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FORESHORE ASSESSMENT IN THE BENNETT BROOK CATCHMENT



WATER RESOURCE MANAGEMENT SERIES

WATER AND RIVERS COMMISSION REPORT NO. WRM 14
1999



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Cover Photograph: Bennett Brook (Map 1), Clarry Small Park. [Taken by Adrian Parker]



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Foreshore assessment in the Bennett Brook Catchment

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Prepared by
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Jointly funded by



Natural Heritage Trust



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Methodology development by Nicole Siemon, EMS in consultation with Dr Luke Pen and Jodie Oates, Water and Rivers Commission.

Surveys and mapping were undertaken by Kelly Shepherd, EMS.

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Foreword

Landcare groups in Western Australia have been concerned with the protection and rehabilitation of river systems for some time. However, with such large areas to cover, and many streams being in private ownership, there is a lack of information available to many groups to assist them in making management decisions.

In 1995 Pen and Scott developed a technique for '*Stream Foreshore Assessment in Farming Areas*'.

This provided a standardised assessment technique that can be performed by groups and individual landholders themselves. It has been widely accepted and used to successfully assess many streams throughout south-west WA. As use of the technique has expanded from farm to catchment scale surveys, some users began to express a need for a modification of the methodology that would enable them to assess streams in urban and semi-rural environments, where there are a different suite of issues to be considered. In 1997 the Water and Rivers Commission obtained Natural Heritage Trust funding to assist in the development of a foreshore condition assessment methodology suitable for use in urban areas and to undertake surveys on several major tributaries of the Swan-Canning Catchment.

Nicole Siemon and Kelly Shepherd of Ecosystem Management Services (EMS), in consultation with the Water and Rivers Commission, have developed a technique for '*Foreshore Condition Assessment in Urban and Semi-rural Areas*'. The assessment technique is comprehensive yet, like that of Pen and Scott, does not require specialised knowledge or expensive technical assistance and hence assessment can be performed by groups and individuals themselves.

The methodology considers overall stream condition to be comprised of four major parameters that are independently assessed and the results are then combined to determine the overall stream condition.

Bank stability includes assessment of bank slope, erosion, slumping, sedimentation and stabilising structures.

Foreshore vegetation structure and composition, includes the use of tables with native and weed species commonly found in the region. This allows for straightforward yet comprehensive vegetation surveys

looking at abundance, health and regeneration of individual species.

Stream cover recognises the importance of overhanging native vegetation and in-stream cover, and notes the abundance of native and exotic vegetation and the presence of deciduous trees.

Habitat diversity includes stream form, water quality and identifies habitat requirements for a variety of terrestrial and aquatic fauna.

Along with recording information on stream condition at the time of the survey the methodology also ensures that information is collected that will aid groups in making management decisions. This information includes disturbance factors, surrounding land use, evidence of existing management and special cultural or spiritual significance.

The condition assessment technique that has been developed has several features that are particularly important in helping groups to make their own river management decisions. The techniques:

- do not require specialised knowledge or expensive technical assistance and surveys can therefore be undertaken by individual landholders or by community groups;
- immediately provide managers with data to aid them in their decision making, especially in prioritisation of works;
- provide standardised data suitable for compilation and comparative assessment, even when using data collected by a variety of groups and individuals; and
- provide standardised data suitable for ongoing monitoring and evaluation.

The methodology has been tested on several tributaries in the Swan-Canning catchment. These tributaries have active catchment groups working on, or planning, rehabilitation works. Reaches surveyed were those identified by the catchment groups as priority areas in which they plan to be undertaking works. It is hoped that this report will assist in the long-term management of these tributaries.





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1. Introduction

The riparian zone adjacent to natural watercourses acts as a buffer to the surrounds. Healthy foreshore vegetation stabilises the foreshore banks, slows and filters water thus reducing erosion of the banks and sedimentation of major channels. Foreshore vegetation also provides stream cover and suitable habitats for aquatic and terrestrial animals. Often these areas are a haven for native fauna, particularly during the dry summer months.

Riparian areas have always been a focus for development and as a consequence are often highly degraded. The major threats to foreshore health are the loss of native vegetation or a decline in health due to weed invasion. The loss of deep-rooted native plants often causes the destabilization of foreshore banks, leaving these areas prone to erosion particularly during peak flow events.

Gaining an understanding of the health of river foreshores is the first step towards developing appropriate management strategies to protect and enhance these areas.

1.1 Need for this study

Community groups are becoming increasingly interested in foreshore management and are taking an active role in this process. This interest in foreshores provides opportunities to collect substantial data about waterways.

The need for a standard methodology to assess foreshore condition was recognised to ensure consistency of information gathering, in the early 1990s. Procedures for recording information on foreshore condition have been available in rural areas for a number of years (Pen and Scott 1995) however this system had limited applications in urban and semi-rural environments. Recognition of the need to modify this methodology

occurred in 1997, and resulted in a funding application being developed for the Natural Heritage Trust. This successful application required the development of a standard foreshore assessment method based on the rural system (Water and Rivers Commission 1999), testing of the new methodology and developing a reporting technique for this work. Ecosystem Management Services (EMS) undertook this project on behalf of Water and Rivers Commission (WRC) and the Natural Heritage Trust (NHT).

1.2 Community involvement process

The intended audience for the foreshore assessment method is state and local government officers and the community. In order to ensure that the information included on the assessment form was relevant to these groups, and captured most of the data required, EMS and the WRC implemented a community involvement process for development of the form.

A preliminary draft of the foreshore assessment method was developed and presented to representatives from many of the catchment groups in the metropolitan area. The comments from this meeting were assimilated into the method. This second draft was then presented at a subsequent series of meetings with each catchment group, to canvas further comments. Again, suggestions recorded were collated and incorporated into the document.

Discussion was also held at the second series of meetings to determine specific areas of interest for each catchment group. Each group identified priority foreshore areas to undergo assessment, to enable further refinement of the standard methodology. The locations selected included areas that were already a focus or were potential sites for future rehabilitation works.



The sites nominated by groups to be surveyed were as follows:

Bennett Brook Catchment

- Bennett Brook

Upper Canning Catchment

- Bannister Creek
- Canning River
- Roley Pool
- Southernwood Creek
- Wright Brook

Ellen Brook Catchment

- Breera Brook
- Ellen Brook

As a result of time constraints and access difficulties not all of the foreshore areas that were nominated by the community groups were surveyed.

1.3 This report

This report summarises the results of the preliminary surveys conducted along Bennett Brook using the revised (draft) foreshore assessment method (Water and Rivers Commission 1999). These surveys were conducted to verify and refine the method. Recommended strategies for appropriate management of future works on the focus foreshore areas are also detailed in the document. Information is provided on weed control techniques, recommended native species for rehabilitation work and methods to undertake soft engineering works.

The results from the surveys conducted within the Canning River Catchment and the Ellen Brook Catchment have been published as separate reports (Water and Rivers Commission 1999).



2. Methodology

2.1 Site selection within tributaries

Following the community involvement process the nominated sections of Bennett Brook were assessed to determine the most appropriate areas to undertake the foreshore survey. This was based on the need to assess a complete range of foreshore health to ensure that the method was sufficiently balanced to cover all situations ranging from rural to urban zones.

The Bennett Brook survey extended from north of Benara Road upstream to Mussel Pool, Whiteman Park.

2.2 Implementing the assessment method

The foreshore assessment survey method has been developed to enable community groups to assess the condition of foreshores in urban and semi-rural areas. For detailed information on the methodology used to assess foreshore condition refer to Water and Rivers Commission (1999).

As outlined above, this process ensures a consistent method is used to gather information. This allows the data collected from multiple surveys, conducted by various people over time, to be collated together. This accumulated information can then be used to prepare management plans and focus on priority areas for rehabilitation. The results can also be used to monitor changes over time and to compare different foreshore areas, and be shared amongst state and local government authorities and the community.

2.2.1 Undertaking foreshore surveys

The foreshore areas selected were traversed prior to the survey being conducted. The foreshore was then divided into relatively homogeneous sections of similar vegetation structure and land use. A survey was conducted for each of these sections, and the condition of the foreshore parameters was calculated and the overall Stream Condition Index was determined.

In areas where foreshore vegetation was very dense on both banks, both sides were surveyed separately and a form was completed for each side. On highly degraded areas where the foreshore along both banks was easily observed from one side, and the vegetation and disturbance factors were similar, a single survey form was completed.

Scaled baseline maps were prepared by WRC showing cadastral boundaries and the waterway. The cadastral information assists in gaining bearings out in the field. As each homogeneous section was identified, information was sketched onto the baseline maps. Other information such as the extent of vegetative overstorey along the foreshore, the location and extent of predominant middlestorey native species and weeds and the presence of disturbance factors such as discharge pipes and infrastructure such as fences present were detailed on each map. This ensured that each form completed for a specific section also had all relevant information marked on the correct map.

Note that the left and right side of the main channel are defined by looking upstream.

2.2.2 Environmental Parameters of Foreshore Condition

Principal environmental parameters are used as indicators of foreshore condition and are assessed during the foreshore survey to determine the overall Stream Condition Index.

These parameters are;

- Bank stability
- Foreshore vegetation
- Stream cover
- Habitat diversity

A colour coded system has been developed to summarise the condition of each of the above environmental parameters. This system allows the information to be provided in an immediately recognizable form. The status of each of the parameters are assessed and graded



from Blue (Excellent) to Black (Very Poor) (Table 1) using the criteria outlined in Table 2. For example, the Bank Stability of an area is determined by assessing the level of erosion, slumping and sedimentation along the foreshore. In a pristine area where there is no discernable decline in condition, and no obvious erosion the Bank Stability may be graded as Blue. In a highly

modified system where the foreshore is highly degraded and subject to severe erosion and bank collapse, Bank Stability may be graded as Red or Black. A scoring system is linked to this process to provide a quantitative method of calculating stream health.

Table 1: Colour codes and points value for ranking stream conditions

Condition	Excellent	Good	Moderate	Poor	Very Poor
Colour rating	Blue	Green	Yellow	Red	Black
Score	8	6	4	2	0

From: Water and Rivers Commission (1999).



Table 2: Determining summary foreshore health

	Blue - Excellent 8 points	Green - Good 6 points	Yellow - Moderate 4 points	Red - Poor 2 points	Black - Very poor 0 points
Bank Stability	No erosion, slumping or sediment deposits; dense native vegetation cover on banks and verge; no evidence of disturbance or areas of exposed soil.	No significant erosion, slumping or sediment deposits in floodway or on lower banks; good native vegetation cover; only isolated areas of exposed soil or thinning vegetation.	Some localised erosion, slumping and sediment deposits; native vegetation cover on verges may be patchy and interspersed with patches of exposed soil.	Extensive active erosion slumping and sediment deposition particularly during peak flows; bare banks and verges common.	Almost continuous erosion; over 50% of banks slumping; sediment heaps line or fill much of the floodway; little or no vegetation cover.
Foreshore vegetation	Healthy, undisturbed native vegetation with structure intact and verges more than 20 m wide; no weed or signs of disturbance evident.	Vegetation structure dominated by native plants that comprise 80 - 100% of the total number of species; only scattered weeds or rarely evident in small clusters; nil or minor signs of disturbance (i.e. tracks, rubbish dumping).	Some changes in vegetation structure, native plants comprising of 50 - 80% of the total species composition; little regeneration of trees and shrubs; weeds occurring occasionally; moderate levels of disturbance.	Modified vegetation structure with native plants comprising only 20 - 50% of the total species composition. Trees remain with only scattered shrubs and an understorey dominated by weeds; high prevalence of disturbance.	Insufficient vegetation to control erosion; natural vegetation structure absent with occasional native trees and shrubs comprising less than 20% of the total species composition; weeds abundant; very high prevalence of disturbance and extensive areas of exposed soil.



	Blue - Excellent 8 points	Green - Good 6 points	Yellow - Moderate 4 points	Red - Poor 2 points	Black - Very poor 0 points
Stream Cover	Abundant stream cover from dense overhanging vegetation providing almost continuous shade; frequent instream cover from aquatic vegetation and/or leaf litter, rocks or logs.	Abundant shade from overhanging vegetation; occasional instream cover from patches of aquatic vegetation and isolated heaps of leaf litter or rocks and logs.	Scattered fringing vegetation with occasional patches of shade; infrequent instream cover with little aquatic vegetation, very infrequent rocks and logs.	Stream channel mainly clear; fringing vegetation almost absent providing very little permanent shade; instream cover almost absent with generally no instream vegetation and very infrequent rocks and logs.	Zero or minimal stream cover with no permanently shaded areas and no instream cover.
Habitat Diversity	Excellent water quality with permanent water (i.e: pools and creeks); three or more aquatic and terrestrial habitats including diverse vegetation types, edge waters, instream cascades, riffles, pools and woody debris.	Good water quality and some permanent water; at least three aquatic habitat types; at least one habitat type for terrestrial invertebrates; at least one habitat type for each terrestrial vertebrate category (frogs, reptiles and birds).	No apparent problems with water quality (i.e: muddy or cloudy in winter); at least two aquatic habitat types; at least one habitat type for terrestrial invertebrates; at least one habitat type for any two of the terrestrial vertebrate categories.	Possible seasonal problems with water quality and no permanent water; at least one aquatic habitat type; at least one habitat type for terrestrial invertebrates; at least one habitat type for one of the terrestrial vertebrates.	Poor water quality; almost no healthy habitats available for aquatic and terrestrial organisms.



The Stream Condition Index is a summary of the foreshore environmental parameters (Table 3) and is an indication of the overall stream condition.

Table 3: Summary of Stream Condition Index

Colour Code	Parameter Rating	Description
Blue (32 points)	Excellent	All parameters blue.
Green (22-30 points)	Good	Three to four parameters rated green or better with only one parameter rated yellow; no red or black ratings.
Yellow (14-20 points)	Moderate	Three parameters rated yellow or better with no more than one red; no black
Red (6-12 points)	Poor	Two or three parameters rated red with no more than one black.
Black (0-4 points)	Very Poor	Two or more parameters rated black.

2.2.3 Collating the results

The results compiled from the foreshore surveys of Bennett Brook were collated and a series of maps produced. These maps were digitised to enable presentation of the foreshore information in a visual format with corresponding text.

The summary codes of the condition of each environmental parameter and the Stream Condition Index are included on the summary map.

This report contains a detailed description of the key findings of the four environmental parameters assessed for each survey section. The recommended strategies for appropriate remedial works are also discussed.



3. Key findings for the Bennett Brook catchment

Bennett Brook flows through urban, semi-rural and rural areas. Along many sites the overstorey is completely absent or present for a few metres only on either side of the main channel. This frequently occurs where the vegetation was cleared or stock traditionally accessed the riparian zone. The lack of healthy foreshore vegetation often leads to a decrease in bank stability, stream cover and habitat diversity.

3.1 Bank stability

Bank stability is determined by the extent of erosion and slumping occurring along foreshore banks and the level of sedimentation within stream channels. Erosion is evident at almost all sites, generally at low to moderate levels.

Localised disturbance frequently occurs along steep banks near the entry points of drainage channels or near outflow points of discharge pipes. Erosion also increases where infrastructure works have been undertaken for example near crossovers and bridges.

