

# MAINTENANCE PLAN KAKADU BEACH PARKLAND AND CONSTRUCTED HIGH TIDE ROOST FACILITY – BRIBIE ISLAND

---

2017



## TABLE OF CONTENTS

TABLE OF CONTENTS	2
1. INTRODUCTION	3
1.1 BACKGROUND	3
1.2 MAINTENANCE RATIONALE	3
1.3 PLANNING PROCESSES	7
1.4 ACHIEVING THE REQUIRED MAINTENANCE OUTCOMES	8
1.5 COMMUNITY CONSULTATION	8
1.6 MAINTENANCE ACTIVITY ZONES	9
1.7 PERMITS REQUIRED FOR MAINTENANCE	12
2. MAINTENANCE SCHEDULE	13
APPENDICES	20
Appendix 1: Migratory Shorebird Species	20
Appendix 2: Kakadu Beach Environmental and Declared Weeds	21
Appendix 3: Kakadu Beach Shorebird Roost / Lagoon Native Vegetation	22
Appendix 4: Kakadu Beach Parkland Vegetation	23
Appendix 5: Kakadu Beach Parkland Vegetation	27

Version Control		
Version	Author	Date
V0.1	Moreton Bay Regional Council - Natural Areas MBRC reference - 14770069 (migrated file)	2017
V0.2	Moreton Bay Regional Council - Environmental Services Minor administration updates MBRC reference: T1 - 66430064	February 2023

## 1. INTRODUCTION

### 1.1 BACKGROUND

The original developer of the now Pacific Harbour Canal Estate at Banksia Beach Bribie Island, Hegira Limited, completed the construction of the 'Kakadu Beach' Migratory Shorebird High Tide Roost facility in March 2002. The Shorebird roost became managed by Council in 2005. The project to design and construct the high tide roost facility included a steering committee of members of the Queensland Wader Study Group, Pumicestone Shorebird Management Group, the former Caboolture Shire Council and Hegira Limited. Hegira Limited engaged consultant HLA-Envirosciences Pty Limited to develop a maintenance manual to ensure the high tide roost site continued to provide for the habitat needs of shorebirds. This document is a review of the former *Maintenance Manual Shorebird High Tide Roost Site Kakadu Beach, North Headland, Bribie Island* dated 25 September 2003 and 2014 Maintenance Plan Kakadu Beach Constructed High Tide Roost Facility- Bribie Island.

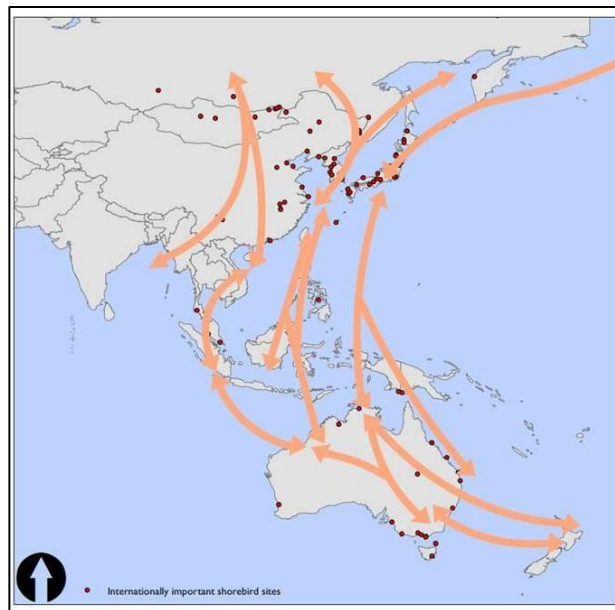
It is to ensure that management actions;

- Are conforming to current legislation;
- Ensure conservation of migratory shorebirds;
- Ensure management actions required to minimise tidal impacts;
- Maintain all parkland ecological values;
- Are consistent with current levels of service.

### 1.2 MAINTENANCE RATIONALE

Migratory shorebirds (refer to Appendix 1) are forced to leave their Arctic breeding grounds during the northern hemisphere winter. They migrate via the East Asian-Australasian Flyway and begin to arrive in Australia in September and depart in March (see Figure 1). Some shorebirds migrate up to 25,000 kilometres each year. Shorebirds need to almost double their weight to enable them to make the return migration back to the Arctic region and to achieve this weight gain they feed continuously on exposed tidal mud flats and roost (or rest) undisturbed at high tide when the mud flats are submerged. Disturbance by people and domestic animals triggers the flocks to take flight while roosting and this high-energy activity can prevent shorebirds from making the weight gain required to make the return journey to breed during the Arctic summer.

**Figure 1: Migratory Shorebird Routes on Australasian East Asian Flyway**



(by Fuller Lab- <https://www.fullerlab.org/>).

The Moreton Bay Shorebird Management Strategy 2005 cites the following relevant facts: -

- 40,000 shorebirds visit the bay each summer (Driscoll 1993; Watkins 1993).
- There are 112 identified high tide roosts but only 15 of these are available to some 50,000 shorebirds during particularly high spring tides.
- Preferred roost sites are close to feeding grounds e.g. Pumicestone Passage.
- Disturbance by people and domestic animals, habitat clearance and lack of awareness are the dominant threatening processes negatively affecting shorebird populations. Disturbance is a major factor preventing birds from reaching their required weight.

