



# Integrated Weed Management Plan

Coochiemudlo Island  
November 2017

Redland City Council

# Contents

1	Introduction.....	1
1.1	Findings from earlier stages of the project .....	1
2	Aims and objectives .....	3
2.1	Approaches to restoration .....	3
2.2	Stages to weed control .....	4
3	Site zones.....	7
3.1	Zone 1 .....	8
3.2	Coastcare zones.....	11
3.3	Zone 2 .....	14
3.4	Zone 3.....	18
3.5	Zone 4 .....	24
3.6	Zone 5.....	29
4	Monitoring.....	34
5	Additional recommendations.....	35
	References .....	37
Appendix 1	Restoration map.....	38
Appendix 2	Priority weed profiles .....	40
Appendix 3	Weed treatment methods .....	49
Appendix 4	Control methods and rates for weed species.....	53
Appendix 5	Spraying in a team* .....	57
Appendix 6	Monitoring proformas* .....	59
Appendix 7	Daily record sheet .....	61
Appendix 8	Photo monitoring data sheet.....	63

# 1 Introduction

Coochiemudlo Island is a small island in Moreton Bay (Quandamooka) containing a range of ecosystems and land uses including more than 48 ha of private land, a 9 ha golf course and 58 ha of public open space and conservation area. The island forms part of an important environmental network within the Moreton Bay Marine Park and is a culturally and spiritually significant landscape for the Quandamooka people. The island provides habitat for a variety of native terrestrial and marine flora and fauna, contains significant cultural heritage values and is managed by Redland City Council (RCC).

In collaboration with residents, the Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC), community groups, concerned citizens and technical specialists, a weed management strategy has been developed for the island to ensure its values are improved and maintained for future generations. The development of a practical Integrated Weed Management Plan (IWMP) will assist coordinating and implementing weed control across the island over the next 10 years. It is designed to assist all stakeholders implement weed control in a way that increases the health and resilience of the islands native vegetation. Ongoing commitment to the implementation of the IWMP is integral to the recovery of native vegetation and protection of the islands important environmental and cultural values.

The development of the IWMP was undertaken in a staged approach, to ensure this weed management and restoration action plan captures information crucial to its successful implementation. The stages of the project included:

- stage one: identification of priority weeds and locations
- stage two: community engagement and consultation
- stage three: review and evaluation of current best practice weed control and alternatives (with input from findings in stages one and two)
- stage four: development of an Integrated Weed Management Plan (IWMP).

This IWMP has taken into account the ecological and cultural values of the island, the need to arrest degradation, support ecosystem recovery, and has integrated the expectations of the majority of community members and groups to develop a practical plan. The full range of weed control options including alternative organic options such as steam weeding were assessed to ensure, wherever possible, the lowest toxicity options have been recommended for each area requiring weed control. This IWMP is stage 4 of the project and combines the information and knowledge gained through all earlier stages including multiple site inspections and consultation with local groups and the Coochiemudlo Island community.

## 1.1 Findings from earlier stages of the project

### Priority weeds and location

Ecosure conducted an initial on ground survey on 29<sup>th</sup> November 2016 (Ecosure 2016) as part

of stage one of this project. During this survey 44 weed species were recorded and during subsequent visits more weeds were observed resulting in a total of 50 species being identified as impacting the natural and cultural values of the island (See Appendix 4). The weeds list together with analysing how and where weeds were impacting the island was used as the basis for investigating options for suitable weed control techniques for Coochiemudlo Island.

### **Community engagement and best-practice evaluation**

Consultation and engagement with local residents, community groups, Traditional Owners, local businesses, key stakeholders and residents living on the island was undertaken between January and August 2017. Individual meetings were held with numerous stakeholder representatives from community groups, local businesses, the golf course and residents over two days in February 2017. A formal meeting with the Coastcare group and Councillor Lance Hewlett occurred on 15<sup>th</sup> February 2017. A total of five visits were made to the island to undertake site assessments and liaise with stakeholders. This was important to ensure community values and views are understood and integrated into this plan wherever possible. A community survey was also established so people could respond on line or through postal responses to a range of questions relating to the island, its values, weeds and how weeds are impacting the island, as well as their opinions on weed control. Forty responses to the survey were received by post with another thirty-one on line surveys were completed. The 71 survey responses were analysed to assist the development of this plan.

To ensure stakeholders and interested parties were kept abreast of findings and to ensure their views and goals are incorporated into the action plan, a further meeting on the island was organised and attended by approximately 25 people, together with Redland City Council officers on the 30<sup>th</sup> May 2017. This forum was attended by representatives of community groups such as Coastcare and Bushcare, both of which have a strong connection to the natural areas of the island. Displays were set up illustrating some of the main weeds impacting the island and a presentation was given highlighting the issues, treatment options, possible approaches, likely priorities and the variety of techniques that can be successfully applied to control weeds impacting the island. The community talked openly about their goals for the island, their current experiences of living and working on the island including their weed control efforts to date, and what and where they believe are the priorities for weed management. A further walk through parts of the island illustrated particular issues relating to some weed encroachments and where some weed control efforts are being made. This inspection was carried out with RCC officers, members of the Coastcare Group and an individual carer who has been carrying out volunteer work in a small section of bush on the western side of the island near Moreton steps (see Figure 1).

Public engagement has gained valuable information regarding community perceptions and weed treatment preferences for the Island. The views on where and how weed control should be approached vary widely and there is some objection to the use of spraying herbicides. It is however clear the community are united with a passion to see Coochiemudlo restored with all main weed infestations controlled within a 10 year timeframe.

## 2 Aims and objectives

The overarching aim of this plan is to direct weed control works so the composition (species), structure (complexity and configuration) and function (processes and dynamics) of the islands native vegetation is restored. The plan has been developed to better incorporate the goals of community, important culturally sensitive areas and the need to arrest weed impacts to native vegetation including threatened species. It includes outlining all stages of the recovery process including primary weed control, follow up weed control across all zones, planting (where required), site maintenance, hygiene practices and monitoring. One of the core goals of this plan is to guide the management of weeds across the island to promote a resilient and more self-sustaining island within 10 years.

The objectives of the ecological restoration plan aim to:

- improve the condition and resilience of native vegetation
- improve habitat values for native terrestrial and marine flora and fauna
- take into account the goals of Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC) as the representative body for the Qandamooka Traditional Owners
- identify all weed species impacting the site and provide information on control including describing how control needs to be varied in different areas across the island
- improve the capacity for native vegetation to regenerate, grow and reproduce
- design an appropriate restoration strategy to assist the accurate and sensitive control of weeds throughout all stages of the restoration process i.e. during primary, secondary and maintenance
- improve the stability of certain areas by facilitating the germination and growth of native species through sensitive weed control
- provide recommendations as to how community groups may be involved in the restoration and ongoing management of the site highlighting where and how certain areas are to be worked to ensure their goals are met
- provide recommendations on how to monitor the recovery of the site and determine if, and when, further intervention may be required
- control weeds systematically so control is both effective and efficient and,
- control weeds consistently across the next 10 years so all areas reach a point of where only minimal maintenance is required and little to no herbicide is used in a decades time.

### 2.1 Approaches to restoration

The restoration of natural areas is a complex and long-term process and may involve one or more approaches to restoration (as outlined below). The most suitable approach or

combination of approaches can only be determined through detailed assessment. Appropriate restoration approaches depend largely on the conditions of the site, the type and extent of degradation and the ability of a site to recover. In many cases, particularly in complex systems, a combination of approaches is often required as the conditions tend to vary more widely. In areas where vegetation cover exists together with the capacity for recovery, either via an existing seedbank or through migration of seed and propagules to the area (i.e. via water, wind, gravity or fauna such as flying fox and birds) assisted regeneration can be applied. Where there are limitations to recovery due to vegetation structure (e.g. erosion or clearing) reconstruction (e.g. planting) may be required. The approaches recommended in this plan are based on current best-practice ecological restoration standards outlined in the National Standards for Ecological Restoration Practice in Australia (McDonald et al. 2017) and other publications such as the South East Queensland Ecological Restoration Framework.

Restoration approaches recommended in this plan include:

- Natural regeneration – applies in circumstances where resilience of the system is strong and recovery is likely following the removal of the cause of the damage / disturbance e.g. some natural disturbances and where no ongoing human intervention is required.
- Assisted regeneration – this approach is appropriate where degrees of resilience exist and ‘triggering’ interventions (either disturbance or resource provision) can affect the recovery by natural regeneration. The most common form of assisted regeneration is via weed control where the soil seedbank is released through ongoing and timely weed control. The recovery of vegetation may also accelerate when other pressures are removed e.g. track closure, erection of fencing, cessation of grazing.
- Reconstruction – this approach is required in highly disturbed, modified and degraded areas where the potential for native plant regeneration is considered to be limited. In these situations, native species are unlikely to return to the site without greater intervention, such as replanting, large-scale weed control, rehabilitation of drains, importation of soil.

The recovery of much of the island is likely to be achieved by assisted regeneration though some areas will require some reconstruction to assist stability and the importation of other native species to suit the recovery of an area.

## 2.2 Stages to weed control

Weed control must be applied in a systematic and sensitive manner and in a way, that ensures weeds are replaced with native species rather than other weeds. The promotion of the germination and growth of native species following weed control is paramount to the success of any restoration project. To ensure weeds are replaced by native species, it is important that each zone is worked and has stabilised before works progress into the next zone and that all follow up and maintenance is well timed and accurate. To assist this process including ensuing resources are spent efficiently, weed control should be undertaken in the following stages:

- a) primary weed control,
- b) secondary weed control or follow up, and
- c) maintenance of the zone and / or site.

### **Primary weed control**

Primary weed control is the initial and strategic control of weed species. Accurate plant identification is paramount to ensure that weeds are targeted, and that native species are not negatively affected. Each weed species or suite of weeds impacting the zone or an area within a zone is to be assessed to determine how each area will be approached, what techniques will be applied, how certain attributes (e.g. habitat for birds, stability of a slope) can be preserved, and the area will be maintained efficiently and effectively. An assessment of how native species suited to the area will likely regenerate (e.g. do they need shade) may also influence the technique/s applied. For example, it may be beneficial to maintain exotic grasses along the edge of the creek to assist stability and habitat for frogs; maintain some tobacco bush in open areas to assist building vegetation structure and assist the recovery process (these can be stem-injected once native plants have become more established and may still be used by birds as perches further facilitating regeneration); or overspray lantana in some areas where no other vegetation structure exists so birds can still utilise the structure for nesting and reptiles for protection. On slopes, particularly those that are susceptible to erosion, it will be important to cut, scrape and paint or stem inject woody weeds, and spot-spray herbaceous weeds, rather than hand pull weeds, so the roots of the plants continue to assist stabilising the slope and native seed is not lost in the erosion process.

Primary weed control may involve several techniques and is predominantly manual work using methods such as cut, scrape and paint and spot spraying. Primary work will often include the Initial spray to control herbaceous weeds (e.g. ground asparagus, exotic grasses), trailing vines (e.g. cat's claw creeper, corky passionfruit) or weed seedlings on the ground. It may also involve the over-spraying of patches of lantana once it has been prepared (i.e. it cut away from native plants or tracks cut to assist application and follow up). Where native species and ground layer weeds occur together (i.e. sporadic and small native seedlings), some hand weeding may be necessary to prepare the area for spot spraying.

Primary works are not often 'neat and tidy', and the site may appear to be unsightly post work particularly as exotic vines (i.e. climbing asparagus, cat's claw creeper) die in the upper layers after being cut. Treated plants may result in significant areas being brown but these plants will break down over time and provide important functions in the recovery of the site. When left in-situ they provide soil stability, cover for native fauna, a mulch layer and perching locations. Ensuring most are left on site saves significant time and resources by not removing them from site.

### **Secondary weed control (follow up)**

On completion of primary weed control, resources vital to plant growth (light, space, moisture and nutrients) are made available to growing plants and soil seed banks. Some treated weeds will re-shoot and a flush of seedlings and groundcovers, both native and exotic, are likely to occur. Identifying regenerating plant species accurately is important to ensure that correct

targeted control can be applied. This may involve recognition of individual plant species at cotyledon (seed leaf) and seedling stage. Incorrect identification or weed control that is not well timed (too frequent, early or too late) and not accurate may adversely impact native species, recovery of the site and reduce the availability of the native soil seed bank. Similarly, weeds may become established again, and if misidentified as a native and not treated, may again out-compete native plants. Well-timed follow up weed control is essential to ensuring soil seed banks are not wasted as this significantly slows the recovery process.

### **Site maintenance and ongoing weed control**

Ongoing weed control and site maintenance are essential to ensure that the site continues to progress, and that exotic species remain at manageable levels. It can take many years of control to exhaust the soil seedbank of weed seed and reduce the capacity for modified root systems such as underground tubers, to re-shoot. Furthermore, birds and other fauna, as well as natural disturbance events (e.g. storms / cyclones, floods etc.) may assist the continued dispersal of weed seeds into an area necessitating the need for ongoing management.

The frequency and duration of site maintenance works will vary according to the resilience of the site (capacity of a site to recover), viability of weed seed within the soil seed banks, the weed species impacting the site, the proximity of weed sources for re-infestation, the level of edge to area ratio, the approach to restoration and by the amount of native vegetation filling available gaps. Maintenance and weed control efforts required at a site will decrease over time as the health of the site improves. Ensuring that weed control maintenance is regular and matches the rates of regrowth, that works are carried out by experienced bush regenerators who are familiar with working larger sites requiring a sensitive approach, and that maintenance is accurate and well timed, will result in a reduction of maintenance requirements over time. Ongoing maintenance will still be required due to the large edge to area ratio, the fact the site is likely to have ongoing inputs of weed seed from the mainland (particularly ground asparagus, ochna and umbrella tree via birds / flying foxes) and natural disturbance via storms / cyclones however, getting the site to a point of minimal maintenance is very possible.

It should be noted that one of the goals of community is to reduce the use of herbicides on the island with an aim to be able to maintain the health of native vegetation via organic methods in the next 10 years. This may not be possible in the area impacted by cat's claw creeper (zone 3a) and will only likely to be successful if weed control efforts are consistent with regular maintenance carried out. Weed seedbanks can be depleted and the management of newly germinating weeds may be able to be managed via organic methods such as hand-weeding, crowning and other techniques such as steam weeding. Saturated steam weeding still requires more trials especially with regard to its effects on soil biota and native seed as well as the control of more complex weeds especially those with larger root systems. It is however likely to be an effective tool on the ongoing maintenance of herbaceous weeds (e.g. grasses) and those plants with a more simple root system such as mother of millions. The need to reduce herbicide use and eventually omit it from the management of weeds on the island is important to the community and every effort to regularly control weeds so this vision is realised should be made.



### 3 Site zones

The site has been delineated into 5 zones (Appendix 1) to assist describing how each zone is to be worked and how all zones are to be integrated into the restoration of the island. Further subdivision of one of the zones (i.e. zone 3) has also been done to assist describing priorities within a zone, where works should be conducted simultaneously and how the area should be worked. The areas where the both the Bushcare and Coastcare groups manage, have been identified due to an agreement between Redland City Council and the community groups to work and manage their sections differently (i.e. both groups tend to hand weed rather than use herbicides). Figure 1 illustrates the location of each zone, the boundary of the zones (i.e. where each zone starts and finishes) and where the community groups work. Other site features such as the boundaries between private and public land, a track and main weed infestations such as the cat's claw creeper outbreak, have been illustrated to assist defining zones and orientating all stakeholders.

Work should commence in zone 1, which mainly encompasses the Ramsar wetland area in the north-eastern part of the island. Once primary and follow up work is complete in this zone (i.e. all woody, herbaceous and vine weeds) have been controlled and the regrowth of weeds have stabilised, weed control should progress through zone 2 and similarly continue sequentially through to and including zone 5. Ensuring all previously worked areas have been consolidated (e.g. zones 1 and 2 before moving into zone 3 or zones 1 to 4 before commencing works in zone 5) better assists an effective and efficient approach to weed control, both environmentally and economically. This does not mean that all primary work must be complete in a zone before carrying out follow up or maintenance in previously worked areas but that whole zones should be worked and stable prior to commencing works in a new zone. For example, maintenance will still need to be applied to zones 1, 2 and 3 while carrying out primary work in zone 4. The level of maintenance required in each zone however will vary. For example, the cat's claw in zone 3a will require more regular maintenance while most of zone 1 (except the western edge) will require very little maintenance by the time primary works reach zone 4.

Some exceptions to this systematic and integrated approach will need to be made and are influenced by the cat's claw infestation in zone 3a and generally by weather conditions on the island. The cat's claw infestation is currently dense and is impacting all layers of the forest in zone 3a where it is bringing down trees under its weight. After zone 1 is worked or if conditions are not conducive to working in zone 1 (e.g. due to wind or rain), efforts should be steered to controlling the cat's claw in zone 3a. Once the mature vines are controlled together with the initial control of understory infestations, the zone order should be resumed with regular monitoring and maintenance being applied to the control of cat's claw as well as zone 1.

If weather conditions on the island and in particular, prevailing winds are not conducive to spot spraying or safely working in an area, works may need to be moved to another more protected area to ensure accurate and sensitive weed control. For example, it is often windy on the eastern and northern parts of the island and if spot spraying maintenance is required and it is too windy to ensure safe and accurate spot-spraying, then work should be shifted to a

protected area on the other side of the island (e.g. zone 3 or 4). Other options to ensure accurate weed control are for teams to be ready to carry out spot-spraying activities in the morning when there is less likelihood of wind and / or move the team into an area where primary woody weed control work is required. Either way teams will need to remain flexible and ensure they work with local conditions and plan ahead, ensuring that comprehensive and systematic weed control is applied. It is vital to build on previous efforts in a zone and working a couple of areas simultaneously ensuring works are always maintained will minimise the need to carry out extra work.

## 3.1 Zone 1

### Description of zone

Zone 1 (Appendix 1) is approx. 19 ha in size and is located in the north east of the island connecting the eastern coastal strip with that of the north. The zone is bounded by Victoria Street to the north, the coast and area being worked by Coastcare to the east, Elizabeth Street to the west and James Street to the south. It also shares a boundary with a formal park and the Council waste transfer station in the south-western corner of the zone as well as private residences in the north, south and a portion of the western boundary. This zone is predominantly Melaleuca wetland and approx. 6.8 ha is mapped as RE 12.2.7 *Melaleuca quinquenervia* open forest. The other 8.8 ha is mapped as RE12.5.3 *Eucalyptus racemosa* subsp. *racemosa* woodland with *Corymbia intermedia*, *E. siderophloia* +/- *E. tindaliae*, *E. resinifera*, *E. pilularis*, *E. microcorys*, *Angophora leiocarpa* which is listed as endangered. *Melaleuca quinquenervia* is often a prominent feature of lower slopes of 12.5.3.

