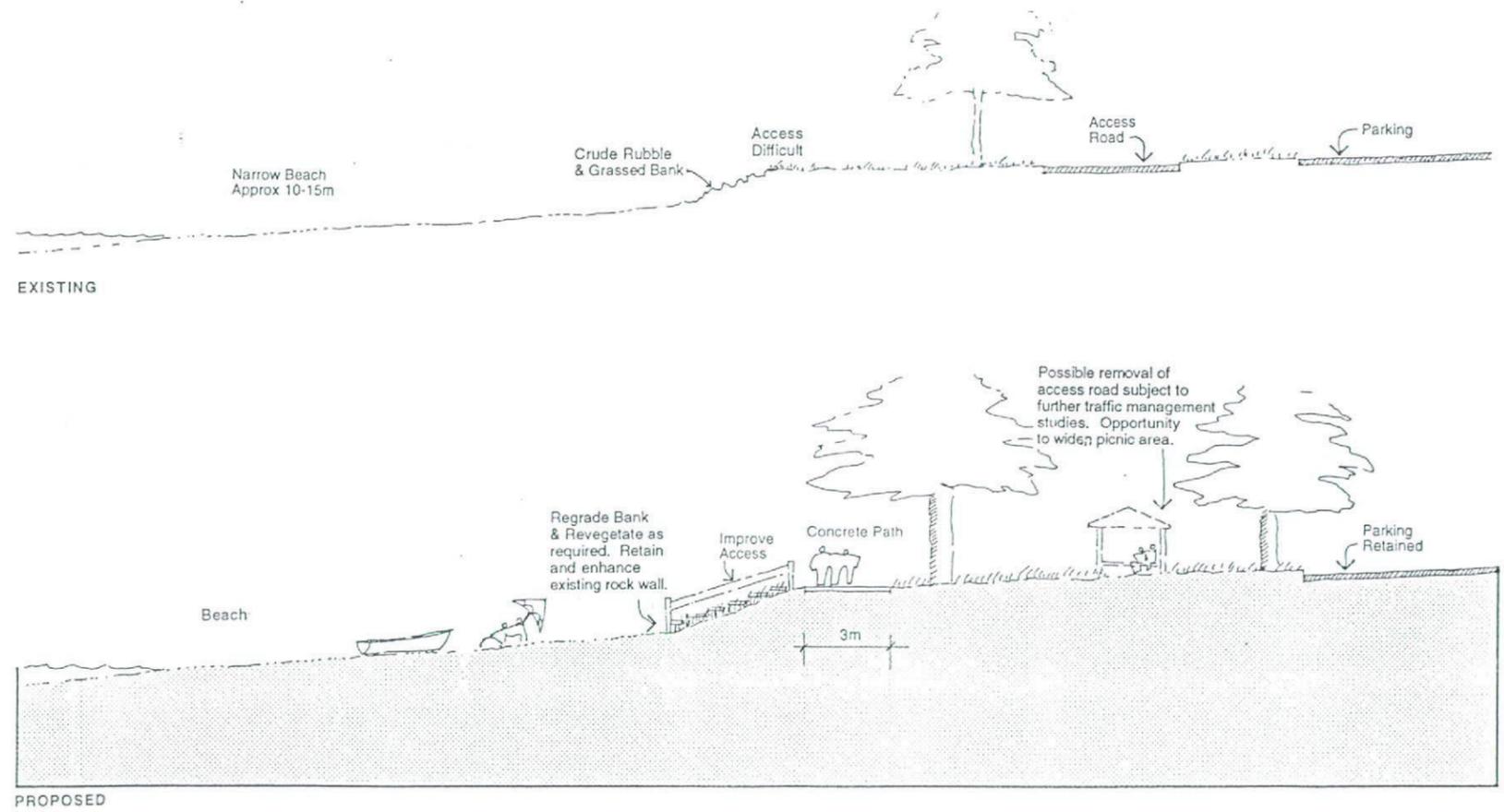


Figure 18: Haven Promenade Section

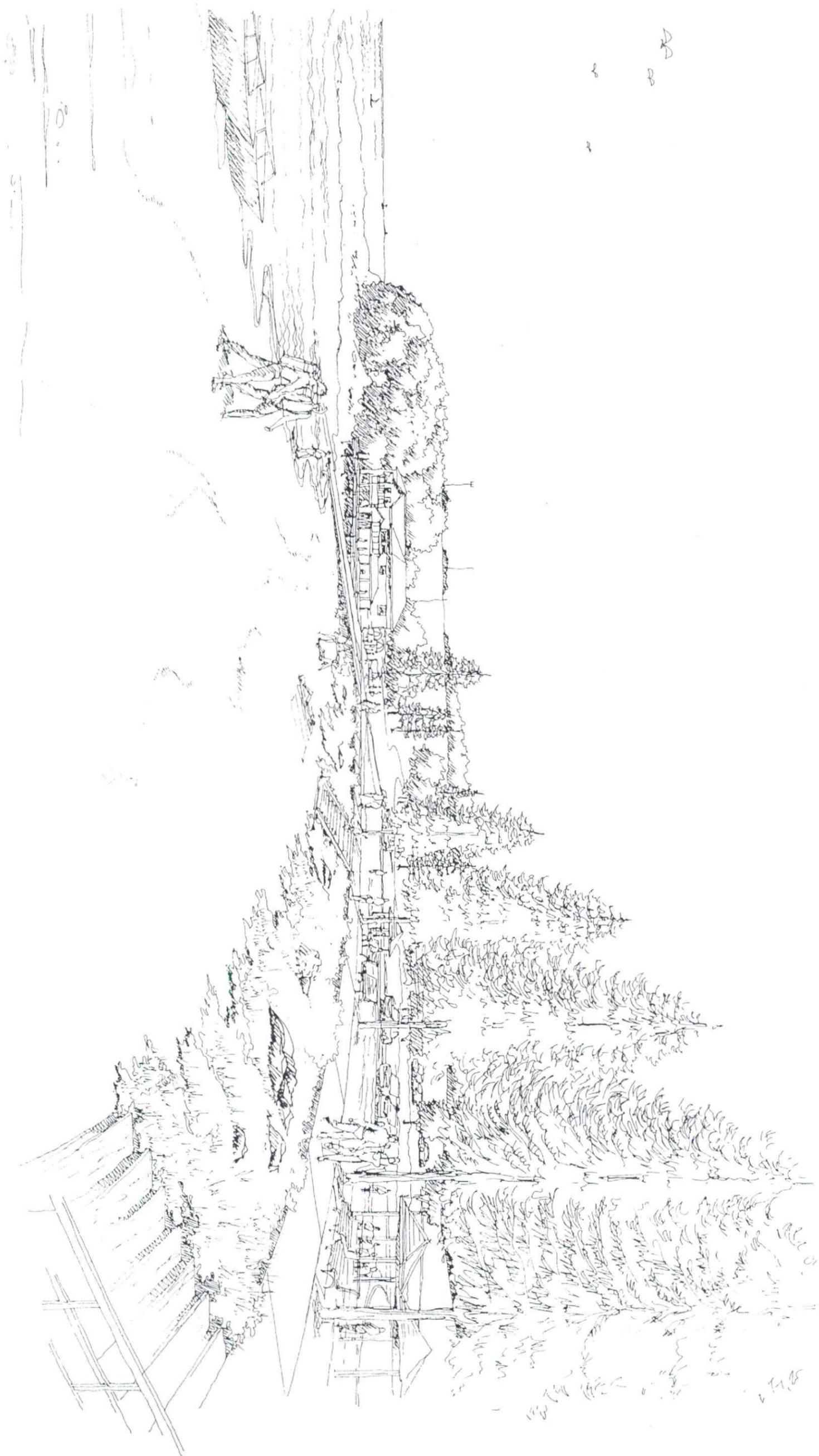


Figure 19: The Haven Promenade

#### 4.6 DESIGN DETAILS

##### i. New Shelters and Facilities

A consistent language of new waterfront structures is proposed. These include:

###### *New Shelters*

All new shelters shall be sensitively designed to minimise the visual impact of the structures on the beach areas.

- There are two types of picnic shelters. Firstly, a timber structure with a gabled roof providing rain and sun shelter, and seats and table. It is composed of two divided bays with views to the water. Secondly, a timber structure with a gabled roof and a large seating platform. These structures are proposed along The Promenade, and in The Haven.
- The shade structure around the Rockpool is a simple timber pergola structure with timber benches underneath.

###### *Facilities*

- The proposed small southern amenities building is a simple masonry and timber structure, matching the character and materials of the proposed upgraded surf club.
- The new children's play area at the southern end of the beach would incorporate nautical themed, brightly coloured play equipment relevant to its beachside location. Slides and climbing structures would link the grassed play area to the beach.
- The five existing outdoor showers are retained and upgraded to co-ordinate with the proposed range of furniture. Their existing locations are the northern carpark (one), the picnic shelter (one), the surf club (one), the southern end of the promenade (one) and the Haven (one).