The impact of a decrease in the extent of dense emergent species along most of the foreshores surveyed is evidenced by increased erosion, particularly near the base of trees that grow immediately along the banks. As the soil is scoured away, roots are exposed and trees are less supported. Subsequently, there is an increased likelihood of trees collapsing and exacerbating the erosion problem.

There are a number of areas along Bennett Brook that show evidence of severe erosion due to the lack of foreshore vegetation. For example, along Section I/Map 7 where stock are present in the immediate foreshore area large patches of bare sand are evident and bank erosion and collapse are obvious.

Sedimentation levels vary along the main channels of the surveyed watercourse. Large deposits of sand near the lower sections of Bennett Brook for example along Section D/Map 2 have become vegetated and stabilised. Significant levels of sedimentation and increasing particle load in the water column are indicative of erosion occurring further upstream. This highlights the need to understand processes occurring upstream of any waterway and demonstrates that no site can be considered in isolation.

3.2 Vegetation

The foreshore vegetation along sections of Bennett Brook is highly modified particularly in areas where the overstorey is completely absent or present for a few metres only. Alternatively, in areas where the overstorey is more extensive, remnant native species persist in the middlestorey and understorey.

Swamp paperbark (*Melaleuca raphiophylla*) and Flooded gum (*Eucalyptus rudis*) are the predominant overstorey trees along all of the foreshore sites. Other less common tree species include Modong (*Melaleuca preissiana*) and Marri (*Corymbia calophylla*) which often occur on drier soils.

In areas where native shrubs persist in low numbers in the middlestorey such as Section G/Maps 4 and 5, Swamp peppermint (*Agonis linearifolia*), Coojong (*Acacia saligna*), Narrow leaved oxlyobium (*Oxlyobium lineare*), Prickly moses (*Acacia pulchella*), Albizia (*Paraserianthes lophantha*) and Blackboy (*Xanthorrhoea preissii*) are found (Appendix 1A).

There are very few native understorey species persisting along these foreshore areas. Ground creepers such as Running postman (*Kennedia prostrata*) and Native wisteria (*Hardenbergia comptoniana*) are present. Native sedges and rushes such as the Pale rush (*Juncus pallidus*) occur in clumps along the foreshore channels and in low-lying damp areas. The small herb Centella (*Centella cordifolia*) persists often in highly weed-infested areas.

There are a few native species that are abundant and form dense stands in the middlestorey and understorey. The native Bracken fern (*Pteridium esculentum*) for example, is often associated with an increased frequency of Marri trees in the overstorey and is located away from the immediate foreshore as seen at Bennett Brook (Section E/Map 2).

Exotic deciduous trees such as Willow (*Salix* sp.) and less commonly Fig (*Ficus* sp.) occur on the degraded foreshores along Sections A and B/Map 1. These trees were originally planted as ornamentals or have escaped from nearby gardens. Deciduous trees threaten foreshore health as sudden leaf fall during winter decreases available stream cover and often introduces



large amounts of vegetative material into the water column. The breakdown of large amounts of soft leaves may cause a sudden decline in the amount of available oxygen in the water column affecting instream organisms.

The control and removal of exotic trees is often difficult as species such as Willow produce numerous suckers. These trees often grow in areas with limited foreshore cover and the removal of these large trees may threaten bank stability.

Weeds in the middlestorey often form dense stands in clumps or in narrow strips along the edge of the watercourse. The most common weed species that form dense stands include Blackberry (*Rubus fruticosus*). Arum lily (*Zantedeschia aethiopica*) is also frequent in high numbers along foreshore areas and in low lying winter wet depressions in the floodplain.

The greatest threat to revegetation is the presence of dominant understorey weeds including grasses such as Kikuyu (*Pennisetum clandestinum*). Other common weeds include Soursob (*Oxalis pes-caprae*), Dock (*Rumex spp.*), Capeweed (*Arctotheca calendula*), Vetch (*Vicia sativa*) and Paspalum (*Paspalum sp.*). The introduced rush *Juncus microcephalus* occurs along foreshore banks and within low lying flooded areas and the Common joy weed (*Alternanthera nodiflora*) is abundant in the main floodway in Section A/Map 1.

3.3 Stream Cover

The level of overhanging vegetation and the abundance of native and exotic species along the foreshore determines the level of cover and permanent shade along a waterway. Instream vegetation and the presence of rocks and logs also provide cover for aquatic organisms.

The Stream Cover condition is scored as Black (Very Poor) along the lower sections of Bennett Brook (Sections A - B/Map 1) due to the predominance of deciduous overstorey trees. Stream Cover along Section F - G/ Maps 3 - 5 is graded as Yellow (Moderate) as dense stands of weeds such as Watsonia (*Watsonia bulbillifera*) or Blackberry (*Rubus fruticosus*) overhang the waterway and provide patches of permanent shade. Overall the stream cover along the length of Bennett Brook is poor due to the absence of dense native species in the understorey and middlestorey.

3.4 Habitat diversity

Instream habitat diversity is affected by the quality and permanency of water and by the presence of instream rocks, submergent and emergent vegetation and logs. These features provide substrates for attachment for aquatic invertebrates, cover for fish and potential basking sites for turtles. Healthy, diverse streamside vegetation provides suitable habitats for terrestrial organisms and overstorey trees provide roosting and nesting sites for birds.

Many of the survey sites assessed along Bennett Brook were scored as having either Red (Poor) or Black (Very Poor) Habitat Diversity. The frequent lack of healthy, diverse native vegetation limits the number of suitable habitats available for terrestrial animals.

Habitat Diversity was graded as Yellow (Moderate) along Sections E - G/Maps 2 - 5 indicating that there are no apparent problems with water quality and there are suitable sites for aquatic organisms such as logs and rocks instream. Further, diverse habitats for terrestrial organisms such as a variety of vegetation types, deep leaf litter and dense streamside vegetation are also present at these sites.



3.5 Overall summary conditions for all surveyed sites

The overall summary conditions of the foreshore sections surveyed for each of the tributaries is provided below.

3.5.1 Summary results for Bennett Brook (Bennett Brook Catchment)

Bennett Brook (Section A)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Black	Black	Black
Moderate	Very Poor	Very Poor	Very Poor
4	0	0	0

Stream Condition
Black
Very Poor
4

Bennett Brook (Section B)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Black	Red	Red
Moderate	Very Poor	Poor	Poor
4	0	2	2

Stream Condition
Red
Poor
8

Bennett Brook (Section C)

<i>Bank Stability</i>	Foreshore Vegetation	Stream Cover	Habitat Diversity
Red	Red	Yellow	Red
Poor	Poor	Moderate	Poor
2	2	4	2

Stream Condition
Red
Poor
10

Bennett Brook (Section D)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Red	Red	Red
Poor	Poor	Moderate	Poor
4	2	2	2

Stream Condition
Red
Poor
10



Bennett Brook (Section E)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Red	Yellow	Yellow
Moderate	Poor	Moderate	Moderate
4	2	4	4

Stream Condition
Yellow
Moderate
14

Bennett Brook (Section F)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Red	Yellow	Yellow
Moderate	Poor	Moderate	Moderate
4	2	4	4

Stream Condition
Yellow
Moderate
14

Bennett Brook (Section G)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Yellow	Yellow	Yellow
Moderate	Moderate	Moderate	Moderate
4	4	4	4

Stream Condition
Yellow
Moderate
16

Bennett Brook (Section H)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Red	Black	Black	Black
Poor	Very Poor	Very Poor	Very Poor
2	0	0	0

Stream Condition
Black
Very Poor
2

Bennett Brook (Section I)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Black	Black	Red	Red
Very Poor	Very Poor	Poor	Poor
0	0	2	2

Stream Condition
Black
Very Poor
4



Bennett Brook (Section J)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Red	Black	Black	Black
Poor	Very Poor	Very Poor	Very Poor
2	0	0	0

Stream Condition
Black
Very Poor
2

Bennett Brook (Section K)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Red	Black	Red	Red
Poor	Very Poor	Poor	Poor
2	0	2	2

Stream Condition
Red
Poor
6

Bennett Brook (Section L)

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Red	Red	Red
Moderate	Poor	Poor	Poor
4	2	2	2

Stream Condition
Red
Poor
10



4. Specific site reports

4.1 Bennett Brook

Results Foreshore Condition Survey

A Study undertaken on behalf of
Water and Rivers Commission and the Natural Heritage Trust



Bennett Brook — Map 1 (Section A) Left Bank

Length of section (m): approximately 175 m
Recorder's name: Kelly Shepherd and Nicole Siemon
Date surveyed: 25/8/98
Nearest road access: Benara Road
Lot number: 0, 76, 75

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity	Stream Condition
Yellow	Black	Black	Black	Black
Moderate	Very Poor	Very Poor	Very Poor	Very Poor
4	0	0	0	4

Description

Bank stability: Bennett Brook is comprised of a number of braided channels and extends across a floodplain area of approximately 30 - 40 m. The location and width of the main channel is difficult to determine due to the presence of the dense emergent Common joy weed (*Alternanthera nodiflora*). The foreshore bank rises gently to a height of 0.3 m. The high level of weed invasion has resulted in slowing of stream flow and extensive retention of sediment from upstream sources (> 50% of the length of the section). The cover provided by the weeds minimises erosion and slumping of the bank.

Vegetation: The overstorey is sparse (< 20% cover) and comprised of exotic deciduous trees such as Willows (*Salix* sp.) and occasional Fig trees (*Ficus* sp.). The native Swamp paperbark (*Melaleuca raphiophylla*) and Flooded gum (*Eucalyptus rudis*) occur occasionally along the foreshore area. The middlestorey layer is continuous (> 80% cover) and dominated by dense stands of Arum lily (*Zantedeschia aethiopica*) interspersed with scattered clumps of the Bulrush (*Typha orientalis*). The native Coojong (*Acacia saligna*) occurs very infrequently. The understorey is also continuous (> 80% cover) and is comprised predominantly of introduced weed species. The native Pale rush (*Juncus pallidus*) and the herb Centella (*Centella cordifolia*) are rare.

Recommended Strategies

- Implement an intensive weed control program ensuring that the potential impact on bank stability is considered before undertaking any works.
- Focus on establishment of deep rooted native middlestorey and overstorey species recommended in Appendix 3, following weed eradication.
- Manage upstream drainage to reduce sediment load to Bennett Brook from subdivisions, road works and other activities.
- Undertake an intensive weed control program in nodes, so areas can be effectively managed and ensure that bank stability is not threatened.
- Focus and maintain weed control activities in any areas sustaining native plant populations and in areas undergoing revegetation following initial weed eradication.
- Inject herbicide into Willow and Fig trees at 10 cm intervals around the trunk in Spring. Monitor and poison any re-growth from suckers. Remove trees when dead.
- Establish native overstorey species such as Flooded gum and Swamp paperbarks, in high density adjacent to exotic species.



Perennial introduced grasses such as Kikuyu (*Pennisetum clandestinum*) are abundant with other species including Soursob (*Oxalis pes-caprae*), Dock (*Rumex* spp.), Capeweed (*Arctotheca calendula*), Vetch (*Vicia sativa*) and Paspalum (*Paspalum* sp.) occurring infrequently. The Common joy weed (*Alternanthera nodiflora*) is abundant along the main floodway.

Stream Cover: Deciduous Willow trees (*Salix* sp.) line the foreshore bank providing only seasonal shade along the edge of the floodway area. There is no permanent shade present across the main channel. Instream cover is abundant due to the predominance of the emergent Common joy weed (*Alternanthera nodiflora*).

Habitat diversity: Water is permanent and the floodway area is waterlogged. The water is shallow due to sedimentation and brown in colour due to the presence of tannins leached from vegetation detritus.

Dense instream and streamside vegetation provides habitats for various aquatic and terrestrial organisms. The water is shallow and slow moving. The lack of overstorey limits the availability of trees for bird nesting and roosting sites.

- Hand weed Soursob, Dock and Cape weed prior to flowering to minimise re-invasion from seed.
- Brush cut and apply flauzifop-butyl in accordance with the recommendations outlined in Appendix 2 to control introduced grasses however, do not disturb root mass.
- Implement instream weed control works (Appendix 2) in bands perpendicular to stream flow i.e. remove a 5 m wide strip of Common joy weed across the floodplain and replant with indigenous rushes and sedges including Jointed twigrush, Pale rush and Sea rush.

- Undertake intensive middlestorey and understorey weed control program.
- Implement planting program of native overstorey trees and when at least 10 m tall, poison deciduous trees and remove from site.
- Monitor sucker establishment from deciduous trees and poison where necessary to minimise further establishment.
- Implement instream control of Common joy weed as discussed above and replace immediately with emergent rushes and sedges. Secure clumps of vegetation using 600 mm “U” shaped pegs.

- Undertake intensive weed control in manageable areas. Focus on monitoring and protecting new revegetation sites.
- Introduce native overstorey species such as Flooded gum and Swamp paperbark along stream length following weed eradication.
- Establish deep rooted middlestorey and understorey species recommended in Appendix 3. Plant in high densities to inhibit weed re-invasion.



Other issues: The presence of a discharge pipe, a bore and pump indicates changes to the hydrological regime. Storage of chemicals, mulches and amended soils occur within 100 m of the Brook at the commercial company City Farmers. The reserve is dominated by introduced annual grasses, which represent a significant fire risk.

- Assess legality of water extraction (Riparian water rights) across the reserve with regards to Water and Irrigation Act.
- Assess water load and qualities contributed to the Brook by the drainage outfall and identify any sources of pollution.
- Determine future landuse for reserve and encourage control of annual grasses to reduce fire risk and re-invasion of revegetation areas.
- Assess management practices at City Farmers to ensure that all nutrient enriched and chemical products are stored in accordance with the local government policy.

Bennett Brook — Map 1 (Section B) Breera Brook

Length of section (m): approximately 180 m
Recorder’s name: Kelly Shepherd and Nicole Siemon
Date surveyed: 24/8/98
Nearest road access: BNorth of Benara Road
Lot number: 3, 9, 10, 11

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity	Stream Condition
Yellow	Black	Red	Red	Red
Moderate	Very Poor	Poor	Poor	Poor
4	0	2	2	8

Description

Bank stability: The brook is comprised of numerous braided channels that flood during the winter. The floodplain extends approximately 30 - 40 m. The location and width of the main channel is difficult to determine due to the presence of the dense infestations of the emergent Common joy weed (*Alternanthera nodiflora*). The foreshore bank rises gently to a height of 1.5 m. The high level of weed invasion has resulted in slowing of stream flow and extensive retention of sediment from upstream sources (> 50% of the length of the section). The cover provided by the weeds minimises erosion and slumping of the bank.

Recommended Strategies

- Ensure the potential impact on bank stability is considered when undertaking weed control activities.
- Focus on establishment of deep rooted native middlestorey and overstorey species recommended in Appendix 3.
- Manage upstream drainage to reduce sediment load to the Brook from subdivisions, road works and other activities.



