PLAN OF MANAGEMENT

for the bushland of

Heinrich Reserve Lugarno

Prepared by Hurstville City Council Bushcare
August 2003

Hurstville City Council

Adopted by Council 27 August 2003

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Heinrich Reserve, Lugarno

CONTENTS

1. Introduction **4**

2. Aim **6**

3. Objectives **7**

4. Site Description **7**

5. History **8**

6. Management Problems and Solutions **10**

7. Site Specific Action Plan **13**

8. Priorities for 2003/2004 **16**

9. Action Plan **17**

Appendices

Appendix 1 – Maps of Heinrich Reserve **21**

- Site Map
- Condition of Bushland (November 2002) Map

Appendix 2 – Native Plants recorded in Heinrich Reserve **27**

Appendix 3 – Weed Species recorded in Heinrich Reserve **31**

PLAN OF MANAGEMENT

Heinrich Reserve, Lugarno

1. INTRODUCTION

1.1 Requirement for a Plan of Management

Under the Local Government Act (1993), Councils are required to prepare Plans of Management for all areas of community land under its control. As a minimum requirement, the Plan must:

- categorise the land in accordance with the legislation
- contain objectives and performance targets for the management of the land
- specify the means of achieving the objectives and performance targets, and
- specify how achievement of the objectives and performance targets is to be assessed.

In addition, for specific plans such as this one, the plan must also:

- describe the condition of the land as at the adoption of the plan
- describe any buildings on the land as at adoption
- describe the use of the buildings and the land as at adoption, and
- state the purposes for which the land will be allowed to be used, and the scale and intensity of that use.

1.2 Land Classification

Community land must be categorised according to its function as part of the Plan of Management. Heinrich Reserve is categorised as a Natural Area. It incorporates the areas of 10 Bayside Drive (Lot 45 DP 237036), 40 Bayside Drive (Lot 3 DP 573022) and 40D Bayside Drive (Lot 26 DP 232089). The reserve also includes 2 Bayside Drive (Lot 1 DP 793262), which is not officially recorded as part of Heinrich Reserve by the Geographical Names Board, but does form part of the reserve under Council's care and control.

Under Section 36(5) of the Local Government Act, Natural Areas are required to be further categorised as either bushland, wetland, escarpment, watercourse or foreshore. Heinrich Reserve is classified as bushland due to its vegetation characteristics and topography.

The Act identifies core objectives for the management of community land categorised as bushland. Specifically, these are:

a. to ensure the ongoing viability of the land by protecting the ecological biodiversity and habitat values of the land, the flora and fauna (including invertebrates, fungi and micro-organisms) of the land and other ecological values of the land, and
b. to protect the aesthetic, heritage, recreational, educational and scientific values of the land, and
c. to promote the management of the land in a manner that protects and enhances the values and quality of the land and facilitates public enjoyment of the land, and to implement measures directed to minimising or mitigating any disturbance caused by human intrusion, and
d. to restore degraded bushland, and
e. to protect existing landforms such as natural drainage lines, watercourses and foreshores, and
f. to retain bushland in parcels of a size and configuration that will enable the existing plant and animal communities to survive in the long term, and
g. to protect bushland as a natural stabiliser of the soil surface.

These objectives have been considered during the preparation of this Plan and in particular the development of the Plan objectives (Section 3).

1.3 Urban Bushland -Its Value

Remnant bushland is increasingly becoming a valuable resource in all developed urban areas. The reasons for this are many and varied, and include the area's potential as an educational, historical, scientific and recreational asset. Indigenous bushland also forms part of our natural heritage and aesthetically, it contributes to the landscape quality of an urban area.

The condition, location and size of any area of urban bushland determines the extent of its "value". Bushland is potentially a habitat for a wide variety of plant and animal life, permitting the retention of biodiversity in an often somewhat degraded environment.

In addition to this, small areas, which may individually seem insignificant, can often be linked together forming wildlife corridors within high density urban development.

Bushland is a natural stabiliser of the soil profile, preventing erosion by wind and water and the resulting damage from siltation of adjacent watercourses and estuaries. It also contributes to the climatic conditions of an area, acting as a wind buffer and contributing to the moderation of extreme weather conditions.

1.4 State Environmental Planning Policy No. 19 -Bushland In Urban Areas

The Environmental Planning and Assessment Act 1979, made provision for the preparation of the State Environmental Planning Policy No. 19 -Bushland in Urban Areas, in 1986.

While large tracts of land have been set aside on the outskirts of Sydney in National Park, concern has been expressed at the decline in the metropolitan area bushland. It is fortunate that a great deal of Sydney's natural bushland has been retained on land dedicated as public open space. The Policy has been designed to ensure that these areas are protected and preserved, and further urban bushland areas retained within the Sydney Region. The Policy does not apply to land administered by the National Parks and Wildlife Service, the Forestry Commission of NSW, other statutory authorities or privately owned bushland, however Heinrich Reserve is considered to be covered by this Policy.

The aims and objectives of the Policy are detailed below:

1. The general aim of this Policy is to protect and preserve bushland within the urban areas referred to in Schedule 1 because of:
   a. its value to the community as part of the natural heritage;
   b. its aesthetic value; and
   c. its value as a recreational, educational and scientific resource.

2. The specific aims of this Policy are;
   a. to protect the remnants of plant communities which were once characteristic of land now within an urban area;
   b. to retain bushland in parcels of a size and configuration which will enable the existing plant and animal communities to survive in the long term;
   c. to protect rare and endangered flora and fauna species;
   d. to protect habitats for native flora and fauna;
   e. to protect wildlife corridors and vegetation links with other nearby bushland;
   f. to protect bushland as a natural stabiliser of the soil surface;
   g. to protect bushland for its scenic values and to retain the unique visual identity of the landscape;
   h. to protect significant geological features;
   i. to protect existing landforms, such as natural drainage lines, watercourses and foreshores;
   j. to protect archaeological relics;
   k. to protect the recreational potential of bushland;
   l. to protect the educational potential of bushland;
   m. to maintain bushland in locations which are readily accessible to the community; and
   n. to promote the management of bushland in a manner which protects and enhances the quality of the bushland and facilitates public enjoyment of the bushland compatible with its conservation.

2. AIM

To create and maintain a self-sustaining native plant community in order to protect and preserve the bushland for its value to the community as a wildlife and vegetation corridor and a recreational and scientific resource.

3. OBJECTIVES

These objectives comprehensively address and relate to the core objectives for management of community land categorised as bushland, listed in Section 1.2.

