

Lyall Bay Five Year Dune Restoration Plan



Prepared for Wellington City Council and Greater Wellington

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Harley Spence - Coastline Consultants &

Dr. David Bergin - Environmental Restoration Ltd

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PLEASE NOTE

This restoration plan is written in good faith between the contractors and the Wellington City Council, based upon site investigations and information available at the time of production. For any queries about the information contained within the document please contact Coastline Consultants.



Ph. +64 (07) 350 2240 (Head Office)
Fx. +64 (07) 350 2241
P.O.Box 910, Rotorua 3040, New Zealand
www.coastline.co.nz



TABLE OF CONTENTS	PAGE
Introduction	5
Scope of this report	5
Site inspections	5
Historical context	6
Site description	10
Area A - Eastern Car Park	15
Area B - Eastern Car Park to Tirangi Road Roundabout	16
Area C - Tirangi Road Roundabout to Kingsford Smith Street	19
Area D - Kingsford Smith Street to the Playground	21
Area E - Playground and Buildings	24
Area F - Western End of Lyall Bay	27
Current beach management issues	12
Site-specific management recommendations	13
Appendix 1: Images Showing Management Issues at Lyall Bay	29
Appendix 2:	32
List of recommended priorities for actions and resources for up to five years required for restoration and management of AREAS A to D, Lyall Bay, Wellington	

FIGURES	PAGE
Figure 1: Aerial view of Lyall Bay beach with the airport on eastern side on the right of the photograph (Photograph Greater Wellington).	6
Figure 2: Lyall Bay circa 1895 showing a significant dynamic dune field comprising mostly well vegetated dunes likely to be a mixture of lighter coloured spinifex (<i>Spinifex sericeus</i>) and darker coloured pingao (<i>Desmoschoenus spiralis</i>). Some development in the foreground is a foretaste of the significant modification to come that will see all the dune system under housing (WCC archives photograph Ref. No. 00138:0:11593).	7
Figure 3: A large dune was still apparent around 1910 and covered in native sand binding grasses, Note the coarse foliage of what is likely to be pingao in the foreground. The bay was clearly under considerable pressure from high public use a century ago (WCC archive photograph).	7
Figure 4a and 4b: Large volumes of sand are being removed directly from Lyall Bay fore-dunes during the 1930s using tramways. Note the dense cover of sand-binding grasses on the dunes that are highly likely to be a mixture of spinifex and pingao (WCC archive photographs).	8
Figure 5a and 5b: Aerial photographs taken in 1945 (top) and in 1962 (below) indicating the significant reclamation undertaken to accommodate the Wellington airport along the eastern end of Lyall Bay (Photograph WCC).	9
Figure 6: Restoration Management Areas A-F identified along Lyall Bay, south coast, Wellington. Site-specific descriptions and management options are provided for each area.	14
Figure 7: Reclaimed car park located at the eastern (airport) end of Lyall Bay within the active beach zone and consequently there is no build up of sand and foredune vegetation.	15
Figure 8: AREA B showing loose rock on beach and timber access way.	16
Figure 9: AREA C showing chain-link wire fencing and foredune vegetation dominated by pingao particularly along the toe of the dune. Note the pingao extending seaward of the fence indicating significant growth since the fence was erected probably to protect newly planted sand binders.	19
Figure 10: Area D showing seawall, windblown sand on the footpath and the marram grass dominated foredune.	21
Figure 11: Stormwater pipe upgrade construction underway in April 2009. Note the stormwater outlet is several metres landward of the vegetated toe of the foredune visible in the background.	22
Figure 12: Dieback of pingao is probably caused by trampling by beach users. Encouraging beach users to avoid walking over dune vegetation and planting a diverse mixture of species reduces overall impact on the dune system of dieback of any one species.	23
Figure 13: AREA 5 showing buildings located seaward of the seawall that are clearly within the active foredune zone. The relatively flat beach is highly vulnerable to storm waves reaching the buildings and seawall.	25
Figure 14: AREA F – Marram grass dominated relatively flat dune area west of the buildings in the foreground. There is virtually no foredune and limited vegetation in the background at the south western end of the bay.	27

TABLES

Table 1: Area B Management Actions and Resources	18
Table 1: Area E Management Actions and Resources	26
Table 1: Area F Management Actions and Resources	28

INTRODUCTION

Lyall Bay is a very popular recreational beach for Wellington residents. The beach is used primarily for active recreation purposes (e.g. surfing, wind surfing, swimming, etc) and also is one of the popular dog-walking beaches in the Wellington area. Lyall Bay also contains infrastructure of significant historical value including the surf club buildings on the beach and the seawall backing the beachfront.

However, the area has been very highly modified by human activities over the last 100 years. Understanding these changes is critical to developing a realistic and achievable dune restoration and management framework for the next five years and beyond.

SCOPE OF THIS RESTORATION PLAN

Greater Wellington (GW) and the Wellington City Council (WCC) have requested a report on dune restoration options and recommendations for the entire length of Lyall Bay Beach from the car park at the eastern end adjacent to the airport to the small dune vegetation assemblages at the western end of the beach (Figure 1). This report contains:

- A brief explanation of the historical context that led to the artificial, narrow sand dune area present on the beach today,
- A brief description of the current botanical and geomorphological setting at Lyall Bay,
- Consideration of current dune management issues at Lyall Bay,
- Detailed dune management recommendations for specific areas of the beach, and
- A recommended timeline for dune restoration activities for the next five years.

