

Titahi Bay Five Year Restoration Plan



Prepared for Porirua City Council and Greater Wellington

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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.



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ACRONYMS

Greater Wellington	GW
Porirua City Council	PCC

INTRODUCTION

Greater Wellington Regional Council (GW) and Porirua City Council (PCC) have requested a five year restoration plan for Titahi Bay beach. It is intended that this project build upon the comprehensive Titahi Bay Beach Reserves Management Plan (Porirua City Council 2008). Guidance is sought to determine the restoration priorities and to identify a multi-year staged restoration process.

SCOPE OF THIS REPORT

A recently completed plan for the Titahi Bay beach (Porirua City Council 2008) along with an assessment of the vegetation of the beach (Smith 2007) provide comprehensive information on the historical, cultural, geomorphological, botanical and human use aspects of the bay. This report briefly reviews selected aspects of these documents relevant to developing restoration options and focuses, for the most part, on providing detailed recommendations for future management of the beach and dunes at Titahi Bay.

SITE INSPECTION

The project team inspected the beach on Wednesday April 22, 2009 along with Greater Wellington (GW) and Porirua City Council (PCC) staff, local residents and users of Titahi Bay beach.

SITE DESCRIPTION AND HISTORICAL CONTEXT

A comprehensive assessment of the vegetation at Titahi Bay beach has been undertaken by Smith (2007) including a list of plants typical of the areas prior to human settlement and plants typically found in the bay today. This assessment of the present condition of the vegetation has been incorporated into a recently completed beach management plan (Porirua City Council 2008). This beach management plan provides a detailed management framework for the Titahi Bay Beach reserves and a comprehensive background of the area including ecology, climate, geology, freshwater, history of human settlement, and information about the current values of human use associated with the beach.

The beach at Titahi Bay, including the vegetation and dune morphology, has been highly modified by more than a century of intensive human settlement and use. Historical photographs clearly show that the beach had an extensive dune system before major settlement occurred.

Several concrete structures such as vehicle ramps, roads, retaining walls, storm water outlets and paths, as well as buildings including the boat sheds, the surf club and toilet blocks occur on the beach and dune system (Porirua City Council 2008). Abandoned but historically significant defence bunkers are also buried or partially buried in the dunes. Boat launching ramps give access to both ends of the beach and parking of cars and trailers is permitted on the beach where the two iconic lines of boat sheds dating back to the early 1900s are located.

The current vegetation cover is a mixture of exotics and natives. Although well south of their natural range, karo (*Pittosporum crassifolium*) and pohutukawa (*Metrosideros excelsa*) have been planted over many years and have naturally regenerated. In terms of natural biodiversity, Smith (2007) has rated the current vegetation on the dunes and adjacent headlands as of low-to-medium significance.

Amongst a number of objectives relating to management of the vegetation at Titahi Bay, the Management Plan (Porirua City Council 2008) aims to:

- work with coastal processes to manage erosion on Titahi Bay beach in a sustainable way;
- restore the ecological integrity, conservation and natural amenity values of the beach;
- manage activities on the beach to support ecological integrity, conservation and natural amenity values, and;
- identify and delineate areas of dune for restoration and protection.

The development of this restoration plan takes these objectives into account wherever possible.

SITE-SPECIFIC MANAGEMENT RECOMMENDATIONS

For the purposes of this Restoration Plan, Titahi Bay beach has been divided into six areas (see Figure 1). Management issues and a description of the dune morphology and vegetation cover are provided for each area along with recommended site-specific management options.

The Titahi Bay beach has also been previously divided into several distinct areas or vegetation management units in the Titahi Bay Beach Management Plan (Porirua City Council 2008). The areas used in this Restoration Plan do not directly match the vegetation management units in the earlier plan. However, the vegetation management units in the Management Plan are cross-referenced below in parentheses.

Management recommendations for up to five years are tabulated for each area. A complete list of these recommendations for all areas is tabulated in Appendix 1. In developing the recommendations for each area we have taken into account the following site-specific factors:

- 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 two 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.