The Kakadu Beach Constructed High Tide Migratory Shorebird Roost Facility forms part of Kakadu Beach Park maintenance that is comprised of four distinctive zones including; a parkland area, beachfront, lagoon and shorebird roost identified in Figure 5. The shorebird roost zone requires a maintenance program to keep the sandy beach suitable for roosting shorebirds. Management actions include; removal of litter and debris washed up on the shoreline, weed control, removal of propagules and newly established or minor vegetation to ensure suitable habitat for migratory shore birds whilst reducing impacts to the tidal area and dunal system.

The roost is delineated by restricted access fencing and signage to be maintained and reduce disturbance while roosting. Staff and/or contractors undertaking maintenance activities need to avoid disturbing the shorebirds by carrying out all maintenance activities at low tide periods during the migration season when the birds are out on the tidal mud flats feeding, and not using the roost. Whilst four management zones are actively managed by Moreton Bay Regional Council; management actions undertaken is restricted within the beach front, and shorebird roost management areas. These contain areas that are outside of council owned land Lot 217 SP106289 (Figure 2) and is under the authority of state government and applicable state and federal legislation. Land is also protected under state legislation to the Highest Astronomical Tide (refer to Figure 3).

**Figure 2: Council Parkland- Kakadu Beach Park Lot 217 SP106289**

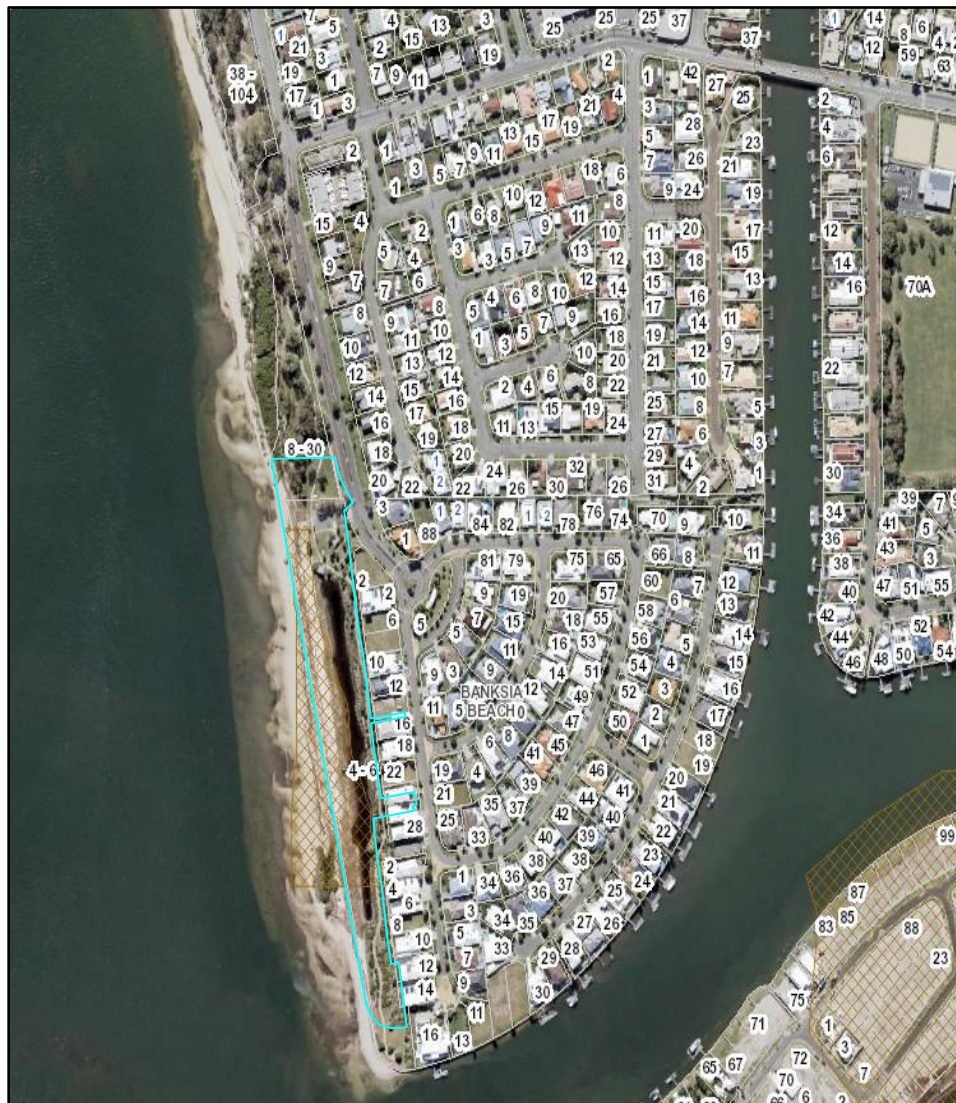
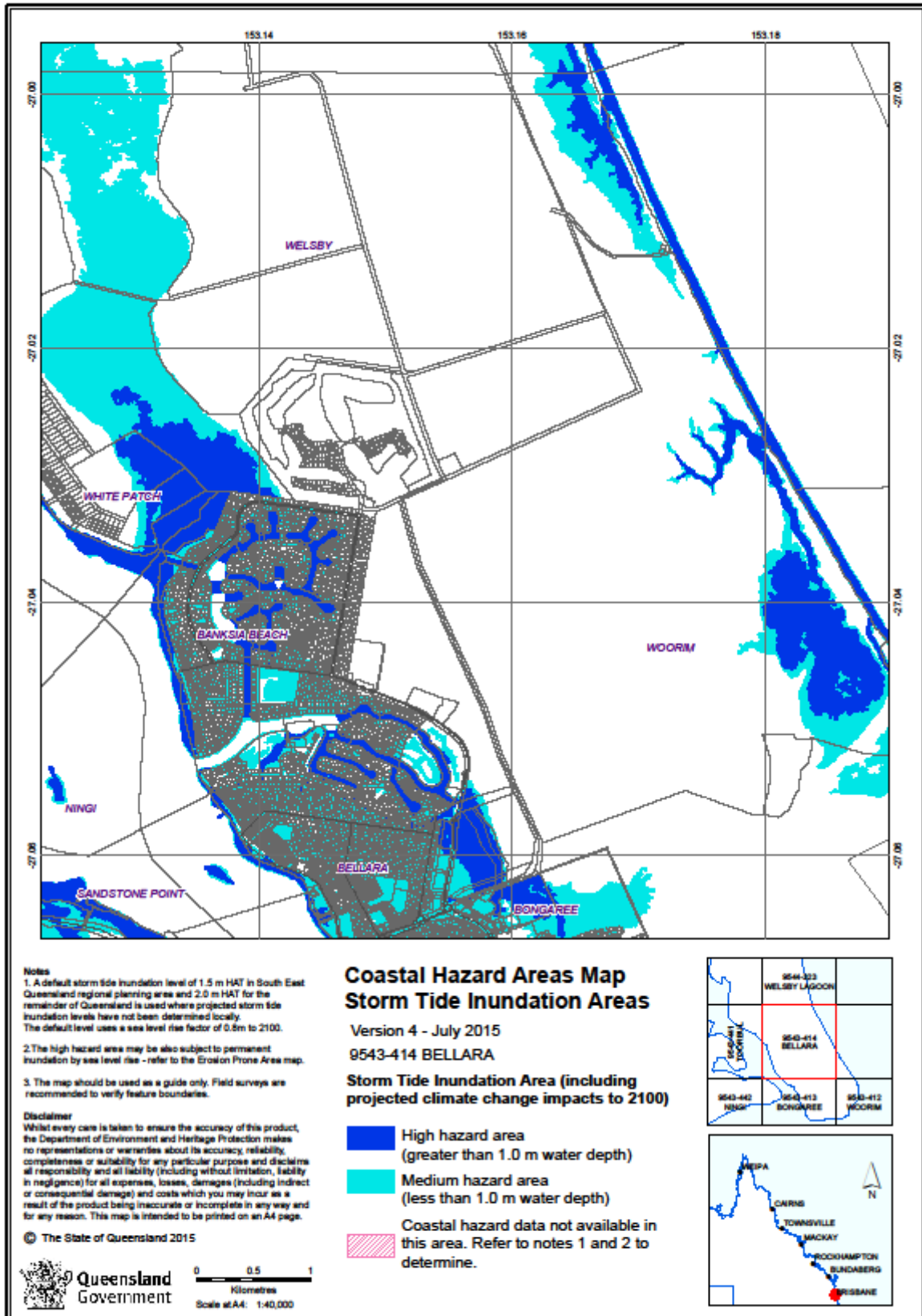




