



Policy 15: Management of Coastal Dune Areas

Chapter 1 Introduction

The Gold Coast City has the benefit of approximately 52 kilometres of beachfront to the Pacific Ocean. It offers some of the best and most popular surfing beaches in Australia and, accordingly, is a major tourist attraction and coastal recreation area.

Naturally occurring beach ecosystems are dynamic and consist of tidal zones, fore dune and hind dune areas.

Dunal areas are critical for the protection of beaches. They are natural 'buffer zones' that reduce the impact of fluctuations of the shoreline and erosion by the sea.

In some areas along the oceanfront, development has encroached upon the frontal dunal area, disturbing the natural balance between erosion and replenishment, with a consequent loss of adequate beach areas in some locations.

The provision and proper management of adequately sized dunal 'buffer zones' in urban and non-urban areas is the most effective means of protection against the loss of the City's beaches.

High quality coastal beaches backed by vegetated and stable dunal 'buffer zones'; contribute to the ecological and environmental integrity of the City, and offer a spectacular visual and natural environment which is a primary tourist attraction.

This policy focuses on reducing the impact of urbanisation on the dunal areas, on the re-establishment, maintenance and protection of the natural dunal areas remaining, and on managing high use public areas within dunal areas.

Chapter 2 Purpose

This policy should be read in conjunction with **Local Planning Policy No.17 – Foreshore Rock Wall Design and Construction**. It is intended that the policy will be educational and promotional rather than regulatory.

The purpose of this policy is to:

1. Promote the establishment and retention of appropriate vegetation as the preferred form of dune stabilisation;
2. Preserve the function and sustainability of natural dunal systems;
3. Provide community guidance on sustainable dunal land use;
4. Project a positive city image;
5. For the benefit of present and future generations of the Gold Coast City community.

This policy will be implemented through various areas of Council responsibility, including:

- Development Approvals;
- Council works programs;
- Community based rehabilitation programs; and
- as a promotional and educational tool to encourage the general public to maintain and care for dunal areas in an appropriate manner.



Chapter 3 Objectives

1. To ensure the retention and planting of appropriate vegetation to assist in:
 - a) stabilising dunes to minimise impacts of cyclonic winds on the natural and built environment adjacent to the active frontal dune area;
 - b) preventing sand losses from wind erosion; and
 - c) establishing a sustainable habitat and corridor for wildlife.
2. To reinforce the visual amenity of the City's beaches by:
 - a) using appropriate vegetation in dunal areas; and
 - b) education and promotion of good landscape design principles in establishing new vegetation in urban areas in, and adjacent to, dunal areas.
3. To facilitate safe public access through public land within dunal areas by defining access ways and public areas that can be maintained to a high standard with minimal impact on natural systems.
4. To consider the visual amenity and privacy requirements of beachfront residents.

Chapter 4 Background

1.0 The Nature of Erosion

Sand dunes act as a long-term sand store to build offshore bars during major erosion events. Large waves make 'withdrawals' from the dunal sand bank to build offshore, protective sand bars, and then small waves return this sand back to the visible beach. The general pattern is one of swift erosion during storms, and a gradual return to the beach of the eroded material during quiet periods.

Gold Coast City Council has measured the volume of sand seaward of the Foreshore Seawall and has estimated that in 1995 this sand is less than necessary to buffer a 1:50 year storm. This means when a storm of this magnitude arrives, the Foreshore Seawall is likely to be exposed.

Vegetation significantly influences the size and stability of dunal areas.

Gold Coast City Council has traditionally aimed to achieve a 'buffer', in the form of stabilised vegetated sand dunes, seaward of the Foreshore Seawall. Stabilised and vegetated sand dunes help to increase the volume of sand available to build sand bars during erosion events, thus protecting the Foreshore Seawall and the properties behind in large storm events.

2.0 The Importance of Native Dunal Vegetation

In coastal areas, the foliage of plants can be burnt by high temperatures, salt-laden winds and rain, and also abraded by windblown sand. Species that can withstand these effects can actually benefit from onshore winds by intercepting wind-borne nutrients from the sea. These nutrients are deposited on the leaves of coastal plants and washed into the sand by the first showers of rain.

Native dunal vegetation can provide a significant refuge and source of food for local and migratory fauna species.

Existing native dunal vegetation provides a seed bank of plants for future generations, thus maintaining the natural biodiversity of the area.

Native dunal grasses, especially Spinifex grass (*Spinifex sericeous*), facilitate dune growth by colonising and trapping windblown sand and preventing it escaping the beach system.

The long, deep and expansive root systems of native dunal plants help to minimise sand losses from frontal dune areas caused by wave attack during severe erosion events.

The varying of height and density of native dunal species provides an effective buffer to minimise wind effects.

Native dunal vegetation can withstand burial by wind-blown sand, a common occurrence in Active Frontal Dune Areas.

Native dunal vegetation provides habitat and corridors for a wide range of insects, birds and other wildlife.

Native dunal vegetation enhances the natural appearance, overall character and environmental quality of the beach and dunal areas and, hence, the image of the City.



3.0 Impacts of Inappropriate/ Non-Native Dunal Vegetation

Hardy salt tolerant non-native dunal species are not desirable in actively forming Frontal Dune Areas. They can often displace native dunal vegetation due to their ability to grow aggressively, smother native dunal species, and compete for available nutrients.

When the dunal areas are stressed through erosion, non-native plant species can quickly die, leaving bare sand which can be prone to wind erosion.

Invasive exotic plants that inhabit areas close to the shoreline can be spread along the coastline by currents and become invasive in other areas.

Mown turf does not have the ability to trap wind-blown sand travelling just above the ground level. The absence of sand-trapping vegetation causes sand to be lost from the system. The natural, dynamic system of sand movement is therefore disrupted.

The establishment of turf and the mowing of herbaceous vegetation stunts the growth of the sand dunes (height and width), and inhibits their capacity to act as long-term sand reserves. The result of stunted dune growth can be seen clearly along the coastline. In areas where native dunal species have been encouraged, the replenishment of sand has resulted in well-formed dunes. In areas where native dunal species have not been encouraged, the dunes are poorly developed and contain small reserves of sand to replenish the beach and provide protection from wave attack.

Turf is not capable of withstanding sand burial. Buried turf is most likely to die off, leaving the dunal area without vegetative stabilisation in erosion events. Mown turf should not encroach into Active Frontal Dune Areas.

The acceptance and use of environmentally inappropriate exotic species within the dunal environment can reduce the natural heritage values of ocean front land, be detrimental to the sustainability of the dunal environment, and have a negative impact on the aesthetic value of our foreshores. The use of exotic species in some areas is contrary to the Strategic Planning Objectives to preserve the character of foreshore/ beachfront areas and their contribution to the image of the City.

4.0 Impact of Human/ Urban Activity

Coastal sand dunes in urban areas are affected significantly by the activities of humans. Such activities include recreational use, establishment of environmentally inappropriate exotic vegetation, roads, car parks, beach access tracks, waste disposal and housing. Dunes and the plants that grow in them have a limited capacity to recover from intensive use without assistance and care from the community.



Chapter 5 Management Units Within Coastal Dune Areas

Because of the ever changing nature of the dunal environment through natural occurrences, the impact of human activity and recreational use, the Coastal Dune Areas have been categorised into three broad management units. Clear guidelines and management practices can then be established to identify appropriate activity, use and vegetation within specific areas.

These broad Management Units are:

1. Non-Urban Dune Areas (for details, refer **Clause 1.0**)
2. Urban Dune Areas (for details, refer **Clause 2.0**)
3. Public Areas (for details, refer **Clause 3.0**)
 - a) Minor Public Areas
 - b) Major Public Areas

The locations of these Management Units have been identified by the Gold Coast City Council on the series of mapped information titled, 'Dunal Management Plans'. A copy of these plans is available from the Gold Coast City Council on request. The information on these plans is continually updated by Council's Managing Authority to reflect the current state of the dunal environment.

Note: Refer to Appendix 3 for typical examples of the:

- 'Dunal Management Unit Plan'; and
- 'Active Frontal Dune Line Plan'.

1.0 Non-Urban Dune Areas

Within areas identified as Non-Urban Dune Areas on Gold Coast City Council 'Dunal Management Plans', the following requirements apply:

- a) Intent
- b) Activity and Use Requirements
- c) Vegetation Requirements

In addition, Basic Management Guidelines for rehabilitation and control of environmental weeds are provided in **Chapter 7** of this policy.

The types of problems encountered when managing coastal sand dunes in Non-Urban Areas are different from those encountered when managing dunes in Urban Dune Areas and Public Areas. Some of the problems experienced are:

- uncontrolled beach erosion and wind erosion;
- unnecessary access and use for recreational purposes;
- damage to land by future development that may be planned nearby; and
- damage to areas of conservation value.

1.1 Intent

To ensure that all Non-Urban Dune Areas are managed and maintained to protect existing natural systems and, where necessary, to rehabilitate degraded environments to replicate locally occurring natural systems.

1.2 Activity and Use Requirements

1.2.1 Policy Provisions

- a) Any rehabilitation or maintenance programmes, including community rehabilitation programs, are to be undertaken only with approval from Council's Managing Authority.
- b) Any practice or activity that destroys natural or native dunal species is unacceptable. This includes uncontrolled vehicle use, high impact recreational use, and grazing by horses and introduced stock. The natural and native dunal vegetation should be left intact to maintain stability against wind and beach erosion and to inhibit potential invasion by weed species.
- c) In some Non-Urban Dune Areas, it may be necessary to construct access ways for the use of vehicles and pedestrians. The construction, type and location of any access ways is to be undertaken using best management practices, as required by Council's Managing Authority.



1.3 Vegetation Requirements for Non-Urban Dune Areas

1.3.1 Policy Provisions

- a) Any planting, modifying (including pruning and shaping) or removal of native species (including native dunal species) requires the approval of Council's Managing Authority.
- b) Species identified in **Chapter 6** of this policy are not appropriate for use in any new planting works, and those species already existing in these areas should be eradicated prior to rehabilitation of the area with appropriate native dunal species.
- c) Best Management Practices shall be used when eradicating weed infestation so that areas treated do not become vulnerable to wind erosion. Any community rehabilitation programs are to be approved by Council's Managing Authority. Control of environmental weeds and exotic species is critical in these areas. Invasion of weeds and introduced species has detrimental effects on the stability and formation of dunes including:
 - competition with, and displacement of, native dune vegetation;
 - displacement of native fauna;
 - increased fire risk.