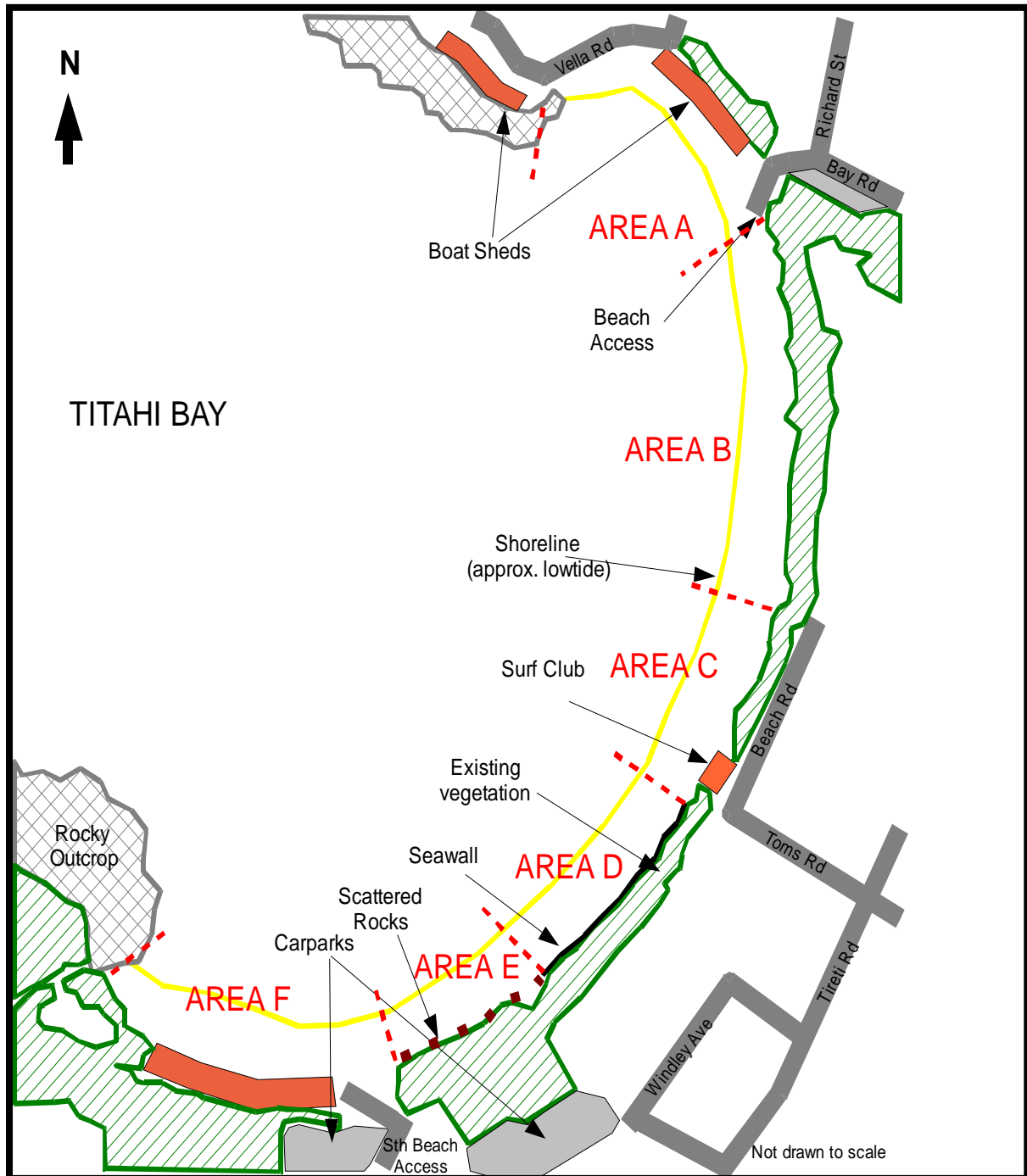


Figure 1: Six site-specific management areas demarcated along Titahi Bay beach have been used to provide descriptions and recommendations for restoration.

AREA A – WESTERN BOAT RAMP TO THE NORTHERN BOAT SHEDS (EQUIVALENT TO MANAGEMENT UNIT A AND B)

DESCRIPTION

- The western boat ramp off the corner of Richard Street and Bay Drive is a significant road that leads directly from built-up area onto the beach.
- There is often loss of windblown sand from the beach up the road.
- The mown kikuyu (*Pennisetum clandestinum*) area adjacent to the boat ramp comprises fill, a historic defence machine gun concrete bunker with unconsolidated rock placed along the foreshore (Figure 2) and a major storm water drain next to the boat sheds. The area is a well used recreation and viewing area.



Figure 2:

A historically significant concrete gun emplacement within a kikuyu grass area and rocks placed at high water mark at the northern end of Titahi Bay Beach. Despite placement of rocks, note erosion by high seas of the grassed bank landward of the rocks.

