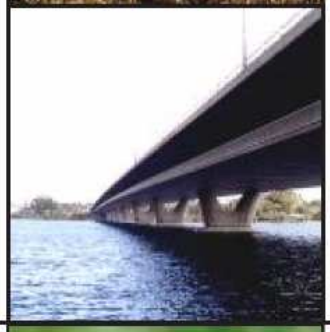
Mt Henry Peninsula Foreshore Management Plan 2004



City of South Perth

Prepared by:
***Ecoscape* (Australia) Pty Ltd**
9 Stirling Highway • PO Box 50 North Fremantle WA 6159
Ph: (08) 9430 8955 Fax: (08) 9430 8977
email: ecoscape@iinet.net.auwebsite: http://ecoscape.com.au

REPORT FOR THE CITY OF SOUTH PERTH
MOUNT HENRY PENINSULA MANAGEMENT PLAN
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Direct all inquiries to:

Ecoscape (Australia) Pty Ltd
9 Stirling Highway • PO Box 50 North Fremantle WA 6159
Ph: (08) 9430 8955 Fax: (08) 9430 8977
ecoscape@iinet.net.au

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Recommendation Summary Table

Mt Henry Peninsula Management Plan

General recommendations

#	Recommendations	Responsibility	Priority
G1	Initiate transfer of vesting of Cloisters Reserve (R21288) from DOLA to the City of South Perth.	CSP, DOLA	Medium
G2	Rezone Vacant Crown Land (VCL) on the western foreshore outside the needs of the freeway, as Parks and Recreation and vest in the City of South Perth.	CSP, DOLA	Medium
G3	Annex the 0.48 ha section of VCL to the Cloisters Reserve (R21288)	CSP, DOLA	Medium
G4	Investigate the feasibility of public acquisition and reservation in the event that all or any of freehold property P003383 should be sold.	CSP	High
G5	Form a steering committee to implement management plan recommendations.	CSP, CB/AqC and other relevant stakeholders	High
G6	Ensure high levels of communication between stakeholders to achieve common goals and interests.	CSP, CB/AqC and all stakeholders	High
G7	Share resources where possible to achieve cost effective solutions.	CSP, CB/AqC and all stakeholders	High
G8	Ensure the steering committee develops an implementation plan of recommendations based on priority.	CSP, CB/AqC and stakeholders	High
G9	Ensure the steering committee reviews the progress of implementation annually.	CSP, CB/AqC and stakeholders	High
G10	Undertake an impact assessment of engineering options before implementation of erosion control measures at Edgewater Overpass.	MRWA, CSP	High
G11	Carry out sediment movement modelling to accurately assess requirements and dimensions of engineering options at Edgewater Overpass.	MRWA, CSP	High
G12	Choose an engineering option for erosion control at Edgewater Overpass, based on impact assessment and sediment movement modelling.	MRWA, CSP	High
G13	Revegetate the eroded sections of the Spit with native rushes and paperbarks upslope from the existing sections of good vegetation.	CSP	Medium

#	Recommendations	Responsibility	Priority
G14	Obtain a geotechnical assessment of the overall stability of the flanks of Mt Henry and the risk of landslides and cliff collapse.	CSP, CB/AqC	High
G15	Close the tracks on steep sections of southwest face of Mt Henry. Use brushing where possible to further discourage access.	CSP, CB/AqC	High
G16	Re-erect signs and fences warning people to keep away from steep sections on the southwest face of Mt Henry.	CB/AqC	High
G17	Investigate the feasibility of providing access to the Mt Henry Peninsula by the general public along a suitably constructed track.	CSP, CB/AqC	High
G18	Erect fences and signs warning people to keep clear of erosion-affected areas on the school slopes of Aquinas Bay foreshore.	CB/AqC	High
G19	Spread mulch over the freeway embankments on the approach to the Mt Henry Bridge and continue revegetating using local species.	MRWA, CSP	Low
G20	Undertake detailed inspections and if necessary repair all drains within the study area.	CSP – Infrastructure Services	High
G21	Undertake weed control measures around all drains within the study area.	CSP – Infrastructure Services	High
G22	Renew Redmond Avenue drain and place it at ground level.	CSP – Infrastructure Services	High
G23	Undertake regular water quality sampling and analysis to ensure that nutrient levels within water entering the river are acceptable. Data collected could include peak flows, nutrient levels, pH and dissolved oxygen levels.	School and community groups, SRT, CSP	Medium
G24	Encourage school and community groups to participate in the 'Ribbons of Blue' and 'Yellow Fish Road' programmes. Sampling should include all stormwater drain outlets and bores within Aquinas College.	School and community groups, SRT, CSP	Low
G25	Provide educational material to landowners, encouraging the proper use of fertilisers and chemicals.	CSP,	Low
G26	Use water sensitive design principles and best management practice for proposed future freeway alterations.	MRWA	High
G27	Continue to support two specialised trained field staff to work in bushland regeneration and maintenance on the foreshore.	CSP	High

#	Recommendations	Responsibility	Priority
G28	Continue policy to employ a part-time bush regenerator or ensure groundkeepers have experience or are trained in bushland vegetation management, if deemed appropriate.	CB/AqC	Medium
G29	Continue revegetation of the foreshore area using local plant species.	CSP – Infrastructure Services, Community Groups	High
G30	Remove inappropriate trees and shrubs planted during the construction of the freeway, DUP and along the foreshore of Aquinas College. Replace with local species as resources become available.	CSP – Infrastructure Services, CB/AqC	Medium
G31	Continue ongoing weed control measures of declared and other pest plants as resources are available.	CSP – Infrastructure Services, CB/AqC Community Groups	High
G32	Close inappropriate tracks and construct appropriate access tracks to minimise erosion.	CSP – Infrastructure Services	High
G33	Formalise weed management strategies based on the general approaches to weed control.	CSP – Infrastructure Services	High
G34	Implement periodic maintenance schedules for ongoing weed control.	CSP – Infrastructure Services	High
G35	Facilitate community involvement in resource-led weed control projects.	CSP, community groups and schools	High
G36	Implement discrete fencing and limestone walking tracks to minimise disturbance and erosion and hence minimise weed infestation.	CSP – Infrastructure Services	Medium
G37	Investigate the use of State Government funded labour programmes such as GreenCorps, Work for the Dole and Correctional Services and support the involvement of local schools and community groups to minimise implementation costs.	CSP, Justice Department, Department of Employment Education and Training, Local Community groups and Schools	Medium

#	Recommendations	Responsibility	Priority
G38	Undertake weed control prior to and during revegetation activities.	CSP – Infrastructure Services	High
G39	Revegetate areas using vegetation associations and plant species lists as a guide.	CSP – Infrastructure Services	High
G40	Brush and revegetate inappropriate tracks.	CSP – Infrastructure Services	Medium
G41	Erect bollards to demarcate mowing limits.	CSP – Infrastructure Services	Medium
G42	Continue to collect local seed and cuttings for propagation at the Council Nursery.	CSP – Infrastructure Services	Medium
G43	Organise community tree planting days to assist with planting and foster community participation.	CSP – Infrastructure Services, Community Groups	Medium
G44	Seek funding to investigate groundwater levels to determine their quality and quantity if required.	CB/AqC, MtHPCG	Medium
G45	Undertake a dieback survey prior to further revegetation in Bassendean soil components of the Mt Henry Peninsula and the Mt Henry Public Open Space if resources become available.	CSP, CB/AqC, Infrastructure Services, Community Groups	High
G46	Select resistant species if dieback is found in the areas to be revegetated. Disinfect equipment and boots upon exiting the site.	CSP, CB/AqC, Infrastructure Services, Community Groups	High
G47	Implement hygiene measures if the area is found to be dieback free, prior to entering the area.	CSP, CB/AqC, Infrastructure Services, Community Groups	High
G48	Investigate if the area is dieback free and assess the risk of dieback occurring. If there is a moderate or high risk, paths in the area should be sealed or closed and measures implemented to stop people from entering the area.	CSP, CB/AqC	Medium

#	Recommendations	Responsibility	Priority
G49	Maintain and periodically update the comprehensive Fire Management and Response Plan according to FESA guidelines.	CSP, CB/AqC, FESA	High
G50	Continue the ongoing control of grassy weeds.	CSP, CB/AqC	High
G51	Assess fuel levels periodically and undertake fuel reduction measures if required.	CSP, CB/AqC	High
G52	Maintain existing access points, fire access tracks and maintain cleared areas 3 m wide around buildings and infrastructure.	CSP, CB/AqC	High
G53	Discontinue the practice of dumping grass clippings in and around the bushland.	CB/AqC	High
G54	Remove litter from the Aquinas Bay foreshore.	CB/AqC, SRT, DPI, Community groups	Medium
G55	Ensure Kensington Fire Brigade has the key to all locked gates and is aware of the joint fire plan and all access issues.	CSP, CB/AqC, FESA, KFB	High
G56	Construct nesting boxes for local birds and mammals (e.g. bats) and tall platforms for birds of prey if resources become available.	CSP, SRT, CB/AqC, Community groups	Low
G57	Undertake a comprehensive fauna survey if resources become available and there is sufficient interest e.g. bird counts and species identification four times a year would be beneficial.	CSP, CB/AqC, Community Groups	Medium
G58	Construct a viewing platform near the Mt Henry Bridge.	CSP – Works Division	Medium
G59	Strategically place woody debris for animal habitat especially for invertebrates such as ants, beetles, termites and vertebrates including reptiles.	CSP, Community Groups, SRT	Medium
G60	Revegetate areas of sparse or cleared vegetation to provide wildlife habitats and corridors.	CSP – Infrastructure Services, Community Groups	High
G61	Undertake a comprehensive feral animal control programme.	CSP	High
G62	Investigate the feasibility of conducting fox trapping in association with CALM.	CSP, CB/AqC	Medium
G63	Conduct ongoing education campaign with cat owners.	CSP	Medium
G64	Investigate feasibility of imposing a ‘cat curfew’ and compulsory sterilisation of non-breeding cats.	CSP	Medium
G65	Investigate the feasibility of conducting periodic ‘cat control’ programmes within the study area.	CSP	Medium

#	Recommendations	Responsibility	Priority
G66	Install signage at key access points advising dog owners of the requirement to keep their dogs leashed.	CSP	Medium
G67	Install Poo-ch pouch (dog refuse bag) dispensers at strategic points.	CSP	Medium
G68	Continue 'Pindone' rabbit baiting within study area.	CSP, APB	High
G69	Ensure development proposals include Aboriginal consultation and avoid disturbance to the riverbed or embankments.	CSP, CB/AqC	High
G70	Restrict use of hard-based paths in addition to the existing DUP. Re-surface other paths with mulch or timber to prevent erosion.	CSP, CB/AqC	Medium
G71	Investigate the feasibility of reintroducing fauna to the area.	CSP, CB/AqC, Community Groups, SRT, CALM	Low
G72	Install interpretive signage and seating overlooking Aquinas Bay.	CB/AqC, Community Groups	Low
G73	Investigate the feasibility of routing power and water from Canning Bridge or under the freeway to Cloisters Reserve.	CSP, MRWA	High
G74	Install facilities and amenities at Cloisters Reserve including picnic tables, benches, play equipment, bins, toilets, bike racks and water facilities.	CSP	High
G75	Investigate feasibility of installing lighting at Cloisters Reserve.	CSP	High
G76	Install seating at strategic points along the Western Foreshore.	CSP	High
G77	Investigate feasibility of providing water fountains at strategic locations.	CSP	High
G78	Install mesh rubbish bins 15 m - 20 m from access points.	CSP	High
G79	Ensure all amenities are complementary in colour and style to existing amenities and blend in with the natural environment.	CSP	High
G80	Resurface freeway using low-noise surfacing materials.	MRWA	Medium
G81	Erect screening vegetation where it does not pose a hazard or detract from the visual quality to freeway users.	CSP	Medium
G82	Construct a path and viewing platform near the Mt Henry Bridge overlooking the Canning River.	CSP, Community Groups	Medium
G83	Install public art sculptures that harmonise with the natural qualities of the area and create a place of tranquillity and reflection.	CSP, Community Groups	Medium

#	Recommendations	Responsibility	Priority
G84	Assess access points for ease of use by disabled people and ensure all future constructions have disabled access where feasible.	CSP	High
G85	Discourage trespassers on Aquinas College land, using fences and signs as resources become available and in accordance with relevant policy.	CB/AqC	High
G86	Upgrade suitable paths to provide access to points of interest.	CSP, Community Groups	Medium
G87	Discuss the feasibility of providing a continuous access path around the Aquinas College foreshore, avoiding areas with high erosion potential and ensuring that legal, safety, security and other issues can be dealt with effectively.	CB/AqC, CSP	Medium
G88	Install bicycle speed limit signs at Cloisters car park and Mt Henry Bridge.	CSP	Low
G89	Investigate the feasibility of selectively widening the DUP in places to reduce conflict between cyclists and pedestrians.	CSP	Medium
G90	Install signs at Mt Henry Bridge and Edgewater Overpass to remind users to keep dogs on leashes.	CSP	Low
G91	Investigate the feasibility of increasing regular patrols by the Council rangers, and ensuring fines are issued to owners of dogs without leashes.	CSP	Medium
G92	Arrange a meeting between the CSP, CB/AqC, SRT and DPI to discuss waterskiing and all other river based water sports issues raised in this report.	CSP, SRT, DPI	Medium
G93	Investigate ways of increasing levels of policing in the area and ensure involvement of all major stakeholders in the discussion.	CSP, DPI – Marine and Harbours, WA Water Police	Medium
G94	Investigate the feasibility of providing a marked buffer zone around the foreshore to limit water skiing close to the shore, if deemed successful at Milyu.	DPI, CSP, SRT	High
G95	Undertake education campaign for recreational boat users.	DPI	Medium
G96	Refer complaints regarding water-based activities to the EPA and the DPI – Marine and Harbours.	EPA, DPI, CSP	Medium
G97	Liaise with the Swan River Trust to determine their current policy relating to bait digging around the river foreshores.	CSP, SRT	High
G98	Assess current level of signage and remove extraneous signs.	CSP, CB/AqC	Medium
G99	Ensure signs are uniform and complement the environment while still being visible or painted on the DUP where possible.	CSP, CB/AqC	Medium

#	Recommendations	Responsibility	Priority
G100	Ensure signs do not block views and are positioned so they do not detract from scenic amenity.	CSP, CB/AqC	Medium
G101	Involve the community, where possible, in management of the area. Reinforce community 'ownership' in this respect.	CSP	High
G102	Involve school groups and the local community in educational activities in the natural areas of the study site including stencilling projects, signs, pamphlets, media and holiday recreation programmes.	CSP, CB/AqC, DOE, SRT, EPA, Community groups, MtHPCG	High
G103	Continue supporting the ongoing involvement of local friends groups and provide supervision and support. Key means of support could include professional advice from the Environmental Programmes Coordinator and Infrastructure Services and the provision of equipment and guidance.	CSP, Community Groups, MtHPCG, CB/AqC	High
G104	Continue to provide bushland regeneration courses to interested members of the public who actively commit more than 40 hours per annum to bushland and wetland maintenance.	CSP	Low
G105	Undertake regular inspections of infrastructure and repair or replace where necessary in accordance with formal maintenance plans.	CSP, CB/AqC, MRWA	Medium
G106	Involve the community in litter collection through the Clean-Up Australia Day and hold additional rubbish collection days following storm and peak river flows.	CSP, CB/AqC, Community groups	Medium
G107	Discourage vandals by repairing all damaged facilities immediately after any act of vandalism.	CSP – Infrastructure Services, CB/AqC	Medium
G108	Develop a community education programme with regard to syringe disposal.	CSP, DoH,	Medium
G109	Investigate the feasibility of providing syringe disposal at key locations if the incidence of carelessly discarded needles is high.	CSP	High
G110	Engage in periodic watering of native vegetation along the Western Foreshore if the plants begin to show signs of water stress.	CSP – Infrastructure Services	Low
G111	Minimise irrigation of ovals and lawns to restrict weed invasion into surrounding bushland areas.	CB/AqC grounds keepers	Medium
G112	Monitor groundwater levels as required and regulate use to ensure adequate water resources for native vegetation.	CB/AqC	Medium

#	Recommendations	Responsibility	Priority
G113	Investigate the feasibility of providing a locked gate at the entrance to Gentilli Way overpass.	CSP	High
G114	Remove graffiti and repair damage to infrastructure as soon as possible after it occurs.	CSP	High
G115	Encourage the community to report anti-social and destructive behaviour to the police and Council authorities.	CSP, WA Police Department	Medium

Site specific recommendations

Cloisters Car park to Infill Area

#	Recommendations	Responsibility	Priority	Timing
A 1.1	Move Gentilli Way drain outlet to a more appropriate location further south if deemed necessary.	CSP	Medium	2003-2004
A 1.2	Replace rubbish bins with metal mesh bins at least 5 metres from the car park.	CSP – Works	Medium	2003-2004
A 1.3	Install toilet, seating, play equipment and other amenities outlined in the Concept Plan.	CSP	Medium	Ongoing
A 1.4	Investigate feasibility of providing power and water to Cloisters for lighting, barbecues and drink fountains.	CSP	Medium	2003-2004
A 1.5	Remove damaged uneven bollards and replace with bollards along margin of the car park as shown on the plan.	CSP	Medium	2003-2004
A 1.6	Investigate the feasibility of erecting a gate on the other side of the overpass at Gentilli Way.	CSP	Medium	2003-2004
A 1.7	Replant the margins of the car park with local amenity species.	CSP	High	Ongoing
A 1.8	Install signage informing people of rehabilitation works and its progress.	CSP	Low	Ongoing
A 1.9	Install a sign with name of reserve in a prominent place.	CSP	Medium	2003-2004
A 1.10	Remove remaining Morning glory from fences and paperbarks.	CSP – Infrastructure Services	High	2003-2004
A 1.11	Continue weed control and revegetation in the Paperbark Grove.	CSP – Infrastructure Services	High	Ongoing
A 1.12	Remove the seat from Paperbark Grove.	CSP	Low	2003-2004

#	Recommendations	Responsibility	Priority	Timing
A 1.13	Remove rubbish and hard-pave or plant under overpass ramp.	CSP	Medium	2003-2004
A 1.14	Fence Paperbark Grove before continuing revegetation. Use 1.5 m high chain-link and pine log fence similar to existing fence at the Spit.	CSP	High	2003-2004
A 1.15	Monitor natural regeneration of *Melaleuca preissiana* and *M. rhaphiophylla* within Paperbark Grove and reinforce with seedlings if necessary.	CSP	High	Ongoing
A 1.16	Plant nodes of *Baumea juncea*, *Juncus pallidus* and *Centella cordifolia* within the Paperbark Grove.	CSP	High	Ongoing
A 1.17	Install signage advising people that rehabilitation projects are underway.	CSP	High	2003-2004
A 1.18	Prune damaged limbs and tidy stripped bark as soon as possible after damage has occurred.	CSP	High	Ongoing
A 1.19	Remove grass clippings from edges of DUP.	CSP	Medium	Ongoing
A 1.20	Install seating on southern end of Cloisters car park.	CSP	High	2003-2004

Paperbark Grove to Infill

#	Recommendations	Responsibility	Priority	Timing
A 1.21	Remove fence and star pickets from the side of the DUP.	CSP	High	2003-2004
A 1.22	Install pine-log and chain-link fence from the start of the good condition bushland near the Paperbark Grove and extend it to the south until fenced to the start of the Infill area.	CSP	Medium	Ongoing
A 1.23	Lay brush over existing minor tracks to discourage use and facilitate rehabilitation.	CSP	Medium	2003-2004
A 1.24	Undertake weed control, particularly Pelargonium, Wintergrass and Kikuyu.	CSP	High	Ongoing
A 1.25	Rehabilitate closed tracks, areas of eroded foreshore and manage existing rehabilitation areas.	CSP	High	Ongoing
A 1.26	Extend and infill current rehabilitation of the cleared area to the south of the Paperbark Grove.	CSP	Medium	Ongoing
A 1.27	Install nature based seating at the end of official walking tracks with views to the river.	CSP	High	2003-2004

Infill

#	Recommendations	Responsibility	Priority	Timing
A 2.1	Continue ongoing weed control in this area, particularly Kikuyu and Pelargonium.	CSP	High	Ongoing
A 2.2	Remove introduced plant species planted by MRWA for rehabilitation that are, or have the potential to, become weeds.	CSP, CB/AqC	Medium	2003-2004
A 2.3	Continue rehabilitation and revegetation of this area. Plant species used should be primarily shrubs, rushes and groundcover species adapted to growing in a hard limestone substrate.	CSP	High	Ongoing
A 2.4	Install seating at strategic locations to provide places for rest and contemplation.	CSP	High	2002-2005

Edgewater Overpass

#	Recommendations	Responsibility	Priority	Timing
A 2.5	Raise or move the DUP immediately south of Edgewater Overpass to prevent it becoming inundated during high tide.	MRWA, CSP	Medium	2003 – 2004
A 2.6	Erect a fence extending 20 m on either side of Edgewater Overpass between the DUP and the foreshore vegetation if safety considerations can be met.	CSP	Medium	2003-2004
A 2.7	Install mesh rubbish bins that are resistant to burning.	CSP	Medium	2003-2004
A 2.8	Investigate and if necessary repair the drain immediately to the north of Edgewater Overpass.	CSP	Low	2003-2004
A 2.9	Liaise with DPI to determine the feasibility of banning water ski take offs near Edgewater Overpass.	CSP, DPI	High	2003-2004
A 2.10	Implement erosion control measures outlined in general recommendations.	MRWA, CSP	High	2003-2004

Infill to the Spit

#	Recommendations	Responsibility	Priority	Timing
A 3.1	Revegetate steep slopes on the Freeway embankment.	CSP, MRWA, Community Groups	High	2003-2004
A 3.2	Investigate the feasibility of installing a drain to stem stormwater runoff from the freeway.	MRWA	Low	N/A
A 3.3	Inspect and if necessary repair drains.	MRWA, CSP,	Medium	2003-2004

#	Recommendations	Responsibility	Priority	Timing
A 3.4	Control weeds around drains.	CSP	Medium	2003-2004

The Spit

#	Recommendations	Responsibility	Priority	Timing
A 4.1	Erect a viewing platform with seating between the Spit and the Mt Henry Bridge.	CSP	Low	2003 – 2004
A 4.2	Continue the ongoing programme of weed control.	CSP	High	Ongoing
A 4.3	Rehabilitate the Spit, working from the good areas towards the poorer areas.	CSP	High	Ongoing
A 4.4	Implement erosion control measures as outlined in general recommendations.	CSP	Medium	2003 - 2004
A 4.5	Repair the stone pitch revetment under Mt Henry Bridge.	MRWA	High	2003-2004
A 4.6	Paint cautionary signage to dog-owners and 'Please slow down' cyclists on the DUP near Mt Henry Bridge.	CSP	Medium	2003-2004

Mt Henry Peninsula

#	Recommendations	Responsibility	Priority	Timing
A 5.1	Install warning signs about the cliff hazard in a prominent position if deemed necessary.	CB/AqC	Medium	2003-2004
A 5.2	Investigate the feasibility of surfacing the cross country track and walk trail. Prioritise resurfacing for steep areas with higher erosion risk.	CB/CB/AqC, CSP	Medium	2003-2004
A 5.3	Close the track leading from the gate at Mt Henry Bridge along the slope face. Fence and lay brush if sufficient resources become available.	CB/CB/AqC	High	2003-2004
A 5.4	Close unofficial paths in the area and rehabilitate if resources become available.	Mt Henry PCG, CB/AqC	Medium	2002-2005
A 5.5	Repair the chain link fence near Mt Henry Bridge. Install a 'private property' sign.	CB/AqC	Medium	2003-2004
A 5.6	Remove the wire fence going into water near Mt Henry Bridge. If resources become available, install a sign warning people not to climb on the cliff face or around the foreshore as it contributes to erosion.	CB/AqC, CSP	Low	2003-2004
A 5.7	Control grassy weeds near buildings and in bushland as resources become available.	CB/AqC	High	Ongoing

#	Recommendations	Responsibility	Priority	Timing
A 5.8	Control weeds along the freeway margin, remove exotic trees and replant with natives.	CB/AqC, MRWA	Medium	2003-2005
A 5.9	Remove rubbish from the quarry area and rehabilitate if resources become available.	Mt Henry PCG, CB/AqC	Medium	2003-2005
A 5.10	Repair the fence along the perimeter of the quarry area if resources become available.	CB/AqC	High	2003-2004

Aquinas Bay Foreshore

#	Recommendations	Responsibility	Priority	Timing
A 6.1	Clean up litter along the foreshore, taking care to minimise erosion while doing so.	Mt Henry PCG, CB/AqC	Low	Ongoing
A 6.2	Repair and rehabilitate eroded areas around the Redmond Avenue drain. Install biological filters.	CSP	High	2002-2004
A 6.3	Remove old compost heaps around and within bushland.	CB/AqC	Medium	2002-2004
A 6.4	Ensure reticulation does not extend into bushland.	CB/AqC	Medium	Ongoing
A 6.5	Ensure compost heaps are located away from bushland or have a buffer between the compost and bushland.	CB/AqC	Medium	Ongoing
A 6.6	Remove weeds and prunings from bushland areas and ensure this practice is not continued.	CB/AqC	High	Ongoing
A 6.7	Remove exotic trees from the bushland and the foreshore and replant with local species as resources become available.	CB/AqC	High	2003-2004
A 6.8	Install signage and seating overlooking Aquinas Bay. Erect signs describing the old boatshed, history and college activities if resources become available.	CB/AqC	Low	2003-2004
A 6.9	Control weeds around the tennis court.	CB/AqC	High	2003-2004

Mt Henry Public Open Space

#	Recommendations	Responsibility	Priority	Timing
A 7.1	Establish communication and liaison procedures for the management of the Water Corporation easement and Dental Hospital land.	CSP, Manning Dental Hospital owners	High	Ongoing
A 7.2	Install signage at both entrances identifying the area as Public Open Space.	CSP	High	2003-2004

#	Recommendations	Responsibility	Priority	Timing
A 7.3	Continue revegetation over the entire area and actively manage the area in future years.	CSP	High	Ongoing
A 7.4	Investigate the feasibility of closing and rehabilitating the vehicular track. Instead allow enough room for maintenance vehicles on the pedestrian path.	CSP, Water Corp.	Medium	2003-2005
A 7.5	Continue weed control measures within the Open Space. Coordinate weed control with Mount Henry Dental Hospital owners.	CSP, Dental Hospital	High	Ongoing
A 7.6	Remove exotic trees and mulch them to provide mulch for rehabilitation. Ensure no exotic seed is in the mulch.	CSP, Dental Hospital	Medium	2003-2004
A 7.7	Erect a fence, bollards or concrete edging between the Open Space and properties to the south to prevent 'lawn drift' and to slow the spread of weed invasion.	CSP	High	2003-2004
A 7.8	Remove gates installed by developers and replace with removable bollards.	CSP	Medium	2003-2004
A 7.9	Rehabilitate the unnamed reserve on the corner of Mt Henry Road and Roebuck Drive to form a wildlife link with the foreshore vegetation.	CSP	High	2002-2005

1.0 Introduction

Mt Henry Peninsula Management Plan

1.1 General Introduction

The Mt Henry Peninsula and its associated foreshore is the largest area of bushland in the City of South Perth and is also an area of high regional conservation value. The study area is about 16 hectares and comprises the foreshore from Cloisters Reserve to the Mt Henry Bridge and the Mt Henry Public Open Space on Hogg Avenue. These areas are vested in the City of South Perth. Other land covered by this study includes the Aquinas Bay foreshore and Mt Henry Peninsula, both of which are owned freehold by the Christian Brothers as Trustees, with Aquinas College acting as land managers.

The study area incorporates several different vegetation communities including highly saline seasonal wetlands and *Banksia* woodlands. Most of the area is of regional significance and is listed under Bush Forever as Site 227. It forms an important remnant habitat for bird and other animal species, as well as providing important corridors for movement of native fauna within the highly fragmented habitat remaining in the Metropolitan area. In addition, the area provides opportunities for passive recreation particularly cycling and walking along the foreshore. Management strategies must therefore balance the provision of recreational facilities with bushland conservation, ensuring maximum enjoyment and safety for recreational users while maintaining and enhancing the natural area. The bushland also has high educational value for Aquinas College and other schools in the vicinity. Key issues that will be addressed in this management plan include weed control, ecological restoration, erosion control, access, education and recreation management. Potential impacts from the possible future widening of the Mt Henry Bridge will also be addressed in the management plan.

1.2 Need for the Study

This Foreshore Management Plan has been undertaken to review the implementation and progress of recommendations from the previous management plan in 1993, as well as to determine new recommendations in light of changes which have occurred since then. In the time between the previous management plan and the present, there have been changes in government legislation and policy toward the environment, as well as changes in community attitudes and requirements. There have also been changes to the study site itself from the implementation of the 1993 Management Plan recommendations. Other changes to the study area have included new subdivisions nearby and associated housing developments on Hogg Avenue, increased recreational use and as a consequence, increasing pressure on the environment. The proposed widening of the Mt Henry Bridge to accommodate the South West Metropolitan Railway also has implications.

The policy and planning framework has also changed and been strengthened with regard to areas of conservation significance within the City of South Perth. Reports commissioned by the City of South Perth, including the City of South Perth Green Plan (2001), the City of South Perth Draft State of the Environment (2002) and the City of South Perth Environmental Strategy 1999-2002 focus on a coordinated approach to environmental management. Combined management planning has resulted in the amalgamation of the Salter Point and Waterford Foreshore Management Plans and the coordination of this plan with other management plans in the City of South Perth. These other plans include the Salter Point and Waterford Foreshore Management Plan (2000), the Sir James Mitchell Park Foreshore Management Plan (2001), the Milyu Nature Reserve Rehabilitation Plan (1998) and the Western Foreshore Management Plan (in preparation).

1.3 Visions and Values

The vision statement for the Mt Henry Peninsula is:

> "To manage the Mt Henry Peninsula and associated foreshores for community enjoyment and educational benefit in a way that protects and enhances the natural environment and Aboriginal and European cultures."

This is encapsulated within the vision for the City of South Perth as a whole, as stated in the City of South Perth Strategic Plan 2002-2005:

> "By the year 2005 the City will be an attractive riverside city reflecting the needs of the community and developed in harmony with its natural environment."

1.4 Aims and Objectives

The aims and objectives of the management plan review is:

- To review the findings and management recommendations made in the 1993 Mt Henry Management Plan.
- To review the progress of management recommendations since 1993.
- To examine new pressures and problems that have arisen since 1993 and make management recommendations that address these issues, and
- To assess the impact of future pressures and problems and make management recommendations to alleviate these impacts.

These aims and objectives are complementary with the long-term goals of the City as outlined in the City of South Perth Strategic Plan 2002-2005. Relevant goals and strategies from this document are reproduced below:

Goal 3 Environmental Management
To maintain and enhance the City's unique natural and built environment

Strategy 3.2 Continue to implement the Environmental Strategy and associated Management Plans to bring a responsible and coordinated approach to the management of the environment.

Goal 4 Infrastructure
To effectively manage, maintain and enhance the City's infrastructure assets.

Strategy 4.1 Develop appropriate plans, strategies and management systems to ensure Public Infrastructure Assets (roads, drains, footpaths etc) are maintained to a responsible level.

Strategy 4.6 Implement the bicycle network plan to enhance cycling and walking facilities.

1.5 Location

The study area (Figure 1) is located within the Perth Metropolitan Area, approximately eight kilometres south of the Central Business District. It is situated on the lower Canning River with the Mt Henry Peninsula being a prominent feature of the lower Canning River landscape. The western foreshore area from Cloisters Reserve to the Mt Henry Bridge lies adjacent to the Kwinana Freeway for approximately two kilometres of its length.

1.6 Methods

1.6.1 Review of 1993 Management Plan

A review of the 1993 Management Plan and other relevant literature was undertaken to determine the progress of recommendations outlined in the 1993 Management Plan and other relevant information associated with the study site. A summary of the implementation status of the recommendations is provided in Appendix 11.

1.6.2 Field Work

Bushland Condition Survey

A bushland condition survey was used to assess the overall condition of areas of bushland and delineate areas in need of rehabilitation and/or weed control. The bushland condition scale developed by Kaesehagen (1995) was used. This scale incorporates quantitative elements, including the percentage of native species and the cover/abundance of weed species. The scale is reproduced below.

The use of this scale allows the production of clear maps that show the various condition ratings attributed to areas. The resulting maps can be used to determine management priorities for restoration, and can also be used to determine the success of restoration efforts if bushland condition mapping is undertaken at regular intervals. A map of the Bushland Condition in the study area is shown in Figure 2.

Condition Rating	Criteria
Very Good – Excellent	• 80 – 100% Native Flora composition • Vegetation structure intact or nearly so • Cover/abundance of weeds less than 5% • Minor signs of disturbance
Fair – Good	• 50 – 80% Native Flora composition • Vegetation structure modified or nearly so • Cover/abundance of weeds 5 – 20% • Disturbance influence moderate
Poor	• 20 – 50% Native Flora composition • Vegetation structure completely modified • Cover/abundance of weeds 20 – 60% • Disturbance incidence high
Very Poor	• 0 – 20% Native Flora composition • Vegetation structure disappeared • Cover/abundance of weeds 60 – 100% • Disturbance incidence very high

Field Assessment

The recommendations made in the 1993 Management Plan were assessed in the field for their level of implementation. The study area was also assessed for the following:

- Current levels and future requirements of rehabilitation works.
- Current levels and future requirements of weed control.
- Identification of inappropriate management practices.
- Assessment of Cloisters Reserve in the context of concept plan to improve the appearance and amenity of the area.
- Assessment of recreational areas and facilities, and
- Assessment of potential impacts of the bridge widening to accommodate the proposed South West Metropolitan Railway.

Erosion Assessment

M.P. Rogers and Associates and Ecoscape carried out the erosion assessment. Assessment included a site survey, development of bank profiles and comparison of historical aerial photos.

1.6.3 Community Consultation

Community consultation was carried out as part of this management plan. As well as allowing for community feedback and promoting discussion on the needs of the community in this area, community consultation contributed towards fulfilling the goal outlined in the City of South Perth Strategic Plan (2002-2005): “To be a customer focused organisation that promotes effective communication and encourages community participation.”

A survey was distributed to fourteen identified user groups and interest groups from local and surrounding areas. In addition a similar survey was distributed via mail drop to 1,600 nearby households in Manning, Como and Salter Point. A total of 43 responses were received from households and eight responses from identified user and interest groups.

A community workshop was held on the 16th of June 2002 to give respondents the opportunity to comment on the main issues raised from the survey responses and identify other outstanding issues. The results of the survey and the community workshop were used to determine how the community used the area and what was required to enhance user experience.

Direct discussions and liaison with some key stakeholders was also undertaken.

Council reviewed the draft document prior to its printing and endorsed its release late in 2002 for wider public comment for eight weeks. Due to the timing over Christmas and as a result of requests from a number of parties, the public comment period was extended to the end of March 2003 to allow sufficient time for consideration of the draft document. Release of the plan was advertised in 'The West Australian' and the 'Southern Gazette'.

Six submissions were received. The comments contained in these submissions were analysed and modifications made to the document as required, in accordance with the results of additional research. A summary of the submissions is included as Appendix 12.

This plan has been presented to Council for adoption and has then been published as the Mt Henry Peninsula Management Plan (2003).

Implementation of the recommendations of the plan will be principally the responsibility of the Council. The Christian Brothers as Trustees and staff of Aquinas College will also play a pivotal role and it is hoped that implementation will occur in a cooperative manner and include some community involvement.

2.1 Boundaries of Study Area

The study area is bounded to the north by Cloisters car park and includes the narrow strip of land between the Kwinana Freeway and the Canning River to the Mt Henry Bridge (Figure 1). It also includes the bushland on Mt Henry Peninsula and the Aquinas Bay foreshore to Redmond Street.

The boundaries of the study area are similar to those delineated in the 1993 Management Plan, however the area from Redmond Reserve to Salter Point has now been included in the Salter Point and Waterford Management Plan. The Mt Henry Public Open Space on Hogg Avenue has also now been included in this plan in order to manage this as a remnant link with the foreshore.

2.2 Physical Environment

2.2.1 Climate

The Perth Metropolitan region has a Mediterranean climate characterised by wet mild winters and hot dry summers. Rain is concentrated into the winter months and in summer vegetation must withstand dry heat and strong desiccating winds. Summer average temperatures are high with the average daily maximum for February of 30^0C and afternoon southwesterly winds averaging 20 - 40 km/hr (Rippey and Rowland, 1995).

2.2.2 Geomorphology/Soils

Mt Henry forms part of the most eastern dune of the Spearwood Dune System, bordering on the Bassendean Dune System. Calcareous sands formed into limestone through cementation or leaching and precipitation around tree roots forming travertine pipes. This can be seen on exposed sections of cliffs on the southern end of Mt Henry Peninsula and at Redmond Reserve.

The 1993 Mt Henry Peninsula Management Plan describes the soils as Spearwood Sands, varying from Karrakatta Yellows to Cottesloe Browns. Soils at the Spit and Mt Henry Peninsula are characteristic of Cottesloe soils with limestone present very close to the surface, while near the Aquinas College oval they are the deeper Karrakatta type. All of the soils are leached and pale, typical of Bassendean soils (Brooker *et al*., 1993). The diversity of soil types in the study area is reflected in the diversity of vegetation types in the area.

2.2.3 Hydrology

Mt Henry is situated on the outer fringe of the Cloverdale Water Mound, the smallest of the three mounds in the Perth Metropolitan area. There is also a small seasonal water mound under the Peninsula that dries up during summer. As the groundwater is shallow and unconfined, it has a high susceptibility to contamination from fertilisers, hydrocarbon leakage and spillage and leaching from old refuse dumps.

Aquinas College uses mains water for its domestic use and draws water from six bores to irrigate 16 ha of ovals and gardens. These are licensed by Department of Environment (Office of Water Regulation) and have been monitored for total dissolved salts since 1988. There are no bores located on the narrow neck of the Peninsula, as it is likely that saline water infiltrates the groundwater in this area.

2.3 Biological Environment

2.3.1 Flora and Vegetation

There is an abundance of different natural vegetation associations in the study area, with a high diversity of species. Many of the species occur outside their normal range. This is a reflection of the position of Mt Henry, as it is 10 km from the coast and rises 27 m above sea level. Bounded by the Canning River on three sides, the area is exposed to stronger winds and more salt spray than nearby areas. This, in conjunction with diverse soil types, creates a microclimate unique to the region, which influences the vegetation associations. As discussed above the soils are derived from Karrakatta, Cottesloe and Bassendean sands and also include areas of Tamala limestone. The varying landscape in the study area offers opportunities for a diverse array of vegetation associations (Figure 1).

Mt Henry Peninsula and its associated foreshore forms the greater part of Bush Forever Site 227. Two floristic supergroups and four floristic community types have been identified in the area from Gibson *et al.* (1994) (WAPC, 2000). These are:

Supergroup 2: Seasonal Wetlands

*16 Highly Saline seasonal Wetlands

*S7 Northern woodlands to forests over tall sedgelands alongside permanent wetlands

Supergroup 4: Uplands centred on Spearwood and Quindalup dunes

*28 Spearwood *Banksia attenuata* or *B. attenuata – Eucalyptus* woodlands

30c2 Woodlands and shrublands on Holocene dunes

Flora considered significant by the Department of Conservation and Land Management are recorded in Bush Forever (WAPC, 2000) and include *Dodonaea hackettiana* (Priority 4); *Astroloma macrocalyx* (Swan berry) and a disjunct population of *Hovea chorizemifolia* (Holly-leaved hovea). A number of species often associated with Spearwood dunes are found at their most inland point on the Swan Coastal Plain at Mt Henry Peninsula. These were *Acacia lasiocarpa* var. *lasiocarpa*, *Acanthocarpus preissii*, *Adriana quadripartite* (Coast bitterbush), *Anthocercis littorea* (Yellow tailflower), *Conostylis candicans* (Grey cottonhead), *Dodonaea aptera* (Coast hop bush), *Dryandra sessilis* var. *cygnorum*, *Eucalyptus gomphocephala* (Tuart), *Spyridium globulosum* (Basket bush) and *Templetonia retusa* (Cockies tongue).

Vegetation surveys undertaken previously have recorded a total of 185 different native plant species, with 132 of these from the Brooker *et al.* (1993) survey. Marchant (1974) recorded five vegetation associations and these were described in Brooker *et al.* (1993). These were Strand Vegetation, Paperbark Woodland, Limestone Knolls, Low Sandy Slopes and Sandy Ridges. The associations from Brooker *et al.* (1993) are described below.

Strand Vegetation

Strand vegetation is found below the high water mark and protects the shoreline from erosion by wave action. The canopy is dominated by *Melaleuca cuticularis* (Saltwater paperbark) and *Casuarina obesa* (Saltwater sheoak) with the understorey consisting of a mosaic of *Juncus kraussii* (Shore rush), *Sarcocornia quinqueflora* (Beaded samphire), *Suaeda australis* (Seablite) and *Sporobolus virginicus* (Marine couch). *Atriplex cinerea* (Grey saltbush), *Gahnia trifida* (Coast saw sedge) and *Threlkeldia diffusa* (Coast bonefruit) occur on the margins of the high water mark. Upslope of the high water mark there are relic *Melaleuca viminea* (Mohan) above an open understorey of *Isolepis nodosa* (Knotted club rush) and *Juncus pallidus* (Pale rush). A number of native shrubs and herbs persist, including *Dasypogon bromeliifolius* (Pineapple bush), *Kunzea ericifolia* (Spearwood) and *Sollya heterophylla* (Australian bluebell). *Schoenus grandiflorus* (Large-flowered bog rush) occurs infrequently.

Isolated clumps of the introduced grass Salt water couch (*Paspalum vaginatum*) persist. More common weeds in this association include Cape weed (*Arctotheca calendula*), Pigface (*Carpobrotus edulis*), Variable groundsel (*Senecio lautus*), Couch (*Cynodon dactylon*), One-leaf cape tulip (*Homeria flaccida*), Lantana (*Lantana camara*), Kikuyu (*Pennisetum clandestinum*), Dock (*Rumex* sp.) and Bulbil watsonia (*Watsonia meriana var. bulbillifera*).

This association has been reduced over time as a result of high levels of disturbance near Cloisters Reserve. Waterskiing and jetskiing activities, with heavy use of the adjoining foreshores are preventing natural regeneration of rushes and sedges (Brooker *et al*., 1993). Weed species are common in this association, particularly Pigface (*Carpobrotus edulis*) and Salt water couch (*Paspalum vaginatum*). Freshwater couch and Kikuyu is also common around drainage outlets and areas of freshwater runoff from the freeway.

Paperbark Woodland

A relatively large grove of paperbark woodland is located within Cloisters Reserve. This is an area of freshwater seepage and *Melaleuca rhaphiophylla* (Freshwater paperbark) and *M. preissiana* (Modong) dominate the canopy, often with *Cassytha* sp. (Dodder) hanging on the branches. There is limited native understorey near the overpass. Persistent species and those re-introduced in revegetation projects include *Juncus pallidus* (Pale rush) and dense stands of *Centella cordifolia* (Pennywort). There are dense swards of Kikuyu (*Pennisetum clandestinum*) towards the car park area.