SITE INSPECTIONS

Lyall Bay was inspected by the project team along with staff from WCC and GW on April 22nd 2009, Team members also viewed the beach to further refine the recommendations on the 24th of April, and during the severe southerly storm on 22 and 23 May, 2009.

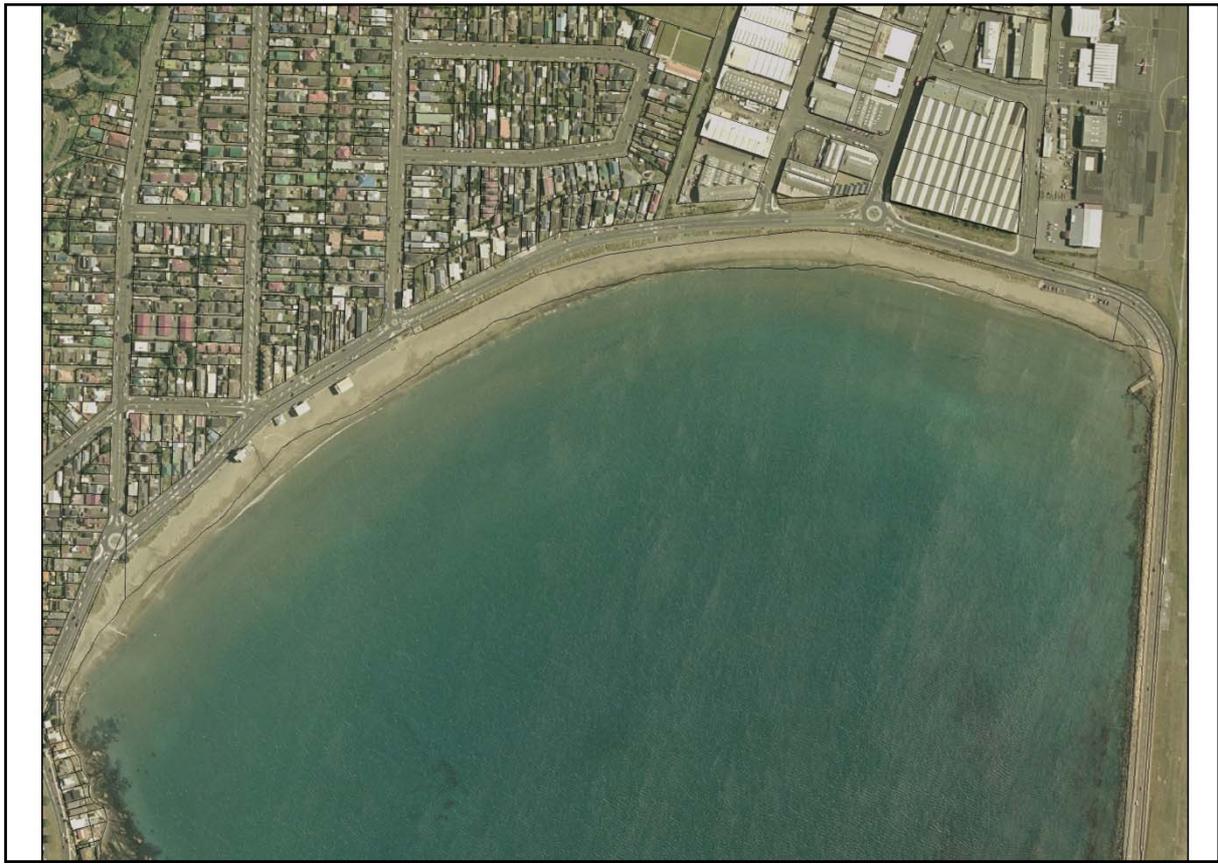


Figure 1: Aerial view of Lyall Bay beach with the airport on eastern side on the right of the photograph (Photograph Greater Wellington).

HISTORICAL CONTEXT

The following sections outline the major historical changes that have occurred for over a century at Lyall Bay..

Pre- and early 1900

Almost all the relatively flat land behind the beach consisted of a wide undeveloped dune field before 1900 (Figures 2 and 3).



*Figure 2: Lyall Bay circa 1895 showing a significant dynamic dune field comprising mostly well vegetated dunes likely to be a mixture of lighter coloured spinifex (*Spinifex sericeus*) and darker coloured pingao (*Desmoschoenus spiralis*). Some development in the foreground is a foretaste of the significant modification to come that will see all the dune system under housing (WCC archives photograph Ref. No. 00138:0:11593).*

