METROPOLITAN COAST PROTECTION DISTRICT

MANAGEMENT PLAN

Coast Protection Board **South Australia**

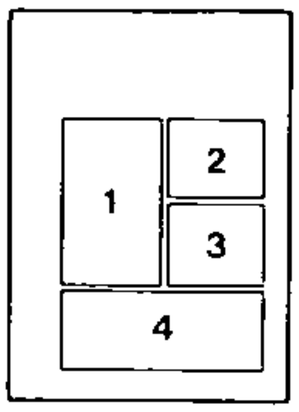
Metropolitan Coast Protection District

Management Plan

Declared by the Governor to be
an approved Management Plan
on **21st October 1982**

Coast Protection Board
South Australia

Front Cover



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This plan has been prepared in accordance with Part III of the Coast Protection Act, 1972-78 by the Coast Protection Board.

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In particular it thanks the officers of the Coastal Management Branch of the Department of Environment and Planning

Layout and Design, Drafting Branch
Technical Services Division
Department of Environment and Planning

1 Explanatory Statement

Note: This explanatory statement does not form part of the Management Plan

1.1 THE COAST

The South Australian coast includes many landforms and activities along its 4000 kilometres of land and water from the Great Australian Bight to the South East.

- On a summer's day thousands of South Australians escape the heat of the city by a visit to the beach, but they often face a traffic jam to get there only to find no parking space, no shade and very few, if any, facilities.

- Many South Australians live quite close to the sea, sometimes too close when potential storm damage or destruction of views and foreshore recreation space are considered.

- The attraction of the coast as a place to spend some time has led to demand for shacks, houses and caravan parks, but the demand is not always met in the best way for everyone as sprawling development, blocked views and overcrowded facilities diminish the attraction that gave rise to the demand in the first place.

- Several areas along the coast are considered especially important for scientific or educational reasons and have been set aside as conservation areas for present and future generations, but sometimes the inspiration and serenity these areas provide is destroyed by the sound of a trail bike or the sight of vegetation trampled by heavy foot-traffic. Sometimes important scientific or educational areas are developed and lost altogether.

opposite: *Sailing off Brighton Beach*

below right: *Port Noarlunga*

below: *Hallett Cove Beach*

• Rural areas on the coast are usually both attractive and valuable for production but can block public access or can upset the coastal environment by over-clearing and over-grazing.

The coast is a popular place to live, work and play and it should be enjoyed by as many people as possible but in a way that enhances rather than detracts from the environment.

1.2 THE NEED FOR COASTAL MANAGEMENT

No plans can foresee all of the problems or provide all the answers for the future of the South Australian coast. However, there are enough examples, including the ones above, to demonstrate that intensifying demand and competition between activities on the coast can lead to mistakes in the use of the coast that will prove costly in the long run.

The coast is finite and should be treated not as ordinary real estate but as a unique place with unique features, problems and appeal, where conservation and special kinds of development should have priority.

This suggests a need for coastal management, which is a process of making decisions on use of the coast, having first studied the environment and its capabilities as well as the issues involved and alternative solutions to them, and having sought and considered the views of the public. It will generally involve guiding development and recreation to less sensitive areas, while restricting access and use in more fragile parts.

1.3 COASTAL MANAGEMENT IN SOUTH AUSTRALIA

In the late 1950s a number of Adelaide seaside Councils formed a committee to discuss mutual problems related to coastline development, with particular emphasis on protection from storms.

Following an approach by this committee the Civil Engineering Department of the University of Adelaide undertook a five year study of the metropolitan coast. The study was completed in 1970 and recommended the establishment of a statutory body with the defined responsibility for management of the coastal zone, provided with adequate staff and finance to perform this task.

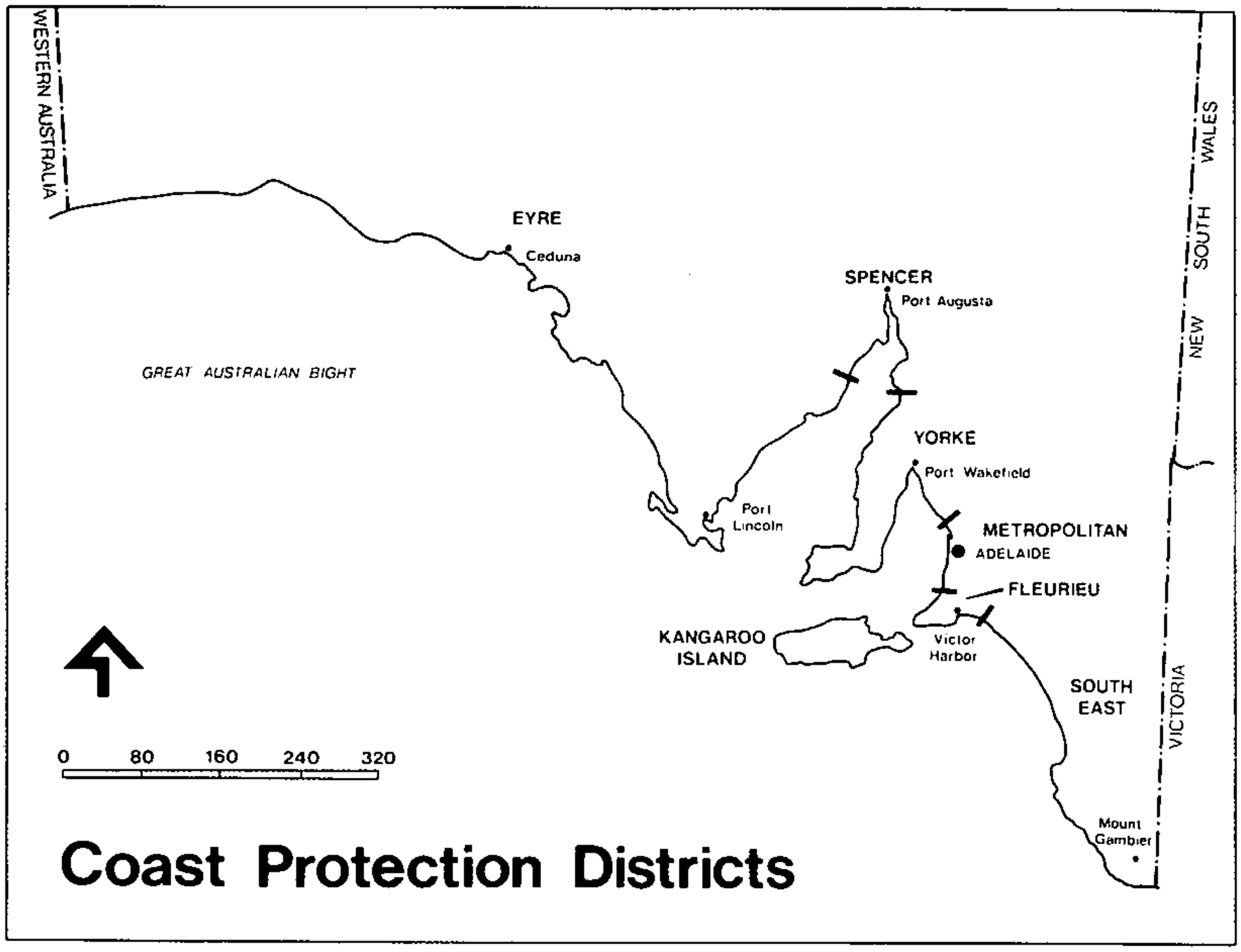
The recommendations were accepted by the State Government and the Coast Protection Act was passed in 1972.

The Coast Protection Act and Board:

The Coast Protection Board is specifically responsible under the Coast Protection Act 1972-1978:

(a) to protect the coast from erosion, damage, deterioration, pollution and misuse;
(b) to restore any part of the coast which has been subjected to erosion, damage, deterioration, pollution or misuse;
(c) to develop any part of the coast for the purpose of aesthetic improvement, or for the purpose of rendering that part of the coast more appropriate for the use or enjoyment of those who may resort thereto;

below: *Storm damage, Henley Beach, 1953*



Coast Protection Districts

(ca) to manage, maintain and, where appropriate, develop and improve coast facilities that are vested in, or are under the care, control and management of, the Board;
(d) to report to the Minister upon any matters that the Minister may refer to the Board for advice;
(e) to carry out research, to cause research to be carried out, or to contribute towards research, into matters relating to the protection, restoration or development of the coast.

The Board has six members representing the fields of state planning, tourism, local government, coastal engineering, marine and harbours, and ecological science. It is responsible to the Minister for Environment and Planning and staff is provided through the Department of Environment and Planning.

The duties of the Board are performed by dividing the South Australian coastline into Districts which are separately studied. When a study is completed for any District a Management Plan is prepared, approved and implemented by regulation and by assistance to Councils.

The Board is encouraged by the structure of the Act to work through Local Government bodies and is anxious to receive advice from the general public and local Councils, either directly or via the Consultative Committee for that District. These committees are established to advise the Board, and consist of one representative from each Council within each Coast Protection District.

The Coast Protection Districts:

It is intended that seven Coast Protection Districts make up the coastline of South Australia.

Prior to the commencement of a study report the Districts are proclaimed over the areas defined as "coast". Under the Act "coast" includes all land three nautical miles below low watermark to one hundred metres above mean high water mark on the seashore at spring tides. It also includes land within any estuary, inlet, river, creek, bay or lake and subject to the ebb and flow of the tide.

"Coast" and "District" may be varied from the minimum area described above.

Study Reports:

The Act requires that the Coast Protection Board 'make an investigation or cause an investigation to be made, in order to determine the most appropriate measures to be taken to protect, restore or develop the coast comprised in the Coast Protection District in the best interests of the public'.

These studies are detailed investigations of all aspects that need to be taken into account in managing the District.

above: *Access control is one form of assistance*

Management Plans:
In accordance with the Act a Management Plan is prepared for each District which sets forth in general terms the measures that the Board considers necessary or expedient for the protection, restoration or development of the coast comprised in the Coast Protection District.

