



Reserve Activity Plan

2016 - 2020

OTAGO LAGOON AND COASTAL RESERVES



ADVICE PREPARED BY
TASFLORA FOR
CLARENCE CITY COUNCIL
MAY 2016

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1 BACKGROUND

This Reserve Activity Plan relates to three coastal and bushland reserves at Otago Bay within the Clarence municipality on the eastern shore in Hobart: Otago Lagoon Reserve, Otago Bay Coastal Reserve and Direction Bushland Reserve. The Reserves contribute to the scenic fringe along the Derwent estuarine coastline on Hobart's eastern shore, and Otago Lagoon and the coastal strip along Otago Bay Road are valued by locals for their natural setting and recreational opportunities.

No management plans have previously been prepared for the three Reserves. While there was previously an Otago Bay Landcare Group that assisted with managing the Otago Lagoon Reserve, this group has been dormant for many years and has only recently reformed.

Tasflora has been engaged by Clarence City Council (Council) to develop a five year Reserve Activity Plan for on ground management activities within each Reserve, including the development of an implementation plan identifying immediate and ongoing management priorities to be undertaken during the period 2016-2020.¹

The recommendations contained within this *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* are intended to provide guidance for on ground activities that can be implemented by Council, community groups and/or volunteers. It is acknowledged that it may not be possible to undertake all recommended activities due to resource constraints; rather the intent of this plan is to provide a guide to management concepts and outcomes that could be achieved if sufficient funding can be obtained.

2 OBJECTIVES

The objectives of the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* are to:

- ensure the Reserves are sustainably managed to preserve and enhance their natural, cultural and social values;
- identify priority management activities to be undertaken within the Reserves by Council, community groups and/or volunteers as resources become available during the period 2016-2020; and
- encourage community engagement through raising awareness of the Reserves' values and encourage participation in activities to minimise threats to these values.

3 SITE DESCRIPTION

The area covered by the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* is illustrated in Figure 1. It includes the following Reserves:

¹ The *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* falls under Council's *Clarence Bushland and Coastal Strategy*, which summarises plans and strategies relevant to Reserves within the Clarence municipality.



Figure 1: Areas covered by the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* (base map sourced from the LIST).

- Otago Lagoon Reserve - comprised of 85 Otago Bay Rd and the adjoining patch bounded by Oak Bank Road and Otago Bay Road;
- Otago Bay Coastal Reserve – comprised of 19 and 30 Otago Bay Rd, plus the coastal strip on the southern side of Otago Bay Road between Conrad Drive and the East Derwent Highway; and
- Direction Bushland Reserve – comprised of 91 Direction Drive.

Council owns and manages Otago Lagoon Reserve and Direction Bushland Reserve, while ownership and management of the land within the Otago Bay Coastal Reserve is mixed between the Crown and Council (refer Figure 2). Direction Bushland Reserve is zoned as Rural Residential under the Clarence Interim Planning Scheme 2015,² with the Otago Lagoon Reserve and Otago Bay Coastal Reserve both zoned as Open Space.

4 SITE VALUES

4.1 Native flora

Native vegetation occurs around Otago Lagoon, within the Direction Bushland Reserve and at the western end of the Otago Bay Coastal Reserve. Typical native vegetation in these areas is illustrated in Figures 3-5, and described at Appendix 2.

The freshwater aquatic sedgeland and rushland community occurring in Otago Lagoon is listed as a threatened native vegetation community under the *Tasmanian Nature Conservation Act 2005*. It is of particular local significance as

² <http://www.iplan.tas.gov.au/pages/plan/book.aspx?exhibit=claips>

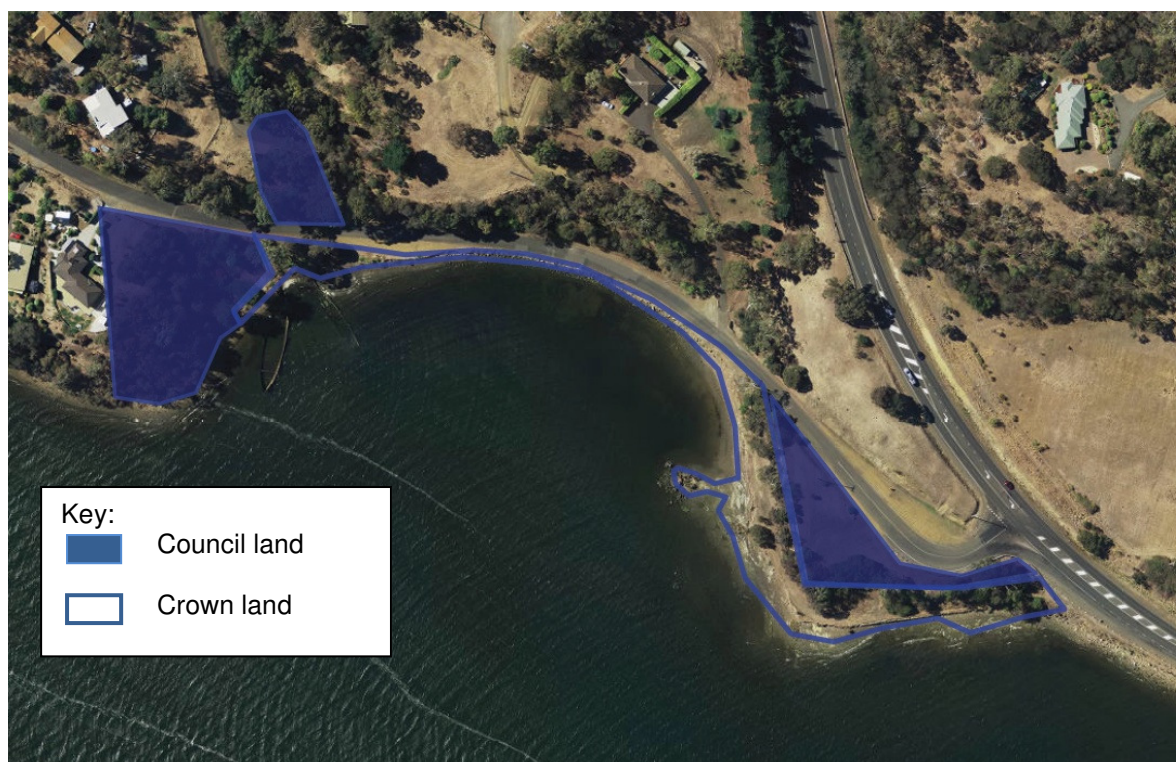


Figure 2: Ownership of land within the Otago Bay Coastal Reserve (base map sourced from the LIST).



Figure 3: Typical wetland vegetation in the Otago Lagoon Reserve.



Figure 4: Typical *Allocasuarina verticillata* forest in the Otago Bay Coastal Reserve.



Figure 5: Typical *Eucalyptus viminalis* grassy forest/woodland in the Direction Bushland Reserve.

many of the Derwent River's original estuarine wetlands have been destroyed. Otago Lagoon represents one of the last remnants of this type of wetland in the lower Derwent estuary.³

Otago Lagoon is recognised a key site for the threatened flora species *Bolboschoenus caldwellii* (club searush),⁴ illustrated in Figure 6. Two other flora species listed as rare under the Tasmanian *Threatened Species Protection Act 1995* (the TSP Act) have been previously recorded in the Direction Bushland Reserve and Otago Bay Coastal Reserve: *Vittadinia muelleri* (narrow-leaf New Holland daisy; refer Figure 7) and *Ranunculus sessiliflorus* var. *sessiliflorus* (rockplate buttercup).⁵ Further information on each of these threatened species is provided at Appendix 1.



Figure 6: Typical habit of *Bolboschoenus caldwellii* within the Otago Lagoon Reserve.

³ Coughanowr C, Whitehead S, Whitehead J, Einoder L and Taylor U (2015). State of the Derwent estuary: a review of environmental data from 2009 to 2014. Derwent Estuary Program.

⁴ Department of Primary Industries, Parks, Water and Environment (DPIPWE) (2003). Threatened Species Notesheet - *Bolboschoenus caldwellii* [online]. Available from: <http://dPIPWE.tas.gov.au/Documents/Bolboschoenus-caldwellii.pdf>

⁵ *Ranunculus sessiliflorus* var. *sessiliflorus* is currently in the process of being delisted (Wendy Potts, DPIPWE, pers. comm. January 2016).



Figure 7: *Vittadinia muelleri* growing within the Otago Bay Coastal Reserve.

4.2 Native fauna

The Reserves contains suitable habitat for a range of native wildlife, including mammals, birds, reptiles, amphibians and invertebrates. Areas of native vegetation in each Reserve contain some or all of the following habitat attributes:

- mature or dead eucalypt trees with hollows, which provide potential den and nest sites for possums and hollow-nesting bird species, including the endangered swift parrot (*Lathamus discolor*) and Tasmanian masked owl (*Tyto novaehollandiae castanops*);
- mature, flowering eucalypt trees that provide a foraging source for possums and birds, including *Eucalyptus viminalis* trees suitable for the endangered forty-spotted pardalote (*Pardalotus quadragintus*);
- shrubs and other understorey species that provide nesting, shelter and a foraging source for birds and small mammals (eg bandicoots);
- fallen timber and leaf litter, which provide shelter and foraging habitat for small birds, reptiles and invertebrates; and
- rocky outcrops which provide potential habitat for reptile species, including snakes and lizards.

Otago Lagoon provides important habitat for a range of invertebrates, frogs and native birds. Local residents have observed a range of bird species inhabiting this Reserve, including ducks, swans, tiels, mallards, swamp harriers and swamp hens,

although sightings have declined in recent years. Frogs are also frequently heard, including the eastern banjo frog (*Limnodynastes dumerili*).

The rocky foreshore along the length of the Otago Bay Coastal Reserve contains habitat for crabs and other marine life living above near the high tide mark.

While no threatened fauna species have been previously recorded within the Reserves,⁶ there are small areas of potential foraging and/or nesting habitat for several threatened species, including the Tasmanian masked owl, the swift parrot, the forty-spotted pardalote and the eastern barred bandicoot (*Perameles gunnii*). Further information on these species is provided at Appendix 1.