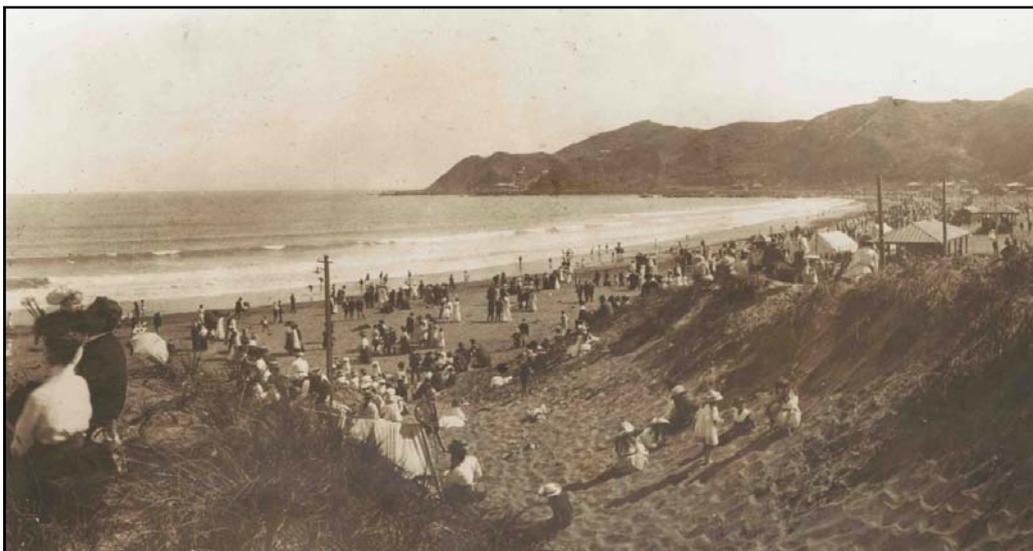


Figure 3: A large dune was still apparent around 1910 and covered in native sand binding grasses, Note the coarse foliage of what is likely to be pingao in the foreground. The bay was clearly under considerable pressure from high public use a century ago (WCC archive photograph).

Early 1990s

During the development of the Maranui and Rongotai area most of the extensive dune field was buried under the houses, roads and other infrastructure. It appears that significant volumes of sand were specifically removed from the dune areas closest to the beach (Figures 4a and 4b)



Figure 4a and 4b: Large volumes of sand are being removed directly from Lyall Bay fore-dunes during the 1930s using tramways. Note the dense cover of sand-binding grasses on the dunes that are highly likely to be a mixture of spinifex and pingao (WCC archive photographs).

Once the sand dunes (a critical part of any naturally functioning beach system) had been removed, the foreshore development including Lyall Parade and the seawall were constructed. The overall impact of this process was to separate the beach from its natural source of sand and to place an artificial barrier within the active foredune zone.

1940-1965

During the construction of the airport approximately 850m of the eastern end of the beach was buried. The associated riprap protection works is likely to have substantially altered the wave climate for the bay. Figures 5a and 5b illustrate the impact of the airport construction and associated shoreline works on the outline of the natural coastline at Lyall Bay.



Figure 5a and 5b: Aerial photographs taken in 1945 (top) and in 1962 (below) indicating the significant reclamation undertaken to accommodate the Wellington airport along the eastern end of Lyall Bay (Photograph WCC).

The cumulative effect of the development of housing, roading and the construction of the airport has resulted in a severely modified beachfront at Lyll Bay. The beach and fore-dunes system is now only the most seaward remnant of what was a significant natural dune system at Lyll Bay. As a result, dune restoration options are extremely limited due to the location of the road and seawalls. In addition, the bay is highly vulnerable to severe wave and wind action reaching the beach from Cook Strait, especially evident in occasional southerly storms.

SITE DESCRIPTION

BOTANICAL

Lyll Bay is a highly modified urban beach where the foredune along the eastern and central portions comprise a small incipient foredune seaward of the road and seawall. The seven to ten metre wide dune is dominated by a dense cover of marram grass (*Ammophila arenaria*) with various proportions of pingao (*Desmoschoenus spiralis*) especially along the toe of the dune. The pingao is largely a result of successful planting programmes over the last few years. The semi-stable parts of this dune along the seawall have occasional native plants such as sand coprosma (*Coprosma acerosa*). Scattered exotic species include occasional patches of ice plant (*Carpobrotus edulis*).

There is no vegetated dune in the vicinity of high use areas adjacent to the playground and several buildings that occur toward the western end of the bay. This very narrow beach zone is frequently exposed to severe storms and swells from Cook Strait. Seaweed along the strandline indicate that high water mark is close to the seawall along this part of the beach and it is likely that significant storm events may occasionally erode the foredune back to the seawall.

At the western end of the bay, a relatively flat, highly modified foredune up to 10 metres wide occurs seaward of the seawall dominated by exotic species, particularly marram grass. There are other occasional patches of exotic species, such as sea couch (*Elytrigia pycnantha*). Scattered shrubs of natives such as taupata (*Coprosma repens*) occur along the seawall.

Significant areas of dense marram grass are found growing on properties on the landward side of Lyll Parade. This vegetation cover appears vigorous and this along with windblown sand found on the footpaths and roads indicates that sand is being constantly lost from the beach to inland sites.

The only spinifex (*Spinifex sericeus*) is a few planted specimens near the playground in the central part of the bay.

GEOMORPHOLOGICAL

Lyall Bay is a southerly facing open dissipative beach which is exposed to Cook Strait's very high wave energy.

As illustrated in the historical photographs, the once large dune system has been removed and built on. The road, seawall and buildings are located within what was the active dune system. A significant change to the bay has been the reclamation of the entire eastern end for the runway for Wellington's airport including Moa Point Road. This part of the bay now comprises a rock riprap along the eastern end including a groin.

The remainder of the bay consists of a narrow highly modified dune system and beach that is approximately 1.4km long from the eastern car park to the rocky shore at the western end. Approximately half of the sandy part of the bay has a small vegetated dune and the rest consists of a flat beach up to the seawall and no foredune.

The beachfront dune area is so narrow that sand binding grasses are growing vigorously on the landward side of the road and collecting significant volumes of windblown sand. This is a direct result of a highly exposed beach where sand is blown inland during occasional southerly storms building drifts of sand on footpaths, along the Lyall Parade, seaside properties and blown many metres up roads leading up to Kilburnie.