The overall zone is in good health including containing a good diversity of native plants and excellent regeneration capacity. In addition, there is a small population of *Phaius australis* (swamp orchid) which is listed as endangered under the *Nature Conservation Act 1992* as well as endangered under the *Commonwealth Environment Protection and Biodiversity Act 1999*. Weeds are however having an impact particularly in the south-western portion of the site where they are escaping the Council waste transfer station, benefitting from the added nutrients leeching from composting materials and are dominating parts of the understorey due to the higher edge to area ratio that is a result of the open area (i.e. greater light conditions). There is also scattered weeds throughout the zone that require a systematic and sensitive approach to control. Experienced bush regenerators should be used for this task. The main weeds impacting this zone include Guinea grass (*Megathyrsus maximus*), mollases grass (*Melinis minutifolia*), Singapore daisy (*Sphagneticola trilobata*), Easter cassia (*Senna pendula* var. *glabrata*), painted spurge (*Euphorbia cyathophora*) fishbone fern (*Nephrolepis cordifolia*) and corky passionfruit (*Passiflora suberosa*). Also in the south-west portion of the zone, adjacent to the children's playground, is a stand of leuceana (some of which are as tall as the canopy).

### Restoration aims for the zone

The goals for zone 1 include ensuring all native vegetation is protected and enhanced by controlling weeds in a systematic and sensitive way. This is particularly important when working around endangered plants such as the swamp orchid (*Phaius australis*) and working

in and around sensitive areas (e.g. where water occurs) or areas identified by Traditional Owners. It should be noted that Cultural Heritage surveys and Indigenous Landscape Values will also influence how some of this area is managed in the future, particularly in relation to fire.

### Restoration approach

This zone will be restored and managed using the assisted regeneration approach due to its high capacity for recovery. It is recommended that weed control commence on the western side of the zone to arrest the growth and encroachment of weeds into the wetland from the Transfer Station. It is suggested that weed control commence with a team working in 10-15 m wide strips concentrating on the main weed infestations around the south-western corner. Once the area is treated, the team is to commence systematic weed control through the zone starting from the park and moving in an east-west direction between the edge of the park and the beach initially using the southern boundary of the zone as the edge. Once a sweep approx. 10 – 20 m wide has been carried out (i.e. from the park to the edge of the zone near the beach), the team is to turn around and follow the edge of the strip back, ensuring no gaps are left. This is to be repeated until the northern strip of the zone is reached and the whole zone is consolidated,

Prior to the commencement of restoration works, it is suggested that a photo monitoring point be established (see section 5) in the SW corner to illustrate the changes in the area over time. It is recommended that a star picket and numbered safety cap are installed and photos taken (i.e. in several directions) prior to the commencement of works. These can then be used to illustrate the changes in the area. The coordinates of the photo monitoring point should also be recorded on the sheet provided in Appendix 8 to assist re-locating the point should the star picket be removed.

### Primary weed control

- Commence with the control of woody weeds such as leuceana, Easter cassia and *Solanum* species < 3 m in height using the cut, scrape and paint (CS&P) technique (see Appendix 3 for how to carry out this technique and Appendix 4 for rates of control). Chop the stems of the plant up into 50 cm billets leaving them scattered on the ground to breakdown over time.
- At the same time, as the team moves through the area, control any exotic vines encountered as per Appendices 3 and 4. Vines such as corky passionfruit and Brazilian nightshade can either be cut off native species and treated using the CS&P technique or if smaller either hand-pulled or placed on the ground to be spot-sprayed.
- As the team carefully moves through the area, simultaneously prepare it for spot-spraying by pulling and rolling exotic groundcovers such as Singapore daisy away from any native species. It is likely that where weeds such as Guinea grass, molasses grass and Singapore daisy are entwined with native groundcovers and sedges that more detailed preparation is required via the separation of exotics from native plants. It is vital that careful consideration to the presence of the swamp orchid and other sensitive native vegetation is provided and that weed control accuracy is

paramount. Carefully preparing the area for spraying will assist the next stage of primary work i.e. the initial control of weeds in the ground layer.

- Continue working in a semi-circle or 10 -15 m wide strips around the south-western corner in preparation for spot spraying and then carefully control all ground weeds. Refer to Appendix 4 for the rates of control required to control weeds such as Singapore daisy, exotic grasses, blue billygoat weed, annuals and other weed seedlings. Only spray in areas previously prepared.
- Once the patch of weeds in the SW corner is controlled, continue working the zone in 10-20 m wide strips east to west, ensuring all woody and vine weeds are controlled using manual approaches such as CS&P, hand pulling, crowning or carefully preparing areas for spot-spraying by separating weeds and natives. The size and habit of the weed together with its ability to re-shoot will influence the technique. See appendices 3 and 4 for more detail.
- Ensure only hand weeding, crowning or the application of the CS&P technique to woody weeds or larger vines is applied around the *Phaius* orchid. No spraying is suggested within a 10 m radius of this plant to guarantee its protection. Ensure the locations of the orchid are recorded with a GPS and that any changes to its appearance including whether it might be in flower or experiencing dieback / change in health etc. are recorded on the daily record sheet (see Appendix 7) and forwarded to RCC.
- Any areas of greater weed infestation such as the SW corner of the zone should be noted for ongoing monitoring as follow up weed control will be required prior to the likelihood of primary work finishing throughout the rest of the zone. Continue to carry out follow up spot-spraying once the area is again prepared, while continuing primary work in the rest of the zone.

## Maintenance

- The more open areas or those adjacent to tracks or edges, are likely to require more maintenance than those in the centre of the zone. For instance, the SW corner will likely require regular maintenance (e.g. every 4-6 weeks for the first year; every 6-8 weeks for year 2; every 8 weeks for year 3; every 8-12 weeks for year 4 etc. until the area reaches a point of minimal maintenance). Once native vegetation fills the gaps, a reduction in weed control maintenance will be better guaranteed however weeds such as glycine and Easter cassia have a 10-15 year seed viability and as the edges will remain light, the ongoing germination of weeds is likely.
- Depending on the stage of the maintenance program (e.g. year 1, 3, 7 etc.), a team should thoroughly work through the entire zone carrying out maintenance. The regularity to which this should happen will depend on how long the area has been worked however at least once a year, the zone should be monitored for the regrowth or germination of weeds.
- It is suggested that wherever possible, the same team (or at least the supervisor) be used to carry out weed control so site knowledge and familiarity with 'hot spots' and sensitive areas is further built. This ensures resources are maximised.

- It is also suggested that when a mosaic burn is put through this area which will be required within the next 2-5 years (depending on fuel levels) to ensure the complexity (species and age classes) of native vegetation is retained throughout this zone, that resources be made available to ensure well timed, follow up weed control. Even if the site has been well maintained for 7 years and weed germination and growth is minimal, a burn will naturally open up the area and weeds that have laid dormant in the soil seedbank may germinate. It is essential that weed control is again applied in a timely and accurate manner to ensure native plants are provided the opportunity to germinate and grow.
- Each time a team works, a daily record sheet and herbicide application sheet (see appendix 7) is to be filled out and forwarded to RCC for their records. Any unusual observations including flora and fauna are to be recorded and communicated.

### 3.2 Coastcare zones

The area managed by the Coastcare group (see Figure1) occurs along a significant portion of the eastern strip of the island with the area extending around the south-eastern tip. The group have done an excellent job at controlling weeds and replanting native species particularly along the dune areas. The area that is marked out as their zone of responsibility is approx. 4 ha and while the group continues to carry out necessary weed control maintenance and planting activities to assist stabilisation along the dune areas, there are still numerous weeds requiring control along the 'Emerald fringe'. It is suggested the following recommendations are adhered to prior to, during and after works to ensure the relationship between Coastcare, professional contractors and Council is improved and maintained.

- Coastcare are to be notified when contractors intend to work in the 'Emerald fringe' behind the active area the group is working. Many weeds exist in this area that require herbicide treatments and while it is envisaged that Coastcare may be able to maintain the area after works have stabilised (e.g. by year 3 of the program), notification will be required.
- Notification and signage will also be required when contractors are required to spray. Again, it is envisaged that spot-spraying will not be required after year 2 or 3, if works are properly timed, particularly between the initial spray and follow up.
- Contractors forward daily record sheets to RCC within 2 days of working in the area so Council have a clear record of all works including herbicide usage and weather conditions.
- Contractors will focus weed control to the hill behind the Coastcare area (i.e. the Emerald Fringe) and will not work in the area where the group is working which is predominantly the flat zone. An onsite meeting between all parties may be required prior to the commencement of works so the boundaries between the zones is clear to all parties.
- Areas managed by Coastcare also require ongoing weed control and management. Numerous weeds such as mother of millions, corky passionfruit, Brazilian nightshade and corky passionfruit continue to germinate, re-shoot or grow and will require

ongoing management. While the manual removal of certain weeds such as mother of millions (*Bryophyllum delagoense*) is successful as a treatment, other techniques such as crowning (see Appendix 3) should be employed by the group when controlling ground asparagus to ensure the rhizome is properly removed. It is also suggested that where possible, leaves and stems of weeds (e.g. of ground asparagus, corky passionfruit) be cut up and left in-situ to assist building organic matter. The only part of the ground asparagus that will re-shoot while in contact with the ground is the rhizome (the hard modified area between the fibrous roots and the stems). This can be cut out and either suspended in a tree to dry out or removed and composted. All other parts of the plant such as the water storage nodules will not re-shoot.

- Ongoing maintenance will be required, particularly as mother of millions, silver-leaf desmodium and Easter cassia are longer term weeds together with corky passionfruit and other weeds such as exotic grasses (e.g. Guinea grass) which will require regular maintenance to ensure their control. As the Coastcare managed area mainly faces the sea, the area will continue to be impacted by natural disturbance events such as storms. Regular weed control maintenance to support the development of native vegetation will assist supporting the development of native vegetation.

### Primary weed control

- Contactors are to commence with the control of woody weeds such as Easter cassia, mickey mouse bush, umbrella tree, *Ficus elastica* and other woody weed species using the cut, scrape and paint (CS&P) technique (see Appendix 3 for how to carry out this technique and Appendix 4 for rates of control). Ensure the variation to this technique is applied to any *Ochna serrulata* encountered. Chop the stems of the plant into approx. 50 cm billets leaving them scattered on the ground to breakdown over time. Larger stems / trunks of the umbrella tree can be elevated off the ground to avoid them re-shooting.
- At the same time, as the team moves through each area of the zone, control any exotic vines encountered as per Appendices 3 and 4. Vines such as corky passionfruit, silver-leaved desmodium and Brazilian nightshade can either be cut off native species and treated using the CS&P technique or if smaller, hand pulled or placed on the ground to the spot-sprayed.
- As the team moves through the area, simultaneously prepare it for spot-spraying by pushing weeds away from natives or hand pulling / crowning small amounts of weed (e.g. ground asparagus, fishbone fern, Swedish ivy, crucifix orchid) where it is close to native vegetation to assist safe and accurate spray works. Exotic grasses and smaller ground asparagus can sometimes be quickly tied in a knot to assist containing the weed and making a native seedling / groundcover more obvious when spot spraying. Preparing areas for spot-spraying should be a relatively quick affair and should not take hours as this will seriously impact the overall efficiency of the weed control program i.e. a balance between accuracy and efficiency is necessary.
- As carrying out an initial spray of the exotic ground layer is also considered primary work, it is suggested that after approximately a hectare of area has had initial woody

and vine control and is prepared for spraying, that a primary spot-spray occur. Bush regeneration teams are to ensure that weather conditions are suitable to spot-spraying (not too windy) and that the rates of control are followed for the weeds likely to be encountered (see Appendix 4). Good adjustable nozzles are to be utilised and it is suggested that atomizers filled with water also be carried by operators to assist washing off any herbicide that may be accidentally applied to any native groundcovers / seedlings. Refer to Appendix 5 for more tips on how to successfully spray as a team in a natural area situation.

- Ensure the areas marked on the map as Coastcare sites are not worked unless requested by the group and agreed to by Redland City Council.
- Work across the slope and continue working in 10 -15 m wide strips carrying out primary woody weed and vine control and primary spot-spraying in sections. Ensure each section treated can be easily monitored and maintained before moving into the next section.
- Any areas of greater weed infestation should be noted on the daily record sheet (see Appendix 7) so ongoing monitoring and weed control maintenance is efficient.
- Once weed regrowth in the understorey has stabilised, stem inject large woody weeds in the canopy. The main weeds requiring this treatment include date palm and umbrella tree. Ensure the umbrella trees are not in flower when stem injecting as anecdotal evidence suggests that birds feeding on nectar might be impacted. If the plant is in fruit, the same impacts do not apply. See Appendix 3 for how to successfully carry out this technique and Appendix 4 for the rates of control.
- Ensure all works are recorded on a daily record sheet (see Appendix 7) and that these are forwarded regularly to RCC for their records.

## Maintenance

- It is good practice to walk through areas previously treated on the way to a new area so good decisions relating to maintenance can be made including when to maintain an area before expanding primary work in the same zone. It is imperative that weed regrowth does not out-compete or prevent native plant germination and it is equally important that areas are not over-maintained, ensuring resources are maximised. This balanced approach will also ensure all plants are recognisable (i.e. that plants are not controlled at the cotyledon stage where confusion as to the species can occur) and to ensure herbicide is applied in an accurate manner (i.e. it is good practice to ensure herbicide is applied to the leaf and not the soil). This will better ensure weeds are controlled at the optimal time further assisting good ecological restoration practice and recovery of the zone and site.
- The areas containing mother of millions and ground asparagus or are closer to the edges where weeds are escaping from gardens, are likely to require more maintenance than those in the centre of the zone or contain a greater density of native plants. For example, in the first two years of weed control work in this zone, it is likely that there will be successional germinations of ground asparagus in areas where it is currently thick requiring more regular maintenance (e.g. every 4-6 weeks

for the first year; every 6-8 weeks for year 2; every 8 weeks for year 3; every 8-12 weeks for year 4 etc. until the area reaches a point of minimal maintenance). Once native vegetation fills the gaps, a reduction in weed control maintenance will be better guaranteed however weeds such as Easter cassia and silver-leaved desmodium have 10-15 year seed viability and the likelihood of ground asparagus being regularly imported to the site via birds is high.

- Depending on the stage of the maintenance program (e.g. year 1, 3, 7 etc.), a team should thoroughly work through the entire zone carrying out maintenance. The regularity to which this should happen will depend on how long the area has been maintained and the stage of the program. It is envisaged that maintenance will still need to occur through the 'Emerald fringe' up to four times a year for at least 3-5 years.
- It is suggested that wherever possible, the same team (or at least the supervisor) be used to carry out weed control so site knowledge and familiarity with 'hot spots' and sensitive areas is further built. This ensures resources are maximised.
- It is also suggested that should any major weather events such as a significant storm occur which is likely to result in the loss of the canopy (trees will re-shoot over time if they remain intact), that resources be made available to assist well timed, follow up weed control. Even if the site has been well maintained for 7 years and weed germination and growth is minimal, a large disturbance event will naturally open up the area and weeds that have laid dormant in the soil seedbank may germinate. It is essential that weed control is again applied in a timely and accurate manner to ensure native plants are provided the opportunity to germinate, resprout and grow.
- Each time a team works, a daily record sheet and herbicide application sheet (see Appendix 7) is to be filled out and forwarded to RCC for their records. Any unusual observations including flora and fauna are to be recorded and communicated.

### 3.3 Zone 2

#### Description of zone

Zone 2 (Appendix 1) is 10.7 hectares in size and includes the southern beach strip and hill behind (part of the 'Emerald Fringe') stretching from the Coastcare area in the east to the track that leads to the golf course in the west. It is bounded by Victoria Parade to the north and is approximately 1 km in length and 125 m wide, narrowing towards the west. The zone also includes the area referred to as 'Curlew Creek'.

Approximately 2.6 ha is mapped as 12.5.2a *Corymbia intermedia*, *Eucalyptus tereticornis* woodland. Other species in this RE can include *Lophostemon suaveolens*, *Angophora leiocarpa*, *Eucalyptus acmenoides* or *E. portuensis*, *E. siderophloia* or *E. crebra*, *Corymbia tessellaris* and *Melaleuca quinquenervia* on lower slopes. It occurs on a complex of remnant Tertiary surfaces +/- Cainozoic and Mesozoic sediments usually in coastal areas with deep red soils. (BVG1M: 9g). A range of coastal systems occur in or adjacent to this zone including mangrove and dune vegetation.



The zone has good resilience and capacity for recovery however the understorey is dominated in weed species which are significantly impacting the ability of native plants to germinate and grow. Weed species impacting this zone are numerous and include mother of millions (*Bryophyllum delagoense*), ground asparagus (*Asparagus aethiopicus*), prickly pear (*Opuntia stricta*), mickey mouse bush (*Ochna serrulata*), corky passionfruit (*Passiflora suberosa*), fishbone fern (*Nephrolepis cordifolia*) and garden escapes such as crucifix orchid (*Epidendrum ibaguense*), Swedish ivy (*Plectranthus verticillatus*) and Agave spp. in the understorey. Other weeds impacting the mid storey and canopy include date palm (*Phoenix dactylifera*), umbrella tree (*Schefflera actinophylla*) and Easter cassia (*Senna pendula* var. *glabrata*).

### **Restoration aims for the zone**

The goals for zone 2 include ensuring all native vegetation is protected and enhanced by controlling weeds in a systematic and sensitive way following the recommendations outlined below. An over-arching goal for this zone is to restore native vegetation and control weeds so that this zone can be managed organically in 5 years. Some of the open sandy areas may be at a point where herbicide is not required for weed control in 2-3 years if systematic weed control is properly applied, while the slopes and surrounding areas will likely take longer to get a point of minimal maintenance. This is due to the higher levels of weed infestation, the weed species impacting the 'Emerald Fringe' and the fact control needs to take into account the slope and possible erosion.