FIGURE 1 : Boundaries of Study Area and Vegetation Associations

N W E S

SCALE 1 : 5500 DATE : Aug 2002

Project: Review of Mount Henry Peninsula Management Plan

Client: City of South Perth

File: Fig 1 - aerial in 0897.apr

• E C O S C A P E •
ECOSCAPE (AUSTRALIA) PTY LTD ABN 70 070 128 675
LANDSCAPE ECOLOGISTS ENVIRONMENTAL CONSULTANTS
9 Stirling Highway North Fremantle Western Australia 6159
Telephone (08) 9430 8955 • Facsimile (08) 9430 8977
email: ecoscape@iinet.net.au

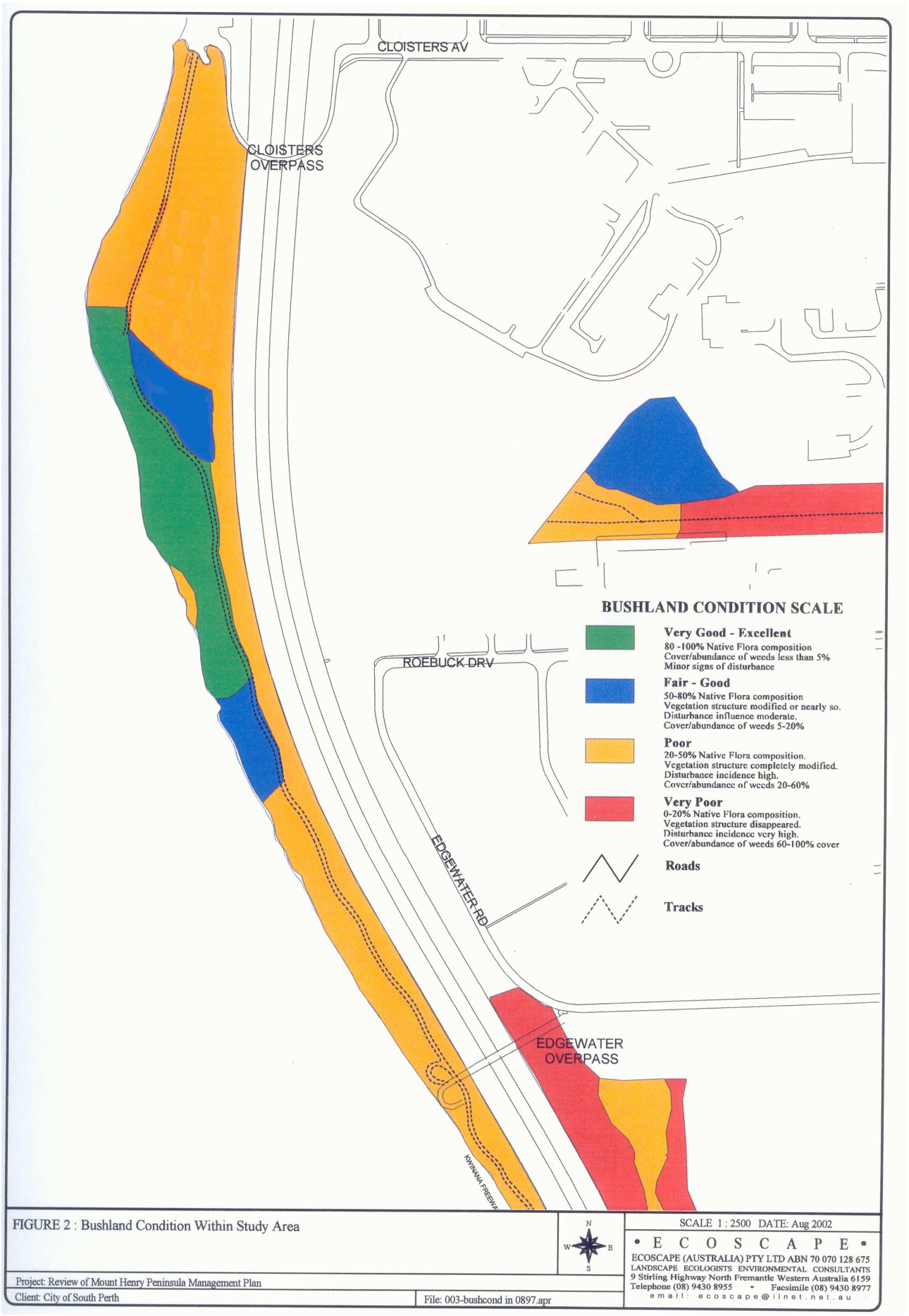

Figure 2 Bushland Condition Within the Study Area

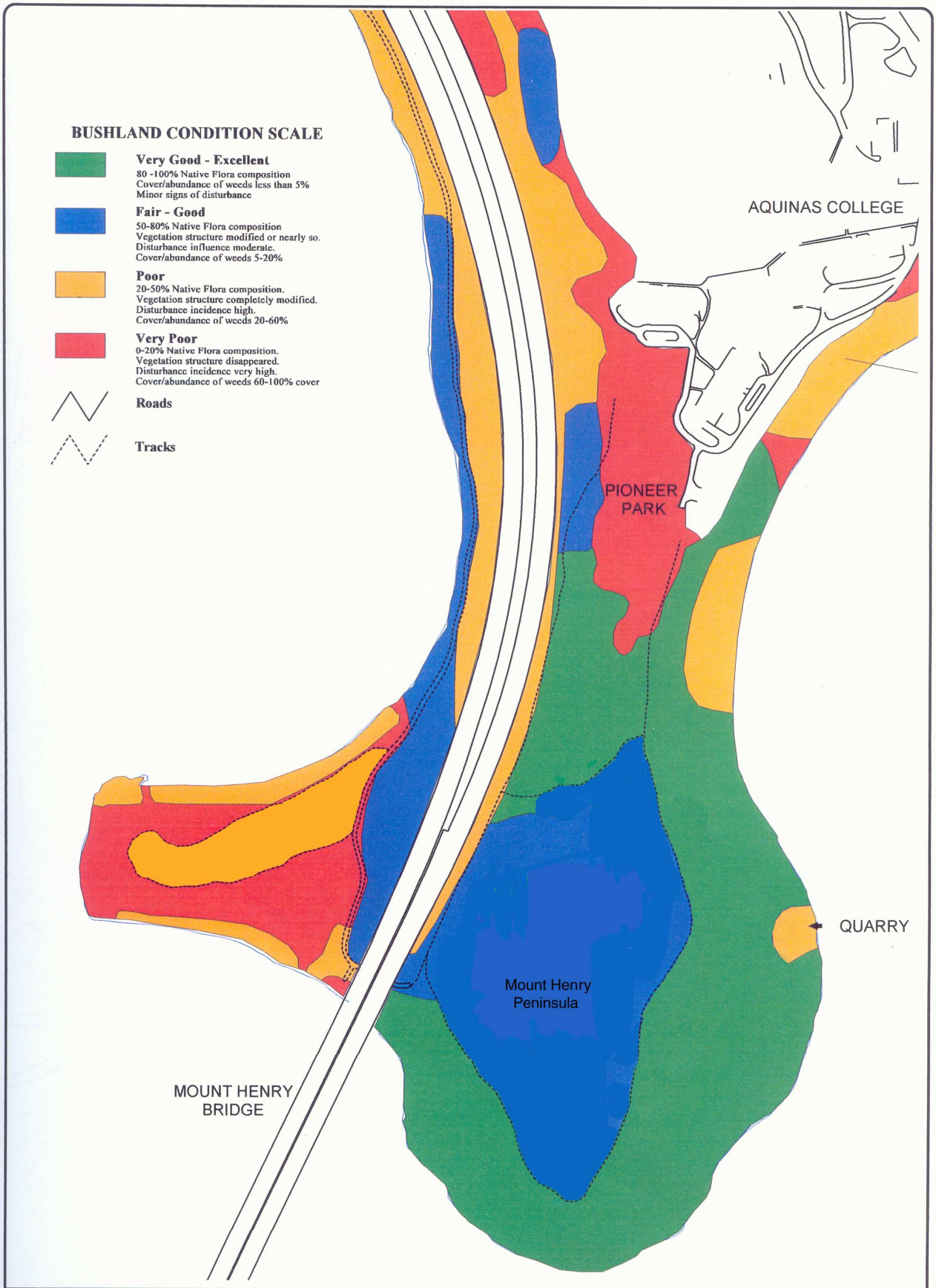

FIGURE 2 : Bushland Condition Within Study Area

SCALE 1 : 2500 DATE: Aug 2002

Project: Review of Mount Henry Peninsula Management Plan

Client: City of South Perth

File: 002-bushcond in 0897.apr

• E C O S C A P E •
ECOSCAPE (AUSTRALIA) PTY LTD ABN 70 070 128 675
LANDSCAPE ECOLOGISTS ENVIRONMENTAL CONSULTANTS
9 Stirling Highway North Fremantle Western Australia 6159
Telephone (08) 9430 8955 - Facsimile (08) 9430 8977
email: ecoscape@iinet.net.au

AQUINAS COLLEGE
SCHOOL SLOPES
AQUINAS BAY
PIONEER PARK
BUSHLAND CONDITION SCALE
Very Good - Excellent
80 -100% Native Flora composition
Cover/abundance of weeds less than 5%
Minor signs of disturbance
Fair - Good
50-80% Native Flora composition
Vegetation structure modified or nearly so.
Disturbance influence moderate.
Cover/abundance of weeds 5-20%
Poor
20-50% Native Flora composition.
Vegetation structure completely modified.
Disturbance incidence high.
Cover/abundance of weeds 20-60%
Very Poor
0-20% Native Flora composition.
Vegetation structure displaced.
Disturbance incidence very high.
Cover/abundance of weeds 60-100% cover
Roads
Tracks
N
W
E
S
SCALE 1 : 2500 DATE: Aug 2002
• E C O S C A P E •
ECOSCAPE (AUSTRALIA) PTY LTD ABN 70 070 128 675
LANDSCAPE ECOLOGISTS ENVIRONMENTAL CONSULTANTS
9 Stirling Highway North Fremantle Western Australia 6159
Telephone (08) 9430 8955 • Facsimile (08) 9430 8977
email: ecoscape@iinet.net.au
FIGURE 2 : Bushland Condition Within Study Area
Project: Review of Mount Henry Peninsula Management Plan
Client: City of South Perth
File: 001 bushcond-east in 0897.apr

This paperbark association is becoming increasingly rare with development pressures resulting in much of this type of vegetation being lost (Brooker *et al.*, 1993). The limited understorey in much of this grove is the result of the area having a long history of disturbance. Until very recently the area was used as a BMX track (S. Smith pers. comm.). While large areas of bare ground remain, the City continues to expend resources to re-create areas of dense *Centella cordifolia* (Pennywort), *Baumea juncea* (Bare twig rush) and *Juncus pallidus* (Pale rush).

The occurrence of weed species is generally quite low and confined to the margins due to low light levels within the woodland. Kikuyu (*Pennisetum clandestinum*) and Couch (*Cynodon dactylon*) are the dominant weeds. Some Morning glory (*Ipomoea indica*) plants continue to climb over the *Melaleuca* despite recent efforts to remove them (J. Box pers. comm.). Flaxleaf fleabane (*Conyza bonariensis*) also occurs near the overpass.

The site is subject to considerable recreational pressure and human use, as it is accessible by car. Public use and vandalism to the trees have degraded the area and the soil has been compacted through bicycle riding and walking which has in turn contributed to the current lack of understorey. Its proximity to the Cloisters car park and Freeway has resulted in large amounts of rubbish being dumped in the area.

Limestone Knolls

Limestone knolls and outcrops occur on the steep slopes of the Mt Henry Peninsula, Aquinas Bay and associated foreshore areas. The dominant overstorey species is *Eucalyptus gomphocephala* (Tuart) over a diverse middlestorey including *Actinostrobus pyramidalis* (Swamp cypress), *Spyridium globulosum* (Basket bush), *Dryandra sessilis* (Parrot bush), *Anthocercis littorea* (Yellow tailflower), *Dodonaea aptera* (Coast hop bush), *Grevillea vestita*, *Hakea prostrata* (Harsh hakea) and *Hibbertia racemosa* (Stalked guinea flower). Frequent *Allocasuarina humilis* (Dwarf sheoak), *Olearia axillaris* (Coast daisy bush) along with two forms of *Templetonia retusa* (Cockies tongue) are also present. Smaller shrubs and groundcovers include *Acanthocarpus preissii*, *Hardenbergia comptoniana* (Native wisteria), *Helichrysum cordatum* (Tangle daisy), *Phyllanthus calycinus* (False boronia), *Rhagodia baccata* (Berry saltbush), *Sollya heterophylla* (Australian bluebell) and the native sedge *Lepidosperma gladiatum* (Coastal sword sedge) and the native grass *Austrostipa flavescens*.

The limestone associations on the Mt Henry Peninsula are degrading, partially as a result of human activities. Paths to the foreshore and down the cliffs are highly susceptible to erosion and attempts have been made to close them. This has generally been successful, however it is apparent that there is still some use despite fencing being erected to deter people from descending to the limestone quarry. The mobilised sand in the quarry has resulted in some level of weed invasion, and its location can result in the downward movement of some weed species, particularly along the low sandy slopes.

The limestone rocks also form the habitat of lichen species unique to Mount Henry (Brooker *et al.*, 1993). These lichens are easily damaged by human activity and should be carefully managed.

Low Sandy Slopes

The Low Sandy Slopes association is found at 1 - 3 metres above high water mark and occurs along the Spit north to Cloisters Reserve and on the Aquinas College foreshore. Aerial photographs taken at 10-year intervals show cycles of disturbance and recovery of the vegetation on the spit, beginning when summer camping was popular in the 1920s and 30s (Brooker *et al*., 1993). The construction of the freeway also saw severe disturbance to this area as it was used as a 'lay down' area for sections of the freeway during its construction in the 1970s and 80s (S. Smith pers. comm.), resulting in large-scale clearing of the vegetation and compaction of the soil. It has more recently been subjected to broad-scale mowing (Brooker *et al*., 1993), which has further degraded the area and promoted the spread of opportunistic weeds. There are areas of good condition bushland in this association (Figure 2), particularly outside of the area known as Infill and along the northern margins of the spit.

The species composition and quality of this vegetation association varies greatly depending on its location. Its canopy is characterised by a combination of various species including *Corymbia calophylla* (Marri), *Eucalyptus marginata* (Jarrah), *E. rudis* (Flooded gum), *Allocasuarina fraseriana* (Common sheoak), *Banksia attenuata* (Slender banksia) and *Nuytsia floribunda* (W.A. Christmas tree). The overstorey species are widely distributed over a range of large to small shrubs. Frequently occurring shrubs include *Acacia cyclops* (Coastal wattle), *A. lasiocarpa* (Panjang), *A. rostellifera* (Summer-scented wattle), *A. saligna* (Coojong), *A. willdenowiana* (Grass wattle), *Allocasuarina humilis* (Dwarf sheoak), *Anthocercis littorea* (Yellow tailflower), *Dryandra sessilis* (Parrot bush) and *Kunzea glabrescens*. Other shrubs in this association include *Adenanthos cygnorum* (Common woollybush), *Conospermum stoechadis* (Common smokebush), *Hakea prostrata* (Harsh hakea), *H. varia* (Variable-leaved hakea), *Hovea chorizemifolia* (Holly-leaved hovea), *Jacksonia furcellata* (Grey stinkwood), *J. sternbergiana* (Green stinkwood), *Macrozamia riedlei* (Zamia), and *Xanthorrhoea brunonis* and *X. preissii* (Balga). The understorey comprises various herbs and low shrubs including *Ptilotus* sp., *Bossiaea eriocarpa* (Common brown pea) and numerous rushes and sedges. These include *Alexgeorgea* sp., *Isolepis nodosa* (Knotted club rush), *Juncus kraussii* (Shore rush), *J. pallidus* (Pale rush), *Lepidosperma gladiatum* (Coastal sword sedge), *L. gracile* (Slender sword sedge), *Leptocarpus* spp. and other unidentified members of the family Restionaceae.

On the Spit and in drier areas, the rushes and sedges give way to grasses and herbs. *Gahnia trifida* (Coast saw sedge) occurs in the transition zone. Upslope there is an interesting association of *Dasypogon bromeliifolius* (Pineapple bush) and *Phlebocarya ciliata* that may be unique (Brooker *et al*., 1993). Herbs in the drier areas include *Anigozanthos manglesii* (Mangles kangaroo paw), *Burchardia umbellata* (Milkmaids), *Diuris longifolia* (Donkey orchid), *Calectasia cyanea*, *Chamaescilla corymbosa* (Blue squill), *Trachymene pilosa* (Native parsnip) and *Sowerbaea laxiflora* (Purple tassels). Groundcovers and small shrubs remaining include *Conostylis candicans* (Grey cottonhead), *C. aculeata*, *Crassula colorata* (Dense stonecrop), *Dampiera linearis* (Wedge-leaved dampiera), *Daviesia* sp., *Gompholobium tomentosum* (Hairy yellow pea), *Kennedia prostrata* (Running postman), *Lyginia barbata*, *Mesomelaena stygia* and *Patersonia occidentalis* (Purple flag). Also present are *Petrophile linearis* (Pixie mops), *Scaevola anchusifolia* (Silky scaevola), *Schoenus grandiflorus* (Large-flowered bog rush), *Sollya heterophylla* (Australian bluebell) and *Stirlingia latifolia* (Blueboy).

There are a number of weed species present in the more disturbed areas of this association. Opportunistic exotic grasses occur on the Spit with African lovegrass (*Eragrostis curvula*),

Perennial veldtgrass (*Ehrharta calycina*), Blowfly and Shivery grass (*Briza maxima* and *B. minor* respectively) being particularly dominant alongside Variable groundsel (*Senecio lautus*). In the wetter areas, Kikuyu (*Pennisetum clandestinum*), Freshwater couch and Saltwater couch can be found. Watsonia (*Watsonia meriana var. bulbillifera*) has also been found by Brooker *et al.* (1993) in some places along the Spit and WA peppermint (*Agonis flexuosa*) has also been seen in numerous areas. The majority of weeds in other areas of this association are from the MRWA revegetation works along the side of the freeway. Various eucalypts from different regions of Australia along with Geraldton Wax (*Chamelaucium uncinatum*), Flame Tree (*Erythrina caffra*) and Japanese Pepper (*Schinus terebinthifolia*) were planted and some have now spread beyond the freeway verge.

Sandy Ridges

The majority of the Mt Henry Peninsula contains the Sandy Ridge association, comprising of a *Banksia* heath community with a wide variety of understorey species that occur on the higher ground and apex of Mt Henry. This vegetation association has been most affected by frequent fires, which has changed the vegetation structure and composition. The vegetation was described by Marchant in Brooker *et al*. (1993) as *Banksia* - Jarrah Woodland, however there is little or no Jarrah present while there are several areas where the *Banksia* canopy remains intact. Some of this area was heavily burnt in a bushfire in 1997. The other association present includes one dominated by *Dryandra sessilis* (Parrot bush), with others dominated by *Banksia menziesii* (Firewood banksia), *B. attenuata* (Slender banksia) and *B. ilicifolia* (Holly-leaved banksia).

Canopy species in this association can also include *Banksia grandis* (Bull banksia) and *Eucalyptus marginata* (Jarrah). Understorey and middlestorey species include *Acacia lasiocarpa* (Panjang), *Allocasuarina humilis* (Dwarf sheoak), *Adenanthos cygnorum* (Common woollybush), *Conospermum stoechadis* (Common smokebush), *Eremaea pauciflora*, *Philotheca spicata* (Pepper and Salt), *Hakea prostrata* (Harsh hakea), *Jacksonia furcellata* (Grey stinkwood), *Macrozamia riedlei* (Zamia), *Xanthorrhoea brunonis* and *X. preissii* (Balga). There is a profusion of groundcover species, herbs and grasses including many orchids. Of these *Hovea chorizemifolia* (Holly-leaved hovea) and *Astroloma macrocalyx* (Swan berry) are outside their normal distribution.

The generally good to excellent condition of the majority of the Mt Henry Peninsula can be attributed to the restricted access of the public and the efforts of the Mt Henry Conservation Group to conserve and rehabilitate the area. Weeds are fairly limited and mainly confined to the margins. Mt Henry Conservation Group and the City of South Perth have undertaken weed control for many years. Weed species along the Freeway margins and areas adjoining Aquinas College include eastern states and exotic tree species introduced during a MRWA revegetation project and opportunistic grassy weeds including Perennial veldtgrass (*Ehrharta calycina*), African Lovegrass (*Eragrostis curvula*) and Blowfly grass (*Briza maxima*).

2.3.2 Fauna

Native Fauna

The fauna of Mt Henry has not been assessed recently with the last comprehensive survey being undertaken in 1992 by the WA Museum. The WA museum database for Como - Manning revealed many species of reptiles (particularly snakes and lizards) and frogs for the area. The only native mammals listed were the Southern Brown Bandicoot or Quenda (*Isoodon obesulus*), Echidna (*Tachyglossus aculeatus*) and lesser long-eared bat (*Nyctophilus geoffroyi*). There is evidence of

Common brushtail possum (*Trichosurus vulpecula*) in the area. As this list is probably derived from opportunistic sightings it is possible that a higher diversity of native mammals exist in the area. It is considered possible that the native Water rat (*Hydromys chrysogaster*) persist in the area.

A comprehensive bird list has been compiled from observations by J. Donohue (1992) and S. Greene (1985 – 92) and is included in Appendix 5. This includes pelicans, cormorants, herons, ibis, ducks, geese, gulls, terns and waders as well as birds of prey including Osprey (*Pandion haliaetus*), Black-shouldered Kite (*Elanus notatus*) and Australian Kestrel (*Falco cenchroides*). A platform for birds of prey has been erected by the Mt Henry Conservation Group and is used by Osprey. These birds were observed during the site survey for this management plan. Three species of birds observed by Donohue and Green are protected under international treaties. The Great Egret (*Ardea alba*) and the Common Sandpiper (*Tringa hypoleucos*) are protected by the JAMBA1 and CAMBA2 agreements and the Crested Tern (*Sterna bergii*) is protected under the JAMBA agreement.

Among other commitments, these agreements specify an obligation by governments of both countries to "….endeavour to take appropriate measures to preserve and enhance the environment of birds protected under provisions of this agreement."

Pest Animals

A number of non-native animal species are known to occupy the area to the detriment of native plant and animal species. The European fox is known to prey on animals within the 35 gram – 8 kilogram weight range and the cat can decimate small mammal and bird populations. Both of these animals are widespread within the Metropolitan area and there are few techniques available for use in urbanised areas. Beyond the Metropolitan area, the Department of Conservation and Land Management uses the poisoning 1080 (sodium monofluoroacetate). However this organization is unwilling to bait in urban areas due to the threat to domestic pets.

Rabbits also occupy the area and can cause considerable damage to native herbs and grasses. Baiting with Pindone™ has been undertaken over the much of the study area and has been successful in reducing populations of rabbits (S. Smith pers. comm). Other non-native animals likely to occur in the area are European mouse (*Mus musculus*), Black rat (*Rattus rattus*) and Norwegian Rat (*Rattus norvegicus*). Although not as insidious as other pest species mentioned, they might impact on small native animals through competition for resources and by introducing disease.

2.4 Social Environment and Heritage

2.4.1 Current Social Environment

The study area is directly adjacent to the suburb of Salter Point in the City of South Perth, with the suburbs of Manning and Como also in close proximity. The foreshore area is a recreational resource for people living locally and in surrounding suburbs. There is considerable use of this

[1] Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment.

[2] Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds in Danger of Extinction and their Environment.

area, particularly by cyclists and walkers originating from other suburbs along the freeway and using the dual use pathway. As such it must be managed as both a recreational and natural resource.

The Peninsula itself forms part of the grounds of Aquinas College, a Christian Brothers' boys school established at Mt Henry in 1938. The Peninsula is a valued resource for the school with Junior School activities, fitness activities and biology classes held there. Although this area is private property, it is very difficult to discourage access by the public. There are signs of recent campfires in the old quarry site as well as unofficial tracks leading off the main cross- country track to sections of the foreshore. Some of these tracks show signs of erosion and activities in this area are likely to contribute to landslip and erosion of the steep embankments leading to the foreshore.

Current activities undertaken by Aquinas College on the Peninsula and along Aquinas Bay include boating (canoeing, rowing and power boating), as well as educational activities in the bushland areas by biology classes. There is also a cross-country track that encircles the top of Mt Henry Peninsula, which is used frequently by the College and by students and staff travelling to and from the College. Aerial photographs show the track has existed since 1959 at least.

The foreshore area from the Mt Henry to Cloisters is used extensively for recreational purposes. A dual use pathway extends from the Cloisters car park, along the foreshore and across Mt Henry Bridge. Cyclists and walkers use the dual use path frequently and it is an important route for cyclists commuting to the city from the southern suburbs. Cloisters car park has boat-launching facilities and generally services water skiers and jet skiers. The area between Canning Bridge and Mt Henry Bridge is a designated water skiing zone and is very popular during the summer months. Prawning and fishing also take place along the foreshore.

2.4.2 Indigenous Heritage

There are no registered Indigenous Heritage sites within the study area (DIA, 2002), however the Swan and Canning Rivers and their tributaries are registered as sacred sites. An ethnographic report for Brooker *et al.* (1993) revealed that the Peninsula was a Nyungar hunting and fishing ground and as it has not been significantly altered since European settlement, it has special interest for Nyungar people.

Nyungar people are descendants of the indigenous people who inhabited Perth and the south west at the time of white settlement in 1829. Culture and traditions were taught by them and by their parents, and so the Nyungar people retain the spiritual association with the country they knew. This is despite these people being prohibited from entering the City of Perth from 1927 to 1954. The Canning River foreshores formed part of a 'run' of certain families (a route on which they habitually travelled).

The Nyungar had an intimate relationship with the river and its foreshore. The Swan River and its tributaries are believed to have been created by the Waugal (the rainbow serpent) and many people still retain this belief (Brooker *et al.*, 1993). The spiritual presence of the Waugal as part of the landscape results in those who believe in its presence to oppose any activity that disturbs the riverbed or any activity that would propose to dig or tunnel under the riverbed or associated floodplain. Any activities that pollute the river are strongly opposed by the Nyungar people as clean unpolluted water is seen as a sign of the benevolent, life-giving presence of the Waugal

(Brooker *et al*., 1993). Footpads (paths) are said to run all along the Swan and Canning Rivers in the Perth Metropolitan Area.

Patricia Baines in her ethnographic report for the 1993 Mt Henry Management Plan could not find the Nyungar name for the Mt Henry Peninsula, however such a feature must have had a Nyungar name. Some of the names of nearby features recorded in Daisy Bates' notebooks and manuscript included:
Crawley Point – Goordandalup
Point Dundas – Moohndup
Point Waylen – Marradungup
Point Heathcote – Beenabup
Point Walter – Beeragup
Melville Waters – Gabbee Kowangoolup
Mouth of the Canning River before it broadens into Gabbee Kowangoolup - Wagoorjup

A meeting was held at Redmond Reserve on the 13th of November 1992 with Nyungar representatives to discuss concerns about the past management of the area, and recommendations for future management. The meeting was attended by Jenna Brooker of the City of South Perth, David Kennedy from Aquinas College and Greg Davis from the Swan River Trust. The following Nyungar people were also in attendance: Sullivan and Lorna Humes, Robert Bropho, Mr and Mrs Malcolm Rider, Ms Margaret Jeffries and Ms Isobel Weir. During the meeting the following concerns were expressed:

- Seepage of sewage from the Redmond Reserve Drain.
- Death and thinning out of *Banksia* on Mt Henry.
- Thinning out of paperbarks and sheoaks.
- Lack of Nyungar representation on management issues.
- Presence of hard-based and cement footpaths and cycleways.
- Erosion, particularly from walking along the steep slopes of Mt Henry and the Aquinas College foreshore.
- Lawns extending to the river.
- Absence of birds and native animals, and
- Presence of introduced pest species.

Recommendations by the Nyungar representatives included:

- Conservation of native bush.
- Representation of Nyungar people on Management Committees.
- No development of the Mt Henry area.
- Cessation of walking on the side of the hill.
- Revegetation of 'thinned out' areas with local species.
- Entice native bird species back, and
- Control of pest animals and plants.

For this management plan, indigenous groups were invited to participate in a survey of user groups in the area. Mr Robert Bropho asked that all management decisions be made in consultation with the Combined Swan River and Swan Coastal Plains Native Title Claimants.

2.4.3 European Heritage

Mount Henry was named after John Henry, Second Lieutenant of the HMS Challenger, who led an overland expedition to trace the headwaters of the Canning River after sailing up the river with Captain Fremantle.

Mill Point was originally a select residential area for government officials and was accessible only by boat across Perth Water. Most of the bushland south of Manning Road was left untouched. Clontarf was established in the early 1900s, using barges to transport building materials across the river.

Title searches in the 1993 Management Plan revealed that 1385 acres of land on the right bank of the Canning, south of Manning Road including Mt Henry was granted to Thomas Middleton, who sold it to Bartholomew Vigors in 1843 for five shillings. The land was then sold again in 1847, this time for 50 pounds. It was again sold in 1851 for 200 pounds and in 1856 to Henry Manning for 700 pounds. The land was then subdivided into smaller parcels, a number of which were bought by the Christian Brothers in 1936. Aquinas College was transferred in 1938 from its previous site in St Georges Terrace. Since then portions of the property have been sold for residential development and the money used to improve the educational facilities.

The ownership of the Peninsula by the Christian Brothers as Trustees reflects the land use that has taken place there. The students of the College, throughout the recent history of the area, have undertaken various activities such as rifle shooting, rowing and swimming and some of the remnants of early activities still remain.

The quarry on Mt Henry Peninsula, which was established before the College, still remains today. A mini rifle range was constructed there by the 'hard earnest work of the boys' and was used by cadets in 1945. Remains of this still can be seen. Cadets camped here and the army huts remained for years after. Around 1955 a golf course was cut into bushland on the ridge, which has since reverted back to bush. Scars of this can still be seen in aerial photographs.

Water based activities have historically taken place around Aquinas Bay. In 1938 a wooden boatshed was opened which extended out to the water. The swimming area was built from recycled jarrah from the Crawley Baths and consisted of two lines of boards along which the boys swam, with an additional boardwalk for the coach. A new land-based boatshed was built in 1971 and shortly after, the old boatshed collapsed. Remains of the pylons can still be seen stretching out into the Bay. These pylons are now WA Heritage listed. The Narrows Bridge was opened in 1959 as the city extended south, and freeway extensions were carried out in 1977 despite opposition from the College.

The foreshore area from Mt Henry to Canning Bridge has been used many times in the past for camping both recreational and out of necessity. The tramline was extended to Como in the 1920s and the beach became popular for camping holidays. Up to 8 000 people would camp there on a summer weekend, causing concern for health inspectors as pollution levels increased. Permanent camps were set up during the depression in the late 1920s and 1930s. Many of the families found shelter under the paperbarks at Cloisters Reserve when they were evicted from their homes in other parts of Perth. The Ugly Men's Association provided rudimentary housing and assistance and also distributed food to the poverty stricken families camping there. This remains one of the

most significant events in the local European history and still remains in some peoples' living memory.

2.5 Land Tenure and Zoning

The present tenure of Mt Henry Peninsula and its adjacent foreshores is a mixture of Freehold Land, Vacant Crown Land (VCL), Crown Resumed Land and five Reserves. The current vesting (as at July, 2002) is shown in Figure 3 from information obtained from the Department of Land Administration (DOLA). The relevant vesting is depicted in the following table:

Table 1: Purpose and vesting of owned land within the study area

Number	Name	Purpose	Vesting	Area (ha)
R 21288	Cloisters Reserve	Parks and Recreation	DOLA	2.83
R 45066	The Spit	Parks and Recreation	CSP	3.95
R 46340	Mt Henry Public Open Space	Parks and Recreation	CSP	0.79
R 25439	Unnamed	Dental Services	Ministry for Health	2.83
R 37828	Unnamed	Parks and Recreation	CSP	0.40
P 012385	Kwinana Freeway	Road Reserve (urban)	Unvested	3.96
P 03383	Mt Henry Peninsula	Freehold Land (urban)	Christian Brothers as Trustees	9.43
P 03383	Mt Henry Peninsula	Freehold Land (urban)	Christian Brothers as Trustees	0.95
P 03383	Aquinas College	Crown Resumed (urban)	Christian Brothers as Trustees	30.09

In addition there are four parcels of unnamed, unallocated crown land that partly forms the road reserve for the Kwinana Freeway. These are (from north to south) 2.43 ha, 0.48 ha, 3.62 ha and 1.56 ha in size respectively. Under the Metropolitan Region Scheme the zoning of Parks and Recreation limits certain forms of development.

2.6 Roles and Responsibilities

There are a number of key government organisations and private stakeholders with roles and responsibilities relevant to the study area in addition to areas directly managed by the City of South Perth. The policies and objectives of these departments, organisations and stakeholders need to be taken into account when undertaking management strategies and coordinating activities within the study area.

The primary stakeholders within the study area are the City of South Perth, Christian Brothers as Trustees and Aquinas College. The roles and responsibilities of the stakeholders and key organisations are given below.

City of South Perth

The City of South Perth has responsibility for local planning and development control in accordance with its Town Planning Scheme. They are also responsible for the management and maintenance of foreshore reserves under their control, including the provision of recreational facilities, rabbit baiting and mosquito control. The relevant departments and personnel are:

- Strategic and Regulatory Services (Environmental Health)
- Infrastructure Services (Environmental Programmes Coordinator, Bushland Maintenance Crew)
- Customer Service (Rangers)

The City of South Perth also acts to facilitate the operation of key stakeholders and organisations, particularly community groups and individuals.

Private Landholders

Management of the only freehold within the study area is the responsibility of two entities. The Christian Brothers as Trustees own freehold title to the Peninsula and the land on which Aquinas College and other buildings are located, while the school is the occupier and manager of the land. The school is answerable to the Christian Brothers in the management of the overall land holdings. There is a direct and binding relationship between these two entities. This means that any use other than those deemed to be 'school use' requires the permission of the Christian Brothers as Trustees.

In summary the College is responsible for the planning, development, management and maintenance of the Aquinas College grounds including the bushland on Mt Henry Peninsula and the Aquinas Bay foreshore, with the endorsement of the Christian Brothers.

Minister for Health

Dental Services WA under the Ministry for Health is responsible for the management of reserve R25439 adjacent to the Mt Henry Public Open Space. The managers of the Dental Hospital have decided to manage the bushland component of the reserve for conservation purposes.

Water Corporation

The Water Corporation is responsible for public water supply, sewerage, irrigation and major drainage networks. There are four Water Corporation drains within the study area and it is responsible for their management.

Department of Environment (DOE)

This agency is the result of an amalgamation between the Department of Environmental Protection (DEP) and the Water and Rivers Commission (WRC).

The DOE provides technical advice on matters relating to the Environmental Protection Act (1986) which relates to prevention, control and abatement of environmental pollution and the conservation, preservation, protection, enhancement and management of the environment. The Environmental Protection Authority administers the Environmental Protection Act (1986) with technical support from the DOE.

Key programmes that are managed by the former WRC component of the DOE include the assessment of water resources as well as planning, allocation and management of water resources, often in conjunction with other agencies and organisations. This agency also administers the 'Ribbons of Blue' programme which provides support for water quality monitoring, vegetation assessment, invertebrate monitoring and other similar activities to schools and community groups. Another programme relevant to this area is the 'Yellow Fish Road' programme, which involves painting yellow fish on stormwater drains etc to promote awareness of the link between the land and water bodies.

Main Roads WA

Main Roads WA is responsible for the land occupied by the Kwinana Freeway and adjacent 'nature strip' which forms part of the study area. Active management in these areas includes weed control and maintenance of roadside revegetation. Main Roads WA will also have a major role in the area in the event of the widening of the Mt Henry Bridge to accommodate the proposed South West Metropolitan Railway.

The Minister for the Environment

The Minister for the Environment is responsible for the administration of the Swan River Trust Act (1988) and the Environmental Protection Act (1986). The Ministry assesses development applications in the Swan River Trust Management Area and may set conditions on developments that may impact on the river.

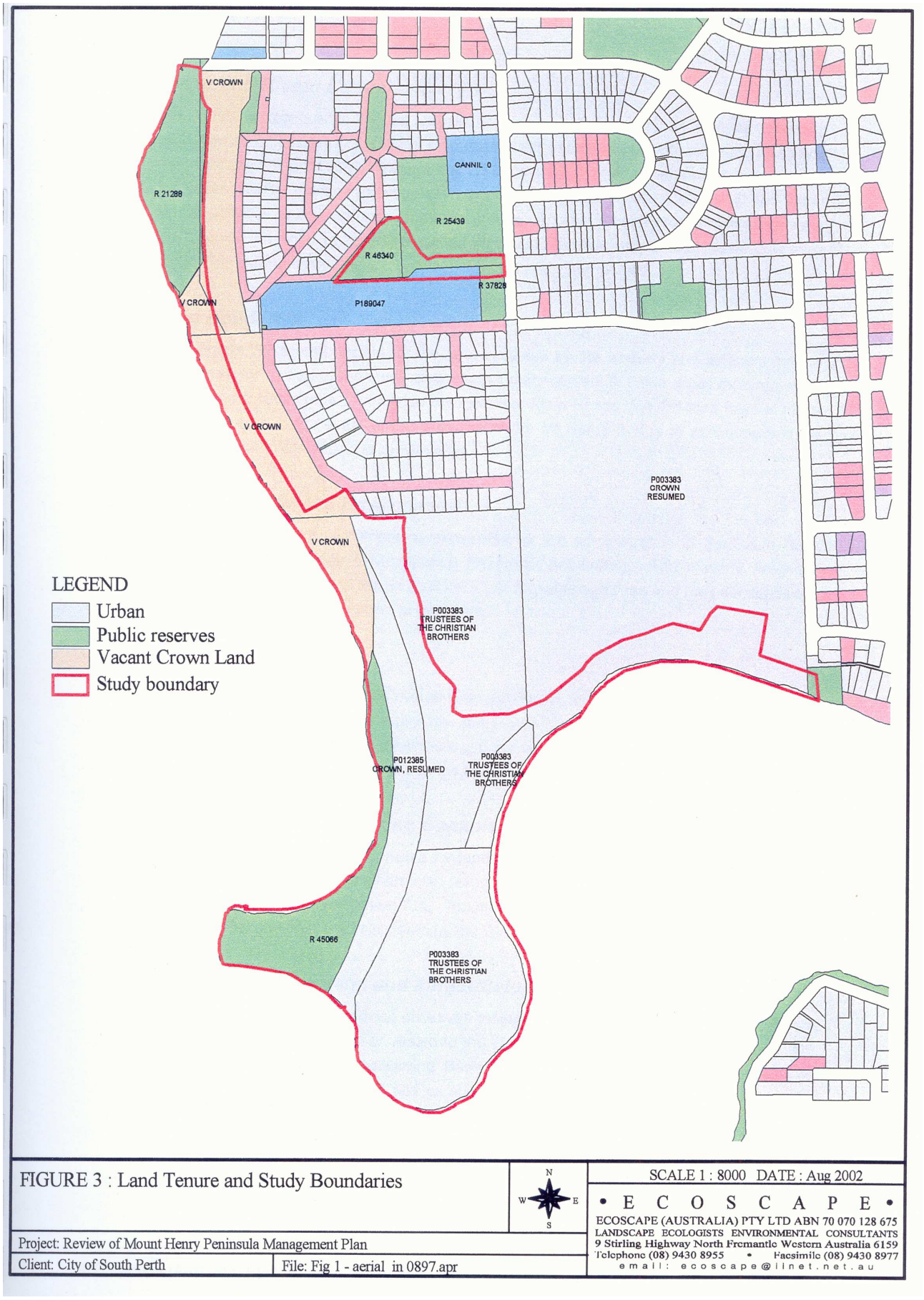

FIGURE 3 : Land Tenure and Study Boundaries

SCALE 1 : 8000 DATE : Aug 2002

Project: Review of Mount Henry Peninsula Management Plan

Client: City of South Perth

File: Fig 1 - aerial in 0897.apr

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ECOSCAPE (AUSTRALIA) PTY LTD ABN 70 070 128 675
LANDSCAPE ECOLOGISTS ENVIRONMENTAL CONSULTANTS
9 Stirling Highway North Fremantle Western Australia 6159
Telephone (08) 9430 8955 • Facsimile (08) 9430 8977
email: ecoscape@iinet.net.au

Swan River Trust

The Swan River Trust (SRT) has overall responsibility for foreshore planning, protection and management of the foreshore within the study area. It was formed to bring together all planning, development and management groups with a major interest in the Swan and Canning Rivers, and provides advice to the Minister for the Environment.

Western Australian Planning Commission (WAPC)

The WAPC is the agency responsible for landuse zoning at a regional scale (Metropolitan Region Scheme or MRS). They are also responsible for planning administration through the Town Planning and Development Act. Amendments to the MRS such as from Urban to Parks and Recreation are administered by the WAPC.

Department of Planning and Infrastructure (DPI)

The Department of Planning and Infrastructure provides technical advice on issues relating to acts administered by the WAPC as well as managing land owned or vested to the WAPC. As well as MRS administration, the Department of Planning and Infrastructure is responsible for administering Bush Forever (WAPC, 2000). The Study area comprises Bush Forever Site 227 and as such has been identified as containing regionally significant bushland.

The Department of Planning and Infrastructure is also responsible for safety and navigation on the Canning River adjacent to the study area. As well as other responsibilities they administer the Navigable Waters Regulations (1982) relating to use of the river, safety and speed limits within areas on the river. They have a particular role in this study as the foreshore within the study area has waterskiing areas and shore take-off points along them.

Department of Conservation and Land Management (CALM)

The Department of Conservation and Land Management is responsible for managing land under their control, administering the Conservation and Land Management Act and conserving wildlife. Although there is no CALM managed land within the study area, they are the first point of contact for matters associated with native fauna protection and feral animal control.

Community groups and interested individuals

Community groups and interested individuals provide an invaluable service to the environment by expressing community needs and interests, participating in planning and management and assisting with rehabilitation and conservation works.

The Mount Henry Peninsula Conservation Group (MHPCG) has worked hard to maintain the bushland on the Peninsula in many areas including rehabilitation, weed control, erosion control and wildlife conservation.

Members of the City of South Perth Environment Association undertake working bees on the western foreshore from Cloisters to the Spit. Works undertaken include hand weeding, rubbish collection and planting.

St Pius has also taken an interest in this area and assisted the City of South Perth to revegetate sections of the river foreshore. This school also helped to prepare information and drawings for a number of posters that are used in shelters along the foreshore.

Other community groups that have an interest include the Canning River Residents Environmental Protection Association, the Urban Bushland Council and the Belmont-Victoria Park Catchment Group.

3.0 General Management Issues and Recommendations

3.1 Ownership and Stakeholder Management

3.1.1 Vesting and Land Tenure

All foreshore areas within the study area are reserved for Parks and Recreation under the Metropolitan Region Scheme (MRS). The bushland on Mount Henry Peninsula is currently zoned Urban under this scheme.

The existing tenure of the western foreshore was implemented to extend the Kwinana Freeway through Mt Henry. Main Roads WA has adequate land for the freeway and excess portions of the reserve should be reserved and vested in the City of South Perth.

The Christian Brothers as Trustees, in partnership with the Aquinas College, have every intention of retaining its freehold property at Mt Henry in perpetuity. However in the event that the Trustees choose to relinquish ownership, acquisition of the Peninsula and its foreshores by the Crown and its reservation for conservation, should be considered.

Recommendations

#	Recommendations	Responsibility	Priority
G1	Initiate transfer of vesting of Cloisters Reserve (R21288) from DOLA to the City of South Perth.	CSP, DOLA	Medium
G2	Rezone Vacant Crown Land (VCL) on the western foreshore outside the needs of the freeway, as Parks and Recreation and vest in the City of South Perth.	CSP, DOLA	Medium
G3	Annex the 0.48 ha section of VCL to the Cloisters Reserve (R21288)	CSP, DOLA	Medium
G4	Investigate the feasibility of public acquisition and reservation in the event that all or any of freehold property P003383 should be sold.	CSP	High

3.1.2 Stakeholder and Cooperative Management

Steering Committee

A recommendation of the 1993 Management Plan for the Mt Henry Peninsula (Brooker *et al*., 1993) was to form a steering committee (MHSC) for Mt Henry Peninsula and associated foreshores to oversee implementation of recommendations from the management plan. A focus group was formed to assist with the development of this management plan and this should be extended and continue as a steering committee to ensure management recommendations are met.

A management group or committee should meet regularly to assess the existing state of the area and formulate short-term and long-term goals based on the recommendations of this management plan. This is important given the diverse vesting and ownership as well as the number of interested parties. A small core of people could form the Steering Committee and call in other parties with a role on an as required basis.

The steering committee could include but not be limited to representatives from:

- City of South Perth Environmental Programmes Coordinator
- City of South Perth Infrastructure Services
- Christian Brothers as Trustees, or representative
- Aquinas College - representatives from the board of management and staff
- Dental Services Land adjacent to the Mt Henry Public Open Space
- South Perth CEAG (Community Environmental Advisory Group)
- Local Aboriginal communities
- Mt Henry Peninsula Conservation Group and other community groups with a specific interest in the study area
- Swan River Trust
- Department of Planning and Infrastructure – Bush Forever Division and
- Department of Environment (former DEP and WRC_ and a representative from the Environmental Protection Authority.

The core members of the MHSC should determine the appropriate frequency and duration of meetings, and a chairman and secretary should be appointed. An agenda for the meeting should be circulated beforehand and invitations to other relevant parties and stakeholders extended when relevant, e.g. Main Roads WA, Water Corporation or residents groups.

Resource Sharing and Communication

Communication between the owners, stakeholders and relevant groups should take place through the steering committee. Management recommendations should be implemented through the coordination of all parties to achieve the most cost-effective results and to ensure that all activities are carried out with common goals.