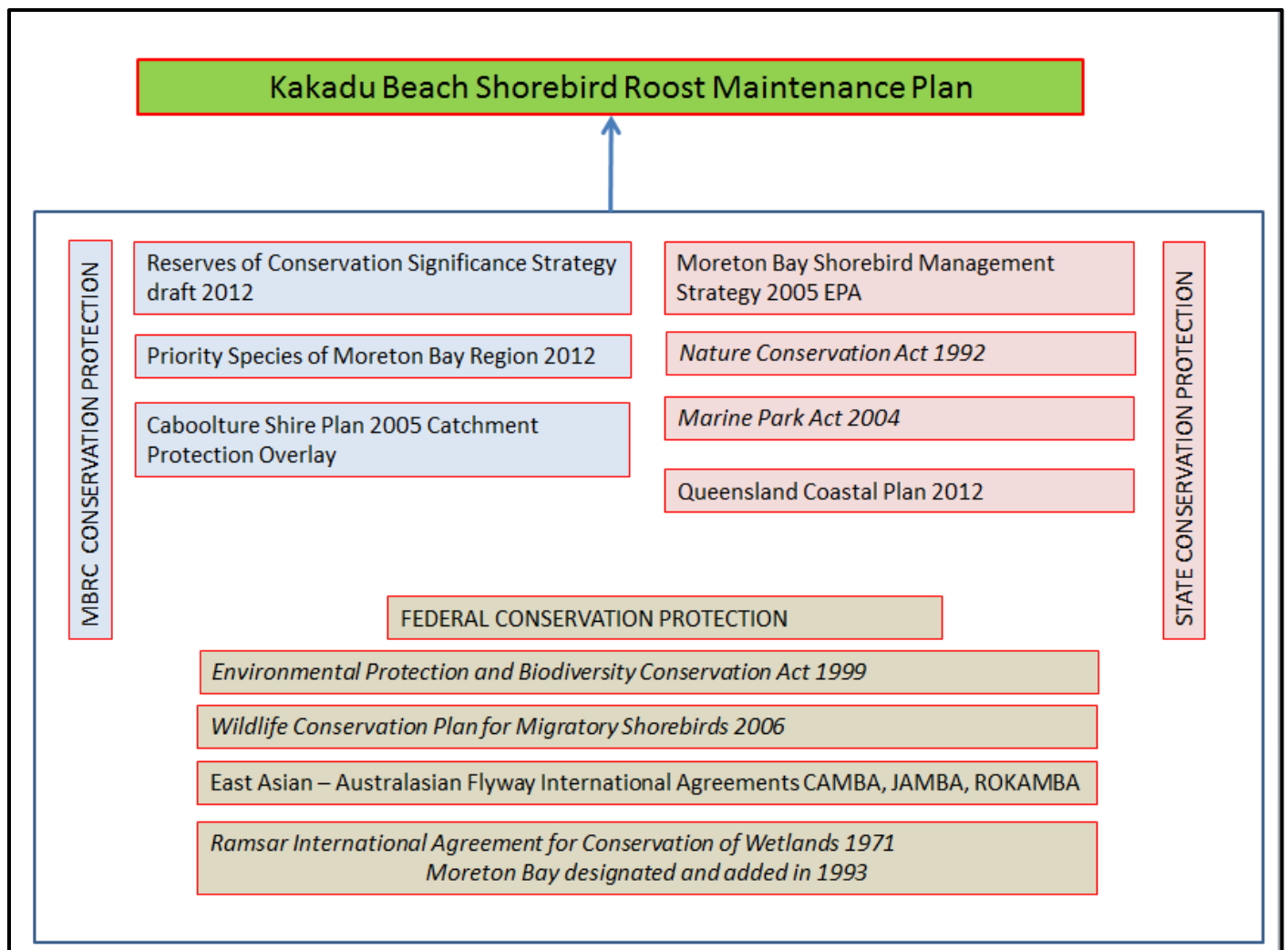
Figure 3: Storm Tide Inundation- 1.5m HAT