3.1 To remove noxious and environmental weeds and encourage natural regeneration of indigenous plant species.

3.2 To revegetate degraded areas where natural regeneration is unlikely to occur, using indigenous plant species.

3.3 To manage the bushland with the understanding that fire is essential for the long term survival of the flora, and having regard to bush fire hazard and the need to reduce fuel loadings and create and maintain fire protection zones.

3.4 To carry out regeneration in a gradual manner in order to preserve and enhance habitat value.

3.5 To encourage local residents to eliminate rubbish dumping and encroachments on the reserve.

3.6 To minimise soil erosion and the effects of stormwater flow on the bushland.

3.7 To improve access to, and maintain and consolidate existing tracks without introducing additional pathways.

3.8 To implement feral & domestic animal controls and encourage native fauna.

3.9 To implement a public education program in conjunction with the site works.

4. SITE DESCRIPTION

Heinrich Reserve is situated on the foreshores of the Georges River below Bayside Drive, Lugarno. The north east facing reserve covers 1.57 hectares, with some moderate to steep slopes to the river. The underlying rock of the area is Hawkesbury Sandstone which gives rise to shallow, sandy soil that is characteristically low in nutrients. Rock outcrops occur throughout the bushland adding to its visual character, and contributing to the steepness of the site. The indigenous vegetation is typical of slopes near waterways in the area. Also there is a narrow strip of salt-marsh species along the tidal interchange.

The grassed area above the bushland has a small natural stand of *Eucalyptus punctata*. The presence of this species is an indication of clay capping in the soil profile.
The native plant community of the drier ground consists of open forest dominated by *Eucalyptus pilularis*, *Eucalyptus haemastoma* and *Angophora costata*, with a few *Eucalyptus punctata* in the northern end of the reserve. The mid-storey is dominated by *Allocasuarina littoralis, Glochidion ferdinandi*, and *Clerodendrum tomentosum.*
In the more sheltered areas there is a diverse range of ground covers including many

different species of native grasses and vines, whilst at the northern end there are Xanthorrhoeas, members of the Proteaceae family, and a number of heath plants. Along the foreshore, the dominant species are *Casuarina glauca* and *Avicennia marina var. australasica.* The mid-storey has *Aegiceras corniculatum* and *Alocasia macrorrhizos.* There is a diverse range of ground covers.

The above description concurs with the vegetation classifications provided under Green Web-Sydney, a vegetation management plan for the whole of Sydney. In this document the area is described under the bushland of Boggywell Creek – west side, and is classified under two plant communities. These are Closed Forest with *Glochidion ferdinandi* and *Ficus rubiginosa*, and Open Forest of *Angophora costata* and *Eucalyptus pilularis*, together described as Sydney Sandstone Gully Forest. Mangroves and saltmarsh are also identified.

Towards the southern end of the reserve, a large swathe of canopy trees has been felled in recent times, presumably to improve water views. This action has increased the weed growth by opening up the canopy, allowing greater light penetration.

The area has been divided into six sites for the purpose of this plan (refer to Site map in Appendix 1).

A full list of native plant species is included in Appendix 2. Weed species are identified in Appendix 3.

5. HISTORY

Records show that the Aboriginal people of the area were the Bedigal Clan of the Darug Tribe.[1]

European History

The following information is obtained from the Hurstville Archival Research and Local Studies Centre ("Gladwyn") and their assistance and cooperation is gratefully acknowledged.

Records for the property date back to 1856 when it formed part of a Crown Grant. In 1892, George Chislett acquired five acres (two hectares) on the northern boundary of the grant with frontage to Forest Road. The waterfront part of this allotment forms part of Heinrich Reserve. This property was later transferred to George Chislett's son, who carried out a cut flower business on the property. He also constructed a pathway to the waterfront, a wharf, boatshed and two bridges over the creek.

Frederick W. Middleton bought Henning's grant on the 2nd November 1885. Mr Middleton had a substantial house built overlooking Lime Kiln Bay of brick with a slate roof featuring an attractive pattern.

[1] Bill Casey, Hurstville Historical Society (2002); pers comm.

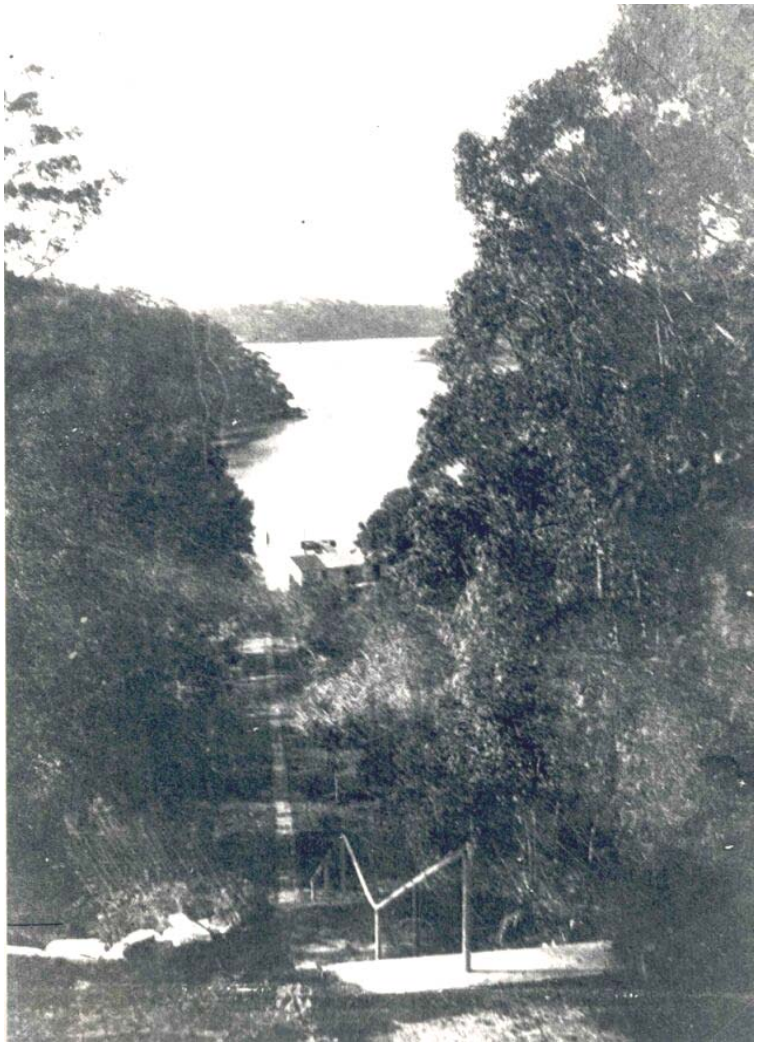
At the turn of the century, Adolph Heinrich purchased the Henning grant, now measured to be 51 acres (20 hectares), which included a derelict house built for Mr Middleton. Mr Heinrich began restoring the house, and named it Woodcliffe, a name later given to the street in which it stands.

