Sarina Coastal Sustainable Landscapes Project

Armstrong Beach

Protecting and Rehabilitating Sarina Beaches Coastline

Supported by BHP Billiton Mitsubishi Alliance (BMA)

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Sarina Coastal Sustainable Landscapes Project

1.0 Introduction

Coastal management and rehabilitation works will be undertaken by council staff at Armstrong Beach from July 2007 to June 2010 as part of the *Sarina Coastal Sustainable Landscapes Project.*

The works will implement, but are not limited to, priority actions identified in the *Sarina Beaches Management Guidelines for Coastal Zones* (Sarina Shire Council, 2006) with the aim to '*improve the environmental condition of the esplanades and dunes associated with each of the populated Sarina Shire beaches'.* The recommendations in the guidelines were based on monitoring the condition of the foredunes in the Sarina beaches which found that the environmental condition of most beaches requires urgent improvement. A copy of the guidelines is available at http://www.sarina.qld.gov.au/SLCMA_COASTAL_MANAGEMENT_GUIDELINES.pdf or follow the links to the project on www.mwnrm.com.au.

Coastal management is defined as '*the protection, conservation, rehabilitation, management and ecologically sustainable development of the coastal zone'* under Queensland's *Coastal Protection and Management Act1995.* This project will implement best management practices to address the key issues of: dune vegetation zonation and complexity; vegetative waste; beach access; weeds and non-native vegetation; erosion; wildlife and turtle nesting.

The project is delivered by Sarina Shire Council (Mackay Regional Council) in partnership with Sarina Landcare Catchment Management Association (SLCMA) & Mackay Whitsunday Natural Resource Management Group (MWNRM) with generous support of BHP Billiton Mitsubishi Alliance (BMA). More information on the project is available by following the links to the project on www.mwnrm.com.au.

2.0 Scope of Works

The rehabilitation and enhancement plan applies to the coastal Esplanade along the Armstrong Beach foreshore extending from the Council Reserve (Lot13CI4144) towards Freshwater Point in the north to the boat ramp at the southern end of the township (Figure 1).

Project activities include:

- Revegetation along esplanade with native species to support dune structure and enhance coastal vegetation buffer against storm events. Emphasis will be placed on thickening areas where coastal vegetation has been cleared particularly in the southern area of the township in addition to larger plantings on areas of esplanade where there is no adjacent houses.
- Coastal post and rail fencing will be constructed along the esplanade in the southern portion of the township to define the dunal buffer rehabilitation zone and better manage access to the foreshore. The fence will link to walkways to access the foreshore and the area inside the fence will be managed to reduce mown lawn and weeds whilst regenerating.
- The project has funds to construct 4 sand ladder walkways to manage pedestrian access to the foreshore. Assessments for exact locations will be undertaken by council. Vehicle access will be restricted to the boat launching area at the southern end of the township.
- Native vegetation will be established surrounding public access points to support dune structure
- Weed control will be the priority action for the esplanade and council reserve in the northern portion of Armstrong Beach to enhance native vegetation condition and re-establishment. In selected areas where needed, fencing and replanting may be undertaken where native vegetation has been removed or disturbed and to restrict unauthorised vehicle access to the foreshore.
- Juvenile coconuts will be removed as part of the project to reduce further issues associated with buildup of vegetative waste. Further, council may decide to remove selected mature coconuts where desired, but will not undertake broad-scale removal of mature coconuts
- Interpretive turtle nesting signage will be installed at a walkway on the foreshore (figure 2).
- Review and modify street and residential lighting to protect turtle nesting areas as nesting turtles and hatchlings can be disturbed and disorientated by lights.
- Throughout the project, ongoing maintenance of the foreshore will be undertaken to minimise weed infestations and facilitate re-establishment of native vegetation.

3.0 Site Description

The following information for Armstrong Beach is from the *Sarina Beaches Management Guidelines for Coastal Zones* (2006) and from subsequent site inspections.