### 1.3 PLANNING PROCESSES

An extensive body of Plans, Strategies and Legislation exists at a Local, State and Federal Government level, including the Federal Government entering several International Conservation Agreements. These are depicted in Figure 4.

Figure 4: Shorebird Conservation Planning Processes



## **1.4 ACHIEVING THE REQUIRED MAINTENANCE OUTCOMES**

The purpose of this manual is to document the maintenance practices that are necessary to retain the Kakadu Beach High Tide Shorebird Roost facility at Banksia Beach in a condition that promotes the long-term use of the site by shorebirds, both resident and migratory. The maintenance practices are specific to shorebird management require methodology atypical horticultural practices. Staff or contractors undertaking maintenance required training for the specific tasks in the maintenance schedule to ensure minimal disturbance to shorebirds.

## **1.5 COMMUNITY CONSULTATION**

The Kakadu and Toorbul High Tide Shorebird Roosts were innovative infrastructure in 2002. There was a high level of community involvement and interest at the construction stage and has continued and expanded to include: -

- notification of government agencies to meet permit requirements detailed in Section 1.7,
- a local resident spotter who advises when and where birds are laying eggs and when rare birds are present, and
- consultation with a shorebird expert who provides specialist knowledge and advice when requested.

There is a high community expectation for consultation or notification prior to undertaking maintenance activities in this environmentally sensitive area. Consultation with high interest stakeholders prior to maintenance activities has proved successful thus avoiding the need for management to commit resources to sort out issues that may result from perceived inadequate communication. Noted successes include:

- a reduction in possible shorebird disturbance at inappropriate times,
- reduced Customer Requests,
- compliance with legislative permit conditions,
- complimentary feedback from stakeholders, and
- availability of resources to respond to requests for information expediently and successfully.

Engaging the community meets objectives in the following MBRC Policies: -

- MBRC Community Engagement Policy 2010 No. 38-2150-010
- Code of Conduct Policy “We work collaboratively with our community and external partners.”

Table 1 lists the contacts for agencies and community stakeholders.



**Table 1: List of Contacts.**

<b>Organisation</b>	<b>Contact</b>	<b>Phone</b>	<b>Email</b>
<i>Department of Parks and Forest (previously Department of National Parks, Sport and Racing)</i>	<i>n/a</i>	<i>(07) 13 74 68</i>	<i>n/a</i>
<i>Department of Agriculture and Fisheries</i>	Principal, Impact Assessment and Management, Fisheries, QLD	N/A	<a href="mailto:planning&amp;assessment@daff.qld.gov.au">planning&amp;assessment@daff.qld.gov.au</a>
Qld Wader Study Group	Chairperson	N/A	<a href="mailto:chairperson@waders.org.au">chairperson@waders.org.au</a>
Moreton Bay Regional Council	Customer Service	(07) 3205 0555	<a href="mailto:mbrc@moretonbay.qld.gov.au">mbrc@moretonbay.qld.gov.au</a>

## 1.6 MAINTENANCE ACTIVITY ZONES

There are four different maintenance zones covered by this maintenance manual, each designed for a specific purpose. These zones, known as 'Parkland', 'Beachfront', 'Lagoon' and 'Shorebird Roost Site', are shown in Figure 5. A brief description of each maintenance zone and its purpose is provided below.

### **Parkland**

The 'Parkland' is shown as the area outlined in purple in Figure 5. The parkland provides an area for public recreation and contains landscaped gardens and lawns, pathways and seating and facilities for bird watching including interpretive exhibits and bird viewing hides. Most vegetation in the landscaped gardens is intentionally kept short (except for established trees). The planting and regeneration of preferred roosting and nesting trees (such as Eucalypts and Casuarina) of raptors is avoided to reduce the risk of attracting them to the site which could compromise the safety of the shorebirds. However; there is an acceptance that raptors such as Sea Eagles, Brahminy Kite and Osprey are within the region and cannot be completely excluded from the area. The landscaped gardens also help to provide a barrier to deter domestic animals from entering the shorebird roost site and lagoon area.

### **Beachfront**

The 'Beachfront' is shown as the two areas outlined in orange in Figure 5. These areas provide the public with access to the beachfront to the left and right hand side of the shorebird roost site. Signage has been erected in these areas to warn the public, including the boating public, not to enter the shorebird roost site. Fencing at either end of the roost site and an outcrop of mangroves on northern end of the southern section of beachfront deters humans and domestic animals from entering the site.