1.4 Vegetation Guidelines

Vegetation communities vary landward across Non-Urban Dune Areas due to:

- decreases in the degree of exposure to salt spray, strong winds and sandblast;
- improvement in nutrient status and moisture content in developing dunes; and
- impacts from recreational use and historical land uses.

The aggregation of vegetation communities in these areas form, in general terms, three zones – Pioneer, Woodland/ Scrub and Forest/ Heath zones. The dunes are dynamic in nature, and not all vegetation zones may be present due to the effect of extreme conditions.

The three zones generally present in non-urban areas are described as follows:

1.4.1 Pioneer Zone

Primary stabilising plants consisting mostly of herbaceous and grass species.

The pioneer zone usually extends landward from the debris line on the beach to the crest of the frontal dune. Where the beach is eroding, this zone may be completely absent. Conversely, where areas are accreting rapidly, the pioneer zone may cover the berm and the whole of the frontal dune.

Pioneer plants constitute the initial vegetation which colonises newly developing sand accumulations, and may eventually be replaced by grassland, scrubland, coastal heath, woodland, forest or wetland.

Pioneer plants do not complete the stabilisation process, but prepare the dune soil and other habitat conditions for establishment of secondary stabilisers. These plants are critical for initial stabilisation of sand.

Some typical species that may inhabit this area are identified in **Appendix 1 – Plant Schedule 6**.

1.4.2 Woodland or Scrub Zone

Secondary stabilising plants including herbs, grasses, vines and stunted trees.

The Woodland Zone usually covers the crest of the frontal dune, and may extend further inland to include the secondary dune. As the soil conditions improve and habitat conditions such as salt spray and sand blast are reduced, pioneer plants may be replaced by secondary stabilising species of the woodland zone. Most plants in these areas can withstand salt spray and salinity, but are damaged by high concentrations of these. Tree or shrub species may become stunted due to exposure to extreme conditions. The main function of this zone is to stabilise the accumulated sand and generally improve soil conditions to enable a wider range of plant species to establish later.

Some typical species that may inhabit this area are identified in **Appendix 1 – Plant Schedule 7**.



1.4.3 Forest or Heath Zone

Tertiary stabilising vegetation usually the same species as the woodland zone.

The forest or heath zone is usually located landward of the woodland zone on the frontal dune to sheltered hind dune areas. This zone represents the mature state of development of coastal vegetation. Sometimes this zone is not present, due to excessive exposure to strong winds, salt spray and other adverse environmental conditions. Generally, in low-lying areas typical of the Gold Coast City, heath land has developed instead of forest.

The main function of the forest zone is to stabilise hind dune areas by holding the sand in place, providing a habitat for flora and fauna diversity, and providing an important transition zone between the sea and the inland zone. If severe erosion occurs and the forest zone becomes exposed to extreme conditions, vegetation may die, leaving the area exposed to wind erosion. It is critical that the area be stabilised with pioneer plants to initiate the process of redevelopment of the vegetation zone.

Some typical species that may inhabit this zone are identified in **Appendix 1 – Plant Schedule 7** and **Plant Schedule 8**. These species are usually the same as in the woodland zone, but can become fully developed and mature in favourable conditions.

2.0 Urban Dune Areas

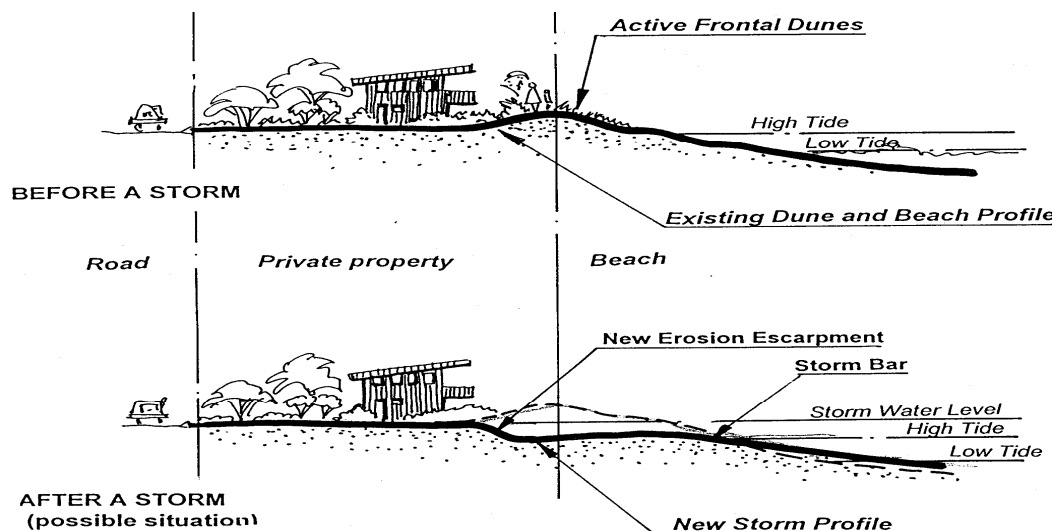
Within areas identified as Urban Dune Areas on Gold Coast City Council 'Dunal Management Plans', the following requirements apply:

Zone A	2.1.1 – Intent
	2.1.2 – Activity and Use Requirements in Zone A
	2.1.3 – Vegetation Requirements in Zone A
Zone B	2.2.1 – Intent
	2.2.2 – Activity and Use Requirements in Zone B
	2.2.3 – Vegetation Requirements in Zone B
Zone C	2.3.1 – Intent
	2.3.2 – Activity and Use Requirements in Zone C
	2.3.3 – Vegetation Requirements in Zone C

In addition, Basic Management Guidelines for rehabilitation and control of environmental weeds are provided in **Chapter 7** of this policy.

Note: *The requirements and guidelines for Urban Dune Areas are to be read in conjunction with the GCCC 'Dunal Management Plans'. Identified on these plans are the locations of the Foreshore Seawall Wall Line A, the Property Boundary and the location of the Active Frontal Dune Line.*

Generally, Urban Dune Areas are those which are seaward of private residences, resort properties and all urban public park areas that have frontages to ocean beaches.



High Seas and Wave Overtopping Erodes Frontal Dune Areas in Severe Storms



Issues associated with the management of Urban Dune Areas are complex due, to the proximity of adjacent development and associated activity. Some of the issues involved are:

- urban development encroaching on what were once active frontal dune areas;
- removal or pruning of native dunal species to create views and gardens, destabilising dune areas;
- encroachment of turf and inappropriate vegetation into public land and actively forming dune areas;
- uncontrolled access in actively forming dune areas, resulting in instability and disruption to dune formation;
- wind erosion resulting from the loss of appropriate vegetation heights and arrangements;
- susceptibility of private property and urban parkland to damage during an erosion event;
- perceptions that public land is private or inaccessible.

To facilitate clear and consistent management guidelines for use, activity and vegetation in Urban Dune Areas, typical zones have been identified. A diagram of Typical Zones within Urban Dune Areas is shown on the following page.

The zones are identified as:

- Zone A – Active Frontal Dune Areas (always present);
- Zone B – Hind Dune Areas (sometimes present);
- Zone C – Property landward of the Hind Dune Line (always present).

Note: *In some locations within Urban Dune Areas, the dunes have not matured to the stage where there is any stable land seaward of the hind dune line. In this instance, there are no hind dune areas present. Placement of the Active Frontal Dune Line is based on assessment of the health and maturity of the dunal system.*

2.1 Zone A – Active Frontal Dune Areas

Naturally occurring Active Frontal Dune Areas are characterised by sand dunes with ground and shrub level vegetation. The Active Frontal Dune Area acts as a barrier and front line defence against the action of tides and waves, as well as a long-term sand store for the beach during erosion events.

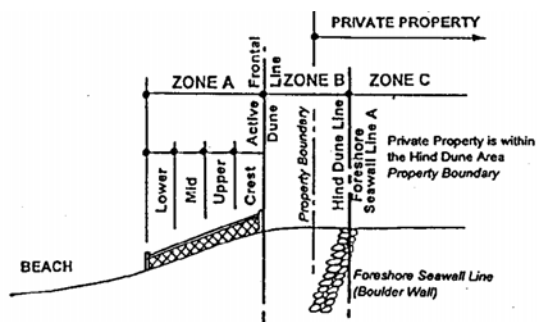
The Active Frontal Dune Area has been identified as an area seaward of the Active Frontal Dune Line. The Active Frontal Dune Line represents the boundary between the dynamic frontal dune area and the more stable hind dune area. Determination of the location of this line is largely based on the condition of the dunal system within neighbourhood block areas.

The location of the Active Frontal Dune Line is assessed, having regard to:

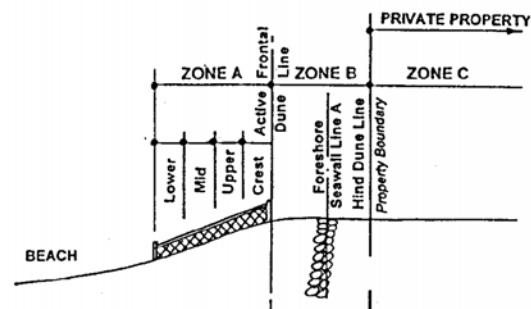
- previous experience gained in managing dunal areas; and
- the state of the vegetation on the dune, and the penetration of wind blown sand particles through buffers.

The Active Frontal Dune Area is dynamic in nature and is at the mercy of climatic influences. The location of the Active Frontal Dune Line may change from time to time in response to these climatic influences. For example, after an erosion event, some Active Frontal Dune Areas may be located further landward by Council's Managing Authority to encourage quicker accretions of sand resources or, conversely, as these areas begin to stabilise, then the Active Frontal Dune Area may be located further seaward.