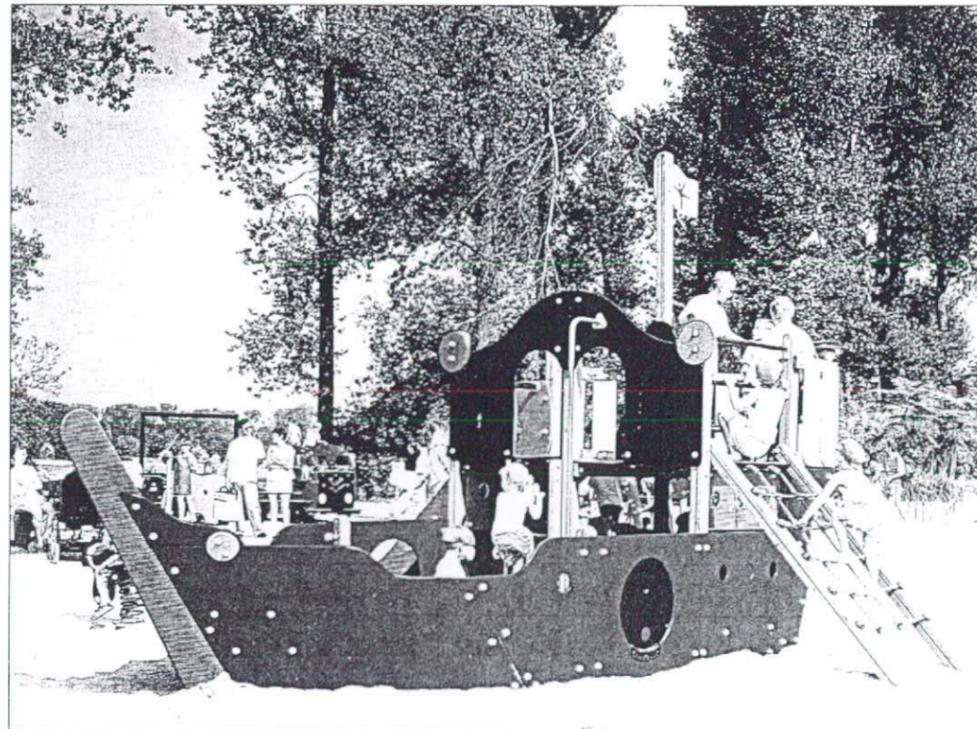
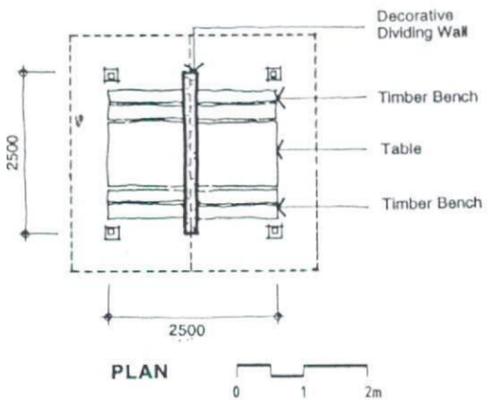
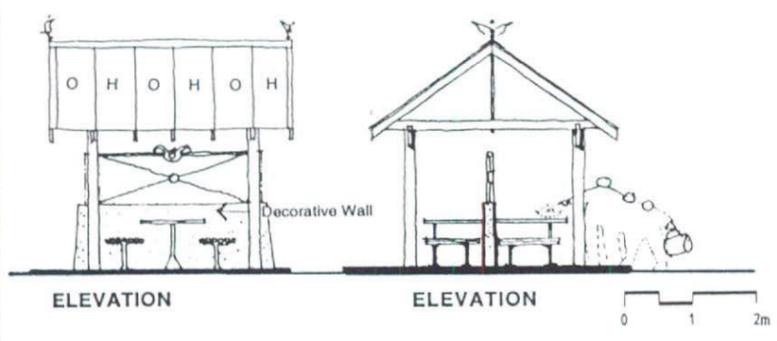


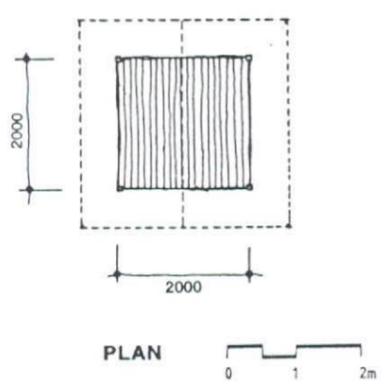
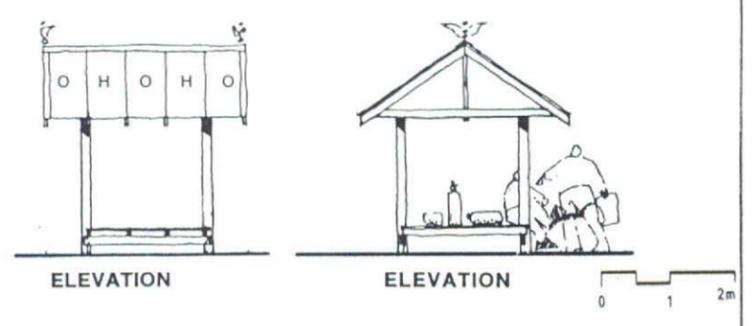
Figure 20: Indicative Children's Play Equipment

O - Off White colorbond  
 H - Homestead Colorbond

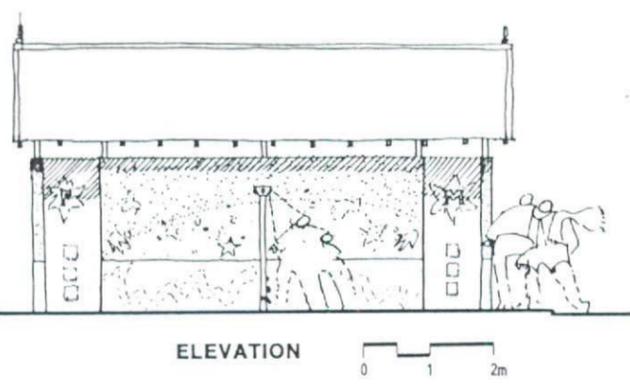


PICNIC SHELTER - TYPE A

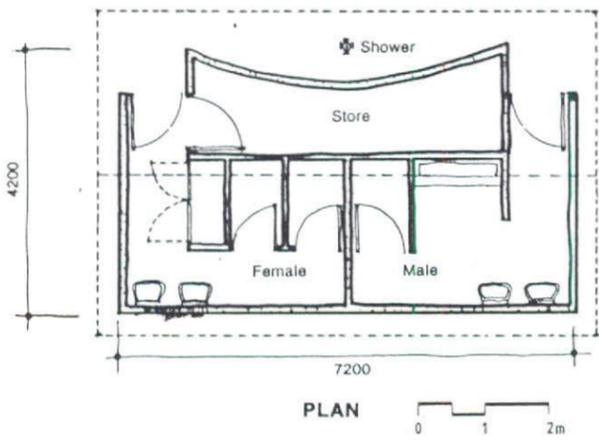
O - Off White colorbond  
 H - Homestead Colorbond



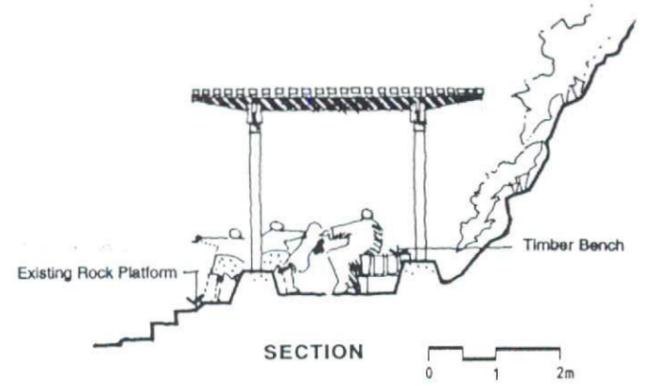
PICNIC SHELTER - TYPE B



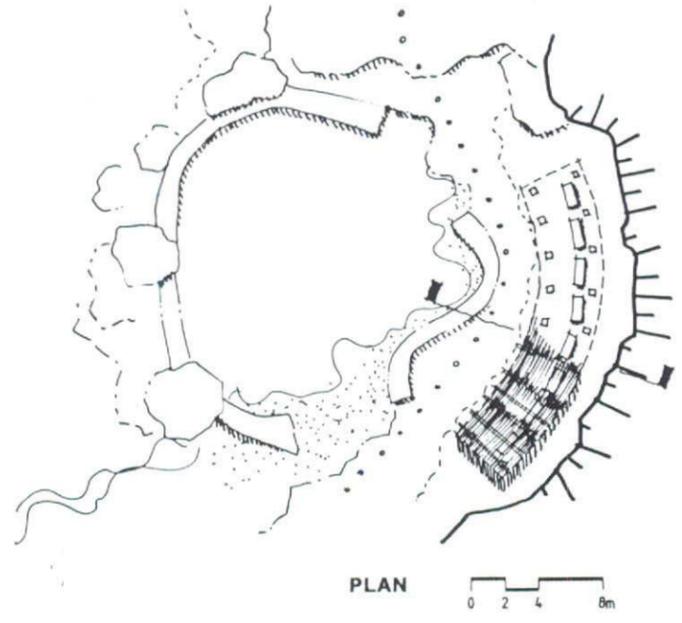
ELEVATION



AMENITIES BLOCK



SECTION



ROCK POOL SHADE SHELTER

Figure 21: Shelters and Facilities

ii. Promenade and Walkways

*Terrigal Promenade:*

- The detail design of the Terrigal seawall and promenade along the beach from the surf clubhouse to the southern end of the beach shall be prepared by Council's Environmental Section. The design study brief shall be developed in conjunction with the Coastal Section of the Department of Land and Water Conservation. The revised alignment shall closely follow the existing alignment, minimising intrusion into the beach.

Following the design of the seawall, a cross section design along the southern end of Terrigal beach will be determined.

*Promenade Pavements:*

- Terrigal and The Haven promenades are concrete construction with a decorative aggregate finish and brick trim to co-ordinate with the Town Centre paving. In the Town Square, decorative motifs of ceramic tile or similar are incorporated in the pavement and can be designed and installed by the local art community.