The slope and movement of water both via the tide and down the slopes (including off any hard surfaces such as a path or road) needs to be considered when carrying out weed control to ensure areas remain stable. Weed control techniques that have been recommended takes this into account. The protection and enhancement of habitat to support fauna is also integrated into the approach for weed control and restoration. Should any obvious habitat be observed such as birds nesting, their life cycles will need to be considered (e.g. retain weed around them if they have eggs or young, and control weed once the young have moved on). It should be noted that ongoing liaison with Traditional Owners is occurring and that a path through to areas of significance may need to be retained and improved.

### **Restoration approach**

This zone will be restored and managed using an assisted regeneration approach due to its high capacity for recovery. It is estimated to have a good soil seedbank and as native vegetation structure is good, will highly likely recover with the germination of native species via ongoing, accurate and well-timed weed control. It is recommended that weed control commence in the eastern side of the zone and head in a westerly direction taking in both the sandy flatter areas as well as the slopes associated with the 'Emerald Fringe'. It is suggested that weed control commences with a team working in 10-15 m wide strips concentrating on weeds in the understorey before any canopy weeds are treated. This will ensure conditions such as shade are maintained to support the germination and management of native vegetation. It will also assist the management of weed regrowth in the first 1-2 years of working this area.

It should be noted that the monitoring and maintenance of zone 1 and the control of cat's claw creeper in zone 3a is to continue as work progresses through zone 2. This will ensure the efforts and progress made are supported.

Prior to the commencement of restoration works, it is suggested that at least 2 photo monitoring points are established (see section 5). It is suggested that a star picket and numbered safety cap be installed, and photos taken (i.e. in several directions) prior to the commencement of any works. These can then be used to illustrate the changes in the site as the recovery of the area improves. The coordinates of the photo monitoring point should also be recorded on the sheet provided in Appendix 8 to assist re-locating the point should the star picket be removed.

### Primary weed control

- Commence with the control of woody weeds such as Easter cassia, mickey mouse bush, umbrella tree and *Solanum* species < 3 m in height using the cut, scrape and paint (CS&P) technique (see Appendix 3 for how to carry out this technique and Appendix 4 for rates of control). Ensure the variation to this technique is applied to any *Ochna serrulata* encountered. Chop the stems of the plant into approx. 50 cm billets leaving them scattered on the ground to breakdown over time. Larger stems / trunks of the umbrella tree can be elevated off the ground to avoid them re-shooting.
- At the same time, as the team moves through each area of the zone, control any exotic vines encountered as per Appendices 3 and 4. Vines such as corky passionfruit and Brazilian nightshade can either be cut off native species and treated using the CS&P technique or if smaller, hand pulled or placed on the ground to the spot-sprayed.
- As the team moves through the area, simultaneously prepare it for spot-spraying by pushing weeds away from natives or hand pulling / crowning small amounts of weed (e.g. ground asparagus, fishbone fern, Swedish ivy, crucifix orchid) where it is close to native vegetation to assist safe and accurate spray works. Exotic grasses and smaller ground asparagus can sometimes be quickly tied in a knot to assist containing the weed and making a native seedling / groundcover more obvious when spot spraying. Preparing areas for spot-spraying should be a relatively quick affair and should not take hours as this will seriously impact the overall efficiency of the weed control program i.e. a balance between accuracy and efficiency is necessary.
- As carrying out an initial spray of the exotic ground layer is also considered primary work, it is suggested that after approximately a hectare of area has had initial woody and vine control and is prepared for spraying, that a primary spot-spray occur. Bush regeneration teams are to ensure that weather conditions are suitable to spot-spraying (not too windy) and that the rates of control are followed for the weeds likely to be encountered (see Appendix 4). Good adjustable nozzles are to be utilised and it is suggested that atomizers filled with water also be carried by operators to assist washing off any herbicide that may be accidentally applied to any native groundcovers / seedlings. Refer to Appendix 5 for more tips on how to successfully spray as a team in a natural area situation.

- Ensure the areas marked on the map as Bushcare sites are not worked unless requested by the group. The group may require assistance with some weed control (primary woody weeds, vines etc.) or maintenance via spot-spraying or in small areas via hand weeding, however these sections are not to be worked unless liaison with the group and Redland City Council is carried out.
- Continue working in 10 -15 m wide strips carrying out primary woody weed and vine control and primary spot-spraying in sections. Ensure each section treated can be easily monitored and maintained before moving into the next section.
- Any areas of greater weed infestation should be noted on the daily record sheet (see Appendix 7) so ongoing monitoring and weed control maintenance is efficient.
- Once weed regrowth in the understorey has stabilised, stem inject large woody weeds in the canopy. The main weeds requiring this treatment include date palm and umbrella tree. Ensure the umbrella trees are not in flower when stem injecting as anecdotal evidence suggests that birds feeding on nectar might be impacted. If the plant is in fruit, the same impacts do not apply. See Appendix 3 for how to successfully carry out this technique and Appendix 4 for the rates of control.
- Ensure all works are recorded on a daily record sheet (see Appendix 7) and that these are forwarded regularly to RCC for their records.

## Maintenance

- It is good practice to walk through areas previously treated on the way to a new area so good decisions relating to maintenance can be made including when to maintain an area before expanding primary work in the same zone. It is imperative that weed regrowth does not out-compete or prevent native plant germination and it is equally important that areas are not over-maintained, ensuring resources are maximised. This balanced approach will also ensure all plants are recognisable (i.e. that plants are not controlled at the cotyledon stage where confusion as to the species can occur) and to ensure herbicide is applied in an accurate manner (i.e. it is good practice to ensure herbicide is applied to the leaf and not the soil). This will better ensure weeds are controlled at the optimal time further assisting good ecological restoration practice and recovery of the zone and site.
- The areas containing mother of millions and ground asparagus or are closer to the edges where weeds are escaping from gardens, are likely to require more maintenance than those in the centre of the zone or contain a greater density of native plants. For example, in the first two years of weed control work in this zone, it is likely that there will be successional germinations of ground asparagus in areas where it is currently thick requiring more regular maintenance (e.g. every 4-6 weeks for the first year; every 6-8 weeks for year 2; every 8 weeks for year 3; every 8-12 weeks for year 4 etc. until the area reaches a point of minimal maintenance). Once native vegetation fills the gaps, a reduction in weed control maintenance will be better guaranteed however weeds such as Easter cassia and silver-leaved desmodium have 10-15 year seed viability and the likelihood of ground asparagus being regularly imported to the site via birds is high.

- Depending on the stage of the maintenance program (e.g. year 1, 3, 7 etc.), a team should thoroughly work through the entire zone carrying out maintenance. The regularity to which this should happen will depend on how long the area has been maintained and the stage of the program. It is envisaged that maintenance will still need to occur through this zone up to four times a year.
- It is suggested that wherever possible, the same team (or at least the supervisor) be used to carry out weed control so site knowledge and familiarity with 'hot spots' and sensitive areas is further built. This ensures resources are maximised.
- It is also suggested that should any major weather events such as a significant storm occur which is likely to result in the loss of the canopy (trees will re-shoot over time if they remain intact), that resources be made available to assist well timed, follow up weed control. Even if the site has been well maintained for 7 years and weed germination and growth is minimal, a large disturbance event will naturally open up the area and weeds that have laid dormant in the soil seedbank may germinate. It is essential that weed control is again applied in a timely and accurate manner to ensure native plants are provided the opportunity to germinate, resprout and grow.
- Additional planting, particularly on the dunes and flat areas adjacent to the beach should be considered especially if no regeneration of native species occurs within the first couple of years of weed control. It is suggested that small clump plantings be installed using appropriate native species suited to those areas and vegetation types, and that these small clumps be placed every 30-50 m with temporary fencing to assist establishment. The local Bushcare group can propagate and / or plant species such as *Spinifex* sp., *Dianella* spp., *Casuarina equisetifolia* and *Cupaniopsis anacardioides*.
- Each time a team works, a daily record sheet and herbicide application sheet (see Appendix 7) is to be filled out and forwarded to RCC for their records. Any unusual observations including flora and fauna are to be recorded and communicated.

### 3.4 Zone 3

#### Description of zone

Zone 3 is approx. 12.5 ha in size and occurs in the south-western corner of the island. It has been broken into two sub zones to assist prioritising a part of the zone and consolidating efforts before expanding works. Zone 3a is an area 2.9 ha in size and can be accessed by the southern part of Victoria Parade as well as the public pathway that runs through the area. Zone 3b is 9.6 ha which covers the golf course and the natural areas amongst and surrounding it.

Zone 3 is made up of a diversity of vegetation types which range according to the height above the tidal area. Mangroves line the northern extent of the zone and are mapped as 12.1.3: Mangrove shrubland to low closed forest. Occurs on Quaternary estuarine deposits. (BVG1M: 35a). Also throughout the lower lying areas (i.e. throughout parts of the golf course and adjacent to mangrove and beach communities is salt marsh vegetation. These areas are

mapped as 12.1.2: Saltpan vegetation comprising *Sporobolus virginicus* grassland and samphire herbland. Grasses including *Zoysia macrantha* subsp. *macrantha* sometimes present in upper portions of tidal flats. Includes saline or brackish sedgeland. Usually occurs on hypersaline Quaternary estuarine deposits. Marine plains/tidal flats. (BVG1M: 35b).

A wide range of weeds impact the zone particularly throughout zone 3a where there is a large diversity of environmental weeds and garden escapes out competing native vegetation for space, water and nutrients. Of particular concern is the mature infestation of cat's claw creeper (see Figure 1 for its location) which is negatively impacting the health of mature trees as well as completely smothering the ground. As the infestation has been there for a long time there is no mid storey and no regeneration of native species for many years. Other weeds impacting zone 3a include fishbone fern (*Nephrolepis cordifolia*), Agave spp, Easter cassia, umbrella tree, mother of millions (*Bryophyllum pinnatum*), crucifix orchid, climbing cactus (*Hylocereus undatus*), mickey mouse bush (*Ochna serrulata*), ground asparagus (*Asparagus aethiopicus*), butterfly bush (*Buddleja madagascariensis*), mother in laws tongue (*Sansiviera trifasciata*), purple succulent (*Calissia fragrans*), black-eyed Susan (*Thunbergia alata*), mulberry (*Morus* sp.), Guinea grass (*Megathursus maximus*), *Ipomoea* spp., molasses grass (*Melinis minutifolia*), lantana (*Lantana camara*) and corky passionfruit (*Passiflora suberosa*).

### Restoration aims for the zone

The over-arching aim for zone 3 is to control weeds in a way that facilitates the recovery of native vegetation. Core goals for this zone include the need to control and contain the spread of cat's claw creeper which is currently and severely impacting native vegetation (zone 3a). While the greatest diversity and density of weeds occur in zone 3a, weeds are also impacting the ability of native vegetation to germinate and grow throughout zone 3b. This includes more sensitive vegetation such as saltmarsh, mangrove and other forest types. All weeds need to be controlled in a systematic, sensitive and integrated way so they are replaced by native vegetation rather than by other weeds.

### Restoration approach

This zone will be restored and managed using the assisted regeneration approach due to its capacity for recovery. It is recommended that weed control commence in the southern portion of zone 3a where it connects zone 2 and head in a northerly direction. It is suggested that the need for weed control is first stabilised in zone 3a before commencing primary weed control in zone 3b. It is also recommended that ongoing monitoring and weed control maintenance of all previous works (i.e. throughout zones 1 and 2) is continued as work progresses through zone 3. This will ensure that previous efforts are maximised and that all areas continue to be maintained. It will require a careful balance between maintenance and the primary and secondary works required throughout zone 3.

It is suggested that weed control commence with a team working in 10-20 m wide strips connecting the previously worked areas of zone 2 with the new areas of zone 3. Teams should work in an east-west direction between the edges of zone 3a (i.e. the eastern edge and the western edge) heading generally towards the north (i.e. until the northern part of the zone and boundary of zone 4 is reached).

Prior to the commencement of restoration works, it is suggested that two to three photo monitoring points be established (see section 5) to illustrate the changes in the area over time. One monitoring point should be established in the cat's claw area and the other two in areas where there is particular interest as how it will develop. It is suggested that a star picket and numbered safety cap are installed, and photos taken in several directions, prior to the commencement of works. These can then be used to illustrate the changes in the area. The coordinates of the photo monitoring point should also be recorded on the sheet provided in Appendix 8 to assist re-locating the point should the star picket be removed.

### Primary weed control – Zone 3a

- Commence with the control of woody weeds such as Easter cassia, umbrella tree, lantana and micky mouse bush < 3 m in height using the cut, scrape and paint (CS&P) technique (see Appendix 3 for how to carry out this technique and Appendix 4 for rates of control). Chop the stems of the plant up into 50 cm billets leaving them scattered on the ground to breakdown over time. Ensure the variation to the technique is applied to all micky mouse bush encountered to guarantee it does not continue to re-shoot for many years to come.
- At the same time, as the team moves through the area, control any exotic vines encountered as per Appendices 3 and 4. Vines such as corky passionfruit, morning glory and Brazilian nightshade can either be cut off native species and treated using the CS&P technique or if smaller placed on the ground to be spot-sprayed. Larger *Ipomoea* stems are best rolled up and elevated off the ground to limit its regrowth.
- As the team carefully moves through the area, simultaneously prepare it for spot-spraying by pulling and rolling exotic groundcovers such as Singapore daisy or purple succulent away from any native species. It is likely that where weeds such as Guinea grass and molasses grass are entwined with native groundcovers such as native basket grass, that more detailed preparation is required via the separation of exotics from native plants. Carefully preparing each area for spraying will assist the next stage of primary work i.e. initial control of weeds in the ground layer. Preparing areas for spot-spraying should be a relatively quick affair and should not take hours as this will seriously impact the overall efficiency of the weed control program i.e. a balance between accuracy and efficiency is necessary.
- When the cats claw infestation is reached, another variation to preparing this weed for CS&P is required. Commence with cutting mature vines at waist height and peel it off the host tree (even if the host tree is also a weed) before cutting it low to the ground and applying the CS&P technique. All vines above the cuts will die over time and the gap created between the ground and waist height will assist monitoring for regrowth. This should assist applying well timed follow up weed control (i.e. it will allow bush regenerators to see when cat's claw has regrown, so spot-spraying can again be applied before it again grows too high. Smaller vines that may be climbing shrubs can be cut off and left on the ground to spray. Retain as much leaf as possible on the smaller stems when peeling it off vegetation as the greater the amount of leaf, the larger the surface area which will facilitate a greater amount of herbicide being translocated to the underground tuber.

- Continue moving through the zone carrying out primary work via the control of woody weeds and vines and preparing areas for spot spraying. Once approximately half a hectare is done, spot-spray the ground infestations of weeds including exotic groundcovers and seedlings. Ensure the rate for cat's claw creeper is 1:100 Glyphosate Biactive® with 1 g of metsulfuron together with 20 ml of Pulse® and 20 ml of organic dye, to ensure the best result. Stronger rates of herbicide tend to burn the leaf preventing any impact to the underground tuber. The rate recommended has proven to be the most successful in controlling this serious and long term weed and even then, many years of ongoing maintenance will still be required.
- In the area east of the walking path, there is a large number of garden escapes and environmental weeds. If work is occurring in this area during Spring, ensure there are no birds nesting and if so, wait until the young have moved on before treating weeds. It should also be noted that the butterfly bush (*Buddleja madagascariensis*) can be irritating to workers when cutting due to its many fine hairs. Working this area on a day that has strong humidity or if it is raining will help provide weight to hairs. Control all woody weeds and vines using the CS&P technique leaving material cut up on the ground as mulch. Any pieces that re-shoot can be controlled during follow up or maintenance.
- Continue systematically working the area in 10-20 m wide strips using the previously worked area as the line and working between the eastern and western boundaries of the zone. This will ensure no areas of weed are left to re-infest areas already under maintenance, particularly if regular maintenance is applied.
- Continue to maintain previously worked areas as primary work progresses in the zone. It is good practice to walk through previously worked parts of the zone on the way to a new area to be worked. This assists with properly analysing the success of previous weed control efforts and determining if the area needs another maintenance run. It also assists with applying further preparation for spot-spraying using manual approaches such as crowning, hand-pulling or simply pushing weeds away from natives so native plants are easier to see during spot-spraying.
- Spray all ground infestations and any weeds that may have re-shot from cut segments (e.g. lantana). Ensure the rates of control listed in Appendix 4 are followed. Note that ground asparagus can take many months to die and that the rate listed has been proven to be the most effective when controlling this extensive weed. It should be noted that when spraying, the leaf of the plant is the target and the saturation of the soil should be avoided. This is also necessary if using alternative treatments such as steam.
- Once follow up spot spraying has been carried out and the germination of weeds have stabilised, stem inject larger weed trees such as umbrella tree. Ensure the umbrella tree is not in flower and if a number occur together, start with those that are next to native plants, so they can quickly take their position. See Appendix 3 for how to successfully carry out this technique and Appendix 4 for the rates of control. Note that when stem injection is carried out and the levels of light change in an area, that weed regrowth can again accelerate and maintenance may need to be more regularly applied.

## Ongoing Maintenance

- Ensure the regrowth of weeds across 3a has stabilised prior to commencing primary weed control work in zone 3b. Other previously worked areas (i.e. zones 1 and 2) should also be regularly monitored and maintained so all efforts are maximised and the germination and growth of native species is supported.
- Continue to record all works on the daily record sheet provided in Appendix 7. This includes ensuring prevailing winds, weather conditions and all herbicide use is recorded each day a team works on site. This will assist communicating activities including any challenges, opportunities and observations with stakeholders. All daily record sheets should also be forwarded to RCC at the end of each month.