### Lagoon

The 'Lagoon' is outlined in green in Figure 5. This lagoon sits between the parkland and the shorebird roost site and provides an effective barrier to prevent humans, domestic animals and feral animals from entering the shorebird roost site. The shallow edge of the lagoon on the side adjacent to the shorebird roost site also has the potential to be used by shorebirds. The vegetation on this side of the lagoon includes rushes and *Ishaemum tritiecum* that are to be retained to provide stability to the bank. However; if the extent of vegetation growth is identified as an impediment to access to the lagoon by shorebirds, corridors for accessibility will be identified for vegetation thinning.

### Shorebird Roost

The 'Shorebird Roost Site' is shown as the area outlined in yellow in Figure 5. The shorebird roost site provides shorebirds with an area to roost at high tide and is one of the few high tide roost sites in Pumicestone Passage. To feel secure, shorebirds need an area with relatively sparse, short vegetation. The exception is the small cluster of established vegetation at the south of the roost that acts a natural barrier to prevent public from entering. These include; *Hibiscus tiliaceus* and *Avicennia marina*. Regenerating trees, mangroves and propagules in the permit area is therefore removed from the roost site and vegetation is kept very low. The public are prevented from entering the shorebird roost site to minimise the disturbance. Maintenance is limited to periods of low tide and care is taken between September and March when migratory species are resident at the site.

Figure 5: Kakadu Shorebird Roost Maintenance Zones



## 1.7 PERMITS REQUIRED FOR MAINTENANCE

To comply with state legislation two permit approvals have been obtained in relation to maintenance at the Kakadu Shorebird Roost Site. These include a Marine Parks Permit for the removal of vegetation and the regrading of the foreshore to a slope of 1:50 if necessary, a Development Permit from the Department of Agriculture, Fisheries and Forestry (formerly the Department of Primary Industries and Fisheries) for the removal of marine plants. Previously a development permit (DA/26993/2012/OPW) was obtained from Moreton Bay Regional Council regrading/reprofiling the foreshore to a slope of 1:50 this included the removal of existing mangroves. Table 2 below provides more detail of current permits.

**Table 2: Permit Applications required for the maintenance of the shorebird roost site**

PERMIT No.	Dept./Act	Works	Activity Period	Issue Date	Expiry Date	Notification of relevant department
MPW2018/MBMP0171	National Parks, Recreation, Sport and Racing <i>Marine Parks Act 2004</i>	Removal of vegetation  Regrading of foreshore 1:50	All Year	10 September 2018	30 September 2028	Not required
2007DB0196	Department of Agriculture, Fisheries and Forestry <i>Fisheries Act 1994</i>	Removal of Marine Plants	All Year	28-Mar-08	Perpetuity	Email notification 5 days before works commence and email report on what has been done within 15 days after works cease. Email contact: Manager of Impact and Assessment at: planning&assessment@daff.qld.gov.au

## 2. MAINTENANCE SCHEDULE

ACTIVITY	TASK	DURATION	RESPONSIBILITY
<u>Shorebird Roost and Lagoon Zones – see Figure 5</u>			
Maintenance Inspection	Inspect lagoon for mangrove colonisation and water weed/algae growth. Inspect lagoon weirs for leaks, lubricate weir locks and clean seaweed from inlet/outlet grates. Inspect fencing and signage for damage. Inspect roost site for mangrove regrowth to determine maintenance needs. Refer any noticeable changes to the beach slope to ECM technical staff for assessment.	6 times a year at low tide	Natural Area Team
Corrective action post inspection and weed control.	Generate Work Orders (WO's) and schedule maintenance as required relevant to inspection findings.	6 times a year as soon as possible after maintenance inspection. To occur at low tide	Natural Area Supervisor
Weed control	Maintenance includes the management of environmental and declared weeds (listed in Appendix 2). Method is largely restricted to hand weeding and removal of weeds from site.  Minor use of herbicides is to be low residual (e.g. Glyphosate (bi-active) and Metsulfuron Methyl) and applied in accordance with labels off label permit 11463.  Works to be undertaken in accordance with best practice techniques as outlined in the Southeast Queensland Restoration Framework Manual.	April, early August, December or as required	Natural Area Team
Grooming	Contact local resident spotter and/or Qld Wader Study Group. Contact for reports on what bird activity/nesting is occurring and specific location on the roost.	2 weeks pre-scheduled works	Natural Area Supervisor



ACTIVITY	TASK	DURATION	RESPONSIBILITY
(When maintenance inspection identifies that grooming is required)	Pre-notification by fax to Department of Agriculture, Fisheries and Forestry 5 days before undertaking beach grooming or beach vegetation control as per DAFF permit 2007DB0196. Naturally occurring vegetation is listed in Appendix 3.  Notify the above within 15 days of completion of these maintenance works and fold up the two on site signs.	5 days before scheduled start	Natural Area Supervisor
	Notification of works signs are to be placed in the foreshore roost area 5 days prior to actual works as per permit conditions.	5 day before scheduled start	Natural Area Team
	Pre-start survey to identify nest eggs and stake location before undertaking any works on the foreshore.	At low tide, each time work site is entered	Natural Area Team
	Pick up, bag and remove all litter from site.	At low tide and before grooming begins	Natural Area Team
	Strip the tidal foreshore area using a stick rake to drag all flotsam and vegetation to either end for on-site decomposition (refer to Appendix 4 Photos). Maintain the buffer of <i>Sesuvium portulacastrum</i> , <i>Carpobrotus glaucescens</i> or native species similar in growth habit within the tidal zone, that does not impede shorebird use and provides stability to the foreshore.	April, early August, December or as required at low tide	Natural Area Team
Mangrove control  (When maintenance inspection identifies action required)	Control and remove newly regenerated mangroves and propagules within the shorebird roost (marked as the yellow area in Figure 5). This will largely be comprised of manual removal.	Low tide	Natural Area Team