Vegetation: The foreshore area is highly disturbed with a patchy overstorey (20 - 80% cover). Stands of Swamp paperbark (*Melaleuca raphiophylla*) and Flooded gum (*Eucalyptus rudis*) are interspersed with introduced Willows (*Salix* sp.), occasional Fig trees (*Ficus* sp.). The middlestorey layer is continuous (> 80% cover) and occurs in bands of homogeneous strips of Arum lily (*Zantedeschia aethiopica*) with Bulrush (*Typha orientalis*) occurring upslope. Isolated patches of the Giant reed (*Arundo donax*) are evident. The understorey is also continuous (> 80% cover) and is comprised predominantly of introduced weed species. The native small herb Centella (*Centella cordifolia*) persists infrequently. Common weed species include Kikuyu (*Pennisetum clandestinum*) and Soursob (*Oxalis pes-caprae*) while Dock (*Rumex* sp.), Vetch (*Vicia sativa*), Paspalum (*Paspalum* sp.) occur infrequently. The Common Joy weed (*Alternanthera nodiflora*) is abundant along the main floodway.

Stream Cover: Deciduous Willows (*Salix* sp.) are common along the right foreshore providing only seasonal shade along the edge of the floodway area. Native species rarely overhang providing very little stream cover. Instream cover is abundant due to the predominance of the emergent Common joy weed (*Alternanthera nodiflora*).

- Implement progressive replacement of native vegetation by undertaking intensive weed control activities and subsequently planting indigenous species as recommended in Appendix 3.
 - Plant dense clumps of native species in islands where weeds have been effectively eradicated, and maintain a 1 m weed control buffer around each island.
 - Maintain weed control activities around planted zones and ultimately poisoning and removing the Willows and Figs using methods outlined in Appendix 2.
 - Selectively paint herbicide to poison Arum lilies to minimise disturbance to the substrate.
 - Brushcut Bulrush and remove bulk of vegetative material and paint regrowth with systemic herbicide (Appendix 2). Should Bulrush occur within the stream channel, brushcut in May/June and assess regrowth in September/October.
 - Brush cut Paspalum, Couch and Kikuyu and treat regrowth with flauzifop-butyl in accordance with the recommendations in Appendix 2.
 - Hand weed Soursob, Dock and Vetch prior to flowering and remove from site.
 - Remove patches of Common joyweed and immediately plant native sedges in high density in accordance with Appendix 3.
-
- Undertake intensive weed control in manageable areas and focus on protecting planted areas from future weed invasion.
 - Focus on reintroduction of native overstorey species such as Flooded gum and Swamp paperbark along stream length. Re-introduce understorey and middlestorey species as recommended in Appendix 3.
 - Remove Common joy weed from the floodway and plant dense clumps of native sedges and rushes along the main channel and along the foreshore. Secure clumps using 600 mm "U" shaped pegs.



Habitat diversity: Water is permanent and the floodway area is waterlogged. The water is shallow due to sedimentation and brown in colour indicating the presence of tannins leached from vegetation detritus. The water is very shallow and slow moving and may not support turtles and fish. Dense instream vegetation also chokes the waterway further slowing water movement. The lack of diverse native species along the foreshore area limits the number of suitable habitats for reptiles and frogs while the patchy overstorey provides limited trees for bird nesting and roosting sites.

Other issues: Residential houses and commercial businesses including a Bird Farm are located adjacent to the foreshore area.

- Implement native tree planting program and when at least 10 m tall, poison deciduous trees and remove from site.
 - Monitor sucker establishment from deciduous trees and poison where necessary.
 - Implement instream control of Common joy weed as discussed above and replace immediately with emergent rushes and sedges.
- Provide information leaflets to landholders adjoining Bennett Brook encouraging protection of the foreshores, native vegetation, nutrient management and techniques to minimise other potential impacts.

Bennett Brook — Map 1 (Section C)

Length of section (m): approximately 134 m
Recorder's name: Kelly Shepherd
Date surveyed: 14/10/98
Nearest road access: Benara Road
Lot number: 75

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Red	Red	Yellow	Red
Poor	Poor	Moderate	Poor
2	2	4	2

Stream Condition
Red
Poor
10



Description

Bank stability: The streamline feeding into Bennett Brook is 1.5 - 3 m wide with the foreshore banks rising on a medium grade to 1 - 1.5 m in height. A number of small braided channels and winter wet depressions occur alongside the floodway area. Localised erosion occurs along 5 - 20% of the foreshore banks with little evidence of slumping or bank collapse. Sedimentation is significant with islands of sand present along 20 - 50% of the channel.

Vegetation: The overstorey vegetation is patchy (20 - 80% cover) and is comprised predominantly of Swamp paperbark (*Melaleuca raphiophylla*) and Flooded gum (*Eucalyptus rudis*) with infrequent Marri trees (*Corymbia calophylla*). Occasional deciduous Willows (*Salix* sp.) are present along the foreshore. The middlestorey is patchy (20 - 80% cover) and dominated by introduced weeds. The native shrub Grey stinkwood (*Jacksonia furcellata*) is found very infrequently. Common weed species include Arum lily (*Zantedeschia aethiopica*) and Bulrush (*Typha orientalis*). Occasional species present along the foreshore include Pampas grass (*Cortaderia selloana*). The understorey is continuous (> 80% cover) and is comprised of weeds. Abundant species include Kikuyu (*Pennisetum clandestinum*) and Veldtgrass (*Ehrharta calycina*). Less common species present are Dock (*Rumex* sp.), Vetch (*Vicia sativa*), *Juncus microcephalus* and Blowfly grass (*Briza maxima*). The native herb Centella (*Centella cordifolia*) is rarely present.

Stream Cover: Overhanging vegetation is patchy along the streamline. Deciduous trees provide only seasonal cover. Occasional logs and trees are present within the channel and there is little instream vegetation.

Recommended Strategies

- Liaise with the Water Corporation and the Water and Rivers Commission to monitor the volume and velocity of water discharged from the drain feeding the streamline.
- Undertake weed control activities ensuring that the impact on foreshore stability is considered before works begin.
- Establish deep rooted native understorey and middlestorey species along the foreshore once weeds have been eradicated to ensure foreshore stability.

- Undertake weed control activities and planting of native species as recommended in Appendix 3 once weeds have been eradicated.
- Ensure weed control activities are continued in rehabilitated areas prior to proceeding with new revegetation sites.
- Inject herbicide into the Willow trees at 10 cm intervals around the trunk in Spring (Appendix 2). Selectively spray any suckers where they regenerate, and remove adult plants once dead.
- Selectively paint herbicide to poison Arum and minimise disturbance to the substrate.
- Brushcut Bulrush and remove bulk of vegetative material and paint regrowth with systemic herbicide (Appendix 2). Should Bulrush occur within the stream channel, brushcut in May/June and assess regrowth in September/October.
- Treat Paspalum, Kikuyu and Veldtgrass with flauzifop-butyl in accordance with the recommendations in Appendix 2.
- Remove flowering heads of *Juncus microcephalus* and spot spray with flauzifop-butyl in accordance with the recommendations in Appendix 2.
- Hand weed Dock, Vetch and Blowfly grass prior to flowering and remove from the site.

- Protect native species within the area and focus weed control activities in nodes to ensure weeds are eradicated prior to revegetating the foreshore.



<p>Habitat diversity: The channel depth of the streamline varies due to deposition of large amounts of sediment. The scattered instream logs provide substrates for aquatic invertebrates. The foreshore vegetation is highly modified and dominated by weeds. The lack of healthy native vegetation may limit the suitability of habitats for terrestrial invertebrates, frogs and lizards. The overstorey trees provide some nesting and roosting sites for birds.</p>
<p>Other issues: A car tyre suspended by rope from a tree indicates that children may use this area to play.</p>

<ul style="list-style-type: none"> • Poison and remove the deciduous exotic trees and plant immediately with deep rooted middlestorey and overstorey plants as recommended in Appendix 3. • Establish clumps of emergent native sedges and rushes within the streamline channel and along the foreshore to increase stream cover and bank stability. Use 600 mm “U” shaped steel pegs to secure the plants to the stream bed.
<ul style="list-style-type: none"> • Liaise with the Water Corporation and the Water and Rivers Commission to monitor water load and quality from the drainage discharge point leading from the adjacent subdivision. • Undertake weed control in manageable nodes and focus on reinforcing overstorey species and restoring the middle- and understorey species once weeds have been eradicated.
<ul style="list-style-type: none"> • Monitor recreational use of the area and define access points and establish walkways if pedestrian access is to be encouraged. • Establish signage to indicate that the reserve management will be focused on weed control and vegetation rehabilitation.

Bennett Brook — Map 1 (Section D)

- Length of section (m):** approximately 290 m
- Recorder’s name:** Kelly Shepherd
- Date surveyed:** 7/9/98
- Nearest road access:** Benara Road
- Lot number:** Left bank — 75, 0, 17, 16 Right bank — 11, 12, 17, 16

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Red	Red	Red
Moderate	Poor	Poor	Poor
4	2	2	2

Stream Condition
Red
Poor
10



Description

Bank stability: The main channel widens to an open lake approximately 60 - 70 m across. The foreshore banks gently rise to a height 1.5 m. Isolated areas of erosion (0 - 5% total foreshore area) occur along exposed foreshore areas that do not support vegetation. Broadscale slumping and bank collapse is not evident along the foreshore. Sedimentation is localised along 5 - 20% of the foreshore and a large island within the open water supports established vegetation.

Vegetation: The overstorey vegetation on the left bank (looking upstream) is patchy (20 - 80% cover). Stands of Swamp paperbark (*Melaleuca raphiophylla*) and Flooded gum (*Eucalyptus rudis*) are interspersed with occasional Marri (*Corymbia calophylla*) and Modong (*Melaleuca preissiana*). Large areas along the foreshore are cleared. The island within the open lake has continuous cover of predominantly Swamp paperbark (*Melaleuca raphiophylla*) with occasional introduced Willows (*Salix* sp.) and Blackberry (*Rubus fruticosus*) within the middlestorey. The landholdings extend to the foreshore on the right bank and the vegetation has been cleared and replaced with perennial grasses (lawn). The left bank middlestorey is patchy (20 - 80% cover). Native shrubs growing on higher ground away from the immediate foreshore area include Coojong (*Acacia saligna*), Green stinkwood (*Jacksonia sternbergiana*), Grey stinkwood (*Jacksonia furcellata*), Hairy yellow pea (*Gompholobium tomentosum*) and Bracken fern (*Pteridium esculentum*). Stands of the Bulrush (*Typha orientalis*) predominate in the immediate foreshore area. *Watsonia* (*Watsonia bulbifera*) plants are also present along the foreshore. The understorey is patchy (20 - 80% cover) interspersed with areas of bare sand. Infrequent native ground cover species include *Conostylis* spp., Running postman (*Kennedia prostrata*), Pale rush (*Juncus pallidus*), Spreading sword sedge (*Lepidosperma*

Recommended Strategies

- Assess bank stability, islands and other features during low flow conditions (for easy access) to determine the presence of actively eroding zones or unstable features.
 - Undertake weed control activities in low flow conditions and plant deep rooted native understorey and middlestorey species to promote bank stabilisation once weeds are eradicated.
 - Ensure subdivision approvals include conditions to manage sediment and dust on site.
 - Encourage the use of sediment traps in drainage systems upstream, which can be regularly cleaned to reduce the quantity of sediment entering Bennett Brook.
-
- Focus weed control activities in immediate vicinity of areas retaining native understorey species to support natural regeneration.
 - Inject systemic poisons into Willow trunks as outlined in Appendix 2. Selectively spray any suckers where they regenerate and once dead, remove from foreshore area.
 - Remove bulk of Blackberry and Bulrush and treat regrowth in accordance with Appendix 2.
 - Hand weed Cape Weed and Black Flag Iris prior to flowering and seeding, place in black rubbish bags and remove from site.
 - Treat Perennial veldtgrass with Flauzifop-butyl as recommended in Appendix 2.
 - Provide information leaflet to encourage private landholders to remove lawn from the high water mark and replace lawn with native understorey species including Tufted sedge, Pale rush and Native cumbungi.
 - Undertake replanting of overstorey and dense stands of understorey in manageable areas and sustain weed control activities to maximise natural regeneration processes.
 - Ensure a limited number of defined access tracks are provided to manage pedestrian use within the reserve. Note this is becoming important with the new subdivisions being constructed upstream.



effusum) and the small herb Centella (*Centella cordifolia*). Weeds present include Capeweed (*Arctotheca calendula*), Perennial veldtgrass (*Ehrharta calycina*) and a Black flag iris (*Ferraria crispa*).

Stream Cover: There is little overhanging vegetation to provide permanent shade on either foreshore. Overhanging from the overstorey vegetation on the established sand bar island may provide some stream cover. Occasional instream leaf litter, detritus and branches may provide intermittent cover.

Habitat diversity: The large stretch of open water is permanent. The water depth is unknown but likely to be deep enough for fish and other aquatic organisms. The presence of dense stands of Bulrush (*Typha orientalis*) and vegetation on the sand bar may provide suitable habitats for reptiles and frogs while the patchy overstorey provides limited trees for bird nesting and roosting sites.

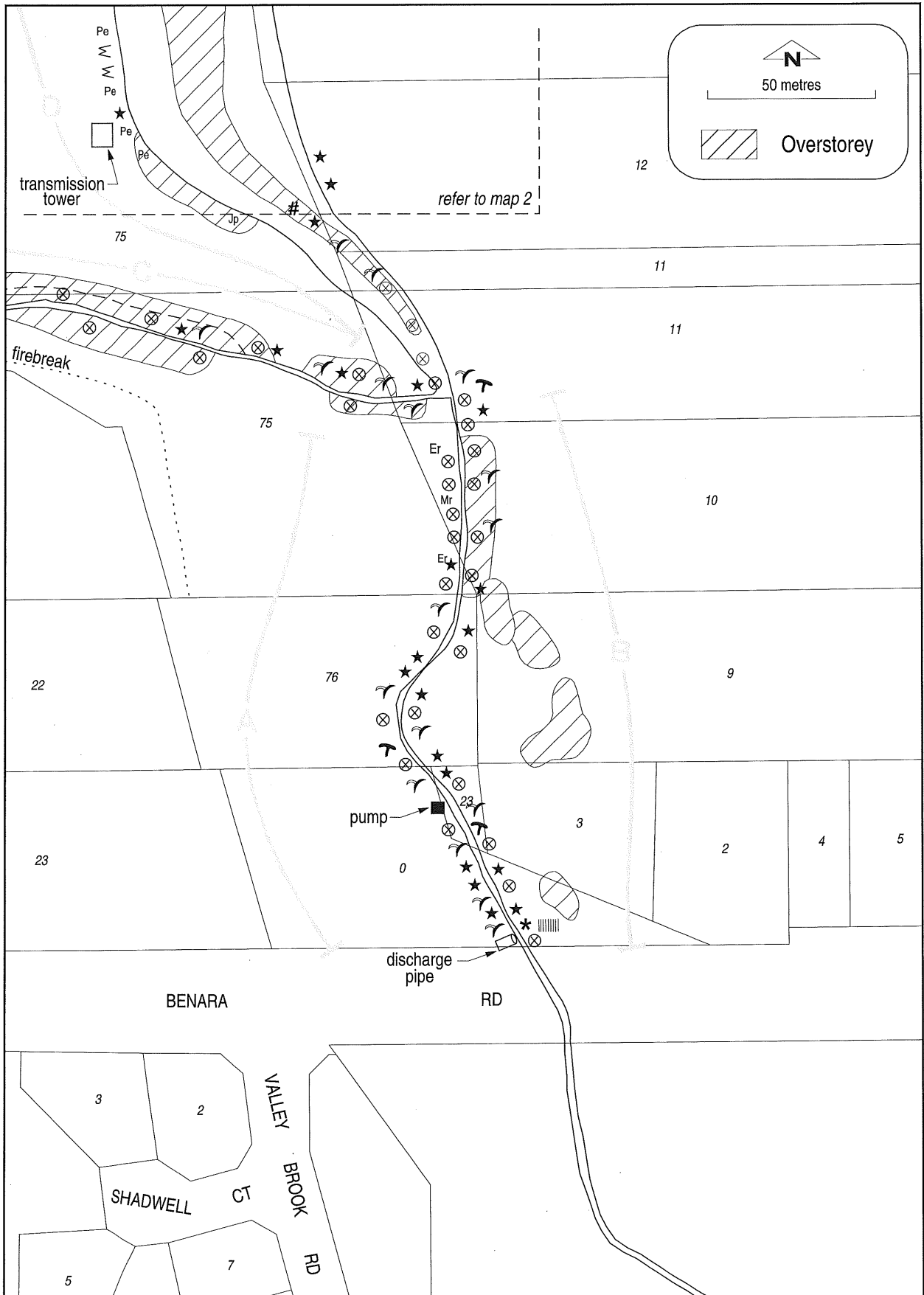
Other issues: The vegetation immediately adjacent to the high tension power lines is cleared increasing weed invasion. The presence of Black flag lily (*Ferraria crispa*) in an isolated area may indicate possible garden escapees. The residential lots immediately adjacent to the foreshore area on the right hand bank may prove limiting to future rehabilitation plans.