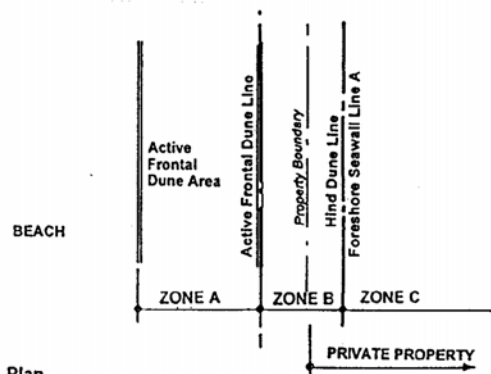
Active Frontal Dune Areas are sensitive to damage, so it is essential that negative impacts on vegetation and dune formation are reduced to a minimum.



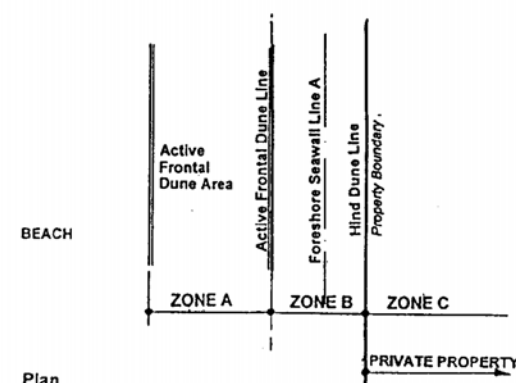
Section



Section



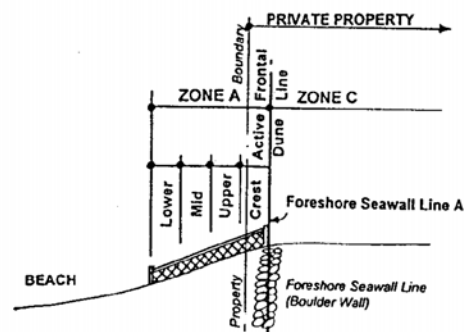
Plan



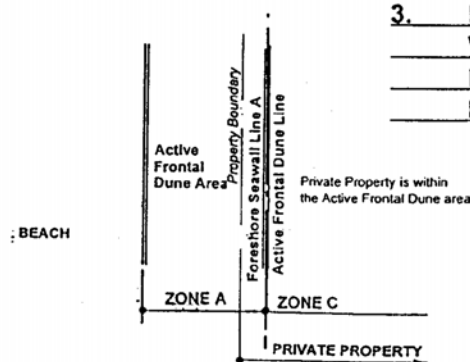
Plan

1. HIND DUNE LINE IS IDENTIFIED
AS THE FORESHORE SEAWALL LINE

2. HIND DUNE LINE IS IDENTIFIED
AS THE PROPERTY BOUNDARY



Section



Plan

3. HIND DUNE AREA NOT PRESENT -
WHEN ACTIVE FRONTAL DUNE LINE
IS LANDWARD OF THE PROPERTY
BOUNDARY

Typical Zones Within Urban Dune Areas



2.1.1 Intent

To ensure that Active Frontal Dune Areas are managed and maintained in a manner which replicates as closely as possible typically occurring natural local conditions.

2.1.2 Activity and Use Requirements for Zone A

Policy Provisions

- a) All Active Frontal Dune Areas, including those on public and private property, must be fenced to exclude human activity, except where access ways have been approved by Council's Managing Authority. The required fencing may consist of a full back and front fence and possibly side fences. Fencing is to be in accordance with **Local Planning Policy No. 7 – Foreshore Rock Wall Design and Construction**.
- b) Access ways to the beach must be no more than a single access way per property to the beach. Access ways are to be constructed to minimise wind and water run-off erosion. The method and location is to be determined by Council's Managing Authority. Use of shared/ neighbouring access ways is encouraged to reduce impact.
- c) Nourishment of Active Frontal Dune Areas with clean sand is acceptable, provided these areas are revegetated to comply with the Vegetation Requirements in **Subclause 2.1.3** of this policy. All sand used for nourishment must be sourced from outside the active beach system and be free of deleterious material, seeds and weed species. Written approval is required from Council's Managing Authority, prior to placement of any sand.
- d) The following activities and uses are not permitted in Zone A:
 - any activity which, in the opinion of Council's Managing Authority, may lead to wind, water run-off or sea erosion, will intensify recreation and uncontrolled access to the beach or reduce the amenity of the beach;
 - the laying of turf areas or mowing of dunal grasses;
 - alteration of the natural configuration of the land, except where written approval has been granted from Council's Managing Authority to deposit clean sand for replenishment of the Active Frontal Dune area;
 - Use of composting material and topsoil;
 - dumping of any garden refuse;
 - the construction of planting beds; and
 - permanent irrigation systems.

All lighting structures for private use must be located within private property. Any lighting of beach areas must not exceed the brightness of street lighting when viewed from the high water mark at any particular location.

2.1.3 Vegetation Requirements in Zone A

Policy Provisions

- a) Any planting of vegetation and/or removal of natural or native dunal species in the Active Frontal Dune Area (Zone A) requires written approval from Council's Managing Authority. The application should be accompanied by a plan showing the location and description of proposed species to be planted or removed.
- b) Planting or seeding of vegetation is to be undertaken using local native dunal species only. Plant stock is to be procured from locally propagated stock sources. Seed stocks are to be harvested from local seed bearing species.
- c) Species identified in **Chapter 6** of this policy are not appropriate for use in any new planting works, and those species already existing in these areas should be eradicated prior to rehabilitation of the area with appropriate native dunal species.
- d) Best Management Practices shall be used when eradicating weeds so that areas treated do not become vulnerable to wind erosion.
- e) Initial stabilisation of Active Frontal Dunal areas is to be achieved using locally obtained sand Spinifex (*Spinifex sericeous*) runners. Gold Coast City Council has approved locations for sourcing Spinifex runners for initial stabilisation purposes.



Spinifex runners should have a minimum length of 750 mm. A minimum of three (3) nodes shall be planted parallel to the water line at 500 mm centres. Rows are to be 1000 mm apart. The runners should be planted vertically, to a minimum depth of 450 mm, with approximately 125 mm of the tip (growing end) exposed. Striking is expected to occur within 2 – 3 weeks, at which time the first of 3 applications of Crop King 600 fertiliser shall be made. The 2 subsequent applications are to be made 3 and 6 months after the first application.

The planted area may be covered with brush matting. The matting should be spread thinly to avoid smothering the Spinifex, but at a sufficient density to act as a sand trap. No limb shall be greater than 50 mm diameter.

After the successful establishment of Sand Spinifex (*Spinifex sericeous*), other ground, shrub and tree species may be planted as secondary stabilisers. **Appendix 1 – Plant Schedules 1 and 2** identifies some appropriate species for planting in Active Frontal Dune Areas. These Schedules include plant descriptions and appropriate locations within the Active Frontal Dune area.

Vegetation Guidelines

There are several different vegetation types that inhabit naturally occurring Active Frontal Dune areas.

These are:

- Initial Stabilisers/ Pioneer Plants

These plants are the initial vegetation which can colonise newly developed sand accumulations. These plants may eventually be replaced during the development of the dune, by scrubland, coastal heath or woodland. Pioneer plants do not generally complete the stabilisation process, but they prepare the dune soil and other habitat conditions for establishment and growth of other vegetation types. It is critical at this stage in the stabilisation process that weed infestation is controlled.

- Herbaceous Plants and Dunal Grasses

These plants play a dominant role in dune formation. They grow in a manner that enables them to help develop dunes in conjunction with wind action. Most of these plants have strong underground root systems and surface runners.

- Shrubs

After initial stabilisation, shrubs act as a low-level windbreak and mound builder, but can also introduce some variety of wildlife habitat, colour, form and texture to the dunal areas. Shrubs provide the best effect when planted in groups of three to five and arranged to replicate naturally occurring groups of vegetation. Shrubs are ideally located at either the upper/ crest of the seaward slope or in the sheltered areas behind the crest of the Active Frontal Dune Area.

- Trees

Trees can make a basic framework in the dunal area by providing higher windbreaks and salt traps, as well as habitat, visual buffer or screen and character, and by framing views and providing shade. They are usually found on the crest and upper part of the landward slope of the Active Frontal Dune area.

2.2 Zone B – Hind Dune Areas

In some locations, dune growth has progressed to the stage where there are some sheltered areas landward of the Active Frontal Dune Area. The Hind Dune area includes all areas landward of the Active Frontal Dune Line and seaward of the Hind Dune Line. (The Hind Dune Line may be either the Foreshore Seawall Line A or the Private Property Boundary, whichever is the most landward.)

In these stabilised areas, access and passive recreational use will not adversely reduce the overall stability of the dunal area. Note that these areas provide long term sand reserves during erosion events, so it is imperative that the appropriate vegetative cover be maintained to sustain the dune area in an erosion event and to hold in reserve enough frontal dune species to quickly rebuild frontal dunes after erosion events.

Naturally occurring Hind Dune Areas are characterised by relatively unbroken canopies of mature native dunal species, including a variety of ground covers, shrubs and trees.

2.2.1 Intent

To ensure that Hind Dune Areas are managed and maintained wherever possible to replicate natural local conditions. However, due to the relative stability of the dunes, low-level passive recreation and public access ways are acceptable.



2.2.2 Activity and Use Requirements for Zone B

Policy Provisions

- a) Any structures or vegetation that impede public access in Hind Dune Areas within Crown Land are not permitted. This means there should be no fences of any description, or deliberate location of planting beds/ vegetation that restrict direct public access and give the perception that Crown Land is private property. Any planting works require approval in writing from Council's Managing Authority. The application should be accompanied by a plan showing the location of proposed fencing or vegetation.
- b) Nourishment of Hind Dune Areas with clean sand is acceptable, provided these areas are revegetated to comply with the Vegetation Requirements in **Subclause 2.2.3** of this policy. All sand used for nourishment must be sourced from outside the active beach system, and be free of deleterious material, seeds and weed species. Written approval is required from Council's Managing Authority prior to placement of any sand in Hind Dune Areas.
- c) Selective mowing of native turf-forming plants is acceptable in Zone B.
- d) The following activities and uses are not permitted on Crown Land within Zone B:
 - the use of composting material and topsoil;
 - dumping of garden refuse;
 - alteration of the natural configuration of land, except where written approval has been granted from Council's Managing Authority to deposit clean sand for replenishment of the dune area; and
 - permanent irrigation systems.
- e) All lighting structures for private use must be located within private property. Any lighting of beach areas must not exceed the brightness of street lighting when viewed from the high water mark at any particular location.