*Haven Boardwalk:*

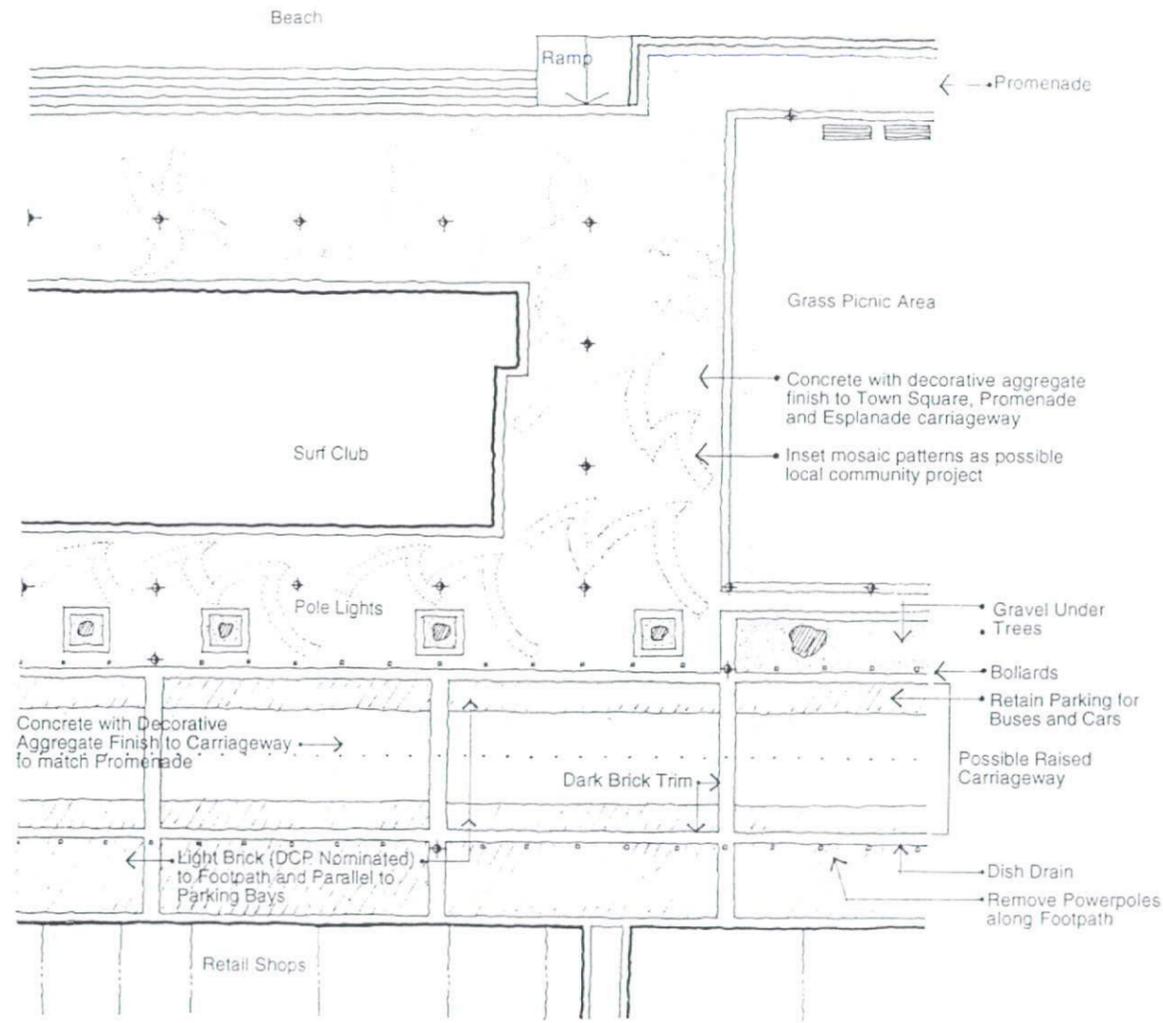
- The Haven boardwalk is a self supporting jetty type timber structure designed to coastal engineering specifications (Refer Appendix 2). It commences at the rock platform and follows the cliff in a zig zag pattern to the sailing club. It is designed for disabled access, and incorporates small seating areas, lighting and viewing platforms. The boardwalk would consist of timber piles and superstructure with timber handrailing on both sides. It would have a proposed deck level of RL 3.1m AHD and a clear walkway width of 2.3m. The precise location of the boardwalk will be subject to further geotechnical survey.

*Footpaths:*

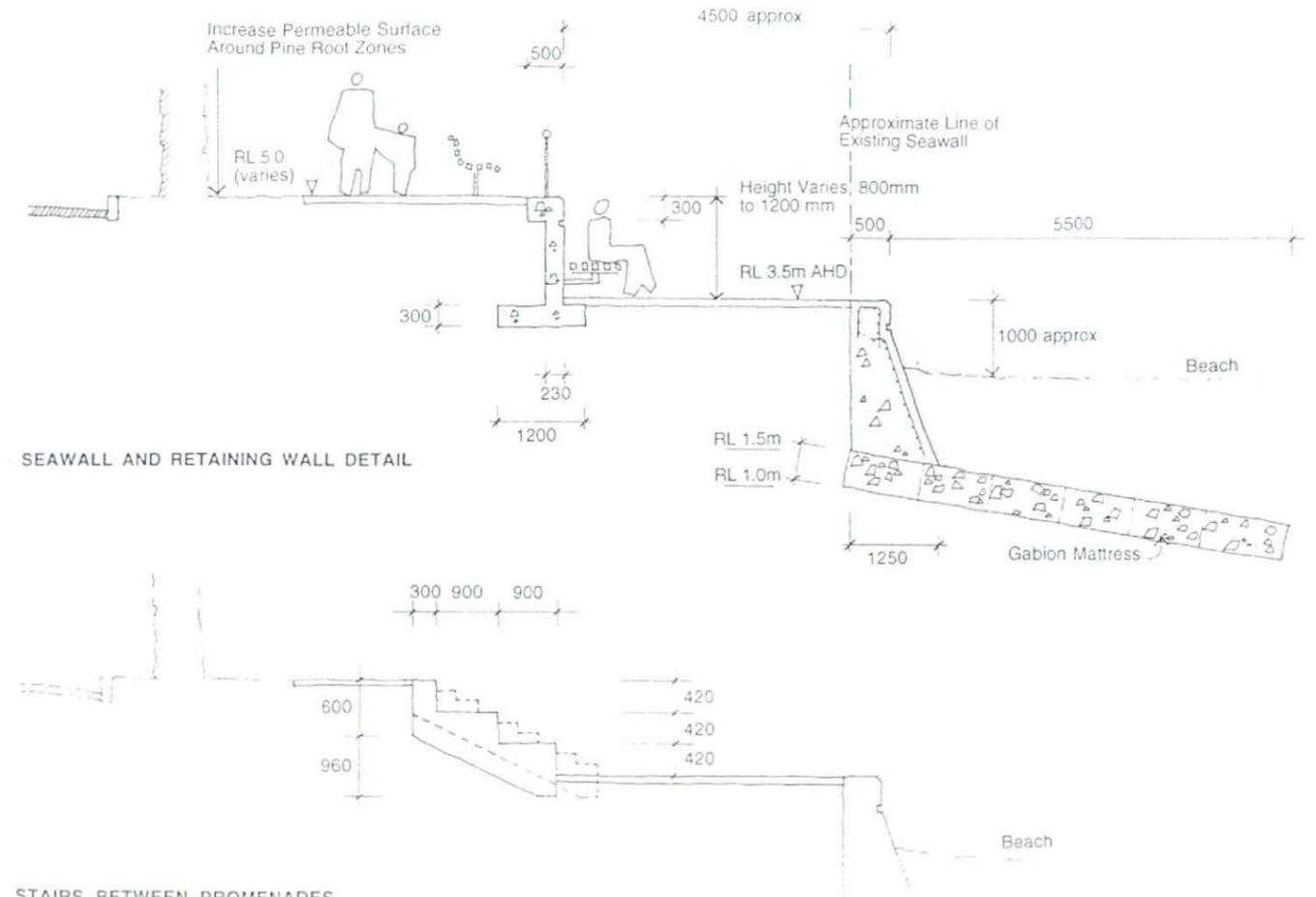
- All footpaths in The Haven and to The Skillion shall be composed of environmentally sensitive materials. This could include stabilised gravel paths with hardwood timber edging. Steps on The Skillion footpath could be composed of hardwood timber risers with stabilised gravel infill. The summit lookout deck could be hardwood timber.

*The Esplanade and Town Centre:*

- Along The Esplanade, the footpaths and parallel parking bays are paved in brick, in accordance with the *Development Control Plan, 1992*. A darker brick will be incorporated as a decorative trim on The Esplanade and also on The Promenade. The two traffic lanes will be paved in concrete with a decorative aggregate finish. The same brick materials will be used throughout the Town Centre precinct.



TOWN SQUARE PAVING DETAIL n.t.s.



