

# Coastal Management Branch: Revegetating Mutton Cove

**Prepared for:** Department for Environment and Heritage



**Consultant:** Faith Cook and Peri Coleman  
Delta Environmental Consulting  
12 Beach Road, St Kilda SA 5110  
Telephone: 08 8280 5910  
Facsimile: 08 8280 5179  
Email: [consulting@deltaenvironmental.com.au](mailto:consulting@deltaenvironmental.com.au)  
Website: [www.deltaenvironmental.com.au](http://www.deltaenvironmental.com.au)



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## GLOSSARY

alien	not native to Australia
conservation interest	a taxon with status of uncertain, uncommon or poorly known
conservation significance	a taxon with status of extinct, endangered, vulnerable or rare
endangered	in serious risk of disappearing in the wild within 10-20 years
endemic	restricted to a specific geographical area
EPBC	Environment Protection & Biodiversity Conservation Act
eutrophic	an environment with high availability of nutrients
exotic	not native to Australia
extinct	not collected or verified in the past fifty years
habitat	a broad classification based on vegetative/geomorphic/locational aspects
indigenous	native to Australia
native	as for indigenous - native to Australia
NPW (SA) Act	National Parks and Wildlife Act of SA
oligotrophic	an environment with low availability of nutrients
poorly known	little is known about the population
provenance	locally indigenous planting materials
rare	rare within Australia but not facing any identifiable threat
Scheduled	endangered, vulnerable or rare within South Australia
taxon	a taxonomic group of plants or animals (usually species but not necessarily)
trash	to mulch and area with coarsely chopped, fertile provenance material
vulnerable	not presently endangered but at risk over 20-50 years

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## 1. Introduction

Delta Environmental Consulting has been asked to prepare a vegetation plan for Mutton Cove, showing which species of native plants should be planted in various locations, and identifying any weed control methods that may be required.

This document outlines the habitat zones on the site, the issues relating to each zone and the species of plants suitable for planting or direct seeding within each zone. An aerial photograph is provided with the zones marked to enable participants to correctly identify one zone from another.

## 2. Zones and what they mean

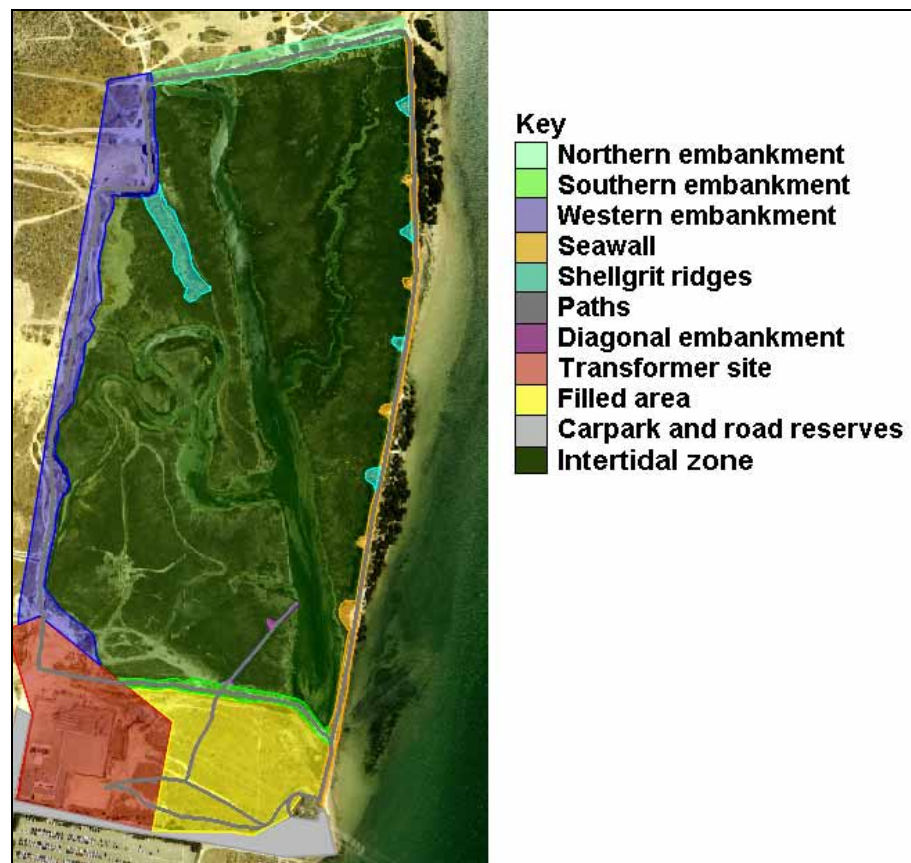


Figure 1 - Planting zones and current paths

For the purposes of this vegetation plan, the entire site has been divided into a number of habitat types or zones. These generally reflect the topography,

degree of tidal inundation, soil type, current vegetation and proposed uses of each area.