It is envisaged that each Management Plan will be arranged according to the same format. The Explanatory Statement and General Policies chapters are the same for each District and are broad objectives for coastal management throughout South Australia. The final chapter contains descriptions and policies specific to individual Districts and derived mainly from the study report of the District.

Implementation:
The duties of the Board under the Coast Protection Act indicate that the Management Plan is implemented by a dual system of control and positive assistance.

The Coast Protection Board is empowered to regulate building, construction, mining or excavation and other works. It does this by regulating 'works of a prescribed nature' which shall not be carried out without the approval in writing of the Board. Where existing regulations are adequate for coast protection, such as those under the Planning Act, 1982, further regulations will not be made under the Coast Protection Act. Any person aggrieved by a decision of the Board with respect to prescribed works may appeal against the decision to the Planning Appeal Tribunal.

The Board also provides financial assistance and expertise to initiate development of the coast that may not otherwise occur.

Under the Coast Protection Act the Board is required to seek public comment on each Management Plan by sending a copy to each Council within the District, arranging for display in areas readily accessible to the public, and advertising. The Board will endeavour to arrange meetings and prepare press statements and brochures, as it recognises the need for all aspects of coastal management to reach as wide an audience as possible so that public attitudes can be effectively gauged and represented.

1.4 HOW TO USE THIS MANAGEMENT PLAN

This Management Plan has been written to show in general terms the measures needed within the Coast Protection District.

It is ordered with general statements at the front and more specific ones at the back.

To ascertain the measures proposed for any one area:

- assess if the area falls within the Coast Protection District;
- if it is, refer to the appropriate Landform Area Issues and Policies (i.e., if the area is a sand dune refer to Section 3.2, etc.);
- these Landform Area Policies also provide a list of the most important General Policies for reference;
- for further information or for assistance ring the Coastal Management Branch, Department of Environment and Planning on (08) 216 7777, or write to the Branch at:
55 Grenfell Street,
Adelaide. S.A. 5000

Management Plan Review

It is a characteristic of coastlines that they are subject to continual and sometimes considerable changes. Many of the changes that occur on the coast will lead to necessary changes in management of the coast.

The Coast Protection Act states that the management plan will be written in general terms but, because of the above, it is anticipated that policies will go out of date over time. So that the management plans retain their usefulness, they will be reviewed regularly, either as a result of changes that have taken place or as new knowledge and policy emerge.

Note: This explanatory statement does not form part of the Management Plan.

2 General Policies

2.1 INTRODUCTION

There are many issues of coastal management common to all Coast Protection Districts. The general policies of the Coast Protection Board are broad guidelines established to resolve these common issues and apply to the coastline throughout South Australia. Although they are not specific to sections of coast or individual proposals, they are nevertheless relevant to both.

2.2 STATE AND LOCAL GOVERNMENT RESPONSIBILITIES

Issues: Local Government has traditionally been delegated the responsibility for the development, care and control of land on the coast, and there are good reasons why this situation should continue. Familiarity with and accessibility to local and regional interests and opinions are invaluable to sound coastal planning. Local Government is directly accountable to the landowners most likely to be affected by coastal planning and is in a position to assist in the implementation of those plans, thereby minimising costs and delays.

However, when the environmental impact of land-use arrangements affects the people of the entire State, decisions about those arrangements can no longer remain matters of purely local concern. The State is concerned with most activities on the coast, in varying degrees, depending on the impact or potential impact of the activity. The often difficult decision of whether an activity is a State rather than local responsibility should be made by the Coast Protection Board, as it is the only body with specific statutory obligations for management of the coast, but the prime responsibility for coastal management will continue to rest with Local Government.

Management Policies

2.2.1 The Coast Protection Board will work closely with Local Government in all aspects of coastal management in South Australia.

2.2.2 Wherever possible the Coast Protection Board will implement the policies of this Management Plan through Local Government and legislation available to Local Government, such as the delegated powers under the Planning Act, 1982.

2.2.3 Financial and technical assistance will be provided to Local Government by the Coast Protection Board for the protection, restoration and development of the coast.

2.2.4 The Coast Protection Board will ensure that State welfare is adequately considered where, in the opinion of the Board, the impact of an activity is of State concern.

opposite: *Onkaparinga Estuary*

2.3 EXISTING LEGISLATION AFFECTING THE COAST

Issues: In addition to the Coast Protection Act of 1972 several Acts relate directly to management of the South Australian coastline. Decisions are made under the Planning Act, Local Government Act, Harbors Act, Crown Lands Act and other Acts which should include consideration of coastal nature of the land. The Coast Protection Board is often consulted by the people administering these Acts before such decisions are made, and this practice will continue.

However, following proclamation of an approved Management Plan for a Coast Protection District and declaration of enabling regulations, some decisions previously made under other legislation could be made by the Coast Protection Board under the Coast Protection Act.

Regulations will not be made under the Coast Protection Act if they can be made under the Planning Act. Many of the policies of this Management Plan will be implemented under the Planning Act, obviating the need for separate regulations under the Coast Protection Act.

Examples of cases where other State departments may need to meet the requirements of the Coast Protection Board include construction of roads, electricity or drainage in areas very close to the sea and the development of foreshore areas in State ownership.

above: *Caravan Park, West Beach*

Certain legislation exists which indentures or establishes trusts with separate powers and responsibilities for certain coastal lands. These include the North Haven and West Beach Trusts.

Wide discrepancies exist between by-laws relevant to coastal management. The discrepancies occur between Councils and also between different by-laws of the same Council. It is apparent that many such by-laws are out of date and require amendment to promote uniformity and coherent coastal management.

Management Policies

2.3.1 Where appropriate, the Coast Protection Board will utilise existing legislation affecting the coast to perform the duties imposed upon it under the Coast Protection Act.

2.3.2 The Coast Protection Board will use the provisions of the Planning Act to implement the policies of this Management Plan to avoid duplication of controls.

2.3.3 The Board will liaise with and advise other authorities and departments of its coastal management policies and request their assistance to implement such policies.

2.3.4 Where existing legislation or the administration of it is at variance to the coastal management policies or could be substantially improved, the Coast Protection Board will suggest and/or support necessary changes to avoid possible conflict and duplication.

2.4 RESEARCH

Issues: One of the most important functions of the Coast Protection Board is to carry out research into matters relating to the coast. Many of the mistakes made in coastal development have been and still are the result of lack of understanding of the complexity of coastal processes.

The Coast Protection Act obligates the Board to investigate each of the seven Coast Protection Districts. These investigations when completed are an extremely detailed store of information which forms the basis of management policies, but needs to be continually updated as conditions change.

The Board is in a position to centrally collect, analyse and act upon a wide variety of information that is necessary for sensible coastal management. Problems that occur on the coast have little regard for political boundaries and are usually common to several Local Government areas. The Board will be expected to be the agency that supplies the information required to solve these problems.

Necessary avenues of research include fundamental studies on a specific area of coast or specific issues, monitoring changes on the coast and compiling data collected from other sources.

The research should include studies of physical processes such as beach profiles, plant and animal communities on land and in the sea, demand studies such as parking, boating and camping demands, feasibility studies for moorings, ramps, sea walls, etc., and land use and other studies concerned with the impact of coastal development. It should include public opinion.

Only if research is carried out in this way can

Management Plans be effectively reviewed and correct information be distributed to other decision-making bodies concerned with the coastal zone.

Management Policies

2.4.1 The Coast Protection Board will carry out a comprehensive program of research for the South Australian coastline.

2.4.2 Research carried out or compiled by the Board will form the basis on which management policies will be formulated and reviewed.

2.4.3 The Board will make the information it compiles available to the general public, Local Government and State and Federal departments with a need for such information.

2.4.4 The Board will assist persons undertaking studies that will improve understanding of the South Australian coast.

2.4.5 The Board will co-ordinate coastal research being undertaken in South Australia.

2.5 USE OF THE COAST

Issues: It is quite apparent that the coast is popular for many activities, including a great variety of recreation pursuits, but also for housing, agricultural and commercial uses, and it is reasonable that the attractions of the coast should continue to be enjoyed by as many people as possible.

The use of the coast is constrained by the ability of the coastal environment to tolerate the demands made on it. Furthermore, competition between uses, particularly between private and public uses, is strong. The issue is therefore a complex one and decisions on use should be made by allocating priorities based on the principles discussed below.

The coastline is of finite length, whereas demand for its use continues to grow. If demand is satisfied with minimum restrictions or guidance, it is likely that in many areas one use will predominate even when the area is unsuitable for that use or more suitable for other uses. This has occurred with housing development on the coast as discussed in Sections 2.8 to 2.11.

It is necessary as a first step in allocating priorities for use of the coast to identify areas which, due to their fragile nature, instability or special significance, require protection. Preservation areas suitable mainly for scientific, educational and recreational uses are discussed in Section 2.11.

As well as allocating priorities for use according to environmental capability, public use should generally be given preference over private use, as it equalises the opportunity for people to use the coast and therefore also optimises use. Recreation and tourism, for example, allow the greatest number of people to enjoy the coast at any one time, although there are nevertheless constraints and conflicts involved in expanding use of the coast for this purpose. The constraints include the carrying capacities of beaches, lack of facilities, the number of suitable areas available for different recreational pursuits and access to those areas. The conflicts occur between boats and swimmers, campers and sightseers, off-road vehicles and beach-goers and many other activities, some of which are already restricted, and others, such as cars on beaches, which may require further restriction.

below: *Fishing - a popular coastal recreational pursuit*

above: *Commercial shipping, Outer Harbour*

Priority for allocating use of the coast should also be given to uses dependent on a coastal location and that priority should be based on the particular need of each use. Harbours and ports for commercial shipping or fishing, for example, could be expected to be given a high priority, as could associated activities such as warehousing, processing works and transport terminals.