- Protect instream branches, leaves and other material providing instream shelter.
- Undertake localised weed control and replanting programs within floodway and stream to increase cover.

- Plant emergent vegetation species along the margins of the open water area including Jointed twig rush, Pale rush and Spreading sword sedge. Use 600 mm “U” shaped steel pegs to secure clumps to the bank.
- Control Bulrush in May by cutting stems below water (Appendix 2).
- Plant overstorey trees to increase the density of cover and sustain weed control activities in nodes where plantings occur.

- Liaise with Western Power to modify maintenance of vegetation beneath powerlines to include weed control and replacement with native species.
- Prepare and distribute information booklet to landholders outlining the importance of native vegetation and encouraging changes to land management practices in the riparian zone.





Bennett Brook Map 1



Bennett Brook — Map 2 (Section D)

Length of section (m): approximately 290 m
Recorder's name: Kelly Shepherd
Date surveyed: 7/9/98
Nearest road access: Benara Road
Lot number: Left bank — 75, 0, 17, 16 Right bank — 11, 12, 17, 16

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Red	Red	Red
Moderate	Poor	Poor	Poor
4	2	2	2

Stream Condition
Red
Poor
10

Refer to previous description and recommended strategies for Section D (Map 1)

Bennett Brook — Map 2 (Section E)

Length of section (m): approximately 186 m
Recorder's name: Kelly Shepherd
Date surveyed: 7/9/98
Nearest road access: Benara Road
Lot number: Left bank — 0, 103 Right bank — 103, 0, 102

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Red	Yellow	Yellow
Moderate	Poor	Moderate	Moderate
4	2	4	4

Stream Condition
Yellow
Moderate
14



Description

Bank stability: The large open expanse of water grades into an area of braided creeks and semi-permanent main channels. The floodplain area is seasonally inundated with sheet runoff and seasonally waterlogged areas. The foreshore banks are shallow rising from a height of < 1 m - 1.5 m. Areas of localised erosion (5 - 20% total area) are present as water runoff increases from undefined channels during winter runoff. Erosion is also evident along the right bank as water enters the Brook from compensation basin drains associated with the newly developed residential subdivision. Sedimentation is significant and 20 - 50 % of the foreshore area is affected, with vegetation establishing on larger sand bars.

Vegetation: The overstorey is continuous (> 80% cover) and is comprised predominantly of Swamp paperbark (*Melaleuca raphiophylla*) and Flooded gum (*Eucalyptus rudis*) along the foreshore banks and in the seasonally wet floodplain. Marri (*Corymbia calophylla*) trees are frequent along the outer margin of the remnant overstorey vegetation on drier ground. The middlestorey is continuous (> 80%) and the Bracken fern (*Pteridium esculentum*) is present in dense stands associated with the Marri overstorey. Coojong (*Acacia saligna*) occurs frequently whilst Green stinkwood (*Jacksonia sternbergiana*) is less common. Abundant weed species include dense stands of Blackberry (*Rubus fruticosus*) interspersed with Arum lily (*Zantedeschia aethiopica*). The understorey is continuous (> 80%) with clumps of the Pale rush (*Juncus pallidus*) and the Angle sword-sedge (*Lepidosperma tetraquetrum*) scattered along the brook margin. Perennial grasses such as Veldtgrass (*Ehrharta calycina*) and other weeds such as Lupins (*Lupinus* sp.) and Capeweed (*Arctotheca calendula*) are more common along the edge of the overstorey and abundant in open areas. The large Zamia (*Macrozamia riedlei*) is rarely observed in the right foreshore area.

Revegetation has been undertaken around the newly established compensating basin.

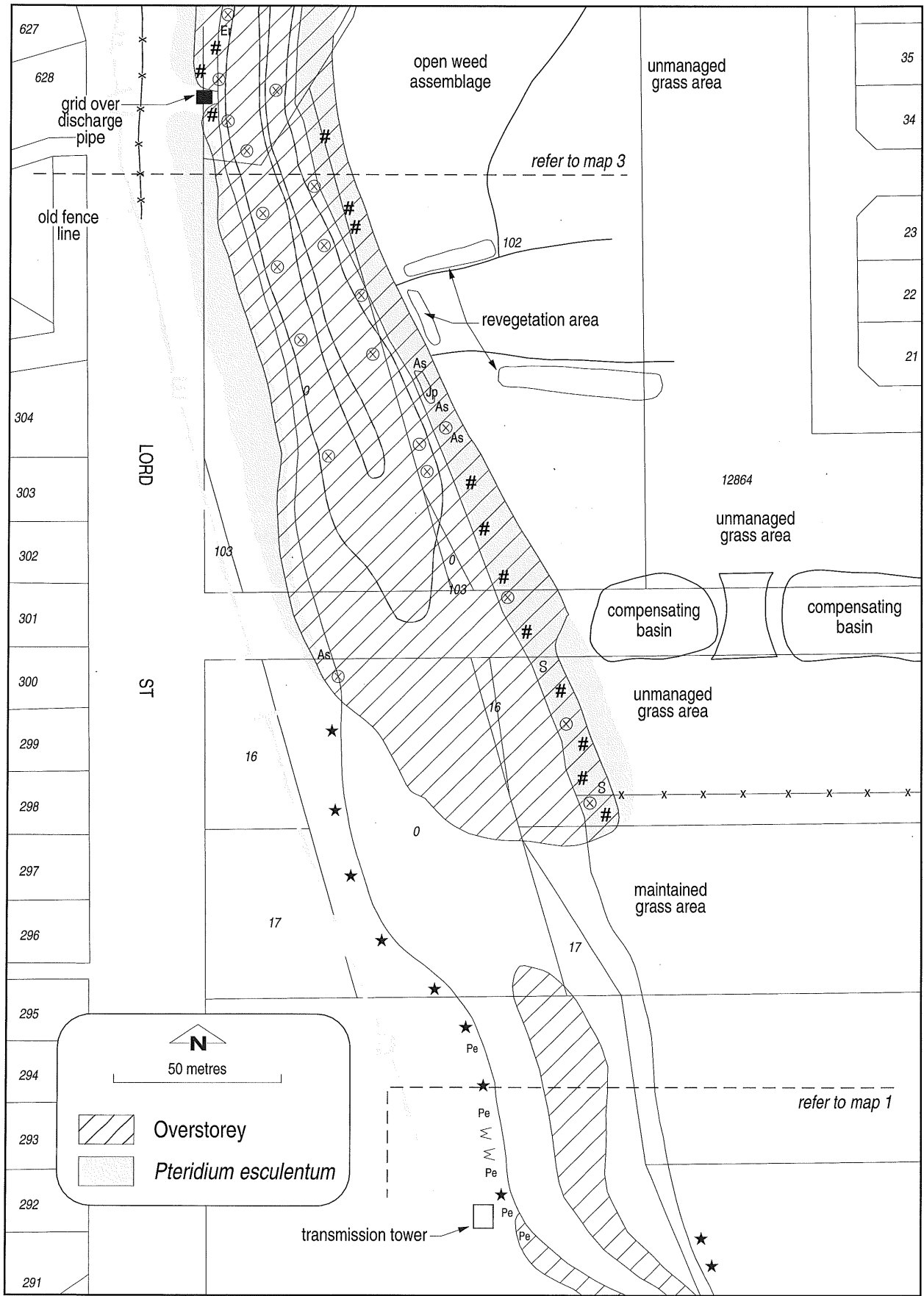
Recommended Strategies

- Assess bank stability, islands and other features during low flow conditions (for easy access) to determine the presence of actively eroding zones or unstable features.
 - Undertake weed control activities in low flow conditions and plant deep rooted native species as recommended in Appendix 3.
 - Encourage the use of sediment traps in drainage systems upstream, which can be regularly cleaned to reduce the quantity of sediment entering Bennett Brook.
 - Re-assess the drainage design connecting the compensation basins with the Brook, and modify discharge point to reduce water velocity.
-
- Focus weed control efforts around remnant native vegetation to increase the potential for natural regeneration.
 - Undertake rehabilitation activities in manageable sized nodes, considering the potential impact of any works on foreshore bank stability.
 - Maintain buffer against the streamline until weeds can be replaced with dense plantings of middlestorey and understorey species to inhibit weed re-establishment.
 - Focus weed control efforts around remnant native vegetation to increase the potential for natural regeneration.
 - Undertake rehabilitation activities in manageable sized nodes, considering the potential impact of any works on foreshore bank stability.
 - Maintain buffer against the streamline until weeds can be replaced with dense plantings of middlestorey and understorey species to inhibit weed re-establishment.
 - Remove bulk of vegetative material from Blackberry and Arum lily and treat regrowth with herbicides (Appendix 2).
 - Hand weed Lupins and Capeweed prior to flowering and fruiting (Appendix 2).
 - Maintain and enhance planting around the compensation basins using locally indigenous species.



	<ul style="list-style-type: none"> • Ensure designated access tracks are developed to localise recreational movement, close additional tracks and implement revegetation works.
<p>Stream Cover: Overhanging vegetation providing patches of permanent shade is common on both foreshores particularly where dense stands of Blackberry line both edges of the main channel. Instream weeds such as <i>Aponogeton elongatus</i> are infrequent while large logs and vegetation detritus are common and provide instream cover.</p>	<ul style="list-style-type: none"> • Protect instream logs, branches and vegetation. • Undertake Blackberry control and replant in areas where this weed has been removed. • Increase extent of native emergent plants within stream channel adjacent to submerged species using species listed in Appendix 3. Use 600mm “U” shaped steel pegs to secure clumps within the flow channels.
<p>Habitat diversity: The water depth varies from 1 - 2 m, often forming small pools as large logs partially block the main channel. The presence of dense streamside vegetation provides suitable habitats for terrestrial invertebrates, reptiles and frogs. The overstorey provides nesting and roosting sites for birds.</p>	<ul style="list-style-type: none"> • Ensure weed control activities take habitat protection and maintenance into consideration. • Maintain continuous bands of vegetation at least 5 m wide within weed control activities to provide for fauna movement.
<p>Other issues: The area appears to see some recreational use as there is evidence of camp fires and rubbish.</p>	<ul style="list-style-type: none"> • Develop and distribute information brochure for local residents about the impact of dumping rubbish and the importance of protecting reserves. • Increase frequency of ranger visits to reduce the occurrence of camping within the reserve. • Develop a reserve management plan for the area to ensure the residents of the new subdivisions are provided for.





Bennett Brook Map 2



Bennett Brook — Map 3 (Section F)

Length of section (m): approximately 450 m
Recorder's name: Kelly Shepherd
Date surveyed: 8/9/98
Nearest road access: Benara Road
Lot number: Left bank — 133 Right bank — 101, 100

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity	Stream Condition
Yellow	Red	Yellow	Yellow	Yellow
Moderate	Poor	Moderate	Moderate	Moderate
4	2	4	4	14

Description

Bank stability: Multiple channels are evident throughout the floodplain and are between 1.5 - 2.5 m wide. Smaller braided streams interconnect the three main channels. The foreshore banks are shallow rising from a height of < 1 - 1.5 m. Localised areas of erosion (5 - 20% total foreshore area) occur along portions of the foreshore as water runoff increases from undefined channels during winter runoff. Sedimentation is significant and occurs in at least 20 -50 % of the survey section.

Vegetation: The overstorey is continuous (> 80% cover) and is comprised predominantly of Swamp paperbark (*Melaleuca raphiophylla*) and Flooded gum (*Eucalyptus rudis*) along the foreshore banks and in the seasonally wet floodplain. Marri (*Corymbia calophylla*) trees are frequent along the outer margin of the remnant overstorey vegetation on drier ground. The middlestorey is continuous (> 80%) with dense stands of the Bracken fern (*Pteridium esculentum*) amongst the Marri overstorey. Albizia (*Paraserianthes lophantha*) and Coojong (*Acacia saligna*) occur infrequently along the left foreshore. Abundant weed species in the damp floodplain include dense stands of Blackberry (*Rubus fruticosus*) and Arum lily (*Zantedeschia aethiopica*). Nightshade (*Solanum nigrum*) and Castor oil plants (*Ricinus*)

Recommended Strategies

- Ensure weed control activities consider the potential impact on bank stability and any areas subject to vegetation removal are immediately replanted with indigenous species.
- Assess catchment sediment contribution and identify any point sources of sediment.
- Develop remedial strategies for any subcatchments discharging high sediment loads.
- Focus weed control activities in areas where natural regeneration is occurring and/or where native plants persist.
- Define tracks into the dense stands of vegetation to allow access to the Blackberry infestations along the river channels within the floodway. Progressively remove nodes of Blackberry vegetation from the site and treat regrowth (Appendix 2). Ensure no segments are dropped outside current infested area. Immediately replace with high density plantings of indigenous species as recommended in Appendix 3.
- Treat Arum lilies prior to fruiting or as a minimum remove flowering heads to prevent seed production.
- Selectively hand weed Whiteflower fumitory, Nightshade, Cape weed and Soursob.



communis) are infrequent. The understorey is continuous (> 80% cover) with clumps of the Pale rush (*Juncus pallidus*) and Pithy sword-sedge (*Lepidosperma longitudinale*) present close to the waters edge. Other native understorey species more commonly associated with the Marri overstorey include Running postman (*Kennedia prostrata*) and Native wisteria (*Hardenbergia comptoniana*). Perennial grasses such as Veldtgrass (*Ehrharta calycina*) and Kikuyu (*Pennisetum clandestinum*) are common in open, exposed areas adjacent to the overstorey and in the access area to the enclosed stormwater drain. Other weeds occurring less frequently include Capeweed (*Arctotheca calendula*), Soursob (*Oxalis pes-caprae*) and Whiteflower fumitory (*Fumaria capreolata*). Common weed species present near the base of the transmission tower on the left foreshore include Freesia (*Freesia aff. leichtlinii*), Rose pelargonium (*Pelargonium capitatum*) and *Hesperantha falcata*. Note on the right foreshore there is a clump of exotic trees, two small stands of Marri (*Corymbia calophylla*) and Firewood banksia (*Banksia menziesii*) with large *Zamia (Macrozamia riedlei)* plants in the understorey.