ACTIVITY	TASK	DURATION	RESPONSIBILITY
Sand accretion and erosion (When maintenance inspection identifies action required)	Tidal action will change the profile of the Shorebird Roost Footprint area and this dynamic action will create sand bars and gullies. This is acceptable unless it is determined that changes to the beach profile/grade is deterring shorebirds from roosting. Refer any concerns to Moreton Bay Regional Council technical officers and Qld Wader Study Group for determination of any need to return the grade to 1:50 slope.	May to July	Natural Area Team
Permit renewal	MPW2013/MBMP0039 National Parks, Recreation, Sport and Racing – Marine Parks (see Table 2).	Expires 30 September 2028	ECM Technical Services and Environmental Services Department
Fence maintenance  (When maintenance inspection identifies action required)	Undertake emergency repairs as needed such as retention of fencing wire.  Replace galvanised wire every 5 years to ensure no breaches of the fenced area.	Low tide  (Approximately every 5 years for replacement of wire)  May to July at low tide	Natural Area Team  Natural Area Team
Restricted access signage  (When maintenance inspection identifies action required)	Refix, repair, relocate and replace signage as required.	Low tide	Natural Area Team
Lagoon mangrove control	Remove mangrove propagules and germinates colonising the lagoon area as identified in the green polygon in Figure 5.	Low tide, at time of each beach grooming	Natural Area Team

ACTIVITY	TASK	DURATION	RESPONSIBILITY
Lagoon western shoreline vegetation.  (When maintenance inspection identifies action required)	Maintain low growing native ground covers (including; rushes and native grasses) along the western shoreline including over the revetment wall to perform the role of a vegetated sand dune separating the lagoon from the cleared high tide roost. Monitor the extent of vegetation growth as an impediment to access to the lagoon by shorebirds. If vegetation growth is preventing access; corridors for accessibility will be identified for vegetation thinning. The dune vegetation will provide habitat and prevent westerly winds from filling the lagoon with windblown sand.	Low tide	Natural Area Team
	Ensure vegetation growth/colonisation does not impede sight lines for children and adults from the two bird hides.	As required	Natural Area Team
Lagoon inlet/outlet weir/s	Inspect the inlet/outlet weirs to ensure there are no blockages/leaks to maintain a permanent lagoon water level of RL 0.83 m AHD (Mean High Water Spring) with an absolute minimum water level of RL 0.53 m.	6 times a year within 2 hours of low tide	Natural Area Team
Clean gross pollutant traps	Inspect and maintain as necessary the gross pollutant traps that filter stormwater from the western side of the development prior to discharge into the passage via the weirs.	6 times a year within 2 hours of low tide	Roads and Drains Team
Lagoon rock border/spillways  (When maintenance inspection identifies action required)	Maintain as necessary.	Low tide	Natural Area Team

ACTIVITY	TASK	DURATION	RESPONSIBILITY
<u>Beachfront Zone – see Figure 5</u>			
Maintenance inspection	Inspect revetment walls for erosion, monitor weed colonisation and confirm the fence and mangrove outcrop deterrents to human entry to the restricted areas are effective.	6 times a year at low tide	Natural Area Team
Corrective action post inspection	Generate Work Orders and lock in scheduled maintenance (see below) dates.	6 times a year at low tide	Natural Area Supervisor
Weed control (When maintenance inspection identifies action required)	<p>Maintenance includes the management of environmental and declared weeds. Method is largely restricted to hand weeding and removal of weeds from site.</p> <p>Minor use of herbicides is to be low residual (e.g. Glyphosate (bi-active) and Metsulfuron Methyl) and applied in accordance with labels off label permit 11463.</p> <p>Works to be undertaken in accordance with best practice techniques as outlined in the South East Queensland Restoration Framework Manual.</p>	April, early August, December or as required	Natural Area Team
Litter removal	Pick up, bag and remove all litter from site.	6 times a year at low tide	Natural Area Team

ACTIVITY	TASK	DURATION	RESPONSIBILITY
<u>Parkland – see Figure 5</u>			
Maintenance inspection	Inspect built infrastructure, soft and hard landscaping and interpretative signage and generate Work Orders for items requiring maintenance outside of scheduled maintenance time frames.	Monthly	Maintenance Operations staff
Vegetation along lagoon pathway	<p>Manage and maintain established vegetation listed in Appendix 5. Maintain to ensure a dense growing vegetation barrier that will deter humans and domestic animals from leaving the pathway.</p> <p>This area requires very low mulching and fertiliser regimes to reduce nutrient leaching into the lagoon which has limited water exchange with Pumicestone Passage and has a history of undesirable algal blooms occurring.</p>	As per level of service specification	Maintenance Operations staff
Litter removal	Litter and debris removal from pathways/gardens/turf/infrastructure/car parks.	As per level of service specification	Maintenance Operations staff
Weed control	Control of environmental and declared weeds (refer to Appendix 3). Herbicides are to be low residual (e.g. Glyphosate bi-active and Metsulfuron Methyl) applied in accordance to labels and off-label permit 11463 and should not impact on the lagoon / water quality. Glyphosate bi-active (only) to be applied close to the waterbody.	As per level of service specification	Maintenance Operations staff
Infill planting	Infill planting within the gardens and along the lagoon pathway to compensate for plant loss and lack of foliage cover (outlined in Appendix 5). Use slow release fertiliser and water crystals at time of planting.	As required	Maintenance Operations staff
Disease control	Where disease is apparent (including Pandanus palm die back) identify and apply best practice management regime. This may include the use of insecticides that should be applied in accordance with label permits.	As required	Maintenance Operations staff
Pruning- general	Prune vegetation within parkland including car parks as necessary to maintain tidy, landscaped appearance and natural form of plants.	As per level of service specification	Maintenance Operations staff