Recommendations

#	Recommendations	Responsibility	Priority
G5	Form a steering committee to implement management plan recommendations.	CSP, CB/AqC and other relevant stakeholders	High
G6	Ensure high levels of communication between stakeholders to achieve common goals and interests.	CSP, CB/AqC and all stakeholders	High
G7	Share resources where possible to achieve cost effective solutions.	CSP, CB/AqC and all stakeholders	High
G8	Ensure the steering committee develops an implementation plan of recommendations based on priority.	CSP, CB/AqC and stakeholders	High
G9	Ensure the steering committee reviews the progress of implementation annually.	CSP, CB/AqC and stakeholders	High

3.2 Management of Physical Environment

3.2.1 Erosion Control

Erosion was identified as a matter of particular concern in the study area with significant erosion occurring at Edgewater Overpass, The Spit and the Mt Henry Peninsula. Coastal Engineers MP Rogers and Associates and Ecoscape assessed the erosion in these areas and determined the most likely causes, and made recommendations. The full report is included as Appendix 9.

Assessment of historical aerial photographs, development of bank profiles and a site survey enabled a comparative examination of erosion issues and causes. The conclusions of the report are summarised below.

Edgewater Road Overpass

The foreshore to the north and south of Edgewater Overpass has eroded over time and is now at a stage where it may potentially threaten the DUP and the overpass itself. The erosion is taking place on land reclaimed for construction of the Freeway and consists of sand and limestone fill material.

Comparison of the aerial photographs showed a slight accretion of sediment over the last decade 350 to 500 metres north of the overpass. The rate of accretion was estimated to be about 250 – 500 cubic metres per year. There also appeared to be a slight recession of the bank over the last decade. The evidence suggests that there is movement of sand north at the overpass, which may be caused by waves generated from winter southwesterly winds. There was no evidence found that longitudinal waves from boat wash and storms had helped contribute to the recession of the riverbank, however they may contribute to the erosion in this area.

Strategies for mitigating erosion in this area include armouring the bank to prevent further erosion, ongoing sand nourishment to replace sediment and structural changes such as groynes and headlands to trap sediment moving north. Of these options, rock armouring was considered to be the best option for the following reasons:

- It is the most cost-effective;
- Sand nourishment would be a source of ongoing disturbance in the area as well as posing an ongoing cost; and
- Groynes and Headlands, while effective and a viable option, may have a higher visual impact than rock armouring, significantly altering the horizontal profile of the bank. The presence of groynes may also encourage recreational fishing in the area, which may increase litter and disturbance to nearby rushes from bait digging. This does, however, remain a viable option and further investigation may show this to be the preferred option.

Rock armouring can be carried out by using a 100 metre long rock revetment consisting of rocks layed onto a bedding layer and geotextile fabric extending below the river embankment about 1 metre to allow for future recession (Figure 2.2, Appendix 9).

The Spit

The Spit west of Mt Henry appears to be eroding. Aerial photographs show that the end of the Spit has retreated about 5 – 10 metres in the decade between 1988 and 1997. The causes of the erosion are likely to be due to:

- Boat wash causing bank slumping;
- Storm waves at high water levels causing a similar slumping effect; and
- Southerly and northerly winds causing waves and moving sediment to the flanks of the Spit.

Given the low rate of recession of the Spit and with no significant assets being threatened, 'hard' engineering solutions would be inappropriate for this area. Revegetation of the foreshore with rushes and sedges would be more appropriate.

Southwest Face of Mt Henry

The southwest face of Mt Henry is very steep, and while comparatively well vegetated, has suffered considerable erosion and landslip caused by rainfall runoff being channelled down walking tracks. In places these steep slopes are dangerous, and there is an ever-present risk of landslip causing personal injury. Signs and fences have been erected in the past, however these have been vandalised and removed. As there is some level of public risk, the overall stability of the area should be comprehensively assessed by an experienced Geotechnical Engineer to determine the future landslip potential of the area.

Limiting landslip to the level of natural occurrence will occur by keeping people off the tracks in this area. This will be difficult as people continue to ignore signs and fences. Brushing along the existing tracks will slow some of the erosion taking place during rain events by trapping sediment and other debris in the branches, and will also help impede pedestrian access.

An alternative solution may be to allow people to walk through the area on a designated track. Security and public liability issues may arise with this option and require further

feasibility studies. Signs should be re-erected warning of cliff/erosion hazards and advising people to keep away from steep slopes.

Other Erosion Issues

The majority of the substrate in the study area is sandy and has good drainage, with few areas of steep slopes. Erosion is not a major issue in these areas. The only other location of severe erosion occurs along the school slopes of the Aquinas Bay. This is similar to the erosion on the south west face of Mt Henry and is likely to be a result of the nature of the slopes combined with unauthorised access. Restricting access through fencing, signage and brushing will assist in mitigating this impact.

The freeway embankments on the approach to Mt Henry Bridge are also very steep and are prone to erosion during high rainfall events. When this occurs, sheet runoff from the freeway results in a network of runnels across the face of the embankment and sedimentation along the base. Spreading mulch along the surface of the embankment and 'infill' planting with native shrubs will reduce erosion in these areas. Hydromulch could be considered an option on the steeper area, however preventing access is critical once the hydromulch has been applied, as walking on it quickly renders it useless.

Recommendations

#	Recommendations	Responsibility	Priority
G10	Undertake an impact assessment of engineering options before implementation of erosion control measures at Edgewater Overpass.	MRWA, CSP	High
G11	Carry out sediment movement modelling to accurately assess requirements and dimensions of engineering options at Edgewater Overpass.	MRWA, CSP	High
G12	Choose an engineering option for erosion control at Edgewater Overpass based on impact assessment and sediment movement modelling.	MRWA, CSP	High
G13	Revegetate the eroded sections of the Spit with native rushes and paperbarks upslope from existing sections of good vegetation.	CSP	Medium
G14	Obtain a geotechnical assessment of the overall stability of the flanks of Mt Henry and the risk of landslides and cliff collapse.	CSP, CB/AqC	High
G 15	Close the tracks on the steep sections of the southwest face of Mt Henry. Use brushing where possible to further discourage access.	CSP, CB/AqC	High
G16	Re-erect signs and fences warning people to keep away from the steep sections on the southwest face of Mt Henry.	CB/AqC	High

#	Recommendations	Responsibility	Priority
G17	Investigate the feasibility of providing access to the Mt Henry Peninsula by the general public along a suitably constructed track.	CSP, CB/AqC	High
G18	Erect fences and signs warning people to keep clear of erosion-affected areas on the school slopes of Aquinas Bay foreshore.	CB/AqC	High
G19	Spread mulch over the freeway embankments on the approach to the Mt Henry Bridge and continue revegetating using local species.	MRWA, CSP	Low

3.2.2 Water Quality Management

There are five stormwater drains within the study area, some in a state of disrepair and others inappropriately located. The Cloisters Avenue drain is inappropriately located in the car park and close to a recreation area. Most of the drains are heavily weed infested. The drainage outlet at Redmond Reserve is broken and causing local erosion in this area. Detailed inspection of the other drains may also reveal cracks or underground leaks. All of the drains, apart from the Cloisters Avenue drain require weed and erosion control and would benefit from the installation of biological filters similar to those implemented at Cloisters Avenue.

As yet no comprehensive studies have been undertaken on the quality and quantity of water feeding into the Canning River from stormwater drains and seeps within the study area. A report by Henderson and Jarvis (1995) showed levels of pollutants from the Manning Road drain to be generally comparable with the lower values shown by similar drains sampled in other suburbs. It would be beneficial to undertake monitoring at stormwater drains, particularly as water-skiers and other users are in direct contact with the water. Ongoing monitoring will also provide baseline data that may be used in the future to determine and pinpoint sources of pollution.

Students and/or community groups could conduct regular water quality sampling of nutrient levels, pH and dissolved oxygen. Aquinas College has undertaken sampling in the past and this needs to continue in a coordinated way, with the results made available to appropriate organisations including the City of South Perth, the Swan River Trust and the Department of Environment. Water sampling equipment can be obtained from the Department of Environment through the 'Ribbons of Blue' programme. Stencils that can be used to label stormwater drains by reminding the general public of the ultimate destination of stormwater can also be obtained from the SRT under the 'Yellow Fish Road' programme.

There are also a number of areas where stormwater from the freeway has resulted in fresh water seepage. This has had an impact on the vegetation in these areas, encouraging water-loving weeds such as Kikuyu. In the event that sections of the Freeway are to be widened, it is essential that best management practice drainage be adhered to, particularly in the section approaching Mt Henry Bridge. The installation of culverts of a sufficient diameter to cope with winter storms and placed to minimise environmental damage will assist efforts to restore natural vegetation and reduce weed infestation.

Recommendations

#	Recommendations	Responsibility	Priority
G20	Undertake detailed inspections and if necessary repair all drains within the study area.	CSP – Infrastructure Services	High
G21	Undertake weed control measures around all drains within the study area.	CSP – Infrastructure Services	High
G22	Renew Redmond Avenue drain and place it at ground level.	CSP – Infrastructure Services	High
G23	Undertake regular water quality sampling and analysis to ensure that nutrient levels within water entering the river are acceptable. Data collected could include peak flows, nutrient levels, pH and dissolved oxygen levels.	School and community groups, SRT, CSP	Medium
G24	Encourage school and community groups to participate in the 'Ribbons of Blue' and 'Yellow Fish Road' programmes. Sampling should include all stormwater drain outlets and bores within Aquinas College.	School and community groups, SRT, CSP	Low
G25	Provide educational material to landowners, encouraging the proper use of fertilisers and chemicals.	CSP,	Low
G26	Use water sensitive design principles and best management practice for proposed future freeway alterations.	MRWA	High

3.3 Vegetation Management

3.3.1 Vegetation

Much of the vegetation fringing the Canning River has high regional significance and conservation value. In addition, it forms a continuous wildlife corridor along the foreshore and provides habitat for native birds and animals. The presence of natural vegetation also increases visual amenity for recreational users, and provides a screen between the freeway and the foreshore. Trees and rushes stabilise the riverbanks and drainage outlets, protecting them from erosion. The remnant nature of the vegetation also provides scientific value and contributes to the biodiversity of the Swan Coastal Plain.

Maintaining the remnant vegetation along the foreshore is therefore imperative to retain the values and function of the area. Revegetation needs to be continued in areas disturbed by the freeway construction, high recreational use and vandalism, as does the ongoing control of weeds. Practices such as the dumping of lawn clippings in bushland, littering and inappropriate paths can lead to reductions in the quality of the vegetation through increased weed invasion and damage to native vegetation.

Inappropriate species used for the revegetation of the freeway verge and along the Aquinas Bay foreshore has compromised the integrity of the natural bushland in some areas. The most prolific of these species such as Geraldton Wax (*Chamelaucium uncinatum*), WA peppermint (*Agonis flexuosa*) and Japanese Pepper (*Schinus terebinthifolia*) need to be removed and replaced with native species of the vegetation associations that naturally occur.

Recommendations

#	Recommendations	Responsibility	Priority
G27	Continue to support two specialised trained field staff to work in bushland regeneration and maintenance on the foreshore.	CSP	High
G28	Continue policy to employ a part-time bush regenerator or ensure groundkeepers have experience or are trained in bushland vegetation management, if deemed appropriate.	CB/AqC	Medium
G29	Continue revegetation of the foreshore area using local plant species.	CSP – Infrastructure Services, Community Groups	High
G30	Remove inappropriate trees and shrubs planted during the construction of the freeway, DUP and along the foreshore of Aquinas College. Replace with local species as resources become available.	CSP – Infrastructure Services, CB/AqC	Medium
G31	Continue ongoing weed control measures of declared and other pest plants as resources are available.	CSP – Infrastructure Services, CB/AqC Community Groups	High
G32	Close inappropriate tracks and construct appropriate access tracks to minimise erosion.	CSP – Infrastructure Services	High

3.3.2 Weed Control

Due to the generally linear shape of the study area, particularly along the western foreshore, there is consequently a large edge:area ratio. This means the area is likely to experience 'edge effects' resulting in higher levels of disturbance and consequently weed invasion. The presence of a dual use path running along the western foreshore, as well as other paths within the study area, also increases the potential points from which weeds can spread.

The City of South Perth has focussed considerable resources into ongoing weed control. This has improved the quality of the vegetation and the aesthetic value in many areas as well as reducing the risk from fire. Work for the Dole schemes have worked alongside staff of City of South Perth Infrastructure Services to remove Morning glory from the branches of the paperbarks at Cloisters Reserve. Staff of the City of South Perth also provide ongoing weed control on paths, verges and on the Spit. Main Roads WA is responsible for weed

control on the freeway verges and along sections of the dual use path. The schools' maintenance crew undertakes weed control within the Aquinas College grounds – particularly in turf areas, while weed control in the bushland areas of Aquinas College is achieved with the efforts of the Mt Henry Peninsula Conservation Group. One groundkeeper in Aquinas College is trained in bushland management. Maintaining an experienced bushland regenerator within staff at Aquinas College could be included as part of the College's standard recruitment process if deemed appropriate.

Weeds opportunistically fill niches where native vegetation has been disturbed and some species of environmental weeds can spread into undisturbed bushland. Approximately 60 species of weeds have been found within the study area, with grasses, predominantly Perennial veldtgrass (*Ehrharta calycina*), extending throughout the area. There are concentrations of this species on the Spit and ridges and slopes of the Peninsula. Kikuyu (*Pennisetum clandestinum*) and Couch (*Cynodon dactylon*) grow prolifically near drains, road and path verges and wetter areas particularly near Cloisters Reserve. Watsonia (*Watsonia meriana var. bulbillifera*) and One-leaf cape tulip (*Homeria flaccida*) are common on the foreshore (Brooker *et al.*, 1993), with Morning glory (*Ipomoea indica*), Lantana (*Lantana camara*) and Kikuyu (*Pennisetum clandestinum*) growing among the paperbarks and fringing vegetation.

It is important to differentiate between Couch (*Cynodon dactylon*) and the native Saltwater couch (*Sporobolus virginicus*) which has a similar appearance. The two species often co-occur. They can be differentiated between by the inflorescence. *Cynodon dactylon* has a whorl of radiating branches with a 'windmill like' appearance, whereas *Sporobolus virginicus* has a long, slender, spike like inflorescence (Wheeler *et al.*, 2002).

Weeds have been introduced and their spread facilitated through poor land management practices associated with land clearing, quarrying, fire, rubbish dumping and poor compost management. Some maintenance practices may also contribute to weed spread such as mowing of verges to reduce fire hazard. Other species such as Geraldton Wax (*Chamelaucium uncinatum*), WA peppermint (*Agonis flexuosa*), Lantana (*Lantana camara*) and Japanese pepper (*Schinus terebinthifolia*) have been deliberately introduced as Main Roads verge revegetation during the construction of the freeway and the DUP.

Existing weed stands need to be controlled and if possible eradicated, and steps taken to prevent their reintroduction. In many cases this will simply require removal of the disturbance agent but in other areas, such as the Spit, it will require careful planning and execution. The general guidelines for successful weed control are as follows:

Weed control methods

Control options for environmental weeds within the study area include:

- Controlling ecosystem degradation processes;
- Herbicides;
- Manual control; and
- Fire management.

Controlling degradation processes that increase ecosystem vulnerability to weeds is often the most effective way to control weeds in the long term. Prevention and control of erosion,

vegetation destruction, pollution and inappropriate access can lessen the disturbance regime of an area reducing the likelihood of reinvasion by opportunistic weeds. The two main methods of weed control, manual control and herbicide control, are discussed below.

Manual Control

Manual control refers to the physical removal of the weed by mechanical or human effort. This includes hand weeding, pulling and digging or grubbing out and relates to small infestations of weeds (Dixon and Keighery, 1995).

Manual control is often the most expensive form of weed removal but it is the most appropriate method in many circumstances. It is particularly valuable for small infestations, where chemical control is inappropriate and resource requirements are not too onerous. Manual control needs to be carefully managed in order to avoid gross soil disturbance that can lead to weed replacement. When undertaking manual weed control, the Bradley (1971, 1988) method should be used and revegetation should be undertaken in conjunction with weed removal. Hand pulling of weeds may be as time efficient as spraying in certain situations, for example where low numbers exist in a localised well-vegetated area of bush – and should be given priority over herbicide spraying. A detailed description of the Bradley Method of weed control is given in Appendix 6.

Herbicide Control

Herbicide application is often the most cost-effective method for the control of weeds and a wide range of herbicides are available for use in weed control. It is important that herbicides should always be used strictly in accordance with directions on the label and their application must be undertaken by personnel trained in the use of herbicide chemicals.

Dixon and Keighery (1995) identified three methods of herbicide control, as follows:

- Herbicide Wipe, Stem Injection and Cut Stump Application
  - Herbicide Wipe – wipe herbicide onto part of the plant (for example a leaf/leaves) using a weeding wand, wick applicator (rope), waterproof (pesticide resistant) glove or modified hand sprayer;
  - Stem Injection – use a small axe to make cuts at 8 cm intervals at a 45^{o} angle and 4 - 5 cm long to penetrate the sapwood beneath the bark, or drill at 45 ^{o} angle with holes 5 cm apart. If the plant is multi-stemmed, treat all stems at chest height. Use a special injector calibrated to deliver the right amount or use a syringe; and
  - Cut Stump Application – when the plant is actively growing, cut the stump almost to ground level and apply the herbicide immediately using a paint brush.
- Herbicide Spot Spraying
  - When spot spraying, avoid spraying non-target species unless using selective herbicides such as Fusilade®. Special shields can be purchased or, if necessary, made for spraying close to non-target species.
- Herbicide Blanket Spraying
  - When blanket spraying, spray over large area using boom spray or similar, when the plant is actively growing (early June to no later than mid-August or when specified).

Two of the major herbicides recommended for use are glyphosate (Roundup®) and fluazifop-butyl (Fusilade®).

Glyphosate is a systemic non-selective herbicide, which is useful for controlling most weeds, particularly bulbous species. Glyphosate should not be blanket sprayed in areas containing native species as it will also kill non-target plants. A "frog-friendly" version of Roundup® (known as Roundup® Bioactive) is available for use near wetland areas.

Fluazifop-butyl is a selective herbicide that is effective on most grassy weeds. Fluazifop-butyl does not affect non-grass native species. A dye should be added to the herbicide to mark areas sprayed. Herbicides should not be sprayed in wetland areas, nor should a wetting agent or surfactant be added to herbicides in these areas. Alternatives to spraying include wick applicators and other methods that target individual plants.

The timing of weed spraying is very important for maximum effectiveness. As a general indication, grassy weeds should be sprayed during the active stages of growth before seed set, and bulbous species should be controlled after flowering and before seed set.

Weed control planning

When undertaking weed control programmes, the primary guiding principle is to work from areas in the best condition to those in the worst condition, and all works should be undertaken in conjunction with a restoration strategy (Bradley, 1971; Bradley, 1988; Buchanan, 1989). The bushland condition map (Figure 2) can provide an overall direction for priority weed control actions, as follows:

1. Those populations occurring in very good – excellent condition bushland areas (green areas) should be treated first;
2. Those populations occurring in fair – good condition bushland areas (blue areas) should be treated next;
3. Those populations occurring in poor condition bushland areas should be treated last.

Using bushland condition as a criterion for determining weed control priorities ensures that:

- Very good – excellent condition bushland is maintained;
- Fair – good condition bushland is enhanced, moved closer to being in very good – excellent condition, and prevented from deteriorating to poor condition bushland; and
- Poor condition bushland is enhanced, moved closer to being in fair – good or very good – excellent condition, and prevented from deteriorating to very poor condition bushland.

The very poor condition bushland areas are generally not suitable for targeted weed control. Instead, weeds in these areas should be addressed within the context of a comprehensive restoration plan.

When working in very good – excellent and fair – good condition bushland, the Bradley method of weed control is recommended (Appendix 6). Essentially, this method involves assisted natural regeneration of native plants from seed banks, rather than relying on replanting programmes.

General Approaches to Weed Control

Weed control can be approached in a number of different ways:

- Species-led control;
- Site-led control;
- Resource-led control;
- Threatened species and communities-led control; and
- Cause-led control.

Species-led Control

Generally, it is recommended that species-led control be undertaken prior to site-led control. Weed species are placed in this category if they:

- Have small populations;
- Are relatively easy to remove; and
- Have a high potential to spread and therefore become a problem in the future.

These weed species should be tackled on a weed-by-weed basis, using the guiding principles outlined in Appendix 6. Detailed control methods for the main weeds found in the area are outlined in Appendix 7.

Species led control should primarily be centred on inappropriate revegetation. Japanese pepper, Geraldton wax and other non-local species should be removed using the methods given in Appendix One, and then replanted using local species complementary to the nearby vegetation associations. Other weed species such as Pigface (*Carpobrotus edulis*) and Arum Lily (*Zantedeschia aethiopica*) and other species that are present in relatively low numbers but have the potential to spread through undisturbed bushland should also be removed by species-led control.

Site-led Control

Generally, it is recommended that site-led control be undertaken after control of species-led weeds. Weed species are placed in this category if they:

- Have wide-spread and well-established populations;
- Require concentrated and/or long-term efforts to remove; and
- Are highly detrimental to ecological functions of bushland if left unchecked.

The most serious infestations within the study area should be tackled using site led control. Kikuyu, Couch, Watsonia and One-leaf cape tulip should be eradicated starting from areas of low weed infestation and working toward areas of high infestation. This method will also be the most effective for Perennial veldtgrass infestations on the Spit and concentrated patches within the Mt Henry Peninsula.

Resource-led Control

Resource-based weed control is recommended where a particular species is known to be within a defined area, and thereby providing a focus for community projects. Morning glory (*Ipomoea indica*) on paperbarks at Cloisters Reserve is a suitable weed for removal using this type of approach.

Threatened Species or Communities-led Control

This approach to weed control focuses on the ecological significance of threatened flora species or vegetation types. If a particular site is known to contain either of these, weed control in these areas becomes a priority to protect the ecological integrity of the site, and thereby promote the long-term survival of the species or community.

Although no threatened species or communities exist within the study area, there are certainly some areas of bushland with higher conservation value than others. The good condition *Banksia attenuata* bushland of Mt Henry and the *Melaleuca rhaphiophylla – Melaleuca preissiana* association are of high conservation value as they have unusual characteristics and are in relatively good condition.

Cause-led Control

If a source or cause of weed infestation can be identified, cause-led control can be used. This is suitable where the cause or source can be eliminated or reduced. An example of this is where weed species spread from disturbance caused by inappropriate walking tracks or from constant disturbance by foreshore erosion. Measures to prevent fires from occurring in the Aquinas College bushland include restricting access to the area, reducing fire hazards and restricting weed invasion. Abandoning inappropriate management and maintenance practices such as dumping lawn clippings and composting within bushland areas will also help to restrict weed invasion.

Weed control can represent a substantial cost to the City of South Perth so external funding and labour assistance would greatly increase the extent and success of weed control within the Mt Henry Peninsula. Community groups and other organisations such as GreenCorps and Work for the Dole can help with resource led control of weed species such as Morning glory and other weeds requiring labour intensive work. Initial training in weed identification and removal, as well as appropriate supervision will be required when using this type of labour. Correctional Services has also been used with success in other municipalities for manual weed removal as well as other maintenance works including fencing and revegetation. External funding may also be found for weed control and rehabilitation. Details of current funding bodies and grants are outlined in Section 7.0.

Recommendations

#	Recommendations	Responsibility	Priority
G33	Formalise weed management strategies based on the general approaches to weed control.	CSP – Infrastructure Services	High
G34	Implement periodic maintenance schedules for ongoing weed control.	CSP – Infrastructure Services	High
G35	Facilitate community involvement in resource-led weed control projects.	CSP, community groups and schools	High
G36	Implement discrete fencing and limestone walking tracks to minimise disturbance and erosion and hence minimise weed infestation.	CSP – Infrastructure Services	Medium

#	Recommendations	Responsibility	Priority
G37	Investigate the use of State Government funded labour programmes such as GreenCorps, Work for the Dole and Correctional Services and support the involvement of local schools and community groups to minimise implementation costs.	CSP, Justice Department, Department of Employment Education and Training, Local Community groups and Schools	Medium

3.3.3 Revegetation and Rehabilitation

General Revegetation Strategies

Ongoing revegetation is taking place by the City of South Perth through the Infrastructure Services Division and coordinated by the City of South Perth's Environmental Programmes Coordinator. Revegetation has been carried out in many areas including Cloisters Reserve, foreshore areas and in the Mt Henry Open Space. Revegetation is carried out in conjunction with weed control and species planted include paperbarks, rushes, sedges and acacias.

Revegetation on Mt Henry Peninsula and in the Aquinas College bushland is carried out through the efforts of the Mt Henry Peninsula Conservation Group, school students and parents with the support of the City of South Perth. This has been beneficial and has been concentrated in areas affected by erosion on the steep slopes and limestone outcrops of the Peninsula.

Restoration and maintenance of native vegetation is a priority that must be implemented as far as available resources allow. There are priority areas that require revegetation to:

- Inhibit or slow erosion.
- Maintain wildlife habitats and corridors.
- Stimulate recruitment in areas showing signs of senescence.
- Fill niches left vacant by weed control and exotic species removal.
- Provide a screen from the freeway, and
- Add to the visual amenity of the area.

Resources should be directed to high priority areas first, if possible building out from existing vegetation in a similar way to the weed control planning in the previous section. Revegetation should radiate out from areas of existing vegetation, as these areas are likely to have better conditions with a higher organic content in the soil and an existing seed bank for natural regeneration to occur. An 'advancing front' type of revegetation strategy can thus improve conditions in the neighbouring soil as litter accumulates and structure is improved. The next stage of rehabilitation then has a greater chance of success. Similarly it is better to concentrate resources in a smaller area than spread them out over a large area. This will inhibit weed reinvasion and greater stimulate soil improvements than spreading revegetation thinly over a large area. The Bradley method of passive weed control combined with natural regeneration may be appropriate in some areas, particularly those areas with fringing / semi-invasive weeds close to natural bushland (Buchanan, 1989).

The strategy of rehabilitation used will ultimately depend on the specific requirements of the site. Rehabilitation in the Paperbark Grove at Cloisters will probably require selective planting of *Melaleuca rhaphiophylla* and *M. preissiana* seedlings in light breaks within the grove. Rehabilitation of the cleared area south of the Paperbark Grove should be a combination of weed control, replanting and some direct seeding. In the area known as Infill, holes may need to be dug with an auger to break up the limestone and allow plants to achieve sufficient root mass to facilitate growth to their maximum potential.

Revegetation at the Spit will be closely associated with weed control. As there are already a large number of native plants, particularly *Dasypogon bromeliifolius* (Pineapple bush) and *Phlebocarya ciliata*, rehabilitation in this area should be primarily focussed on weed control. Efforts should start at the best condition bushland and radiate out to poorer condition vegetation. One of the most pressing revegetation requirements is located along the foreshore where the absence of rushes and sedges is allowing accelerated erosion processes. In many areas, dense planting of relatively mature plants including *Juncus kraussii* (Shore rush) needs to be undertaken in conjunction with energy dissipaters or sediment traps to reduce the direct impact of water skiers on the foreshore integrity.

The plants used for revegetation are also important to maximise success and retain the integrity of the vegetation communities present there. Some vegetation communities have been identified as naturally occurring in the study area and the species chosen should be consistent with what is or should be already present there. Local provenance seeds and plants should always be used where possible to prevent genetic pollution from occurring. Plants obtained from different populations have a slightly different genetic make-up that reflects their original conditions. Introducing these plants reduces the vigour of the local population as it introduces genotypes adapted to different conditions into the gene pool. The suitability of the plant species naturally occurring there should also be considered. They should be freely available from nurseries and have proven successful in establishment. Many species such as *Dasypogon bromeliifolius* cannot be propagated in a nursery and so cannot be used and efforts should be made to conserve populations persisting in these areas. Suggested species lists for the management zones are given in Appendix 3 of this management plan.

In addition to planting species that are known to occur in these areas, consideration should be given to plants that were more prevalent in the past but now have restricted numbers in the area. Aboriginal consultation conducted as part of the 1993 Management Plan (Brooker *et al.*, 1993) revealed that *Eucalyptus rudis* (Flooded gum), *Corymbia calophylla* (Marri) *Adenanthos cygnorum* (Common woollybush) and *Allocasuarina fraseriana* (Common sheoak) are believed to have been present in much larger numbers than they are today. Consideration of these species in revegetation programmes may help restore the bushland to its former state and encourage native animals to inhabit the area.

There are many areas that have proven extremely difficult to revegetate due to compaction of the soil and weed infestation. For example the paperbarks in Cloisters Reserve have no new recruitment, and the ground is highly compacted in this area from years of trampling and BMX use. The area known as Infill is characterised by a highly compacted limestone

substrate that is virtually impenetrable. The Spit area is also highly compacted and weed infested as it was used as a 'lay-down' area for sections of the freeway during construction.

Compaction is a difficult problem with no easy solution. Ripping or tilling the soil will reduce the compaction but in natural areas generally do more harm than good as they can affect the soil biological processes, nutrient cycling and increases susceptibility to opportunistic weeds. The best way to deal with soil compaction in these areas is by minor trenching and backfilling with loose soil before planting. This allows the plants to get to an adequate size before their roots must penetrate and break up the soil. In this way ongoing revegetation will naturally cause the soil to become less compacted. At Infill use of a mechanical auger is feasible. Consideration should also be given to planting species that naturally occur on a hard limestone substrate.

Revegetation programmes should also consider the following:

- Weed control – should be undertaken prior to planting or seeding and throughout the rehabilitation process;
- Stabilising and weed suppression – leaf litter (best if available), mulch, brushing, Environmat®, Aero Mulch Mat®, Weed Control Mat®, Hortopaper®, Rheem's Weed Stop® can be used to inhibit the regrowth of weeds;
- Erosion control – Areas of steep slopes (e.g. Freeway embankment) mulch, pegged chicken wire, Sarlon's Polymesh® and Environmat® can be used to stabilise slopes. Foreshore erosion measures to dissipate wave energy should also be implemented to improve the success of rehabilitation measures; and
- Tree guards – inhibit grazing by rabbits, protect from the elements and provide a moist microclimate reducing water stress.

Depending on the conditions of the site to be revegetated, direct seeding, seedling planting or a combination of both can be used.

Direct Seeding

Although there have been some successes with direct seeding, it is more difficult and requires appropriate soil preparation. Compacted soils are not suitable for direct seeding, so in many areas direct seeding cannot be used initially. Ripping and ploughing is often used during the direct seeding process however due to the presence of natural vegetation this technique is inappropriate in this area. The advantage of direct seeding is that it has a relatively low cost, incorporates 'randomness' into plant positioning and allows for a greater range of species to be used.

Planting

Planting seedlings is the most common form of revegetation in this area and can generally be regarded as a more reliable technique. Community and school groups can be involved in planting, which has added benefits to the community.

The restoration strategy used will also depend on the particular area to be rehabilitated. Due to the diverse nature of the vegetation and substrate within the study area, different approaches will be needed for different areas and these are outlined below.

Specific Revegetation Strategies

Strand Vegetation

Strand vegetation is often inundated with water. An overstorey of *Casuarina obesa* (Saltwater sheoak) and *Melaleuca cuticularis* (Saltwater paperbark) with an understorey of rushes and sedges dominates this association. Rehabilitation of this vegetation zone is very important but can be difficult. Many patches of strand vegetation have been lost due to freeway construction, compaction and excessive erosion as loss of this vegetation type results in increased erosion.

Rehabilitation in these areas is a high priority. Block planting of advanced *Juncus kraussii* (Shore rush) and *Isolepis nodosa* (Knotted club rush) stock should be undertaken during low tide and should take place above and below the high water mark to stabilise the soil. Care should be taken to avoid compaction of the soil during rehabilitation works. *Melaleuca cuticularis* (Saltwater sheoak), *Acacia cyclops* (Coastal wattle) and *Casuarina obesa* (Saltwater paperbark) should then be planted along the upper reaches of the strand. *Acacia cyclops* grows very readily in this area and has been used extensively in previous revegetation activities (S. Smith, pers. comm). Future planting of this species should be undertaken in high erosion risk areas only, to avoid causing a shift toward an *Acacia* dominated vegetation type. Alternatively, a mix of *Acacia cyclops* and rushes can be used during initial revegetation, with *Melaleuca cuticularis* and *Casuarina obesa* planted between them in the following years. A variety of species should be used as well as the ones listed above, and records kept of the success of different species for rehabilitation. Specific plants useful for rehabilitation for this vegetation type are listed under column “f” in Appendix 3.

Sandy Slopes

These areas are located 1 - 3 metres above high water mark and occur within the study area primarily on the Spit and eastern foreshore of the Peninsula (school slopes). Both of these areas show signs of degradation. The Spit was used as a lay down area during construction of the freeway and has been extensively disturbed through clearing, compaction, mowing, weed invasion and foreshore erosion. The school slopes have also been disturbed through trampling and various walking tracks through the area, which have resulted in erosion and landslip.

Rehabilitation of the spit will need careful long-term planning. The following is a suggested programme of works:

1) Intensive weed control for the next two to three years before revegetation. This will involve spraying of Perennial veldtgrass before the weeds set seed, with hand removal based on the Bradley method (Appendix 6) for weeds in lower densities. Seed collection of suitable plants on the Spit and surrounding areas should also be undertaken during this period. Due to the scope of the project it is recommended that intensive long-term weed control be undertaken on a section-by-section basis, starting from the good areas along the margins and ‘islands’ of native vegetation in the area, and working towards the poorer areas. The area of weed control should then be increased incrementally inwards each year. This will ensure that large areas do not become denuded of vegetation.

2) Soil preparation of the controlled sites should then take place. Soils should be tested for pH and nutrient availability and additives applied if necessary. A dieback survey should be

undertaken as well prior to any revegetation. Finally the site should be mulched (to at least 10 cm) before planting takes place, or at least mulched around the new seedlings.

3) Revegetation of sections that have had at least two seasons of weed control and appropriate soil preparation can then be undertaken. Revegetation of foreshore rushes should take place, initially working inward from the good areas on the northern and southern ends of the Spit, to the poorer areas inwards and towards the point of the Spit. Some planting of tree species can also be undertaken further inward, working out from 'islands' of good vegetation. Extreme care should be taken to avoid disturbance to the remaining native vegetation. Some species present there such as *Dasypogon bromeliifolius* are difficult if not impossible to replace or grow.

4) Additional works will involve further incremental weed control and revegetation working inwards to the centre of the spit. Weed control, planting in between existing vegetation and direct seeding of areas revegetated in previous years, should also be undertaken as an ongoing activity.

Rehabilitation of the school slopes along the eastern foreshore will require a different approach. The first and most important action is to stop degradation. This involves closure of all unofficial tracks by fencing and brushing. Weed control, mulching and replanting should then be undertaken using skilled bushland regenerators. Such a project is not suitable for unskilled or semi-skilled personnel, as additional trampling and disturbance must be kept to a minimum.

Sandy Ridges

Sandy Ridges have a sand-over-limestone substrate and high aspect which is reflected in the species used for rehabilitation. These are described in Appendix 3, column "r". The sandy ridge association includes most of the Mt Henry Peninsula feature. Significant rehabilitation works by the Mt Henry Peninsula Conservation Group have occurred for many years. Further rehabilitation is primarily required in sections recently disturbed by fire, unofficial tracks and other degraded areas. Rehabilitation in these areas involves the closure of tracks, mulching and planting. Direct seeding in this area may be appropriate. Before further rehabilitation is carried out, a dieback mapping survey should be undertaken. This will help determine which species can be planted (Table 2, Section 3.3.4) and hygiene requirements.

Rehabilitation should always follow intensive weed control. If the litter layer is absent, mulch should be spread to limit weed growth and stabilise the soil. Mulch should be preferentially applied to steeper areas where erosion is an issue. Direct seeding may also give good results in these areas.

In areas classified as being in good condition, it is best to rely on natural regeneration. Many *Banksia* and other plants on the sandy ridges are showing some degree of stress, however the cause of this stress is unknown. The signs could be related to water stress brought about by several years of drought or bore related drawdown of underground aquifers. This should be further investigated.

Limestone Knolls

The vegetation on the limestone knolls has been degraded by the creation of unofficial tracks and associated erosion. Rehabilitation on the steep slopes and cliffs requires restricting access to the area by installing fencing and closing tracks. There is sufficient existing vegetation for natural regeneration to occur, providing access is stopped.

Paperbark Woodland

Revegetation of the paperbark woodland is a high priority due to the rarity of this association, the historical significance of the woodland, the condition of the understorey and the lack of recruitment of *Melaleuca preissiana* (Modong) and *M. rhaphiophylla* (Freshwater paperbark) seedlings.

Rehabilitation of this area will be difficult as:

- There is a high degree of compaction of the soil.
- Few native understorey species remain, apart from *Centella cordifolia* and an isolated stand of *Juncus pallidus*.
- The area continues to be subjected to disturbance from trampling, rubbish accumulation, wilful destruction of paperbarks limbs and bark and mowing on the woodland edges, and
- There are high numbers of weeds, particularly on the northern end which is infested by Kikuyu (*Pennisetum clandestinum*) and Wintergrass (*Poa annua*). Few weeds are present in the interior apart from Fleabane (*Conyza* spp.) due to soil compaction and low light availability.

Rehabilitation of the area will require the following actions:

1. Fencing while rehabilitation work is carried out to prevent further compaction of the soil and disturbance to seedlings. Seed collection from the paperbarks should also take place from the outset.
2. Ongoing weed control on the margins and northern end of the grove.
3. The soil should be tested for pH and essential nutrients and appropriate adjustments made. Leaf litter or mulch should be applied over areas of bare ground which will provide an aerated surface layer for seedlings to establish.
4. *Melaleuca preissiana* and *M. rhaphiophylla* could be planted in light breaks within the woodland and direct seeded over the rest of the areas using local provenance seedlings. *Juncus pallidus* and *Baumea juncea* should be planted extending from the existing stand near the overpass. Rushes should also be planted in areas of winter wet depressions.
5. Follow up weed control and infill planting over the next few years.

Recommendations

#	Recommendations	Responsibility	Priority
G38	Undertake weed control prior to and during revegetation activities.	CSP – Infrastructure Services	High
G39	Revegetate areas using vegetation associations and plant species lists as a guide.	CSP – Infrastructure Services	High

#	Recommendations	Responsibility	Priority
G40	Brush and revegetate inappropriate tracks.	CSP – Infrastructure Services	Medium
G41	Erect bollards to demarcate mowing limits.	CSP – Infrastructure Services	Medium
G42	Continue to collect local seed and cuttings for propagation at the Council Nursery.	CSP – Infrastructure Services	Medium
G43	Organise community tree planting days to assist with planting and foster community participation.	CSP – Infrastructure Services, Community Groups	Medium
G44	Seek funding to investigate groundwater levels to determine their quality and quantity if required.	CB/AqC, MtHPCG	Medium

3.3.4 Dieback Management

Phytophthora species are soil-borne pathogens (water mould) that kill a wide selection of plant species in the south west of Western Australia. Infection by *Phytophthora* species leads to dieback; a situation characterised by the deaths of susceptible species. The pathogens have become widespread in southwest Western Australia since European colonisation. Human activity is perhaps the biggest factor contributing to the spread of the disease. Spores are spread in a range of ways including vehicles or bikes, footwear, movement of animals (stock and horse riding), and machinery such as road construction or earth moving equipment.

The life cycle of *Phytophthora* requires moist conditions that favour survival, sporulation and dispersal. As *Phytophthora* is a parasite, it requires a living host on which to feed and extracts its food through a mass of thread-like mycelium. This mycelium forms the body of the organism. The fungus kills the host by girdling the base of the stem, destroying the roots and depriving the plant of nutrients and water.

Dieback disease requires three factors: the pathogen (usually *Phytophthora cinnamomi*), a host and suitable environmental conditions. *Phytophthora* has a very wide host range, with possibly up to one third or more of all Western Australian plant species susceptible to infestation. Generally, the indigenous species most affected by the pathogen belong to the following families:

- Proteaceae (e.g. *Banksia* species);
- Epacridaceae (includes many typical heath species);
- Papilionaceae (the pea family); and
- Myrtaceae (e.g. *Eucalyptus* species).

Overstorey species found in the study area that are susceptible to dieback include *Eucalyptus marginata* (Jarrah), *Allocasuarina fraseriana* (Common sheoak), *Banksia attenuata* (Slender banksia), *B. grandis* (Bull banksia) and *B. menziesii* (Firewood banksia).

Susceptible shrubs include *Conospermum stoechadis* (Common smokebush), *Adenanthos cygnorum* (Common woollybush), *Dryandra sessilis* (Parrot bush), *Macrozamia riedlei* (Zamia), *Xanthorrhoea brunonis* and *X. preissii* (Balga).

Some of the genera within the study area that are most affected by the pathogen are listed below.

Table 2: Plant genera within Mt Henry Peninsula known to be affected by Phytophthora cinnamomi 3

Family	Genera	Family	Genera
PROTEACEAE	*Adenanthos*	EPACRIDACEAE	*Astroloma**
	*Banksia**		*Leucopogon**
	Dryandra		*Lysinema**
	Grevillea	CASUARINACEAE	*Allocasuarina*
	Hakea	HAEMODORACEAE	*Conostylis*
	*Persoonia**		*Phlebocarya*
	*Petrophile**	GOODENIACEAE	*Dampiera*
	*Stirlingia**	DASYPOGONACEAE	*Dasypogon*
	Synaphea	PAPILIONACEAE	*Daviesia*
MYRTACEAE	*Calytrix*		*Hovea*
	Eremaea		*Jacksonia*
	Eucalyptus		*Oxylobium*
	Hypocalymma	DILLENIACEAE	*Hibbertia**
	Kunzea	ZAMIACEAE	*Macrozamia*
	Melaleuca	IRIDACEAE	*Patersonia*
	Scholtzia	XANTHORRHOEACEAE	*Xanthorrhoea*
		APIACEAE	*Xanthosia*

Clay and laterite within soils causes subsurface ponding of water, which facilitates the production of *Phytophthora* spores. The moisture content of soils must be sufficient to provide an aerobic environment. Saturated soils become anaerobic and do not contain enough oxygen to favour the production of sporangia.

The study area occurs mostly on the Spearwood sands. The soils of this dune system tends to be highly calcareous, which inhibits this pathogen. The alluvial soils of the western foreshore are likely to be saline and therefore *Phytophthora* is unlikely to be present in these areas. The nearby Bassendean soil system, however, favours conditions that allow the pathogen to express as dieback disease, and also supports a large number of species that are susceptible to the disease.

No comprehensive dieback survey has been done within the study area. This is a relatively simple and inexpensive process. Investigation in areas that may be susceptible to dieback is appropriate prior to rehabilitation works. Due to the high number of susceptible species on the Mt Henry Peninsula and in the Mt Henry Public Open Space, a dieback survey should be undertaken in these areas before further revegetation or other work is carried out. If dieback is not found within these areas, hygiene measures should be implemented on all equipment

[3] Source: Dieback Working Group (2000). Genera with an asterisk include many species susceptible to dieback disease.

prior to commencing revegetation, construction or maintenance. If the area to be revegetated has dieback present, then any equipment should be cleaned after leaving the area and the species planted should not be dieback susceptible. It may also be a good idea to implement hygiene measures for equipment, to limit the spread even if dieback is found to be extensive.

Recommendations

#	Recommendations	Responsibility	Priority
G45	Undertake a dieback survey prior to further revegetation in Bassendean soil components of the Mt Henry Peninsula and the Mt Henry Public Open Space if resources become available.	CSP, CB/AqC, Infrastructure Services, Community Groups	High
G46	Select resistant species if dieback is found in the areas to be revegetated. Disinfect equipment and boots upon exiting the site.	CSP, CB/AqC, Infrastructure Services, Community Groups	High
G47	Implement hygiene measures if the area is found to be dieback free, prior to entering the area.	CSP, CB/AqC, Infrastructure Services, Community Groups	High
G48	Investigate if the area is dieback free and assess the risk of dieback occurring. If there is a moderate or high risk, paths in the area should be sealed or closed and measures implemented to stop people from entering the area.	CSP, CB/AqC	Medium

3.3.5 Fire Management

The incidence of fire on Mt Henry has increased since 1971 and is probably the major contributing factor to local vegetation decline and change (Brooker *et al.*, 1993). The last major fire event on the Peninsula was in December 1997, during which two hectares of bush was severely burnt. Natural regeneration and active rehabilitation of the area by the Mt Henry Peninsula Conservation Group has contributed to a good recovery of the bushland, however there has been a change in the plant species composition.

Increasing fire frequency results in a decrease in species richness, an increase in fire-prone grassy weeds and a succession towards more fire prone native vegetation thereby increasing the risk of further fires. This has consequences for the value of the bushland as well as posing risks to nearby property and human life. Changes to the vegetation that have already occurred are demonstrated by the spread of Perennial veldtgrass (*Ehrharta calycina*), the death of mature stands and mass germination of young specimens of *Dryandra sessilis* (Parrot bush). The occurrence of *Stirlingia latifolia* (Blue Boy) and

Macrozamia riedlei (Zamia), the lack of overstorey on slopes that formerly had dense cover and the absence of eucalypts are other indicators of increasing fire frequency.