Stream Cover: Overhanging vegetation is abundant providing permanent shade along both foreshores due to dense stands of Blackberry and the presence of Swamp paperbark throughout the flooded area. Instream cover is common with aquatic weeds such as *Aponogeton elongatus*, present and large logs and vegetation detritus occurring frequently.

- Cut Castor oil plants and paint the stump with systemic herbicide immediately (Appendix 2). Remove the stump from the site once dead.
- Treat perennial grasses with flauzifop-butyl in conservation areas biannually using rates recommended in Appendix 2.
- Treat Freesia, Rose pelargonium and *Hesperantha* in accordance with Appendix 2.
- Ensure any maintenance works, particularly along the right foreshore do not mow, or otherwise remove any native vegetation or juvenile trees.

- Replace eradicated weeds immediately with high density plantings of indigenous species recommended in Appendix 2, to replace stream cover.
- Maintain vigilant weed control in areas already treated and replanted with native species.
- Protect instream logs, branches and other detritus ensuring the objects are not exacerbating erosion of foreshore banks.



Habitat diversity: The water depth varies from 1 - 2 m, often forming small pools as large logs partially block the main channel. The water is dark brown and muddy due to tannins and the presence of suspended material in the water column. The presence of dense streamside vegetation provides suitable habitats for terrestrial invertebrates, reptiles and frogs. The overstorey provides nesting and roosting sites for birds.

Other issues: There are increased weeds near the base of the transmission tower and along the cleared storm drain area. The old fence line on the left foreshore is not easily observed and may pose a safety hazard.

- Ensure weed control activities take bank stability into consideration and any areas subject to vegetation removal are immediately replanted with indigenous species.
- Assess catchment sediment contribution and identify any point sources of sediment.
- Develop remedial strategies for any subcatchments discharging high sediment loads.

- Liaise with Western Power to modify the management regime beneath the powerlines to improve weed control and potentially reintroduce low native plant species.
- Define access points through reserve and determine whether or not the fence should be removed to reduce safety hazard.



Bennett Brook — Map 4 (Section F)

Length of section (m): approximately 450 m
Recorder's name: Kelly Shepherd
Date surveyed: 8/9/98
Nearest road access: Benara Road
Lot number: Left bank — 133 Right Bank — 101, 100

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Red	Yellow	Yellow
Moderate	Poor	Moderate	Moderate
4	2	4	4

Stream Condition
Yellow
Moderate
14

Refer to previous description and recommended strategies for Section F (Map 3)

Bennett Brook — Map 4 (Section G)

Length of section (m): approximately 545 m
Recorder's name: Kelly Shepherd
Date surveyed: 9/9/98
Nearest road access: walkway at the end of Patricia Street
Lot number: Left bank — 134 Right bank — 99, 41

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Yellow	Yellow	Yellow
Moderate	Moderate	Moderate	Moderate
4	4	4	4

Stream Condition
Yellow
Moderate
16



Description

Bank stability: Across this section a single channel diverges into multiple channels throughout the floodplain, ranging in width between 1.5 - 2.5 metres. Smaller braided streams interconnect all three channels. The foreshore banks are shallow rising to a height of < 1 - 1.5 m. Isolated areas of localised erosion (5-20% total foreshore area) occur along portions of the foreshore as water runoff increases from undefined channels during winter. A fast flowing steep sided drain entering the brook is causing localised erosion within the floodplain area. There is no evidence of significant slumping or bank collapse. Sedimentation is significant and occurs in at least 20 - 50 % of the survey section.

Vegetation: The overstorey is continuous (> 80% cover) and is comprised predominantly of Swamp paperbark (*Melaleuca raphiophylla*) and Flooded gum (*Eucalyptus rudis*) along the foreshore banks. The Swamp paperbark is common across the waterlogged floodplain. Marri (*Corymbia calophylla*) trees are frequent on drier ground adjacent to the low-lying floodplain. The middlestorey is continuous (> 80%) and comprised of a number of parallel stands of shrubs. On the uppermost edge of the overstorey Bracken fern (*Pteridium esculentum*) predominates. Adjacent is a dense strip of vegetation where Swamp peppermint (*Agonis linearifolia*), Narrow-leaved oxlyobium (*Oxylobium lineare*) and Coojong (*Acacia saligna*) shrubs are common. Less frequent native species include Prickly Moses (*Acacia pulchella*), White myrtle (*Hypocalymma angustifolium*), Hairy yellow pea (*Gompholobium tomentosum*), *Hibbertia* sp. and Blackboy (*Xanthorrhoea preissii*). Aligned along the edge of the braided brook and streams are dense stands of Blackberry (*Rubus fruticosus*) and Arum lily (*Zantedeschia aethiopica*). Nightshade (*Solanum nigrum*) occurs very infrequently. A small patch of Giant reed (*Arundo donax*) is present on the right bank. The understorey is continuous (> 80% cover). Within the floodplain and along watercourses, sedges and rushes are common including Pale rush (*Juncus pallidus*), Pithy sword-sedge (*Lepidosperma longitudinale*) and the Angle sword-sedge (*Lepidosperma tetraquetrum*). The small herb Centella (*Centella cordifolia*) is found infrequently

Recommended Strategies

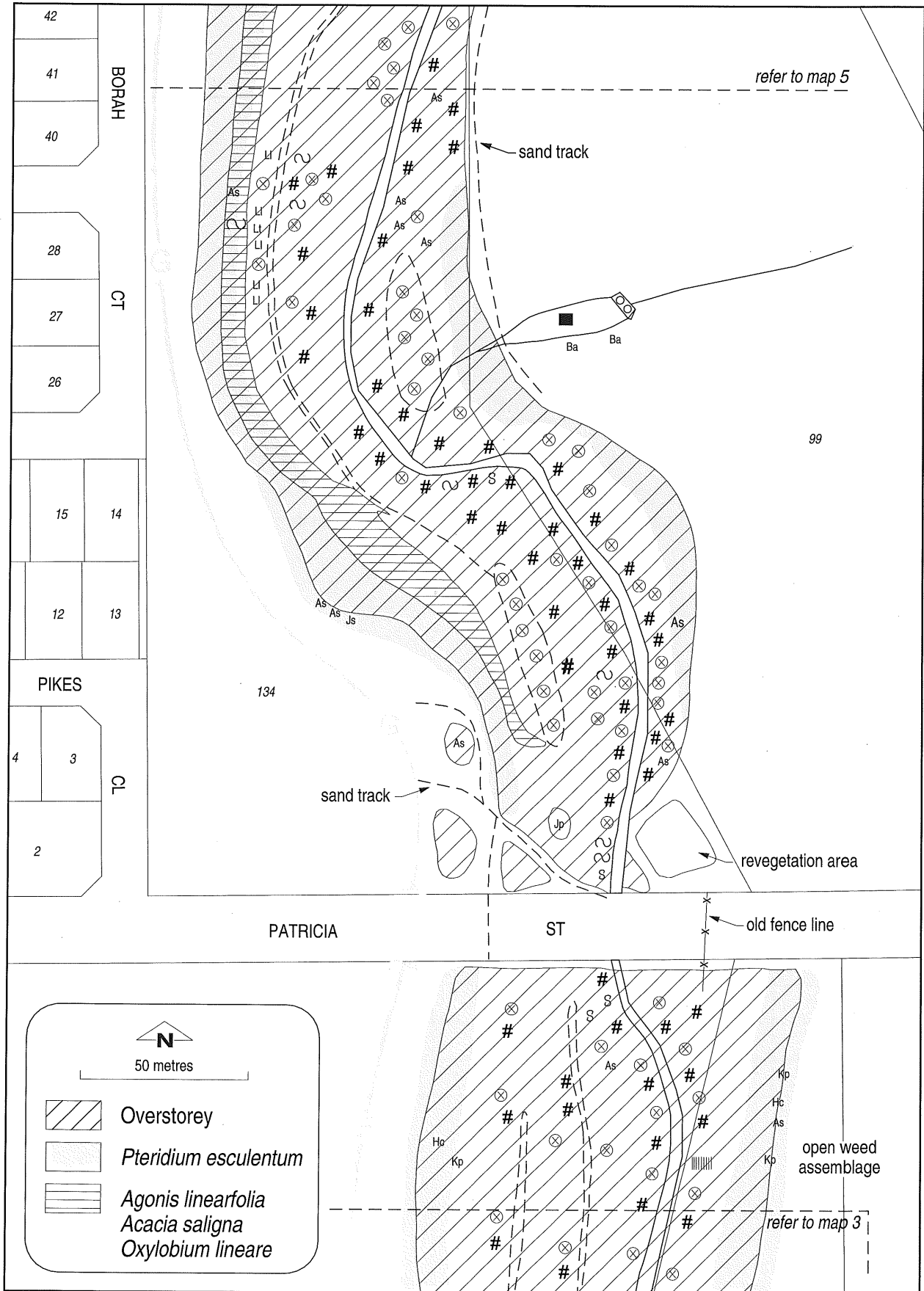
- Ensure weed control activities take bank stability into consideration and any areas subject to vegetation removal are immediately replanted with indigenous species.
 - Assess catchment sediment contribution and identify any point sources of sediment.
 - Develop remedial strategies for any subcatchments or drainage systems discharging high sediment loads.
 - Assess alternative management treatments for the steep sided drain, possible solutions including introduction of riffle beds, recontouring and revegetation works.
-
- Implement intensive weed control around existing nodes of native vegetation to encourage natural regeneration.
 - Undertake replanting of overstorey and dense stands of understorey in manageable areas and sustain weed control activities to maximise natural regeneration processes.
 - Define tracks into the dense stands of vegetation to allow access to the Blackberry infestations along the river channels within the floodway.
 - Progressively remove nodes of Blackberry vegetation from the site and treat regrowth (Appendix 2). Ensure no segments are dropped outside current infested area. Immediately replace with high density plantings of indigenous species as recommended in Appendix
 - Treat Perennial veldtgrass with Flauzifop-butyl as recommended in Appendix 2.
 - Remove bulk of vegetative material of Giant reed and Blackberry and poison regrowth (Appendix 2).
 - Hand weed Nightshade and Cape weed prior to flowering and fruiting to reduce the rate of spread of these species.
 - Remove seed heads from *Juncus microcephalus* to reduce the rate of spread and selectively weed when possible.



<p><i>longitudinale</i>) and the Angle sword-sedge (<i>Lepidosperma tetraquetrum</i>). The small herb Centella (<i>Centella cordifolia</i>) is found infrequently within the understorey. Ground creepers present in the vegetation associated with the Marri overstorey include Running postman (<i>Kennedia prostrata</i>) and Native wisteria (<i>Hardenbergia comptoniana</i>). Weeds that occur infrequently within the damp floodplain near the main channels include Paspalum (<i>Paspalum</i> sp.) grasses and Nightshade (<i>Solanum nigrum</i>). Also present within this zone is the introduced plant <i>Juncus microcephalus</i>. Perennial grasses including Veldtgrass (<i>Ehrharta calycina</i>) and other weeds such as Capeweed (<i>Arctotheca calendula</i>) are abundant in open areas beyond the extent of the overstorey vegetation.</p>
<p>Stream Cover: Streamside vegetation comprises native overstorey trees and dense weeds provides abundant stream cover. Instream cover is also frequent as aquatic weeds such as <i>Aponogeton elongatus</i> and frequent logs and vegetation detritus are present.</p>
<p>Habitat diversity: The water depth varies from 0.2 - 2 m with large areas of accretion and the presence of rocks and logs. Pools form upstream of large logs as water flow is slowed. The water is dark brown and muddy due respectively to the presence of tannins and suspended material in the water column. The small pools and presence of instream logs and vegetation provide suitable habitats for aquatic invertebrates, fish and turtles. The presence of dense streamside vegetation and sedges provides suitable habitats for terrestrial invertebrates, reptiles and frogs. The continuous overstorey provides nesting and roosting sites for birds.</p>
<p>Other issues: Sand footpaths and tracks are evident along both foreshore areas increasing access to the area below the walkway.</p>

<ul style="list-style-type: none"> • Reintroduce canopy species beyond the current extent of overstorey to encourage native species to regenerate and reduce extent of Veldtgrass, which represents a significant fire hazard.
<ul style="list-style-type: none"> • Undertake localised weed control (Appendix 2) and immediate replacement with high-density plantings of tubestock (Appendix 3). • Protect instream debris where material does not pose a threat to foreshore stability.
<ul style="list-style-type: none"> • Assess recreational use of the area, define access tracks and close those that are not required, to protect the native vegetation from unnecessary disturbance. • Develop a reserve management plan, which addresses all uses and potential uses, fire management, weed control and revegetation and protection of fauna. • Identify source of suspended solids and determine means of reducing sediment load through changed management practices.
<ul style="list-style-type: none"> • Designate and formalise access tracks and establish signage to encourage pedestrians to use these designated tracks. • Ensure future developers of subdivision provide some contribution to public open space in areas that will become more frequently used as a result of subdivision.





Bennett Brook Map 4



Bennett Brook — Map 5 (Section G)

Length of section (m): approximately 545 m
Recorder's name: Kelly Shepherd
Date surveyed: 990/98
Nearest road access: walkway at the end of Patricia Street
Lot number: Left bank — 134 Right bank — 99, 41

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Yellow	Yellow	Yellow
Moderate	Moderate	Moderate	Moderate
4	4	4	4

Stream Condition
Yellow
Moderate
16

Refer to previous description and recommended strategies for Section G (Map 4)

Bennett Brook — Map 5 (Section H)

Length of section (m): approximately 550 m
Recorder's name: Kelly Shepherd
Date surveyed: 1/10/98
Nearest road access: Reid Highway
Lot number: 30, 31, 5, 73

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Red	Black	Black	Black
Poor	Very Poor	Very Poor	Very Poor
2	0	0	0

Stream Condition
Black
Very Poor
2



Description

Bank stability: The main channel of the Brook ranges between 1 - 2.5 m wide. The foreshore banks range from a medium gradient to very shallow, ranging in height from < 1 - 1.5 m. Flooding of the immediate surrounds is frequent during the winter months. The floodplain is waterlogged with sheet runoff flowing towards the main channel. Localised erosion occurs along 20 - 50% of the foreshore along the outer edge of the meandering channel and in areas with limited vegetation cover. This is particularly evident beneath the Reid Highway bridge. Artificially modified drainage lines enter the brook on both the left and right foreshore. There is little evidence of slumping. Sedimentation is significant and occurs in at least 20 -50 % of the survey section.