## Primary weed control – Zone 3b

- Access in and around the golf course will need to be coordinated with the golf club to ensure bush regenerators are safe from golf balls and that weed control activities do not impede golfers.
- Even though considerable areas of this zone are taken up by the golf course, it is imperative that weed control is still carried out systematically (e.g. a strip at a time) and that all primary work commences from an area where weed control has already occurred (i.e. from the edge of zone 3a). Once the strip of vegetation adjacent to zone 3a is worked, other strips (east to west) of native vegetation following the fairways should be worked, starting with the area in the southern part of the zone (i.e. next to the beach).
- Commence with the control of woody weeds such as Brazilian pepper tree, Easter cassia, umbrella tree, lantana and micky mouse bush < 3 m in height using the cut, scrape and paint (CS&P) technique (see Appendix 3 for how to carry out this technique and Appendix 4 for rates of control). Chop the stems of the plant up into 50 cm billets leaving them scattered on the ground to breakdown over time. Ensure the variation to the technique is applied to all micky mouse bush encountered to guarantee it does not continue to re-shoot for many years to come. Collect and dispose of Easter cassia pods.
- At the same time, as the team moves through the area, control any exotic vines encountered as per Appendices 3 and 4. Vines such as corky passionfruit, morning glory and Brazilian nightshade can either be cut off native species and treated using the CS&P technique or if smaller, placed on the ground to be spot-sprayed. Larger *Ipomoea* stems are best rolled up and elevated off the ground to limit its regrowth.
- As the team moves through the area carrying out primary work, simultaneously prepare the area for spot-spraying by pulling / pushing and rolling exotic groundcovers away from any native species. Separating ground asparagus and Singapore daisy from native plants will assist accurate spot spraying and better ensure no off-target damage. Carefully preparing each area for spraying will assist the next stage of primary work i.e. initial control of weeds in the ground layer.



- Ensure all spot-spraying activities are done in conditions conducive to accurate works, where no drift or 'off target' damage occurs. Managing spot-spraying in a coastal situation where it is often windy requires good planning. This will include checking weather for the days and weeks ahead, planning activities to ensure maintenance can still be applied and being flexible [i.e. having areas where primary work can continue during days when the wind is up (e.g. zone 4), or spot-spraying in the morning before winds increase). Ensuring the team is aware of the parameters for spot-spraying and ensuring experienced personnel are used every time, will better ensure accuracy.
- The main weeds to be spot-sprayed include ground asparagus, fishbone fern, mother-in-laws tongue, purple succulent and Guinea grass as well as vines such as corky passionfruit, morning glory and cat's claw creeper. Any exotic seedlings or weeds re-shooting should be sprayed at the same time.
- It should be noted that wherever there is risk of erosion such as on steep slopes (e.g. surrounding the community hall) or tidal areas where there is little vegetation holding soil in place, careful consideration to the weed control technique applied together with how much weed is controlled, needs to be continually evaluated. This may be influenced by the time of year and therefore likely large rain events or storm surges, the level of native vegetation (and roots) stabilising an area, the position of the area in relation to the tide etc. It should also be noted that prevailing winds should also be taken into account when controlling weeds. For example, controlling larger areas of canopy weeds during July / August may result in salt laden winds further penetrating the canopy during August resulting in more sensitive vegetation in the understory being affected.

## Maintenance

- Continue to carry out regular weed control maintenance throughout all previously worked areas. Integrate the maintenance of the recently worked areas of zone 3b with those of zone 3a, as well as zones 1 and 2 (though most parts of zone 1 are likely to be stable). All worked areas are to be monitored for any changes and more intensive 'hot spots' such as the cat's claw area, is to be regularly monitored and maintained to ensure all efforts are maximised and the germination and growth of native species is supported.
- Continue to record all works on the daily record sheet provided in Appendix 7. This includes ensuring prevailing winds, weather conditions and all herbicide use is recorded each day a team works on site. This will assist communicating activities including any challenges, opportunities and observations with stakeholders. All daily record sheets should also be forwarded to RCC at the end of each month.
- Take regular photographs of the work being undertaken. It is suggested that whenever a 'before' photograph is taken (even if it is not a formal monitoring point), that an 'after' photo be taken post primary and secondary work to show the changes in the area (i.e. from the stage where there is obvious death of weeds to the regeneration stage). Ensure that the 'before' photos are replicated from each photo

monitoring point each year. These can be used to assist connecting community with the stages of recovery of each part of the site.

## Planting

- It is envisaged that most areas across the island will regenerate naturally with accurate and ongoing weed control. Areas that may require additional planting to assist increasing stability or complexity of vegetation are the areas around the community hall where erosion has occurred or is likely, as well as the zone impacted by cat's claw. Unless the area is unstable, it is recommended that any planting is carried out a minimum of three years post the weed control maintenance stage. This will allow bush regenerators to support the development of native vegetation (i.e. species and composition) rather than simply planting what we think should be there. Nature can then better guide planting decisions and resources can be better focused to ongoing weed control priorities.
- Ensure any planting mimics the regional ecosystem that is naturally occurring in that area / zone / ecotone; that local stock is sourced or seed is collected locally; and that any efforts are properly maintained i.e. that weeds are carefully controlled around planted stock.
- As it is likely that any planting done, will be within a natural area (unless additional landscaping near the pathway in zone 3a or around the hall is implemented), jute mat squares are suggested (rather than mulch) as a way of suppressing weed growth around a plant. These will breakdown over approx. a year and now on the market are degradable pins.
- Any planting done should be recorded including the species, amount and location where plants are installed so the history of the area including makeup of native vegetation is properly understood by land managers into the future.

## 3.5 Zone 4

### Description of zone

Zone 4 is approximately 6.1 ha in size and connects the golf course in the south-western corner of the island with the north of the island. It is approx. 1 km in length and mainly covers the western extent of the island, running parallel to much of Victoria Parade and extending to Flinders Street in the north.

Zone 4 is made up of a diversity of vegetation types all within a small amount of area. Mangroves line the western extent of the zone and are in good condition. They are mapped as 12.1.3: Mangrove shrubland to low closed forest occurring on Quaternary estuarine deposits. (BVG1M: 35a). Also throughout the lower lying areas is an intermittent thin strip of salt marsh vegetation. These areas are mapped as 12.1.2: Saltpan vegetation comprising *Sporobolus virginicus* grassland and samphire herbland. Grasses including *Zoysia macrantha* subsp. *macrantha* sometimes present in upper portions of tidal flats. Includes saline or

brackish sedgeland. Usually occurs on hypersaline Quaternary estuarine deposits. Marine plains/tidal flats. (BVG1M: 35b). From here is another strip of vegetation extending from the low-lying areas affected by tidal influence, up the slope to Victoria Parade. This mainly consists of 12.5.2a: *Corymbia intermedia*, *Eucalyptus tereticornis* woodland. Other species can include *Lophostemon suaveolens*, *Angophora leiocarpa*, *Eucalyptus acmenoides* or *E. portuensis*, *E. siderophloia* or *E. crebra*, *Corymbia tessellaris* and *Melaleuca quinquenervia* (lower slopes). *Eucalyptus exserta* is usually present in northern parts of bioregion. Occurs on complex of remnant Tertiary surfaces +/- Cainozoic and Mesozoic sediments usually in coastal areas with deep red soils (BVG1M: 9g).

A variety of weeds impact zone 4 though by far those that are having the greatest negative impact are mickey mouse bush (*Ochna serrulata*) and ground asparagus (*Asparagus aethiopicus*). These shade tolerant and resilient weeds, together with others such as crucifix orchid and fishbone fern, are seriously impeding the ability for native vegetation to germinate or grow. These weeds and others such as corky passionfruit, purple succulent and Easter cassia take up most of the available space, nutrients and water preventing the germination and growth of future generations of native plants and therefore a diversity of food and habitat to support a wider variety of fauna.

### Restoration goals

The over-arching aim for zone 4 is to control weeds in a way that facilitates the recovery of native vegetation. Core goals for this zone include the need to control the many environmental weeds severely impacting the germination and growth of native vegetation throughout the zone. Weed control should also be done in a way that is sensitive and done using techniques that do not promote erosion. This is particularly important around the slopes of the ochre caves and the slopes leading from the road to the flats adjacent to the mangroves. All weeds need to be controlled in a systematic and integrated way, so they are replaced by native vegetation rather than by other weeds.

### Restoration approach

This zone is to be restored and managed using an assisted regeneration approach (see section 2.1) due to its capacity for recovery. It is likely that the germination of native plants will occur both from the soil seedbank and due to the mostly healthy forest structure which will further assist the importation of seed and propagules.

It is recommended that weed control commence in the southern portion of the zone where it connects with zone 3 and works generally head in a northerly direction. While generally it is suggested that weed control maintenance be consolidated throughout zones 1, 2 and 3 prior to commencing primary work in zone 4, it is also possible that works may have started in this zone. Works may have commenced due to the need to undertake weed control in relation to Indigenous Landscape Values or Cultural Heritage, or due to the fact this zone is a good fall-back area for primary work when it was too windy on the other side of the island to continue any spraying. This zone is often sheltered which is likely due to the presence of the mangroves as well as the native canopy which is providing a more constant microclimate.

It is imperative that weed control maintenance and the monitoring of previous works (i.e.

throughout zones 1, 2 and 3) continue as work progresses, even while primary and secondary weed control is continuing in zone 4. This will ensure that previous efforts are maximised and that all areas worked, continue to be maintained. This requires a careful balance between maintenance and the primary and secondary works that need to occur throughout zone 4.

It should be noted that the Cultural Heritage surveys and Indigenous Landscape Values will influence how some of this area is managed particularly in relation to weed control around the ochre caves or access to certain parts of the area. It is suggested that as some of the areas around the caves are already eroding, that careful weed control be applied and that close liaison with Traditional Owners occur to assist applying appropriate weed control techniques. Stability of the slopes and therefore the integrity of the area needs to be retained.

It is suggested that weed control commence with a team working in 10-15 m wide strips depending on the density of weeds encountered. The width of the zone is approx. 50-70 m wide and ensuring the total area between the mangroves and the top of the hill / edge of Victoria Parade is worked. Generally, the team/s should work from the boundary of zone 3 in a northerly direction towards zone 5 ensuring the full width of the zone is consolidated in sections before continuing to head north. The area that is currently being worked by an individual carer (see Figure 1) should be left as this area is being worked using an organic approach. Work within this area requires consolidation by the individual carer before works are expanded by him. Either side of this area should be worked according to the recommendations outlined below.

Prior to the commencement of restoration works, it is suggested that two to three photo monitoring points be established (see section 5) to illustrate the changes in the area over time. It is suggested that a star picket and numbered safety cap are installed, and photos taken in several directions, prior to the commencement of works. These can then be used to illustrate the changes in the area. The coordinates of the photo monitoring point should also be recorded on the sheet provided in Appendix 8 to assist re-locating the point should the star picket be removed and forwarded to RCC for their records.

### Primary weed control

- Commence with the control of woody weeds such as Easter cassia, mickey mouse bush, umbrella tree, orange jessamine and Brazilian pepper tree etc. < 3 m in height using the cut, scrape and paint (CS&P) technique (see Appendix 3 for how to carry out this technique and Appendix 4 for rates of control). Ensure the variation to this technique is applied to the many *Ochna serrulata* in this zone as it will reduce the need for long term follow up. Chop the stems of the plant up into approx. 50 cm billets leaving them scattered on the ground to breakdown over time. Larger stems / trunks of the umbrella tree can be elevated off the ground to avoid them re-shooting.
- At the same time, as the team moves through each area of the zone, control any exotic vines encountered as per Appendices 3 and 4. Vines such as corky passionfruit and Brazilian nightshade can either be cut off native species and treated using the CS&P technique or if smaller, placed on the ground to the spot-sprayed or hand pulled in areas where erosion is not a risk.

- As the team moves through the area, simultaneously prepare it for spot-spraying by pushing weeds away from natives or hand pulling / crowning small amounts of weed (e.g. ground asparagus, fishbone fern, crucifix orchid) where it is close to native vegetation to assist safe and accurate spray works. Exotic grasses and some ground asparagus can sometimes be quickly tied in a knot to assist containing the weed and making a native seedling / groundcover more obvious when spot spraying. Preparing areas for spot-spraying should be a relatively quick affair and should not take hours as this will seriously impact the overall efficiency of the weed control program i.e. a balance between accuracy and efficiency is necessary.
- As carrying out an initial spray of the exotic ground layer is also considered primary work, it is suggested that after approximately 200 m of length of the zone has had initial woody and vine control and is prepared for spraying, that a primary spot-spray occur. Bush regeneration teams are to ensure that weather conditions are suitable to spot-spraying and that the rates of control are followed for the weeds likely to be encountered (see Appendix 4). A mix of ground weeds such as ground asparagus, crucifix orchid, fishbone fern, Swedish ivy and others will be regularly encountered. Good adjustable nozzles are to be utilised and it is suggested that atomizers filled with water also be carried by operators to assist immediately washing off any herbicide that may be accidentally applied to any native groundcovers / seedlings. Refer to Appendix 5 for more tips on how to successfully spray as a team in a natural area situation.
- It should be noted that there are some areas on slopes or around the caves where potential erosion could occur as a result of certain weed control actions. The weed control techniques applied will need to be carefully considered and ensure they do not exacerbate erosion. For example, even though weed control techniques such as crowning or hand pulling can be used to control weeds such as ground asparagus or crucifix orchid, applying this technique may not be suitable to control weeds around the caves as it has the potential to destabilise the area. Spot spraying and techniques such as cut, scrape and paint are more suitable as the roots of the plant are retained to assist stability.
- Continue working in 10 -15 m wide strips carrying out primary woody weed and vine control and primary spot-spraying in sections. Ensure each section treated can be easily monitored and maintained before moving into the next section. This also includes maintaining zones 1, 2 and 3.
- Any areas of greater weed infestation should be noted on the daily record sheet (see Appendix 7) so ongoing monitoring and weed control maintenance is efficient.
- Once weed regrowth in the understorey has stabilised, stem inject larger woody weeds in the midstory or canopy. The main weed requiring this treatment is umbrella tree. Ensure these are not in flower when stem injecting as anecdotal evidence suggests that birds feeding on nectar might be impacted. If the plant is in fruit, the same impacts do not apply. See Appendix 3 for how to successfully carry out this technique and Appendix 4 for the rates of control.
- Ensure all works are recorded on a daily record sheet (see Appendix 7) and that these are forwarded regularly to RCC for their records.

## Maintenance

- It is good practice to walk through areas previously treated on the way to a new area so good decisions relating to maintenance can be made including when to maintain an area before expanding primary work in the same zone. It is imperative that weed regrowth does not out-compete or prevent native plant germination and it is equally important that areas are not over-maintained, ensuring resources are maximised. This balanced approach will also ensure all plants are recognisable (i.e. that plants are not controlled at the cotyledon stage where confusion as to the species can occur) and to ensure herbicide is applied in an accurate manner (i.e. it is good practice to ensure herbicide is applied to the leaf and not the soil). This will better ensure weeds are controlled at the optimal time further assisting good ecological restoration practice and recovery of the zone and site.
- The areas containing mother of millions and ground asparagus or are closer to the edges where weeds are escaping from gardens, are likely to require more maintenance than those in the centre of the zone or contain a greater density of native plants. For example, in the first two years of weed control work in this zone, it is likely that there will be successional germinations of ground asparagus in areas where it is currently thick requiring more regular maintenance (e.g. every 4-6 weeks for the first year; every 6-8 weeks for year 2; every 8 weeks for year 3; every 8-12 weeks for year 4 etc. until the area reaches a point of minimal maintenance). Once native vegetation fills the gaps, a reduction in weed control maintenance will be better guaranteed however weeds such as Easter cassia and silver-leaved desmodium have a 10-15 year seed viability and the likelihood of ground asparagus and ochna being regularly imported to the site via birds is high, even from the mainland.
- Depending on the stage of the maintenance program (e.g. year 1, 3, 7 etc.), a team should thoroughly work through the entire zone carrying out maintenance. The regularity to which this should happen will depend on how long the area has been maintained and the stage of the program. It is envisaged that maintenance will still need to occur through this zone up to three to four times a year. Eventually (i.e. after 10 years work) it is envisaged that ongoing hand weeding will be sufficient provided a regular maintenance regime is maintained.
- It is suggested that wherever possible, the same team (or at least the supervisor) be used to carry out weed control on the island so site knowledge and familiarity with 'hot spots' and sensitive areas are further built. It also provides connection between the community and the project and ensures resources are maximised.
- It should be noted that weed control within the individual carers area (see Figure 1) should be applied more systematically. Currently there is no clean edge to work from and weeds are still scattered throughout the area even though some headway has been made. It is strongly recommended that works again commence from one end of the mapped area (see Figure 1) and be progressed fully in each area before expanding works. That means all weeds are to be controlled in each patch in the understory before carrying out work in the next strip, always building off previously worked areas. This will better ensure previous efforts are not lost.

- If a major weather event occurs (e.g. a significant storm) which could result in the loss of the canopy (trees will re-shoot over time if they remain intact), that resources be made available to assist well timed follow up weed control. Even if the site has been well maintained for 7 years and weed germination and growth is minimal, a large disturbance event may open up the area and weeds that have laid dormant in the soil seedbank are likely to germinate. It is essential that weed control is again applied in a timely and accurate manner to ensure native plants are provided the opportunity to germinate and grow.
- Each time a team works, a daily record sheet and herbicide application sheet (see Appendix 7) is to be filled out and forwarded to RCC for their records. Any unusual observations including flora and fauna are to be recorded and communicated.

### 3.6 Zone 5

#### Description of zone

Zone 5 covers the northern strip of the island and is approximately 7.7 hectares in size and on average 70 m wide. It connects the northern part of zone 4 with the northern part of zone 1 and includes a number of cells being managed by the local Bushcare group (see Appendix 1 for location). This zone also includes an area on the north-eastern side of the island and this part of the zone connects the Coastcare areas. Zone 5 extends from the junction of Victoria Parade and Flinders Street in the west, with its southern extent following Flinders Street until it joins up with Victoria Parade for approximately 570 m when it bends to the south and meets up with the coast care area.

The vegetation in this area mainly consists of Regional Ecosystem 12.5.2a *Corymbia intermedia*, *Eucalyptus tereticornis* woodland. Other species can include *Lophostemon suaveolens*, *Angophora leiocarpa*, *Eucalyptus acmenoides* or *E. portuensis*, *E. siderophloia* or *E. crebra*, *Corymbia tessellaris* and *Melaleuca quinquenervia* (lower slopes). *Eucalyptus exserta* is usually present in northern parts of bioregion. Occurs on complex of remnant Tertiary surfaces +/- Cainozoic and Mesozoic sediments usually in coastal areas with deep red soils. (BVG1M: 9g).