Allocation priorities according to coastal needs should extend beyond these more obvious examples to include surf lifesaving clubs, yacht clubs and a variety of recreational, agricultural, residential, industrial and other uses or activities. There are many examples along the coast where prime foreshore space has been given over to uses that are not dependent on a coastal location or where sections of coast are under-used in locations where demand for foreshore space is high and can be expected to increase. The assistance provided by surf lifesaving clubs in making the coast a safer and hence more enjoyable place is acknowledged by the Board. It is recognised that this will often result in construction close to the sea.

Management Policies

2.5.1 The Coast Protection Board will encourage and optimise use of the coast and will monitor demands for use and assess the capability of the coastal environment to cater for demand.

2.5.2 As a first step in determining priorities for use of the coast, areas will be identified which, due to their fragile nature, instability or special significance, require protection usually as preservation areas.

2.5.3 The following policies will be adopted by the Board in determining priorities for use in areas of the Coast Protection District not classified as Preservation Areas.

- the ability of the coastal environment as described in the landform classification in Chapter 3 to cater for uses without undue adverse environmental effects will be of prime concern;
- preference will be given to public over private use;
- preference will be given to those uses which, by the nature of the use, need to be located close to the coast such as harbours and ports or, on a smaller scale, surf lifesaving clubhouses;
- where serious conflict already exists between uses or as a result of uses adversely affecting the environment, a policy of restriction, segregation or relocation will be adopted.

2.6 PROVISION OF FACILITIES

Issues: The provision of adequate facilities is basic to the proper development of coastal areas, particularly for recreation. The variety of facilities that could be provided for the coast is large and ranges from simple items such as litter bins and fireplaces to extensive marinas. The responsibility for providing the facilities is divided between Local Government, the State and private organisations, although Local Government has provided the bulk of necessary facilities to date.

below: *The coast - a place to relax*

above: *Launching at the Patawalonga*

It is sometimes considered inequitable that seaside Councils should continue to be alone in providing the items that help make the coast an attractive place for visitors from outside their local government area. Attempting to improve foreshore areas is often an unrewarding task since the rate of vandalism is high, demand is seasonal and continual maintenance is required. Nevertheless considerable opportunity exists for the improvement of facilities for the beach-going public, and this need is recognised by the Coast Protection Act in that it enables the Board to financially assist Councils and empowers the Board to develop the coast for the enjoyment of those who may wish to use it.

For the most part, providing adequate toilets, change-rooms, kiosks and other similar facilities is an easy task once a need has been established and siting and design agreed upon. There are, however, some facilities that are more difficult to provide.

Recreational boating is increasing steadily in all Coast Protection Districts. Many boats are launched directly off beaches. Even so, existing facilities for launching trailer boats from ramps and for permanently mooring boats are generally insufficient for the current demand, and should be increased.

Launching sites should be sheltered from most wave action; this condition is difficult to achieve on open beaches without using extensive breakwaters or similar devices. These structures may interfere with sand movement and hence create problems themselves. Furthermore, the provision of launching facilities also requires commensurate car and trailer parking and suitable road access to the launching area.

Launching facilities should generally be concentrated at a small number of major centres rather than allowing a large increase in the number of beach access ramps and minor launching ramps. Concentration would allow upgrading of standards and better supervision of activities, including hazards associated with swimming adjacent to areas of intensive boating activity.

Another facility of particular importance to the beach-going public is adequate car parking adjacent to popular areas. Like launching facilities, this problem is especially great in the Metropolitan Coast Protection District, but applies equally in other Districts where large numbers of tourists converge during summer months. In many areas where off-beach car parking is inadequate, tourists continue to park on beaches. The use of beaches as public roadways is incompatible with their use for recreation, especially recreation by children. It is difficult to relax when the possibility of being run down by a vehicle exists. If adequate car parking adjacent to beaches cannot be provided restrictions on movement, which is the main problem, can be implemented.

Most public facilities are located close to the beach in foreshore reserve areas that are Crown Lands allocated for special purposes and, in most cases, under the care and control of the local Council. The development and maintenance of these reserves, particularly landscaping adds considerably to the attractiveness of the coast.

Often, reserves are not used for the purpose allocated and are unattractive, barren areas which are empty in winter and congested in summer when various activities crowd the fore-

shore. Improvements could be made to most of the reserves by separating activities, protecting existing vegetation from damage and establishing new plants and trees in areas where they can be maintained and where the benefits of appearance and shade are most needed.

Management Policies

2.6.1 The Coast Protection Board will provide technical assistance and will seek adequate funding arrangements to ensure the provision of a wide range of coastal facilities. This will include a five year rolling programme for coastal works.

2.6.2 The Coast Protection Board will support the restriction of vehicular movement on beaches in the short-term and promote the removal of cars from beaches in the long-term as off-beach parking areas become available.

2.6.3 Where adequate car-parking areas cannot be made available, the Coast Protection Board will support strict restrictions on parking areas and vehicular movement on beaches.

2.6.4 The Coast Protection Board will liaise with Local Government, have regard to their submissions and establish priorities for the provision of facilities.

2.7 ACCESS

Issues: Public access to most of the coastline in South Australia from inland was provided at the time of the State's first cadastral surveys and has remained comparatively unchanged ever since, apart from extra provision during subdivision. There is no doubt that these surveys have contributed greatly to the use and protection of the coast, in that reserves were set aside, both for roads (to ensure adequate access to the coast) and for the immediate foreshore (to prevent activities too close to the sea, and to maintain access and public land around the coastal edge).

However, conditions have changed considerably since late last century and it is important that existing and planned access are carefully studied for each Coast Protection District and rationalised according to up-to-date coastal management objectives.

Many sections of the coast have either too little, too much or poorly located provision for access. Reserves set aside for roads often remain undeveloped and the number of made roads is often considerably less than the number of roads that exist 'on paper' only. Where access to the coast is inadequate it is often because roads have not been developed, but in some cases it is also because road reserves are inadequate and the opportunity to improve access does not exist. This can be as a result of the original survey, encroachment of rural areas, erosion of the coast or closure of road reserves.

If the public is to continue to use and enjoy a variety of coastal landscapes, access must be guaranteed to most of the coastline. However, unrestricted access can damage the environment and among other things can detract from the recreation experience. Furthermore, in some places the coast is dangerous because of treacherous swimming conditions or steep slopes, and under these conditions upgrading access is considered to be unwise.

below: *Access through sand dunes needs to be limited*

above: *Co-operation is required to preserve fragile environments*

Too much or poorly located provision for access is a critical issue of coastal management. Many road reserves run along the coast close to the water's edge on beaches, dunes, estuaries and cliffs. When roads are constructed in these reserves they act as barriers between the land and sea, and can aggravate coastal erosion processes by creating expanses of unvegetated slopes and enabling unrestricted access into fragile environments.

In many places these parallel roads could be closed and access provided by spur roads running towards points on the coast in order to reduce impact. Trails could then be provided from these points for pedestrian access along the coast.

In urban areas, the esplanade in many places is too wide, straight or barren for the function it serves, and closing it in some places would enable recreation reserves to be linked to the foreshore. In other places, particularly where views from the road are good, the esplanade could be narrowed and its function limited to that of a scenic drive. In both cases additional reserve space would be created for parking or landscaping, and reduction in traffic would reduce the risk of accidents and increase the amenity of the foreshore.

As well as the issues involved with access within defined roads and road reserves there are many instances where restrictions to access are required to preserve fragile environments outside road reserves. Access through sand dunes, for example, should generally be limited to specific areas to avoid trampling of vegetation and hence instability of the dune.

Management Policies

2.7.1 The Coast Protection Board will study present access arrangements on the coast with a view to rationalising existing and planned roads to best serve the users of the coast. This will often result in closing unmade road reserves in difficult or sensitive areas.

2.7.2 The Coast Protection Board will investigate the role of esplanade roads along the coast in order to assess the need for further construction and the possibility of reconstruction or closure to improve amenity.

2.8 DEVELOPMENT

Issues: In South Australia most of the pressure for settlement has occurred close to the coast and is likely to continue to do so in the future. A glance at the settlement patterns of the State clearly shows that the coast exerts a strong attraction as a place to live, either permanently in the cities and townships and even small rural holdings, or temporarily in the many holiday homes, shacks, motels and camping grounds.

above: *Damage to the visual environment, Aldinga Beach*

The benefits of living next to the sea are apparent and the popularity and high price of foreshore property are clear indications of these benefits. The costs and effects associated with such development are less apparent. Each stage of housing development from change of land use to subdivision, construction and operation, generates corresponding changes in the environment of the property and surrounding areas.

Development too close to the sea often upsets natural processes which sometimes endangers the development itself. Changes to the visual environment are also significant. Both of these factors are discussed in separate sections. Development close to the sea is also costly to maintain.

above: *Coastal Development, West Lakes*

Another issue that arises is that the attraction of the coast gives rise to linear development. Houses extend uninterrupted for large distances along the coast in the Adelaide metropolitan area and at other coastal cities and towns. Holiday houses and shacks have also developed in a linear fashion in rural areas and reduce public access to many of the attractive bays, headlands and river mouths on the coast. Development of this type is often premature, uneconomic or inefficient so far as the provision of supporting infrastructure is concerned and can quickly degrade and diminish the natural landscape.

Many urban foreshore areas have been established for many years and are now in a dilapidated state which inevitably reduces their attractiveness and economic potential as tourist and recreation centres. Rejuvenation of such areas requires good planning but more importantly initiative from both the State and local governments to substantially improve popular recreation centres. This action can also apply to recreation centres outside urban development areas.

Chapter 3 describes these issues within a specific Coast Protection District and its landform classifications and states policies designed to reduce the adverse effects of past mistakes and to ensure they do not occur again.