It is important to prevent fires or reduce their frequency. This can be achieved by careful planning. There is a current Fire Management Plan and Response Plan for the area. Guidelines for fire management planning from the Fire and Emergency Services Association (FESA) have been followed to ensure the plan meets these guidelines. A Fire Management and Response Plan (FMRP) should identify environmental values and infrastructure at risk, list the major stakeholders and contacts in the event of a fire and determine the appropriate procedures to be followed in the event of a fire. A FMRP also includes a map showing access points, firebreaks, water sources, hazards, environmental values and buildings in the area. This can greatly improve the abilities of fire personnel to respond to a fire and therefore limit the extent of damage caused by a wildfire event.

In addition to the use of an FMRP, several measures can be undertaken to reduce the likelihood and consequence of a bushfire. Reduction of flammable material on the ground, the control of grassy weeds, the facilitation of access by fire fighters and discouraging access by the public will reduce the frequency and severity of fire. To reduce flammability and the spread of weeds, current practices such as depositing prunings and grass clippings in bushland areas should cease.

Due to the environmental values of the Mt Henry Peninsula, the construction of additional firebreaks is not recommended. A minimum width of 3 metres should be cleared of vegetation and weeds around buildings, to provide for fire access. The law requires that construction and periodic maintenance of all fire access tracks be completed by the 30th of November each year. Access points should also be maintained for fire crews and suitable water points provided. Chemical firebreaks are preferred to rotary hoed breaks – as they are less supportive of weed outbreaks.

The outbreak of fire is less likely along the western foreshore however it is still important that appropriate measures are taken to minimise the risk and consequence of fire outbreak. Ongoing weed control of grassy weeds, defining and maintaining access points and reducing the amount of hazardous litter should be undertaken periodically. The dual use path provides important access to fight fire as well as providing a firebreak. The Kensington Fire Brigade should be provided with the key to the removable bollard at Cloisters car park.

Recommendations

#	Recommendations	Responsibility	Priority
G49	Maintain and periodically update the comprehensive Fire Management and Response Plan according to FESA guidelines.	CSP, CB/AqC, FESA	High
G50	Continue the ongoing control of grassy weeds.	CSP, CB/AqC	High
G51	Assess fuel levels periodically and undertake fuel reduction measures if required.	CSP, CB/AqC	High

#	Recommendations	Responsibility	Priority
G52	Maintain existing access points, fire access tracks and maintain cleared areas 3 m wide around buildings and infrastructure.	CSP, CB/AqC	High
G53	Discontinue the practice of dumping grass clippings in and around the bushland.	CB/AqC	High
G54	Remove litter from the Aquinas Bay foreshore.	CB/AqC, SRT, DPI, Community groups	Medium
G55	Ensure Kensington Fire Brigade has the key to all locked gates and is aware of the joint fire plan and all access issues.	CSP, CB/AqC, FESA, KFB	High

3.4 Fauna Management

3.4.1 Native Fauna

The study area is an important interface between the wetland areas and higher slopes and is therefore important for many birds, reptiles and frogs. Maintaining areas that can function as wildlife corridors and facilitate animal and bird movement is of vital importance. Vegetation protection and enhancement should increase the presence of native animals in the area and contribute to the overall biodiversity of the study area.

The diversity of native fauna in the study area is likely to be relatively poor due to the size and shape of the foreshore reserve and the high associated incidence of disturbance. There may be a higher occurrence of native fauna on the Mt Henry Peninsula, however no comprehensive study has been carried out since the 1980s to verify this. The most visible fauna are birds, some of which are protected by international agreements such as the Japan Australia Migratory Birds Agreement and China Australia Migratory Birds Agreement.

The provision of habitat is the most effective way to promote the increase of native animals and birds in the area. Rehabilitation using specific plants that attract specialist fauna and use of materials such as brush and dead logs can also provide additional habitat for fauna species. Construction of nesting boxes can also increase the habitat potential of the area, however these are often used by introduced birds. Manual arts students at Aquinas College may be interested in constructing such boxes and may be able to source funding for such a project.

A survey of nearby residents revealed that many people like to use the area for bird watching, while others identified the presence of birds and wildlife as adding to the natural values of the area. Some respondents identified the beach area near Mt Henry Bridge as a suitable vantage point for watching water birds as well as other wildlife such as dolphins. The construction of a low impact, viewing platform in keeping with the surrounding environment could enhance this experience. Seating and interpretive signage could also be provided depending on needs and budget. The location of such a platform at this site has the following advantages:

- It is one of the quieter areas on the foreshore.
- It has a wide view of the river.
- It has nearby fringing vegetation.
- It can be built off the existing dual use path.
- It is far enough away from vehicle access points that it is less likely to become vandalised, and
- It can provide strategic seating for walkers and cyclists.

The Mount Henry Peninsula Conservation Group has constructed an Osprey platform on the Peninsula. This platform was occupied during a site visit for this project and contributes to the habitat value of the area, as dead tree stags for roosting are limited. Additional platforms and nesting boxes could promote biodiversity and ecosystem function. The provision of habitat for animals through rehabilitation of their natural environment and the strategic placement of woody debris would also benefit the area in a similar way.

Minimising damage to the vegetation is also important. A limited number of designated access points and tracks are required for fire access and education. Closing informal access points and tracks will help to minimise disturbance to the vegetation. Rehabilitation of disturbed areas where the vegetation density is reduced may also help to restore fauna numbers by providing protection from predators, breeding space and offering greater foraging opportunities. Areas including the paperbarks at Cloisters Reserve and the Infill section adjoining the freeway have sparse vegetation with few niches available for fauna.

Implementing a vermin and feral animal control programme will also help native fauna populations through the elimination of exotic predators such as the cats, foxes and rabbits. Rat and mouse control will act to increase niches available for small native mammals.

Recommendations

#	Recommendations	Responsibility	Priority
G56	Construct nesting boxes for local birds and mammals (e.g. bats) and tall platforms for birds of prey if resources become available.	CSP, SRT, CB/AqC, Community groups	Low
G57	Undertake a comprehensive fauna survey if resources become available and there is sufficient interest, e.g. bird counts and species identification four times a year would be beneficial.	CSP, CB/AqC, Community Groups	Medium
G58	Construct a viewing platform near the Mt Henry Bridge.	CSP – Works Division	Medium
G59	Strategically place woody debris for animal habitat especially for invertebrates such as ants, beetles, termites and vertebrates including reptiles.	CSP, Community Groups, SRT	Medium

#	Recommendations	Responsibility	Priority
G60	Revegetate areas of sparse or cleared vegetation to provide wildlife habitats and corridors.	CSP – Infrastructure Services, Community Groups	High
G61	Undertake a comprehensive feral animal control programme.	CSP	High

3.4.2 Pest Fauna

Predation by cats and foxes is likely to be one of the greatest factors causing loss of native fauna in area. Control of feral animals in urban areas is difficult as 1080 baiting by CALM cannot be undertaken in the Metropolitan area. Rabbits, house mice, rats and uncontrolled dogs also pose threats to wildlife.

Foxes

The practice of fox baiting using 1080 (Sodium monofluoroacetate) cannot be undertaken in the Metropolitan area due to the threat to household pets and it is unlikely that CALM will ever extend its Western Shield baiting programme into the Metropolitan area for this reason. At present the only fox management tool available in this area is trapping. This is a difficult practice that may also pose a public hazard. The only area suitable for fox trapping is the Freehold land on Mt Henry Peninsula.

Cats

Domestic and feral cats have a large impact on native wildlife as they are extremely effective hunters. Cat owners should be encouraged to keep their cats well fed, belled and inside as much as possible. This will require an ongoing campaign of community education in various media. Informative pamphlets about the effect of cats on native wildlife and prevention measures should be widely distributed through pet shops and veterinary hospitals and given away.

Currently the local by-laws enforced by the City of South Perth limits the number of cats to two per household. This could be extended to include sterilisation and cat curfews. Sterilisation subsidies and brochures on the subject are already available and should also be made passed on to pet shops and veterinary clinics. A further measure in this regard could be the compulsory registration of all cats with a substantial increase in registration fees for unsterilised cats.

Cat control programmes similar to the mechanisms used by the Botanic Gardens and Parks Authority in Kings Park may also prove an effective means of reducing the numbers of roaming and feral cats. Control nights are advertised in local papers and a trapping programme implemented. Registered cat owners are then notified and must pay the cat's 'board' upon collection. This system has been effective in other areas where it has been implemented.

Dogs

Although dogs are less effective hunters of small mammals and are less likely to roam, they can still pose a considerable threat to native wildlife as well as other recreational users. The foreshore from Canning Bridge to Mt Henry Bridge is an on-lead area and it is important that this is maintained. Several residents have expressed concern about unrestrained dogs and suggested improved enforcement of the leash policy for public safety reasons. Signs at access points such as Cloisters Reserve, Edgewater Overpass and the Mt Henry Bridge would help to make dog owners aware of the requirement to keep pets leashed within the study area.

Dogs also leave faeces, often in recreational areas where children play. This is unsightly and poses a considerable health risk to small children. Dog faeces can also deter small native mammals and add nutrients to the soil. The City of South Perth should consider providing more 'Poo-ch Pouches' (dog faeces bags) near rubbish bins in the study area.

Rabbits

Rabbits cause considerable damage to native plants, can reduce habitat quality and outcompete small native mammals for niches. Pindone baiting has been carried out within the study area and this has had a positive effect. Baiting should continue as new diggings arise.

Recommendations

#	Recommendations	Responsibility	Priority
G62	Investigate the feasibility of conducting fox trapping in association with CALM.	CSP, CB/AqC	Medium
G63	Conduct ongoing education campaign with cat owners.	CSP	Medium
G64	Investigate feasibility of imposing a 'cat curfew' and compulsory sterilisation of non-breeding cats.	CSP	Medium
G65	Investigate the feasibility of conducting periodic 'cat control' programmes within the study area.	CSP	Medium
G66	Install signage at key access points advising dog owners of the requirement to keep their dogs leashed.	CSP	Medium
G67	Install Poo-ch pouch (dog refuse bag) dispensers at strategic points.	CSP	Medium
G68	Continue 'Pindone' rabbit baiting within study area.	CSP, APB	High

3.5 Heritage Management

3.5.1 Indigenous Heritage

Although there are no registered Aboriginal Heritage Sites within the study area, Mt Henry Peninsula is likely to have significance to Nyungar people due to its prominence on the foreshore and the fact that it was a hunting and fishing ground. The Canning River is also a registered Aboriginal Heritage Site and so changes to the foreshore that affect the integrity of the riverbank and bed will have an impact on the site. The Nyungar people are opposed to any development that disturbs the riverbed and works causing erosion of the riverbank can also be regarded as disturbing a Heritage Site.

No comprehensive archaeological survey has been undertaken as there is no intention to develop the Mt Henry area. Dr Pat Baines, a consultant anthropologist, investigated the significance of the Mt Henry Peninsula and foreshore to the Nyungar community as part of the 1993 Management Plan (Brooker *et al*., 1993). This involved contacting Nyungar people with a living memory of the area and a meeting was held at Redmond Reserve at the request of the Nyungar people.

At that meeting they expressed concern at the degradation of the bushland including the loss of trees and the erosion of the area. They described plants and animals that are now absent from the area and expressed a wish that the area be made suitable for reintroduction of these species through rehabilitation and the removal of exotic plants and animals. Species such as *Eucalyptus rudis* (Flooded Gum), *Corymbia calophylla* (Marri), *Adenanthos cygnorum* (Woolly-bush) and *Allocasuarina fraseriana* (Common sheoak or Condil) were believed to have occurred there in greater numbers than are there now, and so should be included in revegetation activities. They also expressed the view that hard cement paths were not in keeping with the natural environment and should not be constructed on Mt Henry. Furthermore they expressed the wish that they be invited to visit Mt Henry Peninsula. Above all they expressed the opinion that the Mt Henry Peninsula should not be developed particularly in areas close to the foreshore.

It is important that Aboriginal people's beliefs and requirements are taken into account when making management decisions. The management and steering committee should liaise with members of the Aboriginal community to ensure that all decisions are in keeping with indigenous beliefs.

Recommendations

#	Recommendations	Responsibility	Priority
G69	Ensure development proposals include Aboriginal consultation and avoid disturbance to the riverbed or embankments.	CSP, CB/AqC	High
G70	Restrict the use of hard-based paths in addition to the existing DUP. Re-surface other paths with mulch or timber to prevent erosion.	CSP, CB/AqC	Medium

#	Recommendations	Responsibility	Priority
G71	Investigate the feasibility of reintroducing fauna to the area.	CSP, CB/AqC, Community Groups, SRT, CALM	Low

3.5.2 European Heritage

There are several sites of European heritage within the study area that should be conserved to maintain a link with the past. The paperbark grove at Cloister's Reserve was the scene of a large encampment of evicted families during the Depression and still remains in some local peoples living memory. Informative signage already exists for this and is a feature of interest for many visitors. Some people still remember the jubilation on the arrival of food parcels from the government and the Ugly Men's Association (E. Davies pers. comm.). In this way the grove helps to awaken memories in people who experienced and witnessed historic events.

The remains of pylons that used to support a boatshed and pier on Aquinas Bay are Heritage Listed and reflect the earlier days of Aquinas College. An off-road viewing point on the approach to the southern buildings would benefit from seating with appropriate signage depicting the history of the Bay area. This would be in keeping with the other artefacts and older style buildings nearby.

Recommendation

#	Recommendation	Responsibility	Priority
G72	Install interpretive signage and seating overlooking Aquinas Bay.	CB/AqC, Community Groups	Low

3.6 Recreation and Infrastructure Management

3.6.1 Amenities

A number of recreational activities were identified from the survey and from the community workshop. The proportions of recreational activities are summarised in Figure 4.

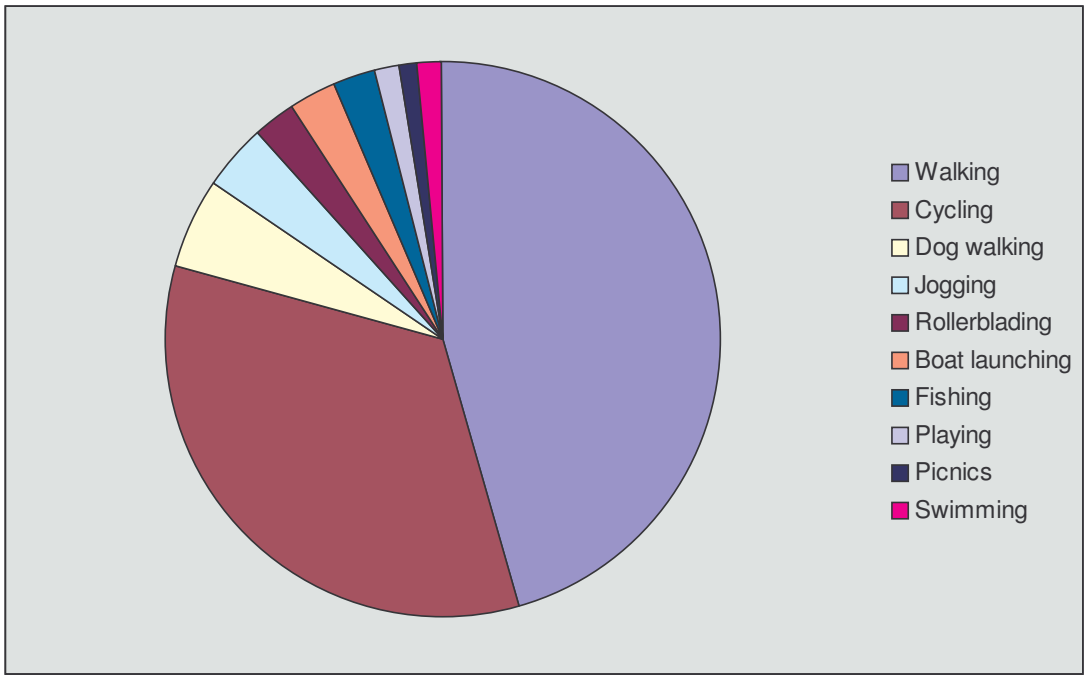


Figure 4 Identified proportions of recreational activities from a survey of nearby residents.

The foreshore between Cloisters Reserve and the Mt Henry Bridge has few amenities for recreational users. This is in part due to the lack of power and water in the area and the difficulties and expense in providing these services. Power and water services must either come from Canning Bridge to the north or under the Kwinana Freeway. The Canning Bridge option has advantages in that providing these services would pose no technical difficulties, however due to the large distances involved, it would be expensive. Routing the services under the freeway would involve much shorter distances, however it would necessitate overcoming engineering and practical constraints and would need to be conducted in conjunction with maintenance or construction work periodically undertaken by Main Roads WA.

Despite the practical constraints, there is a recognised need for the provision of amenities in this area by the public. There was concern expressed by many members of the community, particularly with regards to the lack of water along the pathway. Many people also indicated there was a need for toilet facilities at Cloisters car park, as this can be a fairly heavily used area in the summer months by cyclists, walkers and users of the boat ramp. The provision of other facilities and infrastructure around the car park area will also increase the need for toilet facilities. Lighting would be necessary as a security measure if other facilities are provided. Additional amenities for this area could include picnic tables and benches as well as electric barbecue facilities, bins and water fountains. This will help enhance the recreational value of the area.

Inadequate seating was seen as a major issue in both the survey and the workshop. Currently there is very little seating provided and the seats that are present are frequently moved, vandalised and often thrown in the river. Permanently embedded benches need to be installed at key points to provide rest stops for walkers and cyclists as well as opportunities for reflection and contemplation in a natural setting. Where possible rest points should be evenly spaced apart, with water provided nearby. To discourage vandalism it is recommended that they be placed at some distance from access points as this is where most of the damage appears to occur. Seating should be consistent in design and colour and complement other amenities and the surrounding natural areas.

There is also a need for additional rubbish bins in the area as litter around the car park area and along the foreshore detracts from the visual amenity. Bins should be placed a short distance away from access points and constructed of metal mesh to deter vandalism. Bins should also be consistent in colour and design, and complement other amenities and the surrounding environment. Of primary concern to cyclists was the lack of water and bike racks. Installing water points would benefit all users, while bike racks could be installed at Cloisters Reserve.

Recommendations

#	Recommendations	Responsibility	Priority
G73	Investigate the feasibility of routing power and water from Canning Bridge or under the freeway to Cloisters Reserve.	CSP, MRWA	High
G74	Install facilities and amenities at Cloisters Reserve including picnic tables, benches, play equipment, bins, toilets, bike racks and water facilities.	CSP	High
G75	Investigate feasibility of installing lighting at Cloisters Reserve.	CSP	High
G76	Install seating at strategic points along the Western Foreshore.	CSP	High
G77	Investigate feasibility of providing water fountains at strategic locations.	CSP	High
G78	Install mesh rubbish bins 15 m - 20 m from access points.	CSP	High
G79	Ensure all amenities are complementary in colour and style to existing amenities and blend in with the natural environment.	CSP	High

3.6.2 Visual Amenity

The study area generally has high visual amenity principally as a result of natural amenity, open water and native vegetation. Improvements to natural amenity value will continue over time with ongoing weed control and revegetation in addition to the protection of existing natural values.

The survey and public workshop highlighted elements that detracted significantly from recreational experiences. These were primarily noise from the freeway and to a lesser extent powerboat noise, litter and rubbish accumulated along the shoreline, weeds and other detrimental impacts on the environment. There is limited opportunity to reduce noise levels from the freeway however there are some management strategies that can reduce this impact. These include:

- Use of low-noise road surfacing on the freeway. This has been done successfully in other areas within Perth.
- Use of screening vegetation between the freeway and the Western Foreshore. There are limitations on the extent this can be done in many areas. Main Roads WA' guidelines require a setback of 9 metre to the nearest plant with a stem/trunk diameter of 100 mm if there is no protective guardrail. Protective guardrails would need to be installed if additional screening shrubs and trees are to be planted closer to the road. An additional factor to be considered for screening vegetation or use of noise restricting products is that it will detract from the visual amenity for freeway users. This is important given the large number of people that travel along the freeway who benefit from views to the river.

Existing visual amenities should also be enhanced and could include designated areas where it is possible to stop and rest with views of the Canning River. Suggestions from the community included the provision of a boardwalk and lookout near Mt Henry Bridge. This could be constructed on the northern end of the Bridge at the bend of the DUP. A path could be constructed leading to a wooden fenced viewing platform. Such a platform would offer panoramic views of the river and an opportunity to watch waterbirds. In the early morning it is quite common to also see dolphins swimming in this area. Seating could be also provided around the perimeter of the viewing platform.

A further way to enhance the visual amenity of the area would be to install sculptures created by local artists in keeping with the theme of natural environment. Art competitions, openings and liaison with community art groups can raise the profile of the area and the City of South Perth and stimulate interest and a sense of ownership in residents and users.

Recommendations

#	Recommendations	Responsibility	Priority
G80	Resurface freeway using low-noise surfacing materials.	MRWA	Medium
G81	Erect screening vegetation where it does not pose a hazard or detract from the visual quality to freeway users.	CSP	Medium
G82	Construct a path and viewing platform near the Mt Henry Bridge overlooking the Canning River.	CSP, Community Groups	Medium
G83	Install public art sculptures that harmonise with the natural qualities of the area and create a place of tranquillity and reflection.	CSP, Community Groups	Medium

3.6.3 Access

Entry Access

Due to the nature of the study area, there are limited access points from which to enter and leave it. There are three main access points to the Western Foreshore. These are:

- Cloisters Reserve;
- Edgewater Overpass; and
- Mt Henry Bridge

These points provide access for pedestrians, bicyclists and wheelchairs. The ramps to Edgewater Overpass and Cloisters Reserve are too steep to be managed by a wheelchair without assistance. Disabled access is a high priority for this area as there are several nursing homes and aged residents in the area, so any future construction should aim to facilitate disabled access.

Access to the Aquinas College land is via a gate at Mt Henry Bridge, from the school drive and along the foreshore. This is private property and access by the general public is not encouraged. On weekends in the summer months, people are known to illegally enter the property to launch boats.

Trespassing by the general public is an ongoing problem in this area. The generally good condition of the Mt Henry Peninsula feature can in part be attributed to work undertaken by the Mt Henry Peninsula Conservation Group and also by the low level of public use it receives. Damage by public use is evident by the accelerated erosion on steep areas, damage to fences and rubbish around the Aquinas Bay foreshore. Uncontrolled access of this nature has the potential for public injury and subsequent litigation as well as degrading the natural values of the area. There are also security issues with unauthorised use of the Aquinas College boatramp.

It may be beneficial to review the idea of creating a path that allows limited public access to keep people away from areas with high erosion potential. At present the current unofficial track is causing high levels of erosion as it follows the foreshore at the foot of cliffs and unstable slopes. Creating a defined path through areas of low erosion potential may provide people determined to walk through this area of private property with an alternative, low-impact route. Legal, safety and security ramifications need to be considered when reviewing the feasibility of formalising such access.

Reserve Access

Dual use paths and walkways encourage people to keep off the vegetated areas and provide easy access within the reserve, however the disturbance associated with their use is a potential source for weed invasion. A balance must therefore be achieved between providing enough access to enhance people's enjoyment, while not compromising the natural values of the area. The construction of well designed and maintained tracks to key areas will enhance user experience while discouraging uncontrolled access. These must also be accessible by disabled people and the elderly.

Uncontrolled access presently takes place both within the Aquinas College land as previously mentioned, and the City of South Perth's reserves on the western foreshore.

Activities such as dog-walking along the 'beaches' at low tide and numerous informal paths through the native vegetation contribute to erosion, weed invasion and the degradation of natural values. These paths need to be either closed or upgraded to improve formal access within the area.

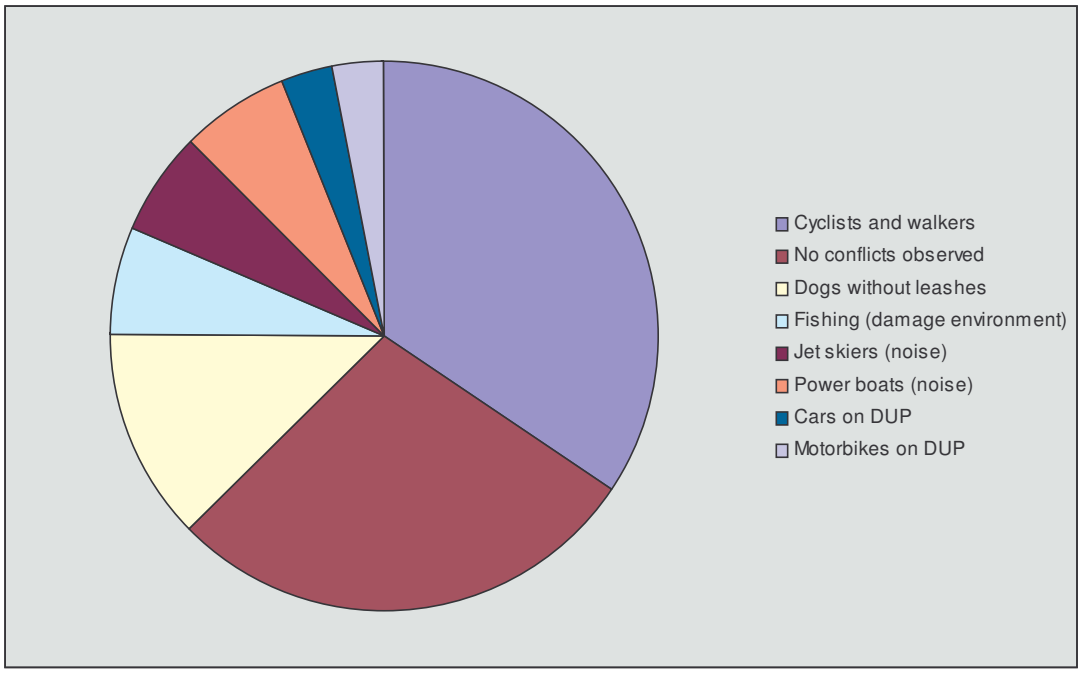
Recommendations

#	Recommendations	Responsibility	Priority
G84	Assess access points for ease of use by disabled people and ensure all future constructions have disabled access where feasible.	CSP	High
G85	Discourage trespassers on Aquinas College land, using fences and signs as resources become available and in accordance with relevant policy.	CB/AqC	High
G86	Upgrade suitable paths to provide access to points of interest.	CSP, Community Groups	Medium
#	**Recommendations**	**Responsibility**	**Priority**
G87	Discuss the feasibility of providing a continuous access path around the Aquinas College foreshore, avoiding areas with high erosion potential and ensuring that legal, safety, security and other issues can be dealt with effectively.	CB/AqC, CSP	Medium

3.6.4 Paths and Walkways

As indicated by the community survey, walking and cycling are the primary activities conducted in the study area. This was also identified as an area in which conflict occurs between these two recreational groups. The general community feeling in this area was that the dual use pathway (DUP) was too narrow to cater for both types of users. Figure 5 shows recreational activities that have been identified through the survey as causing some level of conflict, or shown as incompatible with the main passive recreational activities of walking and cycling.

Figure 5 Identification of conflicts from a survey of nearby residents



The main area of concern to most users was the actual and potential conflicts between cyclists and walkers, some with unrestrained dogs. Fishing was also regarded as being at odds with the environmental values of the area, while jet skis and power-boats were seen as detracting from the experience through excessive noise. Motorbikes and vehicles on the DUP was also identified as a problem.

Suggestions put forward to minimise conflict between cyclists and walkers included speed limits for cyclists and changing the path by either widening it or constructing separate paths for cyclists and walkers. More paths will have larger impacts on the natural environment, particularly given the relevant part of the study area is quite long and narrow. A compromise solution to this would be selective widening of the dual use path and the construction of a limited number of walking tracks off the main path to points of interest.

Maintenance of the dual use path should minimise the impact to the surrounding bushland. Mowing of verges should only extend 1 metre along either side of the pathway and other methods of weed control should be used wherever possible. Rehabilitation should be concentrated where the dual use path runs close to the shoreline and is threatened by natural river processes. The pathway should also be regularly inspected to ensure that there are no blind corners arising from thick vegetation or other obstacles on the bends. Similarly fences should be setback at least 0.5 metres from the edges of the dual use path.

Roaming dogs is an issue of particular concern to many residents particularly the elderly and those with young children. The entire area is an ‘on leash’ zone and there are signs to this effect at Cloisters Reserve. Additional signs located near ‘Poo-ch pouch’ dispensers and at the other access points may also be necessary. Active policing by the City of South Perth rangers may reduce this issue.

Recommendations

#	Recommendations	Responsibility	Priority
G88	Install bicycle speed limit signs at Cloisters car park and Mt Henry Bridge.	CSP	Low
G89	Investigate the feasibility of selectively widening the DUP in places to reduce conflict between cyclists and pedestrians.	CSP	Medium
G90	Install signs at Mt Henry Bridge and Edgewater Overpass to remind users to keep dogs on leashes.	CSP	Low
G91	Investigate the feasibility of increasing regular patrols by the Council rangers, and ensuring fines are issued to owners of dogs without leashes.	CSP	Medium

3.6.5 Water Based Recreation

The study site is adjacent to the only area for public waterskiing area on the Canning River. This is a significant source of erosion on the embankments as well as a source of noise for other recreational users. Jet skiers were identified as being of greater concern than water skiers as they are considered to be much noisier, able to go closer to the shore and often produce a larger wake by executing sharp turns at high speed. The 1993 Management Plan (Brooker *et al*., 1993) recommended that the City of South Perth request the Department of Planning and Infrastructure to seek alternative and more appropriate locations for jetskiing. This has resulted in a new Jet Ski strategy implemented in 2001 and the 'freestyle' area near the Spit has been removed.

The Department of Planning and Infrastructure sets speed limits and local harbour regulations, while the Water Police are responsible for enforcement of regulations. This is generally dependent on reports from local residents. An adequate buffer between skiers and the foreshore needs to be marked. This could be achieved by installing marking buoys at a specified distance from the foreshore, similar to that at Milyu Nature Reserve. A campaign of education among recreational users in this area would also be appropriate.

A number of people including the Beeloo District Scout Association use the area for canoeing. The Scout Association did not feel there were conflicts between themselves and water-skiers as they kept to the banks when canoeing in the area. The area forms part of a trail for canoe expeditions and training runs.

Aquatic areas are also used for fishing and prawning during the season. This has the potential to damage the environment by digging for bait, disturbing foreshore rushes and sedges and contributing to littering. There does not appear to be much evidence from the community survey that this occurs to a large extent and at present it is not necessary to install additional signage. Lighting at Cloisters may alleviate the problem of littering among fisherpeople as it will be more visible to people that they have dropped things or left them behind.

Aquinas Bay is often used by Aquinas College for rowing training. As the College has its own launching facilities this is unlikely to cause erosion of the embankments however there

may be conflicts between waterskiers and rowers. The public also illegally uses Aquinas College's boat launching facilities during the summer months.

Recommendations

#	Recommendations	Responsibility	Priority
G92	Arrange a meeting between the CSP, CB/AqC, SRT and DPI to discuss waterskiing and all other river based water sports issues raised in this report.	CSP, SRT, DPI	Medium
G93	Investigate ways of increasing levels of policing in the area and ensure involvement of all major stakeholders in the discussion.	CSP, DPI – Marine and Harbours, WA Water Police	Medium
G94	Investigate the feasibility of providing a marked buffer zone around the foreshore to limit water skiing close to the shore, if deemed successful at Milyu.	DPI, CSP, SRT	High
G95	Undertake education campaign for recreational boat users.	DPI	Medium
G96	Refer complaints regarding water-based activities to the EPA and the DPI – Marine and Harbours.	EPA, DPI, CSP	Medium
G97	Liaise with the Swan River Trust to determine their current policy relating to bait digging around the river foreshores.	CSP, SRT	High

3.7 Public Awareness, Education and Training

3.7.1 Signage

Signage is needed to inform users of risks, regulations and points of interest. Too much signage can detract from the visual amenity of the area and can lessen the impact of existing signs. It is important therefore to ensure an appropriate level of signage within the study area.

There are currently a number of different signs in the area. These relate to water skiing regulations and guidelines, dog leash requirements, dual use path network, rehabilitation areas, rabbit baiting areas and educational signage in purpose built shelters at Cloisters Reserve and the Spit. There were also signs at the edges of the Mt Henry Peninsula, however these were damaged by vandals and have been removed to ensure no further damage is done. These should be replaced.

The need for additional signage should be assessed in the context of the signage already present. There is an opportunity for management groups within the area to work collaboratively to ensure that signage is uniform and non-obtrusive, while being clearly visible. The current information shelters blend in well with the natural environment, as well

as providing emergency shelter from the elements. The panels provide useful information on the natural features and history of the area.

Additional signs painted on pavement that would probably be beneficial to the area include the following:

- "Please slow down" signs for cyclists at Cloisters Car park and Mt Henry Bridge.
- Use of graphic 'leashed dog' signs at access points.
- Warning signs (landslip) on the limestone slopes of Mt Henry Peninsula, and
- Signs to discourage people walking their dogs along the beaches. Where possible these should be positioned so that they are only visible to people walking along the beach.

Recommendations

#	Recommendations	Responsibility	Priority
G98	Assess current level of signage and remove extraneous signs.	CSP, CB/AqC	Medium
G99	Ensure signs are uniform and complement the environment while still being visible or painted on the dual use path where possible.	CSP, CB/AqC	Medium
G100	Ensure signs do not block views and are positioned so they do not detract from scenic amenity.	CSP, CB/AqC	Medium

3.7.2 Education and Training

Community Education

Community education and involvement is critical for the long-term conservation of environmental values. Raising awareness can be achieved by a number of ways including newspaper articles, signs, guided walks and tours, pamphlets and visits to local schools. These should always be positive and community orientated rather than presented as rules and regulations. Developing a sense of ownership within the community will empower people and encourage them to devote their own resources to appropriate care and management. The local community and school groups should also be encouraged to become involved in activities around the area such as bird watching, weeding, tree planting, plant identification, creating herbariums and assisting in the preparation of signage.

The Mt Henry Conservation Group is investigating the possibility of building a nature trail identifying interesting features of the Mt Henry Peninsula for the benefit of students, teachers and parents. Signs similar to those used at Kings Park range in price from $130 – $150. Anodised, acid-etched aluminium signs are an alternative, and come with guarantees against vandalism. Metal-work students at Aquinas College could be invited to assist in making the signs and the lettering could then be applied by a professional signwriter thus saving costs. Information on the signs can include the common and scientific names of plants, their distinctive features, occurrence, flowering time and ecological notes. The nature trail should essentially follow the cross-country track shown in Figure 2, with some minor deviations to places of interest. The track should be constructed in an environmentally sensitive manner and located away from areas that are susceptible to erosion or weed

invasion. The length of the trail should be fairly short (about 200 – 500m) and offer other visual benefits such as views to the river from the apex of Mt Henry.

Recommendations made for the Salter Point and Waterford Management Plan (Siemon, 2000) can also be extended to include the study area. These include:

- Information leaflets on topics such as pesticide/fertiliser use, recycling of green waste and other plants and garden plants that may escape into natural areas.
- Continue and extend the 'Yellow Fish Road' programme coordinated by the Swan River Trust and the 'Ribbons of Blue' programme coordinated by Department of Environment.
- Educational walks and regular seminars to benefit the local and wider community, and
- Litter campaigns to reduce litter and participation in annual 'Clean up Australia' days.

The Mt Henry Peninsula Conservation Group has produced spectacular results in rehabilitation, weed control and erosion control on Mt Henry Peninsula and have contributed greatly to enhancing the natural environment. Dedicated community "Friends of" groups are another way in which people can become involved in the care of their natural areas. This is particularly beneficial when volunteers belong to a friends group involved with a specific area. A more formal approach to the City of South Perth Environment Association's work on the Western Foreshore area would be of benefit.

School Groups

Schools are a beneficial means of developing environmental stewardship in the community. School groups can assist in programmes for the improvement of natural areas. Students of Aquinas College have been actively involved in rehabilitation of the Mt Henry Peninsula under the direction of the Mt Henry Peninsula Conservation Group. Activities undertaken include collecting, smoke treating and storing seed, weed removal and tree planting. These activities could also be extended to the Western Foreshore and involve other nearby schools.

Bushland rehabilitation and an understanding of the environment are becoming an increasingly important part of school curricula at all levels. Liaison between the City of South Perth's Environmental Programmes Coordinator and local schools will help facilitate conservation programmes. Local Scout groups (Beeloo District) and other local sporting clubs could also contribute to the management of the area. In approaching these groups it is important to always stress the community's ownership of the resource, as this will encourage people to better look after it than if it is regarded as common property.

Recommendations

#	Recommendations	Responsibility	Priority
G101	Involve the community, where possible, in management of the area. Reinforce community 'ownership' in this respect.	CSP	High

#	Recommendations	Responsibility	Priority
G102	Involve school groups and the local community in educational activities in the natural areas of the study site including stencilling projects, signs, pamphlets, media and holiday recreation programmes.	CSP, CB/AqC, DOE, SRT, Community groups, MtHPCG	High
G103	Continue supporting the ongoing involvement of local friends groups and provide supervision and support. Key means of support could include professional advice from the Environmental Programmes Coordinator and Infrastructure Services and the provision of equipment and guidance.	CSP, Community Groups, MtHPCG, CB/AqC	High
G104	Continue to provide bushland regeneration courses to interested members of the public who actively commit more than 40 hours per annum to bushland and wetland maintenance.	CSP	Low

3.8 Maintenance

3.8.1 Infrastructure Maintenance

Existing infrastructure including the dual use path, signage, fences, tracks and future infrastructure such as toilet and water facilities, picnic equipment, play equipment and barbecues should be constantly assessed, maintained and when necessary upgraded so that they may continue to:

- Function in good working order.
- Have a good appearance with uniform style.
- Do not pose a health or safety hazard, and
- Continue to function as they were designed.

Wear and tear over time, vandalism and changing user requirements mean that regular assessment of infrastructure needs to take place depending on the circumstances and type of infrastructure. The following table depicts suggested maintenance schedules for the existing infrastructure. Incorporating new infrastructure will require the maintenance schedules to be updated.

Table 3: Maintenance Schedules

Item	Look For	Responsibility	Inspection
Dual use pathway	• Cracks and potholes • Surface degradation • Graffiti • Public risk	CSP, MRWA	Annually
Walking tracks	• Erosion • Surface degradation • Public risk	CSP, CB/AqC	Biannually

Item	Look For	Responsibility	Inspection
Fencing	• Breaks • Appearance • Wilful damage • Public Risk	CSP, CB/AqC, MRWA	Monthly
Signage	• Visibility • Appearance • Graffiti • Wilful damage	CSP, CB/AqC, MRWA	Monthly
Seats, benches and tables	• Wilful damage • Wear and tear • Graffiti	CSP	Monthly
Rubbish Bins	• Wilful damage • Graffiti • Appearance	CSP	Monthly

Recommendation

#	Recommendation	Responsibility	Priority
G105	Undertake regular inspections of infrastructure and repair or replace where necessary in accordance with formal maintenance plans.	CSP, CB/AqC, MRWA	Medium

3.8.2 Litter Collection

Litter is an identified problem along the foreshore area. Significant volumes of rubbish are also deposited on the foreshore following storm and peak river flow events. Bins have been installed and are emptied fortnightly, but are subject to constant vandalism. Litter on the foreshore area was considered to be a significant detriment to community enjoyment of the area during the survey and community workshop.

There is a recognised need for more rubbish bins in the area, however these will need to be resistant to vandalism. Situating them at a small distance from access points may help to limit vandalism. Installation of 'vandal-proof' metal bins has been tried in the past at Cloisters, however they were ripped out and run over repeatedly (S. Smith pers. comm.). If these measures are to succeed these bins must be sited away from areas with vehicle access. Rubbish bins should also be installed near seating and rest areas.

It may be possible to involve the community in the management of litter through the involvement of friends groups and participation in national clean up days such as 'Clean-up Australia Day'. In addition local schools and scout groups may also like to participate in the removal of accumulated rubbish. Any insurance and public liability issues must be resolved before involving the public in these activities.

Discarded syringes continue to be a problem in many parks in Perth. If reports of discarded needles increase, needle-bins should be provided at selected locations. If a toilet block is constructed at Cloisters, a needle bin and condom dispenser should be installed. The toilets should also be locked at night.

Recommendations

#	Recommendations	Responsibility	Priority
G106	Involve the community in litter collection through the Clean-Up Australia Day and hold additional rubbish collection days following storm and peak river flows.	CSP, CB/AqC, Community groups	Medium
G107	Discourage vandals by repairing all damaged facilities immediately after any act of vandalism.	CSP – Infrastructure Services, CB/AqC	Medium
G108	Develop a community education programme with regard to syringe disposal.	CSP, DoH,	Medium
G109	Investigate the feasibility of providing syringe disposal at key locations if the incidence of carelessly discarded needles is high.	CSP	High

3.8.3 Irrigation

Irrigation is rarely necessary in the majority of the study area, which consists primarily of natural vegetation. Aquinas College lawns and ovals are currently the only irrigated areas. Perth's native flora is drought tolerant and does not generally require irrigation, however new seedlings may benefit from watering in the first year of establishment. Care should be taken to avoid damage to existing vegetation.

The Aboriginal consultation process undertaken as part of the 1993 Management Plan showed that some of the vegetation on Mt Henry Peninsula showed signs of stress (Brooker *et al.*, 1993). Increased pressure on underground aquifers may decrease the amount of water naturally available to the native bushland resulting in water stress. Groundwater use therefore needs to be monitored in connection with vegetation stress.

Irrigation of Aquinas College's 16 hectares of lawns and ovals is sourced from six bores. Salinity should remain low provided the bores remain shallow. There are no bores on the narrow section of the Peninsula where it is probable that saline water infiltrates the groundwater (Brooker *et al.*, 1993). Irrigation of the lawns and ovals should be in keeping with water use guidelines to avoid overwatering. Overwatering may lead to increased numbers of weeds in surrounding bushland areas as the runoff will also contain levels of fertiliser, nutrients and grass seeds.

Recommendations

#	Recommendations	Responsibility	Priority
G110	Engage in periodic watering of native vegetation along the Western Foreshore if the plants begin to show signs of water stress.	CSP – Infrastructure Services	Low
G111	Minimise irrigation of ovals and lawns to restrict weed invasion into surrounding bushland areas.	CB/AqC grounds keepers	Medium
G112	Monitor groundwater levels as required and regulate use to ensure adequate water resources for native vegetation.	CB/AqC	Medium

3.8.4 Graffiti and Wilful Damage

Graffiti and wilful damage has been highlighted by the City of South Perth and by local residents as being a significant problem in the area. This problem is particularly apparent at Cloisters car park and surrounds, however it has also occurred at Edgewater Overpass and on Mt Henry Peninsula.

Cloisters Reserve in particular has a number of damaging activities occurring on a regular basis:

- Burning and destruction of rubbish bins.
- Wheelies or 'burnouts' in the car park.
- Removing bark and limbs in the paperbark grove.
- Lighting fires in the paperbark grove.
- Removing and destroying signs.
- Graffiti on the overpasses and existing signs.
- Destroying fences and bollards, and
- Driving cars and motorbikes along the dual use path.

In addition most garbage bins installed within the study area have been burnt, signs pushed over and/ or removed and seats continuously moved around. Practically every week the seats and signs are fished out of the water (J. Box pers. comm.). This is a significant problem and is a major impediment to installing new amenities and infrastructure. Cloisters car park in particular is a main target for vandals and is regarded as the most vandalised reserve in the City of South Perth (S. Smith pers. comm.).

Graffiti and wilful damage tends to occur primarily at main access points with resulting damage to fences and signs by trespassers on Mt Henry Peninsula. Moving infrastructure away from access points may reduce the frequency of vandalism. Making the susceptible areas less attractive for vandals can also alleviate the problem to some extent.

Lighting is likely to be the most effective way of reducing the incidence of undesirable behaviour at Cloisters car park, particularly given its proximity to the Freeway. It may be possible to source power for lighting from the freeway lighting system.

Gating the Cloister's Overpass is also an option to reduce undesirable behaviour however this has the following drawbacks:

- It requires someone to close and lock the gate every night and reopen it in the morning.
- People using the boat ramp and returning late at night may be locked in, and
- It imposes restrictions on legitimate recreational users who may want to use the area at night, e.g. prawners and fishermen.

One option to alleviate some of these drawbacks is the use of time-delay locks with one-way gates. These locks pose an additional cost and steps must be also taken to ensure that they are not vandalised. Careful evaluation of options is recommended before infrastructure and amenities such as picnic tables and benches, bins, barbecues or play equipment are installed.