ACTIVITY	TASK	TIMING	RESPONSIBILITY
Pruning- Pandanus palms	Inspect and remove dead fronds of Pandanus palms as they occur to reduce the risk of disease. Treat any Pandanus dieback with appropriate regime as required.	As per level of service specification	Maintenance Operations staff
Turf management	Mowing of turfed areas.	As per level of service specification	Maintenance Operations staff
Edging	Maintain a clean edge along all pathways and impermeable surfaces within built infrastructure	As per level of service specification	Maintenance Operations staff
Mulching	For car park and interpretative gardens inspect the depth of garden mulch and replace to a depth of 75-100 mm. Along the lagoon pathway, confine mulch to exposed edges along pathways and infrastructure to ensure that mulch does not enter the lagoon under rain or storm events.	As required	Maintenance Operations staff
Pathway maintenance	Pressure clean concrete and replace or repair splintering timber sections.	As required	Maintenance Operations staff
Bird hide/interpretative exhibit structures	Inspect all built structures and maintain appearance and wheelchair access as necessary.	As required	Maintenance Operations staff

## APPENDICES

### Appendix 1: Migratory Shorebird Species

SCIENTIFIC NAME	COMMON NAME
<i>Limosa limosa</i>	Black-tailed godwit
<i>Limosa lapponica</i>	Bar-tailed godwit
<i>Numenius minutus</i>	Little curlew
<i>Numenius phaeopus</i>	Whimbrel
<i>Numenius madagascariensis</i> (EPBC Status: Critically endangered)	Eastern curlew
<i>Tringa stagnatilis</i>	Marsh sandpiper
<i>Tringa nebularia</i>	Common greenshank
<i>Tringa glareola</i>	Wood sandpiper
<i>Xenus cinereus</i>	Terek sandpiper
<i>Actitis hypoleucos</i>	Common sandpiper
<i>Tringa brevipes</i>	Grey-tailed tattler
<i>Tringa incana</i>	Wandering tattler
<i>Arenaria interpres</i>	Ruddy turnstone
<i>Limnodromus semipalmatus</i>	Asian dowitcher
<i>Calidris tenuirostris</i>	Great knot

## Appendix 2: Kakadu Beach Environmental and Declared Weeds

(observed, but not limited to)

GENUS	SPECIES	COMMON NAME	FORM	WEED CONTROL TECHNIQUE
<i>Anagalis</i>	<i>arvensis</i>	Red Pimpernel	Herb	SS
<i>Barleria</i>	<i>repens</i>	Coral Creeper	Climber	StS, M
<i>Bidens</i>	<i>pilosa</i>	Cobbler's Pegs	Herb	SS, M
<i>Brachiaria</i>	<i>decumbens</i>	Signal Grass	Grass	SS
<i>Cakile</i>	<i>maritima</i>	European Sea Rocket	Herb	M
<i>Chamaesyce</i>	<i>hirta</i>	Asthma Plant	Herb	SS
<i>Conyza</i>	<i>bonariensis</i>	Fleabane	Herb	SS, M
<i>Emilia</i>	<i>sonchifolia</i>	Emilia	Herb	SS, M
<i>Ipomea</i>	<i>cairica</i>	Mile a Minute	Vine	StS, M
<i>Lepidium</i>	<i>virginicum</i>	Virginian Peppergrass	Herb	SS, M
<i>Macroptilium</i>	<i>atropurpureum</i>	Siratro Vine	Vine	SS, StS, M
<i>Melinis</i>	<i>repens</i>	Red Natal Grass	Grass	SS, M
<i>Oenothera</i>	<i>drummondii</i>	Beach Primrose	Shrub	SS, M
<i>Passiflora</i>	<i>suberosa</i>	Corky Passionflower	Vine	StS, M
<i>Sida</i>	<i>rhombifolia</i>	Arrow Leaf Sida	Shrub	SS, StS, M
<i>Sonchus</i>	<i>oleraceus</i>	Sowthistle, Milk Thistle	Herb	SS, M

Abbreviations;

SS= spot spray

StS= stem scrape

M= manual removal

### Appendix 3: Kakadu Beach Shorebird Roost / Lagoon Native Vegetation

GENUS	SPECIES	COMMON NAME	FORM
<i>Acrostichum</i>	<i>speciosum</i>	Mangrove Fern	Fern
<i>Avicennia</i>	<i>marina</i>	Grey Mangrove	Tree
<i>Canavalia</i>	<i>rosea</i>	Beach Bean	Vine
<i>Carpobrotus</i>	<i>glaucescens</i>	Pigface	Herb
<i>Ficinia</i>	<i>nodosa</i>	Knobbly Club-rush	Rush
<i>Hibiscus</i>	<i>tiliaceous</i>	Cottonwood Tree	Tree
<i>Imperata</i>	<i>cylindrica</i>	Bladey Grass	Grass
<i>Ipomea</i>	<i>pres-caprae</i>	Goat's Foot	Vine
<i>Ishaemum</i>	<i>tritiecum</i>	Ishaemum	Grass
<i>Juncas</i>	<i>kraussii</i>	Sea Rush	Rush
<i>Portulaca</i>	<i>oleracea</i>	Pigweed	Herb
<i>Sarcocornia</i>	<i>quinqueflora</i>	Beaded Sapphire	Herb
<i>Sesuvium</i>	<i>portulacastrum</i>	Sea Pursalane	Herb
<i>Spinifex</i>	<i>sericeus</i>	Beach Spinifex	Grass
<i>Sporobolus</i>	<i>virginicus</i>	Saltwater Couch	Grass
<i>Wollastonia</i>	<i>biflora</i>	Wollastonia	Herb
<i>Zoyzia</i>	<i>macarantha</i>	Zoyzia	Grass