The property was developed by the Heinrichs- a workshop, stables and boatshed were built, and later an orchard and garden, with rockeries and stone paths. Some of these are now in Heinrich Reserve, and beside the stone steps the inscription "Adolph Heinrich 1900" may be seen.

The Heinrichs subdivided their property into nine lots of about five acres each, and gradually sold them off between 1923 and 1953. They retained Lot 2 for themselves which included the house, Woodcliffe, and ran from Forest Road to Lime Kiln Bay.

The original orchard farm was subdivided in the 1950's when Lugarno was opened up for residential development. The house remained on a large acreage until the early 1970s when it was again subdivided, to its present residential house block.

Heinrich Reserve was officially named and dedicated as a public reserve at a ceremony held on 15th July 1989.



There is evidence of a heritage garden adjacent to the southern boundary however research has so far been unable to produce a list of species originally planted.

In the past there have been some attempts to control weed growth however the commitment to long term follow-up weeding wasn't possible.

Walkway from Heinrich's house to Lime Kiln Bay – early 20th Century

6. MANAGEMENT PROBLEMS AND SOLUTIONS

There are a number of problems associated with the reserve, which contribute to the degradation of the bushland. These problems need to be addressed to ensure the long term survival of the bushland. It is difficult to identify a time frame for implementation of these actions, as progress is dependent on the number of volunteer work hours per month and on-site conditions.

6.1 Weed Infestation

Management Issue

Weeds can displace native plants and create conditions that favour further weed growth. They need to be controlled to prevent their spread and allow natural regeneration to occur.

Actions

- All noxious and environmental weeds will be controlled using appropriate techniques such as cut and paint or spraying.
- All annual weeds need to be controlled before seeding occurs to minimise their spread in the bushland.
- Weed grasses and garden escapes will be sprayed in those areas where natural regeneration is unlikely to occur, and replaced with appropriate indigenous species.
- Badly degraded areas will be mulched to minimise weed regrowth.

6.2 Stormwater Run-off

Management Issue

Stormwater run-off has a detrimental effect on bushland due to the increased rate and volume of water, as well as increased nutrients. These conditions promote the growth of weeds and favour native mesomorphic (soft-leaved, rainforest-type) species over the original sclerophyll species. While stormwater cannot be eliminated from the bush, steps can be taken to ameliorate its effects.

Actions

- Stormwater run-off needs to be channelled so that the extra nutrient-rich flow that promotes the growth of weeds is restricted to as small an area as possible. This can be done by digging channels and using rocks and logs to direct flow.
- Building of sediment ponds will help slow down the flow of water.
- Drains and sediment ponds need to be regularly checked and maintained.
- Planting may need to be done using suitable local species that can cope with the altered (ie. moist and nutrient rich) conditions down the stormwater drain.

6.3 Dumping of Garden Refuse

Management Issue

Dumping of garden refuse visually degrades the area and causes physical damage to native plants. Garden refuse and grass clippings are especially damaging as they can contain weed seeds and shoots and as they decay, high nutrient conditions are

produced which favour the early growth of weeds. Dumping of garden refuse also increases the fire hazard by adding to the fuel load.

Actions

- Local residents will be encouraged to dispose of garden refuse in an appropriate manner such as mulching garden clippings and using a compost heap or worm farm.
- Full use of recycling services and Council clean ups will also be encouraged.
- Education is needed about the problems of dumping in bushland. If necessary, brochures and leaflets will be dropped in local letterboxes.

6.4 Damage to Native Vegetation

Management Issue

Trees may have been felled to improve water views.

Actions

- Education may be necessary so that local residents are aware of the value and importance of vegetation remnants. Local residents will be informed of their obligations under Council's Tree Preservation Order.
- Interference with or removal of trees is prohibited on Council land and is only permitted on private land with the written consent of Council.
- Tree Management Officers to follow up reports and observations about illegal tree activities within the reserve, and prosecute as necessary.
- Trees to be replaced.

6.5 Altered Fire Regimes

Management Issue

Fire is a recurrent feature of the Australian landscape. Urbanisation has led to altered fire regimes, which includes frequency, intensity and season of fire. Vandalism may result in frequent small fires but these are usually promptly controlled. Thus, most urban bushland has not been burnt for many years. Absence of fire in urban bushland may cause a loss of fire dependent species (such as *Acacia, Grevillea* and *Hakea*) with a subsequent loss in species diversity, and may favour the establishment of weeds. Exclusion of fire has also caused a large build up of fuel in some areas. In addition, frequent fires can also cause the loss of diversity and change the vegetation to one that is adapted to fire. These changes in vegetation towards less flammable species may make burning difficult.

Desirable fire frequencies for Open Forest and Woodland are as follows. "Decline predicted if more than two successive fires occur at less than intervals of 5 years apart. Decline predicted if there are no fires for more than 30 years. Decline predicted if successive fires occur which totally scorch or consume the tree canopy. Avoid successive fires of intensity sufficient to scorch or consume dominant tree crown" (for Open Forest and Woodland).[2]

[2] Conacher Travers (2003); Bushfire Management Plan for Oatley Park, Oatley Heights Park & Lime Kiln Bay Wetlands.

Actions

- Annual assessments of the ground fuel loading to be undertaken by trained Council staff, and where necessary, by the NSW Fire Brigades.
- Hazard reduction burns and pile burns will be carried out under the direction of the NSW Fire Brigades to reduce hazard and stimulate natural regeneration. This will be done in a mosaic pattern over a number of years to maximise diversity of both the flora and the fauna.
- After fire, removal of weed regrowth will be a priority.

6.6 Feral Animals

Management Issue

Feral animals are now an established component of urban ecosystems. Foxes and cats have helped to displace endemic populations of marsupials, and continue to prey upon smaller birds and mammals. They also contribute to the spread of weeds through the consumption of seeds and fruit. Construction of dens creates soil disturbance. Introduced insect species such as bees and ants can displace/compete with their native counterparts.