STAIRS BETWEEN PROMENADES

PROMENADE DETAIL - TYPICAL SECTIONS n.t.s.  
Possible Option subject to future engineering requirements

Figure 22: Promenade Details

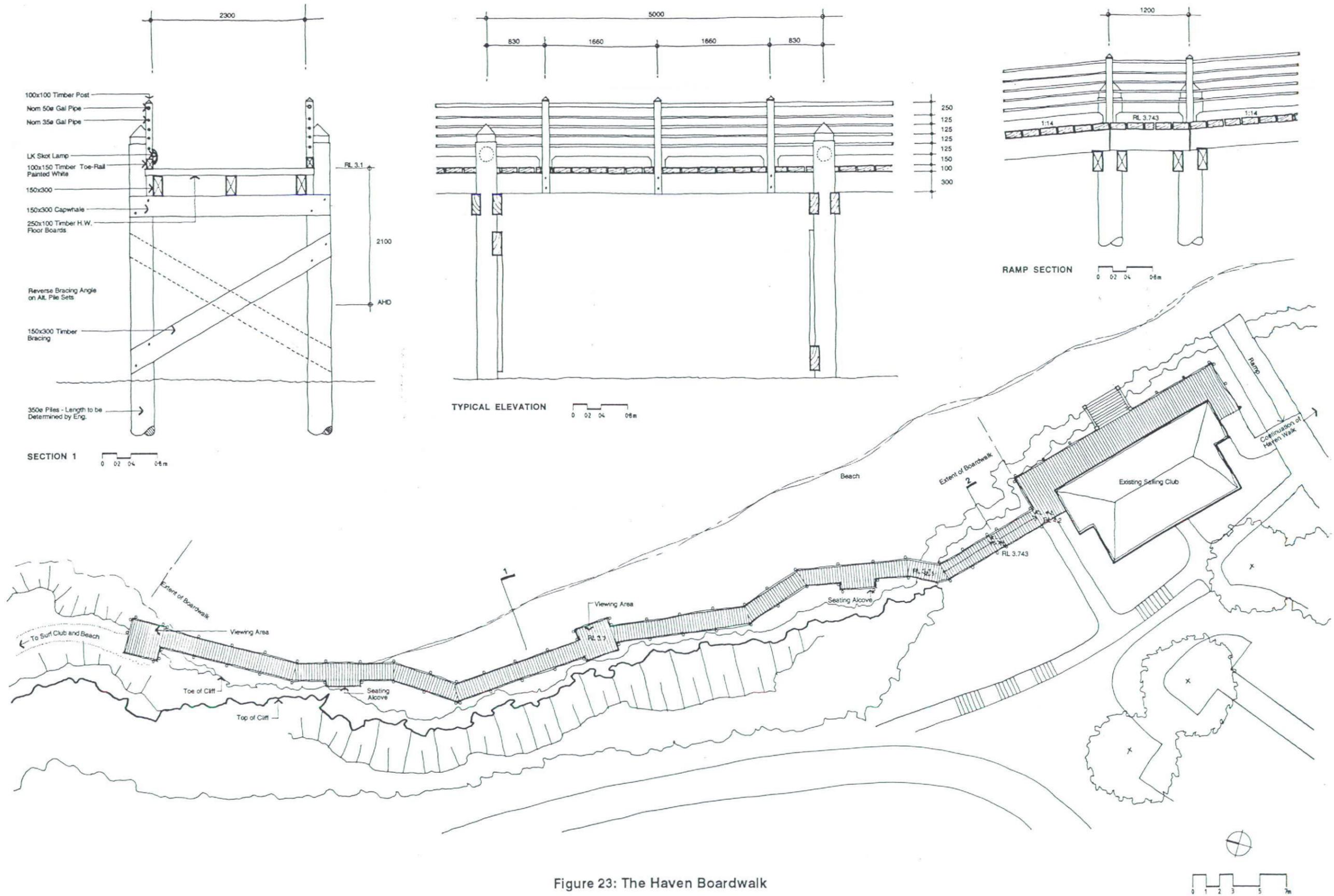


Figure 23: The Haven Boardwalk

iii. Furniture

The *Development Control Plan, 1992*, has recommended a range of street furniture which has been incorporated into this masterplan study. These include:

- **Seats, Bollards and Bins - Street Furniture Australia**  
Generally, seating shall be anchored securely and bin liners shall be secured inside bins to minimise vandalism.  
CM Plaza 1  
CM Plaza 1A  
B2 Bollard  
LBI Bin
- **Bench - Zebra Design**  
3001
- **Tree Grate - Mascot Engineering**  
T601:1200/450
- **Lighting - Louis Poulsen & Co**  
Orbiter Pole Maxi

Along The Esplanade and the Town Centre precinct the following colours are recommended by the *Development Control Plan, 1992*.

- All timber for seats, benches to be finished with 'Jarrah Colourguard'. It is a waterbased clear finish which contains red pigments designed to protect and enhance the naturally occurring red colouring of Jarrah.
- Metalwork, which includes seat and bench frames, bins, bollards and light standards, to be hot dip galvanised and powdercoated 'Transformer Grey'.
- The following surfaces are not to be painted - brass, bronze, copper, stainless steel or aluminium.

Along the beach front, Promenade, and The Haven, a new colour scheme will be developed in the next design stage. These colours will complement the colours of the Town Centre whilst highlighting the different uses and identity of the beachfront areas.

#### iv. Lighting

A lighting concept has been developed with lighting incorporated throughout the beachfront areas of Terrigal and The Haven. All lighting fixtures should be robust and vandal resistant.

The concept includes:

- To brightly light The Esplanade, the Town Square and carparks. This is achieved predominantly with pole mounted lights.
- Along the promenades and boardwalks softer lighting occurs at foot level. This illuminates the walkway but does not impede water views with a 'wall' of light. Lights will be predominantly bollard lights or wall mounted lights.
- Wall mounted lights occur along the Promenade seawall, softly lighting the beach sand below. This is limited to the section of seawall adjacent to the grassed area.
- Feature uplighting highlights the Norfolk Island Pines (subject to further study on the long-term health and amenity of the trees), and the two headlands which define The Haven beach.
- Feature lighting is incorporated into the children's play equipment.
- Underwater lighting of the Rockpool could also be incorporated.

The following fixtures are proposed:

- **Pole Mounted Lights** - Louis Poulsen Lightmakers  
Orbiter Pole Maxi (as recommended by the *Development Control Plan, 1992*)
- **Boardwalk and Wall Mounted Lights** - Bega  
Flush mounted circular wall light - 120mm diameter and 200mm diameter
- **Bollard Lights** - Louis Poulsen Lightmakers  
Waterfront

#### v. Interpretation / Education

A comprehensive signage and interpretation system is proposed to maximise visitor enjoyment of Terrigal and The Haven. The interpretation of the natural diversity and cultural richness of the area will significantly contribute to the visitor experience. Directional signage will provide further assistance to visitors.

Interpretative signage provides the opportunity to educate and inform the public about natural systems, flora and fauna, and history. For example, along The Haven boardwalk signs could reveal the natural systems at work in the intertidal zone, what sea creatures are found below and describe the ship building history of The Haven. Directional signage would indicate the location of various activities, facilities and routes to other areas.

Signage will be designed to be consistent with the selected range of street furniture. More detailed resolution of fonts, styles and colours will occur in the detailed design stage.