A variety of weeds impacting zone 5 vary according to the type of native vegetation, area within the zone and the complexity of vegetation structure (e.g. open area versus canopy cover). This zone is impacted by the main weeds affecting much of the vegetation across the island including mickey mouse bush (*Ochna serrulata*), ground asparagus (*Asparagus aethiopicus*), Easter cassia (*Senna pendula* var. *glabrata*), mother of millions (*Bryophyllum delagoense*), Brazilian nightshade (*Solanum seaforthianum*) and corky passionfruit (*Passiflora suberosa*). These resilient weeds, together with others such as fishbone fern (*Nephrolepis cordifolia*), painted spurge (*Euphorbia cyathophora*), silver leaved desmodium (*Desmodium uncinatum*) and exotic grasses etc. are out-competing native plants for resources and are seriously impeding the ability for native vegetation to germinate or grow.

## Restoration goals

The over-arching aim for zone 5 is to control weeds in a way that facilitates the recovery of native vegetation. Core goals for this zone include the need to systematically and sensitively control weeds so whole areas (and the site itself) is fully consolidated and that all areas reach a point where only minimal maintenance is required.

## Restoration approach

This zone is to be restored and managed using an assisted regeneration approach (see section 2.1). Its capacity for recovery is excellent and it is likely the germination of native plants will occur from the soil seedbank and will be supplemented by those in the canopy, either directly via seed drop or via avifauna being attracted to those areas and further dispersing native seed / propagules as they come into feed, rest or roost. In addition, the existing structure of much of the zone assists with providing a healthy microclimate conducive to the germination and growth of a range of native plants.

It is recommended that weed control commence in the western portion of the zone where it connects with zone 4 and that works generally head in an easterly direction. While it is suggested that weed control maintenance be consolidated throughout zones 1, 2, 3 and 4, prior to commencing primary work in zone 5, it is also possible that works may have started in the eastern portion of the zone (close to zone 1) due to an extension or consolidation of works from or between the Bushcare and Coastcare managed areas. Whichever the direction of works (i.e. from zone 1 or 4), it is vital that all weed control builds on previous efforts, and that monitoring and maintenance continues in those previously worked areas. It is imperative that those areas are stable before increasing the area of primary work. It should be noted that both community groups (Bushcare and Coastcare) may require assistance with the areas they are working in and may require notification as to when a bush regeneration team is working near one of their sites. As work progresses on the island and trust between professional bush regeneration teams and community groups build, there may need to be additional resources allocated so professional teams can further assist the groups with weed control maintenance.

It is suggested that weed control commence with a team of three bush regenerators working in 10-20 m wide strips depending on the density of weed encountered. The width of the zone is approx. 70 m wide and it is important to ensure the full width of the zone between the tidal area (e.g. mangrove vegetation) and the edge of the forest adjacent to Flinders Street is worked. Generally, the team/s should work from the boundary of zone 4 in an easterly direction towards zone 1 ensuring each area is consolidated in sections before continuing to move east.

Prior to the commencement of restoration works, it is suggested that two photo monitoring points be established (see section 5) to illustrate the changes in the area over time. It is suggested that a star picket and numbered safety cap are installed and photos taken in several directions, prior to the commencement of works. These can then be used to illustrate the changes in the area. The coordinates of the photo monitoring point should also be recorded on the sheet provided in Appendix 8 to assist re-locating the point should the star picket be removed and forwarded to RCC for their records.



## Primary weed control

- Commence with the control of woody weeds such as Easter cassia, mickey mouse bush, umbrella tree, Brazilian pepper tree etc. < 3 m in height using the cut, scrape and paint (CS&P) technique (see Appendix 3 for how to carry out this technique and Appendix 4 for rates of control). Ensure the variation to this technique is applied to the many mickey mouse bush in this zone as it will reduce the need for long term follow up. Chop the stems of the plant up into approx. 50 cm billets leaving them scattered on the ground to breakdown over time. Larger stems / trunks of the umbrella tree can be elevated off the ground to avoid them re-shooting.
- At the same time, as the team moves through each area of the zone, control any exotic vines encountered as per Appendices 3 and 4. Vines such as corky passionfruit and Brazilian nightshade can either be cut off native species and treated using the CS&P technique or if smaller, either placed on the ground to be spot-sprayed or hand pulled.
- As the team moves through the area, simultaneously prepare it for spot-spraying by pushing weeds away from natives or hand pulling / crowning small amounts of weed (e.g. ground asparagus, fishbone fern, crucifix orchid) where it is close to native vegetation which will assist safe and accurate spray works. Exotic grasses and some ground asparagus can sometimes be quickly tied in a knot to assist containing the weed and making a native seedling / groundcover more obvious when spot spraying. Preparing areas for spot-spraying should be a relatively quick affair and should not take hours as this will seriously impact the overall efficiency of the weed control program i.e. a balance between accuracy and efficiency is required.
- As carrying out an initial spray of the exotic ground layer is also considered primary work, it is suggested that after approximately 200 m of length of the zone has had initial woody and vine control and is prepared for spraying, that a primary spot-spray occur. Bush regeneration teams are to ensure that weather conditions are suitable to spot-spraying and that the rates of control are followed for the weeds likely to be encountered (see Appendix 4). Good adjustable nozzles are to be utilised and it is suggested that atomizers filled with water also be carried by operators to assist washing off any herbicide that may be accidentally applied to any native groundcovers / seedlings. Refer to Appendix 5 for more tips on how to successfully spray as a team in a natural area situation.
- In areas where native plants fill the ground layer, hand weeding weeds such as manually removing the painted spurge and annuals, as well as crowning isolated ground asparagus, is likely the most effective option. Ongoing assessments of each area to determine the optimal approach for weed control is essential while ensuring all team members are able to positively identify all species – native and weed.
- Continue working in 10 -20 m wide strips carrying out primary woody weed and vine control and primary spot-spraying in sections. Ensure each section treated can be easily monitored and maintained before moving into the next section. This also includes maintaining zones 1, 2, 3 and 4 ensuring the level of primary work in zone 5 is increased only when it is determined all other zones are stable.

- Any areas of greater weed infestation should be noted on the daily record sheet (see Appendix 7) so ongoing monitoring and weed control maintenance is efficient. Other site observations including flora and fauna of note should also be recorded.
- Once weed regrowth in the understorey has stabilised, stem inject larger woody weeds in the midstory or canopy that are not next to roads or pathways. The main weed requiring this treatment is umbrella tree and African tulip tree. Ensure umbrella trees are not in flower when stem injecting as anecdotal evidence suggests that birds feeding on nectar might be impacted. If the plant is in fruit, the same impacts do not apply. See Appendix 3 for how to successfully carry out this technique and Appendix 4 for the rates of control.
- Ensure all works are recorded on a daily record sheet (see Appendix 7) and that these are forwarded regularly to RCC for their records.

## Maintenance

- It is good practice to walk through areas previously treated on the way to a new area so good decisions relating to the timing of maintenance (and the effectiveness of previous work) can be made including when to maintain an area before expanding primary work in the same zone. It is imperative that weed regrowth does not out-compete or prevent native plant germination and it is equally important that areas are not over-maintained, ensuring resources are maximised. This balanced approach will also ensure all plants are recognisable (i.e. that plants are not controlled at the cotyledon stage where confusion as to the species can occur) and to ensure herbicide is applied in an accurate manner (i.e. it is good practice to ensure herbicide is applied to the leaf and not the soil). This will better ensure weeds are controlled at the optimal time further assisting good ecological restoration practice and recovery of the zone and site.
- The areas containing mother of millions and ground asparagus or are closer to the edges where weeds are escaping from gardens, are likely to require more regular maintenance than those in the forested areas in the west of the zone. For example, in the first two years of weed control work in this zone, it is likely that there will be successional germinations of ground asparagus in areas where it is currently thick requiring more regular maintenance (e.g. every 4-6 weeks for the first year; every 6-8 weeks for year 2; every 8 weeks for year 3; every 8-12 weeks for year 4 etc. until the area reaches a point of minimal maintenance). Once native vegetation fills the gaps, a reduction in weed control maintenance will be better guaranteed however weeds such as Easter cassia and silver-leaved desmodium have a 10-15 year seed viability and the likelihood of ground asparagus and ochna being regularly imported to the site via birds is high, even from the mainland.
- Depending on the stage of the maintenance program (e.g. year 1, 3, 7 etc.), a team should thoroughly work through the entire zone carrying out maintenance. The regularity to which this should happen will depend on how long the area has been under maintenance, any 'hot spots' still requiring more intensive treatment, whether an area has had any recent disturbance or the stage of the program. It is envisaged that maintenance will still need to occur through this zone up to three to four times a

year. Eventually (i.e. after 5-10 years work) it is envisaged that ongoing hand weeding will be sufficient provided a regular maintenance regime is maintained.

- Should the numbers within each community group decline and there is an inability to continue regular maintenance in their patches, further support by contractors and Council may be required to carry out weed control maintenance throughout those areas. Liaison with the groups will also be required to ensure they are satisfied with the approach to weed control in around their mapped patches. Further training of group members as well as ongoing negotiation with regard to the application of certain weed control techniques will need to occur to ensure the relationships between community, Council and professional contractors continues to grow.
- It is suggested that wherever possible, the same team (or at least the supervisor) be used to carry out weed control on the island so site knowledge and familiarity with 'hot spots' and sensitive areas are further built. It also provides connection between the community and the project and ensures resources are maximised.
- If a major weather event occurs (e.g. a significant storm) which could result in the loss of the canopy (trees will re-shoot over time if they remain intact), that resources be made available to assist well timed follow up weed control. Even if the site has been well maintained for 7 years and weed germination and growth is minimal, a large disturbance event may 'open up' the area and weeds that have laid dormant in the soil seedbank are likely to germinate. It is essential that weed control is again applied in a timely and accurate manner to ensure native plants are provided the opportunity to germinate and grow.
- Each time a team works, a daily record sheet and herbicide application sheet (see Appendix 7) is to be filled out and forwarded to RCC for their records. Any unusual observations including flora and fauna are to be recorded and communicated.
- Continue with photo monitoring i.e. ensuring that at least annual photographs are taken of each area and where possible from the established photo monitoring point, following the guidelines set out in section 4.

## 4 Monitoring

Monitoring the recovery process of the site is critical to identifying whether the measures implemented are sufficient and to ensure the project goals are met. Monitoring also identifies if further (or different) interventions are needed to remove obstacles that may be hindering the sites recovery (McDonald et al, 2016).

Monitoring should commence prior to any work being undertaken at the site. This is an important step in assessing the baseline condition of the site against which all future monitoring will be compared.

The recovery wheel (Appendix 5) should be used to assess each zone or subzone prior to works (McDonald et al, 2016). The wheel allows the assessor to evaluate the site based on a number of criteria and assign an overall score. The assessment of each zone should occur prior to work commencing and then annually based on a healthy and nearby reference system of the same RE. In addition, studying a nearby reference system is highly likely to assist bush regenerators and land managers understanding if a zone, area or the site is on the correct trajectory. Ideally, the person assessing the site from a monitoring perspective and applying the recovery Wheel would have a good understanding of the project, the site itself and the structure, function, dynamics and diversity of this system/s.

In addition to above mentioned and more scientific monitoring, permanent photo point locations should be established within each zone. The location of some photo monitoring sites have been recommended in this plan based on specific findings, however additional locations would need to be installed. Experienced bush regenerators will be able to identify the most suitable locations for photo monitoring so the demonstration in the changes to the site can be properly captured to share with stakeholders at a later date.

The following is recommended for the establishment of photo monitoring points:

- install a permanent star picket in the ground and number the point by writing on the safety cap, prior to the photo being taken
- record important information such as a GPS location, date, direction, conditions, time of day and the type of camera used
- ensure photos can be replicated and the changes documented. Use features (e.g. large tree, track, dead stag etc.) to align the photo. Ensure the feature chosen is unlikely to change
- ensure changes in both assisted regeneration and revegetation areas are both captured
- take photographs prior to the commencement of works, after initial works (as this is often a major change worth documenting and communicating) and at the end of the first year and then annually
- take photographs after any major event such as (flood, vandalism etc.) so these records can also be used to document the changes in the site over time.

An assessment proforma for the recovery wheel and the photo monitoring is provided in Appendix 6.

## 5 Additional recommendations

- In recognition of the significant Cultural Heritage, Indigenous Landscape Values and past landscape management, Traditional Owners should be actively engaged and where possible, involved in the delivery of weed management activities including planning of works, consultation and on ground delivery.
- The activities and recommendations outlined in this integrated weed management plan shall be conducted with due regard to the findings and recommendations of the Coochiemudlo Island Cultural Heritage Survey and Management Plan and *Aboriginal Cultural Heritage Act 2003*.
- Further opportunities for partnership projects with QYAC, community groups, Council and the broader Coochiemudlo community should be explored.
- It is important that all contractors display signage that informs residents or visitors to the island that herbicide spraying is in progress. Signs near the work area and access points to that area should be displayed to inform people of herbicide use.
- Ensure good weed hygiene practices are implemented. Before a contractor's work vehicle or a slasher is driven onto the ferry, it should be checked and at the very least, cleaned of all visible weed seed. If a contractor has been on another site containing prohibited or restricted weeds under the *Biosecurity Act 2014*, prior to working on Coochiemudlo island, consideration to proving the vehicle has been properly washed down should be considered.
- That any burns including fuel reduction and ecological burns that may be applied to the wetland area (i.e. zone 1) be resourced appropriately including ensuring there is sufficient resources provided for well-timed follow up weed control. This will ensure the gaps created through natural disturbance will be filled with native plants and not more weeds.
- Redland City Council consider the removal of all exotic palms from the island. Cocos palms and date palms should be considered for removal to assist reducing the ongoing dispersal of these weeds into natural areas. It should be noted that these weeds also grow on private land and a good education program and removal that is funded by RCC, will likely assist residents supporting the control program. It should be noted that growing these palms is not illegal however their fruits and seeds are readily dispersed by birds and flying foxes into natural areas.

As a number of other weeds impacting natural areas on the island also grow in gardens or are a result of the close proximity of gardens to the natural areas (i.e. they either grow directly into nature or have been dumped by residents), additional education around this issue is strongly encouraged. Redland City Council offer Environmental Partnerships such as 'Your Backyard Garden' program which aims to support residents adjacent to conservation land with information and tips on how to manage weeds. Information and training could also be provided to residents around weed control and include training on weed control as well as provide them with tips

on the management of weeds. In addition, information on suitable replacement native plants could also be provided.

- That a day every 6-12 months be allocated to support the restoration of community sites by a team of professional bush regenerators. It is envisaged that a professional and experienced team work with the community groups or volunteers at the golf club and on community Bushcare and Coastcare sites to continue to progress work. Skills relating to weed control, plant identification (weed and native) and site management may be shared and if community groups such as Bushcare want extra work done on their site (primary or maintenance) that further resources be provided to connect community sites with the broader work schedule.
- As Coastcare is supported with a non-herbicide approach to weed control in the zones marked on the map as Coastcare (see Figure 1), it is recommended a professional team will need to support weed control in the areas to the west of the Coastcare site (i.e. along the 'Emerald Fringe') as most of the weeds present in that part of the zone are either not able to be controlled using a non-herbicide approach, or are too large in volume for the group to currently manage as they already work significant areas. Weeds such as ground asparagus, micky mouse bush, umbrella tree, rubber tree, yucca, silver-leaved desmodium and garden escapes require control to a point where the Coastcare group may more easily maintain the area via hand weeding.
- Notification to the contractors if a school group is booked to visit the island should be provided with at least with 1 weeks notice. This will prevent any conflict or perceived conflict between school children and weed control works. If Council is aware that a group is visiting the wetlands then informing contractors will be very helpful as they can easily move works to zone 3 or 4. If schools are visiting the whole island, then it may be more effective if contractors either did not go to Coochiemudlo that day or if they did, refrained from spraying. Any notification of schools visiting the island should be shared between community groups, Council and contractors.
- If the Coastcare group is successful with acquiring a steam weeding machine, then a monitoring program be established to determine the success of steam on a number of different weed species in a particular area. The impacts to soil biota has also not been tested and as sand is very open, particularly in comparison to other soil types, establishing some plots to determine if there are any impacts should be considered.

## References

Cardno Chenoweth EPLA and Bushland Restoration Services. 2012. South East Queensland Ecological Restoration Framework: Code of Practice, Guidelines and Manual prepared on behalf of SEQ Catchments and South East Queensland Local Government, Brisbane.