Actions

- Fox traps are available - Council may provide a trap and bait where a resident is prepared to monitor the trap and change the bait regularly.
- Den sightings should be reported to Council. For single entrance dens, fumigation will be considered as a control method (during breeding season only).
- Leave some understorey eg. Lantana as protection for small birds and mammals until sufficient native understorey is regenerated.
- Information leaflet on care of domestic pets near bushland may be distributed to surrounding households.
- Investigate feasibility of baiting program for foxes including procedures, costs, and timing.

6.7 Track Management

Management Issue

Removal of large areas of weed can open up the site and allow for the introduction of numerous small, unofficial tracks. These can create further disturbance to the soil and vegetation if left to establish.

Actions

- Stage removal of woody weeds in small sections at a time.
- Encourage use of established track/s; use signage to indicate tracks.
- Improve access to existing tracks; repair and define steps where eroded.
- Use appropriate materials for path establishment and definition (gravel, rock, and timber).
- Plant out, fence off or disguise unwanted/unnecessary tracks.
- Regularly monitor usage of official and unofficial tracks.

6.8 Historical Aspects

Management Issue

There are several points of historical interest within the reserve. Lack of awareness could lead to their degradation or loss.

Actions

- Install signage to indicate points of interest and describe history of site.
- Install a sign alerting people to the regeneration activities ongoing within the reserve. This should also encourage greater community ownership and care of the reserve.

7. SITE SPECIFIC ACTION PLAN

The project will be undertaken on a long-term basis to allow for the gradual removal of weed habitat and the regrowth of native habitat, therefore having as little impact on the native fauna as possible. The weed seed source will take years to eliminate and invading weeds will continue to be a problem until all weed sources have been removed. It will require regular follow-up weeding to prevent reseeding.

The good bush will regenerate and expand by the gradual weeding from these areas towards the degraded bush. This is where the strongest regeneration will occur, and will help the native regrowth to out-compete the weeds.

As well as the removal of weed trees such as the Privets and Camphor laurels, the native *Pittosporum undulatum* and *Ficus rubiginosa* will be carefully considered for selective culling. These species would have been naturally controlled by hot wildfires that no longer occur because of urban development.

Fuel loads should be inspected annually by FB Officers or trained Council Officers. Depending on the fuel estimates, several options for hazard reduction are utilised. Most often, this involves manual removal of collected weeds and accumulated debris. Burning of piles is scheduled where it can serve the dual purpose of hazard reduction and stimulating regeneration, by destroying weed species and initiating germination of native seed stored in the soil. Larger scale hazard reduction burns may take place where the fuel loads are critical.

The last burn in Heinrich Reserve was in 1997, with several piles having been burned in the adjacent bushland in the years since. It is anticipated that if regularly monitored, the hazard may be successfully managed by manual removal of rubbish, and mosaic burning according to the guidelines provided by the National Parks & Wildlife Service for the vegetation type.

7.1 Site 1

Work will start in Site 1.

To help prevent erosion before the initial weed removal, in a steep area just above the bushland on the exotic grass, a long narrow buffer zone will be created by mulching the designated area and planting out local native grasses and shrubs that have been propagated at the community nursery. Council will monitor the area to ensure that the damaging practice of spreading grass clippings around the base of trees is discontinued.

Neighbours' views will be considered when species for planting are selected, however the importance of maintaining a full canopy as well as understorey should be noted.

As well as the targeted removal of large weed trees such as the Privets and Camphor Laurels, the native *Pittosporum undulatum* will be carefully considered for selective culling. Some of the felled trees will be used to log the steeper areas to enable regenerators access for further weeding. Experienced contractors will be employed to carry out the work on steeper slopes, as the area is currently inaccessible to volunteers.

The environmental weed Madeira Vine (*Anredera cordifolia*) will be one of the first weeds to be treated, to halt its spread.

The lower track will need to be strengthened with rocks to prevent erosion from the water flow below the main drain line and spring (see Site map). If water flow redirection is required to prevent the track from being eroded, on-site materials will be used for construction as available. Where materials must be imported to the site, they will be sandstone and/or timber.

Handweeding from the good bush areas will gradually encourage native regeneration to extend towards the degraded bush. Part of this site has more than 50 per cent native species therefore weeds need to be carefully removed to avoid damage to the bush. The worst weeds are the Asparagus ferns (*Protasparagus aethiopicus var densiflorus*, *P. plumosus, P. scandens, Myrsiphyllum asparagoides*) and assorted vines, which are time consuming and somewhat difficult to eliminate. They will require an extended period of secondary weeding.

The site will require routine maintenance to control the growth of annuals and bird-dispersed weeds throughout the good bush and the revegetated area.

A sign will be installed near the bush path entrance, informing the public of the work being done in the reserve by Bushcare Volunteers.

7.2 Site 2

Active small birds have been noted in the lower level near the wetland.

Target large woody weeds and the Asparagus ferns (*Protasparagus plumosus, P. scandens*, and *Myrsiphyllum asparagoides*).

Handweed around native species to allow regeneration to occur.

7.3 Site 3

This site is below the track and east of Site 1. It incorporates two plant communities; the wet flat area by the river, and the higher, drier plant community. It has been observed that this area has a very active small bird life.

Target large woody weeds and Asparagus ferns (*Myrsiphyllum asparagoides, Protasparagus plumosus,* and *P. scandens*).

Handweed around native species to allow regeneration spread.

7.4 Site 4

The site is a shady wetland community and due to the constant moisture, plant growth is prolific. Weed control is anticipated to be slow.

Woody weeds, the Asparagus ferns and Agave will be targeted first. Weed around native species to allow regeneration to occur. Some clumps of Lantana may be left as habitat for small birds and Ringtail Possums until an alternate native plant community has regenerated to protect them.

7.5 Site 5

Research has not found any detailed information of historical plantings other than the commercial growth of roses and dahlias. There is evidence of an ornamental or building bamboo and an old Canary Island Date Palm (*Phoenix canariensis*). It is unclear at this stage if there are other plants of any historical interest.

This site has a high weed growth due to the history of disturbance. Before weed removal commences on the exotic grass edge, a long narrow buffer zone will be created by mulching the designated area and planting out local native grasses and shrubs and selected canopy species that have been propagated at the community nursery.

Neighbours' views will be considered when species for planting are selected.

7.6 Site 6

This area has a north-easterly aspect and consequently a more open plant community with a number of heath plants present. During the Spring of 2000, a broadacre hazard reduction burn was undertaken by the NSW Fire Brigades. The regeneration has responded well however the burn also opened the edge of the bushland below the houses, allowing the invasion of garden escapes.