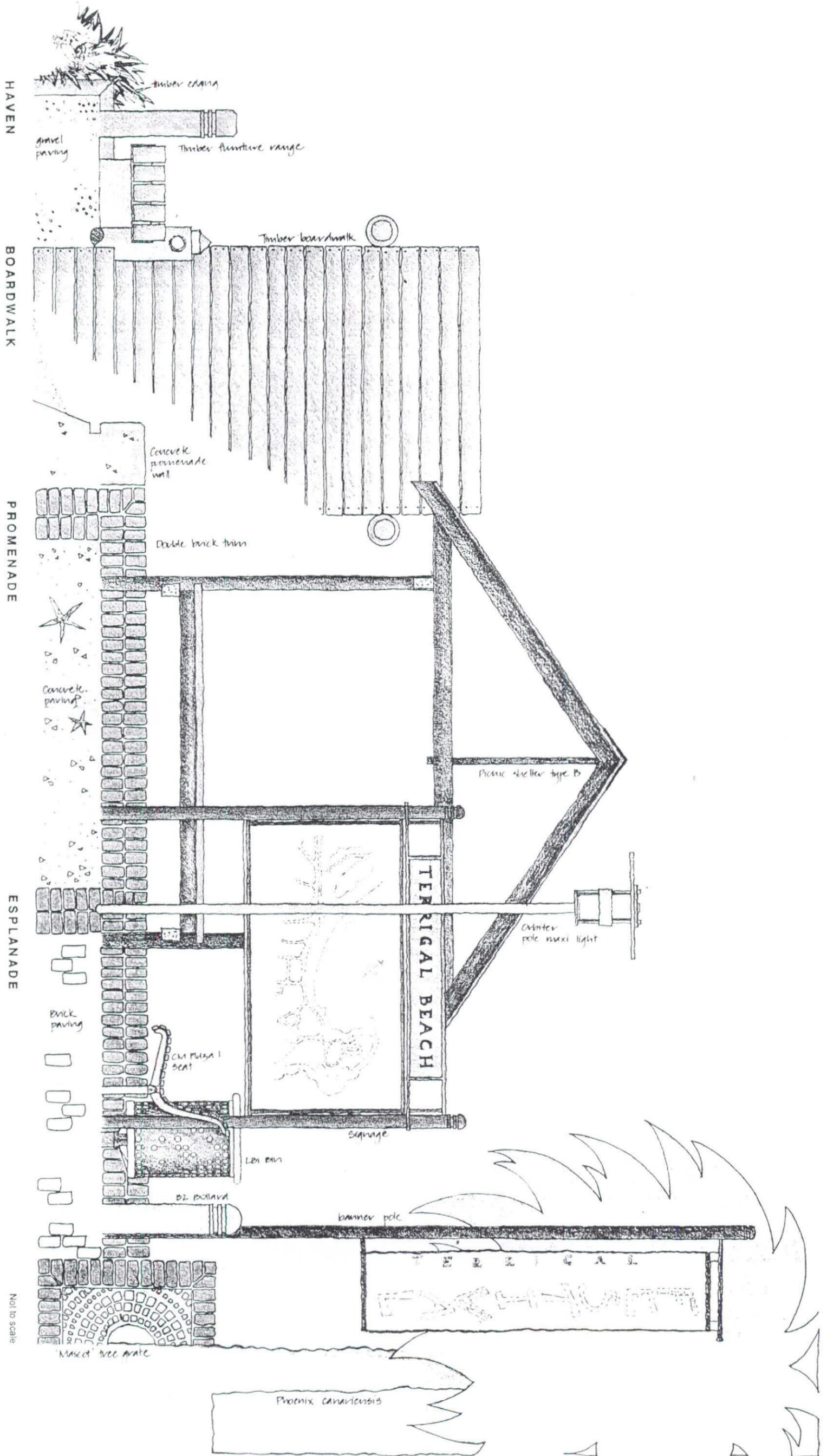


Figure 24: Furniture, Lighting and Signage

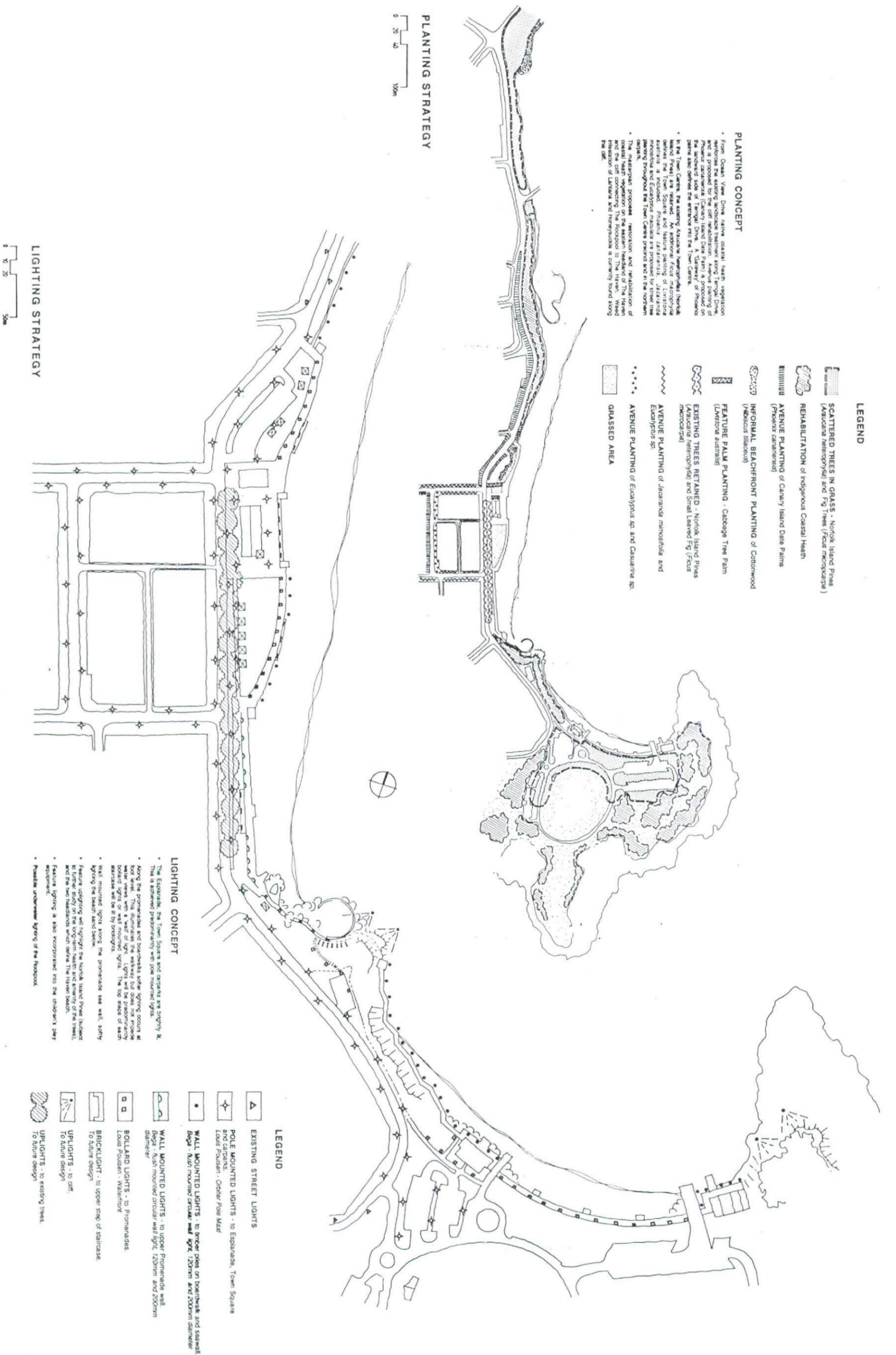


Figure 25: Lighting and Planting Strategies

vi. Planting

The planting strategy proposes street tree planting to the Gateway and Town Centre areas, and native coastal shrub planting to The Haven and cliff escarpments.

- From Ocean View Drive native coastal heath vegetation reinforces the existing landscape treatment along Terrigal Drive, and is proposed for the cliff rehabilitation. Avenue planting of *Phoenix canariensis* (Canary Island Date Palm) is proposed on the landward side of Terrigal Drive. A 'Gateway' of *Phoenix* palms also defines the entrance into the Town Centre. These palms are currently a feature of Church Street and are dotted throughout the Terrigal area. They are appropriate for use considering the man-made impact on the Terrigal environment.
- In the Town Centre, the existing *Araucaria heterophyllas* (Norfolk Island Pines) are retained. An additional *Ficus macrophylla* defines the Town Square and feature planting of *Livistona australis* is included. *Hibiscus tiliaceus* is proposed along the eastern edge of the carpark, providing shade and floral interest for parked cars and picnickers. *Phoenix canariensis*, *Jacaranda minosifolia* and *Eucalyptus maculata* are proposed for street tree planting throughout the Town Centre precinct. The islands within the Terrigal carpark shall be planted with salt tolerant shade trees. The species will be determined by Council's Program Manager - Recreation and Bert Hunter.
- The masterplan proposes restoration and rehabilitation of coastal heath vegetation on the eastern headland of The Haven and the cliff connecting The Rockpool to The Haven. Weed infestation of Lantana and Honeysuckle is currently found along this cliff. The following list of recommended species comes from the *Terrigal Haven Plan of Management, 1990*. Some additional species have also been included.

These species reach a maximum height of approximately 3-4 metres due to severe wind pruning by salt-laden winds.

<i>Banksia integrifolia</i>	Coast Banksia
<i>Dianella caerulea</i>	Paroo Lily
<i>Westringia fruticosa</i>	Coast Rosemary
<i>Allocasuarina distyla</i>	Scrub She-oak
<i>Lomandra longifolia</i>	Spiny Headed Mat-rush
<i>Leptospermum laevigatum</i>	Coast Tea-Tree
<i>Kennedia rubicunda</i>	Dusky Coral Pea
<i>Clematis aristata</i>	Travellers Joy
<i>Darwinia fascicularis</i>	-
<i>Hibbertia scandens</i>	Climbing Guinea Flower
<i>Kunzea ambigua</i>	White kunzea
<i>Acacia longifolia</i>	Sydney Wattle
<i>Acacia longifolia</i> var <i>sophorae</i>	-

vii. Crime Prevention

It is important that the proposal complies with environmental planning for crime prevention. Generally, all structures, materials and fixtures should be robust and vandal resistant. All furniture must be anchored securely, with a preference for surfaces and materials from which graffiti can be easily removed. These issues must be addressed at the detail design stages of work.

## 5.0 ISSUES SUMMARY

The Masterplan Report has identified a number of issues which require more detailed assessment and consideration.

### 1. Promenade Seawall

The existing promenade seawall, constructed after major storms in 1974, consists of timber front and rear walls. The masterplan proposes upgrading the promenade to ensure it is visually and functionally more successful. Its alignment shall closely follow the existing alignment. The detail design shall be carried out by Council's Environment Section and in conjunction with the Coastal Section of the Department of Land and Water Conservation.

### 2. Waterfront Buildings

Currently four buildings are located on the Terrigal beachfront including the Surf Club, two amenities facilities and a picnic shelter.

The masterplan supports the upgrading of the existing Surf Club. Extensions to the Surf Club have been proposed by the Club and incorporate the existing amenities blocks into the Surf Club extension. As the building is within the storm hazard zone, all extensions and proposed uses must be essential services only.

The existing picnic shelter is currently underutilised and visually obstructs water views. This structure should be removed and replaced by a number of smaller picnic structures which permit more flexible use and maximise views to the beach as recommended in the *Development Control Plan, 1992*.

An additional amenities building is proposed at the southern end of the beach. It is "carefully sited against the cliff, and of a design character consistent with the other beachfront buildings" as required by the *Development Control Plan, 1992*. A small maintenance shed located in the existing picnic shelter has been relocated within this amenities building. (Refer Section 4.6 New Shelters and Facilities). It shall be well lit to minimise vandalism.

### 3. Safety Requirements

The construction of the boardwalks, promenades, steps and ramps involves the issue of public safety. Safety precautions need to be considered in the detailed design stage of these structures, and liaison with Council during this process would help ensure the most suitable designs in terms of safety, aesthetics and cost. A comprehensive system of warning signs will need to be established within the signage and interpretation system.

Matters such as risk management, insurance and indemnification of the Crown will also need to be addressed at the detail design stage.

#### 4. Stormwater Management

The current proximity of the stormwater outfall and children's pool poses a potential health and safety problem and requires a satisfactory resolution. However, the scope of this masterplan study does not include recommendations for resolving the conflict. The *Draft Terrigal Trunk Drainage Study, 1993*, has suggested possible alternatives such as a gross pollutant trap near the Bowling Club and a silt trap under Church Street. A more comprehensive assessment of these and other alternatives should occur in the near future to ensure that this issue is adequately and competently resolved.