Management Policies

2.8.1 The Coast Protection Board will support the concept of concentrating urban development into nodes and reducing scattered and linear coastal development.

2.8.2 The Coast Protection Board will continue to liaise with those responsible for implementation of the Planning Act to ensure that coastal management matters are adequately considered in development planning and to prevent duplication of control.

2.8.3 The Coast Protection Board will consider development proposals for the coast by assessing the capability of the environment to support such proposals. In particular it will continue to comment on development proposals referred to it from State and Local Government that are likely to affect or be affected by coastal processes.

2.9 COASTAL ENGINEERING

Issues: In general, the closer construction occurs to the sea the greater is the likelihood of damage to the environment or to the development itself.

The Coast Protection Board was formed largely as a result of the need to provide solutions to the problems that had arisen from developing too close to the sea in the metropolitan district. In this case, sand dunes have been built on and natural processes upset. The costs associated with protecting against the resulting storm damage and maintaining the sand levels of beach are much higher than if the houses and roads had been constructed further inland.

The mistakes made in the metropolitan district have been and still are being made throughout the State. Privately owned land often extends very close and in some cases right up to high water mark. Where this land is used for primary production, erosion of the foreshore, in addition to the natural erosion processes, is often a problem, particularly on unstable land such as dunes or cliffs. Change of land use or land division usually does not adversely affect the coastal environment, but the resulting construction of roads and buildings, with resultant increased use, can. In South Australia many urban sized allotments exist in areas close to the sea that should not be developed further.

These issues are not confined to privately owned land but can occur on leased or licensed Crown Lands or reserves. Road reserves exist along many sections of the coast and, within some of these, esplanades have been constructed too close to the sea, resulting in the need for expensive protective works. In other cases the construction of roads within the reserves allocated for them would be impractical or would substantially degrade the environment.

Many reserves set aside for recreation, boating or other purposes have been developed in

above: *Rip-rap, Glenelg North*

such a way as to destroy their visual character or restrict public access by the construction of sporting facilities and buildings, many of which are poorly sited and are of poor architectural standard. Clubs for boating, rescue work, bowling, tennis and other purposes make heavy demands on some recreation reserves, leaving little space for less-intensive or less-exclusive recreation. This problem can be aggravated by the provision of toilets, change-rooms, shelters and kiosks, and decisions on coastal location often not made on the basis of need.

Management Policies

2.9.1 The Coast Protection Board will support the concept of providing adequate buffer zones, preferably at land division stage but possibly at other stages of the development cycle, between coastal development and the sea, and will continue to investigate and make available erosion rates and other information demonstrating a need for buffer zones.

2.9.2 The Coast Protection Board will only assist in the provision of works where necessary to protect structures poorly located as a result of past mistakes. Assistance for the provision of protective works will not be provided for new construction.

2.9.3 The Coast Protection Board will identify areas of the coast that may be considered unsafe or otherwise unsuitable for construction purposes and/or identify areas over which special restrictions will apply to prevent foreshore erosion. An indication of the relative suitability of coastal landforms for construction is given in Section 3.

2.9.4 The Coast Protection Board will co-ordinate with authorities responsible for the use of Crown Lands to ensure that the coastal environment is adequately protected, particularly where erosion is present and where proposals may affect or be affected by coastal processes.

2.9.5 Proposals for the development of public foreshore areas, including roadways, club rooms or recreation facilities, will be investigated to assess the need for the proposal to be located close to the sea.

below: *Surf life saving club, Moana*

2.10 APPEARANCE AND DESIGN

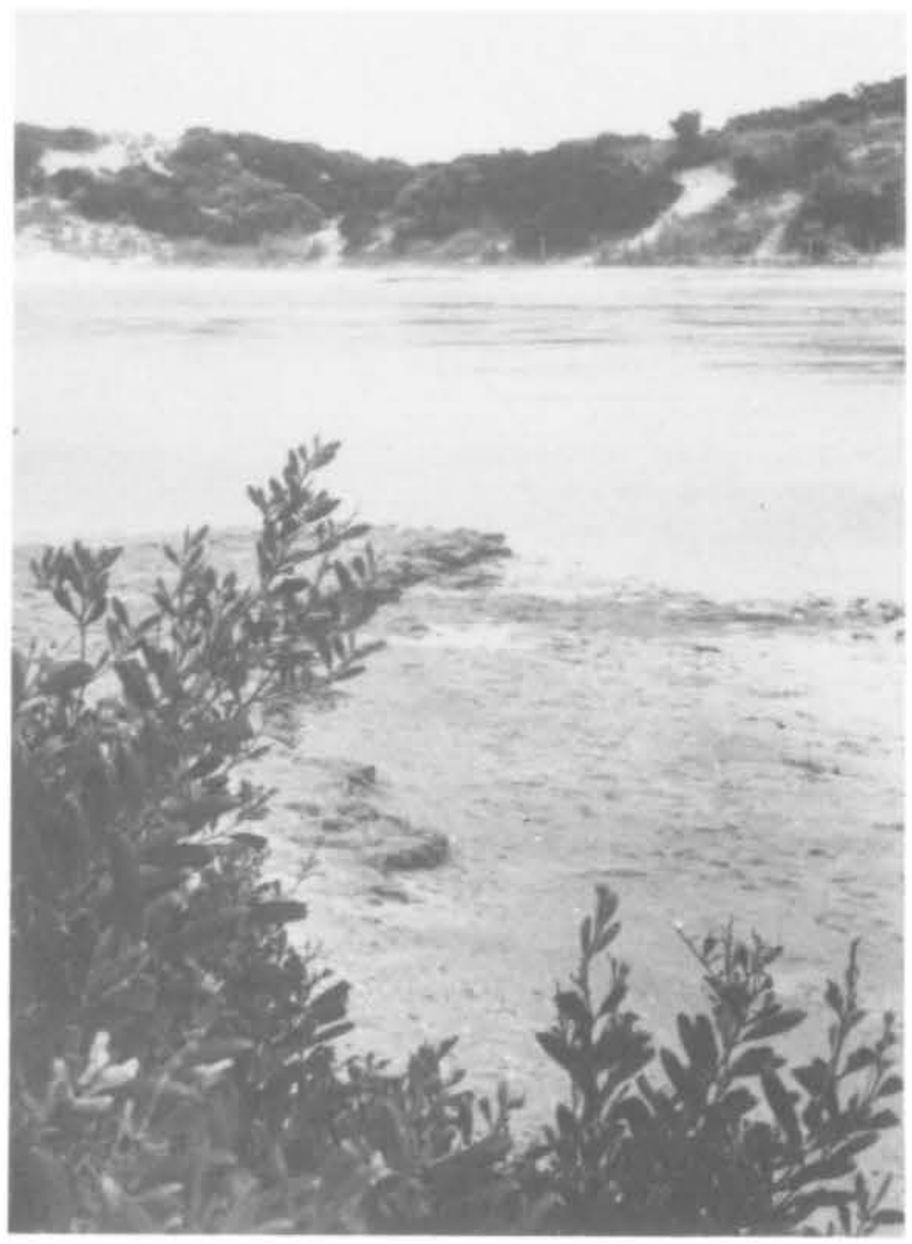
Issues: The visual resource of the South Australian coastline is one of its most important attributes. Appearance is difficult to quantify and appreciation of it varies between individuals. Nevertheless the variety, contrast and beauty of the coast evoke strong responses from most people and should be protected if the coast is to remain an attractive place.

Response to visual resources varies according to a range of factors including type of landform, land use, viewing point, contrast, complexity, colour, uniqueness and, in some ways most importantly, freedom from incompatabilities. This last factor is important since most of the incompatible elements which degrade the visual environment are introduced by man.

Man-made elements such as historic buildings, jetties and boats can add to the visual attraction of the coast. Other elements, such as overhead power lines, signs, mining activities, parking areas and buildings wrongly sited or

below: *Man-made elements can add to the visual attraction of the coast*

above: *Man-made elements can add to the visual attraction of the coast*



above: *Preservation area, Onkaparinga estuary*

designed, are often inappropriate in relation to existing landscapes or development patterns and can degrade the environment.

The impact of housing in the coastal zone varies according to the construction type and nature of the land on which it is built. A timber house, for example, will have different impacts to a brick one. Building on a high point is different to building in a valley, and building in an undeveloped area generally has more impact than building in a developed one.

Landscaping is often inadequate in development areas, creating the appearance of harsh structures imposed on the coastline. This aspect is reinforced when views are blocked by buildings or overhead lines, or when parking areas become a 'sea of bitumen', usually empty but destroying the most important visual quality that identifies coastal areas.

Management Policies

2.10.1 The Coast Protection Board will assess the appearance and design aspects of proposed developments in relation to the visual resource of the coastline.

2.10.2 The Coast Protection Board will assess likely improvement to aesthetic value in considering applications for assistance.

2.10.3 Guidelines around which controls may be implemented will be prepared and made available to Local Government and the public on such matters as the siting and design of coastal housing, landscaping and car parking areas.

2.11 CONSERVATION AND PRESERVATION

Issues: Many areas on the coast are of special scientific or educational interest and require special definition and/or protection measures. This usually means preservation in as near as possible to the natural condition of topography, fauna and flora. Such Preservation Areas include well-preserved sand dunes, cliffs and aquatic reserves. Furthermore, within most Coast Protection Districts several areas or items of significant historic or cultural importance exist which require protection.

In each Coast Protection District there are some preservation areas where development restrictions or incentives to preserve the land would not protect the environment adequately and the cost of purchase is outweighed by the benefits. Management policies for preservation areas should strike a balance between protection and public use for recreation, scientific and educational purposes.

Other areas will be identified by the study reports for Districts as having special significance although their purchase could not be justified. In those cases the Board will need to consider the effects of development proposals and use of the environment more closely. The requirement for harmonious relationships between man and the coastal environment is basic to the conservation and management of the coast and is the underlying principle giving rise to the landform classifications and subsequent policies in Chapter 3.