4.3 Cultural heritage

4.3.1 Aboriginal heritage

The municipality of Clarence, including the Otago Bay area, was previously occupied by the Mumirimina band of the Oyster Bay tribe,⁷ and middens have been recorded along the foreshore near Otago Lagoon.

Under the Tasmanian *Aboriginal Relics Act 1975* (the Aboriginal Relics Act), it is an offence to 'destroy, damage, disfigure, conceal, uncover, expose, excavate or otherwise interfere with a relic' unless a permit has been granted. It is therefore important to ensure that no artefacts or other cultural material are exposed or disturbed without a permit during Reserve management activities. In the event that an Aboriginal artefact is inadvertently uncovered, an Unanticipated Discovery Plan should be implemented immediately (refer Appendix 2) and the items reported to Aboriginal Heritage Tasmania for advice.

4.3.2 Historic heritage

The Otago Bay Coastal Reserve overlooks the wreck of the *Otago*, a three-masted iron barque after which Otago Bay was named. The ship was originally a sea vessel, renowned as being the only command of Polish novelist Joseph Conrad, who used many of his experiences on board as material for his literary work.⁸ The *Otago* was brought to Hobart in 1905 to be used as a coal hulk before being beached in its present location in the early 1930s for dismantling.⁹ A second shipwreck from a steel river steamer, the *Westralian*, can also be seen close to the *Otago* at low tide (refer Figure 8).

4.4 Recreational values

The Otago Lagoon Reserve is utilised year round by a small number of locals and

⁶ Department of Primary Industries, Parks, Water and Environment (2015). *Natural values report*. Unpublished report for Tasflora.

⁷ Alexander, A. (2003). *The eastern shore: a history of Clarence*. Clarence City Council, Rosny Park.

⁸ The Sydney Morning Herald, Saturday 27 August 1949, page 6.

⁹ Further information on the history of the *Otago* is available at:

<http://www.parks.tas.gov.au/index.aspX?base=1793>



Figure 8: Wrecks of the *Otago* and *Westralian* off the Otago Bay Coastal Reserve.

visitors for dog exercise, fishing and contemplation of the natural environment and views. Otago Bay Coastal Reserve is popular for fishing and pedestrians often walk along the Otago Bay Road verge to gain access to the grassy point at the eastern end of this Reserve. Community feedback indicates that the Direction Bushland Reserve is not currently valued for any recreational uses.

4.5 Landscape setting and connectivity

The Reserves form part of the visual landscape connection of bushland areas from the foreshore to ridges in the Clarence municipality. The Otago Lagoon Reserve and Otago Bay Coastal Reserve contribute to the scenic fringe along the Derwent River's estuarine coastline on Hobart's eastern shore, linking with remnant native vegetation on private land, the Meehan Range and with the East Risdon Nature Reserve and Bedlam Walls area to the south to create an extensive strip of remnant vegetation lining the Derwent when viewed from the western shore. Maintaining and enhancing these landscape settings is important for ongoing visual amenity in the area.

Connectivity between areas of bushland provides an important ecological link for flora and fauna to enable gene flow between populations and to allow animals to move across the landscape for foraging, nesting and breeding. The Otago Bay Coastal Reserve and Otago Lagoon Reserve are indirectly linked to each other via vegetated private land along the coastline, and to the Woodville Reserve to the north via Crown Reserves. Direction Bushland Reserve is directly connected to

the Meehan Range via vegetated private land (refer Figure 9), providing an important wildlife corridor. There are also indirect linkages between the three Reserves and the East Risdon Nature Reserve to the south. These indirect corridors are most likely to be of benefit to plant seed dispersal and birds and invertebrates that can aerially traverse residential lots, roads, large open areas and water.



Figure 9: Connectivity between the Otago Lagoon Reserve, Otago Bay Coastal Reserve, Direction Bushland Reserve and other bushland areas (base map sourced from the LIST).

Connectivity from a user perspective could be improved. Pedestrian access between the Otago Lagoon Reserve and the Otago Bay Coastal Reserve is only possible via Otago Bay Road, as foreshore access is currently not feasible due to private land ownership to high water mark. Locals also report that walking between Conrad Drive and the junction of East Derwent Highway is difficult as there is currently no formal walkway and coastal erosion has narrowed the road verge. The Direction Bushland Reserve is currently isolated from other public areas by private property and the East Derwent Highway.

Landscape setting and connectivity are important for the long term viability of Clarence's bushland areas as well as ongoing visual amenity and recreational opportunities within the municipality. It is important that these linkages be preserved and strengthened through strategic land use planning.

5 STAKEHOLDER CONSULTATION

A public meeting and community 'walk and talk' session was facilitated by Council

and Tasflora on 30 August 2015 and attended by 28 local residents. The purpose of the session was to seek input from on the values and management issues associated with the Reserves. A feedback form seeking input to the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* was also mailed to local residents and relevant stakeholders.

The draft *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* was released for community consultation in February - March 2016. An Otago Lagoon and Coastal Reserves Activity Plan Report Card was developed as a key tool in encouraging stakeholder feedback on the draft plan and was mailed out to residents and other interested stakeholders. Eight submissions on the draft plan were received during the consultation period. A summary of the issues raised in these submissions is provided at Appendix 3.

Where possible, all relevant community feedback has been considered in the development of the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020*. However some issues identified during the consultation process are beyond the scope of this plan or pertain to management issues outside the Reserve. These issues have been noted by Council and will be addressed through other processes where feasible.

6 WEED MANAGEMENT

6.1 Weed species present

A list of environmental weed species occurring in each Reserve, including their status and recommended control methods, is provided at Appendix 4. To assist with identification, a picture of each weed species is also provided. The current distribution of declared and other environmental weed species in the Direction Bushland Reserve and Otago Bay Coastal Reserve is illustrated in Appendix 5. Primary weed control was completed in the Otago Lagoon in late 2015 prior to weed mapping being undertaken.

The majority of weeds occur at the western end of the Otago Bay Coastal Reserve, which has not been the focus of targeted weed control activities in recent years and has a dense infestation of various declared and environmental weeds. Weed control activities within the Otago Lagoon Reserve have been undertaken by bush regeneration contractors and Council at various times over the last 20 years, including the removal of a dense large infestation of cumbungi from the lagoon. Primary weed control activities in this Reserve were most recently undertaken in late 2015, meaning that maintenance activities are now the priority for this Reserve. The Direction Bushland Reserve is also largely weed free.

Several weed species found in the Reserves are classified as declared weeds under the Tasmanian *Weed Management Act 1999* (the Weed Management Act) and/or Weeds of National Significance (WONS). Where possible, these weeds should be targeted as a priority to prevent their further spread.

6.2 Recommendations for primary weed control work

Due to the limited penetration of weeds, and its important role as a wildlife corridor,

priority should be given to controlling declared and environmental weeds within the Direction Bushland Reserve. Given the small size and ease of access to this Reserve, combined with the relatively small quantity of weeds present, consideration should be given to engaging a contractor to undertake a sweep of the Reserve to remove all weeds encountered. Follow-up maintenance over the following years could then be undertaken by volunteers and/or contractors.

Recommendation 1: Undertake a sweep of the Direction Bushland Reserve to remove all declared and environmental weeds.

Primary weed control in the Otago Bay Coastal Reserve should initially focus on targeting declared and environmental weeds growing at 19 Otago Bay Road, due to their lesser penetration and the presence of existing native vegetation in good condition. Work should then extend to the Council-managed land between 19 Otago Bay Road and Otago Bay Road, working in an easterly direction.

Recommendation 2: Control all declared and environmental weeds at 19 Otago Bay Road prior to undertaking weed control in the remainder of the Otago Bay Coastal Reserve.

Recommendation 3: Weed control in the remainder of the Otago Bay Coastal Reserve should be undertaken in an easterly direction, working from 19 Otago Bay Road towards Otago Bay Road.

6.3 Non-priority weeds

Broadleaf weeds and exotic grasses are common through the Reserves and are not considered a priority for control except in revegetation areas and where their removal is desirable as part of an ongoing general Reserve maintenance program (eg along track edges) or fuel reduction purposes.

Recommendation 4: Undertake control of exotic grasses and broadleaf weeds only in revegetation areas and where necessary as part of a general Reserve maintenance program.

6.4 Maintenance of weed control work

Regeneration of weeds in the Reserves is likely to continue for many years due to the existing seed bank in the soil and the fact that some weed species have an inherent ability to resprout following primary control (eg boxthorn). Weed control activities will not be successful unless a commitment is made to undertaking ongoing follow-up maintenance activities.

Maintenance of primary weed control work should be undertaken annually, preferably in spring and summer when plants are least likely to be dormant. This can be achieved by performing an annual sweep to remove all new germinants of previously targeted weeds and undertake follow-up control on any plants that may have resprouted. Ongoing annual follow-up will be required until the soil seed bank is exhausted.

Recommendation 5: Undertake an annual sweep and follow-up control of all previously targeted weeds.

GPS weed mapping of environmental weeds occurring within the Reserves has been undertaken during the development of this plan. In order to monitor the success of the weed control program, follow-up GPS weed mapping should be undertaken after five years to assess progress and facilitate planning of future weed control activities. As well, GPS mapping by contractors and volunteers as they control weeds should be encouraged, with data to be provided to Council to enable its database to be updated.

Recommendation 6: Undertake follow-up GPS mapping of all weeds in the Reserve after five years to monitor progress and inform future weed control priorities.

7 REGENERATION AND REVEGETATION

7.1 Regeneration

Natural regeneration should be encouraged within the Reserves as the most cost effective and natural means of restoring their original vegetation in areas where disturbance has occurred. Apart from weed control, management activities in areas of intact native vegetation should be limited to encourage the natural regeneration process.

7.2 Revegetation activities

The primary purpose of undertaking new revegetation activities is to preserve and enhance existing areas of remnant native vegetation, provide habitat for native birds and animals, and improve the visual amenity for users of the Reserves.