- Revegetation along the esplanade identified as a high priority in the Sarina Beaches Management Guidelines. Extensive mown lawns to dune areas are preventing natural regeneration to occur and are leading to a monoculture of garden couch.
- Fencing the esplanade foreshore was given a high priority in the Sarina Beaches management Guidelines.
- Natural foredunes should have distinct zones of vegetation. In some areas (particularly the northern portion) there is good zonation; however the majority of Armstrong Beach township has reduced woody vegetation on the landward dune edge.
- Esplanade and council reserve is impacted by weed species which can suppress regeneration of native species and dominate areas to the exclusion of native species.
- Lantana *(Lantana camara*) and possibly prickly pear *(Opuntia stricta*) are both present at Armstrong Beach and are declared weeds which are targeted for removal.
- Environmental weeds such as Guinea grass (*Panicum maximum*) and couch (*Digitaria eriantha*) are also present and pose a fire risk due to the large flammable fuel loads they create. These establish in areas of disturbance including mown areas and roadsides and will be controlled to reduce fuel loads.
- Dune forest contained along the esplanade and the council reserve is a naturally restricted community vulnerable to weed invasion which can facilitate a fire risk. It contains some good patches of beach scrub, an endangered community important for biodiversity conservation. The dune swales support *Melaleuca quinqenervia* forests which are rare in the bioregion.
- Armstrong Beach is a nationally significant site for migratory and resident shorebirds. These birds are vulnerable to disturbance from humans and domestic dogs. Occasional turtle nestings are recorded at Armstrong Beach.
- Dense mature coconuts & associated build up of waste impacts on aesthetics and provides habitat for vermin. Some juvenile coconuts are growing on esplanade. Domestic garden waste along the foreshore can introduce garden plants which can become weeds. Build up of waste reduces the ability of dunes to withstand erosion.

Figure 1 Armstrong Beach Esplanade and Council Reserve

Rehabilitation Treatment

A number of broad treatments will be used within the Armstrong Beach coastal esplanade and reserve (Refer to *Table 1* below). Retention and restoration of native vegetation is the most important factor in maintaining dune structure and biodiversity and allows beaches the best protection against erosion under adverse conditions.

Table 1: Restoration techniques to be used at Armstrong Beach

Techniques	*Comment*
Natural regeneration	*Encouraging the natural regeneration of native species is the best method for restoration of an area. For this to occur a viable seed bank must be present, and re-growth must include all native plant species from each stratum level. In areas where natural regeneration is to occur, mowing will be stopped and the area clearly marked for exclusion from pedestrians and public. In these areas, ongoing maintenance is required to minimise re-growth of weed species*
Revegetation	*Where planting, local native vegetation is required due to insufficient cover or re-growth of native species. Local native species will be sourced and replanted within an area as per density guide. Correct soil and bed preparation techniques will be carried out prior to planting and ongoing maintenance of the site will be undertaken.*
Staged weed removal	*Weed removal will be carried out in a staged approach. Particularly useful in removal of non-native vegetation along the dune scarp. Large woody weeds will be removed slowly to ensure the replaced native vegetation provides sufficient habitat value and protection against erosion before more removal of woody weeds.*
Physical weed removal	*Physical weed removal, including hand pulling, chipping or cutting weeds is effective in small infestations in environmentally sensitive areas.*
Mechanical weed removal	*Mowing or brush cutting will suppress weed growth, discourage seeding and spread. This method will be used particularly in areas bordering large infestations. Care will be taken to reduce potential disturbance as excessive mowing and brush cutting can facilitate further weed growth and reduce regeneration of native vegetation.*
Herbicide weed removal	*The application of herbicides will include foliage or basal spraying, cut/paste & stem injection where applicable. Spraying may be carried out on large or robust weed infestation, particularly to gain initial control of an infestation. However the majority of spraying will be small scale 'spot spray' applications to minimise non-target impacts Roundup Bi-active® will be the most common herbicide used due to its low toxicity to wildlife and humans.*

3.1 Weed Management

The esplanade contains numerous environmental weeds and non-native vegetation that is preventing the natural regeneration process to occur. Weeds within the site will be removed through a staged approach, with erosion potential and site fragility being the overriding principles. The strategy is to reduce and contain weed infestations and to facilitate natural regeneration of native species.