2.2.3 Vegetation Requirements in Zone B

Policy Provisions

- a) Any planting of vegetation and/or modifying (including pruning or shaping) of natural and native dunal species in Hind Dune Areas requires written approval from Council's Managing Authority. The application should be accompanied by a plan showing the location and description of proposed species to be planted and/or removed.
- b) Planting and seeding of any vegetation in Crown Land is to be undertaken using native dunal species only. Plant stock is to be procured from locally propagated stock sources. Seed sources are to be harvested from locally sourced seed bearing species.
- c) Species identified in **Chapter 6** of this policy are not appropriate for use in any new planting works, and those species already existing in these areas should be eradicated prior to rehabilitation of the area with appropriate native dunal species.
- d) Best Management Practices shall be used when eradicating weeds so that areas treated do not become vulnerable to wind erosion.
- e) In some Hind Dune Areas within Crown Land, the tree and shrub cover may be so dense that little ground cover vegetation is present. Thinning and removal of old and unhealthy plants can be used to encourage the establishment of ground cover vegetation. Removing this type of vegetation can also have an adverse impact on vital wildlife habitat. Therefore, removal and thinning of natural or native dunal vegetation is to be approved in writing by Council's Managing Authority.
- f) Large tree species shall not be planted in the 8.1 metre setback area landward of the Foreshore Seawall Line A (as identified in **Local Planning Policy No. 7 – Foreshore Rock wall Design and Construction**). Such species restrict emergency works associated with maintenance of the Foreshore Seawall.

Vegetation Guidelines

Opportunities exist in the established and stabilised Hind Dune Areas within Crown Land, for planting and planting design that will improve passive recreational value and enhance visual appeal for the public and the beachfront residences.

Note: *Planting that restricts public access in Hind Dune Areas within Crown Land, or that gives the impression that Crown Land is private, is unacceptable.*



The vegetation types that inhabit Hind Dune Areas also include those in Zone A – Active Frontal Dune Areas (**Subclause 2.1.3**, and **Appendix 1 – Plant Schedules 1, 2**). Additionally, **Appendix 1 – Plant Schedules 3 and 4**, identifies other appropriate species that can be planted in Hind Dune Areas.

Note: *Plant Schedule 4 identifies appropriate species for planting in Hind Dune Areas landward of the Foreshore Seawall Line only.*

Appendix 2 sets out some basic design guidelines for improving the visual quality and functional aspects of planting adjacent to Urban Dune Areas.

2.3 Zone C – Property Landward Of The Hind Dune Line

This zone incorporates, primarily, private garden areas and all urban public parkland that is directly adjacent to the dunal area. The selection of plant species and design of the landscaping has a direct impact on both the aesthetic and functional aspects of the dunal system and the beach.

2.3.1 Intent

To encourage private property owners and Council public works departments to have regard to, and reinforce the intent for, the use, activity and vegetation requirements of Urban Dune Areas.

2.3.2 Activity and Use Requirements for Zone C

Policy Provisions

Setbacks and the construction of any built structures and landscape works are to comply with the Gold Coast City Planning Scheme and all other relevant Gold Coast City Council requirements.

2.3.3 Vegetation Requirements for Zone C

Policy Provisions

- a) Any planting of vegetation and/or modifying (including pruning or shaping) of natural or native dunal species and vegetation of cultural significance in Crown Land shall have regard for the requirements in **Clause 2.0 – Urban Dune Areas**, and respect for the natural heritage values of ocean front land and/or recognised cultural landscape of the surrounding area. Council also encourages the same in private land.
- b) Any planting of vegetation and/or modifying of natural or native dunal species and vegetation of cultural significance in Crown Land requires written approval from Council's Managing Authority.
- c) Large tree species shall not be planted in the 8.1 metre setback area landward of the Foreshore Seawall Line A (as identified in **Local Planning Policy No. 7 – Foreshore Rock Wall Design and Construction**). Such species restrict emergency works associated with maintenance of the Foreshore Seawall.

Vegetation Guidelines

Coastal gardens and/or public parkland are subject to a variety of harsh conditions, so it is of prime importance to establish a basic landscape framework. This involves selection and strategic planting of species which have proven to be environmentally appropriate in coastal areas to ensure their continued survival.

The value of local native dunal species in coastal regions has already been identified.

A low maintenance landscape framework and local native dunal species are suitable for both holiday and permanent residences and public use areas. This would enable tender, delicate plants to be grown in the protection of this framework. With a mixture of local native species, a landscape not only maintains local character and wildlife habitat but also provides interest.

Ornamental or exotic species, which have proven to be environmentally appropriate in coastal areas, can often complement the existing native vegetation and improve the visual appeal of the landscaped area, whilst also improving stability against wind erosion. It is critical that exotic or introduced species do not encroach upon or infest nearby Hind Dune and Active Frontal Dune Areas.

Appendix 1 – Plant Schedules 2, 3, 4 and 5 identify and suggest some appropriate species that can be planted in areas that are landward of the Hind Dune Line;

Appendix 2 sets out some basic design guidelines for improving the visual quality and functional aspects of planting adjacent to Urban Dune Areas.



3.0 Public Areas

Some public foreshore areas require different management practices to accommodate greater public use and activity than in Urban Dune Areas.

These public areas have been categorised into two main groups to distinguish between the extreme and the high/ medium public use areas. These are:

- Minor Public Areas; and
- Major Public Areas.

Within areas identified as Public Areas on Gold Coast City Council 'Dunal Management Plans', the following requirements apply:

Minor Public Areas	3.1.1 – Intent
	3.1.2 – Activity and Use Requirements in Minor Public Areas
	3.1.3 – Vegetation Requirements in Minor Public Areas
Major Public Areas	3.2.1 – Intent
	3.2.2 – Activity and Use Requirements in Major Public Areas
	3.2.3 – Vegetation Requirements in Major Public Areas

In addition, Basic Management Guidelines for rehabilitation and control of environmental weeds are provided for in **Chapter 7** of this policy.

Note: *The requirements and guidelines of Public Areas are to be read in conjunction with the GCCC 'Dunal Management Plans'.*

3.1 Minor Public Areas

There are some areas of Crown Land that have a slightly higher intensity of public use and activity than the Crown land within Urban Dune Areas. These areas include some surf lifesaving club precincts and other public areas where large numbers of people access the beach.

3.1.1 Intent

To ensure that any activity, use and management of vegetation has regard for the requirements identified in Urban Dune Areas wherever possible, whilst considering the high intensity public use and activity that occurs in Minor Public Areas.

3.1.2 Activity and Use Requirements in Minor Public Areas

Policy Provisions

- a) All works in Minor Public areas must have regard for requirements identified in **Clause 2.0 – Urban Dune Areas**.
- b) Beach access tracks, fencing and pedestrian areas are acceptable to accommodate low-level pedestrian use and activity. The use of any other hard structural elements, such as vehicle access tracks and boardwalks, are to be approved by Council's Managing Authority.
- c) All structural elements are to comply with best management practices for dune usage, as required by Council's Managing Authority.
- d) Mowing of dunal grasses and establishment of laid turfed areas is acceptable in areas seaward of the Hind Dune Line only where it can be demonstrated to Council's Managing Authority that such will not have a negative impact on the current state and stability of the dunal area and the character and visual amenity of the dunal area.



3.1.3 Vegetation Requirements for Minor Public Areas

Policy Provisions

- a) Natural and native dunal species are to be established and protected wherever possible. Planting of any vegetation seaward of the Hind Dune Line is to be approved by Council's Managing Authority.
- b) Selection of species proposed for planting in Minor Public Areas will be assessed with regard to the following:
 - the current state and stability of the dunal area;
 - whether the locations of the proposed species and/or garden beds are appropriate and in keeping with requirements associated with maintaining stability of dunal areas and wildlife habitat;
 - maintenance requirements of the plant species;
 - whether the species is an environmental weed in dunal areas; and
 - the character and visual amenity of the area.

Vegetation Guidelines

Appendix 1 – Plant Schedules 2, 3, 4 and 5 identify appropriate species for use in Minor Public Use Areas. These lists include appropriate species and appropriate locations for the species identified.

3.2 Major Public Areas

These are areas of Crown Land that:

- are locations for major events within the city and underpin a major tourist centre; and
- have extreme levels of intensity of public use and activity.

Some of the areas identified include:

- Surfer Paradise beachfront areas;
- Kurrawa Surf Lifesaving Club and adjacent park areas;
- Burleigh Surf Lifesaving Club precinct and adjacent park areas;
- Kirra Surf Lifesaving Club precinct;
- Coolangatta Surf Lifesaving Club precinct;
- Foreshore park and access areas at Greenmount.

3.2.1 Intent

To ensure that any activity, use and management of vegetation has regard for the requirements identified in Urban Dune Areas, wherever possible, without compromising the public roles of, and the extremely high intensity of use in, Major Public Areas.

3.2.2 Activity and Use Requirements in Major Public Areas

Policy Provisions

- a) All works in Major Public areas must have regard for requirements identified in **Clause 2.0 – Urban Dune Areas**.
- b) Hard structural elements may be required to accommodate fluctuations in size and intensity of crowds. These structures may include:
 - boardwalks, pedestrian beach access tracks and fencing;
 - vehicle access tracks;
 - paved areas.
- c) All structural elements are to comply with best management practices for dune usage, as required by Council's Managing Authority.
- d) Specific built structures may be required to cater for public need and safety. Location and design of these built structures are to be approved by Council's Managing Authority.
- e) Mowing of dunal grasses and establishment of laid turfed areas is acceptable in areas seaward of the Hind Dune Line only where it can be demonstrated to Council's Managing Authority that such will not have a negative impact on the current state and stability of the dunal area and the character and visual amenity of the dunal area.