Large scale revegetation activities are not considered necessary in the Otago Lagoon Reserve or the Direction Bushland Reserve due to their relatively undisturbed nature. Within the Otago Bay Coastal Reserve, revegetation may be required following removal of large tracts of weeds from the parcel of land between 19 Otago Bay Road and the road. Enhanced native landscaping is also recommended in the existing garden beds at the grassy point at the eastern end of this Reserve to improve the visual amenity of this area.

A summary of recommended revegetation and landscaping activities is provided in Table 1.

Recommendation 7: Undertake targeted revegetation and landscaping within the Otago Bay Coastal Reserve to improve visual amenity and regenerate bare areas following weed control activities.

Where possible, plants should be grown from the seed or cuttings of plants local to the area to ensure local variants of plants are planted. Revegetation and landscaping activities will not be successful unless a commitment is made to undertake follow-up maintenance activities. In particular, it is important to ensure that sufficient resources are available for ongoing maintenance (eg weeding,

Table 1: Recommended revegetation activities to be undertaken within the Reserves.

Activity	Purpose	Recommended locations	Priority
Revegetation following weed control	May be required if large bare patches are created or bank stabilisation is necessary following primary weed control	To be assessed following primary weed control activities at the western end of the Otago Bay Coastal Reserve. Only to be undertaken if natural regeneration is considered unlikely to occur or if bank stabilisation is required.	Immediately following weed control activities
Landscaping	Improve visual amenity	Existing garden beds at the grassy point in Otago Bay Coastal Reserve	As resources become available

watering) before establishing new sites.

Recommendation 8: New revegetation and landscaping activities should not be committed to unless sufficient resources are available to undertake ongoing regular maintenance of newly planted areas.

8 FAUNA HABITAT MANAGEMENT

As described in Section 4.2, the Reserves plays an important role in providing habitat for a range of wildlife, including mammals, birds, reptiles, amphibians and invertebrates. A variety of canopy layers, dead trees, hollow logs, fallen timber and leaf litter are required to provide important habitat for wildlife, including mammals, birds, reptiles and invertebrates. Leaf litter and dead wood are often viewed as a fire risk in bushland reserves located in urban areas. However, it is important that fauna habitat requirements are considered when planning any future bushfire management activities in the Reserves.

Uncontrolled domestic dogs and cats have the potential to harass or kill native wildlife. The Reserve is currently used for off-lead dog exercise (with dogs to remain under effective control) under Council's Dog Management Policy.¹⁰ Council promotes responsible cat ownership, and will continue to encourage local residents to meet their obligations under the *Cat Management Act 2009* through having their cats microchipped, desexed and under effective control (eg indoors at night).

Speeding vehicles pose a threat to native animals crossing roads or browsing on roadside native vegetation, both along Otago Bay Road and along the nearby East Derwent Highway. Erection of wildlife warning signs along Otago Bay Road on the same pole as speed limit signs may raise awareness and encourage drivers to keep below the speed limit both along this road and when continuing on along the East Derwent Highway. Consultation with locals about road kill "hotspots" will be useful in determining the most appropriate locations for wildlife warning signs.

¹⁰ Clarence City Council (2015). Dog Management Policy. Clarence City Council, Tasmania.

Recommendation 9: In consultation with the community, identify locations along Otago Bay Road where wildlife warning signs should be erected.

9 VEGETATION AND FAUNA MONITORING

An assessment of the condition of the native vegetation within the Reserves has not been previously undertaken. Native vegetation condition monitoring is needed to determine the current condition of the vegetation in the Reserves and to assess trends in vegetation composition and condition over time. Information from regular vegetation condition assessments (VCAs) will enable an evaluation of the impact and effectiveness of management actions on the Reserves' native vegetation. The TASVEG VCA method should be undertaken by trained Council staff or consultants using standard TASVEG VCA forms.¹¹ Photo points should also be established within each VCA zone to provide further information on wetland condition, vegetation condition and annual regeneration growth.

Recommendation 10: Undertake Vegetation Condition Assessments (VCAs) in each Reserve in 2016 and 2020.

Recommendation 11: Establish photo points within each VCA zone to facilitate monitoring of vegetation condition.

The Reserves each contain unique habitat for a range of wildlife species, and it is expected that species diversity could increase over time with ongoing appropriate vegetation management practices. Fauna surveys (including mammal, bird, reptile and invertebrate surveys, as well as an aquatic fauna survey of Otago Lagoon) and habitat assessments to confirm the species present in the Reserves are recommended to be undertaken now and at the end of the plan (ie 2016 and 2020) as a basis for monitoring species diversity over time.¹²

Recommendation 12: Undertake fauna surveys in 2016 and 2020 to assess species diversity and further inform on ground management activities.

An analysis of all completed VCAs, fauna surveys and photo points should be undertaken in 2020 to determine trends and implications for ongoing vegetation management in the Reserves. This should be undertaken in conjunction with a review of the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* scheduled for 2020 (refer Section 17).

Recommendation 13: Undertake an analysis of all photo points, VCAs and fauna surveys in 2020 to determine trends and inform future management activities.

¹¹ Full details of the TASVEG VCA method can be found at: [http://dpiw.tas.gov.au/conservation/flora-of-tasmania/monitoring-and-mapping-tasmanias-vegetation-\(tasveg\)/vegetation-monitoring-in-tasmania](http://dpiw.tas.gov.au/conservation/flora-of-tasmania/monitoring-and-mapping-tasmanias-vegetation-(tasveg)/vegetation-monitoring-in-tasmania)

¹² If possible, bird surveys should be undertaken in conjunction with BirdLife Tasmania using standard BirdLife Australia monitoring techniques. A local zoologist has indicated an interest in surveying bat numbers, which should also be conducted if possible.

10 RESERVE ENTRANCES

The main entrances to each of the Reserves are illustrated in Figure 10. Key management issues identified for these entrances are summarised in Table 2. A new, low key entrance to the western end of the Otago Bay Coastal Reserve is proposed in conjunction with a new walking track to the waterfront in this area (refer Section 11). No enhancements to the Direction Bushland Reserve entrances are recommended over the next five years due to its currently limited use as a public recreation area; rather this area will be retained as a wildlife corridor.



Figure 10: Main entrances to the three Reserves including one proposed new entrance (OB2) (base map sourced from the LIST).

Recommendation 14: *Improve Reserve entrances by installing additional signage, improving accessibility and undertaking landscaping activities as recommended in Table 2.*

11 TRACKS AND TRAILS

Key management identified with the Reserves' tracks and trails networks are summarised in Table 3. No track management activities are proposed within the Direction Bushland Reserve.

Recommendation 15: *Improve the Reserves' track networks by improving the condition of existing tracks and constructing new tracks to facilitate foreshore access.*

Table 2: Recommended management activities to be undertaken at Reserve entrances.

Issue	Description	Recommendation
Signage	There is no clear sign identifying the Reserve name at main Reserve entrances	Standard Reserve name signs to be installed at OL1, OB1 and OB2
	Information about dog and other restrictions at the Otago Lagoon are above head height and not easily seen by visitors unfamiliar with the Reserve	Existing signage should be moved to eye height at OL1 to clearly inform users of restrictions on certain activities in the Reserve
Access	Exiting Otago Lagoon Reserve is dangerous due to speeding cars and overhanging trees	Prune overhanging trees around OL1 to improve sight lines
	Cars parking along road when visiting Otago Lagoon Reserve create a hazard	Erect 'No parking' signs along Otago Bay Road adjacent to Otago Lagoon Reserve, as well as a small directional sign pointing to parking off Lagoon Road
	Steep slope and gated entrance into Otago Lagoon Reserve makes access difficult for prams and the elderly	Install a handrail alongside the existing bitumen entrance track at OL1 Create a pedestrian side path adjacent to the existing boom gate to enable access by prams, as per concept landscape plan detailed in Appendix 6
Landscaping	Some entrances would benefit from landscaping activities and enhanced maintenance activities	Undertake native planting within existing garden beds at OB1 Enhance existing Council maintenance program to ensure regular weeding and slashing is undertaken at OB1 and around Otago Lagoon (particularly in spring and summer)

Table 3: Track management issues identified within the Otago Lagoon Reserve and Otago Bay Coastal Reserve.

Issue	Description	Recommendation
Track condition	The track around Otago Lagoon is overgrown and inaccessible	Sensitively clear the existing track and resurface with gravel
Foreshore access	Foreshore access at the western end of Otago Bay Coastal Reserve is difficult at high tide	Construct a gravel walking track following the existing cleared zone adjacent to 21 Otago Bay Road to the foreshore Negotiate with Crown Land Services to construct a small track from the road to the foreshore near the shipwrecks once primary weed control in this area has been completed

Some concerns were raised during community consultation regarding walking access along Otago Bay Road between Conrad Drive and the grassy point in the Otago Bay Coastal Reserve, with pedestrian access restricted to an eroding narrow road verge. As a direct consequence of this feedback, Council has constructed a protective rock revetment wall and a walking path along this section of road.

Consultation during the development of this plan has indicated that there is a level of community desire for foreshore access between Otago Lagoon Reserve and Otago Bay Reserve to eliminate the need to walk along Otago Bay Road. While this section of foreshore is in private ownership to high tide mark, coastal access between the lagoon and the shipwrecks was once possible at low tide. While it is acknowledged that development of a foreshore walkway along the full length of this section may be difficult to achieve due to land ownership issues, the feasibility of developing a coastal foreshore walking track in this area should be investigated. Liaison with private land owners will be required as part of this process. The removal of dead trees overhanging high tide mark should also be considered to facilitate foreshore access at low tide.

Recommendation 16: Undertake a feasibility study into developing a coastal track between Otago Lagoon Reserve and Otago Bay Reserve.

Similarly, there is the potential to create a coastal walking trail north from Otago Lagoon Reserve to Woodville Bay. This section of coastline consists of Crown Reserves intercepted by privately owned properties to high tide mark. Consultation with these landowners would be required to develop the missing linkages along the coastline in this area.