The council reserve located towards Freshwaer Point will be managed to reduce the dominance of weeds, particularly along the road edge where past disturbance has facilitated weed growth. Introduced grasses such as guinea grass and grader grass are well known for out-competing native species in the groundlayer. They are also highly flammable and associated hot fires threaten native habitats, particularly fire sensitive beach scrub rainforest species. These grasses and other environmental weeds will be targeted in the reserve. By restricting fire and managing fuel loads, natural recruitment of canopy trees will result in shading of the groundlayer and reduce the dominance of weeds.

Weed control will involve both manual (e.g. hand pulling, brush cutting) and chemical methods until the seed stock is depleted or native vegetation has established to prevent weed re-growth. To reduce the incidences of erosion in dune areas, it is important to maintain vegetative cover. To meet this objective, some treated weeds will be left on site to enhance the regeneration process. No weeds will be removed on the frontal dune scarp without direct replacement with native species.

Chemical control will primarily involve using *Roundup Bi-active* ® due to its low toxicity to wildlife and humans and rapid breakdown once applied. As native plants re-establish, the area will be checked for other environmental weeds and treated if necessary.

Weeds will be managed by the Council Beach Team for the duration of the project to ensure sites are well maintained and then by volunteers and Parks and Gardens staff under their operational works schedule.

Dumping of garden waste is an on-going concern at Armstrong Beach and can introduce further environmental weeds into sensitive coastal vegetation. Council will enforce local laws prohibiting the dumping of waste and target dumping ‘hotspots’ to stop the practice.

Table 2. Weed species identified from Sarina Shire Beaches	
Botanical Name	**Common Name**
Trees	
Cocos nucifera	coconut palm
Mangifera indica	mango
Shrubs	
Euphorbia cyathophora	painted spurge
Lantana camara	lantana – DECLARED*
Leucaena leucocephala	leucaena
Macroptilium atropurpureum	siratro
Protasparagus sp.	asparagus fern
Forbs	
Achyranthes aspera	chaff-flower
Agave sp	yucca
Aloe sp	Aloe
Apocynaceae sp.	periwinkle
Bidens pilosa	cobbler's pegs
Bryophyllum sp	mother of millions
Conyza sp.	fleabane
Gazania sp.	gazania
Gomphrena celosioides	gomphrena weed
Mimosa pudica	sensitive plant
Opuntia stricta	prickly pear – DECLARED*
Sansevieria trifasciata	mother-in-law's tongue
Stachytarpheta jamaicensis	light blue snakeweed
Stylosanthes sp.	
Fabaceae sp. 1	thistle
Wedelia trilobata	Singapore Daisy
Grasses	
Cenchrus ciliaris	buffel grass
Cynadon nlemfuensis	African stargrass
Digitaria eriantha	couch
Panicum maximium	guinea grass
Panicum maximium var. triaglume	
Brachiaria mutica	para grass
Vines	
Passiflora foetida	stinking passion flower
Passiflora suberosa	corky passion flower

Source: Sarina Shire Beach Management Guidelines for Coastal Zones; SLCMA Pers Comm
* Declared plants under the ***Land Protection*** *(Pest and Stock Route Management)* ***Act*** *2002*

3.2 Natural Regeneration

Native vegetation plays an important role in the formation and stabilization of coastal areas with the root systems of native species more suited to stabilizing coastal areas.

Natural regeneration of *Casuarina equisetifolia* (horsetail she oak) has taken place along some areas of the esplanade and appears to have provided a good seed stock for future establishment.

The council reserve has good regeneration of native canopy trees and beach scrub pioneer species and will be managed to restrict fire.