Mutton Cove has a range of existing habitats, including low-lying areas of remnant salt marsh (with and without tidal inundation), shelly ridges, clay and rubble embankments, sandy fill from the sand dunes to the west and from hydraulic filling, as well as industrial rubble and waste products in the southern part of the site. The proposed uses for each area vary. Some areas will be used for car parking, one area will be developed as an electricity transformer station, paths have been built to allow passive recreation and future proposed developments include an information rotunda, water sampling pontoon and bird hides.

Each of the areas shown in Figure 1 needs to be managed and planted in specific ways. The management and revegetation principles are discussed in the Mutton Cove Management Plan, however the details of which species to plant, and where, are contained in this document. A larger version of Figure 1 is included in this report as [Appendix 1](#). The key provided for Figure 1 will assist in identifying areas that are included in each planting zone, including remnant intertidal salt marsh, industrial fill, old shell grit ridges & embankments.

### 3. Species for each zone

A list of species suitable for planting in Mutton Cove is provided in [Appendix 2](#), along with suggested habitat zones. Not all of these species will have historically occurred within the site itself at Mutton Cove, as it originally contained only salt marsh and shell ridges, however anthropogenic changes to the Cove, including filling activities and embankment building, have changed the topography considerably. These new features will allow the site to support a broader range of species than it may have originally supported. All the species listed in [Appendix 2](#) have been historically recorded within a 5 km radius of the site, occurring on similar habitat types to those currently available within the Cove. If further species are found that meet with these criteria, they should be added to the list.

Each habitat zone naturally would have had 'backbone' species that formed the bulk of the biomass, and these are the species that should form the majority of plantings in each zone. They are listed in **bold** text, while species that are naturally less common are in normal weight text. The less common plants grow scattered, or in small clumps, between the more common plants.

#### 3.1 Intertidal zone and natural shell ridges

The remnant salt marsh areas require no direct assistance with revegetation and very little weeding. Most species expected to occur in the zone are already present and growing strongly, whereas introduced species have declined rapidly with increased tidal flows. As the pipes may restrict seed coming in with the tide, and the site has a micro tidal range, direct seeding of mid and high marsh species will assist in areas where earthworks were conducted during the period

when tidal flow restoration works were underway. Direct seeding will also be beneficial in bare areas along the base of the embankments, however these areas will vegetate themselves over time. For a list of the species most appropriate for seeding these mid and high marsh areas, please refer to the table in [Appendix 2](#).



### 3.2 Diagonal embankment

The diagonal embankment jutting out into the Cove will require dense plantings of high marsh and sand dune species to provide some screening of the walking trail, so that people visiting the site to test water or perform other monitoring tasks do not disturb feeding birds. Taller plants, for example ***Melaleuca halmaturorum***, ***Dodonaea viscosa***, ***Myoporum insulare***, ***Olearia axillaris***, ***Acacia cupularis*** and ***Nitraria billardiarei***, should be planted in groups or clusters along the higher areas either side of the pathway. Ensure these taller plants are at least one metre from the path edge, as this will help reduce pruning, and provide a more natural effect.

Mid and lower storey plants should be planted either side of the taller plants. The outside edge should be planted with ***Nitraria billardiarei***, ***Frankenia pauciflora***, ***Senecio lautus***, ***Rhagodia candolleana***, ***Adriana klotschii***, ***Lotus australis***, ***Apium annuum*** and other high marsh species. The plantings closest to the path should include the species above, plus low growing sand dune species, such as ***Dianella brevicaulis***, ***Enchylaena tomentosa***, ***Carpobrotus rossii***, ***Disphyma crassifolium***, ***Stipa drummondii***, ***Stipa scabra***, ***Stipa nitida***, ***Stipa curticomma***, ***Distichlis distichophylla*** and ***Isolepis nodosa***.