Recommendation 17: Undertake a feasibility study into developing a coastal walking track link between Otago Lagoon Reserve and Woodville Bay.

12 INFRASTRUCTURE

There is currently limited community infrastructure located within the Reserves, and the natural environment would be enhanced through minimising significant additional infrastructure installation.

Community consultation has indicated a general desire to limit infrastructure within the Otago Lagoon Reserve to enhance its natural environment and discourage increased use from day use visitors. However, as this area is used for dog exercise, it is recommended that a dog waste bin and bag dispensers be installed at the entrance to this Reserve, which will also fulfil a dual role of providing a rubbish bin for day visitors. A dog waste bag dispenser and bin is also recommended at the bus stop adjacent to the shipwrecks to deter littering in this area.

Recommendation 18: Install a dog waste bag dispenser and bin at the entrance to Otago Lagoon Reserve and at the bus stop near the shipwrecks.

Due to the scenic location of the Otago Lagoon Reserve and Otago Bay Coastal Reserve, it is recommended that new outdoor seats be installed at strategic

positions to encourage contemplation of the coastal environment. Depending on the level of funding available, the following initial locations are suggested:

- near the foreshore at the western end of Otago Lagoon Reserve; and
- at the grassy point at the eastern end of Otago Bay Coastal Reserve.

Vandal-proof bench seats should be coloured to blend in with the environment (ie seat painted green) and set into a concrete foundation with a compacted gravel surface extending in front of the seat. Alternatively, seats could be constructed from natural stone to deter vandalism.

Recommendation 19: Install new outdoor seats at two locations in the Reserves.

Community consultation indicated that a number of local residents use the area near the shipwrecks for launching kayaks. The opportunity exists to promote this area as a preferred kayak launching site, similar to the setup at Little Howrah Beach, with a fresh water tap, kayak stand and a dedicated path to the water. Interpretation signage could be installed in this area promoting the Clarence Coastal Kayak Trail, including preferred launching sites and wash down areas. The final location of the launch site will depend on water availability and proximity to parking.

Recommendation 20: Promote a preferred kayak launch site near the shipwrecks.

Any additional installation of new infrastructure within the Reserves will be subject to limited funding. With this in mind, no additional infrastructure beyond that discussed above is proposed within the next five years unless significant funding becomes available. If this does occur, it is recommended that consideration be given to installing some play equipment at the grassy point at the eastern end of Otago Bay Coastal Reserve as there are no playgrounds in the immediate Otago Bay area.

Recommendation 21: Install play equipment at the grassy point at the eastern end of Otago Bay Coastal Reserve if significant infrastructure funding becomes available.

A further review of the infrastructure requirements of the Reserves should be undertaken in 2020.

Recommendation 22: Undertake a review of the infrastructure requirements of the Reserve in 2020.

While outside the Reserves, community consultation indicated a desire to develop the State Government owned public open space to the north and south of the Bowen Bridge to increase their recreational value. Suggestions included landscaping, installation of infrastructure (eg play equipment, barbeques), development of fishing opportunities and enhancement of pedestrian access from Otago Bay. Council is supportive of a community based submission (eg via Otago Bay Coastcare Group) being provided to Crown Land Services requesting

consideration of a consultative strategic landscape plan for the long term enhancement of these areas of public open space.

13 BUSHFIRE MANAGEMENT

The Reserves are located in a bushfire prone area, as defined by the Clarence Interim Planning Scheme 2015. Consultation with Council's Fire and Bushland Management team has indicated that a formalised Bushfire Management Plan is not deemed necessary for the Reserves (Rob Whittle, Clarence City Council, pers. comm. 2016). The three Reserves are all currently included in Council's five year Fire and Bushland Management Operational Works Program that includes planned burning, manual fuel reduction and fire break construction as required.

Recommendation 23: Ensure the three Reserves are included in Council's five year Fire and Bushland Management Operational Works Program.

14 COASTAL EROSION AND INUNDATION

Prior to undertaking any on ground work within the foreshore sections of the Otago Lagoon Reserve and Otago Bay Coastal Reserve, the *Tasmanian Coastal Works Manual: A best practice management guide for changing coastlines* should be consulted to ensure best practice coastal management techniques are implemented.¹³

Recommendation 24: The Tasmanian Coastal Works Manual should be consulted prior to undertaking any on ground activities.

Some concerns were raised during community consultation regarding erosion along Otago Bay Road between Conrad Drive and the grassy point in the Otago Bay Coastal Reserve. As discussed in Section 11, Council has constructed a protective rock revetment wall and a walking path along this section of road as a consequence of the feedback from the consultation. Given that the Otago Bay foreshore is subject to wave impacts from wind and ferries, a foreshore erosion monitoring program is recommended to determine locations of significant erosion and provide an estimate of the rate at which recession is occurring.

Recommendation 25: Develop a foreshore erosion monitoring program.

15 COMMUNITY PARTICIPATION AND AWARENESS

Community participation and awareness has an important role to play in protecting the natural, cultural and recreational values of the Reserves. Education of locals, visitors and some residents living adjacent to the Reserves is desirable to foster behavioural change and encourage community ownership and appreciation of the Reserves' values. Key management issues identified as requiring community awareness and enforcement are summarised in Table 4.

¹³ Page, L. and Thorp, V. (2010). *Tasmanian Coastal Works Manual: A best practice management guide for changing coastlines*. Department of Primary Industries, Parks, Water and Environment, Tasmania.

Table 4: Management issues requiring community education and awareness within the Reserves.

Issue	Description
Garden waste dumping	Dumping of garden waste in the Reserves encourages the spread of weeds and is visually unattractive for all users.
Removal of native vegetation	Removal of native vegetation in the Reserves (eg to improve views, reduce bushfire risk, collect fire wood) is illegal. It encourages the establishment of weeds and reduces species diversity and animal habitat. Seed collection should only be undertaken with Council approval.
Environmental weeds	Weeds in adjacent gardens pose a threat to existing native vegetation within the Reserves.
Wildlife	Trapping and relocation of native wildlife and catching frogs for bait in Otago Lagoon is not permitted.
Cats and dogs	Cats and dogs can kill native wildlife. Dogs must be kept under effective control in the Reserves. Cats should be microchipped, desexed and kept indoors at night.
Litter	Reserve users should take all rubbish with them.

Recommendation 26: Consider, and fund as necessary, community education to facilitate behavioural change and encourage ownership and appreciation of the values of the Reserve.

Interpretation signs provide an important opportunity to display information on the Reserve's natural values and the impact certain activities can have on these. Community consultation indicated a level of support for a small interpretation sign to be erected at Otago Lagoon with information on the significance of this wetland, as well as the Aboriginal and European heritage of the Reserve.

Recommendation 27: Install a small interpretation sign at Otago Lagoon.

While there is a history of community commitment for caring for the Otago Lagoon Reserve through the former Otago Bay Landcare Group, this group had not been active for several years. However, following the community consultation process, several community members have indicated an interest in participating in a community based group to help Council care for the area, resulting in the formation of a new Otago Bay Landcare Group. Ongoing support to facilitate the development of this new group is recommended to ensure its successful establishment and ongoing activities.

Recommendation 28: Support the ongoing activities of the Otago Bay Coastcare Group through on ground, technical, administrative and grant application assistance.

Littering along Otago Bay Road and in Otago Lagoon Reserve was identified as an ongoing issue during the community consultation process. While the dog waste bin proposed at the entrance to Otago Lagoon Reserve (refer Section 12) will help reduce littering in this area, littering from cars travelling along the road itself will be

difficult to prevent. Involving the community in clean ups in the Reserves will have the dual effect of cleaning up with minimal costs, boosting community ownership of the Reserves and increasing the chance of long-term behaviour change by removing existing rubbish that may make visitors more likely to drop their own litter. While Council does not allow roadside clean ups due to the high risk nature of this activity, Clean Up Australia Day provides the opportunity for the local community to participate in cleaning up rubbish in the Otago Bay Reserve and Otago Lagoon Reserve, and other volunteer litter collection activities could be organised through the Otago Bay Coastcare Group.

Recommendation 29: Provide opportunities for the local community to share the responsibility for rubbish clean ups in the Reserves through participation in Clean Up Australia Day and other volunteer litter collection activities.

Under the Tasmanian *Work Health and Safety Act 2012*, volunteers are considered 'workers' when working for Council on Council owned land. Council therefore has a duty of care to provide a safe workplace for volunteer workers who may undertake management activities within the Reserves.

- **All volunteers have rights and responsibilities.** Volunteers have the right to a safe work environment, to be treated fairly and with respect, to public liability insurance, to safe equipment, tools and personal protective equipment (PPE), to adequate instruction to perform tasks, to contribute their suggestions and to receive acknowledgement for their contributions. Volunteers also have the right to refuse work if they consider it unsafe.
- **Volunteers also have the responsibility** to care for the health and safety of others, to respect others, to follow policies, procedures and instructions, and to care for their own health and safety.

With this in mind, all volunteers need to refer to the relevant Council Safe Work Method Statements (SWMSs) before undertaking works in the Reserves, including cut and paste work weed control work, brushcutting and spreading of mulch. These are available from Council's Natural Areas Volunteer Coordinator (Chris Johns, phone 6217 9715 or email cjohns@ccc.tas.gov.au). All spot spraying should be undertaken by certified operators (eg Council staff, contractors).

16 IMPLEMENTATION PLAN

A map illustrating the location of on ground management activities recommended within the Reserves is provided at Figure 11. This is based on the key recommendations contained within this plan, which are summarised in detail at Appendix 7.

Based on these recommendations, an Implementation Plan with associated performance measures has been developed and is provided at Table 5. It identifies three stages of management activities to be undertaken within the Reserves:

- Priority 1 - immediate (6-12 months) management activities.
- Priority 2 – medium term (1-3 years) management priorities.
- Priority 3 – long term (5 years) management priorities.