Vegetation: This foreshore area is highly degraded with a narrow margin (< 15 m) of sparse overstorey (< 20% cover) interspersed with completely cleared areas where scattered individual trees are present. The most frequent overstorey trees are Swamp paperbark (*Melaleuca raphiophylla*) with occasional Flooded gum (*Eucalyptus rudis*). The middlestorey is almost completely absent with Coojong (*Acacia saligna*) occurring rarely. Infrequent weeds include Blackberry (*Rubus fruticosus*) and Arum lily (*Zantedeschia aethiopica*). The understorey is continuous (> 80% cover) with dense perennial grasses such as Kikuyu (*Pennisetum clandestinum*) dominant. Other weeds present include Perennial veldtgrass (*Ehrharta calycina*), Dock (*Rumex* spp.), Ribwort plantain (*Plantago lanceolata*), One leaf cape tulip (*Homeria flaccida*), Capeweed (*Arctotheca calendula*), Clover (*Trifolium* spp.) and *Juncus microcephalus*. Infrequent native understorey species include Pale rush (*Juncus pallidus*), Pithy sword-sedge (*Lepidosperma longitudinale*) and Centella (*Centella cordifolia*).

Recommended Strategies

- Ensure future road works manage sediment more effectively, as high level of sedimentation is likely the result of the initial construction of the Reid Highway.
 - Encourage Main Roads WA to implement weed control activities and revegetate the sedimentation ponds on the northern side of Highway.
 - Assess both drainage lines entering the Brook immediately downstream of the Reid Highway bridge, and develop options to redesign these outfalls to reduce water velocity and trap sediment prior to its entry to the Brook.
 - Assess catchment for other sources of sediment and develop strategies to reduce sediment load, and therefore erosive power of water moving through Brook.
-
- Undertake manageable nodes of weed control and plant native species in high densities to minimise the level of reinvasion of weeds. Focus on grass control to enhance natural regeneration of the overstorey species, particularly around existing nodes of native rushes and sedges.
 - Extend the overstorey and plant deep rooted middlestorey and understorey species as recommended in Appendix 3. Maintain a 5 m buffer zone around revegetated sites to minimise re-invasion of weeds.
 - Brush cut Couch and Kikuyu and other grasses and treat with flauzifop-butyl in accordance with the recommendations in Appendix 2.
 - Hand weed or spot spray Blackberry, Arum lily, Dock, Ribwort plantain and One leaf cape tulip in accordance with methods outlined in Appendix 2, before the populations become unmanageable.
 - Remove seed heads from *Juncus microcephalus* if unable to undertake complete removal program.



Stream Cover: Minimal overstorey and middlestorey provide little stream cover. Dense grasses along the margin of the brook may provide some inconsistent shade. Periodic instream cover is available due to the presence of occasional emergent aquatic weeds such as Watercress (*Rorippa nasturtium-aquaticum*). There are no obvious rocks or branches in the main channel.

Habitat diversity: The water depth ranges from less than 1m to 1m. The water is light brown and muddy due to the presence of suspended sediment material in the water column. The absence of small pools or instream logs limits the number of suitable habitats for aquatic invertebrates. The water depth is too shallow and slow moving for fish and turtles. The lack of diverse streamside vegetation limits suitable habitats for terrestrial invertebrates, reptiles and frogs. There is little overstorey available for birds.

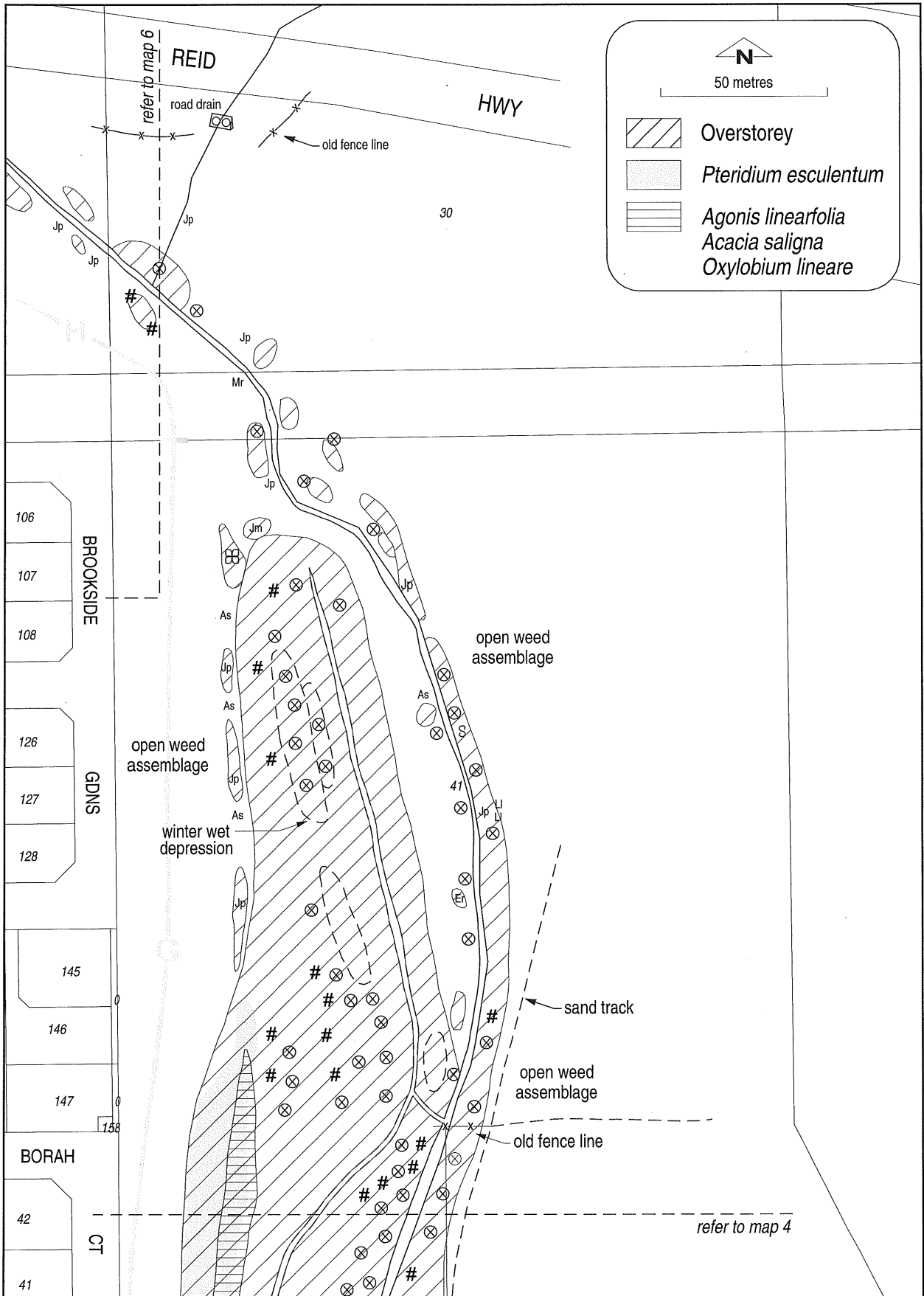
Other issues: Area cleared for construction of Reid Highway. Trees under the bridge are frequently pruned. The presence of old fence lines may pose a safety problem.

- Ensure proposed weed control activities consider the potential impact on bank stability before works are undertaken.
- Extend the overstorey and plant deep rooted middlestorey and understorey species to provide stream cover.
- Plants clumps of emergent sedges and rushes along the foreshore and reinforce stands of native sedges already present. Use 600 mm “U” shaped steel pegs to secure the plants in place.

- Increase overstorey through assisted regeneration and weed control around any naturally regenerating native plants.
- Identify sources of sediment within the catchment and work to reduce the sediment load moving through the Brook.

- Define access points adjacent to Bennett Brook, and determine level of risk associated with the old fenceline.
- Liaise with Main Roads WA to determine most acceptable program for tree pruning and bridge maintenance.





Bennett Brook Map 5



Bennett Brook — Map 6 (Section H)

Length of section (m): approximately 550 m

Recorder's name: Kelly Shepherd

Date surveyed: 1/10/98

Nearest road access: Reid Highway

Lot number: 30, 31, 5, 73

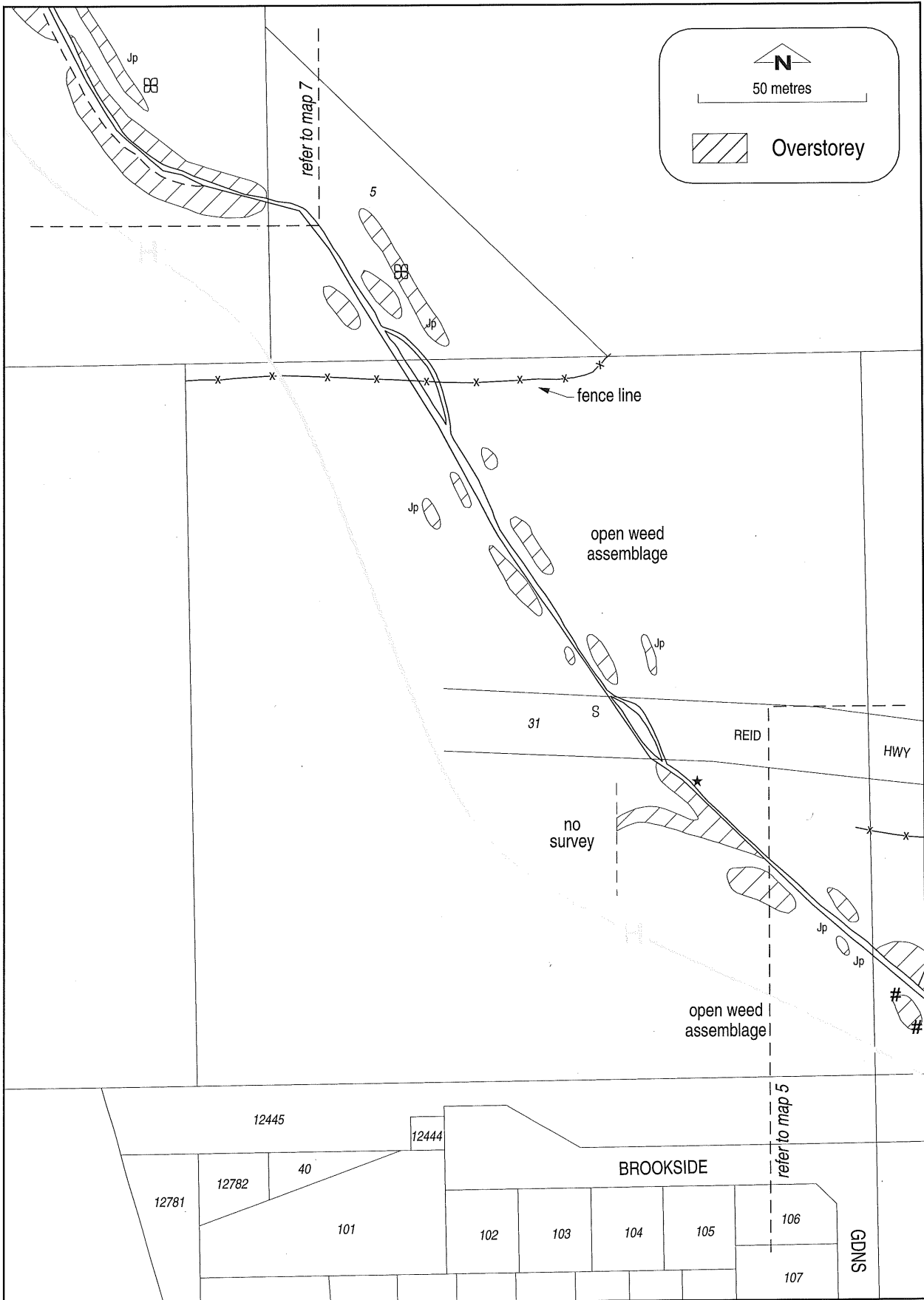
Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Red	Black	Black	Black
Poor	Very Poor	Very Poor	Very Poor
2	0	0	0

Stream Condition
Black
Very Poor
2

Refer to previous description and recommended strategies for Section H (Map 5)





Bennett Brook Map 6



Bennett Brook — Map 7 (Section H)

Length of section (m): approximately 550 m

Recorder's name: Kelly Shepherd

Date surveyed: 1/10/98

Nearest road access: Reid Highway

Lot number: 30, 31, 5, 73

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Red	Black	Black	Black
Poor	Very Poor	Very Poor	Very Poor
2	0	0	0

Stream Condition
Black
Very Poor
2

Refer to previous description and recommended strategies for Section H (Map 5)

Bennett Brook — Map 7 (Section I)

Length of section (m): approximately 245 m

Recorder's name: Kelly Shepherd

Date surveyed: 1/10/98

Nearest road access: Marshall Road

Lot number: 10

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Black	Black	Red	Red
Very Poor	Very Poor	Poor	Poor
0	0	2	2

Stream Condition
Black
Very Poor
4



Description

Bank stability: The main channel is 1.5 - 2.5 m wide with the foreshore banks rising on a medium grade slope to 1 - 2 m high. Small, intermittent braided creeks and winter wet depressions occur within the survey area. Erosion is significant occurring along 20 - 50% of the foreshore as stock have access to the area. There are large patches of exposed sand along both foreshore banks. Slumping is localised (5-20%) and bank collapse occurs along the exposed steeper banks. Sedimentation is also localised along 5 - 20% of the main channel.

Vegetation: The foreshore vegetation is degraded with a continuous overstorey (> 80% cover) comprised of Swamp paperbark (*Melaleuca raphiophylla*) and occasional Flooded gum (*Eucalyptus rudis*). A Japanese pepper (*Schinus terebinthifolia*) seedling is growing on the right foreshore bank. Many of the overstorey trees are sick, and some are dying. The middlestorey is sparse (< 20% cover) with infrequent weed species present such as Arum lily (*Zantedeschia aethiopica*) and Nightshade (*Solanum nigrum*). The understorey is patchy (20 - 80% cover) with perennial grasses predominating, interspersed with patches of exposed sand. Kikuyu (*Pennisetum clandestinum*) is common with annual species such as Soursob (*Oxalis pes-caprae*), Dock (*Rumex* spp.), Whiteflower fumitory (*Fumaria capreolata*) and Capeweed (*Arctotheca calendula*) occurring less frequently. One leaf cape tulip (*Homeria flaccida*) occurs in the more exposed areas along the foreshore. The small native herb Centella (*Centella cordifolia*) frequently occurs along the foreshore bank. Emergent aquatic weeds common within the brook include Watercress (*Rorippa nasturtium-aquaticum*) and *Aponogeton elongatus*.

Recommended Strategies

- Provide landholder with information about the impact of stock on the Brook and the benefits of rehabilitating foreshore areas.
 - Liaise with the landholder to encourage the removal of stock from either side of the stream and formalizing a stock watering point or establishing an off-line watering point away from the foreshore area. This will reduce tree deaths as a result of trampling, encourage natural regeneration and improve bank stability.
 - Offer support, either funding and/or labour, to assist in undertaking weed control and revegetation exercises in accordance with one of the primary objectives of landcare.
-
- Prepare information booklet on managing riparian zone or distribute Water and Rivers Commission and Swan River Trust publications to the landholders.
 - Undertake weed control activities and re-enforced plantings of overstorey recommended in Appendix 3 to enhance foreshore stability.
 - Selectively weed Nightshade, Dock, Whiteflower fumitory, Cape weed and One leaf cape tulip in accordance with Appendix 2.
 - Remove Japanese pepper and poison any resulting suckers to prevent an infestation occurring downstream.
 - Advise local resident of health risk of stock eating Nightshade, to encourage removal.
 - Establish dense clumps of middlestorey and understorey species where weeds have been eradicated. Plant in high densities to minimise weed re-invasion.
 - Develop a "Free tree" scheme within local government to encourage private landholders to improve their foreshores.
 - Plant clumps of emergent native sedges and rushes along the foreshore and within the river channel. Secure the plants using 600 mm "U" shaped steel pegs.



