

Vegetation Management Plan

Main Beach and Clarkes Beach Dune Recovery Byron Bay



Prepared for

Byron Shire Council

8 November 2022



5/11 Buchanan Street Murwillumbah NSW 2484 PO

Box 5198 South Murwillumbah NSW 2484 Phone

0266722220 Mob 0409244294

Email: goorambil2@bigpond.com

www.bushrestoration.com



Table of Contents

1. Introduction.....	2
1.1 Site Description.....	3
1.2 Vegetation Communities	4
1.3 Recreation and land uses-	4
2. Fencing.....	8
3. Restoration Works	10
3.1 Zone 1 – reprofiled dune face	10
3.2 Zone 2 – hind dune	13
4. Community Dune Care Event.....	14
5. General Guidelines.....	14
5.1 Bush Regenerators.....	14
5.2 Pesticide application.....	14
5.3 Work Health & Safety.....	15
6. Monitoring and Reporting.....	15
6.1 Key Performance Indicators.....	15
6.2 Adaptive Management	16
7. References.....	17

1. Introduction

Bushland Restoration Services have been engaged by Byron Shire Council (BSC) to prepare a Vegetation Management Plan (VMP) for the area between Byron Bay Main Beach and Clarkes Beach, as part of the 'Byron Bay-Main and Clarkes Beach Dune Recovery Project'. The VMP includes fencing to protect the revegetation area. The project follows significant erosion events, where Council has been successful in obtaining funding from the Department of Planning and Environment's Coastal and Estuary Grants Program- Implementation Stream. A Review of Environmental Factors (Byron Shire Council 2022) precedes this VMP and has provided background information used in this plan to guide the processes outlined in the following sections.

The aim of the project is to-

- Rehabilitate and restore the dune system to assist in the recovery of its form and function;
- Restore/rehabilitate the dune ecosystem and habitat; and
- Improve the public's beach safety, access and amenity.

The project will involve 'beach scraping' which involves moving, via mechanical means, small volumes of sand, in the context of annual littoral transport volumes, and 'dune reprofiling'. Sand is harvested from the swash zone and lower part of the beach to the back of the beach to help reinstate the frontal and incipient dune (Figure 1).

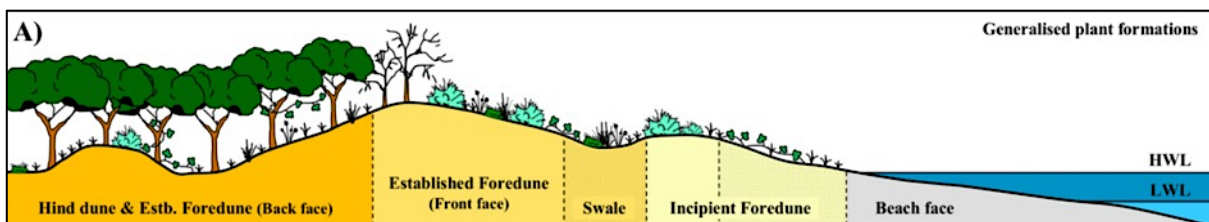


Figure 1: Illustration of dune surface zones (Source: Dune Rehabilitation Plan Clarkes Beach 2019)

The bushland restoration contractor will undertake direct seeding (seeding directly into or on the sand substrate) and replanting of propagules on the dune face for stabilisation and revegetation, and plant local native tubestock on the upper dune. Works will involve follow-up maintenance for up to 12 months, which includes fertilizing, weeding and watering as required.

Prior to the beach scraping works, removal and potting of established plants that are unlikely to withstand sand burial, such as Pigface *Caprobrotus glaucescens*, Dianella *Dianella caerulea*, Sedges *Ficinia nodosa* or tree saplings, will be undertaken. Spinifex *Spinifex sericeus* is the primary species to be used as the seed head can be buried and will naturally re-establish. Other ground cover species such as Beach Bean *Canavalia rosea* and Goats' Foot *Ipomoea pes-caprae* can be lifted with roots intact and plugged back into the dune sands after scraping has been completed.

Fencing of beach accessways and the beach side of the dunes will be undertaken to discourage pedestrian access to the newly established dunes and revegetation area.

Presently three beach accessways are closed (illustrated by the red symbol on **Figure 4**) and are to be decommissioned permanently due to the adequacy of remaining accessways, and to reduce impacts on the dune. The decommissioning and restoration of beach access ways will be completed prior or during the beach scraping and dune reprofiling works.