CURRENT BEACH MANAGEMENT ISSUES

A number of issues have been identified that are relevant to the management of the dune areas at Lyllall Bay. These are in no particular order:

- There are significant quantities of sand blown from the beach and dune system onto the road, footpaths and seaside properties along the entire length of Lyllall Bay. This is particularly evident where there is no vegetated foredunes (see Appendix 1).
- There are historic buildings seaward of the seawall that are located within the active beach zone. The seawall also has heritage status.
- Ongoing planting of native dune vegetation has been undertaken by the Lyllall Bay Coast Care volunteers with weed control carried out by WCC staff.
- Access-ways are at regular intervals from the foot path and road to the beach, and are frequently used.
- There is localised wind erosion near many both formal and informal accessways.
- Scouring of the beach and foredune is occurring where several stormwater drains exit onto the beach.
- Rubbish is reaching the beach from the stormwater system that is draining surrounding streets.
- The playground and buildings in the central and western part of the Bay are a major focus of beach user activity where attempts at revegetation to date have largely failed.
- The seawall extends significantly seaward to accommodate the playground and a path up to nine metres wide westward to the buildings clearly occupies the active foredune. This zone further eastward comprises the narrow vegetated sand binding zone.

RECOMMENDED SITE-SPECIFIC FIVE YEAR RESTORATION PLAN

Management recommendations are provided for six areas demarcated along Lyall Bay (Figure 6). Management recommendations for up to 5 years are tabulated for each area. A list of these management recommendations for all areas is tabulated in Appendix 2.

In developing the recommendations the following site-specific factors have been taken into account:

- Lyall Bay is a highly modified popular urban beach.
- The assets and infrastructure are located too far seaward to maintain a self sustaining fully functioning dune system. Historic photographs clearly indicate substantial active fore-dunes were removed and the airport covers the eastern section of the bay.
- Management options that involve relocation of significant infrastructure and assets more landward, such as the road, seawall and buildings on the beach, to restore a wide and fully functioning dune system are highly unlikely in the short to medium term.
- Therefore, within the scope of this project, restoration of a zone of sand binding plants to enable natural dune form and function within the remaining narrow dune area seaward of the road and seawall is the most realistic restoration option for most of the beach.
- The predominant vegetation cover is marram grass. The focus is therefore on gradually restoring and maintaining a foredune using largely native sand binding plants to firstly reduce wind blown sand, and secondly, to improve amenity, natural character, and biodiversity values where possible.
- The sand dune and beach component of Lyall Bay Beach is approximately 1.4km long with a range of management issues and potential restoration options to consider. Descriptions and management options are described for each of the six areas shown in Figure 6. Recommended restoration and management options attempt to build on existing work and take into account where possible priorities outlined by the community and managing agencies.
- Recommended priorities for actions and resources are only provided in detail for Years 1 and 2. Only general guidelines are given for Years 3-5 as this is dependent on actions undertaken and performance of restoration over the first 2 years.
- Plant numbers are based on a maximum of 500 plants to be planted comfortably within a single morning session by a community group with 10-20 persons attending.

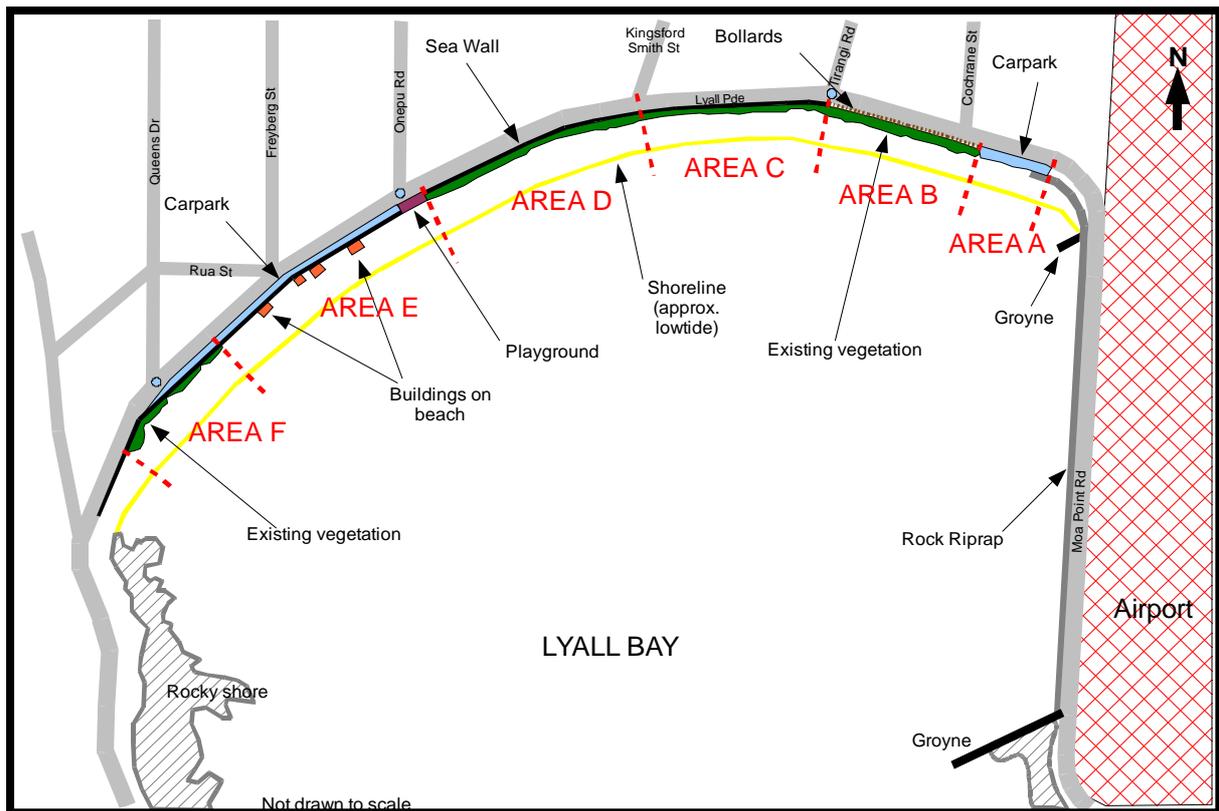


Figure 6: Restoration Management Areas A-F identified along Lyall Bay, south coast, Wellington. Site-specific descriptions and management options are provided for each area.