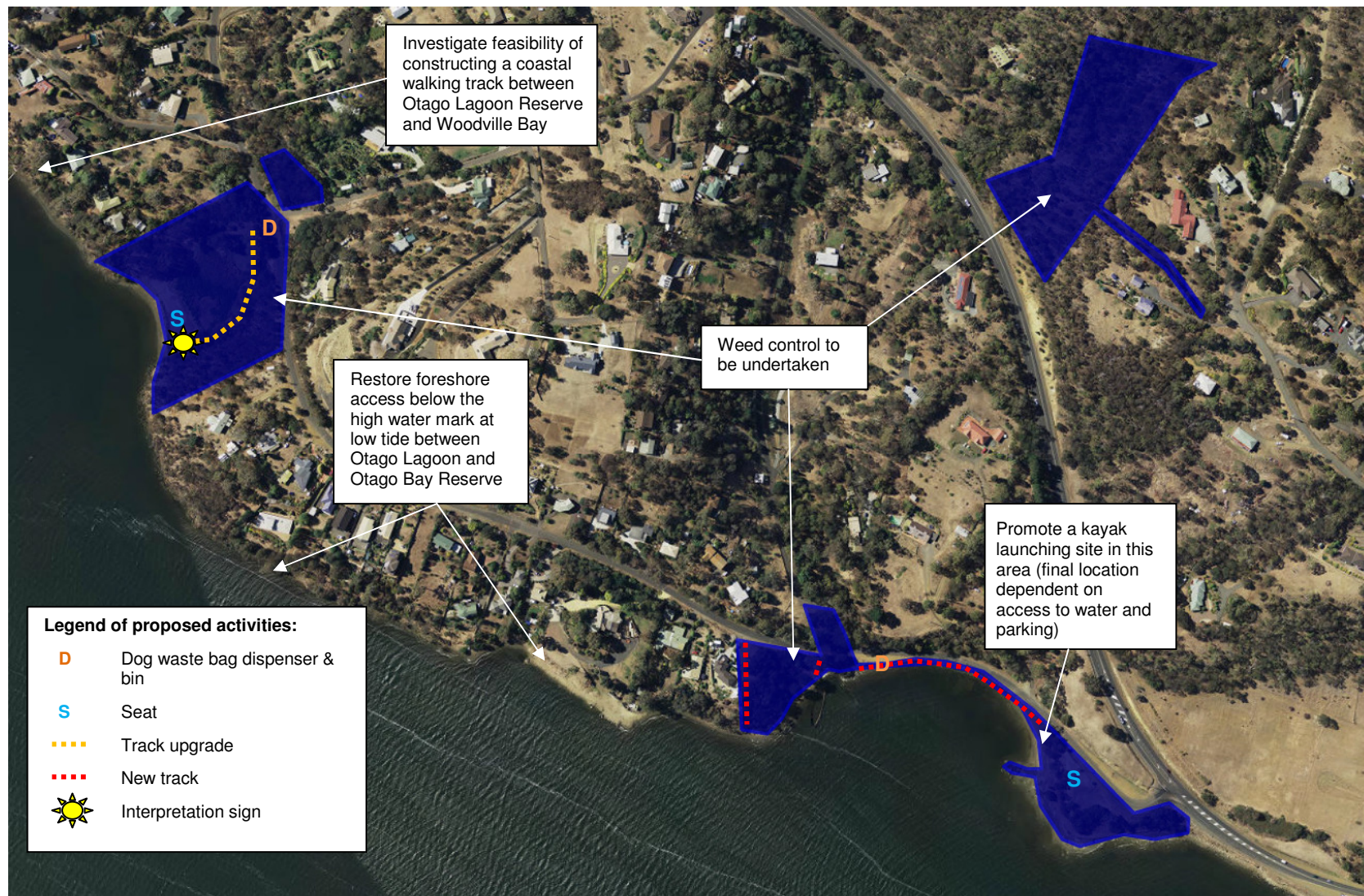


Figure 11: Overview of key proposed on ground management activities in each Reserve (aerial photo sourced from the LIST).

Table 5: Implementation Plan for undertaking recommended management activities within the Reserves.

Priority	Rec. No.	Action	Seasonal timing	Performance measure	Responsibility	Estimated funding ¹⁴
Weed control						
1	R1	Undertake a sweep of the Direction Bushland Reserve to remove all declared and environmental weeds	Spring – summer for spot spraying; all year round for other techniques	All targeted weeds are eradicated from the Reserve	Council, contractor and/or volunteer groups	\$2,000 per annum
2,3	R2	Undertake weed control at 19 Otago Bay Road, followed by the remainder of the Otago Bay Coastal Reserve	Spring – summer for spot spraying; all year round for other techniques	All declared and environmental weeds are eradicated from the Reserve	Council, contractor and/or volunteer groups	
2,3	R5	Undertake annual sweep and follow-up control of all previously targeted weeds	Ongoing on an annual basis	All targeted weeds are eradicated from the Reserves	Council, contractor and/or volunteer groups	\$1,000 per annum
3	R6	Undertake follow-up GPS mapping of all weeds	Spring - summer	Weed maps and Council database are updated within 5 years	Council, contractor and/or volunteer groups	\$600
Regeneration and revegetation						
1,2,3	R7	Undertake native planting within existing garden beds at OB1	Autumn – winter	Revegetation sites established and maintained for 5 years	Council, contractor or volunteers	\$1,000 per annum
Fauna habitat management						
2	R9	In consultation with the community, identify locations along Otago Bay Road where wildlife warning signs should be erected	N/A	Signs erected Feedback from community that less road kill is observed	Council	\$300

¹⁴ Funding estimate is based on total costs required to undertake all recommended activities over the period 2014-15 to 2018-19.

Priority	Rec. No.	Action	Seasonal timing	Performance measure	Responsibility	Estimated funding ¹⁴
Vegetation and fauna monitoring						
1,3	R10	Undertake Vegetation Condition Assessments (VCAs) in each Reserve in 2016 and 2020	In season for highly seasonal vegetation (eg annuals)	VCAs completed in 2016 and 2020	Council or contractor	\$3,000 (N/A if performed by Council staff)
1,2,3	R11	Establish photo points within each VCA zone	Spring	Photo points established and annual photos taken	Contractor	\$2,000
1,3	R12	Undertake surveys to update the fauna record of the Reserves	N/A	Terrestrial and aquatic fauna surveys and bird surveys completed 2016 & 2020	Contractor and/or BirdLife Tasmania and/or University of Tasmania	\$6,000
Reserve entrances						
1	R14	Install Reserve Entrance signs as per Table 1	N/A	Reserve Entrance signs installed as per Table 1	Council	\$500
2	R14	Create a pedestrian access path adjacent to the existing boom gate at Reserve entrance OL1 as per concept landscape plan (refer Appendix 6)	N/A	New access completed at Reserve entrance OL1	Council or contractor	\$1,500
1,2&3	R14	Regularly prune trees around OL1 to maintain sight lines along road	N/A	No complaints from users	Council	N/A
2	R14	Install a handrail alongside the existing bitumen entrance track at OL1	N/A	Handrail installed	Council	\$500
Tracks and trails						
2	R15	Sensitively clear the existing track around Otago Lagoon and resurface with gravel	N/A	Pedestrian access re-established around Otago Lagoon	Council or contractor	\$5,000

Priority	Rec. No.	Action	Seasonal timing	Performance measure	Responsibility	Estimated funding ¹⁴
3	R15	Construct a gravel walking track following the existing cleared zone adjacent to 21 Otago Bay Road to the foreshore	N/A	New track established	Council or contractor	\$5,000
3	R15	Negotiate with Crown Land Services to construct a small track from the road to the foreshore near the shipwrecks once primary weed control in this area has been completed	N/A	New track constructed	Council or contractor	\$2,000
3	R16	Undertake a feasibility study into developing a coastal track between Otago Lagoon Reserve and Otago Bay Reserve	N/A	Feasibility study completed	Council or contractor	\$10,000
3	R17	Undertake a feasibility study into developing a coastal walking track link between Otago Lagoon Reserve and Woodville Bay	N/A	Feasibility study completed	Council or contractor	
Infrastructure						
1	R18	Install a dog waste bag dispenser and bin at the entrance to Otago Lagoon Reserve and at the bus stop near the shipwrecks	N/A	Dog waste bag dispensers and bins installed	Council or contractor	\$1,000
1,2	R19	Install new outdoor seats at two locations in the Reserves	N/A	Two bench seats installed	Council or contractor	\$1,000
2	R20	Promote a preferred kayak launch site near the shipwrecks		Formal kayak launch area established	Council	\$10,000
3	R20	Install play equipment at the grassy point at the eastern end of Otago Bay Coastal Reserve if significant infrastructure funding becomes available	N/A	Playground equipment installed	Council or contractor	\$10,000

Priority	Rec. No.	Action	Seasonal timing	Performance measure	Responsibility	Estimated funding ¹⁴
3	R21	Review the infrastructure requirements of the Reserves in 2019	N/A	Infrastructure review completed in 2019	Council	N/A
1,2,3	R22	Ensure the three Reserves are included in Council's five year Fire and Bushland Management Operational Works Program	N/A	Bushfire management activities undertaken annually	Council	N/A
Coastal erosion and inundation						
3	R24	Develop a foreshore erosion monitoring program	N/A	Foreshore erosion monitoring program undertaken	Council or volunteers	N/A
Community participation and awareness						
2	R26	Install interpretation sign at Otago Lagoon	N/A	Interpretation signage installed.	Council, contractor or volunteers	\$3,000
1,2,3	R27	Support the ongoing activities of the Otago Bay Coastcare Group through on ground, technical, administrative and grant application assistance.	N/A	Otago Bay Coastcare Group remains active	Council and volunteers	N/A
1,2,3	R28	Participate in Clean Up Australia Day and other volunteer litter collection activities	N/A	No large build up of litter in Reserves	Council and volunteers	N/A
Implementation plan						
1,2&3	R29	Undertake annual review against all performance measures	N/A	Review of all performance measures completed annually	Council	N/A
3	R30	Undertake a full review of the <i>Otago Lagoon and Coastal Reserves Activity Plan 2016-2020</i>	N/A	<i>Otago Lagoon and Coastal Reserves Activity Plan 2016-2020</i> reviewed within five years	Council and/or contractor	\$10,000

The intent of the Implementation Plan is to provide a guide to outcomes that could be achieved within the Reserve by Clarence City Council, contractors and/or volunteer groups within the period 2016-2020 if sufficient resources are available.