## Appendix 4: Kakadu Beach Parkland Vegetation

Photo 1 Restricted Access Signage





**Photo 2 Weir grills and orange paint setting the RL for the weir boards.**



**Photo 3 Prestart inspection to locate and mark nesting bird eggs**





**Photo 4 Identification of well camouflaged bird eggs.**



**Photo 5 High tide roost well overdue for grooming.**



**Photo 6 High tide roost being groomed of vegetation**



**Photo 7 Organic debris raked to each end once man-made litter has been manually removed from site.**





## Appendix 5: Kakadu Beach Parkland Vegetation

### KAKADU BEACH ESTABLISHED TREES / SHRUBS TO BE RETAINED

GENUS	SPECIES	COMMON NAME	FORM	HEIGHT (m)	FLOWER
<i>Banksia</i>	<i>integrifolia</i>	Coastal Banksia	Tree	5-25	Autumn-Winter
<i>Cupaniopsis</i>	<i>anacardioides</i>	Tuckeroo	Tree	10	Autumn-Winter
<i>Callitris</i>	<i>columellaris</i>	Coast Cypress Pine	Tree	10	
<i>Livistonia</i>	<i>nitida</i>	Carnarvon Fan Palm	Tree	20	Spring
<i>Melaleuca</i>	<i>quinquenervia</i>	Broad-leaved Paperbark	Tree	25	Autumn-Winter
<i>Pandanus</i>	<i>pedunculatus</i>	Screw Pine	Tre	10	Throughout
<i>Acacia</i>	<i>sophorae</i>	Coastal Acacia	Shrub	2-3	Winter-Spring
<i>Callistemon</i>	<i>Cult. Ewan Road</i>		Shrub	2	Spring
<i>Pittosporum</i>	<i>Cult. Miss Muffet</i>		Shrub	1	Spring
<i>Syzygium</i>	<i>hemilamprum</i>	Broad-leaved Lilly Pilly	Tree	Commonly under 5 in a garden situation	Spring
<i>Syzygium</i>	<i>Cult. Elite</i>		Shrub	5	Spring
<i>Syzygium</i>	<i>Cult. Little Trev</i>		Shrub	1	Spring

**KAKADU BEACH – PLANTS PRESENT/SUITABLE FOR REVEGETATION WITHIN THE PARKLAND (Coastal, Wetland, Wallum species)**

GENUS	SPECIES	COMMON NAME	FORM	HEIGHT (m)	FLOWER
<i>Acacia</i>	<i>sophorae</i>	Coastal Acacia	Shrub	2-3	Winter-Spring
<i>Austromyrtus</i>	<i>dulcis</i>	Midyim/Midgen Berry	Shrub	0.5	Summer-Autumn
<i>Banksia</i>	<i>robur</i>	Swamp Banksia	Shrub	3	Summer-Winter
<i>Banksia</i>	<i>spinulosa</i>	Candlestick Banksia	Herb	1-3	Summer-Autumn
<i>Carpobrotus</i>	<i>glaucescens</i>	Pigface	Herb	2	Summer
<i>Canavalia</i>	<i>rosea</i>	Beach Bean	Vine	0	Summer
<i>Crinum</i>	<i>pedunculatum</i>	Swamp Lily	Herb	1	Summer-Autumn
<i>Dianella</i>	<i>brevipedunculata</i>	Blue Flax Lily	Herb	0.5	Spring -Summer
<i>Dianella</i>	<i>congesta</i>	Beach Flax Lily	Herb	1	Spring -Summer
<i>Dodonaea</i>	<i>viscosa</i>	Sticky Hop Bush	Shrub	3	Spring -Summer
<i>Hakea</i>	<i>actites</i>	Wallum Hakea	Shrub	2	Spring
<i>Hibbertia</i>	<i>scandens</i>	Snake Vine	Vine	0.5	Spring -Summer
<i>Hovea</i>	<i>acutifolia</i>	Hovea	Shrub	2	Spring
<i>Leptospermum</i>	<i>semibaccatum</i>	Wallum Tea-tree	Shrub	2	Spring
<i>Lomandra</i>	<i>longifolia</i>	Mat-rush	Tree	1	Spring -Summer
<i>Melaleuca</i>	<i>pachyphylla</i>	Wallum Bottlebrush	Shrub	1.5	Spring-Summer-Autumn
<i>Melaleuca</i>	<i>thymifolia</i>	Thyme Melaleuca	Shrub	1.5	Spring
<i>Melastoma</i>	<i>malabathricum</i>	Blue Tongue	Shrub	2	Throughout
<i>Myoporum</i>	<i>acuminatum</i>	Boobialla	Shrub	1	Throughout
<i>Scaveola</i>	<i>calendulata</i>	Fan Flower	Herb	0	Throughout