Management Policies

2.11.1 The Coast Protection Board will consider the purchase of areas necessary for preservation within Coast Protection Districts.

2.11.2 The Coast Protection Board will assist in the preservation or restoration of the natural conditions of Preservation Areas by controlling weeds and vermin and re-establishing natural plant communities.

2.11.3 In association with Local Government regular surveys of all Preservation Areas will be undertaken so that the conditions of the areas can be properly assessed and adequate controls on public use can be formulated.

2.11.4 In areas of special significance not classified as Preservation Areas the Board will, in association with Local Government, develop guidelines and principles of environmental protection around which controls and incentives for preservation may be formulated.

2.12 WASTE DISPOSAL

Issues: Pollution is relative to the type and quantity of discharge and the assimilative capacity of the coastal waters and beach. A sensible balance needs to be achieved between the cost of preventative action and the benefits of a healthy system. Matters of pollution are in the main administered by other authorities and agencies and not by the Board. The Board nevertheless is required under the Coast Protection Act to ensure that the coast is protected from pollution and restored in areas that have been subjected to pollution.

Large quantities of outfall from flood drainage, storm water, waste sludge, effluent and heated water are discharged daily into the coastal waters and rivers of South Australia. This activity is inevitably of more concern in major cities and townships. It leads to water pollution by increasing turbidity, nutrients and organisms. Outflow is often channelled or piped in a way that induces erosion or cuts channels on beaches where stagnant water collects. It also brings debris and sediments from developed areas into the tidal zone.

Another potential hazard within the coastal waters area is accidental pollution. Oil spills in recent years have already led to the establishment of mechanisms that will minimise such accidents and mobilise restoring operations should they occur, although various shortcomings exist in these mechanisms. Generally, oil spills should be contained and recovered if possible, since dispersants, although sometimes necessary, can themselves be harmful to the environment.

below: *A coastal landfill operation for the disposal of refuse*

above: *West Lakes*

In the past, land-fill operations for the disposal of household and industrial refuse have been undertaken along the coast and particularly in coastal gullies. These operations have often been far from satisfactory and in future should be fully assessed for possible environmental effects, including water pollution, appearance and smell. The ultimate use of filled areas should be planned in advance so that filling can be carried out in a way which will accommodate the planned use, with proper provision for structures such as buildings and adequate soil cover and soil veins to allow plant growth.

The proper control of litter is also important for the preservation and enhancement of the coast. At present the collection and disposal of litter from the foreshore is undertaken by Councils in conjunction with their normal service to ratepayers. The large increase in the amount of litter resulting from an influx of visitors during the summer holiday season places a heavy burden on the resources of Councils.

Litter control needs to be improved by introducing uniform bin types, placement and identification, increasing the number of bins and frequency of servicing, and by enforcement of laws against littering. Programs of publicity to educate the beach-going public could also be continued and intensified to encourage people to consider the best way to dispose of litter, including keeping it in the car for later disposal with household wastes.

Management Policies

2.12.1 The Coast Protection Board will liaise with agencies and authorities concerned with matters of pollution and will monitor the overall effects of discharge to ensure that a sensible balance exists between the cost of preventative action and the potential harmful effects of pollution.

2.12.2 The Coast Protection Board will seek continued representation to authorities established for accidential pollution in order to ensure that adequate safeguards exist to prevent the likelihood of accidents and that an adequate state of preparedness exists to deal with accidents as they occur.

2.12.3 The Coast Protection Board will study the potential and implications of oil spills with a view to prevention, recovery and, where necessary, dispersion.

2.12.4 The Coast Protection Board will ensure that proposals for future land-fill operations are adequately assessed in terms of possible physical and visual adverse effects.

2.12.5 The Coast Protection Board will assist in rehabilitating unsatisfactory coastal rubbish dumps.

2.12.6 The Coast Protection Board will assist in the provision of facilities and publicity programs for litter disposal.

2.13 MINING

Issues: The Coast Protection Districts contain many mineral and organic resources, some of which are already exploited, whereas others could become viable for mining in the future.

Already the mining of sand dunes, limestone cliffs and shellgrit beaches gives rise to environmental impact. The likely impacts of future proposals for the mining of sand, marine fibre, mineral or other deposits will require assessment to ensure adequate consideration of coastal processes. Proposals should be subject to environmental impact procedures. In most cases the proponent would be required to evaluate environmental impacts. These evaluations should be assessed by various authorities, including the Coast Protection Board. The mining of salt occurs in some Coast Protection Districts as a large-scale operation and can give rise to alienation of public access. Natural surrounding ecological systems can be significantly affected by alteration to drainage patterns.

In considering applications for mining operations, it is essential that the decision to proceed be based on a thorough evaluation of environmental and other factors. Operations should be required to work to approved development and rehabilitation programmes which ensure minimal impact on the environment and adequate restoration procedures.

While large-scale mining proposals are likely to have large impacts on the environment, many small-scale operations exist and continue to develop which also have significant adverse impacts. Furthermore, the net State benefits of these operations are often small. Mines for the mining of shellgrit, and to a lesser extent sand, for construction purposes usually result in damage to relatively unstable areas through visual impact, flooding and sand drift. In many cases existing operations should cease and further mining should be prohibited.

Management Policies:

2.13.1 Proposals for the mining of organic or inorganic resources will be assessed by the Coast Protection Board to ensure adequate protection of the coastal environment.

3 Metropolitan Coast Protection District

The District: The Metropolitan Coast Protection District extends from Port Gawler in the north to Sellicks Beach in the south. The seaward boundary is three nautical miles (5.561 kilometres) seaward of the mean low-water mark. The landward boundary is one hundred metres above mean high water mark on the seashore at spring tides. It also includes land within any estuary, inlet, river, creek, bay or lake and subject to the ebb and flow of the tide.

The Study Report: The 'Study Report for the Metropolitan Coast Protection District' was completed by the Board's consultants, P. G. Pak-Poy and Associates, in 1974. A complete inventory and analysis was made within the study report of the Metropolitan coastline and the recommendations and concepts for development of the report have formed the basis for the production of this Management Plan.

Inevitably the consultants' recommendations have been modified due to changing conditions, the need for a consistent management approach for all Districts and subsequent investigations, but the Study Report will be a useful reference document for some time.

A major review of alternative protection strategies for Adelaide beaches commenced in 1982. This and other ongoing work will lead to regular reviews of the Management Plan.

Area Classifications, Issues and Policies: Issues and policies specific to the Metropolitan Coast Protection District have been considered in terms of area classifications, each of which can be distinguished by landform type, scientific importance or existing and potential land use. The landform classifications are made because the suitability and capability of the coast for activities and uses vary mainly according to the type of land. With the landform classifications the Board will be able to assess more easily the likely effects and best locations of proposed developments on the coast.

The Preservation Area classification overlies the other area classifications which are based on landform only. The landform classifications are not mapped due to the indistinct nature of the boundaries between them. They are nevertheless accurately defined and the issues associated with them give rise to specific management policies.

LAND FORM CLASSIFICATIONS

3.1 Coastal Waters Areas

Definition: This area is defined as the waters, sea-bed and reefs between the seaward boundary of the District and mean high-water mark, including rivers and creeks subject to the ebb and flow of the tide.

opposite: *Largs Bay jetty*

Issues: Section 2.12, dealing with waste disposal, identifies generally the problems created by pollution of the Coastal Waters Areas of South Australia. In the Metropolitan Coast Protection District the Coastal Waters are subject to a greater quantity of outfall from a variety of sources than in other Districts.

Adelaide is fortunate in that no raw sewage is discharged and that the effects of treated effluent discharge are monitored by the Engineering and Water Supply Department and Public Health Department. Potentially adverse effects include increased turbidity, nutrients and organisms which result in disturbance to the sea grasses offshore from the Metropolitan beaches and, in the case of Bolivar outfall, possible damage to mangrove areas. Reports compiled by the Departments monitoring these effects show that the implications of present discharge are not severe. New treatment works and outfalls will be established in the future and volumes from existing outfalls will be increased in order to cater for growth in the Metropolitan area, both of which will add to pollution of the Coastal Waters.

Large quantities of storm water are discharged from closed storm-water drains and from open channels such as the River Torrens and Patawalonga Outlets. The water is accompanied by a great deal of refuse and debris under flood conditions.

With its relatively high volume of shipping and the presence of the Port Stanvac Oil Refinery, the Metropolitan Coastal Waters are more vulnerable than other Districts to accidental pollution by oil spill. Should such accidental pollution occur the damage caused cannot be accurately assessed unless baseline studies documenting the environmental condition of the coastal waters, sea-bed and reefs are made prior to exposure to pollutants.

Section 2.5, dealing with use of the coast, identifies the problems created by competition and conflict between uses and activities on the coast. The Metropolitan Coastal Waters cater to larger numbers of recreational uses, including boating and swimming, than do those of any other District. Although the Coastal Waters are comparatively large for the population they serve, there is already conflict between water-based recreational activities at some locations. Swimmers are separated from surfboard riders and boats in some cases where crowding occurs. Such restrictions may need to be extended to minimise danger and loss of enjoyment through conflict.

Various construction and other works that are likely to have an impact on the sea-bed and coastal waters in the Metropolitan Coast Protection District will continue to be carried out by the Board, other government bodies and private enterprise. They include pipelines, con-

above: *Port Noarlunga South*

below: *Christies Creek, O'Sullivans Beach*

duits or ducts such as the inlet duct that supplies sea water to the West Lakes Development, dredging, dumping or discharging and marine harvesting. The Coastal Waters Areas contain mineral and organic resources such as deposits of sea grasses.

Another issue for the Coastal Waters Area is the need for considerable information on water circulation patterns, wave regimes and other aspects of the sea. This information is critical to adequate understanding of coastal processes such as sand drift and underwater life.