Initial work in this site would target the large woody weeds including Ochna, Asparagus fern, Asparagus scandens, Bridal creeper (*Myrsiphyllum asparagoides)*, Turkey rhubarb and Loquat.

Work is scheduled to start early on this site to halt the degradation of the regeneration that has occurred in response to the hazard reduction burn. Workers will need to have good plant identification skills and tread carefully to maximise the regeneration that has occurred.

Once the weed edge has been cleared, secondary work will be required until the weed seed bank has been eliminated.

8. PRIORITIES FOR 2003/2004

- ♣ Extend the buffer zone above Site 1 across to Site 5 to help control erosion.
- ♣ Site 1. Target large weed species and prepare steep areas for access by regenerators.
- ♣ Site 6. Target large woody weeds, Asparagus ferns, Turkey rhubarb and Bridal creeper.
- ♣ Work from good bush to degraded areas.
- ♣ Program to be reviewed annually.

9. ACTION PLAN

OBJECTIVE	ACTION	AREA	RESPONSIBILITY	PRIORITY
1. To remove noxious and environmental weeds and encourage natural regeneration of indigenous plant species.	Control annual weeds before seeding occurs to minimise their spread in the bushland.	6.1	Bushcare group	Medium/ ongoing
	Treat Madeira Vine as a priority to halt its spread.	7.1	Bushcare group	Short
	Undertake routine maintenance to control the growth of annuals and bird-dispersed weeds throughout the good bush and the revegetated area.	7.1	Bushcare group	Long/ ongoing
	Handweed around native species to allow regeneration to occur.	7.2, 7.3, 7.4	Bushcare group	Medium
2. To revegetate degraded areas where natural regeneration is unlikely to occur, using indigenous plant species.	Spray weed grasses and garden escapes in areas where natural regeneration is unlikely to occur, and replace with appropriate indigenous species.	6.1	Bushcare Officer (spraying)/ Bushcare group	Medium
	Mulch badly degraded areas to minimise weed regrowth.	6.1	Bushcare group	Medium
	Mulch the ground above the bushland on the grassed area where the small stand of *Eucalyptus punctata* is, to prevent further mowing and allow natural regeneration for this remnant to continue. Plant some low tussocky grasses and shrubs.	7.1	Bushcare group/ maintenance crew	Short
3. To manage the bushland with the understanding that fire is essential for the long term survival of the flora, and having regard to bush fire hazard and the need to reduce fuel loadings and create and maintain fire protection zones.	Council or Fire Brigades Officers to inspect fuel loads annually.	6.5	Bushcare Officer/ NSW Fire Brigades	Annual/ ongoing
	Hazard reduction burns will be carried out under the direction of the NSW Fire Brigades to reduce hazard and stimulate natural regeneration.	6.5	NSW Fire Brigades	Long
	Burns done in a mosaic pattern over a number of years to maximise diversity.	6.5	NSW Fire Brigades	Long
	Burns to be undertaken no more than every 5 years (10 for selected species) and not less than every 30 years (as recommended for vegetation type). Adhere to recommended fire frequency thresholds.	6.5	Bushcare Officer/ NSW Fire Brigades	Long
	After fire, removal of weed regrowth is a priority.	6.5	Bushcare group	Short

OBJECTIVE	ACTION	AREA	RESPONSIBILITY	PRIORITY
4. To carry out regeneration in a gradual manner in order to preserve and enhance habitat value.	Leave some understorey (eg Lantana) as protection and habitat for small birds and mammals until sufficient alternative plant community is regenerated.	6.6, 7.4	Bushcare Officer	Medium
	Stage removal of woody weeds in small sections at a time.	6.7	Bushcare Officer	Medium
	Consider *Pittosporum undulatum* and *Ficus rubiginosa* for selective culling.	7.1	Bushcare Officer	Medium
	Allow for an extended period of secondary weeding for the Asparagus ferns and assorted vines, which are time consuming and somewhat difficult to eliminate.	7.1	Bushcare group	Long
	Use some of the felled trees to log the steeper areas to enable regenerators access for further weeding.		Contractors	Short
5. To encourage local residents to eliminate rubbish dumping and encroachments on the reserve.	Encourage local residents to dispose of garden refuse in an appropriate manner such as mulching garden clippings, and using a compost heap or worm farm.	6.3	Bushcare Officer/ Waste Education Officer	Short/ ongoing
	Encourage full use of recycling and green waste services, and Council clean ups.	6.3	Bushcare Officer/ Waste Education Officer	Ongoing
	Undertake letterbox drops of brochures and leaflets as necessary.	6.3	Bushcare Officer	Medium/ long
	Utilise ordinance powers as necessary.	6.3	Law Enforcement Officers	Ongoing
	Discourage the continued practice of spreading grass clippings around the base of trees.	7.1	Bushcare Officer/ Parks Maintenance	Short
6. To minimise soil erosion and the effects of stormwater flow on the bushland.	Create a long narrow buffer zone by mulching the steep area above the bushland, and planting out local native grasses and shrubs that have been propagated at the community nursery.	7.5	Bushcare group	Medium
	Slow down the flow of water through the building of ponds.	6.2	Bushcare Officer/ Bushcare group	Medium