Graffiti and other vandalism should be repaired as soon as possible after its occurrence, as its continued presence tends to invite further acts of vandalism. Graffiti resistant compounds should also be applied to any property that is targeted constantly. The community should also be encouraged to report any acts of vandalism or antisocial behaviour to the police and Council. Successful arrests should then be followed up with a note of thanks to the person who reported the incident.

Recommendations

#	Recommendations	Responsibility	Priority
G113	Investigate the feasibility of providing a locked gate at the entrance to Gentilli Way overpass.	CSP	High
G114	Remove graffiti and repair damage to infrastructure as soon as possible after it occurs.	CSP	High
G115	Encourage the community to report anti-social and destructive behaviour to the police and Council authorities.	CSP, WA Police Department	Medium

4.0 Site Specific Management Issues and Recommendations

The locations of site specific management recommendations area shown in Figure 6.

4.1 Cloisters Car Park To Infill Area

Design changes to the car park area are addressed in more detail in the Concept Plan developed by William K James Landscape Architect (Section 5.0).

4.1.1 Car park Area

Infrastructure and Environmental Considerations:

- Gentilli Way drain outlet close to recreation area.
- Grass clippings left on the side of paths and car park.
- Rubbish bins frequently burnt.
- Lack of seating, picnic tables and other amenities.
- Mixture of rock and bollards around perimeter of car park.
- Lack of shrubs and bushes around margins of car park.
- Lack of signage around rehabilitation.
- Lack of sign identifying reserve, and
- Lack of lighting in the car park.

Recommendations

#	Specific Recommendations	Responsibility	Priority	Timing
A 1.1	Move Gentilli Way drain outlet to a more appropriate location further south if deemed necessary.	CSP	Medium	2003-2004
A 1.2	Replace rubbish bins with metal mesh bins at least 5 metres from the car park.	CSP – Works	Medium	2003-2004
A 1.3	Install toilet, seating, play equipment and other amenities outlined in the Concept Plan.	CSP	Medium	Ongoing
A 1.4	Investigate feasibility of providing power and water to Cloisters for lighting, barbecues and drink fountains.	CSP	Medium	2003-2004
A 1.5	Remove damaged uneven bollards and replace with bollards along margin of the car park as shown on the plan.	CSP	Medium	2003-2004
A 1.6	Investigate the feasibility of erecting a gate on the other side of the overpass at Gentilli Way.	CSP	Medium	2003-2004

#	Specific Recommendations	Responsibility	Priority	Timing
A 1.7	Replant the margins of the car park with local amenity species.	CSP	High	Ongoing
A 1.8	Install signage informing people of rehabilitation works and its progress.	CSP	Low	Ongoing
A 1.9	Install a sign with name of reserve in a prominent place.	CSP	Medium	2003-2004

4.1.2 Paperbark Grove

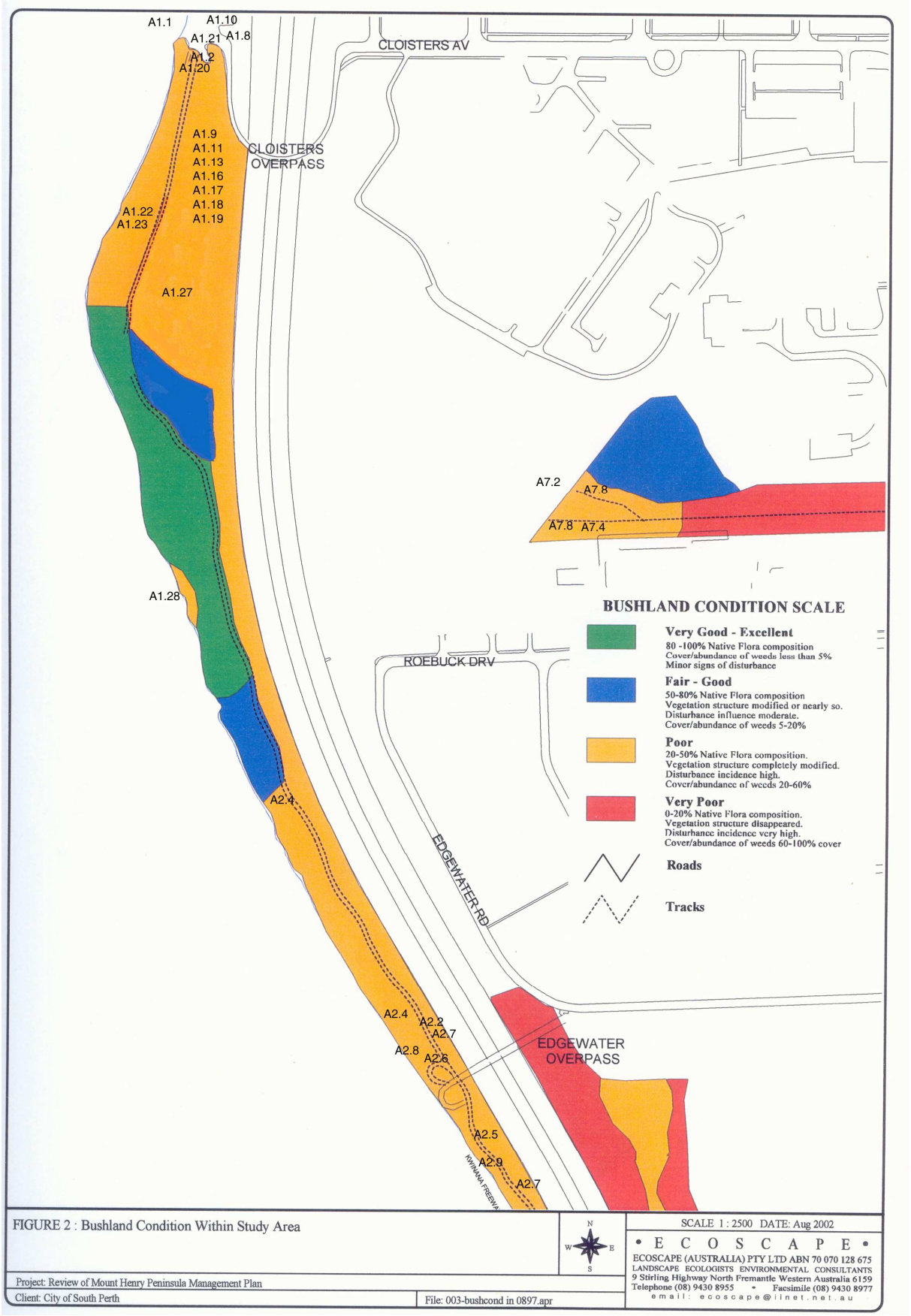
Infrastructure and Environmental Considerations:

- Morning glory growing on fences and paperbarks and dominance of weed species along margins and beneath the Overpass adjacent to the Paperbark Grove.
- Concrete and wooden seat randomly placed in Paperbark Grove – continuous movement disturbs understorey and groundcover species.
- Rubble and rubbish under overpass ramp.
- No recruitment of *Melaleuca preissiana* (Modong) and *M. rhaphiophylla* (Freshwater paperbark).
- Understorey limited to *Centella* sp. groundcover and bare ground due to density of canopy. One patch of native rushes and sedges remains.
- Ongoing damage and vandalism to bark and lower limbs of paperbarks, and
- Grass clippings on side of path from slashing edges of DUP.

Recommendations

#	Specific Recommendations	Responsibility	Priority	Timing
A 1.10	Remove remaining Morning glory from fences and paperbarks.	CSP – Infrastructure Services	High	2003-2004
A 1.11	Continue weed control and revegetation in the Paperbark Grove.	CSP – Infrastructure Services	High	Ongoing
A 1.12	Remove the seat from Paperbark Grove.	CSP	Low	2003-2004
A 1.13	Remove rubbish and hard-pave or plant under overpass ramp.	CSP	Medium	2003-2004
A 1.14	Fence Paperbark Grove before continuing revegetation. Use 1.5m high chain-link and pine log fence similar to existing fence at the Spit.	CSP	High	2003-2004
A 1.15	Monitor natural regeneration of *Melaleuca preissiana* and *M. rhaphiophylla* within Paperbark Grove and reinforce with seedlings if necessary.	CSP	High	Ongoing

#	Specific Recommendations	Responsibility	Priority	Timing
A 1.16	Plant nodes of *Baumea juncea*, *Juncus pallidus* and *Centella cordifolia* within the Paperbark Grove.	CSP	High	Ongoing
A 1.17	Install signage advising people that rehabilitation projects are underway.	CSP	High	2003-2004
A 1.18	Prune damaged limbs and tidy stripped bark as soon as possible after damage has occurred.	CSP	High	Ongoing
A 1.19	Remove grass clippings from edges of DUP.	CSP	Medium	Ongoing
A 1.20	Install seating on southern end of Cloisters car park.	CSP	High	2003-2004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BUSHLAND CONDITION SCALE
Very Good - Excellent
80 -100% Native Flora composition
Cover/abundance of weeds less than 5%
Minor signs of disturbance
Fair - Good
50-80% Native Flora composition
Vegetation structure modified or nearly so.
Disturbance influence moderate.
Cover/abundance of weeds 5-20%
Poor
20-50% Native Flora composition.
Vegetation structure completely modified.
Disturbance incidence high.
Cover/abundance of weeds 20-60%
Very Poor
0-20% Native Flora composition.
Vegetation structure disappeared.
Disturbance incidence very high.
Cover/abundance of weeds 60-100% cover
Roads
Tracks
FIGURE 2 : Bushland Condition Within Study Area
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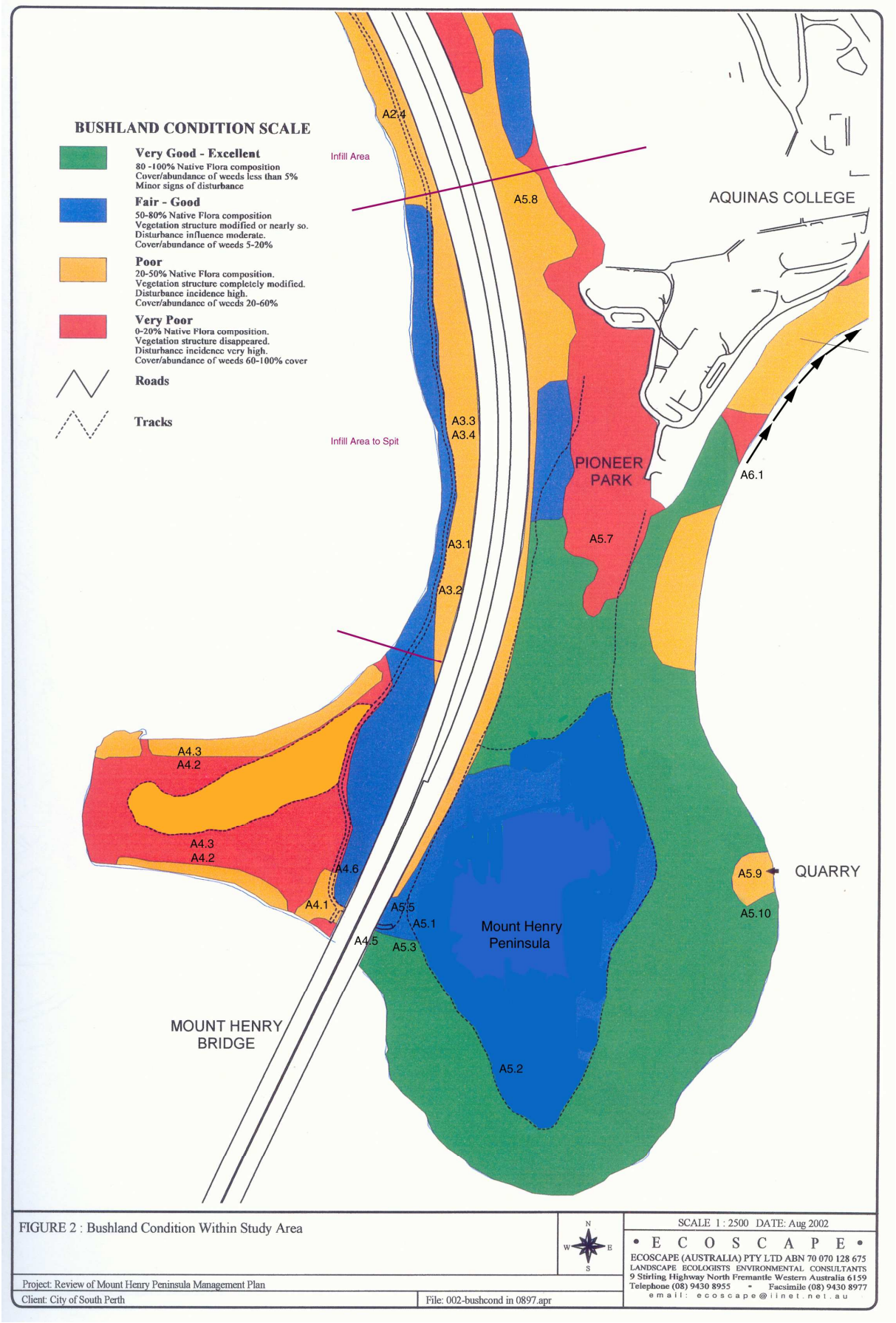
• E C O S C A P E •
ECOSCAPE (AUSTRALIA) PTY LTD ABN 70 070 128 675
LANDSCAPE ECOLOGISTS ENVIRONMENTAL CONSULTANTS
9 Stirling Highway North Fremantle Western Australia 6159
Telephone (08) 9430 8955 • Facsimile (08) 9430 8977
email: ecoscape@iinet.net.au
Project: Review of Mount Henry Peninsula Management Plan
Client: City of South Perth
File: 003-bushcond in 0897.apr


BUSHLAND CONDITION SCALE
Very Good - Excellent
80 -100% Native Flora composition
Cover/abundance of weeds less than 5%
Minor signs of disturbance
Fair - Good
50-80% Native Flora composition
Vegetation structure modified or nearly so.
Disturbance influence moderate.
Cover/abundance of weeds 5-20%
Poor
20-50% Native Flora composition.
Vegetation structure completely modified.
Disturbance incidence high.
Cover/abundance of weeds 20-60%
Very Poor
0-20% Native Flora composition.
Vegetation structure disappeared.
Disturbance incidence very high.
Cover/abundance of weeds 60-100% cover
Roads
Tracks
Infill Area
Infill Area to Spit
A2.4
A5.8
AQUINAS COLLEGE
A3.3
A3.4
PIONEER PARK
A6.1
A5.7
A3.1
A3.2
A4.3
A4.2
A4.3
A4.2
A4.6
A4.1
A5.5
A5.1
A4.5
A5.3
Mount Henry Peninsula
A5.9
QUARRY
A5.10
MOUNT HENRY BRIDGE
A5.2
FIGURE 2 : Bushland Condition Within Study Area
N
W
E
S
SCALE 1 : 2500 DATE: Aug 2002
• E C O S C A P E •
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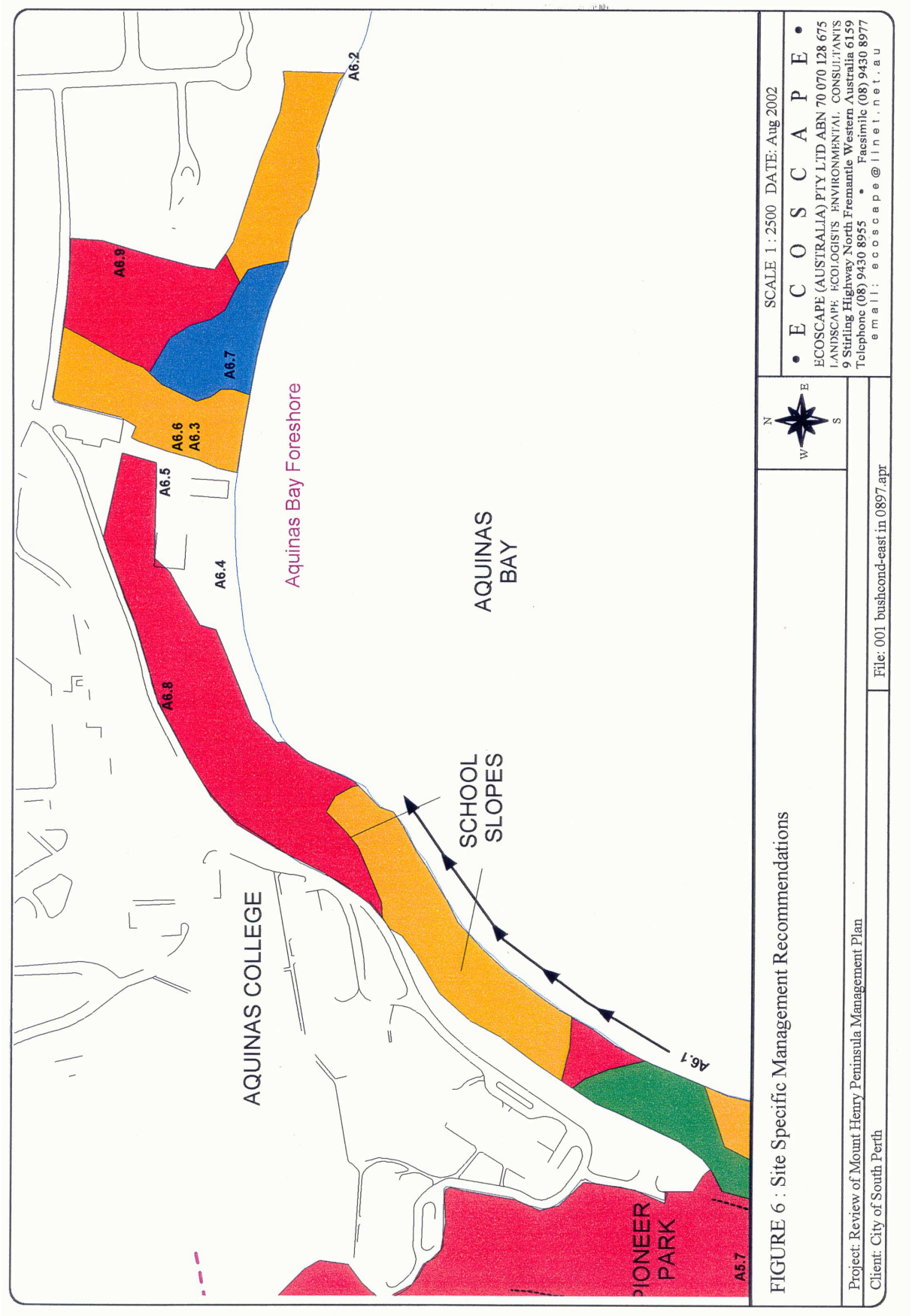
LANDSCAPE ECOLOGISTS ENVIRONMENTAL CONSULTANTS
9 Stirling Highway North Fremantle Western Australia 6159
Telephone (08) 9430 8955 - Facsimile (08) 9430 8977
email: ecoscape@iinet.net.au
Project: Review of Mount Henry Peninsula Management Plan
Client: City of South Perth
File: 002-bushcond in 0897.apr


A6.9
A6.7
A6.6
A6.3
A6.5
A6.4
A6.8
A6.2
A6.1
A5.7
Aquinas Bay Foreshore
AQUINAS BAY
SCHOOL SLOPES
AQUINAS COLLEGE
PIONEER PARK
N
S
E
W
SCALE 1 : 2500 DATE: Aug 2002
• E C O S C A P E •
ECOSCAPE (AUSTRALIA) PTY LTD ABN 70 070 128 675
LANDSCAPE ECOLOGISTS ENVIRONMENTAL CONSULTANTS
9 Stirling Highway North Fremantle Western Australia 6159
Telephone (08) 9430 8955 • Facsimile (08) 9430 8977
email: ecoscape@iinet.net.au
FIGURE 6 : Site Specific Management Recommendations
Project: Review of Mount Henry Peninsula Management Plan
Client: City of South Perth
File: 001 bushcond-east in 0897.apr

4.1.3 Paperbark Grove to Infill Area

Infrastructure and Environmental Considerations:

- Star pickets and the chain-mesh fences pose a hazard to cyclists and detract from visual amenity.
- Unofficial tracks though good condition bushland.
- Invasion of weeds particularly Wintergrass (*Poa annua*), Kikuyu (*Pennisetum clandestinum*), Rose pelargonium (*Pelargonium capitatum*) and Couch (*Cynodon dactylon*).
- Department of Main Road planting of WA peppermint (*Agonis flexuosa*) and Geraldton wax (*Chamelaucium uncinatum*).
- Low revegetation densities.
- Unofficial tracks, and
- Lack of seating in strategic places.

Recommendations

#	Specific Recommendations	Responsibility	Priority	Timing
A 1.21	Remove fence and star pickets from the side of the DUP.	CSP	High	2003-2004
A 1.22	Install pine-log and chain-link fence from the start of the good condition bushland near the Paperbark Grove and extend it to the south until fenced to the start of the Infill area.	CSP	Medium	Ongoing
A 1.23	Lay brush over existing minor tracks to discourage use and facilitate rehabilitation.	CSP	Medium	2003-2004
A 1.24	Undertake weed control, particularly Pelargonium, Wintergrass and Kikuyu.	CSP	High	Ongoing
A 1.25	Rehabilitate closed tracks, areas of eroded foreshore and manage existing rehabilitation areas.	CSP	High	Ongoing
A 1.26	Extend and infill current rehabilitation of cleared area to south of Paperbark Grove.	CSP	Medium	Ongoing
A 1.27	Install nature based seating at the end of official walking tracks with views to the river.	CSP	High	2003-2004

4.2 Infill Area

4.2.1 Foreshore

Infrastructure and Environmental Considerations:

- Numerous weeds exist in the infill area including Couch (*Cynodon dactylon*), Buffalo Grass (*Stenotaphrum secundatum*), Wintergrass (*Poa annua*), Rose Pelargonium (*Pelargonium capitatum*) and Strap Lily (*Trachyandra divaricata*) and some species planted by Main Roads WA.
- Lack of vegetation cover, particularly in the understorey layer; and
- Lack of seating.

Recommendations

#	Specific Recommendations	Responsibility	Priority	Timing
A 2.1	Continue ongoing weed control in this area, particularly Kikuyu and Pelargonium.	CSP	High	Ongoing
A 2.2	Remove introduced plant species planted by MRWA for rehabilitation that are, or have the potential to, become weeds.	CSP, CB/AqC	Medium	2003-2004
A 2.3	Continue rehabilitation and revegetation of this area. Plant species used should be primarily shrubs, rushes and groundcover species adapted to growing in a hard limestone substrate.	CSP	High	Ongoing
A 2.4	Install seating at strategic locations to provide places for rest and contemplation.	CSP	High	2002-2005

4.2.2 Edgewater Overpass

Environmental and Infrastructure Considerations:

- A section of the DUP immediately to the south of Edgewater Overpass is below the high tide mark and is covered with water during high tide events. This poses a threat to cyclists and the DUP itself.
- Edgewater Overpass is susceptible to vandalism and destruction.
- Existing rubbish bins have been frequently burnt.
- The drain immediately to the north of Edgewater Overpass is severely infested with Kikuyu (*Pennisetum clandestinum*) indicating that it may be broken and leaking.
- Water ski-take off area near the Overpass is inappropriate and is contributing to erosion around foundations of overpass.
- The pavement next to the off ramp of Edgewater Overpass is being continually destroyed by wave action, and
- Erosion is threatening the Edgewater Overpass.

Recommendations

#	Specific Recommendations	Responsibility	Priority	Timing
A 2.5	Raise or move the DUP immediately south of Edgewater Overpass to prevent it becoming inundated during high tide.	MRWA, CSP	Medium	2003 – 2004
A 2.6	Erect a fence extending 20 m on either side of Edgewater Overpass between the DUP and the foreshore vegetation if safety considerations can be met.	CSP	Medium	2002 – 2003
A 2.7	Install mesh rubbish bins that are resistant to burning.	CSP	Medium	2002-2003
A 2.8	Investigate and if necessary repair the drain immediately to the north of Edgewater Overpass.	CSP	Low	2003-2004
A 2.9	Liaise with DPI to determine the feasibility of banning water ski take offs near Edgewater Overpass.	CSP, DPI	High	2002-2003
A 2.10	Implement erosion control measures outlined in general recommendations.	MRWA, CSP	High	2002-2003

4.3 Infill Area to the Spit

Environmental and Infrastructure Considerations:

- The steep gradient of the freeway embankment caused by runoff and children's cubbies is causing erosion, and
- Drains are weed infested and the pipework may be damaged.

Recommendations

#	Specific Recommendations	Responsibility	Priority	Timing
A 3.1	Revegetate steep slopes on the Freeway embankment.	CSP, MRWA, Community Groups	High	2003-2004
A 3.2	Investigate the feasibility of installing a drain to stem stormwater runoff from the freeway.	MRWA	Low	N/A
A 3.3	Inspect and if necessary repair drains.	MRWA, CSP,	Medium	2003-2004
A 3.4	Control weeds around drains.	CSP	Medium	2003-2004

4.4 The Spit

Environmental and Infrastructure Considerations:

- Opportunity for viewing platform.
- Lack of signage.
- Extensive patches of weeds on the Spit.
- Need for rehabilitation on the Spit.
- Issues with dogs not being walked on leads.
- Localised erosion on tip of the Spit, and
- Stone-pitching has been removed from under the Mt Henry Bridge.

Recommendations

#	Specific Recommendations	Responsibility	Priority	Timing
A 4.1	Erect a viewing platform with seating between the Spit and the Mt Henry Bridge.	CSP	Low	2003 – 2004
A 4.2	Continue the ongoing programme of weed control.	CSP	High	Ongoing
A 4.3	Rehabilitate the Spit working from the good areas towards the poorer areas.	CSP	High	Ongoing
A 4.4	Implement erosion control measures as outlined in general recommendations.	CSP	Medium	2003 - 2004
A 4.5	Repair the stone pitch revetment under Mt Henry Bridge.	MRWA	High	2003-2004

#	Specific Recommendations	Responsibility	Priority	Timing
A 4.6	Paint cautionary signage to dog-owners and 'Please slow down' cyclists on the DUP near Mt Henry Bridge.	CSP	Medium	2003-2004

4.5 Mt Henry Peninsula

Environmental and Infrastructure Considerations:

- No signage warning people to keep away from limestone cliffs and steep slopes;
- Cross country track partially surfaced with mulch.
- Well used track below cross country track entering from Mt Henry Bridge is causing high levels of erosion.
- Many unofficial paths within the Peninsula.
- Chain-link fence near gate has been cut.
- Wire fence going into water near Mt Henry Bridge in disrepair.
- Infestation of Perennial veldtgrass (*Ehrharta calycina*) between buildings and bushland.
- Lack of vegetation and rubbish in the old quarry.
- Exotic trees and shrubs planted along the Freeway margins, and
- Weeds along Freeway margins.

Recommendations

#	Specific Recommendations	Responsibility	Priority	Timing
A 5.1	Install warning signs about the cliff hazard in a prominent position if deemed necessary.	CB/AqC	Medium	2003-2004
A 5.2	Investigate the feasibility of surfacing the cross country track and walk trail. Prioritise resurfacing for steep areas with higher erosion risk.	CB/CB/AqC, CSP	Medium	2003-2004
A 5.3	Close the track leading from the gate at Mt Henry bridge along the slope face. Fence and lay brush if resources become available.	CB/CB/AqC	High	2003-2004
A 5.4	Close unofficial paths in the area and rehabilitate if resources become available.	Mt Henry PCG, CB/AqC	Medium	2002-2005
A 5.5	Repair the chain link fence near Mt Henry Bridge. Install a 'private property' sign.	CB/AqC	Medium	2003-2004
A 5.6	Remove the wire fence going into water near Mt Henry Bridge. If resources become available, install a sign warning people not to climb on the cliff face or around the foreshore as it contributes to erosion.	CB/AqC, CSP	Low	2003-2004

#	Specific Recommendations	Responsibility	Priority	Timing
A 5.7	Control grassy weeds near buildings and in bushland as resources become available.	CB/AqC	High	Ongoing
A 5.8	Control weeds along the freeway margin, remove exotic trees and replant with natives.	CB/AqC, MRWA	Medium	2003-2005
A 5.9	Remove rubbish from the quarry area and rehabilitate if resources become available.	Mt Henry PCG, CB/AqC	Medium	2003-2005
A 5.10	Repair the fence along perimeter of the quarry area if resources become available.	CB/AqC	High	2002-2003

4.6 Aquinas Bay Foreshore

Environmental and Infrastructure Considerations:

- High levels of litter along foreshore.
- Redmond Avenue drain weed infested and in poor repair.
- Reticulation areas located near bushland.
- Old compost heaps adjacent to bushland.
- No solid barrier between composting sites and bushland.
- Weeds and prunings heaped in bushland.
- Exotic trees planted on foreshore particularly pines and Victorian coastal teatree (*Leptospermum laevigatum*).
- Lack of historical signage, and
- High levels of grassy weeds near tennis court. Perennial veldtgrass (*Ehrharta calycina*), African lovegrass (*Eragrostis curvula*), Blowfly grass (*Briza maxima*) and Wild oats (*Avena barbata*).

Recommendations

#	Specific Recommendations	Responsibility	Priority	Timing
A 6.1	Clean up litter along the foreshore, taking care to minimise erosion while doing so.	Mt Henry PCG, CB/AqC	Low	Ongoing
A 6.2	Repair and rehabilitate eroded areas around the Redmond Avenue drain. Install biological filters.	CSP	High	2002-2004
A 6.3	Remove old compost heaps around and within bushland.	CB/AqC	Medium	2002-2004
A 6.4	Ensure reticulation does not extend into bushland.	CB/AqC	Medium	Ongoing
A 6.5	Ensure compost heaps are located away from bushland or have a buffer between the compost and bushland.	CB/AqC	Medium	Ongoing

#	Specific Recommendations	Responsibility	Priority	Timing
A 6.6	Remove weeds and prunings from bushland areas and ensure this practice is not continued.	CB/AqC	High	Ongoing
A 6.7	Remove exotic trees from the bushland and the foreshore and replant with local species as resources become available.	CB/AqC	High	2003-2004
A 6.8	Install signage and seating overlooking Aquinas Bay. Erect signs describing the old boatshed, history and college activities if resources become available.	CB/AqC	Low	2003-2004
A 6.9	Control weeds around the tennis court.	CB/AqC	High	2003-2004

4.7 Mt Henry Public Open Space

Mt Henry Public Open Space is a recent addition to the management plan and consists of the Water Corporation easement on Hogg Avenue and additional Public Open Space. The Mount Henry Dental Hospital owns the bushland adjacent to it and the area is being managed for conservation purposes. The bushland condition of the area ranges from good to poor with the best area located on the northern side consisting of good quality *Banksia* woodland.

This area can be linked to the foreshore by the rehabilitation of the small reserve on the corner of Mt Henry Road and Roebuck Drive. Currently there are a few trees and *Xanthorrhoea* with the remainder mowed. Weed control and revegetation of this area will provide linkages enabling bird species and some mammals and reptiles to move across the intersection between the Mt Henry Public Open Space and the bushland surrounding Aquinas College.

Environmental and Infrastructure Considerations:

- Lack of signage identifying it as Public Open Space.
- Sparse vegetation.
- Vehicle track within area.
- High levels of weed infestation.
- Lack of fence between Open Space and properties to the south with the potential to increase weed invasion in this area.
- Presence of exotic trees including Geraldton wax, and
- Gates installed at the eastern end by the Hogg Avenue by developers is inappropriate as it is unclear that this land is Public Open Space. This may discourage people from enjoying this bushland.

Recommendations

#	Specific Recommendations	Responsibility	Priority	Timing
A 7.1	Establish communication and liaison procedures for the management of the Water Corporation easement and Dental Hospital land.	CSP, Manning Dental Hospital owners	High	Ongoing
A 7.2	Install signage at both entrances identifying the area as Public Open Space.	CSP	High	2002-2003
A 7.3	Continue revegetation over the entire area and actively manage the area in future years.	CSP	High	Ongoing
A 7.4	Investigate the feasibility of closing and rehabilitating the vehicular track. Instead allow enough room for maintenance vehicles on the pedestrian path.	CSP, Water Corp.	Medium	2003-2005

#	Specific Recommendations	Responsibility	Priority	Timing
A 7.5	Continue weed control measures within the Open Space. Coordinate weed control with Mount Henry Dental Hospital owners.	CSP, Dental Hospital	High	Ongoing
A 7.6	Remove exotic trees and mulch them to provide mulch for rehabilitation. Ensure no exotic seed is in the mulch.	CSP, Dental Hospital	Medium	2003-2004
A 7.7	Erect a fence, bollards or concrete edging between the Open Space and properties to the south to prevent 'lawn drift' and slow the spread of weed invasion.	CSP	High	2002-2003
A 7.8	Remove gates installed by developers and replace with removable bollards.	CSP	Medium	2002-2003
A 7.9	Rehabilitate the unnamed reserve on the corner of Mt Henry Road and Roebuck Drive to form a wildlife link with the foreshore vegetation.	CSP	High	2002-2005

5.0 Cloisters Reserve Concept Plan

Mt Henry Peninsula Management Plan

The concept plan by William K James Landscape Architect, graphically represents many of the recommendations made in Sections 4.1.1 and 4.1.2. This plan can be viewed at the Council Depot by appointment with the Environmental Programs Coordinator. The concept plan illustrates a design aimed at improving the visual and recreational amenity of the area. The design involves the construction or installation of toilets, barbecues and other facilities as well as revegetation works, minor landscaping and the removal of unattractive elements.

5.1 Concept Plan Zones

Cloisters Avenue Bridge Entrance (Gentilli Way Overpass)

The entrance to Cloisters Reserve will require a gate to ensure that vandalism in this area does not continue.

Recommendations:

- Investigate feasibility of placing a gate across the entrance if vandalism does not abate.
- Automatic gate with permanent signage to announce gate opening and closing times.
- Gate opening and closing by Ranger or Council Personnel.

Asphalt Car park and Surrounds

This area, while functional, is lacking in visual amenity. Reducing the car park dimensions will help to reduce anti-social behaviour without decreasing the functionality of the area as a boat-launching area. Vehicle access from the car park is presently restricted by a combination of limestone and uneven, wooden posts. It is proposed that the current infrastructure remains, additional limestone boulders and low wall installed and revegetation undertaken to reduce the visual impact of the bollards.

Recommendations:

- Remove speed humps and extend kerbing to limit access as shown on the Concept Plan.
- Install additional limestone rocks and timber posts as shown to prevent unauthorised vehicles from entering the surrounding areas.
- Repair/replace limestone block kerbs where broken or removed.
- Supply and install 250 diam x 1600 mm oiled and white ant treated seasoned jarrah power poles with a chamfered top at 1500 mm centres apart, to prevent unauthorised access. Posts to stand set at a range of heights ranging from 500 mm - 1000 mm out of ground along edge facing car park.
- Regularly trim existing trees around car park edge to allow for healthy shape and growth which does not adversely affect car parking requirements. Employ an arboriculturalist if necessary.

- Eradicate all grass and other weeds from areas around car park and regrade, level and shape ground to reduce drainage and maintenance problems as shown on concept plan.
- Prepare ground for native groundcover planting and use enough plants to ensure rapid coverage of ground. Fence area off temporarily if disturbance is considered likely.
- Plant additional trees in strategic positions around car park to provide visual screening, shade and also to act as obstructions for unauthorised vehicle access.

Paperbark Grove Picnic and Conservation Area

This area is significant for its remnant vegetation complex and its historical value. It is considered important for conservation and for this reason access by the public should be prevented. It is suggested that the area is 'cleaned up' ie, and that the area is replanted with consideration given to the continuing regeneration of tree species. Additionally it is recommended that the area be fenced off with access provided only for maintenance work to further protect the site.

Recommendations:

- Remove of all building rubbish, litter and weeds.
- Replant with native species.
- Fence area.
- Create picnic node and define the area with a low limestone wall as shown. Pave to minimise further damage to trees.

Boat Ramp

The boat ramp should be formalised to reduce erosion and provide a visual definition of the appropriate locations for launching. This should be installed as shown.

Recommendation:

- Construct hardstand boat ramp as shown.

River Foreshore

The river foreshore is an area of remnant vegetation that is highly important for bird, reptile and frog breeding. This wetland interface should be conserved as a high priority to maintain the environmental value of the area and increase visual amenity. Replacement of narrow strips of grass with rushes and sedges is recommended.

Recommendations:

- Signage should not detract from the area but must also be clearly visible to people launching boats. It is suggested that additional indigenous trees be planted to thicken up existing clumps.
- The trees should be pruned and shaped to allow for access between and under them and also to allow unobstructed views to the water from adjacent areas.
- Additional rushes and sedges should also be planted to thicken existing clumps. This will also help to reduce access to the shoreline and reduce further foreshore degradation.

Northern Picnic Area

This area is designated as the main picnic area and will have facilities including toilets, bicycle racks, picnic tables, benches and rubbish bins.

Recommendations:

- Provide CALM-type toilet facilities and hand basins with disabled access. It is suggested that a compost system be evaluated.
- Provide bicycle racks, picnic tables and barbecues as well as benches positioned to gain good views with shelter from wind and sun where possible.
- This area will require regrading as shown on the concept plan to allow a path and other built facilities to be provided.
- A wide mowing trim will be required to separate grass from groundcover shrub planting.
- Additional indigenous trees will be required to extend shade areas and enclose the space. Trees should be pruned to allow movement underneath and should be maintained to allow views through them to eliminate 'stranger danger'.

5.2 Details of Infrastructure and Recommendations

Watering

- Temporary reticulation system should be considered if plants show signs of water stress.
- Consider the use of grey water if a composting toilet is installed.
- Consider tanker watering of plants on a fortnightly basis for at least the first spring/summer after planting.

Barbecues

Barbecues should be free and of the electric push-button ignition type as used in other parks in South Perth. There was a perceived need for barbecues in the area if it was to be used for passive recreation. It was seen as a good compromise as they could be used by a wider number of people than prawn boilers. Wood-fired prawn boilers would also be inappropriate, as people would collect firewood from the paperbarks nearby. The concept plan shows two barbecues situated near the picnic tables

Toilets

There was a perceived need for toilets at Cloisters Reserve during the community survey and workshop. It is recommended that toilets be installed at Cloisters Reserve for the following reasons:

- There are no nearby public toilets.
- There are no toilet facilities along the DUP route.
- Current and projected levels of recreational use in this area are high enough to warrant a toilet be installed.
- The installation of picnic and barbecue facilities in the area will require toilet facilities, and
- The reserve is far enough away from residential areas that antisocial behaviour should not be a huge concern.

At present there is no power or fresh water on the site, although power will need to eventually be installed to run lights and the barbecues. Toilets may be of the conventional public toilet type or a composting toilet. Construction of the toilet shelter should be sturdy, but modern and in keeping with the surrounding environment. The shelter should also have a large gap at the bottom to discourage anti-social behaviour.

The location of the toilets shown on the concept plan is due to the following rationale:

- It is visible from the freeway discouraging vandalism and anti-social behaviour;
- It is as far away as possible from the edge of the river and slightly elevated to minimise the risk of pollution and ease the construction and maintenance of the foundations and workings of the toilet system. This may also reduce the risk of salt-water corrosion; and
- It is located next to the DUP, which will be appreciated by cyclists and walkers. It is also located only a short walk from the car park and picnic facilities.

Picnic Benches

There was a perceived need for picnic tables and benches during the community survey and workshop. The provision of benches is of primary importance in the transformation of this area from a car park to an area suitable for picnics and passive recreation. Benches and tables should be secured to the ground and be difficult to vandalise or destroy. Benches are also located to the south of the boat ramp and along the DUP.

Rubbish Bins

Rubbish bins are a constant necessity in the area due to the high levels of litter produced by various activities to do with boating and passive recreation. Unfortunately rubbish bins are a primary target for vandals and are frequently burnt and destroyed. Metal mesh rubbish bins were tried but were repeatedly run over by persistent vandals. Metal mesh rubbish bins should therefore be placed away from the car park and behind timber bollards.

Drinking Fountains

A drinking fountain should be installed if it is possible to get water routed to the area.

Bicycle Racks

Bicycle racks should be installed near the toilet and picnic area to allow bicycle users to utilise these facilities.

Bollards, Gates and Fencing

Any of the current uneven bollards that are rotten should be removed and replaced by groups of random height bollards as shown. Revegetation can then take place behind the bollards minimising the risk of damage by vandals. The conservation portion of the Paperbark Grove on the southern end of the car park should be fenced to allow rehabilitation to continue without disturbance. Fencing should be consistent with that recommended in other areas, and of a similar style to that which is being currently employed at the spit (i.e. pine log and chain link to approximately 1 metre high).

It is also recommended that a gate be installed on the other side of the overpass at Gentilli Way. Although this represents a major constraint to after-dark legitimate users as well as additional expense to the City of South Perth as someone must have the task of locking the gate at night and reopening it in the morning. Regardless, this will be the most effective way of discouraging vandalism and undesirable behaviour in the area. The feasibility of automatic time-delay locks on an automatic closing gate should also be explored as an alternative to manual closure.

Revegetation

The margins of the car park and other areas shown in the concept plan should also be revegetated using local species as annotated on the plan. All existing native trees and shrubs are to be retained.

Revegetation of the Paperbark Grove will occur to the south of the picnic area. This area should be fenced and 'Revegetation in Progress – Keep out' or similar signs installed within the Grove.

Landscaping

Considerable landscaping is suggested as part of the concept plan. The ground will also require some minor smoothing before rehabilitation works commence. This should be done with light machinery such as a bobcat or mini-excavator or by hand so as not to further compact the soil. The remaining soil should be disturbed as little as possible so that biological processes within the soil can remain undisturbed.

Lighting

There is a perceived need for adequate lighting in this area. The installation of lighting is intended to reduce the frequency of vandalism and undesirable behaviour that currently occurs in this area.

Pathways

- An additional hard-based pathway from the car park to the toilet is also shown in the concept plan. This path should be in a similar style to other paths in the area.
- Bollards restricting access should be provided to Australian Standards with sufficient room to allow bicycles through while restricting cars.

Signage

Little additional signage is needed. A graphical toilet sign indicating the direction of the toilet is needed at the car park as well as a main sign depicting the name of the park, e.g. "Cloisters Reserve". This will give the park an identity and may instil a sense of ownership and responsibility in users.

Signage should be designed to become part of, and fit with the existing signage along the route. Signage is required to identify the reserve at the entrance to the bridge and within Cloisters Reserve. Signs are also required to identify and explain the conservation zones and identify the toilet in the context of the dual use path route. The position of water-ski

regulatory signage should be considered in the overall context of the area and should be prominent but subdued.

Drain

The existing drain to the south of the boat 'ramp' should be assessed and if damaged, and determined to be necessary, moved further south. Otherwise the drain should be revegetated densely with rushes to exclude contact between the drainage water and people.

6.0 Impacts of Mt Henry Bridge Expansion

Mt Henry Peninsula Management Plan

6.1 Background

The current alignment of the proposed South West Metropolitan Railway has the relevant part of the railway line going down the centre of the Kwinana Freeway and over Mt Henry Bridge. At the current stage of planning, it is intended to widen both sides of the freeway by building additional piers on the side of the existing piers which will interlock and match the current design. The existing bus lanes will be used to accommodate the railway line and the bridge will be widened to allow for a breakdown lane on each side of the bridge. The dual-use pathway will remain in its current design below the traffic lanes.

Widening of the Freeway itself is expected to be minimal, as the railway will be built along the current centre median. Any widening in this area will be within the existing road reservation as Main Roads WA (MRWA) and the Perth Urban Rail Development (PURD) recognise the presence of high conservation value bushland on either side of the freeway. It is envisaged that some retaining walls will be needed on the approach of the bridge so as to keep construction within the road reservation.

The railway line will be of the concrete-track type with concrete barriers. This will affect the drainage in the area, as water from the freeway will no longer be able to soak into the median but must be drained into the river using appropriate storm water and sediment traps. This will be done in consultation with the City of South Perth, the Swan River Trust and the Department of Environment to minimise environmental impacts.

It is not expected at this stage that the Spit will be used as a lay-down area. Instead the use of some streets in the suburb of Mt Pleasant or a nearby car park on the southern approach is likely to be used for this purpose. There will be impacts during construction, as cement trucks will need access to the footings of the bridge. This is likely to be done through use of the dual-use pathway. This may entail restrictions on the passage of pedestrians and cyclists during this phase of the construction.

Due to the early stage of the project, many of the details relevant to the potential impacts have not been finalised or are in the pre-conception stage. The following impacts and their management are therefore subject to change. At this time a concept plan (plan view only) has been submitted to cabinet for approval. It is expected that construction will commence in September 2003 to finish in December 2005 so that the railway may begin operation in December 2006.

This impact assessment examines the impact to the study area only and does not take into account other potential impacts, e.g. impacts on residents.