3.2.3 Vegetation Requirements for Major Public Areas

Policy Provisions

- a) Natural and native dunal species are to be established and protected wherever possible. Planting of any vegetation seaward of the Hind Dune Line is to be approved by Council's Managing Authority.
- b) Selection of species proposed for planting in Major Public Areas will be assessed with regard to the following:
 - the current state and stability of the dunal area;
 - whether the locations of the proposed species and/ or garden beds are appropriate and in keeping with requirements to maintain stability of dunal areas;
 - maintenance requirements of the plant;
 - whether the species is an environmental weed in dunal areas;
 - the character and visual amenity of the area.

Vegetation Guidelines

In some areas, opportunity may exist to use ornamental or exotic species which have proved environmentally appropriate in coastal areas. These species can complement native dunal vegetation and improve the visual appeal of the landscaped areas. It is critical, however, to ensure exotic or introduced species do not encroach upon or infest any nearby Urban Dune Areas or Non-Urban Dunal Areas.

Appendix 1 – Plant Schedules 2, 3, 4 and 5 identify appropriate species for use in Major Public Use Areas. This list includes appropriate species and appropriate locations for the species identified.



Chapter 6 Undesirable Species in Dune Areas

Environmental weeds are plants that have been introduced and have formed wild populations outside their natural range. Successful management of Coastal Dunal Areas can be restricted by uncontrolled invasion by environmental weeds. Environmental weeds in dune areas can displace native dunal vegetation, accelerating dune erosion and destroying habitats for native wildlife.

1.0 Intent

To reduce the risk to the natural dunal environment, endemic vegetation and local wildlife by minimising the occurrence of invasive species or environmental weeds.

2.0 Requirements

Policy Provisions

- a) The following species are not to be used in coastal dune areas:
- All 'declared plants of Queensland', as identified by the Queensland Rural Protection Board;
 - All Gold Coast City Undesirable Plants (as identified in Council's **Landscaping Documentation Manual**);

Some common undesirable species are identified below:

Species	Common Name	Description
<i>Agave sp</i>	Century Plant	Invasive in dunes and associated woodland areas.
<i>Syagrus romanzoffianum</i>	Cocos Palm	Invasive and hardy palm.
<i>Cassytha sp</i>	Devil's Twine	Often parasitic on useful plants.
<i>Chrysanthemoides monilifera subsp. rotundata</i>	Bitou Bush	Shrub, bright green leaves, yellow flowers. Invasive along eastern coastal areas.
<i>Lantana camara</i>	Lantana	Invasive weed on the dunes.
<i>Coprosma repens</i>	Mirror Plant	Increasingly an invasive weed in dunes.
<i>Pennisetum sp</i>	Fountain Grass	Can become a pest in dune areas.
<i>Protasparagus densiflorus</i>	Asparagus Fern	Scrambler with red berries, weed on the dunes and elsewhere.
<i>Bryophyllum sp</i>	Mother of Millions	Fleshy green/ mauve plant with orange bell-like flowers. Common weed in dune areas.
<i>Schefflera actinophylla</i>	Umbrella Tree	Native, but a weed in SEQ.
<i>Wedilia trilobata</i>	Singapore Daisy	Highly invasive weed in SEQ.



Chapter 7 Basic Management Guidelines for Coastal Dune Vegetation

1.0 Repairing Damage and Rehabilitation

Damage to dunal vegetation can be repaired by natural regeneration and/or planned revegetation. Dunal plants will recolonise unstable areas if left undisturbed, though the process is a lengthy one.

General guidelines for repairing and rehabilitation:

1. The initial stabilisation of dunal areas involves the establishment of a cover crop of dune grasses, as discussed in **Active Frontal Dune Areas – Subclause 2.1.3**.
2. Seeding or planting of seedlings, shrubs and trees follows the establishment of dunal grasses. The correct choice of shrub or tree species is critical to the rehabilitation of the dune. The use of tube stock in mass rehabilitation is the most desirable and cost effective method. Seedlings should be protected from harsh conditions during their establishment period.
3. For the best results, local native dunal species that have been grown locally or sourced from local seed bearing species, propagated in a sandy soil medium and acclimatised to harsh coastal conditions should be used.
4. Fertilising should only be used on trees and shrubs to maintain a healthy growth. Never force a growth rate which is quicker than the normal growth rate for the species. Young trees and shrubs can be killed through excessive use of fertiliser. Fertilising native plants may be detrimental to their growth and may encourage further infestation by weeds.

2.0 Control of Environmental Weeds

Weeds can be introduced through roots and seeds in plant pots, cuttings, poorly managed compost, animal manures, wind, tides, animals, and dumping of garden wastes.

Inappropriate species are common in dunal areas that are impacted by human activity. Removal of unwanted introduced plants and weeds, such as Bitou Bush, Lantana, Asparagus Fern, Mother of Millions (refer **Chapter 6**) and lawn grasses, assists in the rehabilitation of dunal areas.

Caution should be exercised in removal, as clearance of large areas of infestation can often result in further destabilisation and reinfestation with other weed species.

2.1 General Guidelines for Weed Control

1. Recognise and identify environmental weeds. (Refer to the Gold Coast City Council **Coastline Protection Brochure**.)
2. Remove young species as soon as possible.
3. Do not remove all weeds at once. Tackle weed control only at the pace at which the area can be maintained, eg. handle one small section at a time. Avoid disturbing the soil as much as possible.
4. Start with the least infested areas first. Major weed infestations should be tackled in fringe areas. As each section is cleared, replant with the appropriate native dunal species for the appropriate area, as identified in **Appendix 1**, and progress to the area of greatest infestation.
5. Remove all seeds and sections of the root system, as some plants grow from even small root sections.
6. Remove environmental weeds and/or invasive species from public areas/ private property adjacent to dunal areas to prevent reinfestation and spread into dunal areas. This includes the control of ornamental garden escapees and lawn grasses.

2.2 Method of Removal

- two pronged weeding tool, fork or hand hoe;
- some herbicides have a long-term residual effect and should be avoided. In cases where specific weeds such as perennials cannot be eradicated by hand, a low toxic and non-residual weedicide should be used, such as Glyphosate products, used as recommended by the manufacturer. The use of any chemicals should comply with any Government requirements.



2.3 Glossary

Exotic Vegetation	Plant species that are not native to Australia.
Native Vegetation	Plant species that originate from the Australian Continent.
Endemic Species	Native species that are peculiar to a specified area.
Indigenous Vegetation	Native species occurring naturally in a general area and/or region.
Native Dunal Vegetation	Plants that occur naturally in dunal areas (this includes endemic and indigenous, as above).
Foreshore Seawall	Boulder Wall, Foreshore Rock Wall or fixed reference line, as defined by the Gold Coast City Planning Scheme.
Foreshore Seawall Line A	The line at the top seaward edge of the Foreshore Seawall as identified in Local Planning Policy No. 7 – Foreshore Rock Wall Design and Construction .
Berm	A wide horizontal flat area, with no vegetation, that forms seaward of the frontal dune. It usually occurs when sand accretes rapidly after an erosion event. In most cases, it is washed away in the next erosion event and, in other cases, it is taken over by the frontal dune vegetation, thus forming part of the frontal dune system.
Council's Managing Authority	The Council body which has delegated authority to manage dunal areas.
Active Fore Dune Line	This is a line that represents the boundary between the dynamic frontal dune area and more stable hind dune areas.
Hind Dune Line	This line is either the Foreshore Seawall Line A or the private property boundary, whichever is the most landward.



Appendices

Appendix 1 Plant Schedules

Plant Schedule 1 – Urban Dune Areas – Zone A	Active Frontal Dunes	Some Initial Stabilisers/ Pioneer Plants
Plant Schedule 2 – Urban Dune Areas – Zone A	Active Frontal Dunes	Some Secondary Stabilisers
Plant Schedule 3 – Urban Dune Areas – Zone B	Hind Dune Areas	
Plant Schedule 4 – Urban Dune Areas – Zone B	Hind Dune Areas	Landward of Foreshore Seawall Line A only
Plant Schedule 5 – Urban Dune Areas – Zone C	Property Landward of the Hind Dune Line	Some Suggested Species
Plant Schedule 6 – Non-Urban Dune Areas	Some Typical Species	Pioneer Zone (also includes those in Plant Schedule 1)
Plant Schedule 7 – Non-Urban Dune Areas	Some Typical Species	Woodland/ Heath Zone
Plant Schedule 8 – Non-Urban Dune Areas	Forest/ Heath Zone	Some Typical Species



Plant Schedule 1: Urban Dune Areas – Zone A – Active Frontal Dunes – Some Initial Stabilisers/ Pioneer Plants				
Species	Common Name	Form	Flower	Comments
<i>Canavalia rosea (maritima)</i>	Beach Bean	Perennial creeper	Pink	Nitrogen fixer, landward slope, bean like seed pods.
<i>Ipomoea pes-caprae subsp. brasiliensis</i>	Beach Morning Glory	Twining herb	Purple	Stabiliser, lower and mid seaward slope.
<i>Sesuvium portulacastrum</i>	Sesuvium	Sprawling herb	Pink	Seaward toe / crest and landward slopes.
<i>Spinifex sericeus</i>	Beach Spinifex	Grass		Seaward slope/ crest and landward slope. Runners obtainable from Council designated areas.