Targeted weed control is aimed at facilitating the natural regeneration process.

3.3 Revegetation

All of the species selected are local indigenous coastal species, and will follow as close as practical to the natural vegetation succession inherent in this coastal zone.

3.3.1 Planting

Plant species used within this site have been identified from field studies of the native vegetation still remaining within this site and other sites within the local area and as per recommendations in the *Sarina Beaches Management Guidelines for Coastal Zones*. The plants for this site will be a mixture low growing shrubs, groundcovers and trees and will be installed as tube stock (Table 4).

Table 4: Selected Species for Revegetation at Armstrong Beach		
Species Name	**Common Name**	**Numbers**
Casuarina equisetifolia	Horse-tail she-oak	1000
Hibiscus tiliaceus	Native Hibiscus	160
Pandanus sp	Pandanus	160
Glochidion lobocarpum	Cheese Tree	160
Pittosporum ferrugeneum	Rusty pittosporum	160
Acacia leptocarpa	Coastal wattle	160
Melaleuca delbata	Broad-leaved paperbark	150
Stericulia quadrifolia	Peanut Tree	160
Mimusops elangi	Tanjong Tree	160
Eugenia reinwardtiana	Beach cherry	10
Chionanthus ramiflora	Native Olive	160
Mallotus phillipensis	Red Kamala	160
	Total	**2600**

3.3.2 Planting Density

The table below will be used as a guide for planting density. Under different circumstances this may be altered to accommodate needs within the site.

Table 5: Estimated Planting Density	
Growth Form	**Planting Density**
Coastal Dunes	1 tree every 4m
	1 shrub every 2-3m
	1 groundcover every 1-2m

Ground covers will be used to run down dune scarp with the purpose of trapping and stabilizing windblown sand. A filtered buffer will be established within this zone using trees and shrubs for the protection of plantings landward of this zone.

Where mortalities of planted tube stock occur, they will be replaced with similar species consistent with the planting tables.

3.3.3 Plant Nutrition

Coastal vegetation does not require a high level of nutrition so a regular fertilizer program is not recommended. Plants will receive *Terracottem*® upon planting (a physical soil conditioner enriched with fertilizers and a root growth starter

compound, designed to improve the water and nutrient retention capacity, structure, aeration, quality and performance of growing media).

3.3.4 Water Schedule

Plants will receive adequate water for establishment and monitored by beach team to improve survival rate. Watering will be conducted by Beach Team for duration of the project as needed and by Parks and Gardens staff in accordance with Council water restriction policy.

4.0 Fencing and Beach Access

To reduce erosion and destruction of sand dune vegetation the beaches should only be accessed at designated points by appropriately designed tracks and sand ladders

Coastal post and rail fencing will be constructed along the esplanade in the southern portion of the township to define the dunal buffer rehabilitation zone and better manage access to the foreshore. The fence will link to walkways to access the foreshore and the area inside the fence will be managed to reduce mown lawn and weeds whilst regenerating.

Fencing may also be erected in areas where continuing unauthorized vehicle access is a problem. Vehicles access to Armstrong Beach is restricted to the boat launching area at the southern end of the beach.

Pedestrian access will be enhanced with the formalization of 4 beach access points on the esplanade. They may include upgrading existing access track/s where required to either sand ladder or walkway features.

No formalised pathways will be constructed on the landward side of the Esplanade.

5.0 Signage

Interpretive/educational signage regarding marine turtle nesting will be installed in an appropriate position on the Esplanade (figure 2 below).