### 3.3 Northern embankment

The northern embankment is primarily white sand, possibly originating from dredging of the shipping channel. Some areas of exposed sand are particularly unstable, and should be stabilized with seagrass mulch. Steeper areas are best covered with leafy prunings from locally sourced native plants, and then direct seeded with green mulch, such as *Atriplex semibaccata*. The ideal prunings are branches at least a metre long from *Acacia cupularis*, *Acacia sophorae*, and *Melaleuca halmaturorum*, preferably with reproductive parts (seed pods or fruit) still attached. The prunings are simply laid on the surface, where they will slow sand movement and trap moisture, forming a micro-climate suitable for seedling growth. Broadcasting the seed of colonizing species over the prunings enhances the speed of colonization.

Once the area is more stable, other dune stabilizing species such as *Spinifex sericeus*, *Carpobrotus rossii*, *Disphyma crassifolium* and *Distichlis distichophylla* may be planted.

There is already a reasonable range of plants growing on the top of the embankment and in the swale area, however coverage is patchy. The species already present should be encouraged to cover much of the remaining disturbed areas. Weed control, erosion prevention, direct seeding and a small amount of judicious planting should be all that is necessary. Most of the required seed could be sourced from the site, or from nearby blocks in North Haven, Largs North, Taperoo and Outer Harbor.

Species suitable for growing on the northern embankment include most of the species listed in Kraehenbuehl (1996) as occurring on the Seacliff to Outer Harbor coastal dunes. Some of the most important species are the sand binders listed above, along with;

- *Dianella brevicaulis* (plant near the pathway),
- *Dodonaea viscosa* (plant at least one meter from the path),



- ***Enchylaena tomentosa*** (useful down steep embankments or unstable areas),
- ***Isolepis nodosa*** (in the swale area),
- *Muehlenbeckia gunnii* (near established shrubs for support),
- *Olearia axillaris* (along the fence line and on dune slopes),
- ***Myoporum insulare*** (on middle parts of embankment above highest tide),
- ***Nitraria billardierei*** (mid to high south facing embankment slopes),
- *Pittosporum phylliraeoides* (on dune slopes and ridges),
- *Threlkeldia diffusa* (near pathway), and
- *Vittadinia gracilis* (in swale area and alongside the path).

Other suitable species for planting on the northern embankment are listed in [Appendix 2](#) in the section on plants for dune habitats. Dense plantings of some of the larger plants should go along the fence line, as this will reduce the likelihood of people cutting through the fence, as well as reducing edge effects from outside activities.

The foot of the northern embankment (below the highest tide mark) should either be direct seeded with a mixed *Halosarcia*, *Sclerostegia* and high marsh seed mix, or left to regenerate naturally as tidal flows stabilize.

### 3.4 Western embankment

The western embankment is similar in many ways to the northern embankment. The majority of the soils along the western embankment are sandy, while the landform is irregular and very steep. This area has considerably less native vegetation on it, so it will require more work to obtain complete coverage.

The first area to be planted on the western side of Mutton Cove should be the fence line, as this is the fence most likely to be cut, and faces the most frequented area of the surrounding blocks. Species suitable for growing along the fence line, due to their growth form and speed include;

- *Myoporum insulare*,
- ***Acacia cupularis***,
- *Acacia sophorae*,
- *Adriana klotschii*,
- *Allocasuarina verticillata*,
- ***Atriplex cinerea***,
- *Callitris preissii*,
- *Dodonaea viscosa*,
- ***Melaleuca halmaturorum***,
- *Melaleuca lanceolata*, and
- *Olearia axillaris*,

These species should be planted in single species clumps, rather than in a random pattern, as this will give a more natural effect and allow 'windows' in the

vegetation coverage. The gaps will provide 'framed' views of Mutton Cove from outside the reserve. Clump planting in groups of 3-10 of each species also allows fauna that rely on a particular species to find plenty of food or shelter without having to travel large distances, which consumes energy.



In the high sections of the western embankment, between the fence and the path, a swathe of smaller (<1m tall) habitat plants and slower growing shrubs should be grown. Suitable species include;

- ***Rhagodia candolleana subsp. candolleana***,
- *Rhagodia crassifolia*
- *Adriana klotschii*
- ***Alyxia buxifolia***
- ***Atriplex cinerea***
- *Calostemma purpureum*
- *Chloris truncata*
- *Geranium retorsum*
- *Isolepis nodosa*
- *Kunzea pomifera*
- *Lawrencia squamata*
- *Lomandra collina*
- *Lotus australis*
- *Pelargonium australe*
- *Spinifex sericeus*, and
- *Vittadinia gracilis*.