MANAGEMENT ISSUES AND OPTIONS

- There is little scope for establishing even a small incipient dune in the vicinity of the boat ramp and grassed area to reduce windblown sand without undertaking major site works to remove rocks and fill along the seaward edge of the grassed area and/or the access road itself. Considerable resources and consultation would be required to achieve this.
- If the road access is retained in the long term, there may be scope to redesign the access to minimise windblown sand losses from the beach. In principle, any management actions should aim to minimise any loss of sand from the beach system. Wherever possible, this should include returning any clean sand collected from the road back to the beach.
- Providing signage to warn motorists that the road is a 'No Exit' could reduce vehicle movements on the beach. Encouraging parking away from the beach and closing this ramp in favour of developing the boat ramp immediately adjacent to the rock platform at the north-western end of the beach off Vella Road could be considered.

Table 1: Area A Management Actions and Resources.

YEAR(S)	ACTIONS	RESOURCES REQUIRED
1	Erect signs at entrance to beach access warning of no exit and entry permitted for boat launching only	Signage design and supply
2-5	Explore opportunities to reduce the impact of Richard St boat ramp and storm water outlet to allow establishment of a small dune system planted up with native sand binders	Consultation with storm water and traffic engineers, and the community and beach users

AREA B – REMAINDER OF BEACH FROM SURF CLUB WEST

(EQUIVALENT TO MANAGEMENT UNIT C)

DESCRIPTION

- High water mark is located at the toe of a steep densely vegetated bank dominated by a range of native and scattered exotic species (Figure 3).
- There are a number of concrete structures on the foreshore in this area. They appear to be associated with rubbish containers and drains.



Figure 3: View of the densely vegetated steep bank where there is no high tide beach. The backdune comprises a dense mixture of native and exotic species.

MANAGEMENT ISSUES AND OPTIONS

- It is impractical to establish foredune native sand binding vegetation in this area.
- Where practical the number of concrete structures along the foreshore should be reduced to enhance amenity values.
- Restoration should focus on removing major weeds such as pampas (*Cortaderia selloana*, *C. jubata*) and karo to allow natural regeneration of various native backdune shrub and tree species such as taupata (*Coprosma repens*), harakeke (*Phormium tenax*) and ngaio (*Myoporum laetum*).

Table 2: Area B Management Actions and Resources

YEAR(S)	ACTIONS	RESOURCES REQUIRED
1-5	Progressively remove exotic vegetation from the embankments to encourage gradual replacement with local native shrub and tree species	Weed control and replanting programme where necessary

AREA C – PLANTED SPINIFEX IMMEDIATELY NORTH OF SURF CLUB (EQUIVALENT PART OF MANAGEMENT UNIT C AND D)

DESCRIPTION

- This area comprises a low sloping foredune from the high water mark to a steep bank dominated by exotic grasses including marram (*Ammophila arenaria*), kikuyu and a range of exotic and native shrubs further inland (Figure 4).
- Beach users gain access to the beach through this area although this is not formalised.
- As there is a small zone of sand between the high water mark and the backdune where a small incipient dune of sand binding plants has established. This comprises two plots of spinifex (*Spinifex sericeus*) planted within the last year. One plot is dominated by vigorous spinifex while the other has become dominated by marram grass (*Ammophila arenaria*).



Figure 4: Two plots of spinifex planted within the last 12 months protected from pedestrian traffic by a fence and a steep back landward dominated by shrub hardwoods.

MANAGEMENT ISSUES AND RECOMMENDATIONS

- The spinifex plantings have demonstrated some early success. However, the plots highlight the need for control of invading marram grass and other exotic species including kikuyu. Future plantings will require weed monitoring and control.
- Spinifex plantings could be extended including into the small area immediately south of the surf club building.
- Control the invasion of marram with careful spraying of gallant and replant gaps with native sand-binders spinifex and pingao (*Desmoschoenus spiralis*).
- Landward of the sand binding zone – control kikuyu by spraying herbicide and gradually replace by planting native backdune coastal species such as wiwi (*Ficinia nodosa*), taupata (*Coprosma repens*), pohuehue (*Muehlenbeckia complex* and *M. astonii*) and wharariki (*Phormium cookianum*).
- Determine where access-ways should be sited within this zone and formalise these with fencing and signage.