AREA A – EASTERN CAR PARK (FIGURE 7)

DESCRIPTION

- Approximately 120 metres in length of coastline located at the airport end of the beach.
- Carpark has been progressively reclaimed since 1975 and is now located on the active beach zone comprising a wooden/concrete wall, rocks placed on the beach and a stormwater drainage outflow pipe.
- There is no dune vegetation within this area.
- High water mark is at the base of the carpark seawall.



Figure 7: Reclaimed car park located at the eastern (airport) end of Lyall Bay within the active beach zone and consequently there is no build up of sand and foredune vegetation.

MANAGEMENT ISSUES AND OPTIONS

- This is a popular parking area with uninterrupted views of the bay.
- Because the car park extends to, or even beyond, the high water mark, storm waves break over the wall.
- There is no scope to establish a sand binding foredune without removing the reclaimed seaward extension of the car park.
- Maintain amenity plantings around car park with native coastal species.
- Low priority for restoration over the next five years unless there is a desire to relocate the car park.

AREA B – EASTERN CAR PARK TO TIRANGI ROAD ROUNDABOUT (FIGURE 8)

DESCRIPTION

- Area extends approximately 200m from eastern car park to the roundabout at the end of Tirangi Road.
- Comprises a zone 7-8 m wide of vegetated foredune dominated by marram grass with scattered pingao and occasional patches of ice-plant. Pingao concentrated along toe of dune.
- Bollards are placed along the roadway landward of a small dune dominated by marram grass that has built up along the side of path.
- Loose rock is scattered between the car park and a stormwater outlet to the west.
- Access-ways, including a solid wood access-way, leading directly to the beach are allowing sand from the beach to be blown onto the footpath and road.



Figure 8: AREA B showing loose rock on beach and timber access way.

MANAGEMENT ISSUES AND OPTIONS

- Remove loose rock scattered on beach in the vicinity of the wooden access way and stormwater outfall near the car park.

Access-ways

- All access-ways to be angled to prevailing onshore winds or doglegged to reduce windblown sand onto the road.

- Signposts for access to beach are only indicated along the road end of each access-way. Some access-ways are not as obvious from the beach as others. Posts could be placed at seaward ends of each access-way to indicate formal access to and from beach and to reduce use of informal access-ways.
- Further formal access-ways are required where desire lines are consistently used by beach users.
- Avoid use of solid structures for access-ways, particularly at the toe of the foredune.
- Use fencing to guide pedestrians along access-ways and ensure fencing ends at the toe of the dune.

Landward zone of vegetation

- The marram grass-dominated vegetated dunes along parts of Lyall Bay are reducing the quantity of sand blown onto the road and seaside properties. Retaining any vegetation cover is therefore desirable.
- Replacement of exotic species should only be considered on a gradual basis; therefore retain marram grass cover to prevent loss of sand from wind until appropriate native species can be planted.
- Occasional taupata, wharariki (*Phormium cookianum*) and sand coprosma established within dense marram dune adjacent to seawall indicates that these and other backdune coastal species could be established.
- Add to existing scattered native plants by planting small groups of low-growing ground cover and shrub native backdune species (e.g., wiwi (*Ficinia nodosa*), wharariki, *Carex testacea*, etc...). Herbicide spray small patches of marram grass and other exotic cover along the seawall and clear by hand to allow planting of small groups of natives (3-5 seedlings) within prepared gaps. There may be scope to use natural gaps in the existing marram grass cover. Retaining marram grass around each group will provide shelter for newly established natives.
- As there are only occasional patches of the exotic ice plant, these can be sprayed out and replanted with small groups of native backdune species.

Foredune vegetation

- Enhance existing populations of pingao along the toe of the foredune between access-ways by spraying grass specific herbicide Gallant® (haloxyfop) over mixed marram grass/pingao foredune sites to reduce competition for pingao.
- Encourage spread of any pingao patches by spraying a narrow band of marram grass around edges. Control any reinvasion of marram grass by regular follow-up spraying as required.

- Establish small plots of spinifex in areas of bare sand along toe of the foredune that are free of marram grass. As Gallant[®] can be sprayed over pingao to control invading marram (in contrast to spinifex) use pingao as a buffer between planted spinifex groups and marram grass.