1.1 Site Description

The site location is between Byron Bay Café (previously Clarkes Beach Café) and the Byron Bay Surf Life Saving Club at Main Beach, a distance of approximately 750m. See **Figure 3**, which shows the spatial extent of the site. The site occurs on mainland and barrier beach associated foredunes and hind dunes on Quaternary (Holocene) sands.

Soils on foredunes are deep (>300 cm), rapidly drained Siliceous Sands (Uc1.21, Uc1.22) which are highly erodible by wind and storm surge. After a period of calm, since 2016, and rapidly increasing since mid-2019, Clarkes Beach and Main Beach became subject to significant coastal erosion which has resulted in significant losses of sand from the beach and frontal dune; damage and subsequent closure of beach access ways, and significant loss and damage of dune vegetation.

There has been a significant loss of sand from the beach and frontal dune, resulting in damaged beach access ways and significant loss and damage of dune vegetation. Several erosion events caused by sand supply deficit, storm wave attack, combined with elevated water levels during large spring tides have resulted in significant dune scarping along the majority of the dune system within the reserve.



Plate 1: Dune scarping evident at the site.

Erosion under this walkway will be addressed through accessway closure.

1.2 Vegetation Communities

The wider project locality comprises coastal dunes, littoral rainforest and heathlands. Under Byron Shire Council's vegetation mapping (2021) the entire project site consists of Littoral Rainforest on the hind dunes and Wallum Heath on the frontal dunes, though much of the previous Heathland has been lost due to recent erosion. Littoral Rainforest is classified as a Critically Endangered Ecological Community under the Federal EPBC Act 2008, and an Endangered Ecological Community under the NSW Biodiversity Conservation Act 2016. Existing vegetation presently within the proposed deposition area of the dunes is predominantly ground covers (Spinifex, Beach Bean, Horsetail She-Oak *Casuarina equisetifolia*, though this cover has been significantly impacted from the recent erosion (BSC 2022).



Plate 2: Revegetated dunes to the east of the site.

1.3 Recreation and land uses-

The site is a popular tourist area and surfing location, with a number of people nearby at all times of the year. Part of the site is also directly below Reflections Holliday Park, which is continuously fenced off from the public. The beach is used for swimming, walking, surfing and commercial operations such as sea kayaking. The reserve area is used for walking, picnicking, monthly markets, and contains play equipment, BBQ's, waste bins and footpaths.

Recreational uses associated with Clarkes Beach have been impacted by the severely eroded beach profile and lack of sand/beach width, and the closure of beach access. The project will restore access and beach amenity.



A large stormwater drain currently empties to the beach and often forms a small lagoon. BSC is currently working to improve the outlet to slow the water flow to reduce scouring.