The Implementation Plan provides an indication of the level of funding required to achieve these outcomes.¹⁵ While it would be desirable to undertake all the recommended activities, it is acknowledged that this may not be possible due to resource constraints, and implementation will ultimately be guided by what is achievable with resources as they become available. Federal, State and Local Government grants programs may provide an opportunity to obtain resources to implement many of the recommendations contained within this report.

A review of progress against all performance measures should be undertaken annually during the period 2016-2020 to help prioritise available resources.

Recommendation 30: Review progress against all performance measures identified in the Implementation Plan annually.

17 FUTURE PRIORITIES

A review of the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* should be undertaken in 2020. The purpose of this review should be to:

- assess progress towards achieving the objectives of the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020*;
- assess progress against all performance measures;
- analyse photo point data and all completed flora and fauna assessments to determine trends and implications for ongoing vegetation management; and
- determine ongoing management priorities for the Reserve for the next five years.

Recommendation 31: Review the Otago Lagoon and Coastal Reserves Activity Plan 2016-2020 in 2020 to assess progress and determine ongoing management priorities for the Reserves.

¹⁵ Funding details are based on an internal Council document which provides a detailed five year cost estimate for all planned activities. This has been developed primarily for Council budgetary processes and potential grant applications. Specific details may be sought by contacting Council's NRM Planner (Phil Watson, phone 6217 9713 or email pwatson@ccc.tas.gov.au).

APPENDIX 1: CONSERVATION SIGNIFICANCE OF THE RESERVES' NATIVE FLORA AND FAUNA

The native vegetation occurring within the Otago Lagoon Reserve, Otago Bay Coastal Reserve and Direction Bushland Reserve are summarised in Table A1.1. Of these, the freshwater aquatic sedgeland and rushland community occurring in Otago Lagoon is listed as a threatened native vegetation community under the Tasmanian *Nature Conservation Act 2005*.

Table A1.1: Conservation status of native vegetation communities occurring within the Reserves.

Community name	TASVEG code	Description	Conservation status
Freshwater aquatic sedgeland and rushland	ASF	Freshwater aquatic community dominated by <i>Phragmites australis</i> , with <i>Triglochin procera</i> also present. Found in Otago Bay Lagoon.	Vulnerable
<i>Eucalyptus viminalis</i> grassy forest and woodland	DVG	Community dominated by <i>Eucalyptus viminalis</i> (white gum), with <i>E. ovata</i> and <i>E. amygdalina</i> also present, and with a grassy, rocky understorey. Typical subspecies include <i>Acacia dealbata</i> (silver wattle), <i>Acacia mearnsii</i> (black wattle), <i>Bursaria spinosa</i> (prickly box) and <i>Dodonaea viscosa</i> (native hop). Occurs in Direction Bushland Reserve and around Otago Bay Lagoon.	Not threatened
<i>Allocasuarina verticillata</i> forest	NAV	Vegetation dominated by <i>Allocasuarina verticillata</i> (sheoak) trees. Occurs at the western end of the Otago Bay Reserve and at the eastern end of Otago Lagoon Reserve.	Not threatened

Otago Bay Lagoon is recognised a key site for the threatened flora species *Bolboschoenus caldwellii* (club searush) (DPIPWE 2003), and two other flora species listed as rare under the Tasmanian *Threatened Species Protection Act 1995* (the TSP Act) have been previously recorded in the Direction Bushland Reserve and Otago Bay Coastal Reserve. These are summarised in Table A1.2.

The Reserve also contains potential habitat for several threatened fauna species listed under the TSP and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act), including several endangered species. These are summarised in Table A1.3.

Table A1.2: Flora species of conservation significance recorded within the Reserves.

Flora species	Common name	Conservation status ¹⁶	Habitat / Comments
<i>Bolboschoenus caldwellii</i>	sea clubrush	Rare	Occurs in Otago Bay Lagoon
<i>Ranunculus sessiliflorus</i> var. <i>sessiliflorus</i>	rockplate buttercup	Rare (in the process of being delisted) ¹⁷	Recorded in Direction Bushland Reserve in 2011
<i>Vittadinia muelleri</i>	narrowleaf New Holland daisy	Rare	Currently growing at 19 Otago Bay Road. Recorded in Direction Bushland Reserve in 2011.

Table A1.3: Fauna species of conservation significance for which suitable habitat exists within the Reserves.

Fauna species	Common name	Conservation status ⁹	Habitat / Comments
<i>Lathamus discolor</i>	swift parrot	Endangered ENDANGERED	Nesting habitat is hollows in mature eucalypts with stem diameter >70cm at breast height. Forages in mature <i>Eucalyptus globulus</i> and <i>E. ovata</i> trees. Potential nesting and foraging habitat exists within the Otago Lagoon Reserve and Direction Bushland Reserve.
<i>Pardalotus quadrangintus</i>	forty-spotted pardalote	Endangered ENDANGERED	Forages in grassy <i>Eucalyptus viminalis</i> forest. Potential foraging habitat within the Direction Bushland Reserve.
<i>Tyto novaehollandiae</i> subsp. <i>castanops</i>	masked owl (Tasmanian)	Endangered VUNLERABLE	Inhabits dry eucalypt forest and woodland with old growth eucalypts containing hollows. Potential nesting habitat exists within the Otago Lagoon Reserve and Direction Bushland Reserve.

¹⁶ Lower case = TSP Act; UPPER CASE = EPBC Act¹⁷ Wendy Potts, DIPWE, pers. comm. January 2016.

Fauna species	Common name	Conservation status⁹	Habitat / Comments
<i>Perameles gunnii</i>	eastern barred bandicoot	VULNERABLE	Inhabits grassy woodlands, native grasslands and mosaics of pasture and shrubby ground cover. Potential nesting and foraging habitat exists within each of the three Reserves.

APPENDIX 2: UNANTICIPATED DISCOVERY PLAN

Unanticipated Discovery Plan

For proponents and consultants dealing with Aboriginal Heritage in Tasmania

This paper provides a Plan that should be followed when dealing with unanticipated discoveries of Aboriginal Cultural Heritage such as sites and objects. The plan provides guidance to project personnel so that they may meet their obligations with respect to Aboriginal heritage in accordance with the *Aboriginal Relics Act 1975* and the *Coroners Act 1995*.

The Unanticipated Discovery Plan is in two sections. The first section primarily explains mitigation strategies that should be employed when any Aboriginal Cultural Heritage sites or items are discovered excluding skeletal remains (burials), while the second process deals specifically with skeletal remains (burials).

Discovery of Cultural Heritage Items

- Step 1: Any person who believes they have uncovered Aboriginal Cultural Heritage material should notify all employees or contractors that are working in the immediate area that all earth disturbance works must cease immediately.
- Step 2: A temporary 'no-go' or buffer zone of at least 10m x 10m should be implemented to protect the suspected Aboriginal Cultural Heritage site or relics. No unauthorised entry or works will be allowed within this 'no-go' zone until the suspected Aboriginal Cultural Heritage relics have been assessed by a recognised Aboriginal Heritage Officer or Archaeologist.
- Step 3: Aboriginal Heritage Tasmania (AHT) in Hobart (ph 6233 6613) needs to be notified and consulted as soon as possible and informed of the discovery. AHT will then provide further advice in accordance with the *Aboriginal Relics Act 1975*.

Discovery of Skeletal Material

- Step 1: Call the Police immediately. Under no circumstances should the suspected skeletal remains be touched or disturbed. The area must now be considered a crime scene. It is a criminal offence to interfere with a crime scene.
- Step 2: Any person who believes they have uncovered skeletal material should notify all employees or contractors that are working in the immediate area that all earth disturbance works must cease immediately.
- Step 3: A temporary 'no-go' or buffer zone of at least 50m x 50m should be implemented to protect the suspected skeletal remains. No unauthorised entry or works will be allowed within this 'no-go' zone until the suspected skeletal remains have been assessed by the Police and or Coroner.
- Step 4: Should the skeletal remains be determined to be of Aboriginal origin, the Coroner will contact the Tasmanian Aboriginal Land and Sea Council (TALSC) to arrange for repatriation of the remains, as per the *Coroners Act 1995*.

Unanticipated Discovery Plan

**Guide to the most common sites of Aboriginal Significance****Stone Artefact Scatters**

Stone artefacts are the tangible evidence found in regard to past Aboriginal lifeways. Stone artefacts indicate areas that were used by Aboriginal People, either for camping, hunting or other activities such as the manufacture of stone tools. Archaeologists can also determine the duration a site may have been occupied, the amount of times that the site may have been occupied, and the number of people that the area may have supported at any given time.

Some stone artefacts are the result of Aboriginal People fracturing or 'flaking' fine-grained rocks to produce sharp cutting or scraping implements. These were then used, for example, for cutting up animals and then scraping the hides. Volcanic rocks such as basalt were flaked and then ground down to form axes for a number of chopping and cutting tasks. The results of such activities can be seen in the archaeological record (i.e. scatters) in the form of modified stones such as cores, retouched flakes, hammerstones and flaked pieces. From these scatters, by understanding site density and frequency patterns, inferences can be made in relation to past Aboriginal lifeways.

Shell Middens

Shell middens by definition are prehistoric refuse pits. They are the leftover waste of resources exploited which formed the basis of Aboriginal diet. Midden sites can range in size from large mounds to small scatters of shell. Middens usually also contain as well as shell, the remains of animals exploited for food as well as artefacts of stone, bone and shell. These sites are usually found near waterways and coastal areas.