AREA B - MANAGEMENT RECOMMENDATIONS

Table 1: Area B Management Actions and Resources

YEAR	ACTIONS	RESOURCES REQUIRED
1	Remove rock in the vicinity of access-way and stormwater outfall near the car park	Contractor with bobcat and truck
1	Consult with the community in review of access-way locations and in developing one or more access-way designs that should be tested.	Access-way design ideas and specs from other Wellington beaches and/or other regions
1-2	Install at minimum of two angled access-ways with appropriate guiding fences per year (at existing access points). Test a minimum of two different designs and layouts.	Materials for access-ways and fencing dependent on designs
1-2	In vicinity of improved access-ways, control marram grass adjacent to pingao, plant more pingao. Plant small groups of spinifex on bare sand areas at toe of dune adjacent to pingao. Area of marram grass control to match available plants and resources required for ongoing weed control.	Gallant [®] herbicide 1-200 pingao plants/year 2-300 spinifex plants/year
2-5	Control scattered exotic weed species such as ice plant. Retain most of the marram grass to hold sand.	Plant specific herbicide as required.
2-5	Trial planting of small groups of low-growing native backdune plants in gaps created within dense marram grass immediately seaward of the seawall.	100 plants/year of a mix of wharariki, <i>Carex testacea</i> , wiwi, sand daphne (<i>Pimelea arenaria</i>)
2-5	Weed control for at least two years after planting for both sand binding and backdune plants.	Community working group required for monitoring and maintenance every two to three months as required

AREA C – TIRANGI ROAD ROUNDABOUT TO KINGSFORD SMITH STREET (FIGURE 9)

DESCRIPTION

- Approximately 150 metres from the Tirangi Road roundabout (where the seawall begins) to west of the Kingsford Smith Road end.
- A vegetated dune eight metres wide comprising marram grass along the dune adjacent to the seawall and an almost continuous zone of established pingao along foredune toe, some of which is fenced.
- Partially buried chain-link wire netting fence is set back up to three metres from toe of vegetated dune along eastern portion of this area. This suggests there has been expansion of dune vegetation seaward and sand accretion within the dune since the fence was established. The fence was probably constructed to protect earlier plantings of pingao. The fence is now not providing any current benefit to pingao other than reducing use of informal access-ways.
- The western portion of this area does not have any fencing and yet pingao is as dense and vigorous as in the fenced area.
- *There are a greater number of informal access-ways along non-fenced portion.*



Figure 9: AREA C showing chain-link wire fencing and foredune vegetation dominated by pingao particularly along the toe of the dune. Note the pingao extending seaward of the fence indicating significant growth since the fence was erected probably to protect newly planted sand binders.

MANAGEMENT ISSUES AND OPTIONS

Fences

- Substantial and elaborate fence constructions such as cyclone netting are difficult to remove from built-up dunes and their use should be avoided.
- While fencing is recommended to protect new plantings from trampling by beach users, fences can be constructed of lighter materials (e.g. posts with one or two ropes or plastic cords). Avoid wire and steel waratahs as these rust and can become a potential health and safety issue.

Access-ways

- Provide more formal signposted access-ways between the footpath and the beach using the desire lines already established.
- Angle access-ways to prevailing onshore winds and provide basic fencing to guide pedestrians.

Foredune plants

- There is presently vigorous growth of pingao on foredune. Spray Gallant® to gradually reduce proportion of marram grass and to encourage further establishment of pingao.
- Plant small groups of spinifex within areas of bare sand amongst pingao colonies along the toe the foredune above high water mark. As described for AREA B, use the pingao as a buffer between any spinifex planting and marram grass so that the latter can be sprayed by Gallant®.

Landward zone of vegetation

- As for AREA B, consider gradual replacement of exotic species along the semi-stable zone immediately adjacent to the seawall. Do not remove large areas of existing vegetation as this continues to reduce windblown sand lost landward.
- Consider planting small groups of low-growing ground cover and shrub native backdune species (e.g., wiwi, wharariki, *Carex testacea*, etc) using methods described for AREA B. Use any natural gaps in the existing marram grass cover to plant natives.

AREA C - MANAGEMENT RECOMMENDATIONS

Refer to relevant aspects in the table of management recommendations for AREA B

AREA D – KINGSFORD SMITH STREET TO THE PLAYGROUND (FIGURE 10)

DESCRIPTION

- Approximately 350 metres from the end of Kingsford Smith Street to the eastern end of the playground.
- Seawall with a marram grass-dominated dune with scattered individual and occasional patches of pingao along the foredune.
- Dune width varies from relatively narrow five to six metres vegetated dune along parts of the eastern portion to up to ten metres wide along parts of the western portion.
- Most access-ways are acting as wind funnels resulting in loss of sand from the beach to the road.
- A recently upgraded stormwater outlet (including large concrete box with trap doors) has been installed within the existing foredune some six metres landward of the current vegetated toe of the foredune. This is highly likely to maintain a low beach level at this point and lead to a permanent indent in the foredune and its' vegetation cover. Management of vegetation and sand movement will be an ongoing problem (Figure 11).



Figure 10: Area D showing seawall, windblown sand on the footpath and the marram grass dominated foredune.



Figure 11: Stormwater pipe upgrade construction underway in April 2009. Note the stormwater outlet is several metres landward of the vegetated toe of the foredune visible in the background.

MANAGEMENT ISSUES AND OPTIONS

Access-ways

- Where the guiding pipe handrails only extend part way over the dune, pedestrians are trampling the foredune vegetation either side. This has created embayments in the vegetation cover along the toe of the foredune.
- Access-ways should be realigned away from prevailing onshore winds with associated signage at both the footpath and foredune toe and with simple fences to guide pedestrians to the seaward margin of the dune vegetation.
- A major access-way via wide concrete steps in particular has created a major gap in the foredune vegetation with consequent loss of sand onto the road and onto inland properties. It is recommended that sand is pushed into the gap immediately seaward of steps using a machine to create a low-angle foredune. Reinststate an access-way at an angle over the new dune with guide fencing. Blanket plant with spinifex and pingao and protect with temporary lightly-constructed fencing.