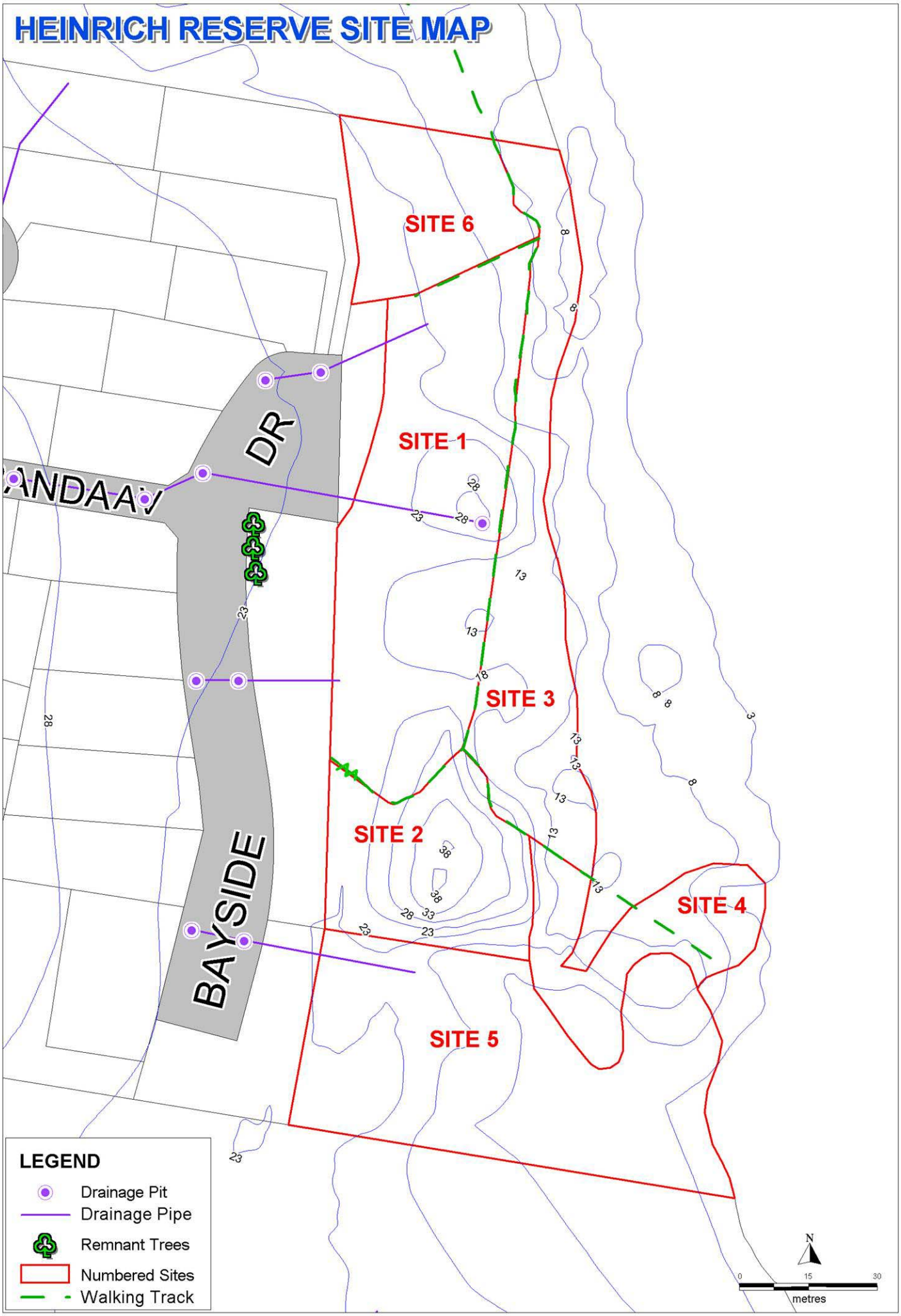
OBJECTIVE	ACTION	AREA	RESPONSIBILITY	PRIORITY
6. cont'd	Stormwater run-off needs to be channelled so that the extra nutrient-rich flow that promotes the growth of weeds is restricted to as small an area as possible.	6.2	Bushcare Officer/ Bushcare group	Medium
	Channel stormwater run-off by digging channels and using rocks and logs to direct flow	6.2	Bushcare Officer/ Bushcare group	Medium
	Regularly check and maintain drains and sediment ponds.	6.2	Bushcare Officer/ Bushcare group	Medium
	Plant where necessary using suitable local species that can cope with the altered conditions down the stormwater drain.	6.2	Bushcare Officer/ Bushcare group	Medium
	Strengthen the lower track with rocks to prevent erosion from the water flow below the main drain line and spring.	7.1	Bushcare Officer/ Bushcare group	Medium
7. To maintain and consolidate existing tracks without introducing additional pathways.	Encourage use of established track/s; use signage to indicate tracks.	6.7	Bushcare Officer	Medium/ ongoing
	Improve access to existing tracks; repair and define steps where eroded.	6.7	Bushcare Officer/ Bushcare group	Medium
	Use appropriate materials for path establishment and definition (gravel, rock, and timber).	6.7	Bushcare Officer	Medium/ Long
	Plant out, fence off or disguise unwanted/unnecessary tracks.	6.7	Bushcare group	Ongoing
	Regularly monitor usage of official and unofficial tracks.	6.7	Bushcare Officer	Ongoing
8. To implement feral and domestic animal controls, and encourage native fauna.	Council may provide a fox trap and bait where a resident is prepared to monitor the trap and change the bait regularly.	6.6	Bushcare Officer	Ongoing
	Den sightings should be reported to Council. For single entrance dens, fumigation will be considered as a control method (during breeding season only).	6.6	Concerned residents/ Bushcare Officer/ Program Manager	Ongoing
	Investigate feasibility of baiting program (procedures, costs, and timing) for foxes.	6.6	Program Manager	Short
	Distribute information leaflet on care of domestic pets near bushland to surrounding households.	6.6	Bushcare Officer	Short