Rockshelters

Rockshelters can either be shelters which contain archaeological deposits from living floors or art rock shelters, and may occur in any area of rocky terrain. Sediments on the floor of the rockshelter can contain preserved stratified deposits of archaeological material. Art types found in rockshelters can vary greatly. It can be in the form of painting, stencils of body parts, tools and equipment, or engravings. Style variations in painting can cover animal or human figurines, supernatural beings, and geometric patterns. Engravings can have similar variations as they can depict tools, humans, human parts, animals and birds and their tracks, geometric patterns and supernatural beings. Pecking is also a form of engraving.

Quarries or Stone Procurement Sites

Quarry sites occur where outliers of suitable tool-making stone appear. A quarry can be generally recognised by evidence of human manipulation and extraction of suitable material and the debris left by the processing of the suitable material. Some quarries can cover vast areas with extremely high amounts of lithic discard. Ochre or pigment was also quarried.

Burials

Burials can occur anywhere, though they are generally found close to areas where there was a high population concentration. Burials can occur where there are soft sediments such as sand hills, they can be found in caves and rockshelters and sometimes they can be associated with hollow trees.

APPENDIX 3: SUMMARY OF STAKEHOLDER CONSULTATION

During August – September 2015, identified stakeholders were invited to provide comments relevant to the development of the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020*.

A public meeting and community ‘walk and talk’ session was facilitated by Council and Tasflora on 30 August 2015 and attended by 28 local residents. The purpose of the session was to seek input from on the values and management issues associated with the Reserves.

Key issues raised during the walk and talk included:

- Otago Bay Lagoon Reserve:
 - General agreement that the natural look and feel of Otago Lagoon Reserve should be retained and it should be retained for the local community rather than being opened up or advertised as a day use area for visitors.
 - Minor enhancements to enhance the enjoyment of Otago Lagoon Reserve could include: improving access for people with prams and the elderly; sensitively reopening the overgrown track around the lagoon; removing weeds and dead trees; consider installing an interpretation sign about the lagoon and aboriginal heritage; installing seating to fit the setting; and installing a dog waste bin (but no major structures or buildings).
 - Rubbish is a major issue and local residents regularly remove it.
 - Need to assess the health of the waterways draining in to the lagoon – perhaps a community water quality monitoring system.
 - General desire not to promote the area as a recreational fishing site as fishermen visiting the lagoon area have been leaving rubbish, trapping frogs for bait, camping and lighting fires.
 - Foreshore access between the lagoon and the shipwreck is desirable, with one landowner expressing willingness for people to traverse their land near the foreshore.
- Otago Bay Reserve:
 - Park bench needed in the grassy area.
 - Difficult to access 19 Otago Bay Road – desire to gain easier access to the water for fishing etc.
 - Weed control at 19 Otago Bay Road.
 - Rubbish is a major issue – should there be a rubbish bin in this area or will it attract more rubbish?
 - Otago Bay Road is eroding away, with limited width for pedestrians.

A feedback form seeking input to the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* was also mailed to local residents and stakeholders.

Written responses were received from five stakeholders, and are summarised in Table A3.1.

Table A3.1: Summary of written responses received during initial stakeholder consultation on the *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020*.

Management issue	Response
Natural values	
Otago Lagoon should not be developed in any way due to its natural values	There is no proposal to undertake significant development within the Reserve
Please look after the ducks	Management activities will aim to protect native fauna habitat
Recreation values	
19 Otago Bay Road would be improved if old bush was cleared away and a pathway put in for fishermen (and families) to walk easily to the foreshore	Two new walking tracks are proposed to facilitate foreshore access in this area (refer Section 11)
Regeneration and revegetation	
Need some replanting at grassy point in Otago Bay Reserve	Revegetation in this area is proposed (refer Section 7)
Tracks and trails	
Erosion of the foreshore along Otago Bay Road - consider a pathway next to the road (an extension to the work that has already been done on the left hand side of the road further up)	Section 11 recommends obtaining engineering advice regarding options for stabilising this section of road and facilitating pedestrian access
A footpath between #19 and the grassy point would be wonderful	Section 11 recommends obtaining engineering advice regarding options for stabilising this section of road and facilitating pedestrian access
Infrastructure	
Otago Lagoon Reserve needs better fencing on both sides of the Reserve and on the roadside	No new fencing is proposed in the next five years
The two points [in the Otago Bay Coastal Reserve] are used by fishermen so it would be good to promote this use, with some signage as to what can be caught	Fishing signage is not considered a priority, although a QR code or similar could be erected to provide users with information.
Picnic seating would enhance the Otago Bay Reserve area and encourage use by the local people.	Rather than picnic seating, a bench seat is proposed to enable visitors to the Reserve to sit and contemplate the surroundings.
Maybe some play equipment at the	While this is not considered a priority over the

Management issue	Response
grassy point	next five years, it will be included as a recommendation in the event that significant infrastructure funding becomes available.
General management issues	
Remove dead wood at 19 Otago Bay Road	Dead wood provides important habitat for native fauna, so its removal is not recommended at this time.
Would love to see the grass kept short year round at the grassy point	This issue is addressed in Section 10.
Management issue outside the Reserves / outside the scope of this plan	
Why is someone living in Otago Bay Road [address suppressed] allowed to ruin the front of their property	While these issues are outside the Reserve boundary and/or outside the scope of the <i>Otago Lagoon and Coastal Reserves Activity Plan 2016-2020</i> , they have been noted by Council and will be addressed where feasible
Extend a walkway to the Bowen Bridge as walking along the East Derwent Highway is quite dangerous	
A small monthly farmers market could be held on both point areas (if they were cleared a little, family day picnics, a concert, etc.). Parking is an issue in the area and this would need some thought.	
Burnt out cars have been as issue near #19 Otago Bay Road – maybe better lighting would deter this from happening	

The draft *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020* was released for community consultation in February - March 2016. An Otago Lagoon and Coastal Reserves Activity Plan Report Card was developed as a key tool in encouraging stakeholder feedback on the draft plan and was mailed out to residents and other interested stakeholders. Eight submissions on the draft plan were received during the consultation period. A summary of the issues raised in these submissions is provided at Table A3.2.

Where possible, all relevant community feedback has been considered in the development of the draft *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020*. However some issues identified during the consultation process are beyond the scope of this plan or pertain to management issues outside the Reserves. These issues have been noted by Council and will be addressed through other processes where feasible.




Table A3.2: Summary of written responses received on the draft *Otago Lagoon and Coastal Reserves Activity Plan 2016-2020*.




Issue	Comment
Site values (Section 4)	
1 Your colourful mention of wildlife forgot to mention snakes	No change to plan required (section 4.2 already mentions snakes).
Tracks and trails (Section 11)	
2 Coastal access was once possible from the lagoon to the shipwrecks at low tide. The removal of dead trees and some remediation by the person who has modified the foreshore would make it relatively accessible again.	This feedback should be considered as part of the proposed feasibility study into a coastal walking track (recommendation 16).
3 Support possible walking link between lagoon and shipwrecks	Refer response to Issue 2 above.
4 A walkway to from Otago Bay to the lagoon used to be possible 20 years ago, but not anymore. Would be a great asset.	Refer response to Issue 2 above.
5 Do not support a formal walking track across the front of my property [between Otago Lagoon and the shipwrecks], nor leasing of my land back to Council for this purpose	Refer response to Issue 2 above.
6 Address the footpath along Otago Bay Road instead of wasting money on a feasibility study that the large majority of waterfront land owners will object to	Refer response to Issue 2 above.
7 Waste of time and resources to contemplate a walking track from the lagoon to Otago Bay. The properties all have title to high water mark.	Refer response to Issue 2 above.
8 Erosion and mud/puddles (in winter) requires pedestrians to walk along the road between the shipwrecks and the southern-most reserve.	No change to plan proposed. Section 11 already proposes looking at options for facilitating pedestrian access along this section of road.
9 Improve walking access along East Derwent Highway in front of the bay with shipwrecks and beyond.	No change to plan proposed. Section 11 already proposes looking at options for facilitating pedestrian access along this section of road. Beyond this area is outside the scope of this plan.




Issue	Comment
Infrastructure (Section 12)	
10 Promote a kayak launching site near the shipwrecks - similar to the setup at Little Howrah Beach (fresh water tap, kayak stand and a dedicated path to the water). A number of residents in our suburb launch kayaks from this location.	A recommendation for this will be included in Section 12 (final location dependent on water availability and proximity to parking).
11 Would love to see a rubbish bin near the shipwrecks	Section 12 will recommend that a rubbish bin be installed at the bus stop in this area.
12 Consider a sign on Oakbank/Lagoon Road on Council land encouraging parking for visitors to Otago Lagoon [rather than along the roadside]	A recommendation will be included to erect 'No parking' signs along Otago Bay Road adjacent to Otago Lagoon Reserve, as well as a small directional sign pointing to parking off Lagoon Road.
13 A seat in the lagoon area and dog waste bags are a good idea	No change to plan required (supports Recommendations 18 & 19)
14 Better access by the shipwrecks is definitely needed as it is a well used spot for fishing and just enjoying the vista outlook	No change to plan required (supports recommended activity proposed in Table 3).
15 Request for landscaping, playground and recreation space around the north side of the Bowen Bridge, combined with fishing areas, small jetties off the old causeway, and possibly a boat launch ramp.	While outside the Reserves, the RAP will be updated to include a discussion of the community interest in this area.
16 Investigate developing the area south of the Bowen Bridge and converting this area to a landscaped park, play area and BBQ spot	While outside the Reserves, the RAP will be updated to include a discussion of the community interest in this area.
Community participation and awareness (Section 15)	
17 Would support and join any Landcare or Coastcare group in this area	No change to plan required. Contact details provided to Council's Natural Areas Volunteer Coordinator.
Other issues outside the scope of the plan	
18 More waste bins at bus stops would keep the area cleaner	Comments 18-22 fall outside the scope of on ground management activities within the Reserves. This feedback should be forwarded to the relevant Council staff for consideration.
19 The road between the new footpath and the lagoon has very little street lighting, no footpath and has overhanging trees	
20 The style of footpath and no signage results in cars parking on the footpath in some areas requiring pedestrians to walk	