Plate 3: Stormwater drain at Clarkes Beach

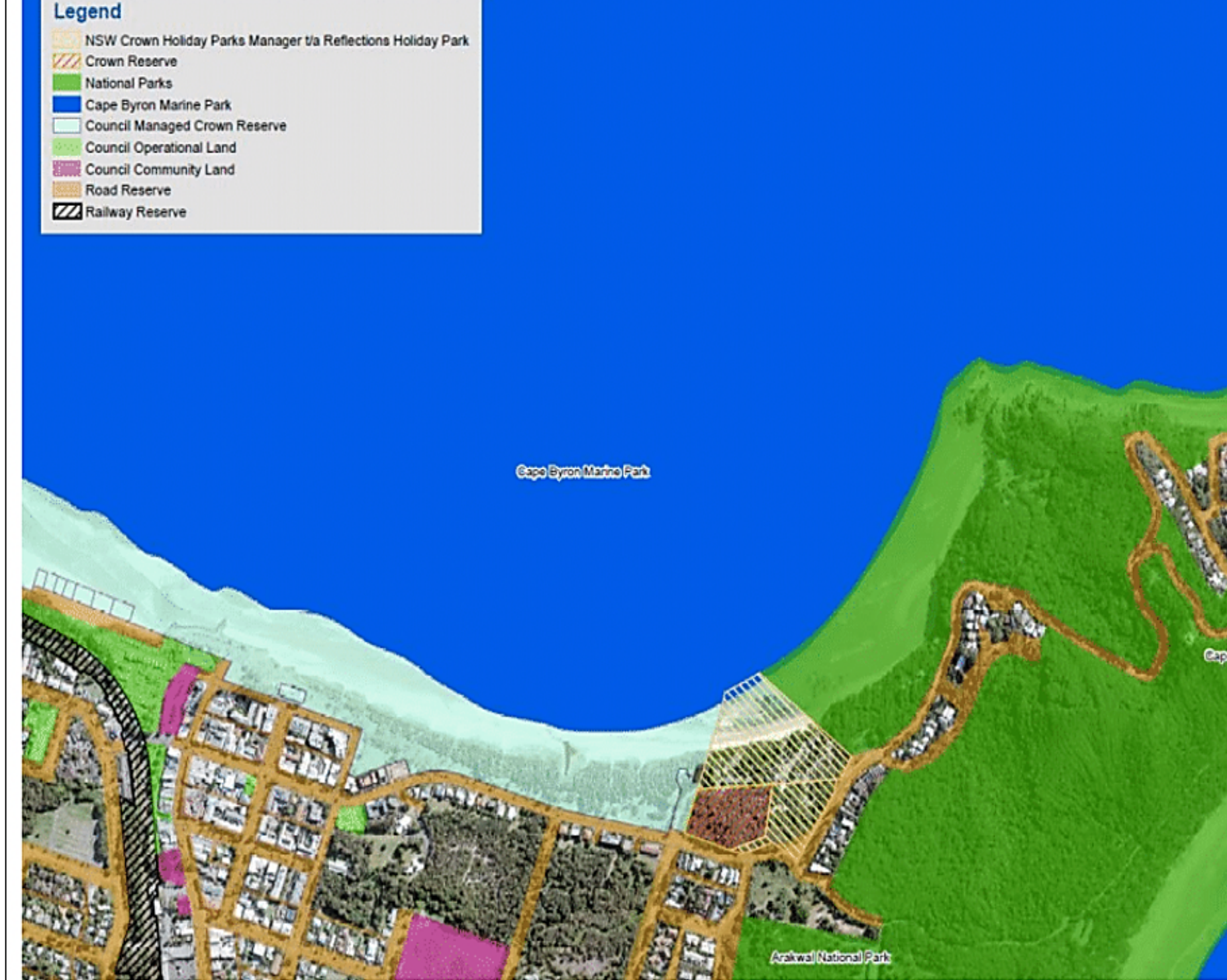


Figure 2: Aerial Image - Land ownership and management arrangements for the broader area. Source: BSC 2022



Figure 3: Spatial extent of project area.

The blue polygon above represents the Scrape Zone from which sand will be removed, green polygons represent Dune Restoration Areas (Zone 1) where strand species will be planted. The pink polygon represents the Landward Vegetation Area where trees will be planted. The red polygon is an exclusion zone which will be protected during scraping works. S



2. Fencing

On completion of the beach scraping, permanent fencing along the newly formed dune and open public beach access ways will be reinstated, repaired and/or newly erected.

The entire project area between the Beach Café and the Surf Club will be fenced, positioned slightly above the frontal crest of the dune, and above the potential wave run-up zone. Fencing will consist of timber posts and 3-line Bayco® wire (**Figure 5**). It is preferred that existing fence posts will be reused where possible.

The alignment and location of the fencing of beach access ways will focus on streamlining pedestrian access straight to the beach and preventing access through rehabilitated areas. Readjustment of existing walkways will be undertaken to reduce the total access to 7 walkways with an average of 70m of fencing each, and a total length of 420 m. This fence will be a total distance of 750m.

Fencing will also be installed along the Landward Vegetation Area (**Figure 4**). The fence will be installed 5m south of the existing fence for a length of approximately 300 m.

Corflute dune signage will be erected along the fenced dune area, another initiative to deter the public from entering dune area.



Plate 4: Existing dune fencing to the east of the subject site.