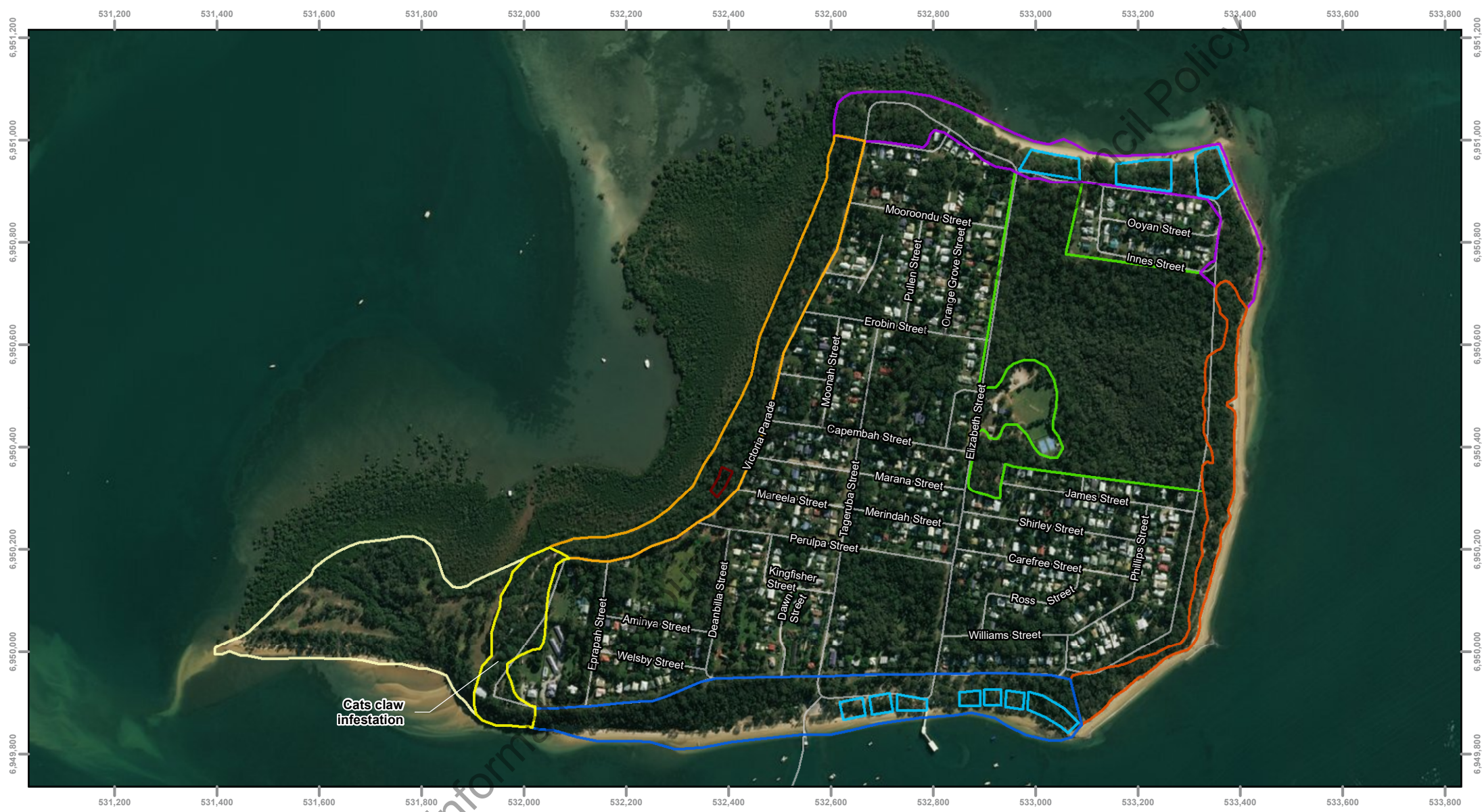
McDonald T, Jonson J and Dixon KW. 2016. National Standards for the Practice of Ecological Restoration in Australia. *Restoration Ecology* vol 24(1): pg S4-S32

Background information resource only. Not endorsed Council Policy

## Appendix 1    Restoration map

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**Figure 1: Restoration zones**

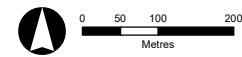
Redland City Council

Coochiemudlo Island weed management plan

- |  |   |   |
|--|---|---|
|  Bushcare site    |  Zone 1  |  Zone 3b |
|  Coastcare area   |  Zone 2  |  Zone 4  |
|  Individual carer |  Zone 3a |  Zone 5  |



Job number: PR2044  
 Revision: 2  
 Author: DB, KF  
 Date: 22/11/2017



GDA 1994 MGA Zone 56  
 Projection: Transverse Mercator  
 Datum: GDA 1994  
 Units: Meter

## Appendix 2 Priority weed profiles

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## Weed Profile Sheet

<b>Scientific Name</b>	<i>Epidendrum ibaguense</i> and hybrids	
<b>Common Name</b>	<b>Crucifix orchid</b>	
<b>Family</b>	Orchidaceae	
<b>Origin</b>	South America	
<b>Habitat</b>	Cultivated, found near human habitation	
<b>Habit</b>	Erect, terrestrial, clumping herb with reed-like stems up to 1 metre, 0.5 cm diameter stems	
<b>Leaves</b>	Type: Simple	
Arrangement:	Alternate, sheaths stem	
Shape:	Narrowly oblong, apex rounded with a slight notch	
Colour:	Colour:	Dark green, leathery
	Size:	1.5-12 cm long
	<b>Flowers</b>	Orchid flower, labellum shaped like a tiny golden cross
Colour:	Reddish yellow, to purple with yellow lip	
	Season:	Year round
	Inflorescence:	Terminal raceme to 60 cm with up to 50 flowers
	<b>Fruit</b>	Season:
Colour:	Type:	
	Size:	2.5-4 cm long, ellipsoid shape
	<b>Seed</b>	
Viability:	Germination:	
	<b>Root Systems</b>	Aerial roots, hybrid will root at nodes
	<b>Dispersal</b>	Reproduces vegetatively, with new growths on stems and flower stalks. Spread by garden dumping, brush-cutting / slashing
<b>Control Techniques</b>	Carefully hand pull, compost on site or bag and remove. If composting place away from drainage lines and creeks and where it can be easily monitored for control of regrowth. Spray 1:50 glyphosate + 1.5 g Associate®:10 L of water + surfactant (e.g. Pulse®) + dye.	
<b>Response to Fire</b>		
<b>Similar Native Species</b>		



(Photo: <http://www.orquidea-algarve.com>)



(Photo: Kurt Stueber)

## Weed Profile Sheet

<b>Scientific Name</b>	<i>Dolichandra unguis-cati</i> ( <i>Macfadyena unguis-cati</i> )
<b>Common Name</b>	<b>Cat's claw creeper</b>
<b>Family</b>	Bignoniaceae
<b>Origin</b>	Brazil and Argentina
<b>Habitat</b>	Sometimes cultivated as an ornamental, it prefers warm-temperate, tropical and sub-tropical areas. It has become naturalised in disturbed rainforests, along roadsides and waterways. Tolerates a variety of soil types.
<b>Habit</b>	Woody climber, stems can extend for more than 20 m. Leaves have two leaflets with a three-clawed tendril (3-17 mm long) growing between them
<b>Leaves</b>	Type: Compound Arrangement: Opposite Shape: Elliptic to ovate Colour: Light green Size: 5-25 mm
<b>Flowers</b>	Colour: Bright yellow Season: Typically early spring and darker flower version in mid-summer
<b>Fruit</b>	Inflorescence: solitary/axillary Season: Summer Colour: Seeds contained in green glossy narrow flat pods, dark brown/black as they mature Type: Winged seeds Size: 10-40 mm x 4-10 mm
<b>Seed</b>	Viability: 1-2 year Germination: High %
<b>Root Systems</b>	Tap, adventitious roots, swollen large underground tubers
<b>Dispersal</b>	Water, wind, gravity.
<b>Control Techniques</b>	C-S-P main stem and prostrate stems as much as possible after cutting off the tree using 1:1 Glyphosate Spot spray with 1:100 Glyphosate + 1 g Associate with 20 ml adjuvant (e.g. Pulse) +20 ml dye per 10 L water
<b>Response to Fire</b>	Very good - resprouts
<b>Similar Native Species</b>	



(Photo: SEQ Catchments)



(Photo: DAFF)

## Weed Profile Sheet

<b>Scientific Name</b>	<i>Passiflora suberosa</i>
<b>Common Name</b>	<b>Corky passionfruit</b>
<b>Family</b>	Passifloraceae
<b>Origin</b>	South America
<b>Habitat</b>	Sometimes cultivated as an ornamental, has become naturalised in disturbed rainforest, sclerophyll forest types and coastal communities in warmer areas, especially margins and gaps. Tolerates a variety of soil types.
<b>Habit</b>	Slender vine with axillary tendrils. Stems green becoming corky particularly at the base.
<b>Leaves</b>	Type: Simple Arrangement: Alternate Shape: Deeply lobed Colour: Dark green Size: 3-10 x 5-12 cm
<b>Flowers</b>	Colour: Pale greenish Season: Late Summer/Autumn Inflorescence: solitary/axillary
<b>Fruit</b>	Season: Autumn/Winter Colour: Purple black Type: Berry Size:
<b>Seed</b>	Viability: 1-2 seasons Germination: High %
<b>Root Systems</b>	Tap and lateral, prostrate stems layer, Coppice from damaged main stems, shoot from stolon.
<b>Dispersal</b>	Birds, humans (as per cultivation), rodents, water, gravity.
<b>Control Techniques</b>	C-S-P main stem and prostrate stems as much as possible 1:1.5 Spot spray with glyphosate 1:50 or Brushoff with surfactant and dye. Hand pull young plants.
<b>Response to Fire</b>	Re-shoots from the base
<b>Similar Native Species</b>	Native passionfruit ( <i>Passiflora herbertiana</i> )



(Photo: Sheldon Navie)



(Photo: Sheldon Navie)

## Weed Profile Sheet

**Scientific Name** *Asparagus aethiopicus* 'Sprengeri'

**Common Name** **Ground Asparagus**  
A declared noxious weed on Lord Howe Island

**Family** Asparagaceae  
**Origin** Native of South Africa  
**Habitat** Cultivated as an ornamental. Extensively naturalised in the Sydney Region. A serious weed in bushland chiefly in coastal districts north from South Coast of NSW north into QLD. Occurs on nutrient enriched coastal sands and rainforest margins.

**Habit** Perennial shrub with sprawling stems to 2 m long.

**Leaves** Type: Scale-like, Cladodes (mod stem)  
Simple Alternate

Arrangement:

Shape: Linear  
Colour: Pale green  
Size: 15-25 mm x 2-3 mm

**Flowers**

Colour: White to pinkish  
Season: Chiefly Spring to Summer

Inflorescence: Axillary racemes

**Fruit** Season: Summer to Autumn  
Colour: Red (will ripen off the plant)  
Type: Berry  
Size: 5 mm

**Seed**

Viability: Several seasons  
Germination: Easy – high %

**Root Systems** Fibrous, arising from compact rhizomes, tuberous, water and food storage organs

**Dispersal** Humans, birds, water, gravity, cultivation and rubbish dumping

**Control Techniques** Crowning; Spot spray 1:100 + 1g Associate® + surfactant (e.g. Pulse®) to 10 L water + dye. When crowning, remove rhizomes and elevate from ground to avoid re-shooting

**Response to Fire** Will re-shoot from rhizome

**Similar Native Species**



(Photo: Sheldon Navie)



(Photo: Sheldon Navie)

## Weed Profile Sheet

<b>Scientific Name</b>	<i>Bryophyllum</i> spp. ( <i>delagoense</i> / <i>pinnatum</i> )
<b>Common Name</b>	<b>Mother-of-millions</b>
<b>Family</b>	Crassulaceae
<b>Origin</b>	Native of South Africa / Madagascar
<b>Habitat</b>	Widely naturalised, often growing in rocky sties near habitation. Occurs frequently in coastal sandy soils.
<b>Habit</b>	Erect succulent, perennial herb up to 1 m
<b>Leaves</b>	Type: Simple Arrangement: Opposite and whorls of 3 Shape: Notched towards the apex where plantlets are produced Colour: Spotted violet – brown, green, pinkish Size: 2.5-15 cm x 5-10 mm
<b>Flowers</b>	Colour: Salmon coloured to scarlet Season: Mainly early summer, can flower all year Inflorescence: Cyme-like terminal cluster
<b>Fruit</b>	Season: Chiefly Autumn Colour: Type: 4 clustered follicle Size:
<b>Seed</b>	Many seeded Viability: Germination:
<b>Root Systems</b>	Weak tap and lateral. Will layer. Sucker from the base of stems. Asexually by plantlets (numerous).
<b>Dispersal</b>	Plantlets, rubbish dumping, vegetative parts, water transporting
<b>Control Techniques</b>	Hand remove and compost. Trials with spraying Glyphosate 1:100 + surfactant. Spray with Metsulfuron methyl (e.g. Associate®) 1g : 10 L water + surfactant (20 ml) + dye for best results.
<b>Response to Fire</b>	
<b>Similar Native Species</b>	



(Photo: Sheldon Navie)



(Photo: Sheldon Navie)

## Weed Profile Sheet

<b>Scientific Name</b>	<i>Nephrolepis cordifolia</i>
<b>Common Name</b>	<b>Fishbone Fern</b>
<b>Family</b>	Davalliaceae
<b>Origin</b>	Pantropics including Queensland and Northern Territory
<b>Habitat</b>	In rainforests or open forests, usually terrestrial, often cultivated, escaped and established in the Sydney region. (Occurs north of the Clarence River as a native fern but only seen naturally in isolated rocky areas of the McPherson Ranges) can outcompete the native herb layer (including the coastal hind dunes) can be heavily epiphytic.
<b>Habit</b>	Tufted, stoloniferous, perennial, terrestrial fern to 75 cm
<b>Leaves</b>	Type: Clustered Erect fronds
	Arrangement:
	Shape:
	Colour: Dull green
	Size: Leaflets 6 x 10-20 mm
<b>Fruit</b>	Season:
	Colour:
	Type: Sori halfway between the midvein and the margin
	Size:
<b>Seed</b>	Viability:
	Germination:
<b>Root Systems</b>	Erect rhizome densely covered with pale brown scales. Stolons slender and wiry, sometimes bearing globose tubers. Regrow from the spore and from the tubers.
<b>Dispersal</b>	Wind, vegetatively (e.g. by water)
<b>Control Techniques</b>	Hand remove all parts (tubers and fertile fronds). Spray dense infestations 1:100 glyphosate and 1.5 g Associate® per 10 L water with Agral surfactant (or Pulse) + dye
<b>Response to Fire</b>	Reshoot from tubers
<b>Similar Native Species</b>	Sickle fern ( <i>Pellaea falcate</i> ) Boston fern ( <i>Nephrolepis exaltata</i> )



(Photo: Sheldon Navie)



(Photo: Sheldon Navie)



## Weed Profile Sheet

<b>Scientific Name</b>	<i>Senna pendula</i> var. <i>glabrata</i>
<b>Common Name</b>	<b>Easter cassia / Winter senna</b>
<b>Family</b>	Fabaceae sub F Ceasalpinioideae
<b>Origin</b>	Tropical South America
<b>Habitat</b>	Cultivated and widely naturalised in coastal areas north from Sydney district. Occurs in disturbed rainforests, wasteland, roadsides, wetland, heath. Tolerates heavy clays to nutrient enriched sands.
<b>Habit</b>	Spreading shrub to small tree up to 3 m
<b>Leaves</b>	Type: Compound Arrangement: Alternate Shape: 1 x pinnate Colour: Dull mid green with gold margin – paler reverse Size: 3-6 pairs of leaflets 4-8 cm long
<b>Flowers</b>	Colour: Bright yellow Season: All year; full flower around Easter Inflorescence: Axillary raceme
<b>Fruit</b>	Season: All year Colour: Green ripening to brown/black Type: Cylindrical pod Size: To 10 cm
<b>Seed</b>	Numerous seeds per pod Viability: 10+ years Germination: High %
<b>Root Systems</b>	Long taproot produced when young, coppices, cuttings on moist ground may re-shoot
<b>Dispersal</b>	Cultivated-humans, rubbish dumping especially persistent fruit pods, rodents, ants, water
<b>Control Techniques</b>	C-S-P 1:1.5 glyphosate to water; Spot spray 1:100 Glyphosate with surfactant and dye.
<b>Response to Fire</b>	Possibly coppices after cool fire. Seed germinates post fire
<b>Similar Native Species</b>	<i>Breynia</i> ( <i>Breynia oblongifolia</i> ) (has alternate leaves) <i>Senna acclinus</i> (flat pod)



(Photo: Sheldon Navie)



(Photo: Sheldon Navie)

## Weed Profile Sheet

<b>Scientific Name</b>	<i>Sphagneticola trilobata</i>
<b>Common Name</b>	<b>Singapore Daisy</b>
<b>Family</b>	Asteraceae
<b>Origin</b>	Native of Mexico to Argentina
<b>Habitat</b>	Invasive weed in riparian areas, drains, road sides, wetlands, and rainforest edges. Also as a garden escapee into most forest types.
<b>Habit</b>	Perennial, mat-forming herb up to 70cm
<b>Leaves</b>	Type: Simple Opposite
	Arrangement:
	Shape: Some leaves trilobed, most leaves irregular toothed margins
	Colour: Dark green above, paler below with simple white hairs
	Size: 3-11 x 2.5 – 8 cm
<b>Flowers</b>	Colour: Bright yellow
	Season: Spring to Autumn
	Inflorescence: Solitary
<b>Fruit</b>	Season: Spring to Autumn
	Colour:
	Type: Tuberculate and topped with short scales
	Size: 4-5 mm long
<b>Seed</b>	Viability:
	Germination:
<b>Root Systems</b>	Spreading stems that root at the nodes and can grow to 2m long.
<b>Dispersal</b>	Water, human cultivation and rubbish dumping, vegetatively spread.
<b>Control Techniques</b>	Hand pull ensuring all root nodes are removed (providing area is not subject to erosion), bag and dispose. Spray Glyphosate 1:100 + 1 g Metsulfuron methyl (e.g. Associate®) : 10 L of water + penetrant (e.g. Protec® or Pulse®) + dye. Cut, scrape and paint larger nodes.
<b>Response to Fire</b>	Unlikely to burn; re-shoots
<b>Similar Native Species</b>	<i>Enydra fluctuans</i>



(Photo: Sheldon Navie)



(Photo: Sheldon Navie)

## Appendix 3 Weed treatment methods

Specific techniques recommended for each weed species identified on the island is provided including modifications to a technique to ensure success. The rates of control for each technique and weed are provided in Appendix 4.

### Cut-scrape-paint method (CS&P)

This method applies to all woody shrubs, trees and some vines.

1. Cut plant low to the ground (approx. 1–2 cm above soil level) and level so herbicide does not run off, and cut stems are less hazardous to workers who may kneel on the ground.
2. Apply herbicide immediately at the suitable rate with a paintbrush approximately 1.5 cm wide.
3. Scrape 3-4 sides of the remaining stump to reveal green tissue and immediately apply the herbicide to the scraped area.
4. Take care that the brush is not contaminated with soil.

**Note** all seed that has high viability and longevity should be removed from the parent and removed from site e.g. *Senna* spp. and other members of the Fabaceae family or plants with a high invasive potential such as moth vine (*Araujia sericifera*) and where fruits and seeds can easily be collected.

**Note** larger trunks, stems or tubers should be scraped and painted in sections as cells quickly shut down once exposed preventing the translocation of herbicide.

**Note** when treating *Ochna serrulata*, the scrape must be light so herbicide is effectively transported to the root system. In addition, excavating soil from immediately around the base of the stem to approx. 2 cm depth and re-cutting and scraping the base will better ensure herbicide travels further into the root system ensuring a massive reduction in this plant re-shooting.

### Gouge-paint method

This method applies to those plant species that have a fleshy root system such as rhizomes or large bulbs. It is particularly appropriate for the treatment of Kahili ginger (*Hedychium gardnerianum*) or exposed rhizomes of climbing asparagus fern (*Asparagus africanus*).

1. Cut the stems of the plant at head height and then at ground level. The stems are then cut up and spread over the ground to act as part of the leaf litter.
2. Gouge out sections of the fleshy base (rhizome) with a knife.
3. Apply herbicide at the recommended rate with a paintbrush approximately 1.5 cm wide avoiding contact with soil.