Vegetation management

- Progressively reduce dominance of marram grass in favour of naturally spreading pingao and planting pingao and spinifex as for Areas B and C.
- Significant dieback of dense populations of pingao within this section (Figure 12) is common. This dieback has been observed in other regions; the reasons for its occurrence are not entirely known although often it is associated with trampling by beach users. At Lyall Bay foot traffic is likely to contribute to the problem.
- Providing regular access-ways and planting a mixture of sand binders (pingao, spinifex) on foredune faces and other species further landward (e.g., sand tussock (*Austrofestuca littoralis*), *Carex testacea*, wiwi) is therefore recommended to provide a diverse community of complementary species and reduce the impact of dieback of any one species.



Figure 12: Dieback of pingao is probably caused by trampling by beach users. Encouraging beach users to avoid walking over dune vegetation and planting a diverse mixture of species reduces overall impact on the dune system of dieback of any one species.

AREA D - MANAGEMENT RECOMMENDATIONS

Refer to relevant aspects in the table of management recommendations for AREA B

AREA E – PLAYGROUND AND BUILDINGS (FIGURE 13)

DESCRIPTION

- 260 metres from the playground to the western extent of the buildings comprising a relatively flat beach to the seawall with no existing sand binding vegetation.
- The footpath is up to nine metres wide at this point, and with the playground, extends seaward significantly into the foredune zone. Significant quantities of sand appear on the footpath and road along this area as a result of southerly winds.
- The location of buildings seaward of the seawall is clearly within the active beach and foredune zone.
- When measured during the field work component of this project, the high water mark was within four to five metres of the seawall. There is no vegetated foredune throughout this area and drifts of windblown sand is evident on the footpath; sand is found along gutters on both sides of the road.
- Several rows of spinifex were planted last year immediately seaward of playground. A one metre tall wooden rail fence constructed of 100 mm x100 mm post and top rail and erected along the toe the dune in front of the playground has been ineffective in preventing access to the planting site. Less than 5 plants remain due to major disturbance from children jumping off the low seawall onto the sand.

MANAGEMENT ISSUES AND OPTIONS

- The establishment of a permanent sand-binding zone along this section of the beach is likely to be difficult due to the proximity of the seawall to high water mark. If an incipient dune can be established, it will remain vulnerable to high seas during storms.
- Residents are nevertheless keen to minimise the quantity of sand that is being blown onto the footpath and road along this area. Establishment of sand binding vegetation in this area is likely to accumulate windblown sand provided there is adequate protection from beach users.
- If a foredune becomes established it is highly likely to be damaged by storm events. A commitment to replanting storm-damaged dunes will be required to maintain a vegetated dune and the long-term reduction of sand loss over the seawall.

Playground area

- Replanting of the foredune immediately in front of the playground will require appropriate fencing and signage advising beach users the importance of avoiding newly planted areas.

- The heritage status of the seawall will need to be considered if fencing is to be attached to reduce pedestrian impacts of children jumping off the wall onto any planted fore-dunes.
- The large solid wooden barriers constructed at access-ways at either ends of the playground are creating major sand movement in this high use area. Reconsidering the purpose, design and effectiveness of the existing solid structures is recommended. More permeable structures or realigned access-ways that incorporate fencing (for example post and rope), could significantly reduce the adverse effects associated with solid structures.
- Members of Lyall Bay Coast Care spoken to during this process have expressed the desire to see the playground moved from its present location. Protection of the dune seaward of the playground was one driver for this request but of primary concern was the playground's location too near the road and the Onepu Road roundabout. Cars have lost control here and serious injuries have occurred to pedestrians on the foot path near the playground.
- With the above point in mind, re-establishment and protection of the dune in this area will likely require further community consultation to resolve these significant issues.



Figure 13: AREA 5 showing buildings located seaward of the seawall that are clearly within the active foredune zone. The relatively flat beach is highly vulnerable to storm waves reaching the buildings and seawall.

Area from playground to western end of the buildings

- Establishing vegetated dunes seaward of the buildings will be impractical. Therefore, efforts to establish an incipient dune in this area should focus on planting immediately adjacent to the sea wall.
- Planting to create an incipient dune west of the playground, immediately seaward of the seawall, will require fencing and signage to reduce disturbance by beach users. Plant a mixture of spinifex (70%) and pingao (30%) in 3-4 rows at 60-80 cm spacing between plants.

AREA E - MANAGEMENT RECOMMENDATIONS

Table 2: Area E Management Actions and Resources

YEAR	ACTIONS	RESOURCES REQUIRED
1-2	Undertake community consultation re long term management of area seaward of playground and in vicinity of buildings.	GW and WCC staff time
3-5	Extend access-way upgrading progressing westward along beach.	Access-way and fencing materials as required
3-5	Undertake planting and fencing of sand binders along incipient dune as per community consultation	Depends on area to be planted. Minimum of 100 pingao plants and 200 spinifex plants each year
3-5	Continue weed control for at least 2 years after planting for both sand binding and backdune plants.	Community working group required for monitoring and maintenance every 2-3 months as required

AREA F – WESTERN END OF LYALL BAY (FIGURE 14)

DESCRIPTION

- 320 metres from the western side of AREA E to the beachfront properties.
- Comprises a marram grass-dominated foredune from near the western-most building to the vehicle access.
- South of the vehicle access there is a low flat grassed area that could be the result of fill dumping. This is fringed by small areas of marram grass on the seaward side.
- Due to the seaward alignment of the road, the beach southwest of the stormwater drain lacks a foredune or vegetation cover of any significance.



Figure 14: AREA F – Marram grass dominated relatively flat dune area west of the buildings in the foreground. There is virtually no foredune and limited vegetation in the background at the south western end of the bay.