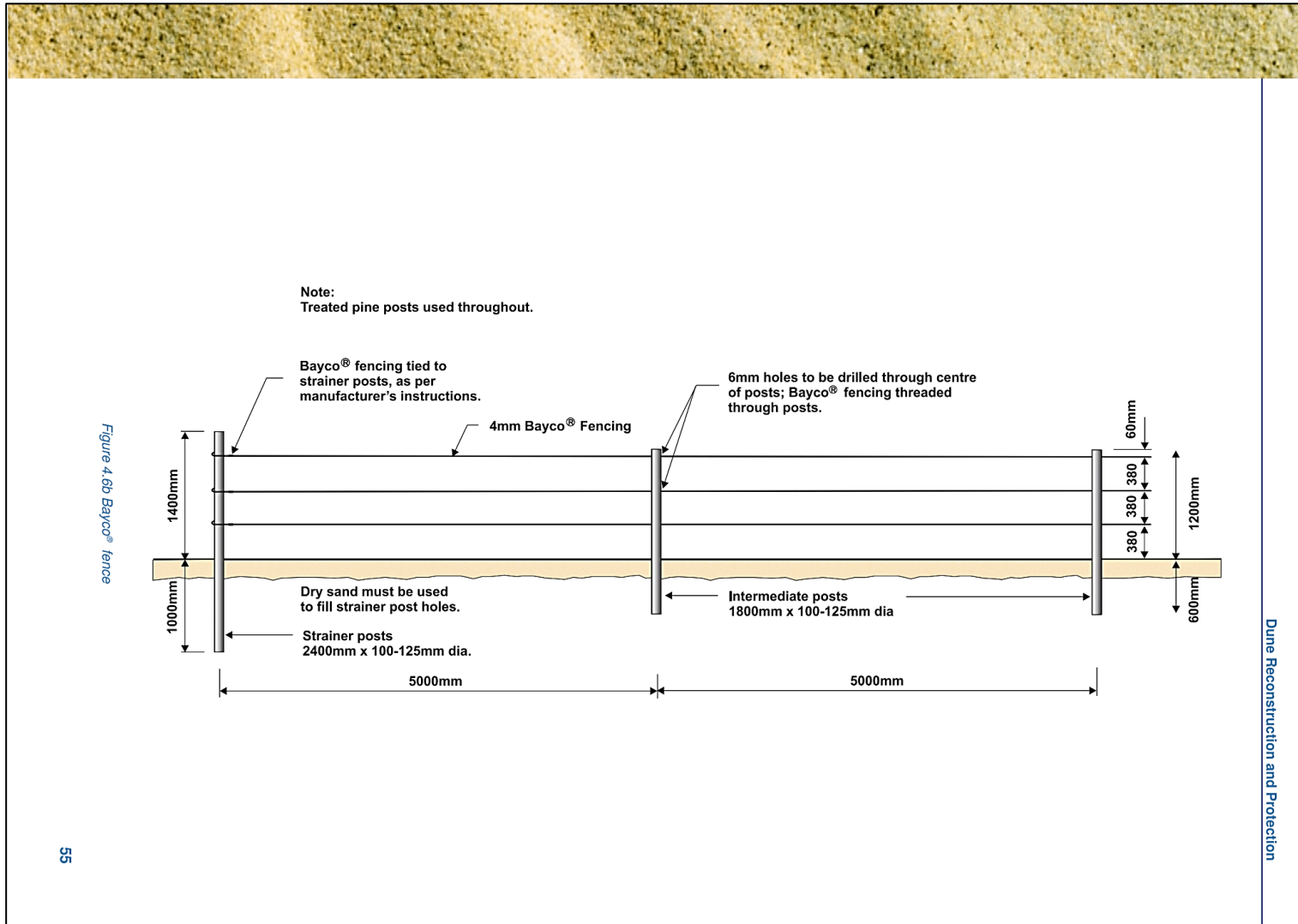


Figure 5: Timber posts and 3-line Bayco® wire fencing

3. Restoration Works

The site has been divided into two zones for restoration purposes. Zone 1 is the dunal zone where direct seeding and planting is proposed. Zone 2 is the hind dune area to be widened and planted. (Figure 6).

3.1 Zone 1 – reprofiled dune face

Zone 1 is the incipient and foredune area where the beach reprofiling and beach scraping will be taking place. The erosion is severe and has resulted in significant loss of sand from the beach and frontal dune, as well as significant loss and damage of dune vegetation (Plates 2 and 3). The aim of the revegetation in Zone 1 is to recreate the incipient dune with dune grasses and creepers.

Direct seeding is the sowing of the seed directly into the ground. Seed will be collected from nearby beaches. The following species will be direct seeded into the incipient dune area of Zone 1.