Table 3: Area C Management Actions and Resources

YEAR(S)	ACTIONS	RESOURCES REQUIRED
1	Formalise access-way with fencing and signage. Continue weed control and planting small colonies of spinifex and include pingao.	Signage design Weed control programme Small numbers of sand binding plants
2-5	Extend planting of incipient dune either side of established sand-binders by planting further spinifex and pingao Maintain sites including control of marram grass and kikuyu and maintain formal access-ways.	Weed control programme Small numbers of sand binding plants
2-5	Plant range of native backdune ground cover and shrubs landward of the spinifex zone in small groups of 3-5 seedlings each where gaps in exotic grass cover sprayed by herbicide.	Knapsack spraying herbicide for small gap planting, Small numbers of backdune native ground cover and shrubs.

AREA D – SEAWALL, CENTRAL BEACH

(EQUIVALENT TO MANAGEMENT UNITS D AND PART OF E)

DESCRIPTION

- A concrete seawall up to 1.8 m high from current level of beach dominates the central part of the bay (Figure 5).
- There is no vegetation seaward of concrete wall. Storm waves come up to the base of the structure along most of the wall where a strandline of coarse driftwood occurs.
- At the Surf Club end of the seawall there appears to be less disturbance from high seas and storm waves. Here 1-2 natural spinifex plants survive amongst driftwood just above high water mark.
- A steep dune landward of the seawall is dominated by marram grass with scattered exotic and native shrubby species.
- Analysis of shoreline positions since 1942 indicates that the shoreline position has not varied significantly. This suggests that the seawall is within the active cut and fill zone of a foredune.



Figure 5: View along the seawall that dominates the central portion of Titahi Bay beach. The seawall is located at or near high water mark where the active foredune zone that historically native sand binding plants is likely to have occurred. Analysis of shoreline positions on aerial photographs since the 1940s indicates the shoreline position has not varied significantly.

MANAGEMENT ISSUES AND RECOMMENDATIONS

- The location of the seawall at or near high water mark precludes the establishment of sand binding vegetation seaward of the seawall. Ideally the wall should have been constructed further landward so that foredune with normal cut and fill cycles could have formed in front. Had this been the case, potentially the wall would have been covered most of the time by a dune, thereby retaining values of a sandy foredune beach.
- Removing the wall from its current position would require a distinct and separate project to specifically assess the potential impacts and for the design of alternative protection measures. In particular, any vision of returning a functioning foredune system dominated by native sand binding plants would require a detailed study to determine if there is sufficient space to restore a foredune and the risks of erosion associated with removal of the wall.
- Natives can be extended in the backdune area behind the wall by planting small groups in gaps created within the shelter of marram grass. Use local hardy native species such as wiwi, sand coprosma (*Coprosma acerosa*), sand carex, (*Carex testacea*), taupata, tauhinu (*Ozothamnus leptocarpus*), wharariki where any organic matter may occur, and harakeke in any dune hollows.
- Other local coastal woody species could be planted in later phases of restoration to increase biodiversity including *Muehlenbeckia complexa*, *M. astonii*, *Coprosma propinqua*, *Olearia solandri* and *Melicytus crassifolius*. Implement establishment and maintenance methods successfully used in the fenced demonstration area within the same semi-stabilised backdune zone immediately to the west.
- Gradually replace scattered exotic shrub species and pampas with native shrub species.
- Gaps can be created for planting natives within the dense marram grass by weed eater and sprayed with gallant to control re-invasion of the marram grass.
- It is recommended that a well-planned planting programme is undertaken for the back-dunes where planted native seedlings are easily 'lost' in dense regrowth of exotic vegetation. Restrict planting of natives to one or two defined small areas initially so that groups can be easily relocated for monitoring performance and maintenance requirements. Avoid random planting of natives as single plants or as small groups that are widely scattered over a large area.
- It is unlikely that native sand binders could be established along the zone above the seawall in the long term, as there is insufficient sand blown from the beach.
- A couple of small spinifex plants existing at the base of the seawall at the Surf Club end could be boosted with a light dressing of fast release fertiliser and with further planting of spinifex and pingao just above the high water mark. However, any vegetation at the base of the seawall is highly vulnerable to wave action during storm events and is therefore unlikely to establish a permanent dune.