MANAGEMENT OPTIONS

Vegetation management west of buildings

- Fore-dunes of pingao and spinifex can be planted as per Areas B, C & D.
- Plant a range of appropriate low growing natives (e.g., sand carex, sand tussock, sand coprosma, sand daphne etc) on semi-stable sites landward of the sand binding zone.

- Plant a range of shrubby native species on landward adjacent parts adjacent to the seawall (e.g., taupata, wharariki, ti kouka (*Cordyline australis*), etc).
- Plant backdune species in small groups of five to ten plants at 80cm spacing within gaps created by spraying and hand clearing marram grass. Small planted groups within marram grass will continue to be sheltered.
- Each group can be a single species or a mix of species. Concentrate gap planting in one area at a time with approximately four to five metres between gaps ensuring adequate shelter is provided by existing vegetation.

Grassed area adjacent to vehicle access-way

- A mown grass area used for recreation located at the vehicle access could be retained between the seawall and the foredune.
- The foredune zone should be planted with native sand binders and fenced to reduce damage from beach users and loss of windblown sand onto the grassed area. Erect signs to inform beach users of the importance of keeping off plantings.
- An alternative to retaining the mown grass area would be to remove grass and any fill from the site and reinstate the backdune with the usual suite of native backdune plants.

Southern end of bay

- As high water mark is near the seawall, there will be difficulty in enhancing and maintaining the small existing incipient dune. Therefore treat as a lower priority area for restoration compared to others parts of Lyall Bay.
- Convert any marram grass dominant dune areas to native sand binders as resources permit.

AREA F - MANAGEMENT RECOMMENDATIONS

Table 3: Area F Management Actions and Resources

YEAR	AREA(S)	ACTIONS	RESOURCES REQUIRED
5	F	Assess the status of the area at the time and develop plan for enhancing backdune and foredune areas gradually replacing marram grass with natives.	Dune management and restoration staff/ contractor time

APPENDIX 1: IMAGES SHOWING MANAGEMENT ISSUES AT LYALL BAY



Wind blown sand is permanently lost from the beach and is a significant management issue for local residents. (photograph Lyall Bay Coast Care)



Stormwater outlets and disposal of rubbish onto the beach at Lyall Bay including erosion of the foredune (photograph Lyall Bay Coast Care).



The playground is located on the active foredune zone where the seawall has been extended seaward making it difficult to establish a vegetated foredune (photograph Lyall Bay Coast Care).

APPENDIX 2: LIST OF RECOMMENDED PRIORITIES FOR ACTIONS AND RESOURCES FOR UP TO FIVE YEARS REQUIRED FOR RESTORATION AND MANAGEMENT OF AREAS A TO F, LYALL BAY, WELLINGTON.

YEAR	AREA(S)	ACTIONS	RESOURCES REQUIRED
1	B	Remove rock in the vicinity of access-way and stormwater outfall near the car park	Contractor with bobcat and truck
1	B, C & D	Consult with the community in review of access-way locations and in developing one or more access-way designs that should be tested.	Access-way design ideas and specs from other Wellington beaches and/or other regions
1-2	B, C & D	Install at minimum of 2 angled access-ways with appropriate guiding fences per year (at existing access points). Test a minimum of two different designs and layouts.	Materials for access-ways and fencing dependent on designs
1-2	B and/or D	In vicinity of improved access-ways, control marram grass adjacent to pingao, plant more pingao. Plant small groups of spinifex on bare sand areas at toe of dune adjacent to pingao. Area of marram grass control to match available plants and resources required for ongoing weed control.	Gallant [®] herbicide 1-200 pingao plants/year 2-300 spinifex plants/year
1-2	C	Where dense pingao already occurs, spray adjacent marram grass to encourage spread of pingao colonies along foredune. Plant small groups of spinifex along bare sand areas along toe of dune adjacent to pingao.	Gallant [®] herbicide 100 spinifex plants/year
1-2	B,C & D	Control scattered exotic weed species such as ice plant. Retain most of the marram grass to hold sand.	Plant specific herbicide as required.
1-2	B, C & D	Trial planting of small groups of low-growing native backdune plants in gaps created within dense marram grass immediately seaward of the seawall.	100 plants/year of a mix of wharariki, <i>Carex testacea</i> , wiwi, sand daphne.
1-2	B, C & D	Weed control for at least 2 years after planting for both sand binding and backdune plants.	Community working group required for monitoring and maintenance every 2-3 months as required
1-2	E	Undertake community consultation re long term management of area seaward of	GW and WCC staff time.

YEAR	AREA(S)	ACTIONS	RESOURCES REQUIRED
		playground and in vicinity of buildings.	
3-5	C, D & E	Extend access-way upgrading progressing westward along beach.	Access-way and fencing materials are required.
3-5	E	Undertake planting and fencing of sand binders along incipient dune as per community consultation.	Depends on area to be planted. Minimum of 100 pingao plants and 200 spinifex plants each year.
3-5	C & D	Continue marram grass control, enhancing pingao, and planting spinifex groups along foredune. Extend planted groups amongst landward marram grass dunes using best-performing backdune species.	Gallant® as required. Approximately 200 spinifex and 100 pingao plants per year. Minimum of 200 backdune plants per year.
3-5	C, D & E	Continue weed control for at least two years after planting for both sand binding and backdune plants.	Community working group required for monitoring and maintenance every two to three months as required.
5	F	Assess the status of the area at the time and develop plan for enhancing backdune and foredune areas gradually replacing marram grass with natives.	Dune management and restoration staff/ contractor time.