From the selection above, the larger, bushier plants should be planted at least one metre from the path, with smaller, neater plants closest to the path, to prevent overgrowth of the path and reduce human / reptile interactions.

The steep slopes dropping down into the salt marsh along the Western embankment should be treated in a similar fashion to those on the northern embankment, with the use of prunings and seagrass to stabilize the slope encouraged.



On the seaward side of the path, or along the lower areas of the western embankment, more salt tolerant species should be planted. Suitable plants for these areas are given in the list below, along with information on whether each species likes moist or dry soils.

Those that like moist soils can be planted right down to the regular inundation line, or near areas with salt crystals on the surface, but not in the salt scald or below the regular tide mark. They like soil that is visibly moist within 10 cm of the surface.

Those that are zoned for the lower embankment areas but like dry soils do best in soils that show some structure when dug to a depth of 30cm or more, and are damper than the soils on the high areas of the embankment.

- *Alyxia buxifolia* (dry)
- ***Atriplex paludosa*** (moist)
- ***Atriplex semibaccata*** (moist or dry)
- *Carpobrotus rossii* (dry)
- *Comesperma volubile* (dry)
- *Dianella brevicaulis* (dry)
- *Distichlis distichophylla* (moist)
- *Disphyma crassifolium* (moist)
- ***Enchylaena tomentosa*** (dry)
- ***Frankenia pauciflora*** (moist)
- *Gahnia filum* (moist)
- *Halosarcia* spp. (moist)
- *Isolepis nodosa* (dry)
- *Kennedia prostrata* (dry)
- *Lawrenzia squamata* (dry)
- *Lotus australis* (dry)
- ***Maireana brevifolia*** (dry)
- ***Maireana oppositifolia*** (moist)
- *Melaleuca halmaturorum* (dry)
- *Mimulus repens* (moist)

- *Myoporum insulare* (dry)
- ***Nitraria billardierei*** (dry)
- *Puccinellia stricta* (moist)
- ***Rhagodia candolleana* subsp. *candolleana*** (dry)
- ***Rhagodia crassifolia*** (dry)
- *Senecio lautus* (moist)
- *Stipa drummondii* (dry)
- *Stipa elegantissima* (dry)
- *Threlkeldia diffusa* (moist or dry)
- *Vittadinia gracilis* (dry), and
- *Wilsonia humilis* (moist).

### 3.5 Seawall

The seawall needs very little revegetation work, however there are some areas that could do with some remediation, in the form of weeding and rubbish removal and amenity planting. Introduced plants, such as Boxthorn and turnip weed, need constant control along the entire embankment because propagation material will be introduced continually, by walkers.

Care should be taken to ensure only stable areas of the embankment are planted, as large patches of the embankment are subject to extreme erosion on the seaward side. Sections of the embankment that are undercut or that have no remaining rock protection should be left unplanted until maintenance of the embankment is completed. An area either side of any undercut areas of the embankment should also be left unplanted, to allow for machinery access.

In areas where the banks appear to be fairly stable, weeds should be controlled and colonizing species, such as *Atriplex semibaccata* should be sown between the rocks, or in large bare areas. Other groundcovers listed in this document would also be suitable. Once bank maintenance has been completed, larger plants could be planted along the edges of the embankment. A track along the seawall embankment top, of about 3m wide, should be left to ensure easy access for maintenance vehicles. Suitable plants for these plantings include;

- *Alyxia buxifolia*
- *Atriplex semibaccata*
- *Carpobrotus rossii*
- *Dianella brevicaulis*
- *Distichlis distichophylla*
- ***Disphyma crassifolium***
- *Enchylaena tomentosa*
- *Isolepis nodosa*
- *Kennedia prostrata*
- *Lawrenzia squamata*
- ***Maireana brevifolia***
- ***Myoporum insulare***
- *Nitraria billardierei*
- ***Rhagodia candolleana* subsp. *candolleana***
- ***Rhagodia crassifolia***
- *Stipa drummondii*

- *Stipa elegantissima*, and
- *Vittadinia gracilis*.