Extraction of sand (for beach replenishment or other purposes), sea grass or mineral deposits could become viable in the future in the Metropolitan Coast Protection District. Other works for the protection, restoration or development of the Metropolitan Coastal Waters may include the construction of groynes, boat havens, boat ramps, slipways, breakwaters, jetties and sea walls. The potential for damage to the sea-bed and coastal waters is high and each proposal for these works will need to be assessed by the Coast Protection Board following the preparation of a report on the environmental factors and, in the case of major projects, an Environmental Impact Statement.

Management Policies
All general policies apply, with the following being especially relevant:
2.2, 2.3, 2.4, 2.5, 2.8.3, 2.9.3, 2.12.1, 2.12.2, 2.12.3, 2.13.

District Policies
3.1.1 The Coast Protection Board will support the preparation of baseline studies to document the environmental condition and water circulation patterns of the Metropolitan Coastal Waters Areas in locations where new outfalls are planned, where volumes from existing outfalls will be increased, and where the risk of accidental pollution is high.
3.1.2 The Coast Protection Board will study the potential and implications of refuse and debris being discharged into the Metropolitan Coastal Waters Areas with a view to trapping and removing the material prior to discharge.

3.2 Beach and Sand Dune Areas
Definition: These are areas extending inland above mean low-water mark comprised of loose material which include, where present, coastal sand dunes of poor stability or which may be affected by coastal processes and physically interact with the beach.

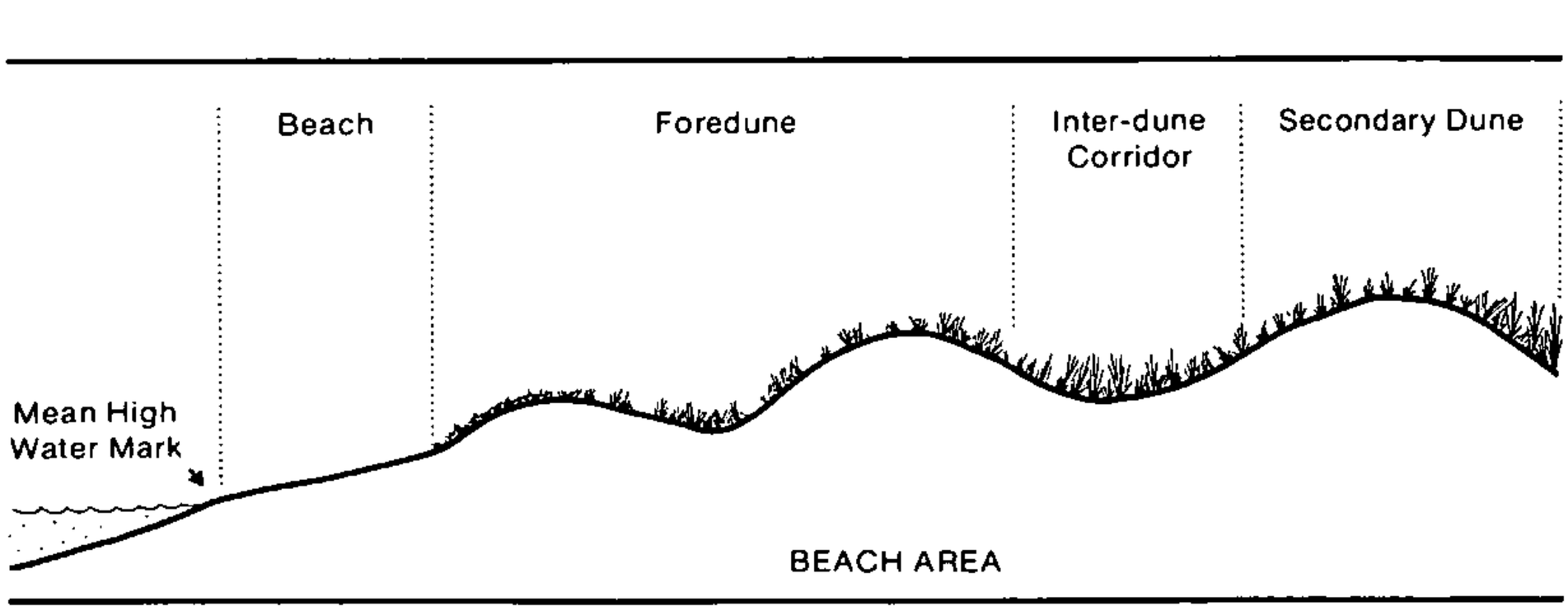
Issues: The major coastal processes of winds, waves, tides, storms and seasonal change have the most effect on this area classification. Beaches and coastal sand dunes are dynamic systems which are responsive to these processes. Sand dunes, in particular, are only as stable as the amount of soil and vegetation cover on them, as well as their protection from erosive forces. In most locations only tertiary and some secondary dunes located well back from the sea could justifiably be termed stable. Environmental stresses are therefore particularly severe on beaches and sand dunes and vegetation needs to be very resilient to survive.

As well as being naturally sensitive, these areas are also subject to a great deal of pressure from man. The risk of degrading the environment is therefore much greater than in classifications further inland and can lead to costly artificial prevention and restoration measures.

The Adelaide beaches between Seacliff and Taperoo form one continuous physiographic unit. Studies on beach erosion indicate that the amount of sand moving into the Metropolitan beach system from the south is very small, and that there is little sand movement out of this system to the north past the end of the Outer Harbor breakwater.

Except for local accretion at Patawalonga and River Torrens Outlets, the beaches between Seacliff and Henley Beach are slowly declining in sand-level, while beaches north of Semaphore Park are in general accreting.

On many sections of the Metropolitan coast, houses and roads have been built on top of the original sand dunes. In most areas this has stabilised the dunes and stopped the physical interaction between the dunes and beach. This



above: *Aldinga Beach and sand dunes*

below: *Road built on dunes, Aldinga*

in turn has speeded up the process of sand depletion, since the natural role of dunes is to supply sand to the beach when levels drop during normal seasonal fluctuations. Because the sand dunes are no longer available to act as a buffer between development and the sea, it has been necessary to construct protective walls to prevent storm damage. The construction of protective walls compounds the problem of falling beach levels, since it is usually followed by a lowering of the beach in front of the walls. This effect, which is caused by the extra turbulence created by the wall, is most serious when vertical solid walls are used and it is for this reason that, when protection is necessary, sloping permeable walls made of layers of carefully placed stones of different sizes are constructed. This wall is known as 'rip-rap'.

Another complicating factor is that mean sea-level is slowly rising, leading to a further relative decline in beach levels.

Within the Metropolitan beach system, where most frontal dunes have been built on and protective works have already been constructed, artificial methods need to be employed if beach levels are to be maintained. Moving sand from those beaches which have an excess to beaches where levels are low is a practical solution, because it is relatively cheap and effective due to the low rate of sand movement along the Metropolitan coast.

It would be preferable, however, to deposit extremely large quantities of sand to make up for the cumulative loss of sand that has occurred in the past and to ensure that the sea only reaches the rip-rap during extreme storms. This would effectively minimise the rate of sand transport along the coast.

One possibility is to replenish beaches from off-beach sand reserves. Surveys have revealed no suitable deposit off the Brighton/Glenelg coast; and it has been necessary to consider more distant sources. Sand at Outer Harbor has been surveyed and found to be suitable, though slightly finer than the sand on the Adelaide beaches. Larger quantities are needed if the replenishment sand is finer than the natural beach sand. Reserves of suitable sand may also exist off North Haven and off Port Noarlunga, but have not yet been confirmed. Dredging and transporting offshore sand onto the eroding southern beaches is feasible for a large quantity, but would require a major expenditure. Inland sand reserves have also been considered. These are scarce and their use would involve high washing and transportation costs.

Other artificial methods of maintaining beach levels, such as groyne construction, are not favoured because of their high cost and limited effectiveness.

below: *Rip-rap, Somerton*

below: *Sand drift fencing working effectively*

In view of these processes, it is important that sand dunes be retained in their natural state or built up by the use of access-control measures, traps for wind-blown sand, and protection or encouragement of vegetation. The situation in which a sandy beach is backed by a dune has been shown to provide the best protection for both the beach and the land behind. It also provides an attractive recreation resource and refuge for wildlife. Several well-preserved sand dunes remain within the Metropolitan beach system, such as those adjacent to Escourt House, Tennyson, and at West Beach.

It is too late for this natural alternative to be restored within the bulk of the Metropolitan beach system, but if foreshore dunes are retained and the need for hard-faced protective works does not arise, the beaches between Sellicks and Seacliff should remain at a satisfactory level.

Nevertheless, many of the sand dunes in this southern area are subject to considerable erosion through overuse or development, which will lead to degradation and destruction of the dunes. This in turn is likely to upset the natural process of physical interaction between the dunes and beach. It is apparent that subdivision and development have, in the past, been permitted in inappropriate areas.

Beach and Sand Dune Areas not in private ownership are either foreshore reserves allocated for specific purposes, usually recreation or provision of roads, or are in the ownership of the Minister for Marine. Demands for the provision of facilities as discussed in Section 2.6 are therefore high in this landform classification.

A need has been identified for additional boat ramps and mooring areas in the southern section of the Metropolitan Coast Protection District. This need has come about due to a rapid increase in the number of boats for recreation and a lack of natural areas on the coastline for sheltered launching, mooring and retrieval.

Driving of cars on beaches has been prohibited in most Metropolitan Council areas, and in those where the practice is still permitted, restrictions on parking and speed apply. It is only practical to remove cars completely from beaches if suitable off-beach parking areas are provided to cater for large summer crowds. In some areas, however, cars are permitted on beaches even during winter months when adequate off-beach car parking exists.