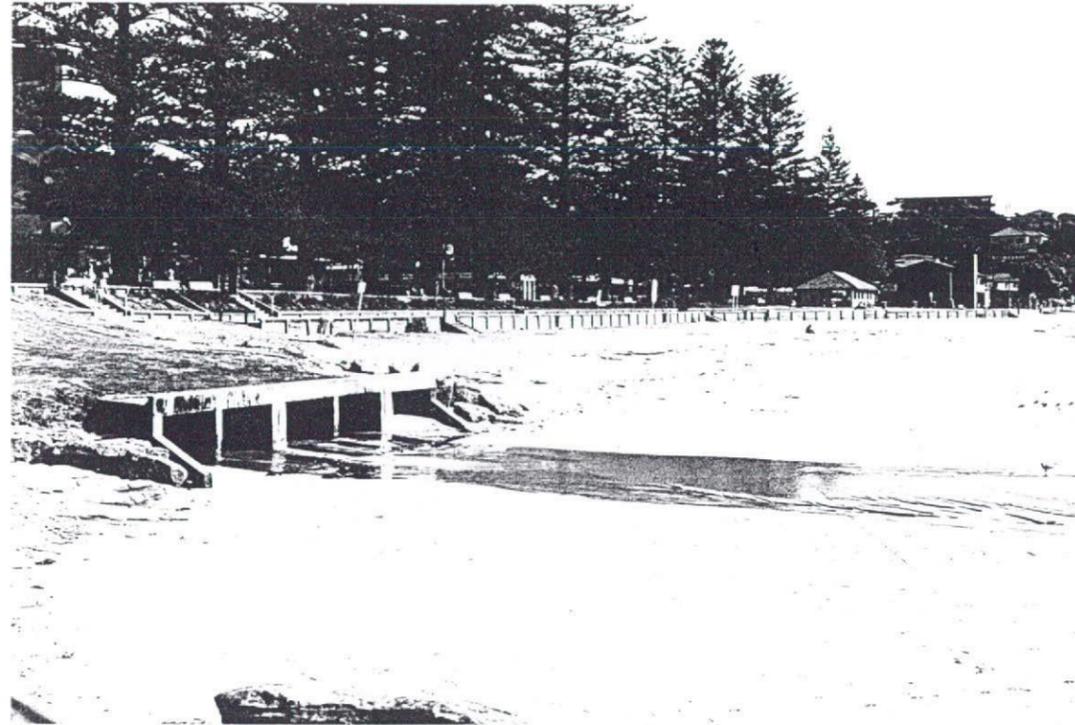


Figure 26: Existing Stormwater Outfall

#### 5. Carparking and Traffic Management

Generally carparking and traffic management have been excluded from the scope of this masterplan study. Any modifications shown on the masterplan are in line with the recommendations outlined in the *Development Control Plan for Terrigal, 1992* and the *Terrigal Waterfront Principles Plan, 1992*. These include reducing the size and scale of the carpark to the north of Terrigal beach and rationalising carparking in The Haven.

The masterplan acknowledges the future possibility to review traffic management in the Terrigal CBD.

## 6.0 FUNDING AND IMPLEMENTATION

### i. Funding

#### Possible Funding Sources

Obtaining funding for a project of this scale and nature is a challenge which will be led and managed by Gosford City Council.

Funds for the project may be obtained from:

- Federal Government
- State Government
- Local Government sources: Section 94 Contributions

#### Federal Sources

##### *Local Capital Works Program "Communities at Work"*

- This program is administered by the Commonwealth Office of Local Government in co-operation with State and Territory Local Government Associations.
- This program involves targeted regions and individual Councils that have experienced above average levels of unemployment.
- The program funds projects which:
  - are strategically important to economic and social development
  - involve high local content in terms of labour, goods and services
  - have early commencement dates
- It is expected that local Councils will contribute between 10% to 20% in cash or kind.
- \$350 million was made available Australia wide for 1992-93 financial year under the "One Nation" program.
- Of this, Gosford City Council received approximately \$3.5 million allocated to previously identified capital works projects.

##### *Commonwealth Training and Employment Programs*

Two current programs include:

- Job skills for Land Care
- Land Care and Environment Action Program

Job skills for Land Care - 12 month training program involving 25% off job and 50% on job training. An amount is allocated per trainee per week including a sum per participant for administrative and training overheads. Also additional funds are provided per trainee for materials. 12% unemployment criteria has to be met.

Administrative Brokers: can be State, Local Council or private organisations.

Landscape improvements and construction of the boardwalk could be ideal for this funding category. This will require Council's involvement to administer the program.

#### State Government Sources

##### *Roads Authority Funds*

The Roads Authority Funds will bear the full cost of all traffic lane widening necessary to accommodate a cycleway approved by both Council and the RTA as an element of an adopted cycleway strategy plan.

The Roads Authority Funds will bear half cost of an agreed separate cycleway or shared cycleway / footpath constructed along or adjacent to a classified road.

*NSW Coastal Waterways Program*

This program is administered by NSW Public Works Coastal Engineers specifically for construction of jetties, boat launching ramps and associated works, eg., carparking. It will fund 50% of all approved works including:

- Pre-construction costs
- Council or any other Federal (but not state) organisation will be required to fund the rest.

*Coastal Management Program*

This program is administered by NSW Public Works Coastal Engineers. Again the funding is for 50% of all approved works including pre-construction costs. This program could fund items such as the timber boardwalk(s), promenade improvements and associated landscaping.

Note: The eligibility of financial assistance under this Program is conditional on the compliance with the guidelines provided in the *Coastal Management Manual, 1990*. The offer of subsidy depends on the normal budgetary constraints and state-wide priorities.

Local Government Sources

Funding for different stages of the project could also be arranged through the distribution of Section 94 contributions. The availability of NSW State Grants depends on matching Council and/or Federal contributions.

ii. **Implementation**

The successful implementation of the Terrigal Waterfront Landscape Masterplan relies on the commitment to a staged program of works which can be carried out as and when funds become available.

The following stages are proposed as part of the Implementation Program.

**Stage 1**

- 1.1 Construction of The Boardwalk Link and associated landscaping from The Rockpool to The Haven to terminate at the Sailing Club.
- 1.2 Construction of The Promenade Link to The Rockpool including upgrading of pathways, new landscaping, children's playground, new toilets and lighting.
- 1.3 Carry out improvements to The Haven related to landscape development and planting improvements, improvements to existing access, circulation and parking.
- 1.4 Undertake appropriate measures to maintain the existing Norfolk Island Pines in The Esplanade.

**Stage 2**

- 2.1 Streetscape improvements to The Esplanade including new paving, new landscaping, lighting and furniture.
- 2.2 Improvements to Terrigal Drive and The Gateway including enhancement of the carpark.

**Stage 3**

- 3.1 Carry out improvements to The Promenade including the building of the new seawall, upgrading of the Surf Club, creation of the Town Square and integration of new furniture, lighting and signage.

## 7.0 ESTIMATE OF COSTS

An outline order of probable cost was prepared based on the sketch masterplan drawings and is summarised below.

Cost calculations are based on March 1996 costs and are works costs only. They do **not** include allowances for:

- Preliminaries and Site Establishment (allow 8%)
- Contingencies (allow 2.5%)
- Professional Fees (allow 12%)

They are not intended as an accurate commercial assessment. They are intended as a general guide for funding and implementation strategy planning.

A number of non-specific items have also not been included in the costings including utility service relocations / temporary works, legal costs, temporary diversions or works, abnormal ground conditions or further geotechnical surveys. The costs of preparing appropriate environmental assessments of the works has also not been included.

The Summary of Probable Costs is as follows:

### STAGE 1 WORKS

Item	Cost
<b>1.1 Boardwalk Link to The Haven, including:</b>	
• Timber pile boardwalk	\$500,000
• Cliff planting rehabilitation	\$32,500
• Timber access deck around Sailing Club	<u>\$45,000</u>
	<b>\$577,500</b>
<b>1.2 Beach Promenade to Boardwalk Link (Children's Pool / Playground Area), including:</b>	
• Upgrade footway to pool (timber)	\$30,000
• New toilet, storage building (Possibility for inclusion in later stage to minimise anti-social behaviour)	\$50,000
• Children's playground	\$25,000
• Enlargement of Rockpool	\$15,000
• Timber stairs to lookout	\$15,000
• Timber shade pergola and seating	\$20,000
• Lighting, signage, seats etc.	\$15,000
• Rehabilitation, planting to cliff and slopes	<u>\$22,000</u>
	<b>\$192,000</b>
<b>1.3 Haven Landscape Improvements, including:</b>	
• Minor regrading embankment and planting	\$25,000
• New concrete promenade and steps to beach	\$14,700
• Remove access road and upgrade picnic area (if required)	(\$14,000)
• Picnic shelters, seating, BBQ's, lighting around picnic area	\$50,000
• Upgrading oval road and parking	\$20,000
• Headland rehabilitation planting, pathways, lookout platforms	\$250,000
• General lighting, signage, bins etc.	<u>\$15,000</u>
	<b>\$388,700</b>
• New carparking areas	\$190,000
• Entry road upgrading	<u>\$25,000</u>
	<b>\$215,000</b>

**STAGE 2 WORKS**

<b>2.1 Esplanade - Improvements, including:</b>	
• Widen western footpath and brick paving	\$250,000
• Shared traffic zone with new brick and concrete pavement (optional)	(\$200,000)
• New lighting, bollards, seats, bins, signage	\$97,000
• Tree planting - Livistona palms	<u>\$23,000</u>
	<b>\$570,000</b>
<b>2.2 Terrigal Drive - Gateway Improvements, including:</b>	
• New landscape planting adjacent road	\$60,000
• New feature Phoenix palms and Tree rehabilitation planting	\$50,000
• Carpark modifications at beach	\$45,000
• Upgrade picnic facilities adjacent carpark	<u>\$30,000</u>
	<b>\$185,000</b>