Stream Cover: The continuous overstorey provides intermittent shade along the brook. Dense grasses along the margin of the brook may also provide some inconsistent shade. Dense aquatic emergent weeds provide instream cover to the point in some sections of minimizing light availability. Large logs and rocks are infrequent along the brook.

Habitat diversity: The depth of water in the brook is shallow and < 1 m. The water is light brown and muddy due to the presence of suspended sediment material in the water column. The water is slow moving and the water depth is likely to be too shallow for fish and turtles. The lack of diverse streamside vegetation limits suitable habitats for terrestrial invertebrates, reptiles and frogs. The overstorey provides nesting and roosting sites for birds.

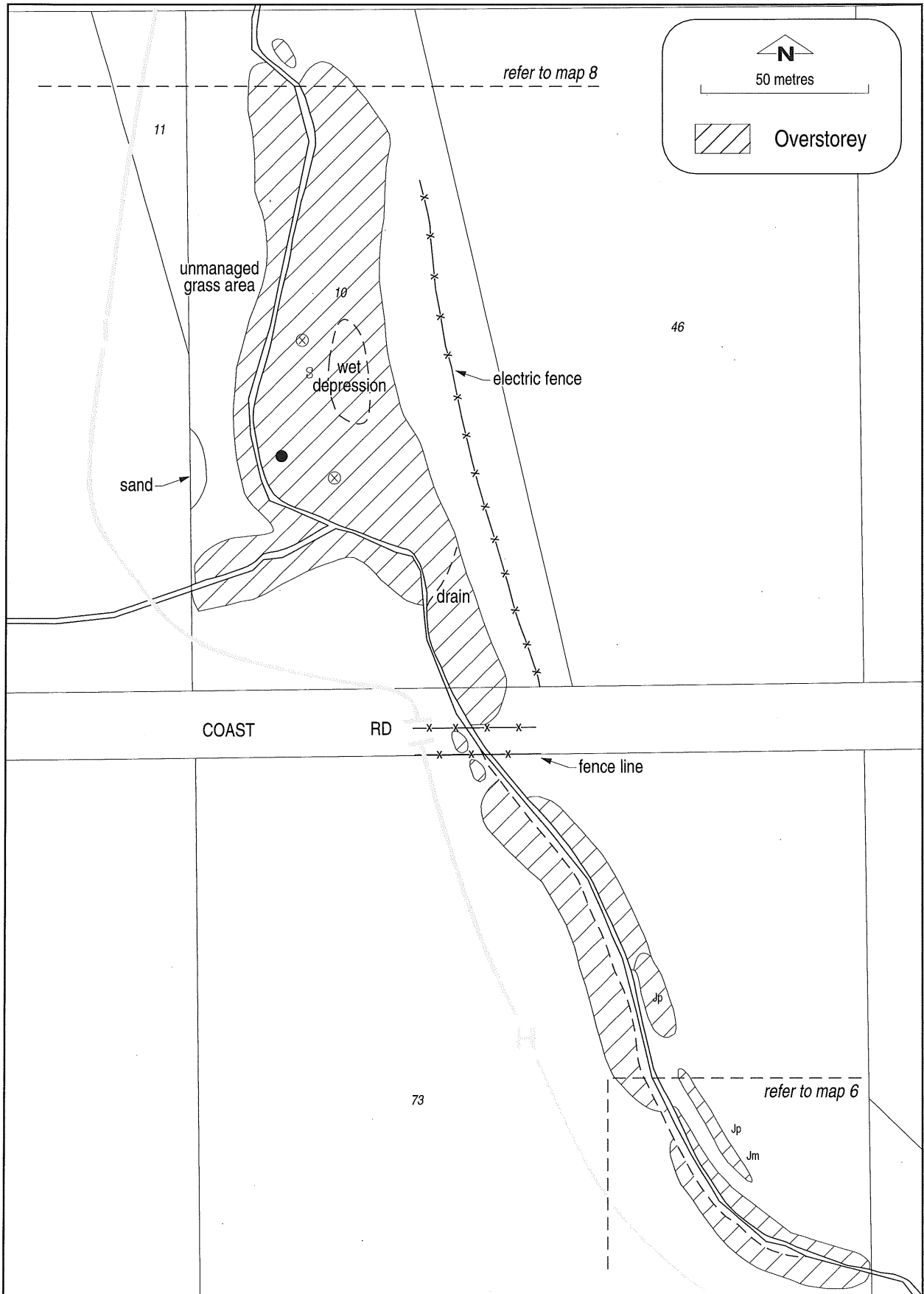
Other issues: Private landowners are aware of the decline in foreshore health noting a change in the volume of water flow and the increase in aquatic weeds.

- Implement major education program to encourage landholder involvement with stream management.
- Encourage weed control and replanting projects to improve bank stability and native vegetation cover.
- Encourage landholder to maintain logs and rocks within the stream zone as habitat for fauna where the materials do not exacerbate foreshore erosion.

- Ensure weed control is undertaken in nodes to ensure habitat provision.
- Focus on re-establishing closed overstorey to assist in weed management in the future.
- Encourage dense planting of middlestorey and understorey species and emergent sedges and rushes to increase habitat diversity along the foreshore area.

- Focus on community awareness and provide information about simple activities, such as weed control and replanting, which could benefit the Brook enormously.





Bennett Brook Map 7





Bennett Brook — Map 8 (Section J)

Length of section (m): approximately 290 m

Recorder's name: Kelly Shepherd

Date surveyed: 1/10/98

Nearest road access: Marshall Road

Lot number: 0, 14

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity	Stream Condition
Red	Black	Black	Black	Black
Poor	Very Poor	Very Poor	Very Poor	Very Poor
2	0	0	0	2

Description

Bank stability: The main channel ranges from less than 1 m to 3 m wide with the foreshore banks rising to a height of < 1m on a shallow grade slope. Winter flooding is common as water flows into the wide floodway. Erosion is localised (5 - 20% of the foreshore area) around the base of trees growing on the immediate foreshore bank and on the outer edge of channel meanders. There is little evidence of slumping but sedimentation is localised, observed along 5 - 20% of the channel. Dense aquatic weeds present in the channel slow water movement resulting in sediment accumulation.

Vegetation: The foreshore vegetation is severely degraded with a sparse overstorey (< 20% cover) comprised of Swamp paperbark (*Melaleuca raphiophylla*) and occasional Flooded gum (*Eucalyptus rudis*). The middlestorey is absent and the understorey is continuous (> 80% cover) and comprised of pasture grasses and weeds. Native sedges such as the Pale rush (*Juncus pallidus*) occur in scattered clumps. Predominant weeds include Kikuyu (*Pennisetum clandestinum*) and *Juncus microcephalus*. Emergent aquatic weeds such as Watercress (*Rorippa nasturtium-aquaticum*) are abundant. Revegetation and weed control activities have been undertaken along both foreshore banks.

Recommended Strategies

- Remove aquatic weeds around the base of any trees and replant emergent rushes such as Jointed twig rush and Lake club sedge beneath trees to slow water movement and increase sediment stability. Use 600 mm "U" shaped steel pegs to secure plants to the foreshore bank.
- Ensure weed control is undertaken in nodes to protect soil stability and reduce any sudden changes to water velocity through the area.
- Assess and manage upstream drainage to reduce sediment load to the brook.
- Focus weed control around any native vegetation, juvenile or mature, and in areas where planting of overstorey and middlestorey is occurring.
- Join these nodes together by undertaking weed control and re-placement with native plants once the nodes are stable and the plants are developing well.
- Increase canopy cover across Brook by densely planting Swamp paperbark and Flooded gum.
- Use flauzifop-butyl to control Kikuyu biannually, focussing in revegetation areas.
- Remove seed heads from *Juncus microcephalus* to reduce the rate of spread of this weed. Remove and replace immediately with Pale rush if possible.



<p>Stream Cover: The absence of continuous overstorey limits stream cover. Dense aquatic weeds choking the main channel minimizing light availability. Large logs occur very infrequently along the brook.</p>	<ul style="list-style-type: none"> • Increase canopy cover across Brook by densely planting Swamp paperbark and Flooded gum. • Allow any branches or logs from senescent trees to remain within waterway, where they are not exacerbating erosive processes. • Establish dense nodes of emergent rushes and maintain weed control around these plantings to maximise success.
<p>Habitat diversity: The channel depth is shallow, less than 1m and water movement is slow, limiting the number of suitable habitats for aquatic organisms. The absence of diverse streamside vegetation also provides very few habitats for terrestrial animals.</p>	<ul style="list-style-type: none"> • Implement weed control in nodes to maximise habitat protection during revegetation process. • Focus on establishment of overstorey species and overtime, as weed control has improved access to understorey, reintroduce native understorey and middlestorey species. • Plant emergent sedges and rushes along the foreshore increasing stream cover. Secure plants using 600mm “U” shaped steel pegs.
<p>Other issues :</p>	

Bennett Brook — Map 8 (Section K)

Length of section (m): approximately 870 m
Recorder’s name: Kelly Shepherd
Date surveyed: 14/10/98
Nearest road access: Whiteman Park
Lot number: Left bank — 0, 1, 627, 279, 278 Right bank — 0, 626, 3, 2, 281

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity	Stream Condition
Red	Black	Red	Red	Red
Poor	Very Poor	Poor	Poor	Poor
2	0	2	2	6



Description

Bank stability: The main channel is 1 - 2 m wide with the foreshore banks rising on a gentle gradient to a height of < 1 m. Winter wet depressions and small artificial drains occur in the floodway adjacent to the main channel. Erosion is localised (5 - 20% of the foreshore area) around the base of trees growing along the foreshore banks. There is little evidence of slumping. Sedimentation is significant (20 - 50% of the survey area) as a result from high sediment loads and reduced water velocities within the main channel.

Vegetation The foreshore overstorey vegetation is open and continuous (> 80% cover) and is comprised of Swamp paperbark (*Melaleuca raphiophylla*) and Flooded gum (*Eucalyptus rudis*). The middlestorey is very sparse and almost absent with the exception of a few Blackboy (*Xanthorrhoea preissii*) plants and scattered Arum lily (*Zantedeschia aethiopica*) and Nightshade (*Solanum nigrum*) weeds. The understorey is continuous (> 80% cover) and dominated by weeds. Native sedges such as the Pale rush (*Juncus pallidus*) and Pithy sword sedge (*Lepidosperma longitudinale*) occur in stands along the foreshore as do the small herbs Centella (*Centella cordifolia*) and Button weed (*Cotula coronopifolia*). Common weeds include Kikuyu (*Pennisetum clandestinum*), Soursob (*Oxalis pes-caprae*), Dock (*Rumex* spp.), Whiteflower fumitory (*Fumaria capreolata*) and Cape weed (*Arctotheca calendula*). One leaf cape tulip (*Homeria flaccida*) and *Paspalum* sp. are also present. *Juncus microcephalus* is present in low lying wet depressions and along the foreshore. Native species such as Running postman (*Kennedia prostrata*) and Orchids (*Caladenia* spp.) occur rarely. Aquatic emergent weeds such as Watercress (*Rorippa nasturtium-aquaticum*) and *Aponogeton elongatus* are frequent.

Recommended Strategies

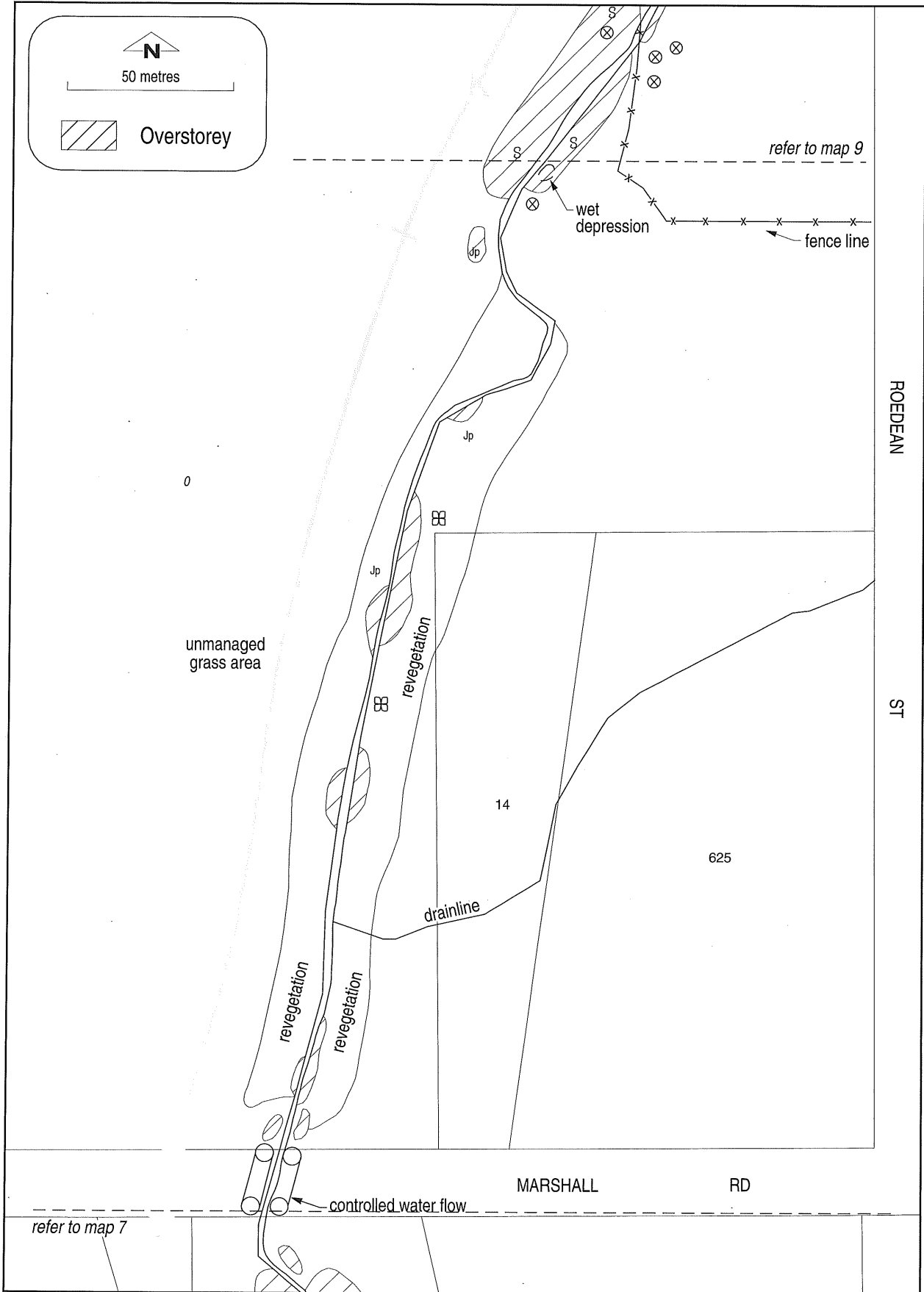
- Re-establish emergent rushes Lake club rush, Jointed twig sedge and Pale rush within stream channel immediately upstream of trees at risk. Secure plants using 600mm "U" shaped steel pegs.
 - Establish islands of emergent vegetation on newly formed banks to enable control of submerged weed species without loss of habitat.
 - Assess areas drained by the artificial channels to determine whether or not there are other alternative management options for water management.
-
- Focus weed control activities in areas where natural regeneration is occurring and/or where native plants persist particularly near the stands of native sedges and rushes. Maintain weed control buffer around persistent clumps, eventually joining the clumps by planting if required
 - Treat Arum lilies prior to fruiting or as minimum remove flowering heads to prevent seed production.
 - Selectively hand weed Whiteflower fumitory, Dock, One leaf cape tulip, Nightshade, Cape weed and Soursob.
 - Monitor germination of new species and hand weed while plants remain juvenile.
 - Treat perennial grasses with flauzifop-butyl in conservation areas biannually in accordance with the recommendations outlined in Appendix 2.
 - Increase extent of vegetation by reinforcing canopy species and ensuring any maintenance works do not mow, or otherwise remove, juvenile trees or threaten bank stability.
 - Establish emergent vegetation as recommended in Appendix 3 and once established, implement gradual removal of submerged weeds.
 - Develop and distribute information to local residents to encourage wise nutrient management and reduce level of nutrients instream, and therefore the prevalence of submerged weeds.