6.2 Impacts of Expansion

The risk of environmental impacts occurring is a direct consequence of the likelihood of the event occurring combined with the severity of consequences. The severity, or magnitude, of an event's occurrence is assessed within the context of existing management controls. In this instance, a qualitative risk analysis of activities on the study area was conducted using descriptive scales to describe the magnitude or potential consequences and the likelihood of those consequences occurring.

A system of prioritisation of each potential environmental impact was derived from the product of the likelihood and consequence of each potential event occurring in the area.

The qualitative measure of likelihood is outlined below:

Level	Descriptor	Description
1	Rare	Environmental impact may occur only in exceptional circumstances.
2	Unlikely	Environmental impact could occur at some time based on current practices.
3	Possible	Environmental impact has a moderate probability of occurring based on current practices.
4	Likely	Environmental impact will probably occur based on current practices.
5	Certain	Environmental impact is expected to occur in most circumstances or is already occurring.

AS: 4360 (1999) Risk Management

The qualitative measure of consequence is outlined below:

Level	Descriptor	Description
1	Insignificant	Negligible short term environmental impact to habitat with no monitoring required.
2	Minor	Some short term environmental disturbance with localised impacts, some management required.
3	Moderate	Obvious environmental impact to habitat, more widespread effects, normal incident management response is sufficient.
4	Major	Critical environmental impact, loss of immediate habitat, widespread side effects over extended time, long term remediation management required, external agencies utilised.
5	Catastrophic	Extreme environmental impact, permanent loss of widespread habitat, loss of species, external agencies utilised, incident of regional significance.

AS: 4360 (1999) Risk Management

The risk priority for each potential environmental impact is calculated as a product of the likelihood and consequence scales.

25	Extreme Risk: Immediate action required to intervene and prevent incident.
15 – 20	High Risk: Prompt Management of potential environmental impact required.
10 – 12	Moderate Risk: High priority issue that can be managed by routine procedures.
6 – 9	Low Risk: Low priority issue that can be managed by routine procedures.
1 – 5	Insignificant Risk: Issue of low importance not requiring management but only occasional monitoring.

Table 4 Environmental Issue Identification and Prioritisation

Environmental Issue	Potential Environmental Impacts	Issue Priority			
		Likelihood	Consequence	Total	Priority
Hydrology and Drainage	▪ Cementing of median strip will alter hydrology.	5	2	10	M
	▪ Design will require extra drains to be installed or existing drains to be upgraded to provide water outlet.	4	2	8	L
	▪ Drains and associated traps may decrease visual quality of the area.	3	3	9	L
Erosion	▪ Construction of larger footings may add to foreshore erosion.	3	4	12	M
Vegetation Clearing	▪ Native vegetation clearing to accommodate bridge and freeway widening.	2	3	6	L
	▪ Native vegetation clearing during construction.	3	4	12	M
	▪ Removal of existing freeway revegetation.	4	2	8	L
Weed Invasion	▪ Weed invasion increased by disturbance from construction.	4	3	12	M
Dieback	▪ Risk of dieback on Mt Henry Peninsula.	3	5	15	H
Soil Compaction	▪ Soil compaction through construction.	4	4	16	H
	▪ Soil compaction through use of spit as a lay down area.	2	4	8	L
Loss of fauna habitat	▪ Fauna habitats destroyed.	2	4	8	L
	▪ Surrounding fauna habitat value diminished through noise and vibration.	4	3	12	M
Visual Amenity	▪ Larger bridge will have greater visual impact.	4	2	8	L
	▪ Overhead wires will impact on visual amenity.	4	4	16	H
	▪ Retaining walls will impact on visual amenity.	4	3	12	M
Noise	▪ Higher noise levels during construction and operation of railway.	5	4	20	H
Pollution	▪ Contamination of soil through oil and fuel spills.	3	4	12	M
	▪ Contamination of water through oil and fuel spills.	3	4	12	M
	▪ Increased pollution levels in waterways through increased drainage flows.	3	4	12	M
Infrastructure	▪ Steps to Aquinas College removed or altered.	3	3	9	L
	▪ DUP blocked during construction.	4	4	16	H

Positive Effects

- Use of retaining walls in place of embankments will reduce the likelihood of erosion.
- Upgrading of drainage (Installation of sediment traps and oil filters) will raise the quality of stormwater draining into the river.
- Opportunity to replace exotic species along the margins of the freeway planted previously for rehabilitation with local species.
- Provision of improved transport service to nearby residents, and
- Reduction of vehicle emissions through increased use of rail service.

6.3 Management Recommendations

Management recommendations for the mitigation of environmental impacts are outlined below. These recommendations are intended to minimise the likelihood and extent of environmental impacts caused by the construction and subsequent operation of this section of the South West Metropolitan Railway.

Hydrology and Drainage

- Ensure upgrade of drainage system does not have adverse environmental impacts on the vegetation and water quality of the study area.
- Ensure drainage system is perpetually maintained, inspected regularly and does not hamper other maintenance activities (eg weed control, and
- Ensure drainage system does not present a negative visual impact on the area.

Erosion

- Implement measures to minimise erosion during construction of larger footings, e.g. temporary hard-based track on beach and embankments.
- Minimise use of caterpillar tracked machinery outside immediate construction area.
- Use cemented stone pitching on new footings.
- Ensure no steep embankments (1:3 or greater).
- Use mulch on embankments and rehabilitation areas, and
- Ensure retaining walls adequate to stop erosion.

Vegetation Clearing

- Minimise clearing of native vegetation during construction.
- Rehabilitate areas unavoidably cleared.
- Ensure long-term maintenance and ongoing revegetation of rehabilitation areas, and
- Remove exotic plantings and revegetate using local species.

Weed Invasion

- Use clean equipment during construction phase. Ensure all machinery and equipment is cleaned before entering bushland areas.
- Minimise disturbance to soil during construction, and
- Carry out ongoing weed control throughout construction process.

Dieback

- Undertake dieback testing on Mt Henry Peninsula before construction takes place, and
- Undergo hygiene procedures on all equipment entering bushland on eastern side of the freeway if dieback (Phytophthora cinnamomi) is present.

Soil Compaction

- Avoid taking vehicles or machinery off hard-paved roads, and
- Minimise extent of construction zone.

Loss of fauna habitat

- Minimise vegetation clearing, and
- Minimise pollutants into watercourses and soil (see pollution).

Visual Amenity

- Ensure options for retaining wall construction takes visual and aesthetic considerations into account.
- Plant screening trees and shrubs along the freeway margins in high noise areas. Leave some large gaps between the trees for glimpses of the river for motorists and train passengers, and
- Ensure the use of barriers on the freeway margin to increase the amount of room for replanting.

Noise

- Ensure the use of low-noise materials on freeway surface, and
- Plant screening trees and shrubs along the freeway margins in high noise areas. Leave some large gaps between the trees for glimpses of the river for motorists and train passengers.

Pollution

- All refuelling of vehicles and machinery to be carried out off-site.
- Minimise pollution runoff when spreading bitumen.
- Install buffer or temporary bund when spreading bitumen, and
- Ensure the use of sediment traps and oil screens when upgrading drains.

Infrastructure

- Maintain access to Aquinas College.
- Minimise closure of dual use path.
- If possible provide alternative routes for cyclists without further destroying vegetation, and
- Realign DUP at approach to Mt Henry to provide better visibility.

In addition it is recommended that MRWA, PURD and City of South Perth establish communication protocols to liaise effectively and make needs and requirements known.

6.4 Rehabilitation

MRWA and PURD must rehabilitate all areas affected by the Bridge and Freeway widening to the satisfaction of CSP using local species. This includes follow-up maintenance, weed control and replanting for several years after initial revegetation. The following recommendations should be considered when undertaking rehabilitation:

- Rehabilitation must use local species only and where possible local provenance. MRWA should liaise with the City of South Perth to purchase seed from their seed bank;
- The majority of revegetation should involve the use of planted seedlings rather than direct seeding to maximise the chances of success and provide an immediate screen. It is also recommended that some form of direct seeding take place to restore the seed bank and increase species diversity;
- Tenders should be called for seed collection and rehabilitation at the outset of the project to allow enough time for the gathering of enough seed and propagation of tubestock seedlings;
- Rehabilitation should take place in a section as soon as possible after construction has been completed in that section;
- Ensure that adequate weed control is undertaken at the appropriate time of year before planting/seed spreading commences;
- Ensure planting and seed spreading is done in late autumn/early winter;
- The MRWA rehabilitation plan should include adequate soil preparation including mulching particularly on sloping ground; and
- Ensure adequate follow-up weed control and revegetation for at least 3 years after the project is completed.

7.0 Opportunities for Resource Sharing and Funding

7.1 Resource Sharing

Due to the number of different stakeholders and interest groups involved in management of the study area, there are opportunities for resource sharing of labour and equipment to improve and maintain the natural qualities and amenity of the study area. The City of South Perth, Aquinas College and Dental Services being the key stakeholders in the area all have individual resources that can be utilised for the efficient management of the entire area. The following are the resources of each relevant group and stakeholder, which may be utilised in other areas.

7.1.1 Relevant Groups and Stakeholder Resources

City of South Perth

The City of South Perth, as well as being directly responsible for the management of the Reserves under its control, is also to some extent responsible for the management of all areas within the boundaries of the City and therefore the entire study area. The City of South Perth allocates an annual budget for the management and upgrade of its bushland areas both in reserves and privately owned. Their resources include:

- Expertise in bushland management (Environmental Programmes Coordinator, Two Full time rehabilitation officers).
- Equipment and machinery (vehicles, hand-tools, etc.).
- Native seed bank and nursery.
- Ability to apply for grants and funding, and
- Ability to coordinate revegetation programmes with schools and community groups.

Aquinas College

Aquinas College is responsible for the ongoing management of the foreshore and bushland within its boundaries as well as maintaining its grounds including lawns and ovals. Resources of Aquinas College include:

- Potential involvement by students in rehabilitation activities.
- Groundskeeping equipment and tools, and
- Specialist subjects that can become involved in such aspects as the construction of signs (e.g. metalwork, woodwork and art), seats (e.g. metalwork and woodwork), biological and water quality monitoring (e.g. biology and science).

Dental Services grounds

The Dental Hospital on Mt Henry Road is responsible for the upkeep of its grounds including bushland adjacent to the Mt Henry Public Open Space. The administration of the Dental Hospital has become highly involved in the restoration and management of this area and conduct weed control and revegetation on an ongoing basis.

Community Groups

The main community group with an active involvement in the area is the Mt Henry Peninsula Conservation Group. This group has been involved in many projects on the Peninsula including revegetation, weed control, erecting signs and the construction of an osprey platform on the Peninsula. They frequently involve students, parents and friends of Aquinas College in their activities and have successfully applied for numerous grants. The contact details of community groups and grass roots organisations that have an interest in this area are included in Appendix 8.

The City of South Perth Environment Association is also involved in hands on management in this area, particularly focused on the Western Foreshore and Redmond Reserve which adjoins the study area.

Community groups are extremely beneficial in bushland management as they create a sense of ownership and responsibility, can muster volunteer labour and expertise, raise awareness of bushland issues and alert others to negative processes or activities when they occur.

Resources that can be provided by community groups include:

- Volunteer labour and expertise.
- Ability to apply for certain grants and funds, and
- Contributions to public awareness and community support.

Other organisations

Other organisations such as the Swan River Trust and Greening Australia can provide expertise and can often offer financial assistance and other resources. Greening Australia can provide plants, expertise and organise community planting days. The Swan River Trust can provide grants and funds as well as coordinating programmes such as the Yellow Fish Road programme and other programmes and activities.

7.1.2 Opportunities for resource sharing

Many opportunities for resource sharing exist between the above groups and organisations. Resource sharing will maximise the benefit to the local bushland and result in a coordinated approach to rehabilitation activities, which can then be conducted with greater efficiency and cost effectiveness. There are many scenarios where resource sharing can occur. Following are a few suggestions:

- City of South Perth can make equipment available such as spray equipment for weed control and rehabilitation on Mt Henry Peninsula.
- CB/AqC and other nearby schools can encourage students and parents to attend planting days along the foreshore and on the Peninsula.

- City of South Perth can coordinate its weed control and rehabilitation programme of Mt Henry POS with weed control and rehabilitation undertaken by the Dental Hospital.
- City of South Perth can collaborate with community groups interested in seeking funding and undertaking rehabilitation and weed control projects within the area encompassed by this management plan, and
- Collaboration on rehabilitation projects along the Freeway should be undertaken in conjunction with the City of South Perth, the Department of Main Roads and the Perth Urban Rail Development.

7.1.3 Conservation Volunteers

Volunteer labour, work experience and casual labour for conservation and rehabilitation work can be useful for many projects particularly those that are unsuitable for general community involvement such as weed control and more technical aspects of rehabilitation. Volunteer labour for some on-ground conservation works can be sought through Conservation Volunteers Australia/ Green Corps. Contact 1800 032 501 or 9336 6911 or Email: perth@conservationvolunteers.com.au. Green Skills Inc is a community-run organisation that offers work experience to people interested in conservation work as well as providing casual employment to people experienced in conservation work through its Ecojobs programme. More information on Green Skills Inc can be found on their web site www.greenskills.green.net.au.

7.2 Funding and Grants

7.2.1 Sources of Grants

Grants and other sources of funding are available from a number of government departments, organisations and industry. These can be rather ephemeral in nature and often exist for as long as funds remain. It can therefore be difficult to track down sources of funding for restoration projects of this nature, as funding bodies and programmes come into and out of existence.

Sponsorship from local businesses for small projects can be sought with appropriate advertising. An example of suitable projects for this is 'Clean up Australia Day' which often attracts local sponsorship. Competitions (e.g. public art competitions and design competitions) can also attract local business sponsorship. An example of such competitions in this regard could be designing public art facilities such as seats that are in harmony with the surrounding environment. Additionally local businesses can be approached to 'value-add' to projects by donating goods and services. For example a local garden centre may donate seed raising trays or other equipment. Remember to acknowledge their donations.

7.2.2 Grant Applications for Community Groups

The following should be considered when applying for grants:

- It is important to find out as much as possible about the grant programme, particularly how well the project matches the selection criteria.
- Keep accurate records of the expenditure of grant money. Retain receipts and in some cases it may be beneficial to open an account for the administration of grant funds.
- Use all of the money obtained and in keeping with the application requirements.

- Notify the granting body of any changes of circumstances.
- Generally groups must be incorporated before they can receive funds. If not incorporated then it would be helpful to link with another group such as the Urban Bushland Council, the Conservation Council of WA or the City of South Perth in a joint project, and
- Good places to find help with writing grant applications are Ecoplan, the Swan Catchment Centre, the Urban Bushland Council or the Conservation Council of WA.

7.2.3 Current Grants Available

Bushcare

Bushcare is a programme administered by Environment Australia and funded by the Natural Heritage Trust. It provides funding to projects which can demonstrate:

- A regional perspective.
- Activities are aimed at conservation of bushland.
- Projects are community-based.
- Have a 1-3 year time frame, and
- Detailed programmes have been developed for projects.

Further emphasis is placed on areas that contain significant ecological communities and/or species, which are afforded protection under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. It is also necessary to demonstrate that the funding can achieve a demonstrable improvement in bushland condition. The use of a central database and monitoring of all weed control activities and their outcomes could assist in demonstrating this requirement for funding. For more information see the Bushcare website www.ea.gov.au/land/bushcare.

Rivercare

The National Rivercare Program was established to ensure progress toward sustainable management, rehabilitation and conservation of rivers. As the National Heritage Trust has been extended for a further five years from July 2002 (NHT2) the details of specific funding programmes have not yet emerged, however the aims of strategic investment in this area will be in line with the following objectives:

1. Increase community awareness and understanding of river management issues and promote linkages to facilitate community involvement in developing responses.
2. Promote integration of riverine action plans with land and vegetation management issues.
3. Assist in developing responses that address critical barriers or impediments to improved river health, particularly within catchment or regional contexts, through targeted management responses.
4. Assist, and further stimulate investment, in activities that address national, State and regional strategies and priorities for improved river outcomes.
5. Assist in providing high quality data and decision support systems that will sustain investment and decisions in relation to environmental water provisions.

Further information can be found on the NHT web site:

www.affa.gov.au/docs/1_nrm/nht_landcare/nht/nrp-summary.html or by contacting the National Rivercare Programme Manager on Telephone: (02) 6272 3932 or email: rivercare@affa.gov.au.

Gordon Reid Foundation

The Lotteries Commission's Gordon Reid Foundation for Conservation provides funding to help community groups conserve natural habitats and biodiversity. There are two grant categories, Minor Grants for up to $5000 and Major Grants for grants over $5000, which are available to incorporated organisations. Only local government authorities and non-profit community groups can apply for this type of funding. Projects that have previously received funding support from the Foundation include revegetation, direct seeding, fencing remnant vegetation and controlling weeds, feral animals, disease and fire. For more information contact the Executive Officer on 9340 5270.

Greening WA

Greening WA Inc works with the community to protect and restore native vegetation at a greater rate than the rate of decline. Greening WA is particularly concerned with restoring degraded farmland, neglected wetlands and natural bushland. Greening WA is a member of the national Greening Australia federation. It is resourced through the Federal Government's Bushcare programme, the Western Australian government, corporate sponsors and members. Greening WA is involved with administering a number of programmes for revegetation and protection of remnant vegetation, such as the National Corridors of Green Programme. Greening Australia also assists in fencing projects. For more information see www.greeningaustralia-wa.org.

Community Cultural Development Grants (CCD)

Community Cultural Development grants replaces the Community Environment Art and Design (CEAD) which was established as a funding programme by the Australia Council for the Arts. Through it's funding programme, the Community Cultural Development Board supports projects in which the community is involved at all levels: in the management of the project, the development of the creative ideas and in the creation of the artwork. Information for CCD grants can be obtained by ringing (02) 9215 9029, emailing ccd@ozco.gov.au or visiting the CCD pages on the Australian Arts Council website www.ozco.gov.au/ccd/index.htm.

Swan Catchment Urban Landcare Program (SCULP)

This programme was established to provide community environmental groups with funding for a wide range of activities. Funding is provided by the state government and Alcoa (through the Swan Canning Cleanup Program). The priorities of the programme are projects that:

- Retain, restore and manage bushland, wetland and riverine vegetation; or
- Protect and enhance the quality of streams, rivers, wetlands, dams and groundwater.

Projects lasting one year are preferred although funding for up to three years may be considered. Contact the Swan Catchment Centre for more details. The Mt Henry Peninsula Conservation group has successfully obtained SCULP funding in the past for weed control.

The Western Australian Landcare Trust

This is a statutory authority established by the state government to seek corporate and private sources of funds for the landcare movement. It assists landcare groups and the community to identify projects for sponsorship and the development of sponsorship proposals. It is also developing a 'matching funds to projects' role for projects in line with the trust's objectives. Contact WA Landcare for more information.

Community Conservation Grants

These are allocated annually by the Minister for the Environment from state funds. They are designed to help communities and individuals undertake projects involving flora, fauna, conservation and/or land rehabilitation to benefit nature conservation. Grants range from $5,000 to $50,000 while fauna rescue grants range from $100 to $500 for an individual and $500-$5,000 for incorporated groups. Grants availability are usually advertised in August/October newspapers and will be considered upon acceptance of official application forms. For more details contact the Community Conservation Grants Coordinator on 9421 7777.

National Wetlands Program

The National Wetlands Program has funding available for wetlands particularly Ramsar listed wetland sites. Although the Canning River is not a Ramsar listed site (Ramsar Convention, 1971), there is also funding available to support the community to undertake rehabilitation and wise use projects as well as to promote public education and awareness of wetlands conservation. For more information see the National Wetlands Program web site www.ea.gov.au/water/wetlands/nwp/index.

7.2.4 Other Schemes Supporting Nature Conservation on Private Land

There are a number of schemes that offer financial and technical assistance in WA. The following is a list of some of the existing programmes for private landowners and in some cases local-government owned land:

Land for Wildlife

The Department of Conservation and Land Management (CALM) offers support through regional extension officers. They can help with property assessment, technical advice and notes, newsletters and field days. Their focus is in the SW agricultural region however they do also operate within the metropolitan area. Aquinas College is currently a member of Land for Wildlife. For more information contact Penny Hussey 9334 0530, or email: pennyh@calm.wa.gov.au.

Voluntary Nature Conservation Covenant

This covenant works in conjunction with Land for Wildlife and offers support for landholders that agree to reserve their land for conservation for a permanent or agreed period. CALM can provide funds for fencing, emergency problems (e.g. weed control), rate rebates and legal advice. For more information contact Sophie Moller on 9334 0477 or email: sophiem@calm.wa.gov.au.

Remnant Vegetation Protection Scheme

The Department of Agriculture offers fencing assistance of up to $1,200 per km to landholders who covenant their land for conservation for a period of at least 30 years. For more information, contact Kelly Holyoake 9368 3282 or email: Kholyoake@agric.wa.gov.au.

National Trust (WA) Conservation Covenant

The National Trust WA offers assistance to land covenanted to conservation for an agreed (or permanent) period. It offers assistance in the form of technical advice, annual visits and advocacy for threatened land. Incentive funds for fencing, restoration, weed or erosion control and rate reductions in some circumstances and tax deductions for permanent covenants may also be available. Also included is a 5-year free National Trust membership. For information email: covenanting@ntwa.com.au.

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Appendix One:
Native Plant Species List

Mt Henry Peninsula Management Plan

The table below uses the following codes:

Vegetation Surveys

M	Species identified at Mt Henry by Marchant (1974)
A	Species Identified at Mt Henry by O'Meara (1968)
S	Species Identified at Mt Henry by Sammy (1972)
B	Species Identified at Mt Henry by Brooker *et al.* (1993)

Vegetation Associations

Vegetation Associations follow Marchant (1974)

f	Fringing river / Strand Line
s	Sand Flats
r	Sand Ridges
l	Limestone Knolls
w	Freshwater Seepages (paperbark woodland)
m	Species planted by Main Roads Department on DUP (1978-1991)
o	Species found on Mt Henry Public Open Space

M	A	S	B	GENUS SPECIES	COMMON NAME	f	s	r	l	w	m	o
			*	*Acacia cyclops*	Coastal wattle							
		*		*Acacia dentifera*								
				Acacia huegelii								
			*	*Acacia lasiocarpa*	Panjang							
	*			*Acacia pulchella*	Prickly moses							
	*	*	*	*Acacia rostellifera*	Summer-scented wattle							
			*	*Acacia saligna*	Coojong							
				Acacia stenoptera	Narrow winged wattle							
			*	*Acacia willdenowiana*	Grass wattle							
	*	*	*	*Acanthocarpus preissii*								
*		*	*	*Actinostrobus pyramidalis*	Swamp cypress							
*	*	*	*	*Adenanthos cygnorum*	Common woollybush							
			*	*Adriana quadripartita*	Coast bitter bush							
			*	*Alexgeorgea arenicola*								
				Alexgeorgea nitens								
*		*	*	*Allocasuarina fraseriana*	Common sheoak							
*	*	*	*	*Allocasuarina humilis*	Dwarf sheoak							
		*		*Amphipogon turbinatus*								
*	*	*	*	*Anigozanthos humilis*	Catspaw							
*	*	*	*	*Anigozanthos manglesii*	Mangles kangaroo paw							
		*		*Anogramma leptophylla*									
*			*	*Anthocercis littorea*	Yellow tailflower							
		*		*Arnocrinum preissii*									
		*		*Astartea fascicularis*	Common astartea							
			*	*Astroloma macrocalyx*	Swan berry							
			*	*Astroloma pallidum*	Kick bush							
			*	*Atriplex cinerea*	Grey saltbush							
		*		*Austrostipa compressa*									
			*	*Austrostipa flavescens*								
*	*	*	*	*Banksia attenuata*	Slender banksia							
*	*	*	*	*Banksia grandis*	Bull banksia							
		*	*	*Banksia ilicifolia*	Holly-leaved banksia							
*	*	*	*	*Banksia menziesii*	Firewood banksia							
*	*	*	*	*Bossiaea eriocarpa*	Common brown pea							
*		*		*Burchardia multiflora*	Dwarf buchardia							
	*	*	*	*Burchardia umbellata*	Milkmaids							
				Caladenia arenicola	Carousel spider orchid							
*		*	*	*Caladenia discoidea*	Dancing orchid							
	*			*Caladenia ferruginea*	Rusty spider orchid							
*	*	*	*	*Caladenia flava*	Cowslip orchid							

M	A	S	B	GENUS SPECIES	COMMON NAME	f	s	r	l	w	m	o
		*	*	*Caladenia latifolia*	Pink fairy orchid							
			*	*Calandrinia calyptrata*	Pink purslane							
		*	*	*Calectasia cyanea*	Blue tinsel-lily							
		*		*Calytrix flavescens*	Summer star-flower							
	*	*		*Calytrix fraseri*	Pink summer calytrix							
		*		*Carpobrotus virescens*	Pigface							
			*	*Cassytha* sp.	Dodder laurel							
*		*	*	*Casuarina obesa*	Saltwater sheoak							
				Centella cordifolia	Centella							
*		*	*	*Chamaescilla corymbosa*	Blue squill							
		*		*Clematis microphylla*	Small-leafed clematis							
				Comesperma calymega	Blue-spike milkwort							
			*	*Conospermum stoechadis*	Common smokebush							
	*		*	*Conostephium pendulum*	Pearl flower							
			*	*Conostylis aculeata*	Prickly conostylis							
*	*	*	*	*Conostylis candicans*	White conostylis							
*		*		*Conostylis juncea*								
				Conostylis setigera	Bristly cottonhead							
				Corymbia calophylla	Marri							
		*	*	*Corynotheca micrantha*	Netbush							
*	*	*	*	*Cotula coronopifolia*	Waterbuttons							
*		*	*	*Crassula colorata*	Dense stonecrop							
			*	*Cytogonidium leptocarpoides*								
*		*	*	*Dampiera linearis*	Common dampiera							
*		*	*	*Dasypogon bromeliifolius*	Pineapple bush							
	*	*	*	*Daviesia* sp.								
				Dianella revoluta	Blueberry lily							
*	*	*	*	*Diuris corymbosa*	Common donkey orchid							
		*	*	*Dodonaea aptera*	Coast hop bush							
		*		*Drosera erythrorhiza*								
				Drosera glanduligera	Pimpernel sundew							
	*	*		*Drosera macrantha*	Bridal rainbow							
*		*		*Drosera menziesii*								
		*		*Drosera pallida*	Pale rainbow							
				Drosera penicillaris	Pink rainbow							
			*	*Drosera* spp								
*		*		*Drosera stolonifera*	Leafy sundew							
	*	*	*	*Dryandra sessilis*	Parrot bush							
			*	*Eremaea pauciflora*	Orange eremaea							
	*	*	*	*Eriostemon spicatus*	Pepper and Salt							
*	*	*	*	*Eucalyptus gomphocephala*	Tuart							
*		*	*	*Eucalyptus marginata*	Jarrah							
*		*	*	*Eucalyptus rudis*	Flooded gum							
			*	*Gahnia trifida*	Coast saw-sedge							

M	A	S	B	GENUS SPECIES	COMMON NAME	f	s	r	l	w	m	o
*	*	*	*	*Gompholobium tomentosum*	Hairy yellow-pea							
	*	*	*	*Grevillea vestita*								
*		*		*Haemodorum spicatum*								
	*	*	*	*Hakea prostrata*	Harsh hakea							
*		*	*	*Hakea varia*	Variable leaved hakea							
		*		*Halophila ovalis*	Sea wrack							
*	*	*	*	*Hardenbergia comptoniana*	Native wisteria							
		*	*	*Helichrysum cordatum*	Tangle daisy							
		*		*Hemiandra pungens*	Snakebush							
			*	*Hibbertia huegelii*								
*	*	*	*	*Hibbertia hypericoides*	Yellow buttercup							
	*	*	*	*Hibbertia racemosa*	Stalked guinea flower							
	*		*	*Hovea chorizemifolia*	Holly-leaved hovea							
	*	*		*Hovea pungens*	Devil's pins							
*	*	*	*	*Hovea trisperma*	Common hovea							
*		*	*	*Hybanthus calycinus*	Wild violet							
*	*	*	*	*Hypocalymma angustifolium*	White myrtle							
*		*	*	*Hypocalymma robustum*	Swan River myrtle							
*		*	*	*Isolepis nodosa*	Knotted club rush							
		*	*	*Isotropis cuneifolia*	Grannies bonnets							
*	*	*	*	*Jacksonia furcellata*	Grey stinkwood							
		*	*	*Jacksonia sternbergiana*	Green stinkwood							
*		*		*Johnsonia pubescens*	Pipe lily							
*	*	*	*	*Juncus kraussii*	Shore rush							
		*	*	*Juncus pallidus*	Pale rush							
*	*	*	*	*Kennedia prostrata*	Running postman							
*	*	*	*	*Kunzea glabrescens*								
		*		*Laxmannia squarrosa*								
*			*	*Laxmannia* aff. *grandiflora*								
*		*	*	*Lechenaultia floribunda*	Free-flowering lechenaultia							
			*	*Lepidobolus angustatum*								
			*	*Lepidobolus* sp.								
		*		*Lepidosperma effusum*	Spreading sword sedge							
		*	*	*Lepidosperma gladiatum*	Coastal sword sedge							
			*	*Lepidosperma gracile*								
*		*	*	*Leptocarpus canus*	Hoary twine rush							
				Leucopogon conostephioides								

M	A	S	B	GENUS SPECIES	COMMON NAME	f	s	r	l	w	m	o
			*	*Leucopogon parviflorus*								
				Levenhookia stipitata	Common stylewort							
		*		*Lomandra preissii*								
				Lomandra suaveolens								
*			*	*Loxocarya fasciculata*								
		*	*	*Loxocarya flexuosa*	Squiggly grass							
		*		*Luzula meridionalis*	Field woodrush							
		*	*	*Lyginia barbata*								
				Lyginia imberbis								
		*		*Lyperanthus nigricans*	Red-beak orchid							
*		*		*Lysinema ciliatum*	Curry flower							
*	*	*	*	*Macarthuria australis*								
*	*	*	*	*Macrozamia riedlei*	Zamia							
				Meeboldina coangustata								
*		*	*	*Melaleuca cuticularis*	Saltwater paperbark							
		*		*Melaleuca laxiflora*								
*		*	*	*Melaleuca preissiana*	Stout paperbark							
*		*	*	*Melaleuca rhaphiophylla*	Freshwater paperbark							
				Melaleuca seriata								
		*		*Melaleuca teretifolia*	Banbar							
*		*	*	*Melaleuca viminea*	Mohan							
				Mesomelaena pseudostygia								
	*	*	*	*Mesomelaena stygia*	Telegraph grass							
		*		*Microtis media*	Common mignonette orchid							
*		*		*Neurachne alopecuroides*	Foxtail mulga grass							
*	*	*	*	*Nuytsia floribunda*	WA Christmas tree							
		*	*	*Olearia axillaris*	Coast daisy bush							
			*	*Opercularia vaginata*	Dog weed							
	*	*	*	*Oxylobium capitatum*	Bacon and eggs							
			*	*Oxylobium lineare*	River pea							
*	*	*	*	*Patersonia occidentalis*	Purple flag							
		*	*	*Persoonia saccata*	Snotty gobble							
			*	*Petrophile linearis*	Pixie mops							
	*	*	*	*Petrophile macrostachya*								
*		*	*	*Phlebocarya ciliata*								
	*	*	*	*Phyllanthus calycinus*	False boronia							
		*	*	*Pimelea rosea*	Rose banjine							
		*	*	*Pimelea sulphurea*	Yellow banjine							
			*	*Podolepis gracilis*	Slender podolepis							
				Podotheca angustifolia	Sticky longheads							
				Podotheca chrysantha	Yellow podotheca							
		*		*Pterostylis nana*	Snail orchid							
				Pterostylis vittata	Banded greenhood							
		*	*	*Ptilotus polystachyus*	Mulla mulla							
				Quinetia urvellei								

M	A	S	B	GENUS SPECIES	COMMON NAME	f	s	r	l	w	m	o
			*	*Rhagodia baccata*	Sea berry saltbush							
*		*		*Samolus repens*	Creeping brookweed							
			*	*Sarcocornia quinqueflora*	Bearded samphire							
		*		*Sarcocornia* sp.								
	*	*	*	*Scaevola canescens*	Grey scaevola							
		*	*	*Scaevola holosericea*	Silky scaevola							
				Scaevola repens var. *repens*								
*		*		*Schoenus curvifolius*								
		*	*	*Schoenus grandiflorus*	Large-flowered bog rush							
		*		*Scholtzia involucrata*	Spiked scholtzia							
			*	*Senecio lautus*	Coastal groundsel							
*				*Siloxerus humifusus*								
*		*	*	*Sollya heterophylla*	Australian bluebell							
*	*	*	*	*Sowerbaea laxiflora*	Purple tassels							
			*	*Sporobolus virginicus*	Native couch							
*	*	*	*	*Spyridium globulosum*	Basket bush							
	*	*	*	*Stirlingia latifolia*	Blue boy							
*		*		*Stylidium brunonianum*	Pink fountain trigger							
*		*		*Stylidium ciliatum*	Golden triggerplant							
				Stylidium repens	Matted triggerplant							
		*	*	*Suaeda australis*	Seablite							
		*	*	*Synaphea spinulosa*								
	*	*	*	*Templetonia retusa*	Cockies tongues							
			*	*Threlkeldia diffusa*	Coast bonefruit							
*	*	*	*	*Thysanotus* sp.	Fringed lily							
		*	*	*Trachymene pilosa*	Native parsnip							
*		*		*Tricoryne elatior*	Yellow autumn lily							
			*	*Pterochaeta paniculata*								
			*	*Xanthorrhoea brunonis*								
*	*	*	*	*Xanthorrhoea preissii*	Balga							
		*		*Xanthosia huegelii*								

Appendix Two: Introduced Plant Species List

Mt Henry Peninsula Management Plan

M	B	GENUS SPECIES	COMMON NAME	f	s	r	l	w	m
	*	*Acacia iteaphylla*	Flinders Range wattle		■				
	*	*Agave americana*	Century plant		■				
	*	*Agonis flexuosa*	WA peppermint		■				■
	*	*Allium triquetrum*	Three-cornered garlic		■				
	*	*Alyssum linifolium*	Flax-leaf alyssum		■				
*	*	*Arctotheca calendula*	Cape weed	■	■				
*		*Asphodelus fistulosus*	Onion weed				■		
*		*Aster subulatus*	Bushy starwort						
		Avena barbata	Bearded oats			■	■		
*		*Avena fatua*	Wild oats			■	■		
		Brassica tournefortii	Mediterranean turnip			■	■		
*	*	*Briza maxima*	Blowfly grass			■	■		
*		*Briza minor*	Shivery grass				■		
	*	*Callitris preissii*	Rottnest Island pine		■				■
	*	*Calothamnus quadrifidus*	One-sided bottlebrush		■				■
*	*	*Carpobrotus edulis*	Pigface	■		■			■
	*	*Centranthus macrosiphon*	Pretty betsy		■			■	
	*	*Chamaelaucium uncinatum*	Geraldton wax		■	■			■
*	*	*Cynodon dactylon*	Couch	■	■		■		
	*	*Cytisus proliferus*	Tagasaste		■				
*	*	*Ehrharta calycina*	Perennial veldtgrass		■	■			
*		*Emex australis*	Doublegee						
	*	*Eragrostis curvula*	African lovegrass						
	*	*Erythrina caffra*	Flame tree	■	■	■	■		
	*	*Eucalyptus citriodora*	Lemon-scented gum		■				■
	*	*Eucalyptus ficifolia*	Red flowering gum		■	■		■	■
	*	*Eucalyptus* sp	Mallees			■		■	
	*	*Foeniculum vulgare*	Fennel		■			■	
	*	*Freesia* aff. l*eichtlinii*	Freesia		■				
*	*	*Fumaria capreolata*	Little tube-weed		■	■	■		
*	*	*Geranium molle*	Dove's-foot cranesbill						
*	*	*Gladiolus caryophyllaceus*	Wild gladiolus			■	■		
*	*	*Grevillea biternata*							■
	*	*Grevillea crithmifolia*							■
	*	*Homeria flaccida*	One-leaf cape tulip	■	■				
*		*Hordeum marinum*	Barley grass						
	*	*Ipomoea indica*	Morning glory					■	
		Lachenalia reflexa							

M	B	GENUS SPECIES	COMMON NAME	f	s	r	l	w	m
*	*	*Lagurus ovatus*	Hares'-tail grass						
	*	*Lantana camara*	Lantana						
		Lactuca saligna	Wild lettuce						
	*	*Leptospermum laevigatum*	Victorian coastal teatree						
*	*	*Lupinus cosentinii*	Blue sandplain lupin						
*	*	*Lupinus luteus*	Yellow lupin						
*		*Medicago polymorpha*	Burr medicago						
	*	*Melaleuca elliptica*	Granite bottlebrush						
		Melaleuca radula	Graceful honeymyrtle						
	*	*Mirbelia dilatata*	Prickly mirbelia						
*		*Monopsis debilis*							
	*	*Olea europea*	Olive						
		Orobanche minor	Lesser broomrape						
*		*Osteospermum clandestinum*	Stinking roger						
*		*Oxalis corniculata*	Yellow wood-sorrel						
*	*	*Oxalis glabra*	Pink sorrel						
*	*	*Oxalis pes-caprae*	Soursob						
		Oxalis purpureus	Larger wood-sorrel						
	*	*Paspalum vaginatum*	Saltwater couch						
	*	*Pelargonium capitatum*	Rose pelargonium						
	*	*Pennisetum clandestinum*	Kikuyu						
*		*Phytolacca octandra*	Inkweed						
	*	*Pinus* spp.	Pine						
	*	*Raphanus raphanistrum*	Wild radish						
	*	*Regelia megacephala*							
*	*	*Romulea rosea*	Guildford grass						
	*	*Rorippa nasturtium-aquaticum*	Watercress						
	*	*Rumex* sp.	Dock						
	*	*Schinus terebinthifolia*	Japanese pepper						
*		*Silene gallica*	French catchfly						
*		*Sisymbrium orientale*	Indian hedge mustard						
	*	*Solanum nigrum*	Blackberry nightshade						
	*	*Taraxacum officinale*	Dandelion						
	*	*Trachyandra divaricata*	Strap lily						
*		*Trifolium procumbens*	Clover						
*		*Trifolium tomentosum*	Woolly clover						
	*	*Tropaeolum majus*	Nasturtium						
*		*Typha orientalis*	Bulrush						
	*	*Urospermum picroides*	False hawkbit						
*	*	*Ursinia anthemoides*	Yellow daisy						
	*	*Vicia sativa*	Common vetch						
*		*Wahlenbergia capensis*	Cape bluebell						
*	*	*Watsonia meriana* var. *bulbillifera*	Bulbil lily						
	*	*Zantedeschia aethiopica*	Arum lily						

Appendix Three: Selected Plant Species for Rehabilitation

Mt Henry Peninsula Management Plan

GENUS SPECIES	COMMON NAME	f	s	r	l	w	m	o
Acacia cyclops	Coastal Wattle	■	■					
Acacia dentifera								
Acacia huegelii								
Acacia lasiocarpa	Panjang		■	■			■	
Acacia pulchella	Prickly Moses							■
Acacia rostellifera	Summer–scented wattle		■					
Acacia saligna	Orange wattle		■					
Acacia stenoptera								■
Acacia willdenowiana	Grass wattle		■					■
Acanthocarpus preissii					■			
Actinostrobus pyramidalis	Swamp cypress				■			
Adenanthos cygnorum	Common woollybush		■	■				■
Alexgeorgea arenicola			■	■				
Allocasuarina fraseriana	Common sheoak		■				■	■
Allocasuarina humilis	Dwarf Sheoak		■	■	■			■
Anigozanthos humilis	Catspaw			■				
Anigozanthos manglesii	Mangles kangaroo paw		■	■				
Astartea fascicularis		■				■	■	
Banksia attenuata	Slender banksia		■	■				■
Banksia grandis	Bull banksia			■				
Banksia ilicifolia	Holly-leaved banksia			■				
Banksia menziesii	Firewood banksia			■				■
Bossiaea eriocarpa	Common brown pea		■	■				■
Burchardia multiflora								
Burchardia umbellata	Milkmaids		■	■				■
Calytrix flavescens	Summer star flower							
Calytrix fraseri	Pink summer calytrix							■
Casuarina obesa	Saltwater sheoak	■						
Centella cordifolia	Centella (often C. asiatica)					■		
Chamaescilla corymbosa	Blue squill		■	■				
Clematis microphylla	Small-leafed clematis							
Conospermum stoechadis	Common smokebush		■	■				
Conostylis aculeata	Prickly conostylis		■	■				■
Conostylis candicans	Grey conostylis		■	■				
Conostylis setigera								■
Corymbia calophylla	Marri		■					■
Dampiera linearis	Common dampiera		■					

GENUS SPECIES	COMMON NAME	f	s	r	l	w	m	o
Daviesia sp			■	■				
Dianella divaricata			■	■				■
Dodonaea aptera	Coast Hopbush				■			
Dryandra sessilis	Parrot Bush		■	■	■			
Eremaea pauciflora	Orange Eremaea			■				■
Eriostemon spicatus	Pepper and salt			■				■
Eucalyptus gomphocephala	Tuart				■			
Eucalyptus marginata	Jarrah		■	■				■
Eucalyptus rudis	Flooded Gum		■					
Gompholobium tomentosum	Hairy Yellow Pea		■	■				■
Grevillea vestita					■			
Haemodorum spicatum								■
Hakea prostrata	Harsh hakea		■	■	■			
Hakea varia	Variable-leaved hakea		■					
Hardenbergia comptoniana	Native wisteria		■	■	■			■
Hemiandra pungens	Snakebush			■				■
Hibbertia racemosa	Stalked guinea flower		■	■	■			■
Hovea chorizemifolia	Holly-leaved hovea		■	■				
Hovea pungens								
Hovea trisperma	Common hovea			■				■
Hypocalymma angustifolia	White myrtle		■					
Hypocalymma robustum	Swan River myrtle			■				■
Isolepis nodosa	Knotted club rush	■	■					
Isotropis cuneifolia	Grannies bonnets		■	■				
Jacksonia furcellata	Grey stinkwood		■	■				■
Jacksonia sternbergiana	Green stinkwood		■					
Juncus kraussii	Shore rush	■						
Juncus pallidus	Pale rush	■						
Kennedia prostrata	Running postman		■	■				■
Kunzea ericifolia	Spearwood	■	■				■	
Lepidosperma gladiatum	Coastal sword sedge		■		■			
Loxocarya flexuosa	Squiggly grass		■					
Macrozamia riedlei	Zamia		■	■				■
Melaleuca cuticularis	Saltwater paperbark	■						
Melaleuca preissiana	Stout paperbark					■		
Melaleuca rhaphiophylla	Freshwater paperbark			■		■		
Melaleuca seriata								■
Melaleuca teretifolia	Banbar							
Melaleuca viminea	Mohan	■						
Neurachne alopecuroides	Foxtail mulga grass							
Nuytsia floribunda	WA Christmas tree		■	■				■
Olearia axillaris	Coast daisy bush			■	■			
Oxylobium lineare	River pea					■		
Patersonia occidentalis	Purple flag		■	■				■
Persoonia saccata	Snotty gobble			■				■

GENUS SPECIES	COMMON NAME	f	s	r	l	w	m	o
Petrophile linearis	Pixie mops		■					■
Petrophile macrostachya				■				
Phyllanthus calycinus	False boronia		■	■	■			
Pimelea rosea	Rose banjine			■				
Pimelea sulphurea	Yellow banjine			■				
Ptilotus polystachyus	Mulla mulla		■	■				
Rhagodia baccata	Sea berry saltbush				■			
Schoenus grandiflorus	Large flowered bog rush	■	■					
Scholtzia involucrata								
Spyridium globulosum	Basket bush		■	■	■		■	
Stipa flavescens	Native grass				■			
Stylidium brunonianum	Pink fountain trigger							
Templetonia retusa	Cockies tongues				■			
Threlkeldia diffusa		■						
Thysanotus sp.	Fringed lily			■				
Xanthorrhoea preissii	Balga		■	■				■

Appendix Four: Bird Species List

Mt Henry Peninsula Management Plan

Compiled from observations in the Mount Henry area by J.Donohue, 1992, and S.Greene, 1985-92.

* Denotes protected by international agreement.