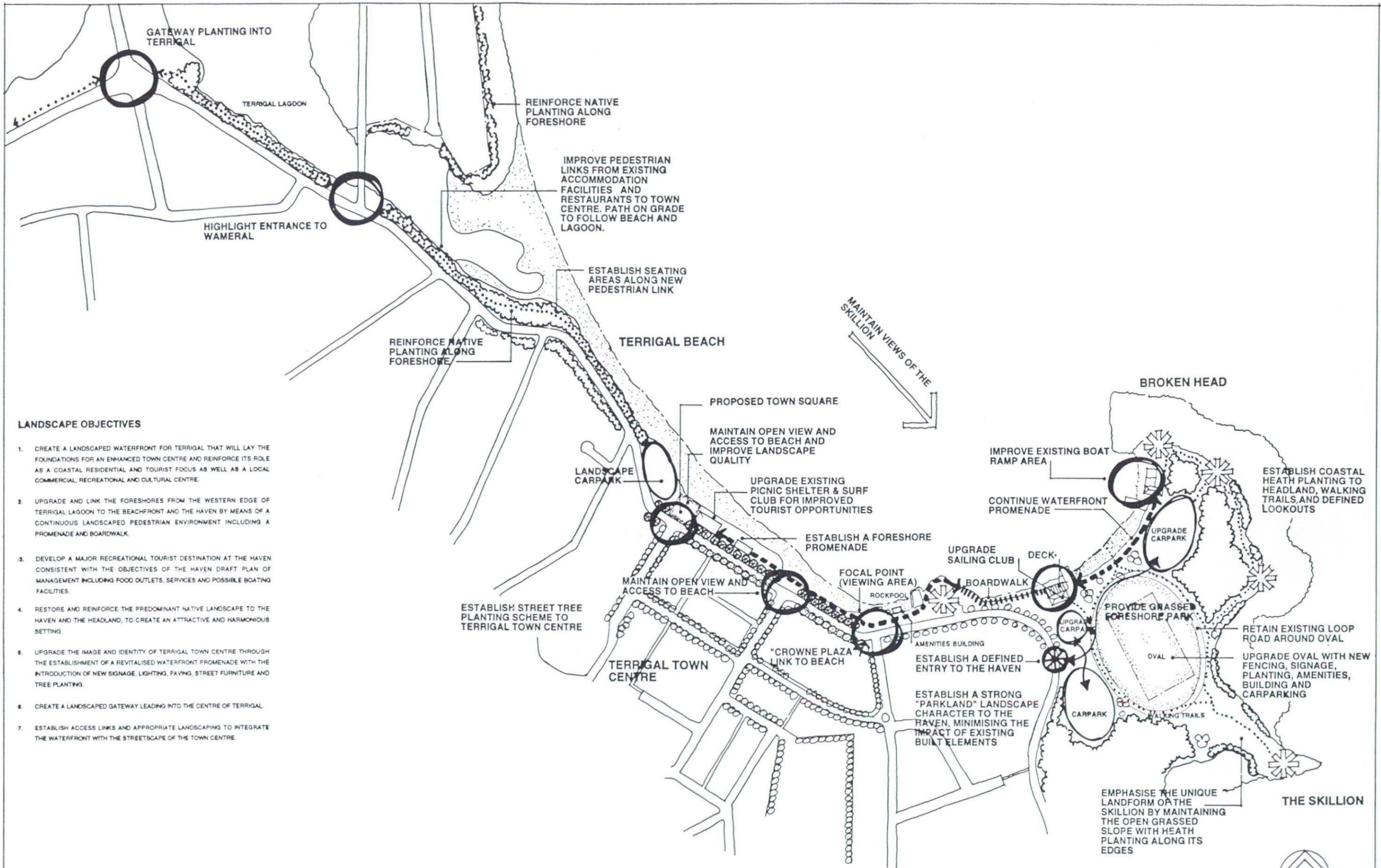
**STAGE 3 WORKS**

<b>3.1 Beach Promenade and Town Square, including:</b>	
• New promenade wall - entire length (subject to future design)	
• New concrete steps and ramps to sand (subject to future design)	
• Upper level retaining wall and sitting steps (subject to future design)	
• New paving to promenade, surf club and town square areas	\$250,000
• Turf to new picnic areas	\$15,000
• New tree planting	\$10,000
• Picnic shelters, lighting, seats, bins, signage, outdoor shower stands, shade shelter etc.	\$250,000
• Irrigation (allow)	<u>\$15,000</u>
	<b>\$540,000</b>

<b>TOTAL ESTIMATED WORKS COSTS</b>	<b><u>\$2,668,200</u></b>
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APPENDICES

**1.0 TERRIGAL WATERFRONT PRINCIPLES PLAN - AN INTEGRATED LANDSCAPE**  
CONTEXT Landscape Design



**LANDSCAPE OBJECTIVES**

1. CREATE A LANDSCAPED WATERFRONT FOR TERRIGAL THAT WILL LAY THE FOUNDATIONS FOR AN ENHANCED TOWN CENTRE AND REINFORCE ITS ROLE AS A COASTAL RESIDENTIAL AND TOURIST FOCUS AS WELL AS A LOCAL COMMERCIAL, RECREATIONAL AND CULTURAL CENTRE.
2. UPGRADE AND LINK THE FORESHORES FROM THE WESTERN EDGE OF TERRIGAL LAGOON TO THE BEACHFRONT AND THE HAVEN BY MEANS OF A CONTINUOUS LANDSCAPED PEDESTRIAN ENVIRONMENT INCLUDING A PROMENADE AND BOARDWALK.
3. DEVELOP A MAJOR RECREATIONAL TOURIST DESTINATION AT THE HAVEN CONSISTENT WITH THE OBJECTIVES OF THE HAVEN DRAFT PLAN OF MANAGEMENT INCLUDING FOOD OUTLETS, SERVICES AND POSSIBLE BOATING FACILITIES.
4. RESTORE AND REINFORCE THE PREDOMINANT NATIVE LANDSCAPE TO THE HAVEN AND THE HEADLAND, TO CREATE AN ATTRACTIVE AND HARMONIOUS SETTING.
5. UPGRADE THE IMAGE AND IDENTITY OF TERRIGAL TOWN CENTRE THROUGH THE ESTABLISHMENT OF A REVITALISED WATERFRONT PROMENADE WITH THE INTRODUCTION OF NEW SIGNAGE, LIGHTING, PAVING, STREET FURNITURE AND TREE PLANTING.
6. CREATE A LANDSCAPED GATEWAY LEADING INTO THE CENTRE OF TERRIGAL.
7. ESTABLISH ACCESS LINKS AND APPROPRIATE LANDSCAPING TO INTEGRATE THE WATERFRONT WITH THE STREETScape OF THE TOWN CENTRE.

**TERRIGAL WATERFRONT:  
TERRIGAL LAGOON TO THE HAVEN**

*"An Integrated Landscape"*



**CONTEXT**  
LANDSCAPE DESIGN  
346 KENT ST SYDNEY 2000  
(02) 999 5711 • FAX (02) 292 4795  
91.174 • 1992

**2.0 TERRIGAL FORESHORE ENGINEERING REPORT**  
Patterson Britton and Partners Pty Ltd



The boardwalk would consist of timber piles and superstructure with timber handrailing on both sides. It would have a clear walkway width of 2.3 m. The timber piles would either be driven into the sand or potted into a rock socket. In sand, the piles would be driven the necessary founding distance below an anticipated scour level of RL -2 m AHD. In rock, an undersized hole would either be drilled or chiselled about 1 to 1.5 m into the bedrock and the pile driven into the hole to achieve fixity.

The pile spacing would be about 5 m with lateral bracing on each pile set.

The approximate cost of the boardwalk would be about \$800/m<sup>2</sup> of deck area.

### 3. LAGOON BOARDWALK

The Lagoon Boardwalk would be a timber jetty type structure similar to the Haven Boardwalk. While the boardwalk would be located at the back of the beach, it may be exposed to waves during a severe storm and as such has to be designed to withstand these loads. The boardwalk design features would be the same as for the Haven Boardwalk.

The proposed deck level is RL 3.1 m AHD. Historical beach profiles should be checked to establish typical backbeach sand levels and ascertain the potential for this deck level to be inundated with sand.

The boardwalk would have a clear walkway width of 2.3 m with a timber handrail on one side. Timber piles would be driven a sufficient distance below the estimated wave scour level of RL -2 m AHD or into bedrock as required. The piles would have a spacing of about 5 m and lateral bracing would be required.

The estimated cost of the boardwalk would be about \$500/m<sup>2</sup>.

### 4. PROMENADE SEAWALL

The beachfront promenade would consist of a reinforced concrete seawall retaining the lower level and a reinforced concrete retaining wall supporting the upper level. The levels have been maintained the same as the existing promenades but the seawall has been extended up to a 0.5m further seaward.

The relocation of the seawall further seaward would cause an increase in the amount of sand lost from the beach in a severe storm. It is unlikely, however, that the relocation would have a significant influence on the long term sand loss rates from the beach compared to the existing seawall.

The seawall would incorporate a flexible gabion mattress which would gradually lower in severe storms as sand was eroded under its seaward edge. In this way, it would prevent undermining of the seawall. The design scour level is estimated to be RL -2 m AHD immediately seaward of the seawall. The mattress consists of PVC coated wire baskets filled with cobbles. The standard length of the mattress is 6 m.

The seawall would be cast insitu and built on top of the landward end of the mattress to ensure an integral connection between the two.