- Beach Spinifex *Spinifex sericeous* seed heads mature during November-December, detach from the parent plant and are blown about the dune where they gather in hollows or against other vegetation. Collection should occur sooner rather than later or birds will have consumed much of the seed. Seeds should be buried 30-100mm, preferably in moist sand. (OEH 2018)
- Warrigal Cabbage *Tetragonia tetragonoides* can be pruned lightly to collect branches with mature berries and then scattered manually.
- Coastal Acacia *Acacia sophorae* seed can be collected.
- Yellow Beach Bean *Vigna marina*, Goats Foot *Ipomoea pes-caprae*, Pig Face *Carpobrotus glaucescens* and Beach Bean *Canavalia rosea* can be lifted with attached roots and dropped back over dune profile to capture the newly formed dune.

Table 1: Recommended species for direct seeding and planting in Zone 1

Botanical Name	Common Name	Method
<i>Acacia sophorae</i>	Coastal Acacia	Direct Seeding / Planting
<i>Canavalia rosea</i>	Beach Bean	Planting/ Direct seeding/ Cuttings
<i>Carpobrotus glaucescens</i>	Pig Face	Cuttings /Planting
<i>Ficinia nodosa</i>	Knobby Club Rush	Planting
<i>Ipomoea pes caprae</i>	Goat's Foot	Cuttings
<i>Melanthera biflora</i>	Melanthera	Cuttings
<i>Myoporum boninense</i>	Boobialla	Planting
<i>Scaevola calendulacea</i>	Beach Fan Flower	Planting
<i>Spinifex sericeus</i>	Spinifex	Direct Seeding
<i>Tetragonia tetragonoides</i>	Warrigal Cabbage	Direct Seeding
<i>Vigna marina</i>	Yellow Beach Bean	Planting/ Direct seeding/ Cuttings

Revegetation will commence after beach scraping and fencing in the following sequence:

- Direct seeding of Spinifex along top of dune, planted in 3 rows at 1 metre spacing
- Other ground cover species (e.g. Beach Bean and Goats Foot) lifted with attached roots and dropped back over dune profile.
- Planting of cuttings and of nursery stock in 2 rows at 1 metre spacings, to total 750 plants per row.

A second wave of revegetation will be undertaken 6 months after the initial phase. This will include:

- Replacement of failed beach runners.
- Introduction of beach shrubs (e.g. Coastal Acacia, Boobiolla).
- Final planting and direct seeding of 1500 plants in 2 rows at 1 metre spacings.



Plate 5: Eroded dune area towards Main Beach.



Figure 6: Restoration Zone 1 is approximately indicated by the blue shading above. Zone 2 is approximately indicated by the pink shading. Zone 2 will be concentrated on the parts of the zone where trees are thinnest (purple shading).

3.2 Zone 2 – hind dune

Zone 2 is located at the rear of the foredune and into the hind dune area, where the vegetation is currently very thin (one row of larger trees in some sections behind the mid dune species (**Plate 6**)). The vegetated dune buffer area will be expanded up to 4 metres or more landward, into the grassed area that is currently used as a recreational space (**Plate 7**). The tree planting area is approximately 1500m² (300m x 5m) and will be planted with tubestock, dominated by Coastal Banksia *Banksia integrifolia*, with the remainder consisting of littoral rainforest species (**Table 2**).



Plate 6: Loss of foredune and hind dune vegetation.



Plate 7: Parkland area to be replanted with trees.

Table 2: Tree species for hind dune planting

Scientific Name	Common Name
<i>Banksia integrifolia</i> *	Coastal Banksia
<i>Cupaniopsis anacardioides</i>	Tuckeroo
<i>Acronychia imperforata</i>	Beach Acronychia
<i>Alectryon coriaceus</i>	Beach Alectryon
<i>Cyclophyllum coprosmoides</i>	Coast Canthium
<i>Cryptocarya triplinervis</i>	Three-veined Laurel
<i>Hibiscus tiliaceus</i>	Cottonwood
<i>Elaeodendron australe</i>	Red Olive Plum
<i>Syzygium oleosum</i>	Blue Lilly Pilly

*Banksia to be 40% of hind dune planting

In the area between the two zones on the top of the foredune, Coastal Acacia, *Acacia sophorae*, will be planted out to create a wind buffer in front of the planting.



General recommendations

- Prior to plantings, grassed area should be sprayed with herbicide as part of the planting preparations.
- Plant in gaps and areas where natural recruitment not occurring. Soak plants in Seasol prior to planting and include water crystals mixed well into the planting hole. Mulch and water regularly. Install trees guards and stakes.