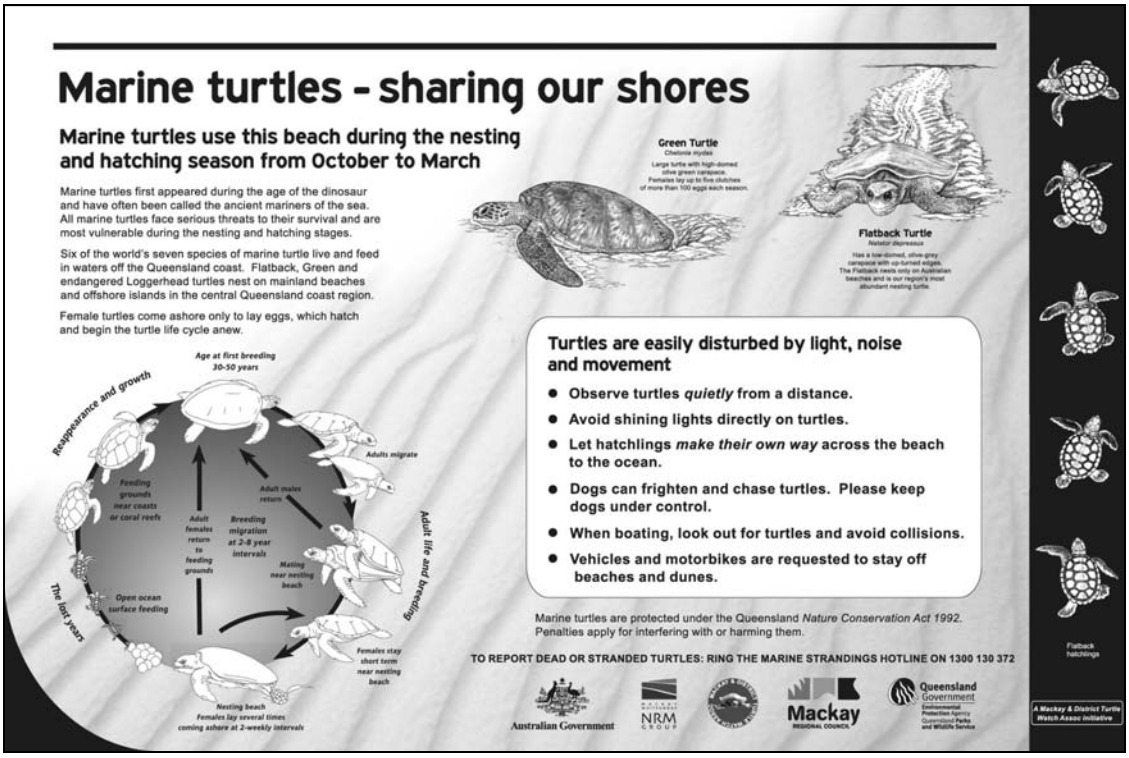

Figure 2 Turtle interpretive sign developed for the project in partnership with Mackay & District Turtle Watch Association Inc.

6.0 Turtle-Friendly Lighting

A monitoring survey of street & residential lighting will be undertaken to identify lighting hazardous to nesting marine turtles & hatchlings. Once identified, consultation with stakeholders will be carried out to identify and implement solutions.

7.0 Community Involvement

It is envisaged that Council will encourage residents (& community groups) at Armstrong Beach to become involved with on-ground activities, whether through the development of a community rehabilitation plot, or on areas adjacent to private property.

Sarina Landcare will facilitate formation of a Coastcare volunteer group of local residents and provide support for ongoing vegetation and biodiversity management practices.

8.0 Monitoring and Maintenance

The Beach Team will monitor and maintain the area for the duration of the project with the main focus on vegetation establishment and weed suppression. This site will be maintained by Parks and Gardens Staff under their operational works schedule.

Where mortalities of planted tube stock occur, they will be replaced with similar species consistent with the planting tables.

Monitoring will be undertaken periodically using the methods outlined in the *Sarina Beaches Management Guidelines for Coastal Zones* (Sarina Shire Council, 2006) to assess the effectiveness of on-ground works in improving the condition of esplanades and dunes at the Sarina beaches.

9.0 Exclusions

Park facilities and designated open spaces are excluded from plan.

Large scale mature coconut tree removal is excluded from this plan, however council may decide to remove selected trees.

Council will not provide walkways on inland edge of esplanade to join with all access points.