Plant Schedule 2: Urban Dune Areas – Zone A – Active Frontal Dunes – Some Secondary Stabilisers				
Species	Common Name	Form	Flower	Comments
<i>Acacia sophorae</i>	Coastal Wattle	Shrub	Yellow	Stabiliser crest seaward slope, best in group planting.
<i>Banksia integrifolia var integrifolia</i>	Coastal Banksia	Tall shrub/ tree		Extensive root carpets, bird attracting, crest/ seaward slope and landward slope, can be grouped or as single species, plant preferably behind a windbreak or shrubbery in initial establishment.
<i>Banksia oblongifolia</i>	Dwarf Coastal Banksia	Prostrate shrub	Yellow	Upper seaward slope/ landward slope, useful stabiliser, group planting.
<i>Carpobrotus glaucescens</i>	Coastal Pigface	Creeping herb	Pink	Stabiliser upper seaward slope, grows in already vegetated areas.
<i>Casuarina equisetifolia var incana</i>	Coastal She-Oak	Tree	Cone	Mid – crest of seaward slope/ landward slope/ screening plant in groups, useful windbreak, most common species.
<i>Hibbertia scandens</i>	Guinea Flower	Woody trailer	Yellow	Stabiliser, top/ crest seaward slope, under <i>Casuarina</i> sp.
<i>Leptospermum laevigatum</i>	Coastal Tea Tree	Shrub	White	Upper/ crest seaward slope, landward slope, good in group.
<i>Vigna marina</i>	Yellow Beach Bean	Creeping herb	Yellow	Stabiliser, upper seaward slope, sheltered areas.
<i>Pandanus tectorius var penunculatus</i>	Coastal Screw Pine	Palm-like tree	Fruit	Stabiliser, upper/ crest of seaward slope, landward slope, single or group planting – plant preferably behind a windbreak or shrubbery in initial establishment. Should only be obtained from local stock and seed harvesting sources.
<i>Scaevola calendulacea</i>	Dune Fan Flower	Sprawling shrub	Blue/ white	Crest seaward slope. Sand accumulates around plant to form mounds, attractive plant in mass planting.
<i>Vitex rotundifolia (ovata)</i>	Compact Vitex	Prostrate shrub	Purplish leaves	Stabiliser, ground cover.
<i>Vitex trifolia var trifolia</i>	Coastal Vitex	Shrub	Purplish leaves	Stabiliser, prostrate on active frontal and taller elsewhere, upper seaward slope, useful grouped as a windbreak.

Note: Palms are not acceptable in this area. This list identifies some appropriate species for Active Frontal Dune Areas. This list is not exhaustive and therefore subject to change from time to time. This Plant Schedule must be read in conjunction with the 'Management of Coastal Dunes Policy'.



Plant Schedule 3: Urban Dune Areas – Zone B – Hind Dune Areas				
Species shown in Plant Schedules 1 and 2 can be grown in the Hind Dune Area also				
Species	Common Name	Form	Flower	Comments
<i>Alectryon coriaceous</i>	Beach Birds Eye	Shrub		Grows well in sand and regular soils.
<i>Banksia aemula</i>	Wallum Banksia	Shrub		Crest seaward slope and landward slope. Plant preferably behind a windbreak or shrubbery in initial establishment.
<i>Banksia serrata</i>	Saw Leaf Banksia	Tall shrub/ tree	Yellow	Crest seaward slope and landward slope. Plant preferably behind a windbreak or shrubbery in initial establishment.
<i>Correa alba</i>	Coastal Correa	Compact shrub	White	Useful stabiliser in disturbed areas, flowers in winter, can be planted in a group, hedge, windbreak.
<i>Cupaniopsis anacardioides</i>	Tuckeroo	Tree	Small cream flowers	Shade tree in sheltered areas, slow growing.
<i>Cymbopogon refractus</i>	Barb Wire Grass	Grass		Grows well in dunal areas. Can grow to about 1.0mm.
<i>Dianella congesta/ caerulea</i>	Beach Flax Lily	Grass	Blue berries	Grassy ground cover, sheltered areas.
<i>Helichrysum bracteata</i>	Paper Daisy	Ground cover		
<i>Hibiscus tiliaceus</i>	Cotton Tree	Tree	Yellow	Large shade tree, screening tree.
<i>Impertata cylindrica</i>	Blady Grass	Grass	Silky plume of spikelets	Grass, sheltered areas.
<i>Kunzea ambigua</i>	White Kunzea	Bushy shrub	White scented	Plant in group as a windbreak in sheltered areas or as a single planting.
<i>Macaranga tanarius</i>	Macaranga	Tree		Quick growing pioneer plant.
<i>Monotoca elliptica</i>	Monotoca	Shrub	White small	Useful stabiliser in disturbed areas.
<i>Myoporum boninense subsp. australe</i>	Coastal Boobialla	Small shrub	Purple fruit	Useful stabiliser in disturbed areas.
<i>Pelargonium australe</i>	Coastal Geranium	Small spreading herb	Pink	Useful for feature planting if requiring a garden-like feature in stabilised areas.
<i>Petalostigma quadriloculare</i>	Petalostigma	Small/ med. shrub	Yellow fruit	Useful stabiliser in disturbed areas.
<i>Themeda triandra</i>	Kangaroo Grass	Grass		Adaptable to most soils.
<i>Westringia fruticosa</i>	Native Rosemary	Small/ med shrub	White, blue	Useful in disturbed areas, good landscape plant, can be planted in groups or as single species.

Note: Palms are not acceptable in this area. This list identifies some appropriate species for Hind Dune Areas. This list is not exhaustive and is a guide only. This list is subject to change from time to time. This Plant Schedule must be read in conjunction with the 'Management of Coastal Dunes Policy'.



Plant Schedule 4: Urban Dune Areas – Zone B – Hind Dune Areas (Landward of Foreshore Seawall Line A <u>only</u>)				
Species shown in Plant Schedules 2, 3 & 4 can be grown on landward side of the Seawall Line				
Species	Common Name	Form	Flower	Comments
<i>Araucaria heterophylla</i> *	Norfolk Island Pine	Tall pine		Large feature and significant cultural planting.
<i>Baekea stenophylla</i>	Weeping Baekea	Shrub/ small tree		Semi-exposed position.
<i>Banksia robur</i>	Swamp Banksia	Shrub	Brown	Sheltered areas, good feature plant, likes water.
<i>Banksia spinulosa</i>	Hairpin Banksia	Shrub	Yellow	Ornamental plant, good landscape plant.
<i>Callistemon salignis</i>	Willow Bottlebrush	Large shrub		Good screening plant.
<i>Callitris columellaris</i>	Dune Cypress	Tree		Hardy dune species, indigenous to S.E. Qld dunal areas.
<i>Clerodendron inerme</i>	Clerodendron			Exposed position.
<i>Eucalyptus intermedia, robusta, tessellaris</i>	Gum Trees	Trees		Preferably planted away from residential buildings.
<i>Lomandra longifolia</i>	Swordgrass	Tussock, perennial	Straw stems	Landward slope, requires some watering.
<i>Melaleuca linariifolia</i>	Snow In Summer	Small tree	Cream	Whitish bark, very showy in semi exposed positions, group planting or single species.
<i>Melaleuca quinquenervia</i>	Paperbark	Tree	Cream	Exposed to semi-exposed, good in a group.
<i>Pittosporum revolutum</i>	Shrubby Pittosporum			Semi-exposed position.

Note: *Palms are not acceptable in Public Land landward of Foreshore Seawall and Hind Dune Line . This list identifies some appropriate species for Hind Dune Areas landward of the Foreshore Seawall Line only. This list is not exhaustive and meant to be a guide only. This list is subject to change from time to time. This Plant Schedule must be read in conjunction with the 'Management of Coastal Dune Policy'.*

Large tree species should not be planted in the 8.1 metre setback area landward of the Foreshore Seawall Line A (as identified in Local Planning Policy No. 11). Such species restrict emergency works associated with maintenance of the Foreshore Seawall.

* *Denotes an exotic species, but a significant cultural planting associated with public land in Foreshore Areas.*



Plant Schedule 5: Urban Dune Areas – Zone C – Property landward of the Hind Dune Line (Some suggested species)				
Species shown in Plant Schedules 2, 3 & 4 can be grown on landward side of the Hind Dune Line				
Species	Common Name	Form	Flower	Comments
<i>Acmena hemliampra</i>	Broad Leafed Lily Pilly	Tree		Not recommended for planting straight into sand, locate in sheltered areas.
<i>Acmena smithii</i>	Lily Pilly	Shrub/ small tree	white	Useful stabiliser and landscape plant in sheltered areas.
<i>Acronychia imperforata, littoralis</i>		Shrub		Common coastal shrub, is found in Burleigh National Park, not recommended for planting straight into sand, locate in sheltered areas, similar to <i>Cupaniopsis</i> sp.
<i>Agapanthus orientalis*</i>	Lily of the Nile	Low shrub	blue or white	Shiny strappy green leaves, good mass planted, sheltered.
<i>Ailanthus trifysa</i>	White Bean	Small tree		Weeping foliage, not recommended for planting straight into sand. Locate in sheltered areas.
<i>Archontophoenix alexandrea</i>	Alexander Palm	Palm		Good in a group, hardy – native.
<i>Arytera divaricata</i>	Coogrea	Small tree		Only grows to about 2m in coastal areas. Not recommended for planting straight into sand. Locate in sheltered areas.
<i>Brachysome mulifida</i>	Native Daisy	Ground cover	lilac/ pink/ white	Showy, needs trimming.
<i>Cordyline rubra, stricta, congesta</i>	Cordyline	Shrub		Adaptable to most soils and conditions, locate in sheltered areas.
<i>Elaeocarpus reticulatis, obovatus</i>		Tree	white	Not recommended for planting straight into sand, locate in sheltered areas.
<i>Gazania rigens*</i>	Gazania	Herbaceous perennial	yellow	Colourful ground cover for garden areas, contain growth to garden areas to prevent naturalisation in dune areas.
<i>Hibiscus splendens*</i>	Hibiscus	Shrub	red, pink, orange	Feature plant, hedge sheltered areas.
<i>Juniperus horizontalis*</i>	Juniperus	Prostrate		Conifer like hardy ground cover, good landscape plant.
<i>Livistona australis</i>	Cabbage Palm	Palm		Needs protection until 2m.
<i>Lophostemon confertus</i>	Brush Box	Tree		Framework planting tertiary stabiliser.
<i>Melicope elleryana</i>	Pink Euodia	Tree	pink	Feature plant, needs protection from severe salt and sand blast.
<i>Metrosideros excelsa*</i>	N.Z. Christmas Bush	Large shrub/ small tree	red	Ornamental shrub, good landscape plan, hedge and screen – semi-exposed.
<i>Murraya paniculata*</i>	Mock Orange	Evergreen shrub	white, fragrant	Screen, monotype planting.
<i>Podocarpus elatus</i>	Illawarra Pine	Tree		Evergreen tree, prefers well drained soils, not recommended for planting straight into sand, locate in sheltered areas.
<i>Schizumeria ovata</i>	Crab Apple	Small tree		Not recommended for planting straight into sand, locate in sheltered areas.
<i>Strelitzia reginae*</i>	Bird Of Paradise	Clump forming shrub	orange	Feature landscape plant in sheltered areas.
<i>Toechima tenax</i>	Pitted Steelwood	Small tree		Attractive foliage, not recommended for planting straight into sand. Locate in sheltered areas.