Maintenance will involve:

- Follow up weed control, grass that re-establishes in the zone.
- Maintain tree guards
- Watering if required.
- Check and repair fences

4. Community Dune Care Event

Council will hold a Community Dune Care event with the local Dune Care group, with the bushland regeneration contractor hosting the event. The contractor will provide information and recommendations to the group members on the management of the site. The contractor will provide plants, seedlings and or cuttings for the Dune Care members to plant. The majority of the maintenance work will be undertaken by the Dune Care group therefore working with the group and maintaining a positive relationship is important to the project. Byron Shire Council will organise dates, invitations to members and cover costs for supplies required.

5. General Guidelines

5.1 Bush Regenerators

On ground works, planting and maintenance, will be undertaken by bush regeneration contractors, volunteers and Byron Shire Council staff.

Qualified Bush Regenerators (TAFE Bush Regeneration Certificate 111 or equivalent) with demonstrated experience in working in local Littoral Rainforest and coastal habitats. A qualified bush regenerator will be capable of advising on extent and timing of works, record keeping, selected locations and appropriate species for planting if required, and maintenance program.

Supervising bush regenerators must hold an appropriate licence (issued under the *Biodiversity Conservation Act 2016*) to work in the habitat of threatened species and ecological communities prior to commencing on ground restoration works.

5.2 Pesticide application

Use of chemicals such as herbicides and their additives must only be carried out by personnel who hold current chemical users' certificates. These chemicals must be used in accordance with label directions



unless an off-label use permit is procured from the Australian Pesticides and Veterinary Medicines Authority (APVMA).

Chemical use records must also be kept and include weather conditions, areas treated, amounts used and application rates in accordance with the *NSW Pesticides Act 1999*.

5.3 Work Health & Safety

All works are to adhere to the relevant industry standards, permits, certificates and regulations. In accordance with the *Work Health and Safety Act 2011* and *Work Health and Safety Regulations 2017* workers will comply to ensure safety in the workplace.

Contractors are also required to provide Workcover for employees or ensure sub - contractors hold individual personal insurance for bush regeneration work. Contractors approved by Byron Shire Council need to ensure they have submitted and adhere to an approved current Work Health and Safety System as per Council's requirements.

6. Monitoring and Reporting

Two photo points shall be set up within each zone. The photo point locations to be recorded using a GPS and recorded in the work diary or Daily Record Sheet and marked on a map of the site.

The photo points are to be set up as follows;

- Photo point location marked using a star picket with protective cap on the top;
- The marker to be located in the centre of the photo to provide a reference point;
- Photos to be taken at the same direction and time of the day each time; and
- The camera lens, angle and height to be the same for each photo.

6.1 Key Performance Indicators

The monitoring program which measures Key Performance Indicators (KPIs) has been designed to gauge, progressively, the success of the program and allow for the early detection of risk factors to achieving the restoration project. This provides an opportunity for adaptive management and improves the chances for success of the project.

- Reduction of impacts as specifically identified within this plan.
- Environmental weeds are to be progressively treated to ensure <10% weed cover is recorded at completion of year one.
- Survival of plantings and direct seeding to achieve 80% after first year.
- During the establishment and maintenance period increased recruitment of native species and percentage cover of native species to be achieved.

Monitoring of Key Performance Indicators (KPIs) and repeat photographs to be undertaken on an annual basis.



6.2 Adaptive Management

A key factor for success will be the ability of those implementing the revegetation to respond to changing site conditions. The purpose of regular monitoring, recording and reporting is not just to document the progress of the project, but also to respond to unanticipated circumstances, provide feedback on the success or failure of the planting and allow adaptation of the techniques and implementation schedule to achieve maximum effectiveness in weed control and planting management.

An adaptive management approach is especially important in relation to the control of weeds and the species selection and survival rates for planting programs. Regular monitoring is to be used to assess the effectiveness of management strategies and provide the basis for adaptation of the implementation schedule.



7. References

Byron Shire Council (2022) *Main and Clarkes Beach Dune Recovery Project REF*. Unpublished Report to BSC by Chloe Dowsett.

Office of Environment and Heritage (2018). *NSW Coastal Management Manual Part A: Introduction and mandatory requirements for a coastal management program*. Accessed online 1 November 2022 at <https://www.environment.nsw.gov.au/research-and-publications/publications-search/coastal-management-manual-part-a>