The retaining wall for the upper promenade would be reinforced concrete cast insitu. It would have to resist wave runup loads during a severe storm when it could be expected that waves overtop the seawall.

The concrete stairs leading from the beach to the lower promenade would be free standing structures independent of the seawall. This would allow them to slide away from the seawall if undermined during a severe storm without any damage to the seawall. The stairs could be readily reinstated following recovery of sand on the beach.

The estimated costs of the seawall and retaining wall would be:



### 5. CLIFF STEPS

The cliff steps would be constructed as timber stairs supported on timber poles in order to negotiate the steep slope. Landings would be required at least every eighteen stairs. The clear gap between each stair could not exceed 125 mm. The allowable stair dimensions would be:



The estimated cost of the stairs including handrails would be approximately \$1,000/m<sup>2</sup>.

### 6. BOARDWALK STRUCTURAL DIMENSIONS

Refer to fax from Conybeare Morrison (*Tim*) dated 15 June 1994. Please note that from a structural point of view the piles can be terminated below the deck level allowing the handrail to be located on the outside line of the piles.

**3.0 GEOTECHNICAL REPORT**  
Coffeys Engineering



Your Reference S10164/1-AB CJP:KJZ

Our Reference 1st July 1994

Date

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The Manager,  
Context Landscape Design,  
346 Kent Street,  
SYDNEY N.S.W. 2000

ATTENTION: MR. CHRISTOPHER THOMAS

Dear Sir,

RE: GEOTECHNICAL ASSESSMENT OF CLIFF FACE - TERRIGAL FORESHORE  
MASTERPLAN

#### 1.0 INTRODUCTION

At the request of Mr. Christopher Thomas of Context Landscape Design and on behalf of Gosford City Council a preliminary geotechnical assessment of cliff face areas associated with the proposed Terrigal Foreshore Masterplan was undertaken by our Mr. Colin Parker, Senior Engineering Geologist, on 17th June 1994. The work has been carried out in general accordance with our Proposal No. SP4386/1 dated 30th May 1994, though the scope of work has been increased to include additional areas other than the cliff line area described in the proposal.

Based on discussions with Mr. Christopher Thomas on 14th June 1994, and provision of a concepted drawing of the "Landscape Masterplan" (Drawing No. SK-03) the following areas of foreshore clifflines required a preliminary geotechnical assessment, namely:-

#### **Locality 1**

The cliffline area around the headland containing the rock pool. Areas 10 and 12 on Drawing No. SK-03.

#### **Locality 2**

The cliffline area above the beach leading to the dive centre/restaurant and boat ramp on The Haven. Area 11 on Drawing No. SK-03.

#### **Locality 3**

Potential/existing lookout points on The Haven headland and The Skillion.

#### **Locality 4**

The clifflines above the southern edge of Terrigal Lagoon. Area 2 of Drawing No. SK-03.

### 2.0 SITE OBSERVATIONS AND RECOMMENDATIONS

#### 2.1 Locality 1 - Rockpool Headland

#### **Proposal**

It is understood Gosford City Council wish to construct a timber boardwalk around the base of the cliffline at the site of the existing Terrigal rockpool. The boardwalk would extend along the wavecut platform following the existing informal walkway. The wavecut platform is not present on the southeastern side of the headland and in this area it is intended to cantilever a walkway from the cliff base out over the water or have a walkway supported entirely on piers above the water near the base of the cliff.

#### **Site Observations**

Site observations revealed the headland to be about 12m high above the wavecut platform. The escarpment of the headland can be described as having the lower half exposing moderately weathered horizontal beds of massive sandstone with interbeds of extremely to highly weathered siltstone/claystone; while the upper half of the escarpment is vegetated with steep slopes of 45° to 65°. Much of the vegetated portion is assessed to contain a thin soil cover over weathered rock extending upwards to road level in The Esplanade.

The rock within the cliffline around the rock pool consists of the following main rock units listed below in increasing elevation above the wavecut platform:-

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- A lower unit of massive sandstone 2m thick.
- A middle unit of thinly bedded siltstone, claystone and sandstone, 5m thick.
- An upper massive sandstone unit 2m thick.
- An upper unit of thinly bedded siltstone and sandstone.

The siltstone/sandstone beds appear to be extremely weathered and are more extensively eroded causing the overlying sandstone joint blocks to fall or slide as wedge failures out of the cliff face. The various beds also thin and "lens out" around the headland. Landslide debris is evident at the rear of the rock pool indicating relatively recent slope failures from the soil covered vegetated slopes onto the wavecut platform.

#### Geotechnical Assessment

The proposed walkway along the wavecut platform will be at risk of isolated block fall from the cliff face and landslides from the upper vegetated area. Remediating the cliffline to reduce the risk of instability can be undertaken. However, it is unlikely given the geology present, the cliffline exposure and history of instability that the risk of instability can ever be eliminated without major engineering works. Therefore options for the walkway around the cliffline could include a combination of locating the walkway away from the toe of the cliffline (ie. further out on the wavecut platform) and providing some remedial measures to reduce, but not eliminate, the risk of instability. Further geotechnical investigations are required to assess the risk of instability and provide recommendations for remediation. Consultation would also be needed with Council in relation to aesthetic issues arising from the remediation measures to be adopted to achieve a level of risk acceptable to Council.

The section of walkway which is proposed to be cantilevered from the cliffline out over the water will require a detailed geotechnical assessment. Preliminary observations suggest several large potentially unstable sandstone blocks are located above the walkway level and it may be more prudent to support the walkway out from the cliffline on piles founding beneath the water. Surface water is also concentrated on the cliff face in this area and some control of runoff is required.

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#### 2.2 Locality 2 - The Haven Beach

##### Proposal

The walkway is proposed to be constructed along the rear of the beach at the base of the steep vegetated cliffline.

##### Observations

The beach at Locality 2 is about 10m to 15m wide at high tide. A sharp slope break to the ocean cliffline is evident at the rear of the beach. The cliffline along the back of the beach has a slope of about 45° up to The Esplanade and vegetation growth covers much of the slope. Evidence of previous landsliding on the cliffline can be observed from areas of rock exposure and low vegetation regrowth. A large landslide deposit 15m wide and 2m thick is evident on the back of the beach.

##### Geotechnical Assessment

The coastal escarpment at this locality is less likely to experience isolated rock falls compared to the headland area (Locality 1). However, larger scale landsliding of 10m to 15m width could be expected. Positioning the walkway away from the toe of the coastal escarpment will reduce the risk of the walkway being covered by slide debris and placing pedestrians at risk (albeit a very remote risk of personal injury given the low frequency of such slides).

Preliminary observations would suggest positioning the walkway more than 5m from the escarpment toe will significantly reduce the risk. It is important to note that the stability of the escarpment slope is enhanced by the vigorous vegetation growth. Any removal of undesirable vegetation species from the escarpment should be only considered in isolated areas (at any given time) so that suitable replacement trees/shrubs can be established.

#### 2.3 Locality 3 - Various Lookout Points

Five potential lookout points have been shown on the supplied drawings. These lookout points include two cliff-top sites on the headland north of The Skillion, a lookout point at the rear of the beach (in an area known as The Village Green), the existing Skillion lookout site and a site immediately southeast of The Haven football field.

Based on the preliminary assessment, all five lookout points present no major geotechnical concerns. However, we would suggest that when the specific lookout points are finalised that a

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further geotechnical assessment is carried out to assess for recommended offsets from the cliff safety fences.

#### 2.4 Locality 4 - Terrigal Lagoon

##### **Proposal**

It is proposed to construct a walkway around the southern edge of Terrigal Lagoon. The walkway is to be constructed just above high water mark at the base of the steep escarpment slope (some 15m high) extending down from Terrigal Drive. The escarpment slope has a small bench near the water level at the eastern end of the lagoon upon which the walkway is to be constructed. However, for much of the length of the lagoon walkway the escarpment slope extends directly into the lagoon and the walkway is intended to be constructed as either a cantilevered structure off the escarpment rock face or be piered onto the floor of the lagoon.

##### **Observations**

The escarpment slope above the southern shoreline of Terrigal Lagoon slopes steeply up to Terrigal Drive at angles of 30° to 50° with locally steeper slopes. The lower portion of the escarpment slope exposes a sandstone unit while the upper portion is thickly vegetated and is assessed to have a thin soil cover. Evidence of recent slope instability can be observed along the escarpment slope where arcuate shaped sandstone exposures extend up into the vegetated areas suggesting the slide debris has slipped downslope due to excessive ground pressures and/or removal of toe support by erosion of the lower sandstone exposure. The debris from these recent slides is evident on the beach at the eastern end of the lagoon, while the slide debris from the area above the lagoon is likely to have moved onto the floor of Terrigal Lagoon. Several areas of potential instability could be seen at the eastern end of the lagoon while it was not possible to assess instability risk for the area above the lagoon without the use of a boat.

##### **Geotechnical Assessment**

Given the steep escarpment slope above the proposed lagoon walkway route and the inferred recent history of instability on the escarpment it is considered that a significant risk exists to the walkway site. This risk is primarily associated with the risk of larger landslides (say 25m<sup>3</sup> to 50m<sup>3</sup> in size) moving onto the elevated walkway and causing significant damage. It is recommended that considerations be given to relocating the walkway to the northern side of the lagoon and avoid the instability risk of the southern escarpment slope. Remediation measures to effectively stabilise the

escarpment slope and ensure the integrity of the walkway is assessed to be not practicable given the magnitude of the problem.

If you require any further assistance on these matters please contact our Mr. Colin Parker in our Sydney Office on (02) 888 7444.

Yours faithfully

**COFFEY PARTNERS INTERNATIONAL PTY. LTD.**

COLIN PARKER