Note: This list identifies some appropriate species for private property and some public parkland areas landward of the Hind Dune Line only. This list is not exhaustive and is meant to be a guide only. This Plant Schedule must be read in conjunction with the 'Management of Coastal Dunes Policy'.

Large tree species shall not be planted in the 8.1 metre setback area landward of the Foreshore Seawall Line A (as identified in Local Planning Policy No. 11). Such species restrict emergency works associated with maintenance of the Foreshore Seawall.

* Indicates some environmentally appropriate exotic species.



Plant Schedule 6: Non-Urban Dune Areas – Some Typical Species – Pioneer Zone				
Also refer to Plant Schedules 1 and 2 for additional species that may occur in this area				
Species	Common Name	Form	Flower	Comments
<i>Acacia sophorae</i>	Coastal Wattle	Shrub	Yellow	Stabiliser, crest seaward slope of frontal dune.
<i>Cakile maritima</i>	Sea Rocket	Upright annual		Just above high water mark.
<i>Carpobrotus glaucescens</i>	Coastal Pigface	Creeping herb	Pink	Stabiliser upper seaward slope of frontal dune, grows in already vegetated areas.
<i>Ipomoea pes – capra subsp. brasiliensis</i>	Goats Foot Convolvulus	Twining herb	Purple	Stabiliser, lower and mid seaward slope of frontal dune.
<i>Scaevola calendulacea</i>	Beach Fan Flower	Sprawling shrub	Blue/ white	Crest seaward slope of frontal dune. Sand accumulates around plant to form mounds.
<i>Sesuvium portulacastrum</i>	Sesuvium	Sprawling herb	Pink	Seaward toe/ crest and landward slopes frontal dune.
<i>Spinifex sericeus</i>	Beach Spinifex	Grass		Seaward slope/ crest and landward slope of frontal dune.

Note: *This list is not exhaustive and is meant to be a guide only. This list identifies some species that may inhibit pioneer zones. It should be noted that each area is different and there may be endemic species that inhabit particular areas that should be investigated prior to any rehabilitation programs. This Plant Schedule must be read in conjunction with the 'Management of Coastal Dunes Policy'.*

Reference:

Refer to National Parks and Wildlife and the Department of Environment for appropriate species lists for National Park areas and other conservation parks.



Plant Schedule 7: Non-Urban Dune Areas – Some Typical Species – Woodland/ Heath Zone				
Species shown in Plant Schedule 6 are also found in this Zone Also refer to Plant Schedules 3 and 4 for additional species that may occur in this area				
Species	Common Name	Form	Flower	Comments
<i>Banksia integrifolia</i> <i>var integrifolia</i>	Coastal Banksia	Tall shrub/ tree	Yellow brush	Extensive root carpets, bird attracting, sheltered parts of the crest/ seaward slope and landward slope of frontal dune, in exposed areas it grows as an asymmetric shrub.
<i>Canavalia rosea</i> <i>(maritima)</i>	Beach Bean	Perennial creeper	Pink	Nitrogen fixer, landward slope, bean like seed pods.
<i>Casuarina</i> <i>equisetifolia var</i> <i>incana</i>	Coastal She-Oak	Tree	Cone	Mid-crest of seaward slope/ landward slope.
<i>Cupaniopsis</i> <i>anacardioides</i>	Tuckeroo	Tree	Yellow	Shade tree in sheltered areas.
<i>Dianella sp</i>	Dianella	Grass	Blue berries	Sheltered areas.
<i>Hibbertia</i> <i>scandens</i>	Guinea Flower	Woody trailer	Yellow	Stabiliser, top/ crest seaward slope, under <i>Casuarina</i> sp.
<i>Impertea cylindrica</i> <i>var major</i>	Blady Grass	Grass		Sheltered areas.
<i>Leptospermum</i> <i>laevigatum</i>	Coastal Tea Tree	Shrub	White	Upper/ crest seaward slope, landward slope.
<i>Melaleuca</i> <i>quinquineria</i>	Swamp Paperbark	Tree	Cream	
<i>Monotoca elliptica</i>	Monotoca	Shrub	White, small	Colonises disturbed areas.
<i>Westringia</i> <i>fruticosa</i>	Native Rosemary	Small/ med shrub	White, blue	Useful stabiliser in disturbed areas.
<i>Pandanus</i> <i>penunculatus</i>	Coastal Screw Pine	Palm like tree	Fruit	Stabiliser, upper/ crest of seaward slope, landward slope.
<i>Vigna marina</i>	Yellow Beach Bean	Creeping herb	Yellow	Stabiliser, upper seaward slope.
<i>Vitex ovata</i>	Compact Vitex	Prostrate shrub	Purplish leaves	Stabiliser , ground cover, secondary stabiliser.
<i>Vitex trifolia</i>	Coastal Vitex	Shrub	Purplish leaves	Stabiliser, prostrate on active frontal and taller elsewhere, upper seaward slope.

Note: This list is not exhaustive and is meant to be a guide only. This list identifies some species that may inhabit Woodland Heath Zones. It should be noted that each area is different, and there may be endemic species that inhabit particular areas that should be investigated prior to any rehabilitation programs. This Plant Schedule must be read in conjunction with the 'Management of Coastal Dunes Policy'.

Reference:

Refer to National Parks and Wildlife and the Department of Environment for appropriate species lists for National Park areas and other conservation parks.



Plant Schedule 8: Non-Urban Dune Areas – Forest/ Heath Zone – Some Typical Species				
Species shown in Plant Schedules 6 and 7 also grow in this Zone Also refer to native species in Plant Schedules 4 and 5 for additional species that may occur in this area				
Species	Common Name	Form	Flower	Comments
<i>Banksia sp</i>	Banksia	Shrub	Brown	Sheltered areas.
<i>Correa alba</i>	Coastal Correa	Compact shrub	White	Useful stabiliser in disturbed areas, flowers in winter.
<i>Hibiscus tiliaceus</i>	Cotton Tree	Tree	Yellow	Large tree.
<i>Casuarina littoralis</i>	Black She Oak	Tree		
<i>Acacia sp</i>	Wattles	Shrubs, tree	Yellow	Coloniser.
<i>Eucalyptus intermedia</i>	Pink Bloodwood	Tree	Green buds	Cracking bark.
<i>Eucalyptus tereticornis</i>	Forest Red Gum	Tree	White	Grey/ blue bark.
<i>Eucalyptus tessellaris</i>	Moreton Bay Ash	Tree	White	Weeping branches.
<i>Lophostemon confertus/ suaveolens</i>	Brush Box	Tree	White	Densely textured crown.
<i>Omalanthus nutans</i>	Native Bleeding Heart			
<i>Glochidion ferdinandi</i>	Cheese Tree			
<i>Callitris columellaris</i>	Dune Cypress	Tree		Hardy dune species, indigenous to S.E. Qld dunal areas.
<i>Myoporum insulare</i>	Coastal Boobialla	Small shrub	Purple fruit	Useful stabiliser in disturbed areas.

Note: This list is not exhaustive and is meant to be a guide only. This list identifies some species that may inhabit Forest Heath Zones. It should be noted that each area is different, and there may be endemic species that inhabit particular areas that should be investigated prior to any rehabilitation programs. This Plant Schedule must be read in conjunction with the 'Management of Coastal Dunes Policy'.

Reference:

Refer to National Parks and Wildlife and the Department of Environment for appropriate species lists for National Park areas and other conservation parks.



Appendix 2 Design Guidelines for Planting Adjacent to Urban Dune Areas

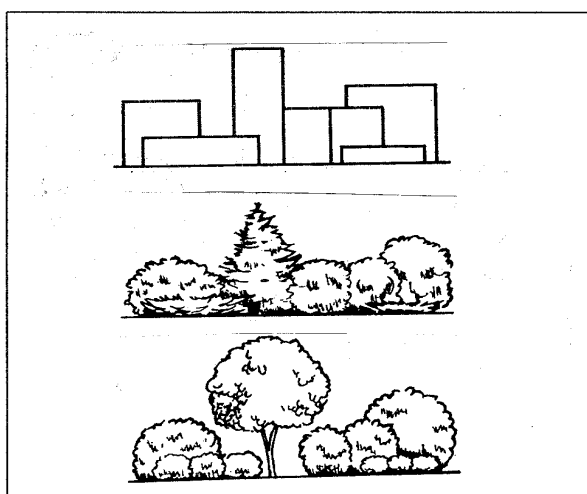
• DESIGN QUALITY OF PLANTS

The character of a plant is a combination of distinctive attributes such as the habit of growth, form, texture or colour. Seasonal effects give wonderful character changes from summer and winter months

- Texture* - the texture of a plant is expressed through it's foliage. Texture can be either seen or felt
- Form* - line direction and arrangement of the branches
- Line* - edges outlining forms or shapes, rows of plants, silhouettes
- Colour* - two types of colour, one which as it's source from light and one which has it's source from pigments

• GENERAL PRINCIPLES

- ◇ Note the alignment of any proposed planting to major sightlines.
- ◇ Consider the degree of importance of the planting composition in relation to the total landscape, respecting function and aesthetics.
- ◇ The theme or expression of the planting eg. restful, stimulating, formal, natural.
- ◇ In designing a landscape, compositions of planting should be approached initially as a series of abstract blocks of various sizes, based on mature height and spread of the plant. How you place the abstract blocks depend on the purpose of the planting.