PELICANS, CORMORANTS	
Australian Pelican	*Pelicanus conspicillatus*
Darter	*Anhinga melanogaster*
Pied Cormorant	*Phalacrocorax varius*
Little/White Pied Cormorant	*P.melanoleucos*
Great Cormorant	*P. carbo*
Little Black Cormorant	*P.sulcirostris*
HERONS, IBIS	
White-faced Heron	*Ardea novaehollandiae*
Great Egret	*Ardea alba**
Sacred Ibis	*Threskiornis aethiopica*
Yellow-billed Spoonbill	*Platalea flavipes*
DUCKS, GEESE	
Black Swan	*Cygnus atratus*
Pacific Black Duck	*Anas supciliosa*
Grey Teal	*A. gibberifrons*
Maned Duck	*Chenonetta jubata*
HAWKS, EAGLES, FALCONS	
Osprey	*Pandion haliaetus*
Black-shouldered Kite	*Elanus notatus*
Australian Kestrel	*Falco cenchroides*
WADERS	
Common Sandpiper	*Tringa hypoleucos**
SKUAS, GULLS, TERNS	
Silver Gull	*Larus novaehollandiae*
Crested Tern	*Sterna bergii**
PIGEONS, DOVES	
Spotted Turtle-Dove	*Streptopelia chinensis*
Laughing Turtle-Dove	*S. senegalensis*

COCKATOOS, PARROTS	
Galah	*Cacatua roseicapilla*
Red-capped Parrot	*Purpureicephalus spurius*
SWIFTS, KINGFISHERS	
Rainbow Bee-eater	*Merops ornatus*
BUSHLARKS, SWALLOWS, PIPIT	
Welcome Swallow	*Hirundo neoxena*
Tree Martin	*H. nigricans*
CUCKOO-SHRIKES	
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
FLYCATCHERS, FANTAILS	
Willie Wagtail	*Rhipidura leucophrys*
HONEYEATERS,CHATS	
Red Wattlebird	*Anthochaera carunculata*
Singing Honeyeater	*Lichenostomus virescens*
Brown Honeyeater	*Lichmera indistincta*
New Holland Honeyeater	*Phylidonyris novaehollandiae*
MISTLETOEBIRD, PARDALOTES	
Spotted Pardalote	*Pardalotus punctatus*
MAGPIE-LARK, WOODSWALLOWS	
Australian Magpie-lark	*Grallina cyanoleuca*
MAGPIES, CURRAWONGS, CROWS	
Australian Magpie	*Gymnorhina tibicen*
Australian Raven	*Corvus coronoides*

Appendix Five: Fauna Species List

Mt Henry Peninsula Management Plan

Species likely to occur on Mount Henry and foreshores. This Information is from the WA museum database, September 1992 for the suburbs Manning and Como, and was obtained from Brooker *et al.* (1993). The presence of these animals have not been confirmed by fauna survey. There is a high likelihood that many of them do not currently occur in the study area.

REPTILES

AGAMIDAE	
**Moloch horridus*	Thorny devil
Pogona minor minor	
CHELUIDAE	
Chelodina oblonga	Long necked tortoise
ELAPIDAE	
Demansia psammophis reticulata	Yellow faced whipsnake
Notechis coronatus	Black tiger snake
Notechis scutatus occidentalis	Tiger snake
Pseudechis australis	Mulga snake
Pseudonaja affinis affinis	Dugite
Pseudonaja modesta	Ringed brown snake V
Rhinoplocephalus gouldii	
Vermicella bertholdi	Jan's banded snake
Vermicella bimaculata	Bandy-bandy
Vermicella calonotus	Black striped snake
Vermicella semifasciata	Bandy-bandy
GEKKONIDAE	
Gehyra variegata	Tree dtella
Phyllodactylus marmoratus	Marbled gecko
PYGOPODIDAE	
Aprasia repens	Legless lizard
Delma fraseri	
Delma tincta	
Lialis burtonis	Burton's legless lizard
Pletholax gracilis gracilis	Burrowing legless lizard
SCINCIDAE	
Cryptoblepharus plagiocephalus halus	Fence/sun skink
Ctenotus gemmula	

Ctenotus grandis	
Ctenotus lesueurii	
Egernia kingii	King's skink
Hemiergis quadrelineata	Yellow-bellied skink
Lerista elegans	
Lerista lineata	Lined skink
Menetia greyii	Grey's skink
Morethia lineoocellata	
Morethia obscura	
Tiliqua occipitalis	Western blue tongue
Tiliqua rugosa rugosa	Bobtail
TYPHLOPIDAE	
Ramphotyphlops australis	Blind snake

AMPHIBIANS

HYLIDAE	
Litoria moorei	Western green & golden bell frog
MYOBATRACHIDAE	
Heleioporus eyrei	Moaning frog
Limnodynastes dorsalis	Western banjo frogs
Myobatrachus gouldii	Turtle frog
Ranidella insignifera	

MAMMALS

FELIDAE	
**Felis catus*	House Cat
MACROPODIDAE	
**Mus musculus*	House mouse
**Rattus norvegicus*	Norway rat / Brown rat
**Rattus rattus*	Black rat
PERAMELIDAE	
Isoodon obesulus	Southern shortnosed bandicoot
SCIURIDAE	
Funambulus pennanti	
TACHYGLOSSIDAE	
Tachyglossus aculeatus	Australian spiny anteater/Echidna
VESPERTILIONIDAE	
Nyctophilus geoffroyi	Lesser long-eared bat

Appendix Six:
Bradley Method of Weed Control

(from Bradley, 1971, Bradley 1988 and Buchanan, 1989)

The aim of bush regeneration by the Bradley Method is the systematic removal of weeds to allow native plants to re-establish themselves when and where they choose. This method does not involve replanting – simply the gradual removal of weeds so that no large openings are made. This makes the Bradley method ideal for many situations, such as where native plants are able to colonise the site by seeds or vegetative means, areas sensitive to erosion and areas likely to be over-used.

UNDERLYING PRINCIPLES

Always work from areas with native plants towards weed-infested areas.
This makes good ecological sense. If you are relying on natural regeneration then choose areas that will contain the maximum number of existing native plants and native plant seeds, and minimal weed seeds and vegetative reproductive organs of weeds.

Make minimal disturbance.
Application of this principal depends on the native species to regenerate. Many plant communities (both weeds and native) need disturbed and sunlit soil for successful regeneration. However, by following the 1st principle above, any weed regeneration should be minimised. Any soil that is disturbed should be returned in its original layers, thus ensuring that any native seed stored in the soil will still be on top. This principle also applies to the application of natural plant mulch in the work area – where a gap is left as a result of weeding, it is recommended that mulch from surrounding areas be added to the gap. This helps to minimise weed regeneration.

Let native plant regeneration dictate the rate of weed removal.
The ability to follow this principle may depend on the amount of time and money committed to a particular project. If few weeds and many native plants regenerate, or if the ground remains weed free, little time will need to be spent re-weeding a site, allowing time to be spent on other sites. If masses of weeds regenerate then a lot of time will be required re-weeding so that regenerating native plants can flourish.

DEVELOPING WORK PLANS

Prevent deterioration of good areas.
Start by removing weeds scattered through otherwise clean bush. Practically no follow up work will be needed, but it should be checked once or twice a year.

Improve the next best area.
Once you are confident you have prevented deterioration of the bush in better condition, you can start working on thicker patches of weed. Choose a place you can visit easily and often, where thick native growth is pushing up against weeds, preferably no worse than one weed species to every two native plant species. Start with a strip approximately 12 feet wide and no longer than can be managed with monthly weeding days. If the area to be cleared of weeds runs up a slope which may erode, clear a number of smaller patches instead.

Hold the advantage gained.
Resist the temptation to push deeper into the weeds before regenerating natives have stabilised each cleared area. The natives do not need to be very tall, but they usually need to form an almost complete ground cover. Weeds will always nearly keep germinating until native plants achieve sufficient cover. Newly regenerated areas are most vulnerable to weed reinvasion and so must be re-weeded as required. If weeding occurs in regenerating areas adjacent to cleared patches before sufficient native plant cover has been achieved, it can affect the regeneration of natives.

Cautiously move into the really bad areas.
When new growth coming up consists almost entirely of native plants with only a few weeds among them, it is safe to move deeper into the weeds. Keep working along the regeneration boundary, making new clearings smaller as the weeds get more dense.

WEEDING TECHNIQUES

Disturb the soil as little as possible.
All tools used for weeding programmes should be small, such as a broad boning knife, trowels, secateurs, pliers (for pulling roots), loppers, hatchet and small saws. This recommendation is based on the belief that using small tools will cause minimum soil disturbance and minimal damage to the roots and shoots of nearby native plants.

Sweep back the mulch surface.
Any weeding will disturb the ground litter and soil will be exposed. Repair the damage as you go, by pushing back as much mulch as possible. It is often helpful to sweep aside mulch prior to removing large plants, so that it can easily be redistributed when you have finished removing the plant.

Mulch with the weeds themselves.
Weeds removed can be used to add to existing mulch, providing they do not contain ripe seed. In dry areas leaving the weed with its roots exposed will be sufficient to kill it. In moist areas, hanging the weeds on nearby native vegetation will allow them to dry out and die. Some items are unsuitable for mulch, and these are removed from the site. Such items include bulbs and tubers, plants that root at every node and free-seeders with ripe seed.

Watch where you put your feet.
Be careful how you move through the bush. A small weeding party moving through thick bush single file can open up a track. Efforts should be made to not walk on the same paths all the time, and to watch where you walk to ensure you are not trampling native vegetation.

Appendix Seven:
Weed Control Methods for Selected Species

Mt Henry Peninsula Management Plan

The following are weed control strategies for weeds listed as Moderate and High in the Environmental Weed Strategy for Western Australia (1999) or are a particular problem in the study area. Control techniques are adapted from Scheltema and Harris (1995).

Species	Method*				EWSWA Rating	Herbicide(s) and Application Rates	Timing	Control Notes and General Comments
	1	2	3	4				
Agonis flexuosa WA peppermint	✓	✓	✓		Moderate	Cut stump method. Use neat Glyphosate. Spray or paint regrowth with 1:5 Glyph. Could try cut stump method with Garlon®.		Very difficult to kill. Remove seedlings by hand or cut below lignotuber. Note that regrowth may take several months during summer.
Arctotheca calendula Cape Weed	✓	✓	✓		Moderate	Glyphosate knapsack 100 mL in 15L water or stronger solution on large plants. Lontrel® 1 in 100 has been used successfully by Mains Road Dept. over 1 year old direct seeded woody seedlings and mature bush. Do not use Lontrel over sensitive plants such as orchids. Seek further advice before using.		Mainly in disturbed areas where extra water/nutrients encourage lush growth. Generally only worth controlling in these areas.

Species	Method*				EWSWA Rating	Herbicide(s) and Application Rates	Timing	Control Notes and General Comments
	1	2	3	4				
Avena barbata Wild Oats	✓	✓	✓	✓	Moderate	Use 2L Fusilade® per ha for blanket and spot spraying. Easy to control.	No timing given – probably best to spray before flowering to prevent seed set.	
Briza maxima Blowfly Grass	✓	✓	✓	✓	Moderate	Sertin® or other similar herbicides at 2L/ha.	No timing given – probably best to spray before flowering to prevent seed set.	Easy to control.
Carpobrotus edulis	✓				Moderate	No specific information – Pull up and destroy		
Chamelaucium uncinatum Geraldton Wax	✓	✓			Moderate	Cut stump method for large plants. Apply Glyphosate immediately after cutting (1 part in 5).		Similar to local variety. Can be prolific in past revegetation. 2-3 years after fire, remove plants before flowering to stop reseeding. Cut stems below ground level.
Cynodon dactylon Couch			✓	✓	Moderate	Fusilade® 4L ha or similar (e.g. Sertin®, Targa®). Glyphosate can be used if you can avoid non target species	When actively growing late spring early autumn	Best spraying young growth after fire otherwise several applications may be necessary.

Species	Method*				EWSWA Rating	Herbicide(s) and Application Rates	Timing	Control Notes and General Comments
	1	2	3	4				
Ehrharta calycina Perennial veldtgrass			✓	✓	High	Easy to control with Fusilade® at 4L/ha. or similar herbicides e.g. Sertin®, Targa®. Spot spray at 2L/ha to run off.	Treat during winter, early spring, before seeds set and before plants dry out (thus avoiding fire hazard).	Remove small infestations by hand, cut roots as close to culms as possible with a sharp knife. Heavy infestations may require mop up spray the following year. Smothers small plants and competes with natives. A serious fire hazard.
Eragrostis curvula African Lovegrass	✓	✓	✓		High	Use Roundup® or Glyphosate 360, 1L in 100L water and wetter e.g. Agral 60, X77 when actively growing. In areas clear of non-target sspecies use mixtures of Roundup/Oust® or Frenock®.	Best to spray after fire on fresh young growth in summer months before seed set.	Thorough coverage of foliage essential. May require mop up spray next year.
Freesia aff leichtlinii Freesia	✓	✓	✓		High	Spray large infestations with Glyphosate 1 in 100. Brushoff®, Ally® 2.5 to 5g ha in 250 to 500 L water per ha.	Treat just before flowering to mid-flowering, in August to September.	Competes, smothers, small native plants and bulbous herbs. Prolific seeder. Very difficult to control in natural bushland. Plants spread quickly forming large colonies. Small infestations can be removed by careful digging. Spray large infestations with Glyphosate 1 in 100 just before flowering to mid flowering (Aug – Sept).
Foeniculum vulgare Fennel	✓	✓	✓		Unrated	Spray Roundup® at flowering time (Aug/Sep) gives good control	August – September	If crown is cut below ground level plants rarely regrow.
*Method 1 – Hand Weeding, Pulling, Digging; Method 2 – Herbicide Wipe, Stem Injection or Cut Stump; Method 3 – Spot Spraying; Method 4 – Blanket Spraying								

Species	Method*				EWSWA Rating	Herbicide(s) and Application Rates	Timing	Control Notes and General Comments
Gladiolus caryophyllaceous	✓	✓			Moderate	Remove old flower heads to prevent seeding. In some sandy soils can pull straight out of the ground, otherwise cut roots close to stem and pull out. Wipe one leaf with Glyphosate 1 in 100 at flowering time	August – September	Spreads quickly by the large number of seeds produced
Homeria flaccida One-leaf Cape Tulip	✓	✓	✓		High	Difficult to control. Not all corms shoot every year, therefore need repeat treatments. If spot spraying use Glyph. high rate or Ally, 5g/ ha. Weeding wand Glyphosate or Ally/ Brushoff, Glean 1g in 1L water.		Small infestations in sandy soil can be removed by hand, cut roots with knife or long narrow trowel and pull out at or just before flowering time.
Ipomoea indica Morning Glory	✓	✓	✓		Mild	Dixon & Keighery (1995) suggest high rate of Glyphosate (e.g. 300 ml in 15 L) plus Pulse. Cut down old plants and spray regrowth. 2 or more applications may be necessary.		Smothers native plants. Generally found in highly disturbed areas
Lagurus ovatus Hare's Tail Grass	✓	✓	✓	✓	High	Spray with Fusilade® or similar herbicide at 2-4L/ha..	Winter.	Competes with native plants
Lantana camara Lantana	✓	✓	✓		Moderate	Glyphosate 1 to 9 parts water, cover all foliage, knapsack or use cut stump method		Not as highly invasive as in other states however should be controlled. May be best to grub out small populations by hand. Check over next few years for new germinants
*Method 1 – Hand Weeding, Pulling, Digging; Method 2 – Herbicide Wipe, Stem Injection or Cut Stump; Method 3 – Spot Spraying; Method 4 – Blanket Spraying								

Species	Method*				EWSWA Rating	Herbicide(s) and Application Rates	Timing	Control Notes and General Comments
Leptospermum laevigatum Victorian Tea Tree	✓	✓	✓		High	Hand pull small seedlings. Spot spray small plants. Paint cut stump when actively growing. Apply Roundup®. straight after cutting. Remove tops which may have seeds still attached. Check following years for new seedlings. Can use Garlon®, Grazon® or Velpar® with care.If cut at ground level no need for herbicide.		Replaces native species. Produces large amounts of seed. Killed by fire.
Pelargonium capitatum Rose Pelargonium		✓	✓		High	No specific data for herbicide control. Suggest Ally/Brushoff® at 5g/ha. Glyphosate 1 in 100 in early September gave some control, add wetting agent. Try with wick applicator. Repeat applications may be necessary.	Ally/Brush-off: August, September. Glyphosate: June to October	Smothers small native plants. Colonises natural bare sandy areas, therefore destroys natural habitat of burrowing snakes. Difficult to control. Pull plants in autumn/winter when soil is damp. Plant will reshoot if stem is broken at or below ground level. Secondary weeding is important but good control can be achieved.
*Method 1 – Hand Weeding, Pulling, Digging; Method 2 – Herbicide Wipe, Stem Injection or Cut Stump; Method 3 – Spot Spraying; Method 4 – Blanket Spraying								

Species	Method*				EWSWA Rating	Herbicide(s) and Application Rates	Timing	Control Notes and General Comments
Pennisetum clandestinum Kikuyu	✓	✓	✓	✓	Moderate (would be high in study area)	Use 4L Fusilade®, Targa® or similar herbicide per ha when actively growing (most of year). Best sprayed after fire or mowing, onto new growth. Follow up application may be necessary. Fusilade 1.5 kg active ingredient ha has been used in wetland situations but not over free water.	Most of year for herbicide treatment.	In wetland situations try raking the kikuyu out of the rushes and roll kikuyu back out of the rushes with a small amount of digging. Remove as much of the kikuyu thatch as possible. Cover the remaining kikuyu in June/July with black plastic held down with rocks. Over winter the water level will rise and drown the kikuyu. In summer remove the black plastic, control any live kikuyu runners and seed or plant with native species.
Romulea rosea and *Romulea rosea* var *australis* Guildford Grass	✓		✓		High	Glyphosate 20-40 mL in 10L water + 0.25% wetter or surfactant, e.g. Pulse. Glean®, Ally/Brushoff® at 5g in 250L water per hectare.	Glyphosate in mid-winter; Ally/Brush-off/Glean no later than early stages of flowering.	Ally/Brush-off can be used where Romulea grows among native shrubs without killing natives
Schinus terebinthifolia Japanese Pepper Tree	✓	✓			Moderate	Try cut stump method with Glyphosate. Failing this try Velpar or Garlon®.	In wetland areas treat in late summer/autumn when water recedes and plants are not waterlogged.	Very difficult to control. Spread by birds. Follow up treatment essential as initial treatment may only kill part of the plant. Cuttings will regrow if left in wetland.

Species	Method*				EWSWA Rating	Herbicide(s) and Application Rates	Timing	Control Notes and General Comments
Solanum nigrum Blackberry Nightshade	✓	✓	✓		Moderate	Hand pull small populations. Spray seed 200, 10-20 ml in 10L water using knapsack. Apply to seedlings. Also try Roundup® 300ml in 15L water.		Usually in highly disturbed areas. Toxic. Annual or short lived perennial. Often best to hand weed. Spread by birds.
Trachyandra divaricata Strapweed	✓	✓	✓		Mild	Difficult to remove by hand due to regrowth and new germinants. Spot spraying with Ally/Brushoff® in summer/autumn at 5g ha gives 95% control, spraying at same rate the following year gives 100% control. Wiping with 1g to 1L water eg 10L solution per ha gives 85 - 90% control.	Summer and autumn with follow up one year later.	Usually found in disturbed areas. Only control in areas where this is no danger of erosion by wind.
Trifolium spp. Clover	✓	✓	✓		Moderate	Some species are known to be controlled by Glyphosate/ Roundup® 75-100mL in 15L water, knapsack when actively growing. Therefore this is the suggested treatment for all species.	When actively growing.	Clovers are usually so abundant it is often only practical to control them in lightly infested areas.
Ursinia anthemoides Ursinia	✓	✓	✓		Moderate	No specific information for herbicide control available. Suggest Glyphosate/Roundup® at 75-100 mL in 15L water knapsack, preferable before flowering.	Before flowering – autumn and early spring as the plant flowers in spring and summer.	Usually in disturbed areas. So common may not be practical to control in most instances. Pull out small populations before they spread.
*Method 1 - Hand Weeding, Pulling, Digging; Method 2 - Herbicide Wipe, Stem Injection or Cut Stump; Method 3 - Spot Spraying; Method 4 - Blanket Spraying								

Species	Method*				EWSWA Rating	Herbicide(s) and Application Rates	Timing	Control Notes and General Comments
Watsonia sp.	✓	✓	✓		High	Glyphosate 360 or Roundup® wick applicator at 1 L to 2 L water. Excellent results have been obtained by wiping one side of the leaf using a sprayer with foam attached at 1 part water to 10 parts Roundup applied in Oct., in some areas as late as Nov., when plants are in full flower. Spot spray Glyph.1 in 100. The herbicides TCA, Amitrol and 2,2-DPA are registered for Watsonia control in WA. The latter is most widely used, immediately before flowering and is very cost effective, especially in badly degraded areas. Extreme caution should be taken when applying 2,2-DPA as it remains viable in the soil for some time and will kill non target species. Ally/Brushoff® and Glean® have also been used in July and Aug for successful control. Spot spray 5-10g ha or use wick applicator. 1g in 1L water.	Herbicide control is generally recommended from Sept to Nov when in flower, however control has been achieved from July to as late as Dec, the latter in moist shady positions.	Hand removal of small populations by pulling or grubbing in moist soil removes the corm, or by snapping/twisting the top off near the corm which rots it. Latter method is ideal for sensitive areas such as granite rocks. An important factor in control is removing any bulbil/seed heads to stop reinfestation.
*Method 1 - Hand Weeding, Pulling, Digging; Method 2 - Herbicide Wipe, Stem Injection or Cut Stump; Method 3 - Spot Spraying; Method 4 - Blanket Spraying								

Species	Method*				EWSWA Rating	Herbicide(s) and Application Rates	Timing	Control Notes and General Comments
Zantedeschia aethiopica Arum Lily	✓	✓	✓		High	Glyphosate: 1 in 100, several applications may be necessary. Can also use Glean®, Ally/ Brushoff® – spot-spray Glean 20g/ha (1g in 50 L water) plus wetter. Respray 2 months later for missed growth Spot-spray Ally/Brush-off at 5g/ha.	Glyphosate best applied June to October. Glean best used from April to November when plants are 8 to 12cm high. Spray before flowering to prevent seed set.	Replaces native species mainly in highly disturbed sites. Now being found in much drier areas. Difficult to dig out in most areas. On dry sites use a Peter lever. In wetland areas use Glyphosate without surfactant to avoid problems with aquatic animals such as frogs. The herbicide will form a pool at the leaf base and be absorbed into the plant.

*Method 1 - Hand Weeding, Pulling, Digging; Method 2 - Herbicide Wipe, Stem Injection or Cut Stump; Method 3 - Spot Spraying; Method 4 - Blanket Spraying

Note: Glyphosate concentrations given are for Glyphosate 360.

A key to the herbicides and their active ingredients is provided below:

Product Name	Active Ingredient	Product Name	Active Ingredient
Ally ®	metsulfuron-methyl	Pulse ®	polyalkyloxylated dimethylpolysiloxane
Amitrol T ®	amitrole + ammonium thiocynate	Roundup ®	glyphosate
Brushoff ®	metsulfuron-methyl	Spray-Seed ®	paraquat + diquat
Dalapon ®	2,2-DPA	Sertin ®	Sethoxydim
Fusilade ®	fluazifop-butyl	Targa ®	quizalofop-p-ethyl
Glean ®	chlorsulfuron		

Please note:
The products highlighted in bold typeface above have been registered for the above specific purposes with the National Registration Authority for Agricultural and Veterinary Chemicals. Other products may be registered via an Off-Label Permit, which allows use of registered or non-registered products for specific purposes.

It is necessary that the application of herbicides be in accordance to labelling requirements or the manufacturers Materials Safety Data Sheet and must be undertaken by personnel trained in the use of herbicide chemicals. The application of any herbicide for purposes not specified on the labelling requires an Off-Label Permit from the National Registration Authority in Canberra. The application of herbicides must also be in accordance with water catchment restrictions.

Appendix Eight: Contacts

Mt Henry Peninsula Management Plan

Community Groups

Community groups and grass-roots organisations that have an interest in the study relevant to this management plan include the following:

Mount Henry Peninsula Conservation Group
Contact: Jan King
C/o Aquinas College
Mt Henry Road
Manning, WA 6152

Urban Bushland Council
Contact Andrew Thomson (President)
2 Delhi Street
West Perth, WA 6005

Belmont-Victoria Park Catchment Group
Contact: Michelle Crow (Catchment Coordinator)
PO Box 562
Cloverdale, WA 6985

City of South Perth Environmental Association
Contact: Warwick Boardman
20 Unwin Crescent
Salter Point, WA 6152

Canning River Residents Environmental Protection Association
Contact: Diane Matthews
7 Bridget Place
Shelley, WA 6148

Stakeholders

City of South Perth
Contact: Mark Taylor
Operations Centre
Thelma Street
South Perth, WA 6151

Aquinas College
Contact: Peter Shaw
Mt Henry Road
Manning, WA 6152

Dental Services
Contact: Peter Neesham
Mt Henry Road
Manning, WA 6152

Appendix Nine:
Coastal Engineering Advice

Mt Henry Peninsula Management Plan

The following is the coastal engineering advice provided by M.P. Rogers and Associates – Coastal & Port Engineers. The report follows a site inspection by MP Rogers and Ecoscape and examination of historical aerial photography supplied by the City of South Perth and bank profiles supplied by Ecoscape.

August 2002

Ecoscape (Australia) Pty Ltd

Mount Henry FMP - Coastal Stability

Job J401 Letter Report 02063 Rev 0 - Record of Document Revisions

Rev	Purpose of Document	Prepared	Reviewed	Approved	Date
0	Issued for Client use	M Rogers	S Gerbaz	M Rogers	06/08/02

M P ROGERS & ASSOCIATES - Coastal & Port Engineers
Unit 2, 133 Main Street, Osborne Park WA 6017, AUSTRALIA
Phone: +618 9444 4045, Fax: +618 9444 4341
Email: cape@bigpond.net.au

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1. Introduction & Scope of Work

Ecoscape (Australia) Pty Ltd have been engaged by the City of South Perth to review the Mouth Henry Peninsular Management Plan. This includes the Canning River foreshore along the freeway south of the Canning Bridge and the foreshore adjacent to Mount Henry itself.

As part of its work, Ecoscape engaged M P Rogers & Associates Pty Ltd (MRA) to examine the coastal stability at the following locations.

- Edgewater Road overpass,
- The spit west of Mount Henry, and
- The southwest face of Mount Henry.

The scope of work for MRA included the following.

- Inspection of the site with Abe Francis from Ecoscape to identify the problems and discuss the approach to improvements.
- Review aerial photographs and simple bank surveys provided by Ecoscape.
- Develop simple options for the improvement works, management of the area and / or further studies to better understand the coastal dynamics of the areas. This work would be completed largely using engineering judgement and should be considered preliminary and subject to further investigations if needed.
- Prepare a brief report on the findings of the coastal stability and management investigations.

The study area for MRA is shown in Figure 1.1.

2. Edgewater Road Overpass

2.1 Assessment of Issues

During the site inspection, it was observed that at high river levels, the riverbank near the overpass ramp was just inundated. This is shown in Figure 2.1. There was also evidence of erosion of the riverbank. This has culminated in the overpass foundations being partially exposed and holes appearing in the pavement behind the small limestone wall that protects the pavement.

2.2 Aerial Photographs

The series of photographs supplied include photographs for the following years.

- 1926,
- 1948,
- 1956,
- 1969,
- 1977, and
- 1988.

In addition, a rectified image taken recently was supplied and another rectified image from 1997 was available from the MRA database. The various aerial photographs were closely examined to determine if there had been any significant movement of the riverbanks in the vicinity of the overpass. The likely accuracy of such a comparison is about ±5 to 10 metres in the horizontal plane because of the distortion in the various photographs. Nevertheless, the method is of value in identifying significant movements.

It was identified that the riverbank about 350 to 500 metres north of the overpass had accreted slightly in the decade between 1988 and 1997. It was estimated that about 3,500 m^3 of sand had accreted over the 150 metres of the riverbank. Given the accuracy of the measurements and the assumption needed concerning the active height of accretion, the rate of accretion would seem to be about 250 to 500 m^3/year.

The review of the aerial photographs also indicated that there had been about 5 metres of bank recession at the overpass over the last decade. This is within the range of likely accuracy of the methods.

2.3 Bank Surveys

Ecoscape supplied a number of simple surveys of the riverbank. The sites of these surveys were:

- 300 metres north of the overpass,
- near the overpass,
- 250 metres south of the overpass, and
- at the spit west of Mount Henry.

These bank surveys extend from the water line to about 20 metres into the river. The profile near the overpass had a slope of about 1 in 15 to more than 1.2 metre of water depth. The other profiles had a slope of about 1 in 15 to about 0.7 metres of water depth then were quite flat.

2.4 Likely Causes of Erosion at the Overpass

The movements of the riverbank observed in the aerial photographs suggest that there may be movement of sand from the overpass area to the north. Such movement is likely to be caused by waves generated by winds blowing over the river. The dominant southwesterly winds could be responsible for the net movement of sand from the overpass area to the north. Because of the protection provided by the spit to the west of Mount Henry, the amount of sand feeding into the overpass area could be less than that leaving the area. This would cause a net loss leading to erosion and recession of the riverbank near the overpass. It has been estimated that the net movement to the north is about 250 to 500 m^3/year and that the bank near the overpass may have experienced recession of about 0.5 m/year.

Such a pattern of sediment movement is consistent with the observed steeper underwater bank slope measured in the bank surveys supplied by Ecoscape.

In addition to the longshore sediment movement, the movement of sediment across the shore could be a contribution. Both storm waves and boat wash could cause such erosion. Such movement is not evident in the limited bank profiles and will not be considered further.

2.5 Possible Stabilisation & Management

The erosion at the overpass has already affected the footings for the overpass structure and the pavements around the overpass. Some action is warranted as valuable assets are being affected.

There are a number of strategies that could be appropriate for the Canning River bank near the Edgewater Road overpass. They include:

- Armouring the bank to prevent further erosion,
- Ongoing sand nourishment to compensate for the loss of sediment, and

- Structural changes such as groynes and headlands to alter the movement of sediment along the coast.

The present scope of work does not involve detailed assessment of the various options for stabilisation and management of the area. Based on MRA's experience and engineering judgement, the armouring of the bank has been assessed as likely to be one of the better options.

There are a number of ways of armouring the bank. Figure 2.1 shows that simple timber fencing has been tried in the past with little success. A common method is to use a rock revetment. A sketch of an indicative section has been included as Figure 2.2. This method uses rocks laid on a slope to provide the required protection and stop further recession. The rock revetment would need to be about 100 metres long to protect the overpass footings, the foreshore pavement and several established trees in the area.

Before implementing such an option, more detailed work is warranted to confirm this initial assessment and provide sufficient information to reliably predict the impacts of the proposed rock revetment. The scope of the detailed coastal engineering should include the following.

- Extension of assessment of aerial photography.
- Computation of sediment movement along the river bank using established methods of wave hindcasting and estimation of longshore sediment transport.
- Design of the rock revetment and the detailed assessment of the impacts of the revetment on adjacent areas.

3. Spit West of Mount Henry

3.1 Assessment of Issues

The spit west of Mount Henry appears to be eroding. Figure 3.1 shows that the top of the bank has collapsed. The general area is not developed and there are no significant assets in the area. The erosion does not appear to be causing any problems at the moment.

3.2 Aerial Photographs

The aerial photographs supplied by Ecoscape and available from the MRA database were used to examine the movement of the spit west of Mount Henry. Comparison of the 1988 and 1997 images indicated that the spit might have retreated about 5 to 10 m in about a decade. This is rate of about 0.5 to 1.0 m/year.

3.3 Bank Survey

The bank survey completed by Ecoscape shows a 1 in 15 slope below the water to about 0.8 metres of water then a flatter slope. This could be an indicator that the movement of sediment is across the profile.

3.4 Likely Causes of the Erosion of the Spit

Based on the limited site information and assessment of coastal processes, and largely on engineering judgement, it is thought that the most likely causes of the observed erosion could be the following.

- Boat wash causing bank slumping.
- Storm waves at high water levels could also move sediment across the bank and cause bank slumping in a similar way to boat wash.
- Locally generated waves causing movement of sediment along the shore and away from the spit. Southwest winds and waves would tend to move sediment to the northern flank of the spit and northwest winds and waves would tend to move sediment to the southern flank of the spit.

3.5 Possible Stabilisation & Management

As the rate of recession appears quite low and there are no significant assets being threatened, the most appropriate management would be managed retreat. This would involve letting the erosion continue and monitoring the recession with simple surveys. This could be a simple survey of the spit every 5 years to confirm the rate of erosion and ensure that no assets become threatened.

Any planning for the area should make allowance for the erosion by placing all structures at least 30 metres from the waters edge. This should be sufficient buffer for several decades.

4. Southwest Face of Mount Henry

4.1 Assessment of Issues

The southwest face of Mount Henry is steep, well vegetated with the occasional rock outcrop. There are a number of walking tracks that have been formed by those using the area. Figure 4.1 show one of the walking tracks.

In places, the steep slopes are dangerous because of landslips and erosion caused by rainfall runoff being channelled down the walking tracks. Many of the tracks on the steep face present some danger to the public.

4.2 Possible Stabilisation & Management

The overall stability of the area needs to be properly assessed by an experienced Geotechnical Engineer. This work should quantify the risk of significant landslides and cliff collapses and ways of addressing the dangers.

In addition to the investigations by the Geotechnical Engineer, the public access to the steep face should be managed. This may require that some tracks are fenced off and signs erected advising the public that the area is being rehabilitated and it is unsafe to enter the restricted areas. The walking tracks that are removed from public access should be rehabilitated with vegetation to minimise the scour during rain events.

As the public presently uses the area, it may advisable to create a safe walking track for public use. This would need careful planning and may need some stairways in the steeper sections. The Geotechnical Engineer could advise on such a development.

5. Figures

Figure 1.1 – Location Diagram

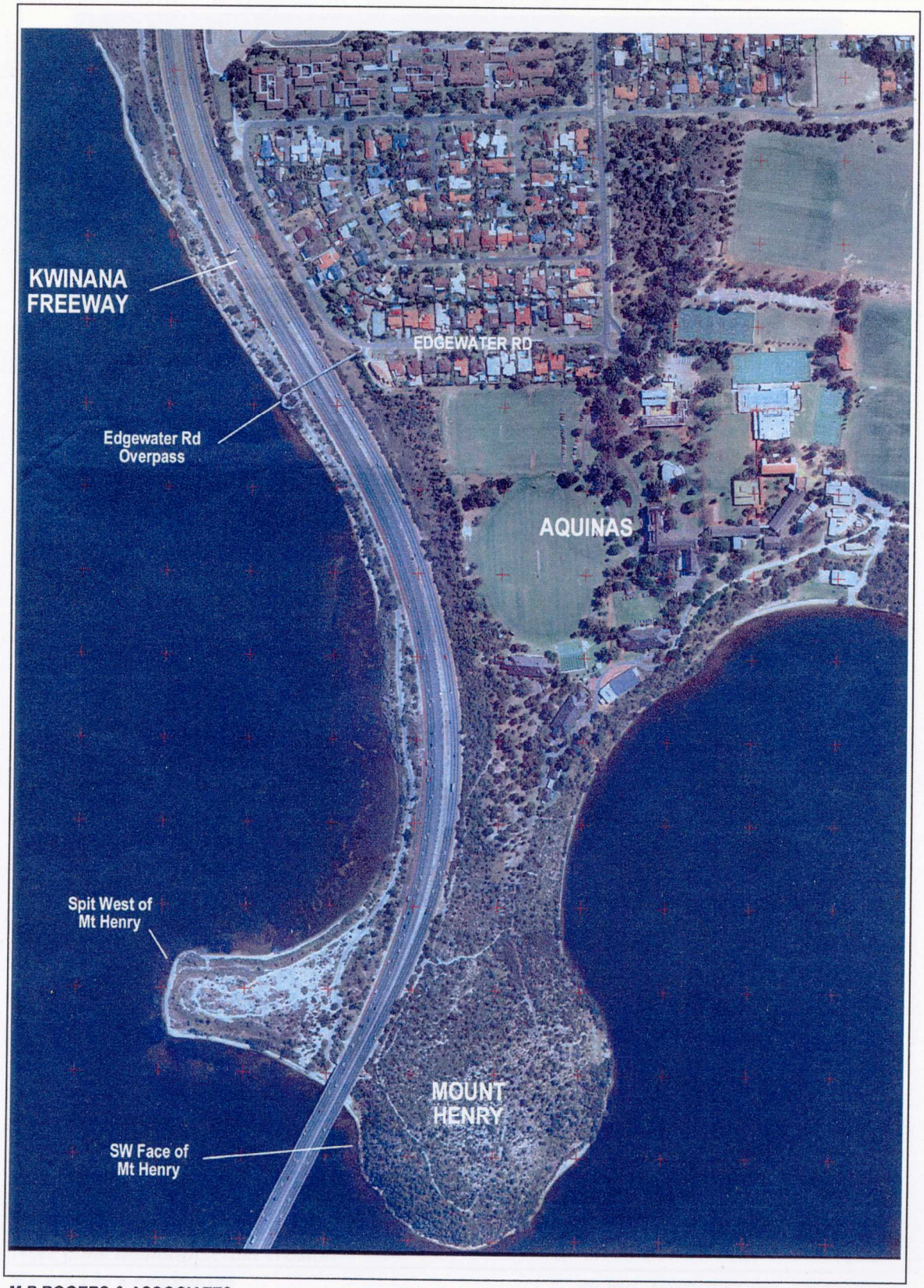

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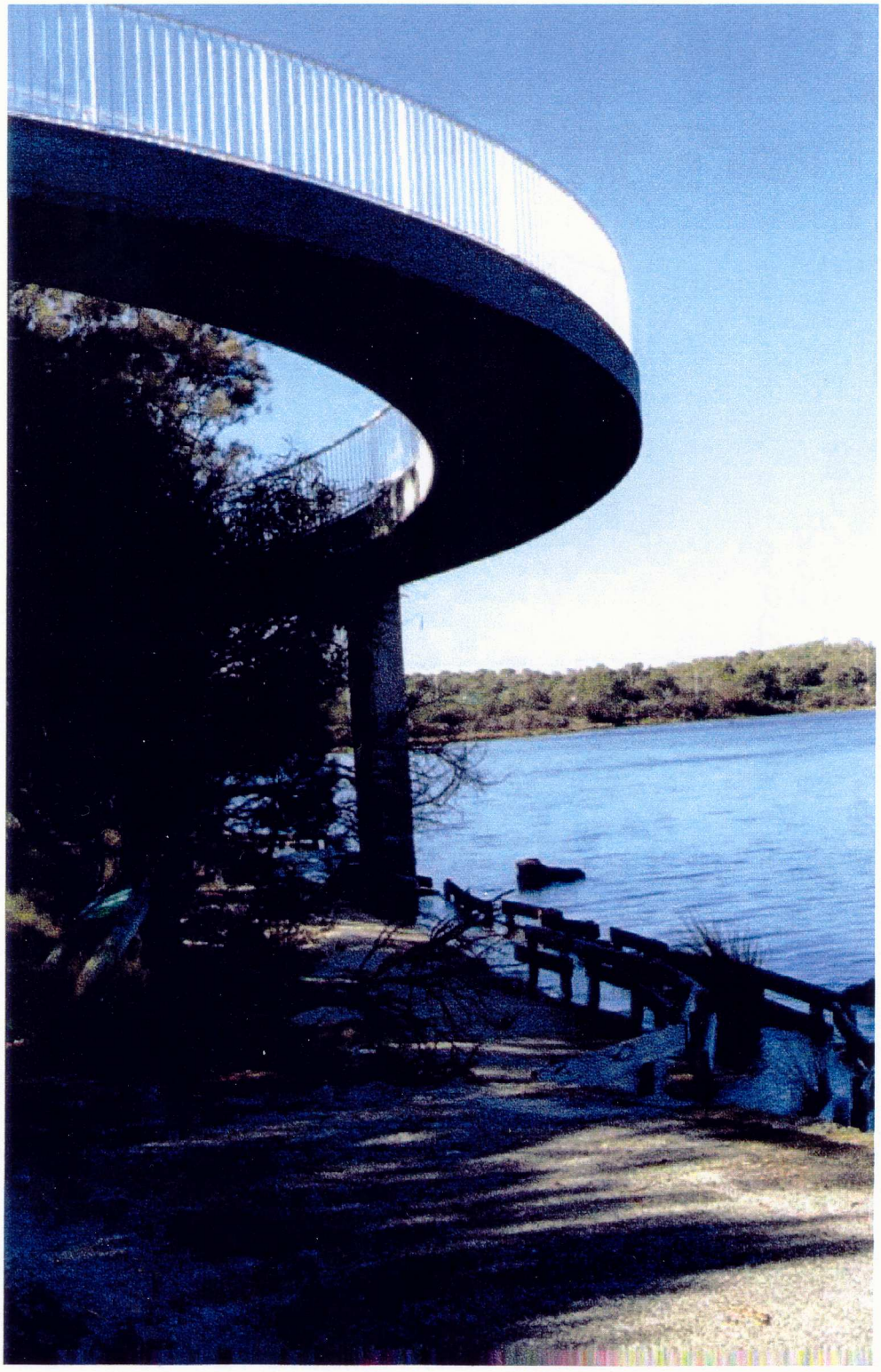
Figure 2.1 – Edgewater Road Overpass



Note bank inundation and erosion

Figure 2.2 – Indicative Rock Revetment

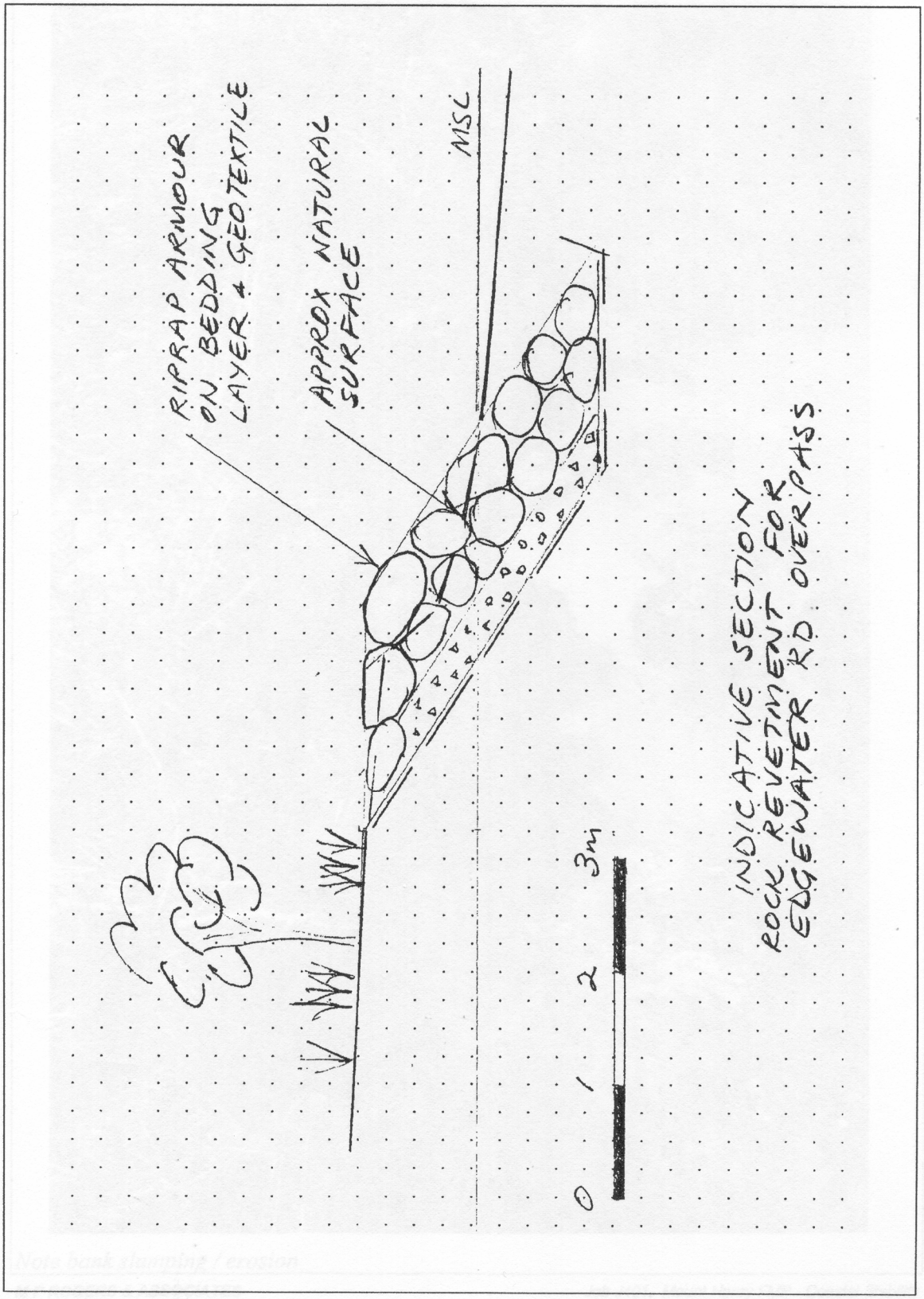


Figure 3.1 – Spit West of Mount Henry

Note bank slumping / erosion

Figure 4.1 – Southwest Face of Mount Henry

Note erosion of walking track

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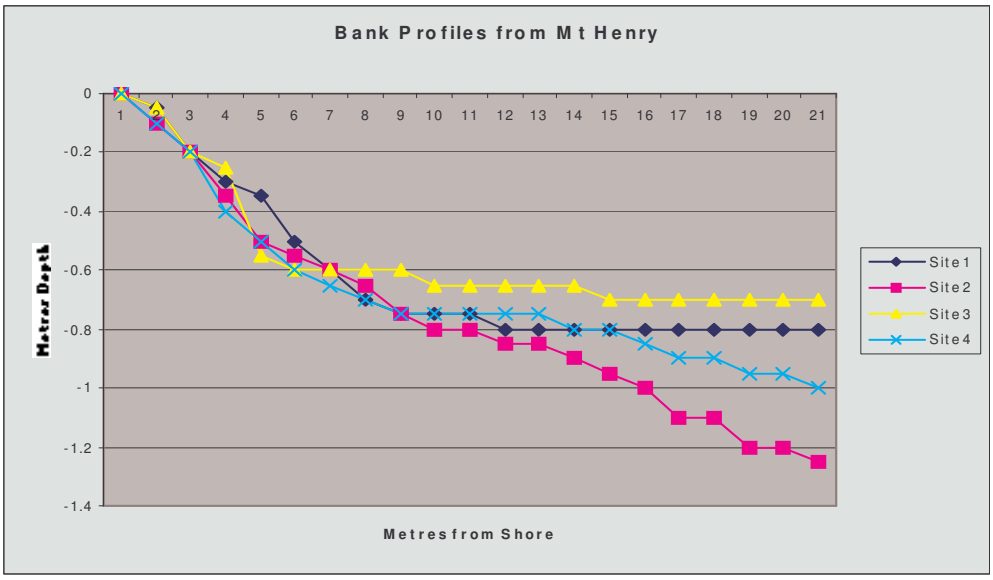
Appendix Ten:
Bank Profiles

Mt Henry Peninsula Management Plan

The following bank profiles were measured by Ecoscape on the 16th June, 2002.