Issue	Comment
	well into the road to get around them
21	Cars often encroach on to the footpaths while driving along the road... ridged edges (like on the Southern Outlet) may help discourage driving on the footpaths
22	There are a couple of area where a small amount of remedial work could be carried out to allow pedestrians to walk all the way from Lagoon Rd to the Bowen Bridge while staying behind the traffic safety railings

APPENDIX 4: WEED SPECIES PRESENT AND RECOMMENDED CONTROL TECHNIQUES

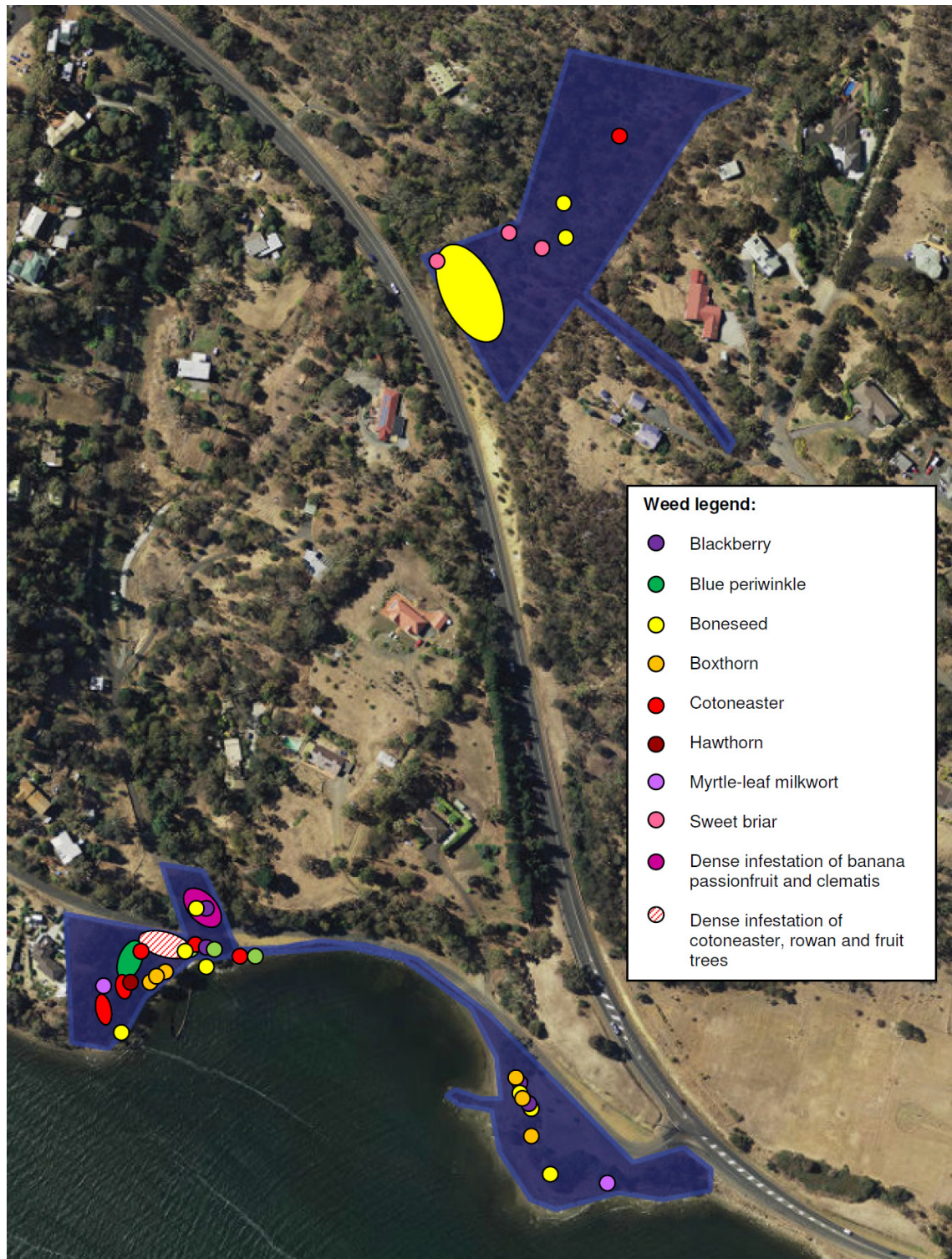
Common name	Species	Status	Picture	Recommended control technique
<u>DECLARED WEEDS</u>				
African boxthorn	<i>Lycium ferocissimum</i>	Declared WONS		Cut and paste or spot spray. Care should be taken to avoid the spines on this species as they can produce painful puncture wounds and/or an allergic reaction.
Blackberry	<i>Rubus fruticosus</i> aggregate	Declared WONS		Large stands - spot spray larger using an appropriate herbicide (as per the DPIPWE Control Guide) in non-fruiting periods Isolated patches - spot spray or cut and paste
Boneseed	<i>Chrysanthemoides monilifera</i>	Declared WONS		Hand pull seedlings. Cut and paste larger plants. Fruit should be bagged and disposed of responsibly.

Common name	Species	Status	Picture	Recommended control technique
Fennel	<i>Foeniculum vulgare</i>	Declared		Cut and paste or spot spray.
<u>OTHER ENVIRONMENTAL WEEDS</u>				
Banana passionfruit	<i>Passiflora tarminiana</i>			Cut and paste all stems. Leave dead material in situ.
Blue periwinkle	<i>Vinca major</i>			Brushcut followed by spot spraying. Repeated follow-up spot spraying required.

Common name	Species	Status	Picture	Recommended control technique
Cotoneaster	<i>Cotoneaster</i> sp.			Hand pull seedlings. Cut and paste larger plants.
Hawthorn	<i>Crataegus monogyna</i>			Hand pull small plants. Cut and paste larger plants.
Myrtle-leaf milkwort	<i>Polygala myrtifolia</i>			Hand pull small plants. Cut and paste larger plants.

Common name	Species	Status	Picture	Recommended control technique
Sweet briar	<i>Rosa rubiginosa</i>			Cut and paste or spot spray

APPENDIX 5: LOCATION OF WEEDS IN THE DIRECTION BUSHLAND RESERVE AND OTAGO BAY COASTAL RESERVE



APPENDIX 6: CONCEPT LANDSCAPE PLAN FOR RESERVE ENTRANCE OL1

APPENDIX 7: SUMMARY OF ON GROUND MANAGEMENT RECOMMENDATIONS

Weed management	
R1	Undertake a sweep of the Direction Bushland Reserve to remove all declared and environmental weeds
R2	Undertake weed control at 19 Otago Bay Road prior to undertaking weed control in the remainder of the Otago Bay Coastal Reserve
R3	Weed control in the remainder of the Otago Bay Coastal Reserve should be undertaken in an easterly direction, working from 19 Otago Bay Road towards Otago Bay Road
R4	Undertake control of exotic grasses and broadleaf weeds only in revegetation areas and where necessary as part of a general Reserve maintenance program
R5	Undertake an annual sweep and follow-up control of all previously targeted weeds
R6	Undertake follow-up GPS mapping of all weeds in the Reserve after five years to monitor progress and inform future weed control priorities
Regeneration and revegetation	
R7	Undertake targeted revegetation and landscaping within the Otago Bay Coastal Reserve to improve visual amenity and regenerate bare areas following weed control activities
R8	New revegetation and landscaping activities should not be committed to unless sufficient resources are available to undertake ongoing regular maintenance of newly planted areas
Fauna habitat monitoring	
R9	In consultation with the community, identify locations along Otago Bay Road where wildlife warning signs should be erected
Vegetation and fauna monitoring	
R10	Undertake Vegetation Condition Assessments (VCAs) in each Reserve in 2016 and 2020
R11	Establish photo points within each VCA zone to facilitate monitoring of vegetation condition
R12	Undertake fauna surveys in 2016 and 2020 to assess species diversity and further inform on ground management activities
R13	Undertake an analysis of all photo points, VCAs and fauna surveys in 2020 to determine trends and inform future management activities
Reserve Entrances	
R14	Improve Reserve entrances improved by installing additional signage, improving accessibility and undertaking landscaping activities as recommended in Table 2
Tracks and trails	
R15	Improve the Reserves' track networks by improving the condition of existing tracks and constructing new tracks to facilitate foreshore access
R16	Undertake a feasibility study into developing a coastal track between Otago Lagoon Reserve and Otago Bay Reserve
R17	Undertake a feasibility study into developing a coastal walking track link between Otago Lagoon Reserve and Woodville Bay
Infrastructure	
R18	Install a dog waste bag dispenser and bin at the entrance to Otago Lagoon Reserve and at the bus stop near the shipwrecks

R19	Install new outdoor seats at two locations in the Reserves
R20	Promote a preferred kayak launch site near the shipwrecks
R21	Install play equipment at the grassy point at the eastern end of Otago Bay Coastal Reserve if significant infrastructure funding becomes available
R22	Undertake a review of the infrastructure requirements of the Reserves in 2020
Bushfire Management	
R23	Ensure the three Reserves are included in Council's five year Fire and Bushland Management Operational Works Program
Coastal erosion and inundation	
R24	The <i>Tasmanian Coastal Works Manual</i> should be consulted prior to undertaking any on ground activities
R25	Develop a foreshore erosion monitoring program
Community participation and awareness	
R26	Consider, and fund as necessary, community education to facilitate behavioural change and encourage ownership and appreciation of the values of the Reserves
R27	Install a small interpretation sign at Otago Bay Lagoon
R28	Support the ongoing activities of the Otago Bay Coastcare Group through on ground, technical, administrative and grant application assistance
R29	Provide opportunities for the local community to share the responsibility for rubbish clean ups in the Reserves through participation in Clean Up Australia Day and other volunteer litter collection activities
Implementation Plan	
R30	Review progress against all performance measures identified in the Implementation Plan annually
R31	Review the <i>Otago Lagoon and Coastal Reserves Activity Plan 2016-2020</i> in 2020 to assess progress and determine ongoing management priorities for the Reserves