There are a number of nodes along the seawall protruding out into the samphire areas of Mutton Cove. The higher areas are support structures put in place to ensure the embankment did not give way easily, and also function as turn-out areas to ease traffic congestion during maintenance operations. Lower areas appear to be parts of natural chenier ridges, or shell grit dunes, which were utilised as bases for the nodes.

The nodes are built of rubble and have reasonably flat, unvegetated surfaces. The flat top areas of these structures could be used for recreational purposes, such as picnics and bird watching. With this eventual purpose in mind, the nodes should be planted around the edges with dense shade and screening plants, with occasional gaps to allow views across the tidal areas. Suitable shade and screening plants include;

- ***Myoporum insulare***,
- *Melaleuca lanceolata*,
- *Melaleuca halmaturorum*,
- ***Olearia axillaris***,
- *Pittosporum phylliraeiodes*,
- ***Acacia cupularis***,
- *Acacia sophorae*,
- *Allocasuarina verticillata*,
- *Adriana klotschii*, and
- *Callitris preissii*.

The building rubble exposed down the sides of these structures could be covered with seagrass mulch and planted with quick growing native groundcovers and stabilizers as listed elsewhere in this document. Dense growth of under story plants should be avoided near areas where people may sit for long periods, to discourage unwary reptiles from visiting quiet humans. Near walking paths, this is less of a concern due to the ground vibrations caused by footfalls.



## 3.6 Southern areas of fill

### 3.6.1 High areas of fill

Plants in the higher areas of fill will need to be very drought tolerant. Due to the low organic content of the anthropogenic fill, large amounts of organic matter, preferably seagrass, will need to be spread across areas to be planted. This will decrease the plants water requirements, while adding organic matter to the soil and decreasing erosion.

It is recommended that planting start immediately adjacent to the pathways. These plantings are the most visible and so provide the most visual impact from the smallest number of plants. The barrier of plants that is formed along the path edges will encourage visitors to remain on the marked paths.

Some good species to start planting into this area include;

- ***Atriplex semibaccata***
- *Atriplex cinerea*
- *Chloris truncata*
- *Carpobrotus rossii*
- *Dianella brevicaulis*
- *Distichlis distichophylla*
- ***Disphyma crassifolium***
- *Dodonaea viscosa*
- ***Enchylaena tomentosa***
- *Lawrenzia squamata*
- *Lotus australis*
- ***Maireana brevifolia***
- *Vittadinia gracilis*
- *Chloris truncata*
- ***Nitraria billardierei***
- *Rhagodia candolleana* subsp. *candolleana*
- *Rhagodia crassifolia*
- *Geranium retorsum*
- *Convolvulus erubescens*
- *Pittosporum phylliraeoides*
- *Themeda triandra*
- *Threlkeldia diffusa*
- *Vittadinia gracilis*

Once these species have established, other species lists from either the lower areas of fill, or from the list in the appendices should be consulted for further possibilities. Careful monitoring, possibly in the form of counts, should be completed during the first few years to identify which species survive on the site, and which do not. Those that do not have a survival rate above 50% should be removed from the planting lists, or planting methods should be altered to increase success rates.

### 3.6.2 Shelly areas of fill

Plants that like growing on shellgrit closer to the groundwater table in more sheltered areas should be planted on the area that has shelly/sandy fill. This includes a wide range of chenier ridge species, some of which are very attractive, particularly when in flower. Suitable species for plantings include;

- *Myoporum insulare*,
- *Melaleuca lanceolata*,
- *Melaleuca halmaturorum*,
- ***Olearia axillaris***,
- *Pittosporum phylliraeoides*,
- *Acacia cupularis*,
- *Acacia sophorae*,
- *Allocasuarina verticillata*,
- *Adriana klotschii*,
- *Atriplex paludosa*
- *Atriplex semibaccata*
- *Calostemma purpureum*
- *Callitris preissii*
- *Carpobrotus rossii*
- *Clematis microphylla*
- *Comesperma volubile*
- ***Alyxia buxifolia***
- *Atriplex semibaccata*
- *Isolepis nodosa*
- *Danthonia caespitosa*
- *Dianella brevicaulis*
- *Disphyma crassifolium*
- *Distichlis distichophylla*
- *Enchylaena tomentosa*
- *Exocarpus aphyllus*
- *Helichrysum leucopsidium*
- *Kunzea pomifera*
- *Lomandra collina*, and
- *Lotus australis*.