	Site 1	Site 2	Site 3	Site 4
Direction (degrees)	250	250	250	290
MGA Easting	391923	392111	392216	391980
MGA Northing	6456442	6456148	6455912	6455455
		Depth From Surface		
Metres from Shoreline	**Site 1**	**Site 2**	**Site 3**	**Site 4**
0	0	0	0	0
1	0.05	0.1	0.05	0.1
2	0.2	0.2	0.2	0.2
3	0.3	0.35	0.25	0.4
4	0.35	0.5	0.55	0.5
5	0.5	0.55	0.6	0.6
6	0.6	0.6	0.6	0.65
7	0.7	0.65	0.6	0.7
8	0.75	0.75	0.6	0.75
9	0.75	0.8	0.65	0.75
10	0.75	0.8	0.65	0.75
11	0.8	0.85	0.65	0.75
12	0.8	0.85	0.65	0.75
13	0.8	0.9	0.65	0.8
14	0.8	0.95	0.7	0.8
15	0.8	1	0.7	0.85
16	0.8	1.1	0.7	0.9
17	0.8	1.1	0.7	0.9
18	0.8	1.2	0.7	0.95
19	0.8	1.2	0.7	0.95
20	0.8	1.25	0.7	1

Appendix Eleven:
1993 Recommendation Status

Mt Henry Peninsula Management Plan

Rec. No.	Recommendation	Current Status
3.1	SPCC should initiate transfer of vesting of Cloisters Reserve No. 21288 to SPCC	Not yet implemented – Recommendation carried over
3.2	All vacant Crown land on the west foreshore south of the Cloisters Reserve, whether unvested or vested in MRD, DOLA or DPUD should be vested in SPCC and amalgamated in one reserve, classified 'C' for the purpose of conservation, recreation and education	Not yet implemented – Recommendation carried over
3.3	SPCC should implement procedures to close the road reserve extension of Salter Point Parade, declare it a reserve, vest it in SPCC, classify it 'C' for the purpose of conservation, recreation and education	Now covered under the Salter Point and Waterford Foreshore Management Plan
3.4	In the event that changes of ownership of all or any of the freehold property included in this plan is ever contemplated, public acquisition should be considered and its subsequent declaration as a reserve	Recommendation carried over
4.1	MHMC should form a Steering Committee, with representation from SPCC, CB/AqC, SRT, DPUD, EPA, Friends Groups and anyone else with relevant expertise. This Committee should be given responsibility to oversee implementation of the management plan	Not Yet implemented – Recommendation carried over
5.1	MHSC should liaise with other departments or individuals to minimise the negative impacts on the foreshore	Ongoing
5.2	SPCC should provide copies of appendix "Guidelines for Appropriate Management of Property Adjacent to Bushland and Foreshore" to CB/AqC and residents of River Way	Not yet implemented
5.3	SPCC should ensure that all rubbish, including builder's rubble is removed from East Foreshore road reserve immediately, and without additional damage to native vegetation	Implemented – South Perth Foreshore LEAP in 1995
5.4	SPCC should continue to monitor the Eastern Foreshore and take prompt action if rubbish accumulates on the boundaries of River Way properties	Letter sent in 1996 – ongoing monitoring

5.5	SPCC, with SRT approval, should provide guidelines for design and sharing of paths and steps on steep slopes suitable for construction on River Way properties where residents gain private access to the foreshore	Addressed in landscape/rehabilitation plan
5.6	CB/AqC and SPCC should regularly remove rubbish from the shoreline. (Organic material such as sea weed is not rubbish and should be left to protect the foreshore from erosion.)	River Way foreshore cleaned up by LEAP in 1995. Ongoing
6.1	SPCC should investigate designs for, and install, biological or other appropriate filters on all storm drains, planting local vegetation species only	Biological filter installed on Cloisters Avenue drain only
6.2	SPCC should investigate the possibility of relocating Cloisters Avenue drain to the southern end of the paperbark grove or to the north of the car park	Not yet implemented – Recommendation carried over
6.3	SPCC should clean out the weeds at Edgewater Avenue drain and repair it if necessary	Not yet implemented – Recommendation carried over
6.4	SPCC should renew the outlet from Redmond Avenue drain, placing it at ground level	Not yet implemented – Recommendation carried over
6.5	SPCC should replace builder's rubble surrounding Sulman Avenue drain outlet, with gravel	Implemented – South Perth Foreshore LEAP in 1995
6.6	SPCC and SRT should encourage CB/AqC and other local schools to extend the Ribbons of Blue water monitoring programme to include sampling at stormwater outlets, at Cloisters, Edgewater, Redmond and Sulman Avenues, Aquinas boatshed, and bores at CB/AqC and River Way and submit results to SRT	St Pius X Primary School to be involved in sampling at Cloisters – Recommendation carried over
6.7	SPCC and WAWA should provide guidelines to CB/AqC and other local residents to minimise application of water and fertilisers to gardens, lawns and ovals	Yellow Fish Road programme recommended to continue
7.1	MHSC should initiate a comprehensive and professional fauna survey to establish baseline data of fauna population on Mount Henry and foreshore	school students undertaken some fauna and rabbit monitoring – Recommendation carried over
7.2	CB/AqC students should undertake ongoing fauna surveys only under close supervision	As above
7.3	CB/AqC and SPCC in conjunction with CALM should examine the feasibility of reintroducing appropriate faunal species once pests have been excluded	CB/AqC are part of Land for Wildlife scheme with CALM – Recommendation carried over
7.4	SPCC should mark limits for recreation activities at Cloisters and Edgewater and on the East Foreshore by erecting signs to discourage people from walking on protected and planted foreshore	Implemented at Cloisters in 1997 - On-going – Recommendation Carried over

7.5	SPCC should protect trees at Cloisters, Edgewater and East Foreshore by pruning them, to remove evidence of past damage, installing free gas BBQ's and prawn boilers, and erecting explanatory signs	Morning glory removed from paperbark trees at Cloisters by SP Foreshore LEAP in 1995. – Some recommendations carried over
7.6	CB/AqC should discourage access to limestone outcrops to protect lichens, by erecting informative signs, removing cubby litter and closing paths	Recommendation carried over
7.7	CB/AqC and SPCC should undertake revegetation on all foreshore and bushland according to recommendations in Rehabilitation	Ongoing – Recommendation carried over
7.8	All management bodies, SPCC, MRD, DPUD and CB/AqC should ensure that no mowing us undertaken in areas of native vegetation (see recommendations 9.1 & 16.2)	Ongoing
8.1	CB/AqC and SPCC should undertake weed control in each zone as recommended in each area plan, employed trained bush regenerators, following guidelines given in the Weed Appendix, and using suitable equipment to avoid damaging local vegetation	SPCC on-going. Bushland maintenance worker undertaking tasks as required – Recommendation carried over
8.2	SPCC should cut DUP verges for only 1 metre from the path	Requires ongoing attention and is managed according situation
8.3	CB/AqC and SPCC should minimise reticulation and fertilising near bushland to discourage weed invasion	Ongoing however still occurring in places – Recommendation carried over
8.4	CB/AqC should construct a firm based path between lawns or ovals and bushland to stop grass and weed spread	Not completed
8.5	CB/AqC should remove all reticulation and all kikuyu and couch, south of the boarding/boatshed road	Not completed – included with other reticulation/weed control recommendations
8.6	CB/AqC should not deposit weeds and prunings on bushland areas	Not completed – Recommendation carried over
8.7	CB/AqC should create a solid barrier between composting sites and bushland	Not completed – Recommendation carried over
8.8	SPCC and CB/AqC should replace planted species with local species, on a progressive basis, when local species are available, over a period of 3-5 years	SPCC on-going. Bushland maintenance worker undertaking tasks as required – Recommendation carried over
8.9	MHSC should liaise with MRD and River Way neighbours to plan cooperative management of weeds in adjacent areas (see Rec. 10.2)	Addressed in landscape/rehabilitation plan

9.1	Following the fauna survey on Mount Henry, MHSC should investigate and implement a vermin control programme with advice and approval from the APB	Rabbit baiting implemented in summer of 00/01- Recommended to continue
9.2	MHSC should investigate the feasibility of erecting a vermin proof fence across the neck of Mount Henry and extend it into the river	Fence installed though it is ineffective for vermin control. Purpose is access control
9.3	CB/AqC students should research the impact of rabbits on vegetation at the Point	see 7.1
9.4	Following recommendation 9.3 above, MHSC should implement a rabbit control programme on Mount Henry Point and Spit with advice from APB	Rabbit baiting implemented in summer of 00/01- Recommended to continue
9.5	CB/AqC and SPCC should encourage dog owners to use leashes when walking their pets on Mount Henry Point or Spit	Addressed in information shelters installed around foreshores – Further signage and policing recommended
9.6	SPCC should extend the cat policy, encouraging owners to keep their pets indoors at night, and to have them sterilised (see Recs. 7.1 & 7.3)	Voluntary sterilisation and subsidy introduced Cats kept in at night not taken up by Council – Recommendation carried over
10.1	CB/AqC should surface the existing multiple use track on Mount Henry to provide a 2.5 metre wide aesthetic and firm based path suitable for use for cross country running, walking, small fire control vehicular access and a fire break	Mulch from Mt Henry hospital site used to provide a firm surface on part of the track – Recommendation carried over.
10.2	CB/AqC and SPCC should control highly flammable introduced grass species such as Perennial veldtgrass in bushland and adjacent areas and especially in areas adjacent to popular picnic spots	Ongoing Perennial veldtgrass control by both the SPCC and CB/AqC – Recommendation carried over
10.3	SPCC and CB/AqC should meet with Kensington Fire Brigade to plan appropriate action in the event of a fire on Mount Henry or the foreshore	Fire response management plan in place – Recommendation carried over
10.4	CB/AqC should extend its 100 mm water main from the Manager's house southwards toward the point to facilitate access to water in the event of fire	Status unknown
10.5	CB/AqC and SPCC should remove stacks of prunings from foreshore slopes where vegetation exists (River Way, Redmond Reserve. Provinciate). Where prunings are used for revegetation programmes, they should be judiciously placed with wide spacing to minimise fire risk (see also Rec. 7.5)	Prunings removed from East Foreshore
11.1	SPCC should construct a narrow meandering limestone based walking path at Cloisters through foreshore vegetation, according to Plan C, and close and rehabilitate all other paths in the reeds	Small path closed in 1997- Further track closure and nature trail recommended

11.2	SPCC should provide low key infrastructure on the Spit to encourage cooperation from cyclists and walkers, in accordance with Plan S. Infrastructure should include narrow walking paths, informative and directional signs, a bike exclusion fence and bike racks	Path, fencing and information shelter installed
11.3	CB/AqC should protect the Point from erosion with a limited number of paths and signs, closing off all access to the steep slopes from above and below CB/AqC should make a development application to SRT for permission to extend the existing 2 metre high fence along the freeway to the water's edge on the south east side of Mount Henry Bridge	Attempts made – Recommendation Carried over
11.4		
11.5		
11.6	CB/AqC should erect signs on the foreshore of Mount Henry to increase awareness of rehabilitation programmes	Several signs have been erected
11.7	CB/AqC should continue Quarry revegetation, brushing, seeding and planting with limestone community species	Ongoing – Recommendation carried over
11.8	CB/AqC should re-routes the cross country course to the existing bitumen road and away from the steep foreshore on the School slopes (Plan BS)	Not implemented
11.9	CB/AqC should close all existing paths on School slope, rehabilitating them, and erecting signs to encourage student cooperation (Plan BS)	Ongoing – Recommendation carried over
11.1	CB/AqC and SPCC should plant reeds on eroded foreshore, and direct users to recreation areas	Ongoing – Recommendation carried over
11.11	SPCC should install and fence steps at Redmond Reserve and Sulman Avenue to provide controlled access from hilltop to foreshore (Plan E)	Fencing, stairs and rehabilitation of slope all completed
11.12	SPCC should link steps at Redmond Reserve and Sulman Reserve with a limestone base path and continue the path to Salter Point Reserve (Plan E)	Path installed
11.13	SPCC should rehabilitate slopes at Redmond Reserve and Sulman Avenue and then monitor and maintain them (Plan E) (see also Rec. 5.5)	Partially completed. Landscape/rehabilitation plan to be implemented with residents
12.1	SPCC and CB/AqC should collect seed locally and propagate local species required for revegetation in each vegetation association	Sustainable seed bank and seed orchard are operating

12.2	SPCC and CB/AqC should commission local collection and propagation of the same local species by other appropriate nurseries	Ongoing
12.3	All plants should be planted in the correct vegetation association using the vegetation maps and species lists as guides	Ongoing
12.4	SPCC and CB/AqC should monitor the success of all rehabilitation management on an annual or, where appropriate, more frequent basis, record practices and results, repair damage to infrastructure and replant vegetation promptly where necessary (see also Rec. 7.6, 7.7, 8.1, 8.8, 10.5, 11.3, 11.7, 11.9, 11.10, 11.11, 11.12, 11.13, 15.3 and 15.5	Visual inspections and photographic records ongoing
13.1	CB/AqC should invite Nyungar people associated with Mount Henry to visit the area	Some recognition in information shelters – Further Nyungar involvement recommended
13.2	Representatives of the Nyungar families associated with Mount Henry and the foreshore should be invited to serve on the Lower Canning River Management Plan Steering Committee	Not implemented – Nyungar consultation recommended
13.3	Should there be plans some time in the future to develop any portion of the area covered in this report then Nyungar people must be consulted again (see also Rec. 7.3, 7.7, 8.7, 11.7, 12.1, 12.2, and 12.3)	Recommendation carried over
14.1	CB/AqC should erect informative plaques to indicate the past use of the boat shed and the Quarry, and to assist in appreciation of the modified landscape. A suitable site for plaques would be adjacent to the seat on the road above the school slopes, from which there is a clear view of the Point and the Quarry scar	Not implemented. – Recommendation carried over
15.1	CB/AqC should prepare a programme for gradual introduction of practical use of Mount Henry for curriculum based studies	Ongoing
15.2	CB/AqC should establish low key infrastructure near or on the Point to make possible its use by large groups of students (Plans P & E)	Not implemented
15.3	CB/AqC should implement “education through regeneration” programmes (Plans F,Q and BS)	Ongoing
15.4	CB/AqC should undertake single or group studies on Mount Henry as and when practicable	Ongoing
15.5	CB/AqC should involve students in local plant propagation programmes	CB/AqC utilising APACE programme
15.6	SPCC and CB/AqC should offer to share their expertise in the areas of seed collection and plant propagation with other local schools	SPCC has Green Teams programme with local schools
16.1	CB/AqC should mark limits for recreation activities at Boatshed Foreshore by erecting signs	Not implemented – Buffer Recommended

16.2	SPCC should request DMH to seek alternative and more appropriate locations for jetskiing	New jet ski strategy implemented. Freestyle area removed from near Spit
16.3	CB/AqC, SPCC and DMH should meet to discuss the local water-skiing problem and the enforcement of water skiing regulations	Recommendation carried over
16.4	CB/AqC should approach trespassers and ask them to leave the property	
16.5	CB/AqC should place signs on small beaches and at Quarry to discourage trespassing on private property	Recommended signage be re-erected
16.6	MRD should re-route DUP adjacent to freeway at Cloisters and for 250 metres south, and retain the existing DUP as a walking path only	Implemented in 1997
16.7	MRD should re-route the DUP at the approach to Mount Henry Bridge to improve visibility of access	Can be addressed in bridge widening
16.8	Bikewest in conjunction with SPCC and the community should investigate alternative routes to link the bike path between Mount Henry Bridge and Waterford or between Mount Henry and Shelley Bridges	On-going with Bikeplan
16.9	Complaints regarding water based activities should be referred to the EPA and DMH in writing. In the event of excessive noise, Marine Emergency Operations Centre of Department of Marine and Harbours should be contacted immediately (see also Recs. 7.4, 7.5, 10.1, 11.3, 11.8, 11.9, 11.11 and 11.12	Ongoing - – Recommendation carried over
17.1	SPCC, CB/AqC, DMH, SRT should co-operate to ensure uniformity of design and location of signs, following CALM's Sign Manual	Uniformity recommended
17..2	SPCC and CB/AqC should erect informative and directional signs at points of entry to foreshore reserves, at sites of particular activities and along access paths	Information shelters installed. Various signage recommended
17..3	CB/AqC and SPCC should locate information boards and interpretive signs at appropriate observation points, to convey information about the local environment (for example foreshore flora and fauna)	Information shelter at Cloisters Reserve and the Spit completed under Gordon Reid grant
17.4	SPCC should supply information in pamphlet form regarding foreshore, recreation sites, community and public education and activities of Friends Groups at the Council Libraries and at the Administration Office (see also Recs. 7.4, 7.5, 7.6, 11.2, 11.6, 11.9, 14.1, 16.1 & 16.4)	Not implemented – General community education strategies recommended
18.1	CB/AqC should set up transects and quadrats for annual monitoring in each vegetation association	Ongoing – Some existing Bush Forever Transects
18.2	CB/AqC, SPCC or other groups undertaking rehabilitation and management should keep records of methods employed and their outcome, including photographic records (see also Recs. 6.6, 9.3, 12.4 & 15.4)	Ongoing

19.1	MHSC should prepare an implementation plan according to priorities	Not implemented – Recommendation carried over
19.2	MHSC should review the progress of implementation annually	Not implemented – Recommendation carried over
19.3	SPCC and CB/AqC should budget funds and actively seek additional outside funding for implementation of these recommendations	Ongoing – Recommendation carried over
19.4	CB/AqC and SPCC should employ appropriately qualified staff to supervise and implement this management plan	Full-time Environmental Officer and Bushland Maintenance Officer employed by City of South Perth
19.5	CB/AqC should invite expressions of interest in the formation of a Friends Group to be involved in rehabilitation projects such as on the foreshore, or the Spit	Ongoing through Ecoplan and the Mt Henry Peninsula Conservation Group
19.6	SPCC should invite expressions of interest in the formation of a Friends Group to be involved in rehabilitation projects such as on the foreshore, or the Spit	Ongoing through the City of South Perth Environmental Association– Recommendation carried over
19.7	This management plan should implemented over a period of 7 years at which time a review should be undertaken (see also Rec. 13.2)	Due for review in 2009
1 Cloisters	Relocate DUP further east, under overpass bridge. Continue DUP south along freeway fence for 250 metres	Implemented
1 Cloisters	Move storm drain outlet north of car park & incorporate biological filter	Biological Filter installed. Not moved – Recommendation carried over
1 Cloisters	Install free gas barbecues and prawn cookers	Not implemented – Recommendation carried over.
1 Cloisters	Install additional rubbish bins	Not implemented – Recommendation carried over.
1 Cloisters	Prune damaged limbs on paperbarks	Implemented – on-going maintenance
1 Cloisters	Erect signs (paperbarks, fires, rubbish, prawning)	Signage addressed in recommendations
1 Cloisters	Propagate F species	On-going
1 Cloisters	Close paths in fringing reeds, place firm narrow limestone base on one path only	Implemented – limestone path not yet constructed
1 Cloisters	Revegetate closed paths and gaps in fringing vegetation south of prawning area	Implemented – on-going

1 Cloisters	Plant F species and propagate C, W and S species	Ongoing
1 Cloisters	Control weeds (grasses, fennel) south of fresh water paperbarks	On-going – Recommendation carried over
1 Cloisters	Densely plant C, W and S species	Ongoing
1 Cloisters	Empty bins, remove rubbish on waterline	Ongoing – Recommendation carried over
1 Cloisters	Employ professional bush regenerator to undertake removal of weeds under paperbarks (kikuyu, lantana, creepers (not dodder) and trees	Implemented by South Perth Foreshore LEAP – full time bush regenerator employed
2 Foreshore Fringing Vegetation	Except where recreation activities require river access, revegetate banks with reeds for planting methods, refer Pen (1983), SRT and City of Melville.	Ongoing – Recommendation carried over
3 Spit and Infill	Assess vermin damage in consultation with APB - If warranted, institute control measures (gas, trap, fence)	Rabbit baiting implemented
3 Spit and Infill	Re-route cycle track for safer access to Mount Henry Bridge - Install bike racks at DUP	Not implemented – Addressed in management plan
3 Spit and Infill	Commence weed control (veldgrass and watsonia)	Implemented 1997 – ongoing – Recommendation carried over
3 Spit and Infill	Plant and direct seed bare areas with S and R species	Ongoing - Rehabilitation plan
3 Spit and Infill	Erect fence west of DUP on Spit	Implemented
3 Spit and Infill	Install narrow limestone path on Spit	Implemented
3 Spit and Infill	Erect information signs at strategic points on path (eg near bike racks)	Implemented – Two information shelters
4 Dup/infill	Repair damaged DUP at Edgewater	Ongoing – Erosion issued addressed in management plan
4 Dup/infill	Progressively replace non local plants (especially WA peppermint, lemon scented gum, oleander) with S, W species over several seasons	Ongoing – Recommendation carried over
4 Dup/infill	Undertake propagation and planting programme of coloniser, S, W and F species	Ongoing – Rehabilitation Plan
7 East Foreshore	Remove builder's rubble at Sulman Ave drain and replace with gravel	Implemented by South Perth Foreshore LEAP

7 East Foreshore	Fence steep slope at Redmond Reserve top and bottom. Maintain in good repair	Top fenced in 1998
7 East Foreshore	Install and fence steps at Sulman Ave from cliff top to foreshore	Implemented 1995
7 East Foreshore	Revegetate slopes at Sulman Ave and Redmond Reserve by direct seeding and planting	Redmond implemented 1998
7 East Foreshore	Erect signs: Regeneration in progress	Implemented where large regeneration areas – Recommendation carried over
7 East Foreshore	Install and fence steps at Redmond Reserve as at Sulman Ave.	Stair constructed 1998
7 East Foreshore	Undertake weed control, cut and spray. (requires permit from WA Health Department & supervision by SRT)	ongoing – Recommendation carried over
7 East Foreshore	Erect signs for fires and prawning	Not implemented – Not carried over
7 East Foreshore	Install free gas barbecues and prawn cookers	Not implemented – Barbecue recommendation carried over
7 East Foreshore	Over several years progressively replace planted species on flats with local species	Ongoing – Recommendation carried over
7 East Foreshore	Infill plant the foreshore except small beach area	Ongoing – Recommendation carried over
7 East Foreshore	Replace drain at Redmond Reserve and install biological filter	Not implemented – Recommendation carried over
7 East Foreshore	Surface narrow limestone path on flats from Redmond Reserve to Salter Point Reserve	Implemented by South Perth Foreshore LEAP
7 East Foreshore	Maintain rehabilitation fences and steps regularly, repair damage immediately	Ongoing – Recommendation carried over

Appendix Twelve: Summary of Submissions

Mt Henry Peninsula Management Plan

Six submissions were received on the draft management plan:

Robert White	Aquinas College
Warwick Boardman	City of South Perth Environment Association
Jan King	Mt Henry Peninsula Conservation Group
Joe King	Mt Henry Peninsula Conservation Group
Br Kevin P Ryan	Christian Brothers
Andrew Thomson	Resident

The following analysis of submissions is based on the City's standard approach to reviewing submissions received against the City's policies and preferred procedures.

General

The report needs to be formally edited to repair a number of spelling, formatting (e.g. font sizes) and grammatical errors which detract from the quality of the report. Referencing to maps and figures in the document are inconsistent. There is some need to ensure the overall numbering system is followed consistently and that recommendation numbers aren't missed in the final report. The numbering system has been adjusted from the Salter Point and Waterford management plan to include an extra level of breakdown - which does not make it clearer. Some of the wording of the recommendations do not read well independently which will hinder reproduction of isolated sections of the report when planning works.

There were general concerns about the basis of the maps contained within the report - with some disagreement about the condition assessments and boundaries of different vegetation communities. These concerns were raised following release of the first draft and no amendments were made prior to the second draft being released for public comment. Further, the vegetation associations do not match the Gibson (1994) supergroup and floristic community types. The maps need to be amended to more accurately reflect the current status of the bushland communities and its health.

Two submissions reiterated their support of the City of South Perth's endeavours and offers general support for the document, however, there was considerable concern about the implications of the document and the process by which it was developed. These particular submissions focused on these aspects.

Process

One submission expressed concern about the public comment period being called over the festive season and that this may have been a deliberate attempt to limit the number of comments received. The public comment period was extended until the 7 March 2003 to overcome this issue.

Two submissions considered that the level of community consultation and involvement in the preparation of the report did not include as much involvement of all parties as the report suggests. The copyright statement shall be amended to more accurately reflect the level of involvement of all parties.

Two submissions expressed considerable concern about the process and lack of direct consultation with one of the major stakeholders in the area. There was also concern expressed that changes made from a very early rough draft were not made, and the draft plan released for public comment had not been reviewed by all of the major stakeholders prior to its release. Overall communication with one of the major stakeholders was considered to be inadequate by this submission. This criticism is accepted and the draft document will be amended to incorporate the initial comments in addition to those raised in this submission.

Two submissions highlighted the need to more precisely distinguish between statutory responsibilities of Government, the legal and non-legal obligations of landholders and the entirely voluntary involvement of the community in the recommendations. Concern was expressed that the document is unclear as it relates to statutory versus discretionary activities. Further, the submission considered that some of the recommendations are clearly the responsibility of State or local government bodies however have been incorrectly assigned to other groups. The recommendations and actioning groups will be re-assessed and modifications made where deemed appropriate.

Two submissions identified the increasing reliance on a small number of volunteers to undertake works that might be the direct responsibility of government, and that there is experience in a few individuals carrying the burden. Further, the difficulties associated with attracting new members was highlighted. These statements in the submission were not intended to detract from the desirability of involving the community in projects as a general principle, but to highlight the lack of sustainability of such arrangements. It is agreed that dependence on volunteers is not sustainable, however requires further discussion about which works are being undertaken by volunteers that may be the responsibility of government. This can be addressed in the Steering Group to be formed to provide guidance for works within the study area.

Two submissions expressed concern that the language used in the 1993 and the 2002 management plans conveys the impression that that the recommendations are confirmed and obligatory. Further many of the broader initiatives that may have been within the scope of private organisations in 1993, are now not due to additional cost pressures. Management plans are intended to provide a framework and guidance for activities, and as such most recommendations do not generally have a statutory basis. The benefit of having a management plan is that it provides a foundation against which to seek external funds and/or undertake general works within a framework. The intention of the document is to achieve planning benefits.

Two submissions expressed concern about the style in which the document is written, whereby there is an orientation towards a 'preferred reading' style. The submission pointed out that this is most conspicuous in the discussion relating to access and the merits of public access along the foreshore. The level of unauthorised activity that is suggested in the report is not consistent with the opinion of the landholders. The interpretation of this information is considered to be inaccurate and a mis-leading outcome that there is a need for facilities to be provided and

recreation activities managed in a more formal way. The submission rejected the recommendation relating to providing for access.

Omissions

One submission suggested that the bushland along Redmond Street and part of Roebuck Drive should be included in this management plan, and considered that such an action by Aquinas College would be pleasing. The submission pointed out a number of attributes of this bushland area making it worthy of retention, particularly its high diversity for its condition. There was concern that the current management system is eating away at the area year by year, particularly through use of the area as a rubbish dump. It was beyond the scope of the document for this section of bushland to be included in the report, however, the Steering Committee that is recommended in the draft management plan can discuss management of this area if agreed.

Specific comments

Figure 1: Boundaries of the study area and vegetation association (title could be modified)

One submission indicated that the map does not show that limestone slopes are present west of the ovals and cleared areas, does not fully show the area of limestone on the eastern side of the Peninsula and does not identify low sandy slopes that extend a small way east of the Freeway near the transverse path that runs between the main track. This figure should be amended prior to completion of the final report.

Figure 2: Bushland condition within study area (title could be modified)

One submission expressed concern at the level of detail in the condition scale mapping and further considered some of the classifications to be an inaccurate assessment, particularly in relation to the proportion of weeds present. This map needs to be updated prior to completion of the final report.

Section 2.3.1 Flora and vegetation (title could be modified)

Sandy ridges

One submission indicated that description of sandy ridges states that the "Areas heavily burnt in 1997 fire.... etc dominated by *Dryandra*". This statement is incorrect as the fire did not include the area of *Dryandra*, and the area has not been burnt for at least 15 years. The text has been amended.

Limestone knolls

One submission pointed out that the mapping near the quarry area did not include the areas of sandy slopes and suggested that the mapping needs to be more detailed for this area. The statement that the "vegetation in the quarry source of weed spread to sandy slopes" is not concise and needs amending to reflect the mapped data. The text and maps have been amended.

Sandy ridges

One submission pointed out that *Acacia lasiocarpa* and *Allocasuarina humilis* have been incorrectly included with the canopy species. Both are understorey plants. The text has been amended accordingly.

One submission provided additional information about native plant species in the area. This information will be added to the report.

Section 2.3.2 Native fauna

One submission indicated that there is believed to be evidence of a native water rat in the area. A suggested fauna survey may offer an opportunity to confirm this.

Section 2.5 Land tenure and zoning

One submission identified that the tenure and zoning information does not clearly define the two entities directly involved with the Aquinas College site, namely that the Christian Brothers as Trustees, own the land and the Aquinas College, the school, is the occupier and manager of the land. The school is answerable to the Christian Brothers in the management of the overall land holdings. There is a direct and binding relationship between these two entities, and means that any use other than those deemed 'school use' requires the permission of the Christian Brothers as Trustees. The text has been amended to incorporate this information.

Section 3.1 Ownership and stakeholder management

One submission highlighted the private land ownership as being an important strength in bushland protection. The submission sought to congratulate Aquinas College on its protection and preservation of the regionally significant bushland, and expressed support for the Recommendation G3.2 for the College to employ a part time bush regenerator. This comment has been noted.

Section 3.1.1 Vesting and land tenure

Three submissions expressed support for the concept of a management body for the areas involved (Recommendation G 1.5). One submission offered an alternative forum as being in the City's Community Environmental Advisory Committee. It highlighted the benefits of a coordinating body in terms of seeking resources and preparation of grant applications. This recommendation will be implemented as a priority.

Two submissions supported the suggestion of ensuring high levels of communication between all stakeholders, with a proviso that the major landholder was not required to provide the lead. The importance of open communication lines is recognised and the comment about possible lead organisations noted. The City of South Perth is happy to offer support to such a forum.

Two submissions recognised that recommendations such as those relating to sharing resources will be best managed in the Steering Committee (management group) that will be established as one of the other recommendations of the plan. Further this forum provides an appropriate location for the setting of priorities. This approach is preferred by the City of South Perth and establishing a Steering Committee is seen as an extremely high priority.

One submission expressed surprise at the mention of a current MRS amendment to change the Urban zoning of Mt Henry Peninsula to Reserve for Parks and Recreation. The submission further indicated that follow-up calls to the Department of Planning and Infrastructure and the Planning Department of the City of South Perth also indicated no knowledge of any such amendment. This will be investigated and the text amended accordingly.

Section 3.2.1 Erosion control

Two submissions indicated that the feasibility of implementing recommendations such as those relating to geotechnical assessment, closing and rehabilitating tracks, installing signage and fencing and investigating the feasibility of a public access track will be best managed in the Steering Committee (management group) that will be established as one of the other recommendations of the plan. Further this forum provides an appropriate location for the setting of priorities. This approach is preferred by the City of South Perth and establishing a Steering Committee is seen as an extremely high priority.

Section 3.2.2 Water quality management

One submission expressed strong support for the recommendations relating to the educational aspects of the management plan (Recommendations G 2.15 and G 7.5). The submission further suggested that the environmental officer could provide considerable support or a new part time position (Environmental Education Officer) be created for this purpose. The City will investigate opportunities to increase the level of funding available to support environmental programs, and liaise with the Education Department about increasing participation in such programs.

One submission recommended rewording of the text relating to management of drainage in the event that sections of the freeway being widened, to ensure that best management practice is adhered to. The text has been amended.

Section 3.3.1 Vegetation

One submission expressed strong support for the presence of the City's two specialised and dedicated bushland care officers, and recognised the benefits of this labour force (Recommendation G 3.1). This comment is noted.

Two submissions identified that the one member of the Aquinas College ground staff has accreditation in bushland revegetation, and further suggested that increasing this presence had associated resourcing issues (Recommendation G 3.2). The text has been modified to reflect the current staffing arrangements. Any recommended increase in the presence of trained bushland regenerators can be assessed as part of standard recruitment process, if deemed appropriate.

Two submissions accepted in principle many of the recommendations relating to improved management activities and practices such as modifying watering and irrigation regimes, weed control techniques, disposal of grass clippings, positioning of compost heaps, fuel reduction and firebreak maintenance and general clean ups and litter removal. These comments are noted.

Section 3.3 Vegetation management

One submission expressed support for the ongoing control of non-local species (Recommendation G 3.3, G 3.4 and G 3.13). This comment is noted.

Two submissions suggested that the recommendation relating to continuing revegetation of the foreshore (G 3.3) requires further discussion. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Two submissions suggested that removal of inappropriate vegetation and replacement with appropriate species (G 3.4) is not the responsibility of the Aquinas College. Private landholders are required to control plants declared under the Agricultural Protection Act, and aside from that legislation, any control is the prerogative of the College.

Two submissions accepted the need for weed control (Recommendation 3.5) in principle within the confines of available resources. This has been noted.

Two submissions considered the recommendation to close certain tracks and constructing others (G 3.6) to be problematic and requiring further discussion. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Two submissions indicated that the recommendations encouraging investigations into groundwater, dieback mapping and rehabilitation to be problematic (G3.18 - 3.20 respectively), principally in relation to the cost. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Section 3.3.4 Dieback management

One submission considered that the idea of a dieback survey to be interesting and supported recommendations G 3.19 - G 3.22.

Two submissions accepted the recommendations to implement hygiene measures when working in the bushland and to consider dieback risk and develop responses, however, suggested further discussion is required. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Two submissions supported the need for fire management, control of grassy weeds, periodic fuel reduction, the need for maintenance of firebreaks and modifying the current disposal of lawn clippings. The submissions also accepted the need to liaise with the Kensington Fire Brigade.

Two submissions expressed an interest in determining available resources to remove litter from the foreshore, and suggested further discussion take place. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Section 3.4 Fauna management

One submission expressed support and excitement for the involvement of manual arts students in constructing nesting boxes (Recommendation G 4.1), if there is energy and interest. This recommendation should be followed up with the teacher and students of the manual arts classes.

Section 3.4.1 Fauna

One submission pointed out that the consultants wrote that “There may be a higher occurrence of native fauna on the native fauna on the Mt Henry Peninsula, however no comprehensive study has been carried out.” Clarification of this point is required as there is an understanding that a fauna survey was undertaken by the WA Museum in 1994.

Two submissions considered the recommendation to undertake a comprehensive fauna survey (G 4.2) and fox control (G 4.7) to be problematic due to the likely associated high cost.

Section 3.4.2 Pest fauna

One submission considered that it is in the interest of both CALM and the City of South Perth to undertake fox control on ecological and health grounds, and offered the suggestion that if rabies were to get into the fox population at its current level then the disease would spread rapidly. The City will continue to investigate opportunities to implement Recommendation G 4.8 with Aquinas College.

One submission agreed with the recommendation for dogs to be held on leashes (Recommendation G 4.11), however, provided anecdotal evidence that many dog owners continue to let their pets off their leashes during low tide events and many animals play in the water. The submission indicated that a long education process will be required, and that the recommended signage 'No dogs' be installed at strategic locations. The submission also supported the use of plenty of Poo-ch Pouche dispensing points. The submission also suggested installing a short treated pine log post-and-rail fence similar to that at Milyu Reserve at high water mark with a 'No dogs' sign on it.

One submission was concerned that there was inadequate discussion about dog management and the need to keep dogs on leashes. This issue was discussed in Section 3.4.2 of the draft management plan and Recommendation G 4.11 relates to ensuring that this information is presented clearly to people using the area.

One submission expressed support for the rabbit baiting program undertaken so far (Recommendation G 4.13). The submission further suggested that the City develop a By-Law requiring owners of pet rabbits to restrain their pets to within their property boundary.

Section 3.5 Heritage management

Two submissions considered that the four recommendations (G 5.1 - G 5.4) relating to Aboriginal heritage management to be problematic and requiring further discussion. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Section 3.6 Recreation and infrastructure management

One submission noted that a high priority for installation of toilets at Cloister's avenue overpass was recommended. It was considered that bushland management should rate much more highly than amenities. There was also concern that a toilet block similar to that at the Narrows Bridge and Melville Parade will attract undesirable elements. It was suggested that one or two unisex/disabled access toilets may be sufficient for the area, and would meet the needs of most cyclists.

Section 3.6.3 Access

One submission expressed support for an exclusion policy to keep uncaring members of the public out (G 6.13) while suggesting a need to develop opportunities for caring people to obtain access to the land. The submission also disagreed with the recommendations to provide access to the area with a pathway (G2.8 and G 6.15). There was also recognition of the use of the gate on the Redmond Street entrance to Aquinas Bay in preventing access to non-school users of the boat launching area.

Two submissions expressed a need for discussion prior to any action being taken to implement the recommendations relating to installing signage and fencing to discourage trespassers

(Recommendation G 6.13). The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Two submissions indicated that recommendations to install public access tracks along the foreshore (Recommendation G 6.15) and the associated encouragement of public access are of concern and unacceptable. The concerns principally relate to general security issues and the general implications and potential liability risk of an increased public presence. Vandalism is also of concern. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Two submissions expressed further concern with the wording of the text describing access which can be perceived as "assuming that there will be public access". Major impediments to this assumption as associated with the private ownership status of the land, security and risk issues. The submission further indicated a willingness to defer this issue pending ongoing discussions between the major stakeholders, and gaining advice from the relevant State Government departments. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Two submissions identified a need for a better system for ensuring that the locked gates at the entry to Mt Henry Bridge are kept locked. The submission suggested that master keys be provided to approved individuals, and the managers of the Kwinana Freeway and Mt Henry Bridge take responsibility for ensuring these entry points are secured at all times. Discussion should be held between the City of South Perth, Main Roads WA and other primary stakeholders to address this issue of uncontrolled access. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Section 3.6.5 Water based recreation

Two submissions noted that the recommendation relating to holding a meeting to discuss waterskiing issues (Recommendation G 6.20) is not a direct responsibility of the College, however, identified that the College should be one of the stakeholders who participates in the meeting. The recommendation suggests that a meeting be held with key stakeholders to discuss this issue, and identifies the lead agency to the City of South Perth.

One submission notes that the provision of a marked buffer zone (Recommendation G6.22) is not necessarily going to work, and pointed out where a similar approach had failed at Milyu.

Two submissions expressed concern that the recommendation for the marked buffer zone would have cost implications for the College. It is considered that the recommendation identifies the College as a major stakeholder to be present in the discussions, and seeks to ensure open communication about issues that may indirectly impact on the College.

One submission suggested that the most effective way to alleviate worm digging everywhere (G6.25) would be to set aside an area with arrowed signs pointing to the area suitable for digging. Areas where such activities can occur were suggested as Sulman Avenue steps or near the end of Salter Point Parade.

One submission highlighted the importance of addressing the impacts of river based water sports on the immediate foreshore. Activities including a tendency for boat users to slowly clear/remove

foreshore vegetation to create more useable beach space to land their boats and to provide picnic space are of particular concern. Other issues of concern are general vandalism, accumulation of rubbish and an increased risk of summer bushfire, which all pose a threat to the wider environment. The submission suggested that state and local government authorities look at this issue more closely and develop detailed management strategies with the support of the Aquinas College and Christian Brothers as Trustees.

Section 3.7 Public awareness, education and training

Two submissions considered that there is a need to discuss the recommendations relating to signage design, assessment, placement and removal further. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Two submissions supported in principle the recommendations relating to the school involvement and formation of local friends groups. The recommendation relating to the friends group should be re-worded to reflect that the Mt Henry Peninsula Conservation Group exists and should seek more members rather than use of the phrase “support the formation of”.

Section 3.8.1 Infrastructure maintenance

One submission highlighted the need for Main Roads WA to have their own management plan for the area (Recommendation G 8.1). The plan should require the endorsement of the EPA, CSP and other stakeholders such as Aquinas College before proceeding with any more works.

Two submissions considered that recommendation encouraging regular inspection and maintenance to be problematic due to the cost and resourcing implications (Recommendation G 8.1). Recognition of this activity in the document relates to normal property control and should not be seen as a request for additional works.

Two submissions accepted in principle the benefits of community involvement in litter collection.

Two submissions considered that recommendation encouraging repairing damage caused by vandalism to be problematic due to the cost and resourcing implications (Recommendation G 8.3). Recognition of this activity in the document relates to normal property control and should not be seen as a request for additional works.

Two submissions endorsed the recommendation relating to minimising irrigation (Recommendation G 8.7).

Two submissions considered that Recommendation G 8.8 requires further discussion due to associated cost implications. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Area specific management recommendations

Section 4.1.1 Cloisters car park area

One submission agreed with the recommendation to fence off the paperbark grove (Recommendation A1.14), and that fencing should be installed around all important remnants. It suggested that a fenced bike track may be acceptable at the Spit.

Section 4.5 Mt Henry Peninsula
Two submissions supported Recommendation A 5.7.

Two submissions considered that recommendations A5.1 - A5.10 all require further discussion The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Section 4.6 Aquinas Bay
Two submissions identified a need to further discuss recommendations relating to removal of exotic trees from bushland, signage and seating and foreshore cleanups. The Steering Committee that is recommended as the first action of this management plan, will provide an appropriate forum for such discussions.

Two submissions endorsed the recommendations to removal and relocation of old compost heaps, weed control around the tennis courts and the need to remove weeds and prunings.

Section 7.2.4 Other schemes supporting nature conservation on private land
One submission identified that there was concern about funding expressed in the document while the appendix there is mention of covenanting and CALM's current involvement in the area under the Land for Wildlife Scheme. The submission sought more information on the position of the Christian Brothers and Aquinas College on covenanting, and requested that this information be included in the main part of the management plan. The submission recognised that Aquinas sets a fine example to other schools in the district, especially the government schools of Manning Primary School and Koonawarra Primary School. It was suggested that the Christian Brothers and Aquinas College could consider taking out a covenant to help put moral pressure on the Education Department to allow covenanting or even - re-vesting of their remnant bushland areas.

Appendices

Appendix 7:
One submission identified that there is no control information on a potentially serious weed, *Lachenalia reflexa*. Some of the recommended weed treatments from 'Managing Perth's Bushland' are now out of date and need revising.

One submission advised that the Mt Henry Project Vision Statement that is included in the appendices has recently been updated, and that the document should be amended to reflect this.