Esplanade road reserves in the Metropolitan Coast Protection District are, in many places, extremely wide, covering the strip of land between private allotments and high water mark. The reserve in places is over 200 metres wide and often includes sand dunes and beach. The road reserve is often not used for the purpose allocated and in fact should not

be used for that purpose since traffic or road construction within it would degrade the environment.

All construction, whether it be buildings, roads, or engineering structures such as sea walls, needs to be carefully considered in the Beach and Sand Dune Areas. The potential for structures to interfere with natural processes, aesthetics and public access is high, and this, together with a risk of damage to the structure itself, indicates that siting and design are more critical than in inland areas and that in many cases development should be prohibited.

Management Policies
All general policies apply, with the following being especially relevant:
2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.12.1, 2.12.2, 2.12.3, 2.12.6, 2.13.

District Policies:
3.2.1 The Coast Protection Board will endeavour to maintain adequate beach levels to reduce storm damage, decrease the rate of erosion, and to provide adequate recreation space.
3.2.2 Rip-rap walling is considered to be the most appropriate type of protective work for use in the Metropolitan Coast Protection District. The Coast Protection Board will consider assisting in its provision where necessary.
3.2.3 The sand balance of the Adelaide beach system will be monitored regularly so that necessary artificial replenishment and redistribution measures can be determined and undertaken.
3.2.4 The Coast Protection Board will endeavour to retain sand within the Adelaide beach system by supporting restrictions and initiatives designed to:
- retain natural sand dunes;
- prohibit the use of sand dunes and beaches as sources of filling material;
- encourage the growth of foredunes and reduce the loss of wind-blown sand by sand-drift control fencing;
- assist in stabilising all areas of sand above the tidal range with coastal plants such as spinifex and marram grass;
- control pedestrian access in Sand Dune Areas.

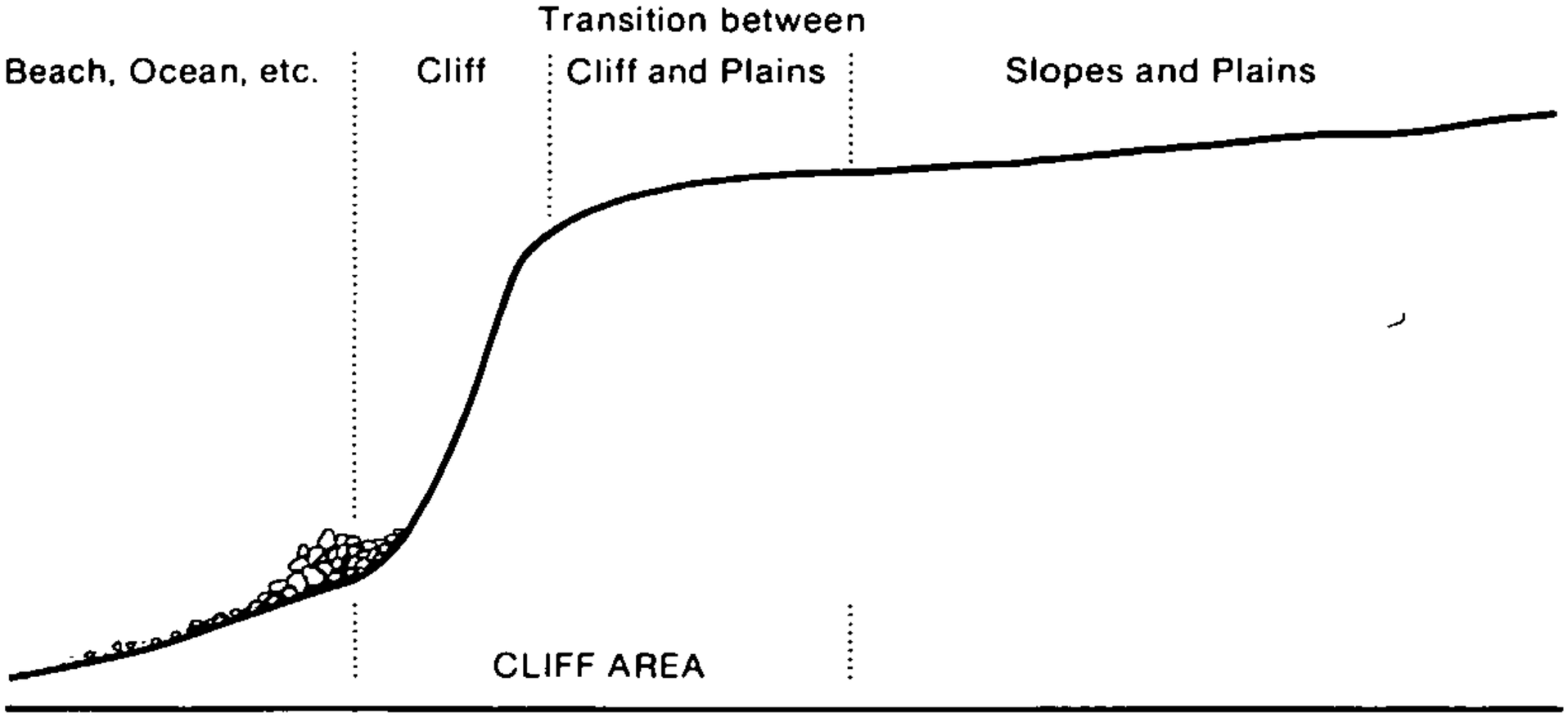
3.2.5 Since the risk of damage from storms or interference with natural processes is great in the Beach and Sand Dune Areas, the Coast Protection Board will support strict controls on all construction proposals in these areas.
3.2.6 The Coast Protection Board will support the selected closure of esplanade road reserves and the re-allocation of these for a more appropriate public use in areas which are unsuitable for traffic and roads.
3.2.7 The Coast Protection Board will continue to monitor levels of seaweed build-up on Adelaide beaches and assist Councils with the problem it creates.

3.3 Cliff and Cliff-Top Areas

Definition: Cliff Areas are generally seaward-facing, steeply sloping areas of varying heights comprised of exposed material ranging from loosely compacted earth to hard rock. Included within this classification is an area extending inland from the top of the cliff where land-use activity or construction may affect the physical and visual characteristics of the cliff and its immediate locality. Also included are headlands and promontories, as well as rock platforms and rocky coastlines not defined as beach.

Issues: Many of the cliffs are comprised of soft material and are vulnerable to erosion from several sources.

Erosion from the toe of the cliff by wave action can cause the cliff to slump into the sea. This process has already endangered the coastal road at Witton Bluff, Christies Beach, and led



above: *Cliffs, Hallett Cove*

to the establishment of expensive protective works to stabilise the cliff toe. This example indicates that adequate engineering and geological analysis is required before any cliff-top construction proceeds and that buffer zones are provided.

In some areas the cliffs are not precipitous and have become popular areas for trail bikes, heavy pedestrian traffic and hang-gliding. These activities cause damage to vegetation and erosion.

Another cause of cliff erosion is storm-water being discharged over cliff tops. An alternative is to direct the discharge into a few major outfalls which are piped to the beach and provided with proper energy dissipators.

In many places within the Metropolitan Coast Protection District, roads, houses and other construction have been placed too close to the cliff-top. This decreases the aesthetic value of the cliff and the locality and increases risk of damage to the cliff-face and the construction. Where existing subdivision, housing and roadways exist or are planned, very little can be done to prevent these problems apart from restricting access and parking to defined points, re-establishing vegetation to prevent erosion and providing protective works.

The few undeveloped Cliff Areas that remain should be retained in their natural state for their landscape value.

The visual impact of a construction in an otherwise undeveloped area is greater than in a developed area and even minor buildings need careful siting.

Management Policies

All general policies apply, with the following being especially relevant:
2.2, 2.3, 2.4, 2.5, 2.7, 2.8.1, 2.8.3, 2.9, 2.10, 2.12.1, 2.13.

District Policies:

3.3.1 The Coast Protection Board will support the reduction in the number of storm-water outlets in Cliff Areas. Storm-water should be directed to existing natural run-off systems where possible, or alternatively to beach level.

3.3.2 The Coast Protection Board will support restrictions on public access, particularly by trail bikes, to ensure the survival of cliff vegetation and hence the stability of soft cliffs.

3.3.3 The Coast Protection Board will assist in revegetating damaged Cliff Areas to improve stability and visual attractiveness.

3.3.4 The Coast Protection Board will support the use of buffer zones and the concept of clustering of urban development in order to retain some cliff-tops in their natural state for their landscape value. The Coast Protection Board will support restrictions on construction to preserve landscape values.

3.3.5 Proposals for construction within a Cliff Area should be accompanied by a full assessment of the effect of the proposal on the stability of the cliff-face, the likelihood of damage to geologically significant areas, the likelihood of damage to the construction should the cliff recede, and the visual impact of the construction. Visual impact is particularly important in undeveloped areas.

3.3.6 The Coast Protection Board will assist in improving the recreation aspects of Cliff Areas by rationalising parking to a few defined areas and by providing facilities such as lookouts and beach access walkways.

3.4 Estuary and Inlet Areas

Definition: Estuary and Inlet Areas are the areas of land and water in rivers and creeks, bays and lagoons that are above low-water mark and subject either directly or indirectly to tidal influence. The classification may include fresh-water bogs and marshes, which may or may not be land-locked, brackish water marshes and low-lands, mangrove stands, sand and mud-flats. It also includes flood-liable land.

Issues: Tidal areas are usually rich in plant and animal life and are especially susceptible to degradation from development and pollution. Shallow estuarine waters and tidal flats serve as important feeding areas for many marine organisms, including plankton, crustaceans, shellfish, fish, and many vegetation types, and provide nurseries for most of these organisms.

In the past, however, the high biological, economic, social and scientific value of these areas has been ignored and they have been viewed in the light of their potential for development as agricultural or urban land. Consequently swamps have been either drained, land-filled or dammed as artificial water bodies. In each case the value of the area has been lost or replaced by the benefits associated with other uses.