Many of these plants are very attractive to hares and rabbits, so it may be worth-while protecting each plant with a tree guard. Larger tree guards (at least 30cm across) will be needed for the ground covers. A cheaper and often more effective solution is to plant specific areas each year, and install a 60cm high chicken wire and star picket fence around them, which will need leaving in place for at least 2 years. This often a more attractive option, as the plants can be seen, and it minimizes the use of plastic sleeves or mesh, which can be a hazard to fauna if the tree guards are destroyed by wind or vandals and not removed in time.

Once the species from the list above have established and an organic layer has been generated, some of the more tender plants could be planted in small numbers. Species of particular interest once host plants are present in mature form include some native parasites, including the Quandong (*Santalum acuminatum*) and the Melaleuca mistletoe (*Amyema melaleucae*), which both occur nearby, but do not regularly feature in revegetation efforts.

### 3.6.3 Muddy areas of low fill

This area will most likely require some form of reshaping prior to planting, however some species are more tolerant of salt affected areas than others, so could be planted if the decision not to reshape is reached by the site management team. If a decision to reshape is reached, then the area should be left unplanted until the final levelling is finished. Plantings in this area should also wait until earthworks on the transformer site are completed, and the final changes to their stormwater treatment facilities are made. If plantings are done before this time, greater or total losses should be expected, as changes to the hydrology or soil levels are not appreciated by established plants.

Once the fate of this area is decided, the area could be direct seeded and/or planted with a mixture of the species listed below.

- ***Atriplex semibaccata*** (almost anywhere apart from areas where salt is crystallising),
- ***Atriplex paludosa*** (wet saline areas above the crystallised zone),
- *Gahnia filum* (in areas which receive brackish water),
- *Samolus repens* (in between successful *Gahnia* plants),
- ***Disphyma crassifolium***
- ***Distichlis distichophylla***
- *Enchylaena tomentosa* (in areas that are not permanently damp)
- *Frankenia pauciflora* (in areas that are not permanently wet)
- *Isolepis nodosa* (in drier areas)
- *Lawrenzia squamata* (in drier areas)
- *Maireana oppositifolia* (in areas that are not permanently damp)
- *Melaleuca halmaturorum* (in areas that are not permanently wet, and have freshwater input)
- *Mimulus repens* (plant in areas that receive brackish water)
- *Rhagodia candolleana* ssp. *candolleana* (drier areas)
- *Rhagodia crassifolia* (drier areas), and
- *Senecio lautus* (may be suitable for direct seeding onto disturbed areas).

## 3.7 Meandering southern embankment

The southern embankment currently has very little vegetation due to earthworks. This embankment is of high priority for planting because of the proximity of the main public entry points and potential for erosion. Areas away from the transformer site should be planted first, as this will allow Electranet to complete their development without worrying about destroying plantings. Once



the new site is completed the surrounding areas should be planted as soon as possible.

The soil contained within this embankment is variable. Some areas contain cinder or other manufactured fill, whereas other areas contain salt marsh clay, shell grit and sand. Each of these soil types will need slightly different species planted in them due to their different moisture contents, however those species sensitive to moisture levels are noted in the list below.

As many areas of this embankment are experiencing erosion due to lack of soil structure, it is advisable to mulch these areas prior to planting. A discussion relating to methods of controlling erosion are discussed in the sections relating the northern and western embankments. An initial direct seeding of *Atriplex semibaccata* and *Atriplex paludosa* is recommended. This can be onto the mulch, or onto the soil in areas that are not visibly eroding.

Mulching, direct seeding of colonizing species, and the high salt content in the soil should keep weeds under reasonable control in this area, however regular spot spraying with glyphosate should be conducted if weeds do occur.



Plantings should be arranged in a similar stepped manner to the plantings along the paths on the north and west embankments. Many of the species suitable for planting on the embankment should not be planted near the path, as they grow quite large. These are best planted in the wider sections of the embankment, toward the west side of Mutton Cove. Although most of the species planted on the other embankments are generally suitable, some species particularly suitable for planting on this embankment include;

- *Melaleuca halmaturorum* (at least 1.5m from path to allow for growth),
- *Olearia axillaris* (at least 1m from the path to allow for growth),
- *Carpobrotus rossii*,
- *Distichlis distichophylla*,