## Stem Injection method

This method applies to all woody trees and shrubs with a diameter of 6-10 cm or greater.

1. With a tomahawk make a cut the width of the blade at an angle of about 45° into the trunk.
2. Apply herbicide at recommended rate immediately into the cut using a tree injecting device.
3. Repeat this procedure in a brickwork pattern around the circumference of the tree as close to the ground as possible over lapping cuts, not joining cuts. Where the presence of a crotch angle makes this difficult make a cut above it. Ensure cuts are also made on the inside of forks. This may need to be done with a drill or hand saw to get the appropriate angle. Note two rows of cuts will be sufficient for trees with trunks of 6-10 cm. Larger trunk diameters will need correspondingly more.
4. Treat all visible lateral roots as per 1 and 2.

**Note** stem injection can also be carried out using a drill. Holes can be inserted approximately 10 cm apart and filled with the appropriate herbicide. Lateral roots should also be drilled and filled with the appropriate herbicide.

## Scrape and paint method

This method is applicable to a couple of species of vines where it is desirable to treat the vines intact, particularly those with aerial tubers such as Madeira vine (*Anredera cordifolia*) or those which will propagate from segments e.g. Cape ivy (*Delairea odorata*).

1. Remove and bag tubers before scraping to avoid dislodging them during treatment.
2. Scrape the stem tissue on one side of the stem only for up to 100 cm if possible before leaving a small gap (approx. 5 cm) and changing sides. Note on Madeira vine it is necessary to scrape heavily, to expose white inner tissue. Scrape as much of the stem as possible.
3. Apply undiluted Glyphosate with a paintbrush within 7 seconds of scraping the stem i.e. scrape and paint in sections.
4. In the case of *Anredera cordifolia* (Madeira vine) it is essential that ground tubers and lateral roots are also treated with a heavy scrape and paint. If the tuber is of substantial size, a gouge can be made into the tuber with a knife and apply herbicide. Any side roots must also be scraped and painted.

## Spot spraying method

This is carried out using a 15 L backpack spray unit with a modified spray nozzle that gives an accurate and easily adjustable spray pattern e.g. Rega®. It is advised to fill the backpack to 10 L only, to avoid back strain, particularly where spraying for extended periods. All rates of control listed in Appendix 4 are for a 10 L amount. Glyphosate and metsulfuron methyl are the main herbicides used with the addition of a marker dye. A surfactant such as Pulse® is

added in some treatments to assist the transfer of the herbicide through the surface tissue – particularly plants with waxy leaves, such as camphor laurel, Madeira vine, purple succulent and umbrella tree. The addition of Pulse also assists providing a greater weight to the solution and it sticking to the leaf which further assists the transfer of herbicide through the plant.

### Overspray method

This method is applicable to large, dense infestations of such plants as lantana (*Lantana camara*). This method may be used where it is desirable to leave partially dead or dead plants intact to prevent erosion and over exposure of large areas, to protect native seedlings from predators such as wallabies, to avoid trampling, retain habitat and to save on resources.

1. Ensure the area is fully prepared by cutting around developing native plants and creating tracks through the lantana to assist application and maintenance.
2. Spray over the top of the infestation using a solution of water, herbicide and marker dye at the recommended rate. **Note** any native plants that may be under dense weed will be protected by the foliage cover of the weed.
3. Leave the sprayed plants intact so that native seedlings can establish under the shelter provided.
4. **Alternatively**, weeds can be cut and flattened with brush hooks or loppers and the subsequent regrowth spot sprayed with glyphosate or metsulfuron methyl (species specific).

### Crowning method

This method is applicable to weeds which have their growing points at ground level or below the surface of the ground such as corms, bulbs, rhizomes, clumped or fibrous root systems e.g. *Asparagus* spp., spider plant (*Chlorophytum comosum*) and smaller clumps of grasses.

1. Cut asparagus vines at head height and then again closer to the ground.
2. Grasp the leaves or stems and hold them tightly and close to the ground so that the base of the plant is visible.
3. Insert the knife close to the base of the plant at a slight angle with the tip well under the root system.
4. Cut through the roots close to the base. Depending on the size of the plant two or more cuts may be needed to sever all the roots.
5. Remove the plant. Make sure that the base of the plant where the roots begin is completely removed.
6. Shake off excess soil and hang the plant up in a tree to prevent it from reshooting, or remove it from site. NB. If *Asparagus* sp. has a huge rhizome, cut at head height and then cut through entire rhizome, (may need to do with loppers or a hand saw, scrape and paint. Note the water storage organs on ground asparagus do not re-shoot and can be left on the ground to compost.

## Steam weeding

This technique uses saturated steam via a steam weeding unit designed for weed control. This system uses water which is heated under pressure and applied via a delivery hose and nozzle. The combination of saturated steam and boiling water is applied at temperatures of 98°C to 110°C and penetrates the soil up to 5 mm. This results in damage to the soft tissue and cell wall of the plants causing the weeds to die off within 1-3 days (Blue Hand Steam 2016).

Due to the size of the equipment, suitable access to the treatment site would be required. The treatment regime would vary with this technique depending on factors such as the timing of application (i.e. the stage of the weed's life cycle) and whether the weeds are perennials or annuals (Blue Hand Steam 2016; Weedtechnics 2016). When treating weeds, care must be taken to ensure surrounding native plants or the soil are not sprayed with the saturated steam and thereby be adversely impacted. Weeds that may suit this technique include some low growing exotic grasses, annuals and perhaps when the site is at a maintenance stage, individual *Bryophyllum* segments. To date it has been ineffective on larger plants or those with modified root systems.

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# Appendix 4 Control methods and rates for weed species

## Ratios for application of herbicide

Dilution ratios for the application of herbicide are provided in the table below. Always read and follow the directions on the product label and obtain a Safety Data Sheet (previously known as a Material safety data sheet) for each chemical and additive.

For some weeds a combination of glyphosate and metsulfuron-methyl (such as Associate®) is recommended, permitted under APVMA off-label permit numbers **PER 11463**

A surfactant such as Pulse® is added in some treatments to assist the transfer of the herbicide through the surface tissue – particularly plants with waxy leaves, such as camphor laurel, Madeira vine and trad.

## Abbreviations

<b>CS&amp;P</b>	Cut, Scrape and Paint	Usually with a mixture of Glyphosate and water at 1:1 or 1:1.5.
<b>S&amp;P</b>	Scrape and Paint	Usually with straight Glyphosate.
<b>C&amp;P</b>	Cut and Paint	Usually with a mixture of Glyphosate and water at 1:1 or 1:1.5.
<b>Gly</b>	Glyphosate	e.g. Weedmaster Duo®, Roundup Biactive®
<b>MM</b>	Metsulfuron methyl	e.g. Associate®, Brushoff®, Brushkiller®
<b>S</b>	Surfactant	e.g. Pulse®, LI700®, Prosil®
<b>O</b>	Spray adjuvant	e.g. Agral®, Protec®, Codacide®,
<b>dye</b>	Colour Marking Dye	e.g. Herbi Liquid Dye®

**1:1.5** 1 part chemical to one and a half parts water (eg. 100ml chemical to 150ml water)

**1:50** 1 part chemical to 50 parts water (e.g. 200ml chemical to 10 litres water)

**1:100** 1 part chemical to 100 parts water (e.g. 100ml chemical to 10litres water)

**1.5g:10L** 1.5gram (usually MM) to 10 litres water

## Trees and shrubs

Scientific Name	Common Name	Control Method
<i>Archontophoenix alexandrae</i>	Alexander palm	Hand pull or crown out small specimens and seedlings. Spray seedlings <b>1:50 Gly + S + dye</b> . Larger specimens <b>SI at 1:1 Gly</b> or chainsaw large specimens below swollen base
<i>Buddleja madagascariensis</i>	butterfly bush	Lopper, then <b>CS&amp;P</b> base <b>1:1 Gly</b> . Spot spray regrowth and overspray large infestations <b>1:100 Gly+ A + dye</b> . growing). Ensure care is taken working with this plant in dry conditions as hairs may irritate the eyes or throat
<i>Cascabela thevetia</i>	yellow oleander	Lopper, then <b>CS&amp;P</b> base <b>1:1 Gly</b> . Spot spray regrowth <b>1:50 Gly+ A + dye or 1:50 + 1g MM + S + dye</b> . Care to be taken working with this plant as white latex sap is known to be highly poisonous
<i>Duranta erecta</i>	duranta	Hand pull seedlings or spot spray seedlings and regrowth <b>1:50 Gly + A + dye</b> . Shrubs <b>CS&amp;P 1:1 Gly</b> or larger specimens <b>SI at 1:1 Gly</b> . Where possible remove and bag fruit. The fruit of this species is known to be poisonous to dogs

Scientific Name	Common Name	Control Method
<i>Eriobotrya japonica</i>	loquat	Hand pull <u>or</u> spot spray seedlings <b>1:50 Gly + S + dye</b> . Saplings <b>CS&amp;P 1:1 Gly</b> . Larger specimens <b>SI</b> at <b>1:1 Gly</b>
<i>Ficus elastica</i>	rubber tree	Hand pull <u>or</u> spot spray seedlings <b>1:50 Gly + A + dye</b> . Saplings <b>CS&amp;P 1:1 Gly</b> . Larger specimens <b>SI</b> at <b>1:1 Gly</b> . Cuts and application of herbicide will need to be quick due to milky latex
<i>Jacaranda mimosifolia</i>	jacaranda	Hand pull <u>or</u> spray seedlings <b>1:50 Gly + A + dye</b> . Saplings <b>CS&amp;P 1:1 Gly</b> . Larger specimens <b>SI</b> at <b>1:1 Gly</b>
<i>Lantana camara</i>	lantana	Lopper, then <b>CS&amp;P base 1:1 Gly</b> . Spot spray regrowth and overspray large infestations <b>1:100 Gly+ A + dye</b> . Red flowering species will require a rate of <b>1: 50 Gly + A + dye</b> . Splatter gun method <b>Gly 1:9</b> . (1 part Gly to 9 parts water) + <b>dye</b> (best results when plants actively growing) Hang thick large stems or base of stems off-ground
<i>Leucaena leucocephala</i>	leucaena	Spray seedlings <b>1:50 Gly + 1.5g MM:10Lwater + S + dye</b> . Saplings <b>CS&amp;P 1:1 Gly</b> . Larger specimens <b>SI</b> at <b>1:1 Gly</b> , Drill holes into cut stump + frill with <b>1:1 Gly</b> for best results
<i>Murraya paniculata</i>	orange jessamine	Spray seedlings <b>1:50 Gly + 1.5g MM:10Lwater + S + dye</b> . Saplings <b>CS&amp;P 1:1 Gly</b> . Larger specimens <b>SI</b> at <b>1:1 Gly</b>
<i>Morus alba</i>	mulberry	Spray seedlings <b>1:50 Gly + 1.5g MM:10Lwater + S + dye</b> . Saplings <b>CS&amp;P 1:1 Gly</b> . Larger specimens <b>SI</b> at <b>1:1 Gly</b> , Drill holes into cut stump + frill with <b>1:1 Gly</b> for best results
<i>Ochna serrulata</i>	Mickey mouse bush	Lopper then <b>CS&amp;P 1:1 Gly</b> (scrape lightly) <b>1:1 Gly + MM</b> . Spot spray regrowth and seedlings <30 cm tall <b>1:50 Gly + 1.5g MM: 10L water + S + Dye</b> . DO NOT TRY TO HAND PULL, for larger specimens, <b>SI</b> with <b>Gly 1:1 + 1g MM</b>
<i>Phoenix dactylifera</i>	date palm	Spot spray seedlings <b>1:50 + S + dye</b> . Trees <b>SI 1:1Gly + 1g MM</b>
<i>Schefflera actinophylla</i>	umbrella tree	Hand pull seedlings <u>or</u> spray <b>1:50 Gly + 1.5g MM:10Lwater + A + dye</b> . Saplings <b>CS&amp;P</b> and larger specimens <b>SI</b> at <b>1:1 Gly</b> . (Do NOT stem inject when in flower as it can affect birds feeding on nectar)
<i>Schinus terebinthifolius</i>	broad-leaf pepper tree	Hand pull <u>or</u> spray seedlings <b>1:50 Gly + A + dye</b> <u>or</u> <b>1:50 Gly + 1.5 g MM:10 Lwater + A + dye</b> . <b>CS&amp;P 1:1 Gly</b> . Larger specimens <b>SI</b> at <b>1:1 Gly</b> .
<i>Solanum chrysotricum</i>	devils fig	Spot spray seedlings <b>1:50 + S + dye</b> . Saplings <b>CS&amp;P</b> and larger specimens <b>SI</b> at <b>1:1 Gly</b>
<i>Spathodea campanulata</i>	African tulip tree	Hand pull seedlings <u>or</u> spot spray <b>1:50 Gly + A + dye</b> . <b>CS&amp;P</b> saplings <b>1:1 Gly</b> . Larger specimens <b>SI</b> at <b>1:1 Gly</b> .
<i>Syagras romanzoffianum</i>	Cocos palm	Hand pull or crown young seedlings. Cut down and cut out below growing point. Larger specimens <b>SI</b> at <b>1:1 Gly</b>
<i>Yucca aloifolia</i>	Spanish bayonet	Dig out by hand or hand pull smaller plants. <b>CS&amp;P</b> near ground <b>1:1 Gly</b> . Spot spray smaller plants <b>1.5g MM:10Lwater + A + dye</b> or <b>SI</b> larger plants at <b>1:1 Gly + 1 g MM</b>

### Vines and scramblers

Scientific Name	Common Name	Control Method
<i>Desmodium uncinatum</i>	silver-leaf desmodium	Hand pull seedlings or spot spray <b>1:50 Gly + A + dye</b> . Large vines <b>CS&amp;P 1:1 Gly</b> .
<i>Dolichandra unguis-cati</i>	cat's claw creeper	Large climbing vines, cut at waist height and again at the base by <b>CS&amp;P 1:1 Gly</b> . This gap created assists in visually checking for regrowth. Spray seedlings and regrowth <b>1:100 Gly + 1g MM + S + dye</b> for best results <u>or</u> <b>1:100 Gly + S + dye</b> .



Scientific Name	Common Name	Control Method
<i>Ipomoea cairica</i>	Mile a minute	Hand pull small infestations on ground, roll up and hang debris to prevent re-shooting. Treat climbing vines by cutting off host tree and at head height. Treat base of vine by <b>CS&amp;P 1:1 Gly</b> and hang cut sections off ground. Spray seedlings and regrowth with good density of leaf <b>1:100 Gly + 1.5g MM:10L water + A + dye.</b>
<i>Ipomoea purpurea</i>	common morning glory	Hand pull small infestations on ground, roll up and hang debris to prevent re-shooting. Treat climbing vines by cutting off host tree and at head height. Treat base of vine by <b>CS&amp;P 1:1 Gly</b> and hang cut sections off ground. Spray seedlings and regrowth with good density of leaf <b>1:100 Gly + 1.5g MM:10L water + A + dye.</b>
<i>Lantana montevidensis</i>	creeping lantana	Hand pull <u>or</u> spot spray <b>1:100 Gly + 1.5 g MM:10Lwater + S + dye.</b>
<i>Neonotonia wightii</i>	glycine	Hand pull seedlings or spot spray <b>1:100 Gly + S + dye.</b> Large vines <b>CS&amp;P 1:1 Gly</b>
<i>Passiflora suberosa</i>	corky passionfruit	Hand pull seedlings and smaller vines <u>or</u> spray regrowth and vines scrambling on ground <b>1:50 Gly + 1.5g MM:10L water + S + dye.</b> Follow large vines on ground and <b>CS&amp;P 1:1 Gly</b> or carefully hand pull
<i>Passiflora subpeltata</i>	white passionflower	Hand pull seedlings and smaller vines <u>or</u> spray regrowth and vines scrambling on ground <b>1:50 Gly :10L water + S + dye.</b> Follow large vines on ground and <b>CS&amp;P 1:1 Gly</b> or carefully hand pull
<i>Philodendron</i> sp.	climbing philodendron	Remove manually what can reached and dispose of offsite. <b>CS&amp;P</b> bases <b>1:1 Gly</b> or spot spray ground infestations <b>1:50 Gly + 1.5 g MM : 10 L water + S + dye</b>
<i>Solanum seaforthianum</i>	Brazilian nightshade	Hand pull seedlings and smaller vines <u>or</u> spot spray regrowth and vines scrambling on ground <b>1:50 Gly :10L water + S + dye.</b> Follow large vines on ground and <b>CS&amp;P 1:1 Gly</b> or carefully hand pull
<i>Rubus fruticosus</i>	blackberry	Lopper then <b>CS&amp;P 1:1 Gly.</b> Spot spray regrowth or seedlings <b>1:50 Gly + S + Dye or 1:100 Gly + 1 g MM + S + dye</b>
<i>Thunbergia alata</i>	black eyed Susan	<b>CS&amp;P 1:1 Gly.</b> Spray dense foliage <b>1:50 Gly + S + dye</b> <u>or</u> <b>1 g MM:10L water + A + dye</b>
<i>Thunbergia grandiflora</i>	blue thunbergia	Mature vines cut off at head height and then low to ground, either <b>CS&amp;P 1:1 Gly</b> <u>or</u> spray regrowth <b>1:50 Gly + 1.5 g MM:10L water + S + dye.</b> If tuber can be accessed gouge and paint <b>1:1 Gly</b>

## Succulents

Scientific Name	Common Name	Control Method
<i>Aloe</i> sp.	aloe	Hand pull smaller plants and remove from site <u>or</u> spot spray <b>1:50 Gly + 1.5g MM:10Lwater + S + dye. SI</b> larger plants at <b>1:1 Gly + 1 g MM</b>
<i>Agave</i> sp.	century plant	Hand pull smaller plants and remove from site <u>or</u> spot spray <b>1:50 Gly + 1.5g MM:10Lwater + S + dye. SI</b> larger plants at <b>1:1 Gly + 1 g MM</b>
<i>Hylocereus undatus</i>	night flowering cactus	Hand pull smaller plants and remove from site. <b>SI</b> larger plants at <b>1:1 Gly + 1 g MM</b> ensuring every segment that can be reached is injected or <b>gouged and painted</b>
<i>Opuntia stricta</i>	prickly pear	Hand pull smaller plants and remove from site <u>or</u> spot spray <b>1:50 Gly + 1.5g MM:10Lwater + S + dye.</b> Gouge and paint larger plants at <b>1:1 Gly + 1 g MM</b> ensuring every cladode is <b>gouged and painted</b>