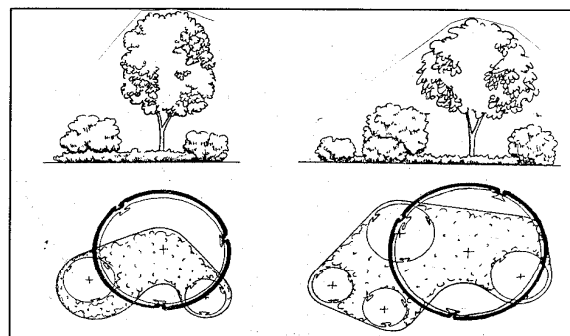
• LANDSCAPE ELEMENTS

Of all the various planting compositions to be found in the Landscape, group planting, shrub massing and tree compositions are the three most important

Group Planting

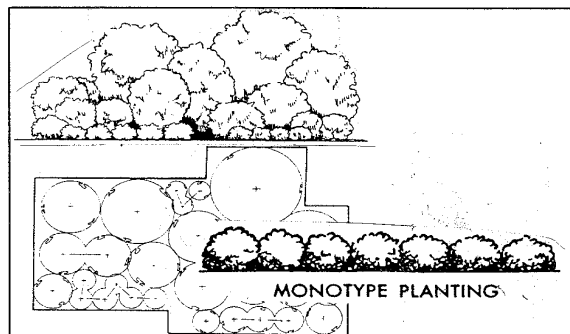
Description	Uses
<ul style="list-style-type: none"> irregular arrangement of plants; 5 or 7 plants make up the composition open in character 	<ul style="list-style-type: none"> entry spaces into buildings break up architectural surfaces by reducing size and surface texture; subdivide spaces.

Note: When planting trees in group or mass planting beds, ensure that there is space allowed between the top of the understorey and the bottom of the tree branching



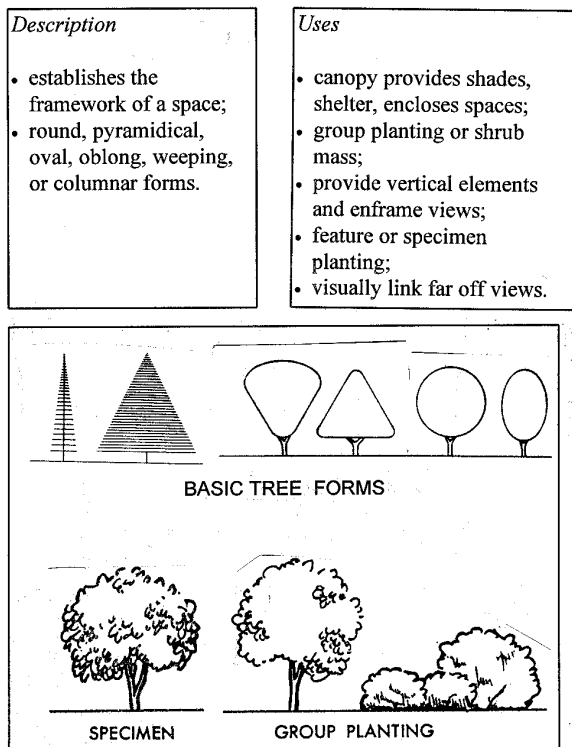
Shrub Massing

Description	Uses
<ul style="list-style-type: none"> combination of several shrubs into a shrub mass with little or no visual penetration; plants touch, overlap and merge; monotype planting is a shrub mass of one variety of plants repeated throughout the length and width. 	<ul style="list-style-type: none"> large and small areas soften or blend strong vertical lines of architecture provide enclosure and privacy, visual screening and climatic and traffic control (hedges and screens)





Tree Compositions



Note: Where a tree is planted in a shrub mass, locate the tree forward in the planting bed so it becomes a feature.

Planting Bed Layout

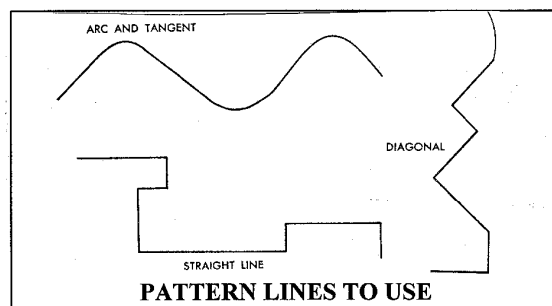
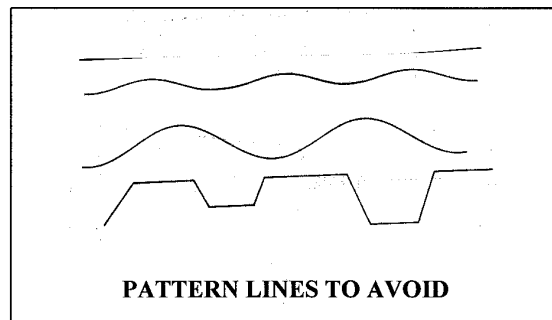
The arrangement of a planting bed should be drawn in plan view. Be sure any newly created planting bed design fits with the other design patterns established in the surrounding landscape or site eg. is the area natural and informal or is their hard geometric lines of built form adjacent.

Description

Curves - soft and shallow curves and are not suitable near buildings or in small spaces. Depending on the character of the space and the amount of space available, the use of dramatic, bold and decisive curvilinear patterns can be integrated more successfully.

Geometric Patterns - rectangular shapes, right angles, and straight lines are the forms found in architecture. Straight lined patterns near buildings create unity in the landscape.

Arcs and Straight Lines - Stylised version of the flowing curved line. The arcs can vary from small to large. The arc and straight lines (tangent) pattern harmonises well with straight lines and right angles of architecture, and can fit into the open landscape as well.



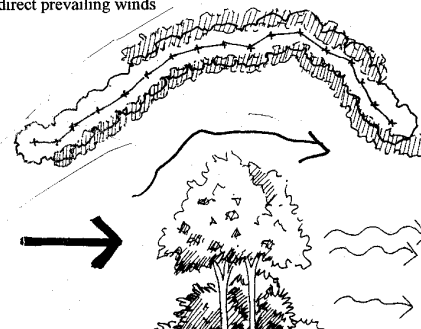
Windbreaks

The most successful wind breaks are those which modify wind force rather than set up an impenetrable barrier. Solid barriers redirect the entire airflow which can increase turbulence in adjacent areas. A successful windbreak should allow at least 40% of the wind force to pass through.

An effective windbreak consists of different plant groupings. Foliage cover at ground level will catch the wind below the foliage of the larger species. To achieve this effectively both the larger and smaller species should be planted at the same time.

Long term results and plant survival is usually achieved by using young plants. This allows the trunk and the root system to develop in accordance with the sites conditions.

Softly curved alignment acts as a wind scoop to redirect prevailing winds



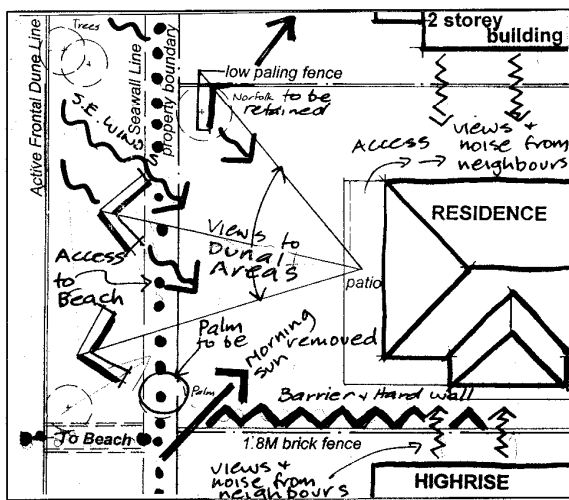


• DESIGNING THE LANDSCAPE

Step 1 - Site Analysis

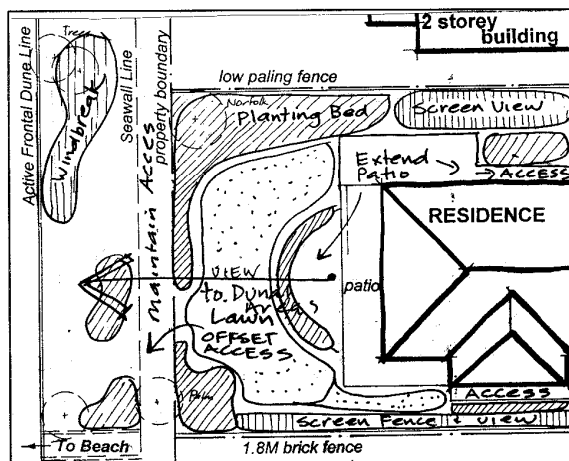
In order to develop a successful landscape design, an investigation of the site's conditions, site's elements, features and the site in it's context. Some of these would include:

- existing trees
- aspect and prevailing winds
- views
- uses and access
- neighbouring uses, property boundaries and fences
- drainage and services



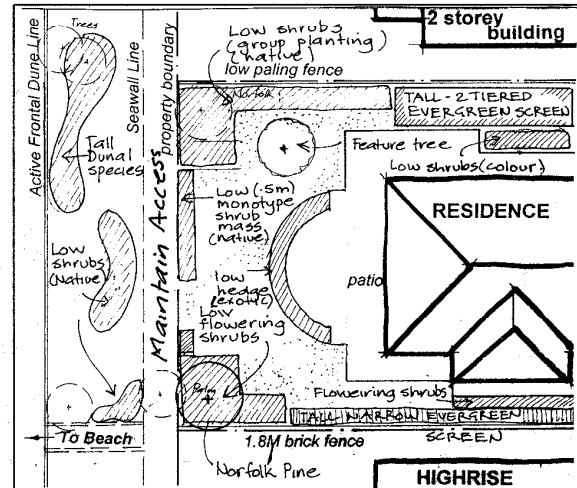
Step 2 - Functional Concept

Using the information from Step 1, look at the advantages and disadvantages of the site and decide on the best locations for various activities, privacy requirements, screening, harvesting the morning sun. Sketch out broadly the structure and function of the landscape area.



Step 3 - Planting Concept

Using Step 2 as the basis for the planting concept, you can begin to identify and label the type of planting and it's proposed height. For example, you may note whether planting should be evergreen or deciduous, the basic configuration of the planting bed or what type of plant groupings you require.



Step 4 - Planting Plan

From Step 3 you now have the preliminary information for a detailed planting plan. Selection of the plant species will be determined by their height, spread, colour, texture and form etc. Some appropriate species are identified in attached Plant Schedules in Appendix 1.