- *Disphyma crassifolium* (particularly on the lower damp parts of the embankment),
- *Enchylaena tomentosa*,
- *Acacia cupularis* (at least 1.5m from path to allow for growth),
- *Adriana klotzschii* (at least 1m from the path to allow for growth),
- *Atriplex cinerea* (at least 1m from the path to allow for growth),
- *Atriplex semibaccata* (in higher areas),
- *Atriplex paludosa* (in seasonally damp areas),
- *Danthonia caespitosa* (in drier zones),
- *Dianella brevicaulis* (on the top of the embankment),
- *Frankenia pauciflora* (midway down the embankment on the tidal side),
- *Lotus australis* (likes shellgrit and sand),
- *Maireana oppositifolia* (midway down the embankment on the tidal side)
- *Myoporum insulare* (at least 1.5m from the path to allow for growth)
- *Nitraria billardiarei* (midway down the embankment on either side)
- *Puccinellia stricta* (low on the embankment near the monthly high tide mark),
- *Wilsonia humilis* (just below the monthly high tide mark),
- *Threlkeldia diffusa* (just above the monthly high tide mark),
- *Poa poiformis* (Above high tide mark),
- *Pittosporum phylliraeoides* (at least 1m from the path to allow for growth), and
- *Stipa nitida* (in open areas along the embankment).

Once the embankment has been planted with these species, other species from the list provided in the appendices should be trialled.

## 4. Planting numbers and times

Mutton Cove is a sizable area to plant, however the remnant tidal areas and shell grit ridges need little assistance. This leaves the filled area, and the surrounding embankments, which equates to approximately 10.6 hectares that need some form of erosion control, planting and weeding. The table below shows some conservative estimates of the quantities of seed and numbers of plants required to restore these areas to reasonable levels of cover, and basic levels of biodiversity.

The numbers for tube stock were calculated using 80-100% survival (possible using mulch, but requires a good year), and specifying one plant per 2m<sup>2</sup> of currently bare soil or non-native vegetation. These planting numbers could be doubled if rapid coverage was desired or low survival rates were encountered.

The seed weights were calculated using 5g per m<sup>2</sup>. Many more plants and seeds could be required if some form of natural mulch is not used (eg. seagrass or branches), the planting was done during a dry year, or not done at the optimal time (May-July).

The selection of plants will also affect the final coverage of vegetation. Selecting mainly shrubs and trees will give you rapid cover, but will leave you with low

biodiversity. A general rule of thumb to use on non-tidal areas within the Cove is that no more than one third of the plants should be the tallest level of vegetation (eg. *Myoporum insulare*), one third should be midlevel plants (eg. *Ragodia* species) and at least one third should be groundcovers and grasses.

Although no planting is required or suggested within the intertidal zones, it is important to note that this rule holds in intertidal marshes as well, however the species within each level get a lot shorter, and become banded into tidal zones, with the tallest plants being various samphires, and the small plants being only a couple of centimetres tall, including species like *Apium annum*.

Planting Zone	Minimum tube stock	Seed for hand broad-casting
North Embankment	2,500	12 kg
Seawall	1,800	5 kg
West Embankment	12,000	87 kg
South Embankment	1,300	12 kg
Filled Area	12,600	10 kg (low area only)
Diagonal Embankment	450	2 kg
<b>Total for the site</b>	<b>30,650</b>	<b>128 kg</b>

**Table 1 – Tube stock and seed requirements**

There is no practicable way to complete this huge planting and hand broadcast seeding task within a single planting season, using volunteer labour. The commercial value of this scale of once-off revegetation effort would be approximately \$160K, without taking into account mulching or weed control, which would add substantially to this total.

The most reasonable approach to take would be to select areas that are either highly visible, are eroding rapidly or need little work to make them 'perfect'. If the selected area requires extensive work, ensure that the area is no more than 2000m<sup>2</sup> (20m x 100m). These areas should then either be fenced off with chicken wire or signposted, weeds should be controlled, mulch should be applied if needed, and then planting and hand broadcasting of seeds should occur. Fencing is optional in areas that will not be seeded, are sheltered or have low visitor and hare numbers. Areas without fencing will need tree guards.

It is expected that the Friends Group would be able to tackle one or two of these small revegetation sites per year. It is possible to tackle more sites if preparation is done one year, possibly including broadcasting of seeds, and planting is done the second year in the gaps between last year's seedlings. More sites could also be approached if external funding and/or labour was sourced.



## **5. Appendices**

### **A1 - Large zone diagram**

## **A2 - Whole site species list**