Table 4: Area D Management Actions and Resources

YEAR(S)	ACTIONS	RESOURCES REQUIRED
1-2	<p>Plant small groups of backdune native ground cover and shrub species amongst marram grass above wall.</p> <p>Establish small groups in gaps cut within marram grass and other exotic cover to maintain some shelter.</p> <p>Confine planting to small areas rather than random planting over wide areas.</p>	<p>Range of local coastal native backdune plants – initially 20-30 plants of three or more species.</p> <p>Use locally proven hardy species first (e.g. wiwi, taupata, wharariki)</p>
2-5	<p>After the first 1-2 years, increase biodiversity by planting small groups of other local species.</p>	<p>10-20 plants per year of several less common local native species</p>
1-2	<p>Continue to encourage spinifex plants established at the base of the wall at the Surf Club end by light dressings of fertiliser.</p> <p>Plant small groups of spinifex and pingao above mean high water mark at northern end of seawall.</p>	<p>Small numbers of sand binding plants</p> <p>Small volumes of fast-release high-N fertiliser such as Urea</p>

AREA E – FOREDUNE AREA BETWEEN SOUTHERN CAR PARKS (EQUIVALENT TO THE WESTERN PART OF MANAGEMENT UNIT E)

DESCRIPTION

- There is a line of unconsolidated rock along the toe of the foredune at the high water mark (see Figure 6).
- Immediately landward of the high water mark is a current steep foredune dominated by marram grass and other exotics resulting in no natural dune form and function.
- Landward of the concrete path is a fenced area which has been planted over several years with a large array of local semi-stable and backdune coastal species. The area was dominated by marram grass. This is an excellent demonstration area of key local species that can be planted on the semi-stable marram grass zone that dominates parts of the back-dunes within this area and behind the seawall in Area D to the north.



Figure 6: View northwest along Area E. Note the scattered rocks and debris associated with the high water mark at the toe of the vegetated bank.

MANAGEMENT ISSUES AND OPTIONS

- There is no scope to establish native sand-binders at the toe of the dune without removal of rocks, clearing the dense exotic vegetation and reshaping the foredune.
- There is considerable scope to establish a small demonstration trial of a mechanically reshaped foredune planted with native sand binders. There are several aspects to consider if a dune reshaping trial is to be established including:
 - Dune reshaping and planting with native sand binders has been successfully carried out on a small number of degraded dunes in New Zealand;
 - Not all sites are suited to this approach so each site requires careful consideration and planning;
 - Reshaping dunes requires heavy machinery involving movement of sand and often removal of previous engineering works and dune fill - often including clay capping, rocks and debris that has been dumped on dunes over many years;
 - Resource consents are likely to be required before works begin;
 - Consultation will be required between the local community and councils and the involvement of experienced dune restoration expertise to evaluate all options is essential.
- For Titahi Bay, any dune reshaping works will require:
 - Development of a separate project that will comprise detailed design, planning and costing;
 - The reshaped foredune is likely to require a reformed zone from high water mark that is at least 10 m wide (preferably wider);
 - All soil and rock fill needs to be removed from the site to successfully re-establish foredune vegetation;
 - As part of the detailed design, factors such as the location of the historically significant concrete bunker buried within the dune in this area will need to be considered.
- Once the success of the small demonstration trial has been determined, consideration should be given to extending the reshaping and planting model to other sections of the beach.

Table 5: Area E Management Actions and Resources

YEAR(S)	ACTIONS	RESOURCES REQUIRED
1	Investigate the feasibility of mechanically reshaping part of this area including removal of rocks and fill and planting reformed dune with native sand binders	Specific reshaping and planting design project (including a public communication process)
2-4	Conduct reshaping and planting pilot trial	Specific reshaping and planting design project

AREA F – SOUTHERN BOAT RAMP AND SHEDS (EQUIVALENT TO MANAGEMENT UNIT F)

DESCRIPTION

- The boat sheds in Area F are a significant historical feature of the beach that is intended to be protected into the future. Occupants of sheds have a licence to occupy.
- Beach access to the sheds, for boat launching, parking of cars and boat trailers has occurred since the turn of century and is likely to remain a feature of this area of the Bay.
- There is concern about the localised erosion created by the stormwater flow onto the beach adjacent to the boat ramp off South Beach Access Road (see Figure 7)
- Fill is a significant component of the short section of bank at the western end of the beach between the boat sheds and the natural rocky shore.



Figure 7: View of the southern end of Titahi Bay beach. Note the impact for the storm water outlet eroding the beach and contributing to the indent in the vegetated dune in the foreground. The vehicle access-way leading to the boat sheds in the centre left will be contributing to loss of sand inland.