Examples in the Metropolitan Coast Protection District where estuaries and inlets and their associated wetlands have been lost or substantially modified include the Patawalonga and River Torrens Outlets, extensive mangrove areas and the salt pan and sewage works areas in the northern section of the Metropolitan Coast Protection District and the Port River and its associated tidal flats.

The Onkaparinga Estuary has been retained relatively intact and is in public ownership.

Management Policies

All general policies apply, with the following being especially relevant:
2.2, 2.3, 2.4, 2.5, 2.7, 2.8.3, 2.9, 2.10, 2.11, 2.12, 2.13.

District Policies:

3.4.1 The Coast Protection Board will assess development proposals in or adjacent to Estuary and Inlet Areas to ensure that adequate consideration is given to the sensitivity of such areas to change, their uniqueness and their importance as areas of high biological productivity.

3.4.2 The Coast Protection Board will support the protection of mangrove areas from changes in sediment transport patterns, pollution and from excessive foot and boat traffic.

below: *Barker Inlet, Torrens Island*

above: *Mangroves, Barker Inlet*

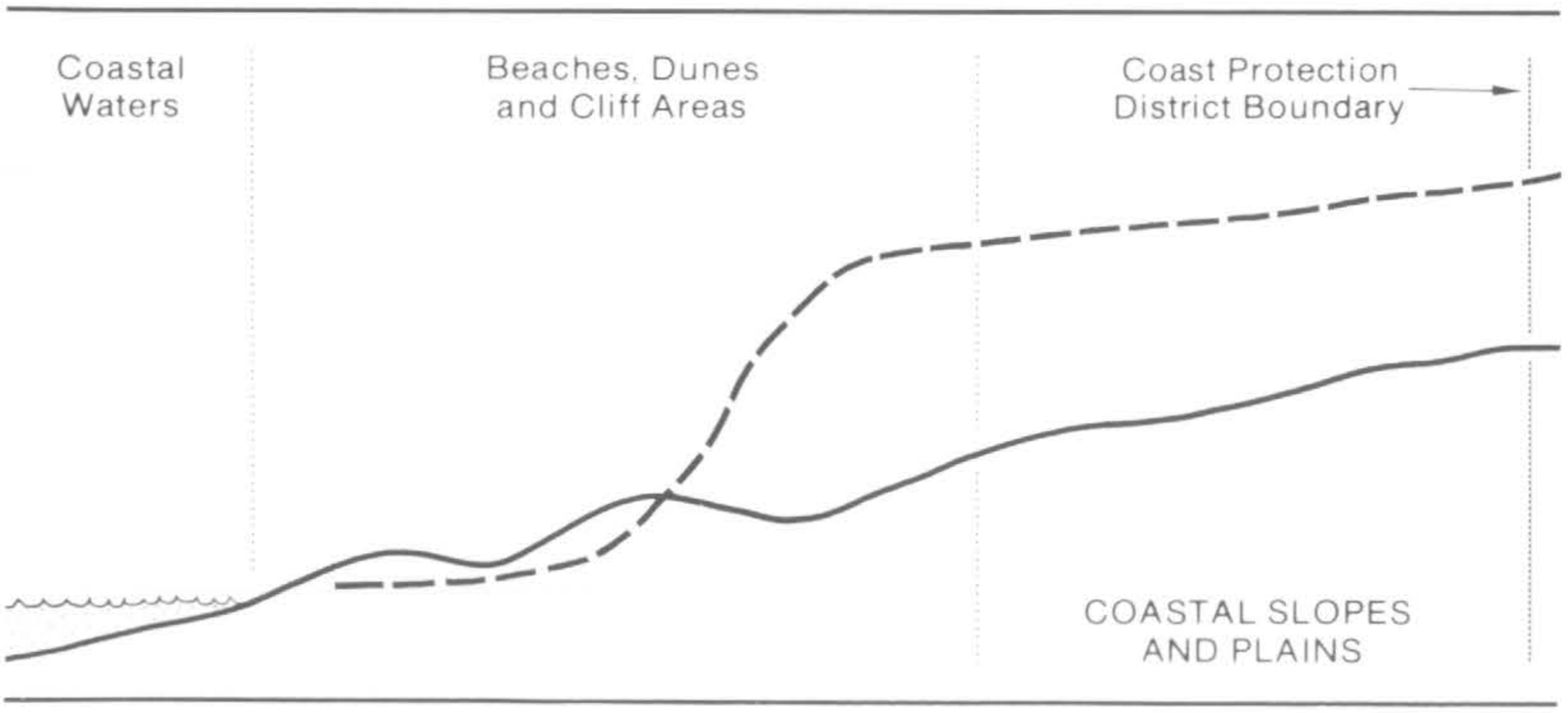
below: *The Onkaparinga estuary has been retained relatively intact*

3.5 Coastal Slopes and Plains Areas

Definition: This landform classification is defined as those areas within the Coast Protection District not included in, and generally landward of the other landform classifications.

Issues: Although areas within the Coastal Slopes and Plains classification are considered to be significant in terms of coastal management, and have therefore been included in the Coast Protection District, the issues arising in these areas are usually not as critical as in other area classifications.

Coastal Slopes and Plains Areas are often well back from the water's edge and therefore separated from coastal processes by other landform types.



above: *Coastal plain, Sellicks Beach*

In the Metropolitan Coast Protection District the classification includes private urban allotments located landward of a developed esplanade road and often on former sand dunes. The allotments are included in this classification since these areas could no longer be described as sand dunes (as defined in Section 3.2), as they have been stabilised and cannot interact with the beach due to the presence of rip-rap protection works.

The housing in many of these areas is old, and redevelopment has either already been undertaken or is likely in the foreseeable future. Redevelopment of the urban Metropolitan coastline gives rise to various issues and opportunities. In areas that are close to the sea, new construction may be vulnerable to storm attack and should therefore be provided with adequate foundations to ensure that the likelihood of storm damage arising from poor location is minimised. Many redevelopment projects will include high-rise buildings, the design of which will need to take into account overshadowing, wind disturbance and relationship to existing urban scale.

As discussed in Section 2.7, the esplanade road is in many places too wide, straight or barren for the function it serves. An opportunity exists in these areas to close or narrow the roadway or to re-route it landward of public reserves to increase the area available for recreation. Redevelopment to higher densities would be likely to place greater demands on esplanades for vehicular movement which would add to the problems of severance that the esplanade now creates.

The rural Coastal Slopes and Plains Areas in the Metropolitan Coast Protection District act as agricultural landscape buffers separating urban coastal areas. The scenic contrast provided by these areas will be eroded unless construction of rural housing and associated structures is sited and designed in a way that blends with the landscape.

Management Policies

All general policies apply, with the following being especially relevant:
2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.10.

LAND USE CLASSIFICATIONS

Unlike the landform units, which are concerned with environmental classifications alone, the land-use classifications have a specific purpose which is reflected in the issues and management policies.

below: *The esplanade road is in many places too wide*

3.6 Preservation Areas

Definition: These are areas in which, due to their uniqueness or for their protection from the influences of man, development may be either severely restricted or limited to a single use, and where action may be taken to remove existing undesirable development. They are areas which require preservation or restoration to as near as possible to natural condition. They include all Aquatic Reserves under the Fisheries Act and all Sand Dune Areas and Cliff Areas within the District that are in public ownership.

Issues: The natural features of the Metropolitan coastline provide recreational venues which attract many thousands of people each year. Some of these natural features have been classified as Preservation Areas.

Although Preservation Areas are a management category in themselves, they are also covered by the various landform categories which each area encompasses.

Within the Coastal Waters and Estuary and Inlet Areas of the Metropolitan District, several Aquatic Reserves exist which may not be subject to great pressures from recreation or other uses, but are nevertheless areas which need protection. They include the mangrove and tidal flats of Barker Inlet and the Aldinga and Noarlunga reef areas.

The sand dunes at Woodville adjacent to Escourt House are the last remaining dunes in the Metropolitan beach system with natural topography and vegetation. The dune at the Onkaparinga River Mouth has also remained relatively undisturbed and those at Moana contain Aboriginal artifacts. All of these Sand Dune Areas have been included as Preservation Areas.

There are also many areas along the coast that have been identified as worthy of protection from a geological point of view. The value of such areas for educational and scientific use is demonstrated at Hallet Cove. Other areas include rock platforms and strata of coastal cliffs. For the most part, such areas are not subject to development pressures but it is important to consider geologically significant sites in proposals for construction, including car parks, breakwaters and protective works.

below: *Sandunes adjacent Estcourt House*

below: *Fort Glanville*

Uncontrolled intrusion by pedestrians and off-road vehicles is having serious effects on some of the more sensitive Preservation Areas. Some of the Preservation Areas hold historical and educational significance in addition to their landscape and conservation value.

Management Policies

In addition to the general policies, Preservation Areas will be subject to the appropriate landform classification policies each area encompasses.

District Policies:

3.6.1 The Coast Protection Board will limit the land-uses in Preservation Areas with a view to protecting the areas and eventually returning them to their natural state. The land uses may be restricted to one single use (i.e., scientific, education or recreation) if the area is sensitive enough to warrant such action, or to a number of sympathetic uses.

3.6.2 The Coast Protection Board will consider purchase of areas necessary for preservation within the Metropolitan Coast Protection District.

3.6.3 The Coast Protection Board will support the preservation or upgrading of the natural conditions of Preservation Areas by controlling access and assisting in re-establishing natural plant communities.

3.6.4 The Coast Protection Board will ensure that any future development within the District will be controlled to avoid damage to historical land-marks and other man-made features worthy of preservation.

3.6.5 The Coast Protection Board will, in conjunction with other agencies concerned, undertake regular surveys of Preservation Areas so that the condition of the areas can be properly assessed.