## Herbs, ferns, grasses and groundcovers

Scientific Name	Common Name	Control Method
<i>Asparagus aethiopicus</i>	ground asparagus	Crown out smaller plants and hang up rhizome off ground (leaves and stems can be cut up and left on ground). Spray <b>1:100 Gly + 1.5g MM:10Lwater + A + dye</b> .
<i>Brachiaria decumbens</i>	signal grass	Spray <b>1:100 Gly + A + dye</b> , crown or hand weed smaller plants and leave <i>in-situ</i> .
<i>Bryophyllum delagoense</i>	mother of millions	Hand pull and remove from site <u>or</u> spot spray <b>1.5g MM + S + dye</b> .
<i>Callisia fragrans</i>	purple succulent	Spot spray <b>1.5g MM: 10L water + A + dye</b> <u>or</u> <b>1:50 Gly + 1.5 g MM: 10 L water + S + dye</b> .
<i>Cenchrus echinatus</i>	Mossman River grass	Spray <b>1:100 Gly + A + dye</b> , crown or hand weed smaller plants and bag seed heads and remove.
<i>Conyza bonariensis</i>	flaxleaf fleabane	Hand pull <u>or</u> spray <b>1:100 Gly + A + dye</b> <u>or</u> <b>1.5g MM:10 Lwater + A + dye</b> .
<i>Epidendrum ibaguense</i>	crucifix orchid	Hand pull and remove from site <u>or</u> spot spray <b>1.5g MM + S + dye</b> .
<i>Euphorbia cyathophora</i>	painted spurge	Hand pull <u>or</u> spray <b>1:100 Gly + A + dye</b> .
<i>Megathyrsus maximus</i>	Guinea grass	Spray <b>1:100 Gly + A + dye</b>
<i>Melinis minutiflora</i>	molasses grass	Spray <b>1:100 Gly + dye</b>
<i>Nephrolepis cordifolia</i>	fishbone fern	Hand pull/crown out and hang off ground to dry out and monitor for any regrowth. Spray <b>1:100 Gly + 1 g MM:10 Lwater + A + dye</b>
<i>Plectranthus verticillatus</i>	Swedish ivy	Hand pull and dispose of off site and monitor for any regrowth. Spray <b>1:100 Gly + 1 g MM:10 L water + S + dye</b> .
<i>Sansevieria trifasciata</i>	mother-in-law's tongue	Hand pull and remove from site <u>or</u> spot spray <b>1:50 Gly + 1.5 g MM:10 L water + S + dye</b>
<i>Solanum nigrum</i>	blackberry nightshade	Hand pull <u>or</u> spot spray <b>1:100 Gly + A + dye</b>
<i>Sphagneticola trilobata</i>	Singapore daisy	Spot spray <b>1.5g MM:10 Lwater + S + dye</b> <u>or</u> hand pull ensuring all root nodes are removed <u>or</u> roll and spray. For best results, <b>1:100 Gly + 1 g MM + S + dye</b>

## Appendix 5 Spraying in a team\*

\*Extract from South East Queensland Ecological Restoration Framework (2012)

### 5.1.7 WORKING AS A TEAM

Usually restoration work is undertaken by a group of people working together. As such, a description is given here on how a team undertaking restoration work can operate effectively together.

Work usually commences at an easily identifiable landmark e.g. a track, road-edge or simply at the edge of the vegetation remnant. The direction of work will depend on factors such as the size of the management zone and the terrain. A key aspect in working together effectively to cover the entire work site systematically and comprehensively, is working in lines (see Figure 3). Using this technique ensures that every square metre of the site is treated for weeds. It should be employed during all phases of work, from primary work such as cut-scrape-painting woody weeds in the understorey or follow-up work and maintenance such as spot-spraying. It works as follows:

- The first team member commences work using an edge as a guide, moving from one end of the work site or zone to the other, with the width of the worked area depending on the density of the vegetation being worked, and the density and type of weed. An individual's worked area will vary depending on these factors.
- The second team member positions themselves so that they are slightly behind and to the side of the first team member, approximately 1-3m from the edge of the line. This allows them to observe the area that has already been worked, and carry out their weed control so that the two worked areas meet. Again, the width of the second team member's worked area will vary according to the vegetation, but they should ensure that they do not fall more than 5-10m behind the leader, so that the cohesiveness of the team is maintained.
- Any remaining members of the team arrange themselves in a similar fashion, always ensuring that the line remains staggered and that all team members remain in verbal contact with each other. Teams of three or four people usually function best, however larger teams can also work effectively together, providing that good communication is emphasised. The team member who is on the outside edge of the run (red in the Figure 3 diagram) may find it useful to tag their line (using coloured flagging tape) as they work through the site, as it will be their responsibility to follow the line back once the far edge of the zone has been reached, and the team has turned in order to continue working through the site systematically.

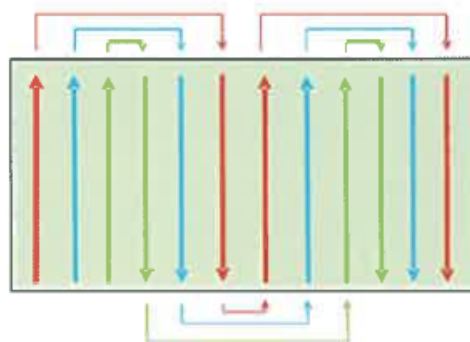


Figure 3 - Team working in lines

Because the line of workers is staggered, each individual only has to concern their self with making sure that one edge of their worked area meets up with that of their co-workers, as the worker to their other side is required to maintain the staggered formation, thus ensuring that no gaps in the worked area are left.

Walking the line



- It can be beneficial to try to keep the lines fairly straight, if the terrain allows, in order to facilitate the movement of workers through the site without becoming disoriented, and to avoid confusion. This may mean that in a relatively weed-free area it may be necessary for workers to walk straight through a section of the site. It is important to avoid the temptation to zig-zag from side to side in an attempt to 'chase weeds', as this will make the line crooked which is difficult for other workers to follow.

Clearly, communication skills are an essential aspect of working effectively as a team. Examples of good communication that facilitates the smooth operation of the team are:

*"I have to veer off my line to get around that fallen tree, but you'll be right to maintain your line as I will soon move back to mine."*

It may also be necessary, especially when workers are new to the idea of working systematically in lines, to prompt them to stay in formation. For example:

*"You're starting to move in front of me. You need to drop back behind me a bit."  
(in order to maintain staggered line)*

Working as a team in lines is an acquired skill and it will take time and practice in order to learn how to carry it out proficiently. However, do persist! The advantages of working in lines include:

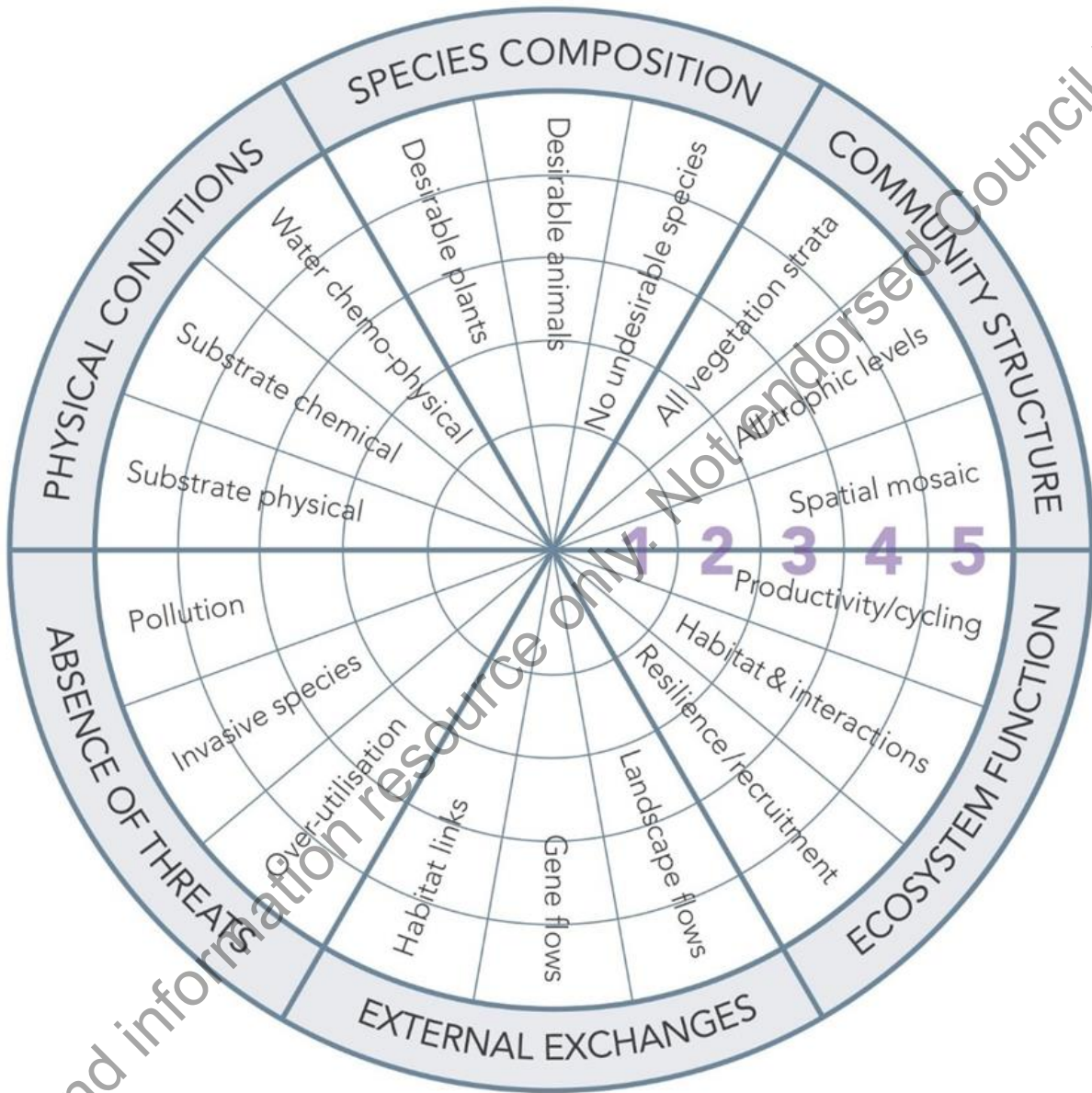
- Covering the site systematically and comprehensively, to enable the most efficient implementation of restoration works;
- Building up observations of site as different team members will observe different aspects;
- Effective use of the time and resources that have been allocated to the site; and
- Building team strength and cohesiveness.

**Safety Caution:**

When working on a steeply sloping site it is advisable to work across the contour rather than up and down the slope, as this is physically less demanding. However, it is especially important for the restoration workers to stay markedly staggered in this case, due to the high risk of rocks being dislodged.

# Appendix 6 Monitoring proformas\*

\*The recovery wheel and proforma obtained from the National Standards for the Practice of Ecological Restoration McDonald Et al (2017).



Background information resource only. Not endorsed Council Policy

Evaluation of Ecosystem Recovery proforma Site: .....

Assessor: .....

Date: .....

ATTRIBUTE CATEGORY	RECOVERY LEVEL (1-5)	EVIDENCE FOR RECOVERY LEVEL
<b>ATTRIBUTE 1. Absence of threats</b>		
Over-utilization		
Invasive species		
Pollution		
<b>ATTRIBUTE 2. Physical conditions</b>		
Substrate physical		
Substrate chemical		
Water chemo-physical		
<b>ATTRIBUTE 3. Species composition</b>		
Desirable plants		
Desirable animals		
No undesirable species		
<b>ATTRIBUTE 4. Community structure</b>		
All vegetation strata		
All trophic levels		
Spatial mosaic		
<b>ATTRIBUTE 5. Ecosystem function</b>		
Productivity, cycling, etc.		
Habitat and plant-animal interactions		
Resilience, recruitment, etc.		
<b>ATTRIBUTE 6. External exchanges</b>		
Landscape flows		
Gene flow		
Habitat links		

Background information resource only. Not endorsed Council Policy

# Appendix 7 Daily record sheet

## Daily Herbicide Use Sheet Retain for 2 Years (Agricultural Chemicals Distribution Control Act 1966)

<b>Environmental Conditions</b>			<b>Site:</b>	<b>Date:</b>
<input type="checkbox"/> Clear	<input type="checkbox"/> Dry	Wind speed (km/hr):	<b>Work Location:</b>	<b>Time start:</b>
<input type="checkbox"/> Overcast	<input type="checkbox"/> Mild	Wind direction (N,E,S,W):		<b>Time finish:</b>
<input type="checkbox"/> Showers	<input type="checkbox"/> Humid	Temperature (°C):	<b>Personnel using herbicide</b>	
<b>Zone Vegetation Type</b>				
<input type="checkbox"/> Rainforest	<input type="checkbox"/> Coastal			
<input type="checkbox"/> Dry Eucalypt	<input type="checkbox"/> Riparian	<input type="checkbox"/> Dune system		
<input type="checkbox"/> Wet Eucalypt	<input type="checkbox"/> Wetlands	<input type="checkbox"/> Other:		

Equipment Used	Chemicals Used (trade name)	Total quantity applied on site	Rate:	Plants treated	Method
<input type="checkbox"/> Knapsack	<input type="checkbox"/> Glyphosate:	amount used	ml		
<input type="checkbox"/> Power spray	<input type="checkbox"/> <del>Metsulf</del> methyl:	amount used	g		
<input type="checkbox"/> ATV unit	<input type="checkbox"/> Surfactant:	amount used	ml		
<input type="checkbox"/> Poison Pot	<input type="checkbox"/> Penetrant:	amount used	ml		
<input type="checkbox"/> Injector Kit	<input type="checkbox"/> Dye:	amount used	ml		
<input type="checkbox"/> Quikspray	<input type="checkbox"/> Other:	amount used	ml		
<input type="checkbox"/> Splatter Gun		Tot. volume of mixture:	Litres		
		Total area treated:	m <sup>2</sup>		
Equipment Used	Chemicals Used (trade name)	Total quantity applied on site	Rate:	Plants treated	Method
<input type="checkbox"/> Knapsack	<input type="checkbox"/> Glyphosate:	amount used	ml		
<input type="checkbox"/> Power spray	<input type="checkbox"/> <del>Metsulf</del> methyl:	amount used	g		
<input type="checkbox"/> ATV unit	<input type="checkbox"/> Surfactant:	amount used	ml		
<input type="checkbox"/> Poison Pot	<input type="checkbox"/> Penetrant:	amount used	ml		
<input type="checkbox"/> Injector Kit	<input type="checkbox"/> Dye:	amount used	ml		
<input type="checkbox"/> Quikspray	<input type="checkbox"/> Other:	amount used	ml		
<input type="checkbox"/> Splatter Gun		Tot. volume of mixture:	Litres		
		Total area treated:	m <sup>2</sup>		
Equipment Used	Chemicals Used (trade name)	Total quantity applied on site	Rate:	Plants treated	Method
<input type="checkbox"/> Knapsack	<input type="checkbox"/> Glyphosate:	amount used	ml		
<input type="checkbox"/> Power spray	<input type="checkbox"/> <del>Metsulf</del> methyl:	amount used	g		
<input type="checkbox"/> ATV unit	<input type="checkbox"/> Surfactant:	amount used	ml		
<input type="checkbox"/> Poison Pot	<input type="checkbox"/> Penetrant:	amount used	ml		
<input type="checkbox"/> Injector Kit	<input type="checkbox"/> Dye:	amount used	ml		
<input type="checkbox"/> Quikspray	<input type="checkbox"/> Other:	amount used	ml		
<input type="checkbox"/> Splatter Gun		Tot. volume of mixture:	Litres		
		Total area treated:	m <sup>2</sup>		

# Vegetation Field Work Sheet

Park Name:				Date:			
Total hours personnel x hours				Contractor:			
Personnel:							
Work Completed (description of work undertaken)	Precinct	Zone	Primary (hrs)	Follow up (hrs)	Planting/ Other Hrs	Planting No' s	Comments
Follow-up Comments							
Native flora notes (Scientific name)	Flowering:						
	Fruiting:						
	Germinating:						
Reportable Incidents		Details					
Client Contact:							
Fauna Notes: Observations							
Flora Notes: flowering/seeding							
OH&S Issues							
Public Contact							
Weather Conditions							
Project Blockages							
Environmental Issues							

Name: \_\_\_\_\_ Signature: \_\_\_\_\_



# Appendix 8 Photo monitoring data sheet

## Photo Monitoring Data Sheet

Project details

Photographer

Date:

Photo ID point	GPS Settings (GDA 94/WGS 84, UTM grid system, Zone 56)		Bearing (deg <sup>0</sup> )	Filename	Weather		Camera Setting			Comments
	Northing	Easting			Fine	Overcast	Auto	Landscape	Portrait	
e.g. 1a(i)	e.g. 547287	6886371	0°	GV405-MM.PMP001 2014 03 31						Photo taken head height from star picket at 2.30pm (commence file name with GV405-MM. photo point number then the date (year, month, day))

## Revision History

Revision No.	Revision date	Details	Prepared by	Reviewed by	Approved by
00	15/08/2017	Integrated Weed Management Strategy draft report	Deanna Bayliss Senior Ecologist and Jen Ford Principal Restoration Ecologist	Jen Ford	Principal Restoration Ecologist
01	15/09/2017	Integrated Weed Management Strategy draft report	Jen Ford Principal Restoration Ecologist	Jen Ford	Principal Restoration Ecologist
02	22/11/2017	Integrated Weed Management Strategy draft report	Jen Ford Principal Restoration Ecologist	Jen Ford	Principal Restoration Ecologist

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2	15/08/2017	Electronic	Ecosure	Administration
3	25/09/17	Electronic	Redland City Council	Candy Daunt
4	22/11/17	Electronic	Redland City Council	Candy Daunt

Citation: Ecosure (2017), Weed Management Strategy for Coochiemudlo Island, Report to Redland City Council, Publication Location – Brisbane

Report compiled by Ecosure Pty Ltd

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