MANAGEMENT ISSUES AND RECOMMENDATIONS

- PCC staff have indicated that reducing the flow from the stormwater outlet adjacent to South Beach Access Road by establishing a wetland to help absorb nutrient runoff and act as a temporary storage is impractical as there is insufficient room within Arnold Park.
- Extending the stormwater outflow pipe out onto the beach could potentially reduce the localised scouring. However, where extended outfall pipes occur on other beaches, natural character and beach amenity values have been seriously compromised. While a small extension may be warranted to the mean high water springs mark, introducing a major new hard structure to the Titahi Bay beach environment should be considered a last resort.
- In the long term there may be scope to route the boat ramp via an elevated grassed levelled area at the extreme western end of the beach that once located an aquarium. In the meantime, boatshed owners could be encouraged to park vehicles and trailers off the beach. This may require additional landward parking facilities.
- There is little scope for extending dune restoration works in the vicinity of the boat ramp without undertaking major site works to remove fill and/or the access road itself. Considerable consultation and resources would be required to undertake this.
- Restoration of a functioning dune would be difficult west of the boat sheds as this short section of the beach comprises fill.

Table 6: Area F Management Actions and Resources

YEAR(S)	ACTIONS	RESOURCES REQUIRED
1	Conduct consultation to assess the likely community response to an extended stormwater pipe over the beach.	Design and facilitate consultation process
5	Explore opportunities to re-route the southern boat ramp to reduce windblown sand up South Beach Access Rd such as via the grassed former aquarium site.	Consultation with boat ramp users

REFERENCES

- Milne, R.; Sawyer, J. 2002: Coastal foredune vegetation in Wellington Conservancy. Current status and future management. Department of Conservation, Wellington Conservancy. 82p.
- Porirua City Council 2008: Titahi Bay beach reserves management plan. Leisure Assets and Services, Porirua City Council. 69p.
- Smith, R. 2007: Report on Titahi Bay, assessment of vegetation. Prepared for the Titahi Bay Beach Working Group, February 2007.

APPENDIX 1:

List of recommended priorities for actions and resources for up to five years required for restoration and management of Areas A to F, Titahi Bay beach, Wellington.

AREA	YEAR(S)	ACTIONS	RESOURCES REQUIRED
A	1	Erect sign at entrance to beach access warning of no exit and entry only for boat launching	Signage design
A	2-5	Explore opportunities to reduce the impact of Richard St boat ramp and storm water outlet to allow establishment of a small dune system planted up with native sand binders	Consultation with storm water and traffic engineers
B	1-5	Progressively remove exotic vegetation from the embankments to encourage gradual replacement with local native shrub and tree species	Weed control and replanting programme where necessary
C	1	Formalise access-way with fencing and signage. Continue weed control and planting small colonies of spinifex and include pingao.	Signage design Weed control programme Small numbers of sand binding plants
C	2-5	Extend planting of incipient dune either side of established sand-binders by planting further spinifex and pingao Maintain sites including control of marram grass and kikuyu and maintain formal access-ways.	Weed control programme Small numbers of sand binding plants
C	2-5	Plant range of native backdune ground cover and shrubs landward of the spinifex zone in small groups of 3-5 seedlings each where gaps in exotic grass cover sprayed by herbicide.	Knapsack spraying herbicide for small gap planting, Small numbers of backdune native ground cover and shrubs.
D	1-2	Plant small groups of backdune native ground cover and shrub species amongst marram grass above wall. Establish small groups in gaps cut within marram grass and other exotic cover to maintain some shelter. Confine planting to small areas rather than random planting over wide areas.	Range of local coastal native backdune plants – initially 20-30 plants of 3 or more species. Use locally proven hardy species first (e.g. wiwi, taupata, wharariki)

D	2-5	After the first 1-2 years, increase biodiversity by planting small groups of other local species.	10-20 plants per year of several less common local native species
D	1-2	Continue to encourage spinifex plants established at the base of the wall at the Surf Club end by light dressings of fertiliser. Plant small groups of spinifex and pingao above mean high water mark at northern end of seawall.	Small numbers of sand binding plants Small volumes of fast-release high-N fertiliser such as Urea
E	1	Investigate the feasibility of mechanically reshaping part of this area including removal of rocks and fill and planting reformed dune with native sand binders	Specific reshaping and planting design project
E	2-4	Conduct reshaping and planting pilot trial	Specific reshaping and planting design project
F	1	Conduct consultation to assess the likely community response to an extended stormwater pipe over the beach.	Design and facilitate consultation process
F	5	Explore opportunities to re-route the southern boat ramp to reduce windblown sand up South Beach Access Rd such as via the grassed former aquarium site.	Consultation with boat ramp users