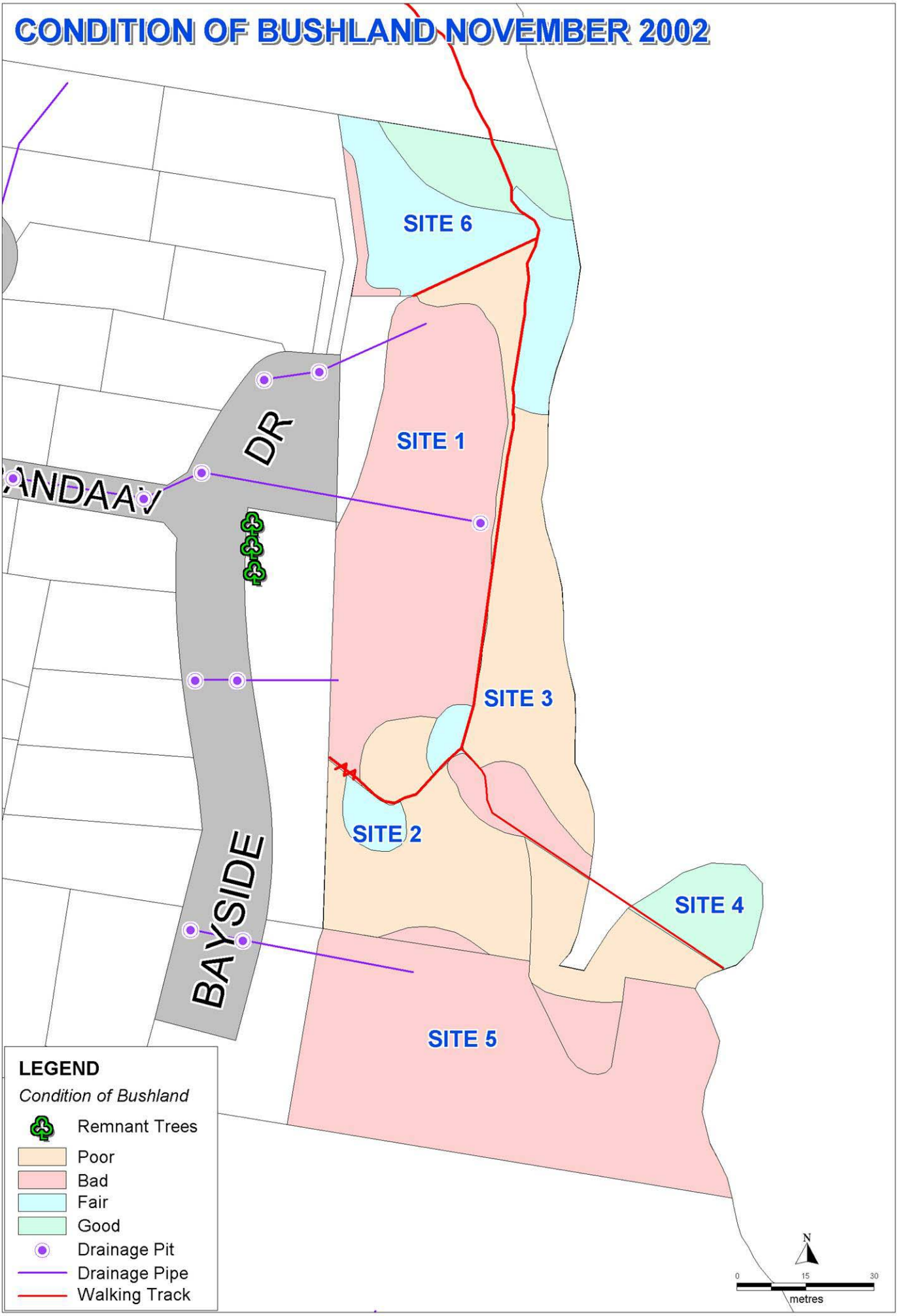
OBJECTIVE	ACTION	AREA	RESPONSIBILITY	PRIORITY
9. Implement a public education program in conjunction with site works.	Education may be necessary so local residents are aware of the value and importance of vegetation remnants	6.4	Bushcare Officer	Medium/ ongoing
	Inform local residents of their obligations under Council's Tree Preservation Order.	6.4	Bushcare Officer/ Tree Management Officer	Short
	Follow up reports and observations about illegal tree activities within the reserve, and prosecute as necessary.	6.4	Tree Management Officer	Ongoing
	Alert people to the regeneration activities ongoing within the reserve to encourage greater community ownership and care of the reserve.	6.8	Bushcare Officer	Ongoing
	Install signage to indicate points of interest and describe history of site.	6.8	Bushcare Officer/ Manager – Parks & Recreation	Long
	Install a sign near the bush path entrance, informing the public of the work being done in the reserve by Bushcare Volunteers	7.1	Bushcare Officer/ Engineering staff	Short
	Maintain the established Volunteer Bushcare group for the site.		Council/ Bushcare Officer	Ongoing

PRIORITIES:
Short – within 12 months
Medium – 2-4 years
Long – 5+ years
Ongoing – a continuing responsibility

APPENDIX 1

MAPS OF HEINRICH RESERVE


HEINRICH RESERVE SITE MAP
SITE 6
SITE 1
SITE 3
SITE 2
SITE 4
SITE 5
DR
BAYSIDE
LEGEND
Drainage Pit
Drainage Pipe
Remnant Trees
Numbered Sites
Walking Track
N
0
15
30
metres


CONDITION OF BUSHLAND NOVEMBER 2002
SITE 6
SITE 1
DR
ANDAAV
SITE 3
SITE 2
SITE 4
BAYSIDE
SITE 5
LEGEND
Condition of Bushland
Remnant Trees
Poor
Bad
Fair
Good
Drainage Pit
Drainage Pipe
Walking Track
N
0
15
30
metres

APPENDIX 2

NATIVE PLANTS RECORDED IN HEINRICH RESERVE

FAMILY NAME	BOTANICAL NAME	COMMON NAME
PTERIDOPHYTES		
ADIANTACEAE	Adiantum aethiopicum	Common Maiden Hair Fern
CYATHEACEAE	Cyathea australis	Rough Tree Fern
DENNSTAEDTIACEAE	Pteridium esculentum	Bracken Fern
DICKSONIACEAE	Calochlaena dubia	False Bracken Fern
GLEICHENIACEAE	Gleichenia dicarpa	Pouched Coral Fern
THELYPTERIDACEAE	Christella dentata	
CYCADOPSIDA		
ZAMIACEAE	Macrozamia communis Macrozamia spiralis	Burrawang
ANGIOSPERMS	**Dicotyledons**	
AIZOACEAE	Tetragonia tetragonioides	Warrigal Cabbage
AMARANTHACEAE	Alternanthera denticulata	Lesser Joyweed
APIACEAE	Actinotus helianthi Centella asiatica	Flannel Flower
ARALIACEAE	Polyscias sambucifolia	Elderberry Panax
AVICENNIACEAE	Avicennia marina var. australasica	Grey Mangrove
BIGNONIACEAE	Pandorea pandorana	Wonga Vine
CASUARINACEAE	Allocasuarina littoralis Casuarina glauca	Black She-Oak River She-Oak
CUNONIACEAE	Ceratopetalum gummiferum	NSW Christmas Bush
ELAEOCARPACEAE	Elaeocarpus reticulatus	Blueberry Ash
EUPHORBIACEAE	Breynia oblongifolia Glochidion ferdinandi Omolanthus populifolius	Breynia Cheese Tree Bleeding Heart
FABACEAE	Desmodium sp. Dillwynia retorta ssp. Glycine sp. Hardenbergia violacea Kennedia rubicunda Pultenaea daphnoides Pultenaea hispidula Pultenaea villosa	Tick-trefoil Eggs and Bacon Twining Glycine Purple Twining Pea Dusky Coral Pea Large Leaf Bush Pea
Subfamily:MIMOSOIDAE	Acacia falcata Acacia hispidula Acacia implexa Acacia linifolia	Sickle Wattle Hickory Flaxed-leafed Wattle

FAMILY NAME	BOTANICAL NAME	COMMON NAME
	Acacia longifolia var. longifolia	Sydney Golden Wattle
	Acacia myrtifolia	Myrtle Wattle
	Acacia parramattensis	Parramatta Green Wattle
	Acacia suaveolens	Sweet Scented Wattle
	Acacia terminalis	Sunshine Wattle
	Acacia ulicifolia	Prickly Moses
GOODENIACEAE	Goodenia hederacea var. hederacea	Violet-leaved Goodenia
HALORAGACEAE	Gonocarpus teucrioides	Germander Raspwort
MENISPERMACEAE	Sarcopetalum harveyanum	Pearl Vine
MORACEAE	Ficus rubiginosa	Port Jackson Fig
MYRSINACEAE	Aegiceras corniculatum	River Mangrove
MYRTACEAE	Angophora costata	Sydney Red Gum
	Corymbia gummifera	Red Bloodwood
	Eucalyptus pilularis	Blackbutt
	Eucalyptus punctata	Grey Gum
	Leptospermum sp.	Paperbark Tea Tree
OLEACEAE	Notelaea sp.	Mock Olive
PHILESIACEAE	Eustrephus latifolius	Wombat Berry
PITTOSPORACEAE	Billardiera scandens	Apple Berry
	Pittosporum revolutum	Rough-fruit Pittosporum
	Pittosporum undulatum	Sweet Pittosporum
POLYGONACEAE	Persicaria sp.	Knotweed
PRIMULACEAE	Samolus repens	Creeping Brookweed
PROTEACEAE	Banksia serrata	Old Man Banksia
	Banksia spinulosa	Hair-pin Banksia
	Grevillea sericea	Pink Spider-flower
	Hakea dactyloides	Broad-leaved Hakea
	Hakea sericea	Needlebush
	Lomatia silaifolia	Wild Parsley
	Persoonia levis	Smooth Geebung
	Persoonia linearis	Narrow-leaf Geebung
RANUNCULACEAE	Clematis glycinoides	Old Man's Beard
RUBIACEAE	Pomax umbellata	Pomax
RUTACEAE	Correa reflexa	Common Correa
SAPINDACEAE	Dodonaea triquetra	Native Hop Bush
SMILACACEAE	Smilax glyciphylla	Native Sarsaparilla
THYMELAEACEAE	Pimelea linifolia spp. linifolia	Rice Flower

FAMILY NAME	BOTANICAL NAME	COMMON NAME
ULMACEAE	Trema aspera	Native Peach
VERBENACEAE	Clerodendrum tomentosum	Hairy Clerodendrum
VITACEAE	Cayratia clematidea	Slender Grape
ANGIOSPERMS	**Monocotyledons**	
AGAVACEAE	Doryanthes excelsa	Gymea Lily
ARACEAE	Alocasia macrorrhizos	Spoon Lily
COMMELINACEAE	Commelina cyanea	Scurvy Weed
CYPERACEAE	Gahnia sp. Isolepis inundata Lepidosperma laterale	Saw Sedge Swamp Club-rush Variable Sword Sedge
JUNCACEAE	Juncus usitatus Juncus prismatocarpus	Common Rush Branching Rush
LILIACEAE	Dianella caerulea var. producta Dianella revoluta	Blue Flax Lily Mauve Flax Lily
LOMANDRACEAE	Lomandra longifolia Lomandra multiflora Lomandra obliqua	Spiny-headed Mat-rush Many-flowered Mat-rush Twisted Mat-rush
POACEAE	Danthonia sp. Digitaria parviflora Echinopogon caespitosus Entolasia stricta Entolasia marginata Eragrostis brownii Imperata cylindrica Microlaena stipoides Oplismenus sp. Phragmites australis Poa sp. Themeda australis	Wallaby Grass Smallflower Fingergrass Tufted Hedgehog Grass Wiry Panic Brown's Love Grass Blady Grass Weeping Meadow Grass Basket Grass Native Reed Tussock Grass Kangaroo Grass
TYPHACEAE	Typha orientalis	Bull Rush
XANTHORRHOEACEAE	Xanthorrhoea sp.	Grass-tree

Note:
Species lists compiled by Heather Stolle, Bushcare Officer, during summer 2001/2002

APPENDIX 3

WEED SPECIES RECORDED IN HEINRICH RESERVE

BOTANICAL NAME	COMMON NAME
Acetosa sagittatus	Turkey Rhubarb
Ageratina adenophora	Crofton weed
Anredera cordifolia	Madeira vine
Arundo donax	Bamboo
Bidens pilosa	Cobblers Pegs
Brachychiton acerifolius	Illawarra Flame Tree
Chlorophytum comosum	Spider Plant
Cinnamomum camphora	Camphor Laurel
Conyza sp.	Fleabane
Coreopsis sp.	Coreopsis
Cotoneaster sp.	Cotoneaster
Cyperus eragrostis	Umbrella Sedge
Dietes sp.	African Iris
Ehrharta erecta	Veldt grass
Eragrostis curvula	African love grass
Eriobotrya japonica	Loquat
Hydrocotyle bonariensis	Kurnell curse
Lantana camara	Lantana
Ligustrum lucidum	Large leaf privet
Ligustrum sinense	Small leaf privet
Lilium formosum	Formosa Lily
Lonicera japonica	Honeysuckle
Myrsiphyllum asparagoides	Bridal Veil Creeper
Nephrolepis cordifolia	Fishbone Fern
Ochna serrulata	Mickey Mouse plant
Paspalum sp.	Paspalum
Pennisetum clandestinum	Kikuyu
Phoenix canariensis	Canary Island Date Palm
Protasparagus aethiopicus	Asparagus Fern
Protasparagus plumosus	Climbing Asparagus
Protasparagus scandens	Asparagus Fern
Rubus fruticosus	Blackberry
Senecio madagascariensis	
Senna pendula	
Sida rhombifolia	Paddy's Lucerne
Solanum mauritianum	Wild Tobacco
Solanum nigrum	Black Nightshade
Thunbergia sp.	Black-eyed Susan
Tradescantia albiflora	Wandering Jew
Tropaeolum majus	Nasturtium
Toxicodendron succedaneum	Rhus Tree
Verbena bonariensis	Purple Top

BOTANICAL NAME	COMMON NAME
	Bulbs and other garden escapes including;
Hedera helix	Ivy
Hibiscus sp.	Hibiscus (inappropriate planting)
Morus sp.	Mulberry
Pelargonium sp.	Geranium
Agave and Yucca	Palm Grass