<p>Stream Cover: The continuous overstorey provides areas of permanent shade along the brook. Aquatic vegetation provides temporary instream cover. Occasional large logs occur very infrequently along the brook.</p>
<p>Habitat diversity: The channel depth is shallow < 1 m and water movement is slow with infrequent instream rocks forming small riffles zones. The absence of diverse streamside vegetation limits habitats for terrestrial animals. The presence of overstorey trees provides nesting and roosting sites for birds.</p>
<p>Other issues: The river floodway extends into a stock paddock in the adjoining private property. During peak flows in winter stock watering along the fence line causes increased erosion.</p> <p>There is a constructed “humpy” located on the banks of the brook.</p>

<ul style="list-style-type: none"> • Plant emergent species such as Jointed twig rush and Lake club sedge along the foreshore and within the channel bed to increase stream cover. • Undertake manual removal of submerged species once nodes of native emergent plants are established.
<ul style="list-style-type: none"> • Re-establish dense middlestorey and understorey patches of different native plants including Swamp peppermint, rushes and sedges and small paperbarks once weeds have been eradicated. • Protect existing riffle zones by managing sediment load from upstream.
<ul style="list-style-type: none"> • Liaise with the adjoining landowner to determine if the fence line can be moved to restrict stock access and develop a formalised watering point. If this is not possible assess the possibility of redirecting water flow and undertake rehabilitation focussing on understorey weed control and replacement of understorey and middlestorey. • Ensure minimal level of disturbance on environment by users of the “humpy”, as currently experienced.





Bennett Brook Map 8



Bennett Brook — Map 9 (Section K)

Length of section (m): approximately 870 m

Recorder's name: Kelly Shepherd

Date surveyed: 14/10/98

Nearest road access: Whiteman Park

Lot number: Left bank — 0, 1, 627, 279, 278 Right bank — 0, 626, 3, 2, 281

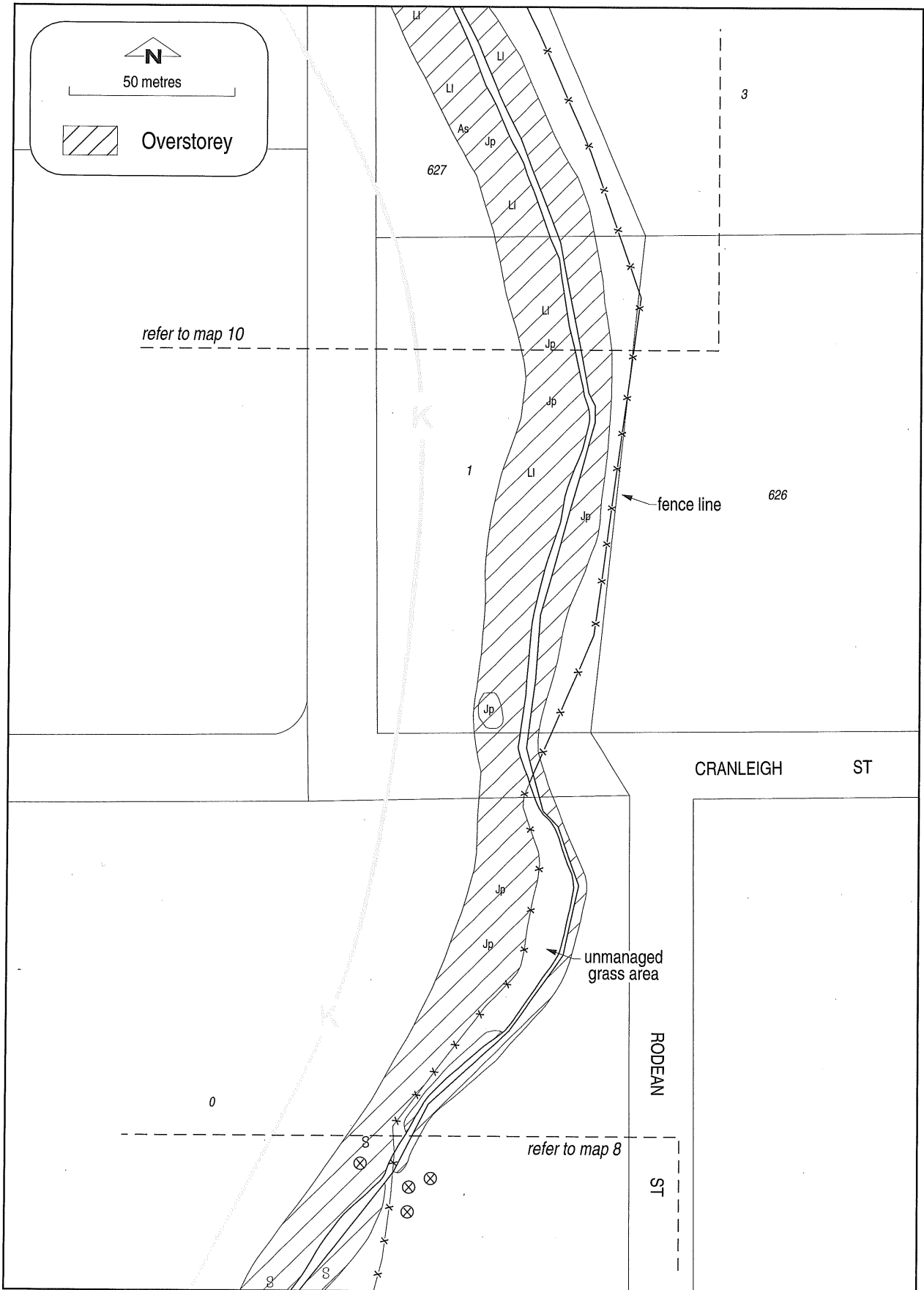
Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Red	Black	Red	Red
Poor	Very Poor	Poor	Poor
2	0	2	2

Stream Condition
Red
Poor
6

Refer to previous description and recommended strategies for Section K (Map 8)





Bennett Brook Map 9



Bennett Brook — Map 10 (Section K)

Length of section (m): approximately 870 m

Recorder's name: Kelly Shepherd

Date surveyed: 14/10/98

Nearest road access: Whiteman Park

Lot number: Left bank — 0, 1, 627, 279, 278 Right bank — 0, 626, 3, 2, 281

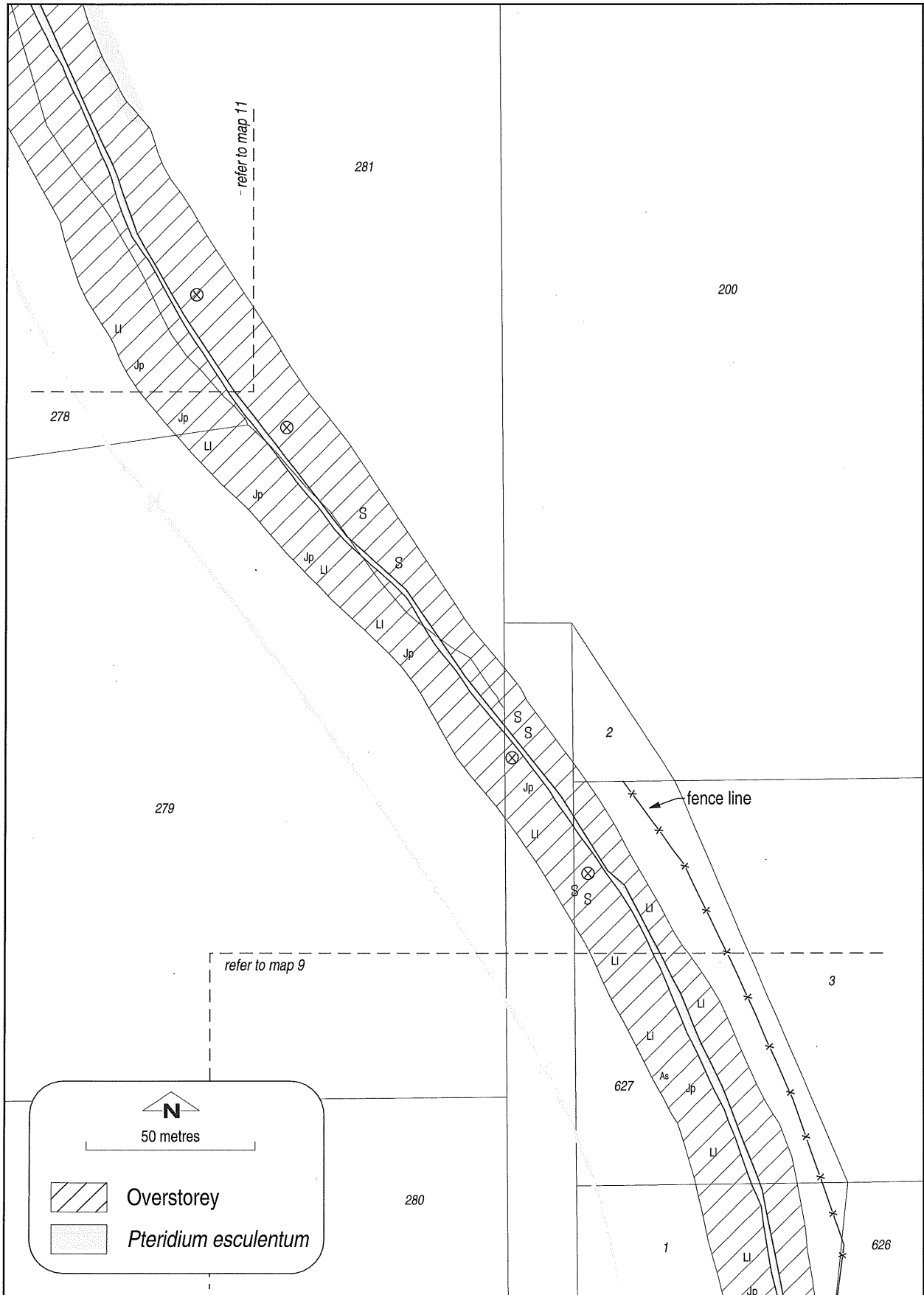
Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Red	Black	Red	Red
Poor	Very Poor	Poor	Poor
2	0	2	2

Stream Condition
Red
Poor
6

Refer to previous description and recommended strategies for Section K (Map 8)





Bennett Brook Map 10





Bennett Brook — Map 11 (Section L)

Length of section (m): approximately 280 m
Recorder's name: Kelly Shepherd
Date surveyed: 15/10/98
Nearest road access: Whiteman Park
Lot number: Left bank — 277, 275 Right bank — 282, 283

Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity	Stream Condition
Yellow	Red	Red	Red	Red
Moderate	Poor	Poor	Poor	Poor
4	2	2	2	10

Description

Bank stability: The main channel is 1 - 2.5 m wide with the foreshore banks rising on a gentle to medium gradient to a height of < 1 - 1 m. Erosion is localised along 5 - 20% of the foreshore area occurring around the base of trees growing along the foreshore banks. There is little evidence of slumping. Sedimentation is localised (5 - 20% of the survey area).

Vegetation: The foreshore overstorey vegetation is open and continuous (> 80% cover) and is comprised of Swamp paperbark (*Melaleuca raphiophylla*), Flooded gum (*Eucalyptus rudis*), occasional Marri (*Corymbia calophylla*) and infrequent Modong (*Melaleuca preissiana*). The middlestorey is patchy (20 - 80% cover) with dense stands of Bracken fern (*Pteridium esculentum*) associated with the Marri overstorey and scattered Coojong (*Acacia saligna*). Scattered Arum lily (*Zantedeschia aethiopica*) and Nightshade (*Solanum nigrum*) weeds are also present. The understorey is continuous (> 80% cover) and

Recommended Strategies

- Liaise with Whiteman Park management to ensure weed control activities are maintained beyond the extent of this survey area.
- Liaise with the Water Corporation and the Water and Rivers Commission to determine water quality and load entering Bennett Brook from Mussel Pool located in Whiteman Park.
- Re-establish emergent rushes Lake club rush, Jointed twig sedge and Pale rush within stream channel immediately upstream of trees at risk. Use 600 mm "U" shaped steel pegs to secure the plants into the foreshore banks.
- Focus weed control in areas supporting remnant native vegetation (at least a 1 m buffer around patches of native vegetation) to encourage natural regeneration.
- Plant middlestorey and understorey species in areas where effective weed control programs have been implemented using species recommended in Appendix 3.
- Undertake selective herbicide control of Arum lily, Kikuyu, Paspalum and *Cyperus* to control extent of infestations (Appendix 2).



dominated by weeds including Kikuyu (*Pennisetum clandestinum*), *Paspalum* sp., Fleabane (*Conyza* sp.) and Cyperus (*Cyperus involucratum*). The small herb Centella (*Centella cordifolia*) occurs along the foreshore. Aquatic emergent weeds such as Watercress (*Rorippa nasturtium-aquaticum*) and *Aponogeton elongatus* are present in the main brook channel.

Stream Cover: The continuous overstorey provides stream cover and areas of permanent shade along the brook. Instream logs and rocks are occur very infrequently along the brook. Aquatic instream vegetation provides temporary instream cover.

Habitat diversity: The channel depth is shallow generally less than 1m and water movement is slow. Instream rocks may provide substrates for aquatic invertebrates but the shallow water depth and slow movement is likely to limit suitable habitats for aquatic organisms. The streamside vegetation provides some habitats for terrestrial invertebrates and reptiles and frogs. The presence of overstorey trees provides nesting and roosting sites for birds.

Other issues: Railway line crosses Bennett Brook.

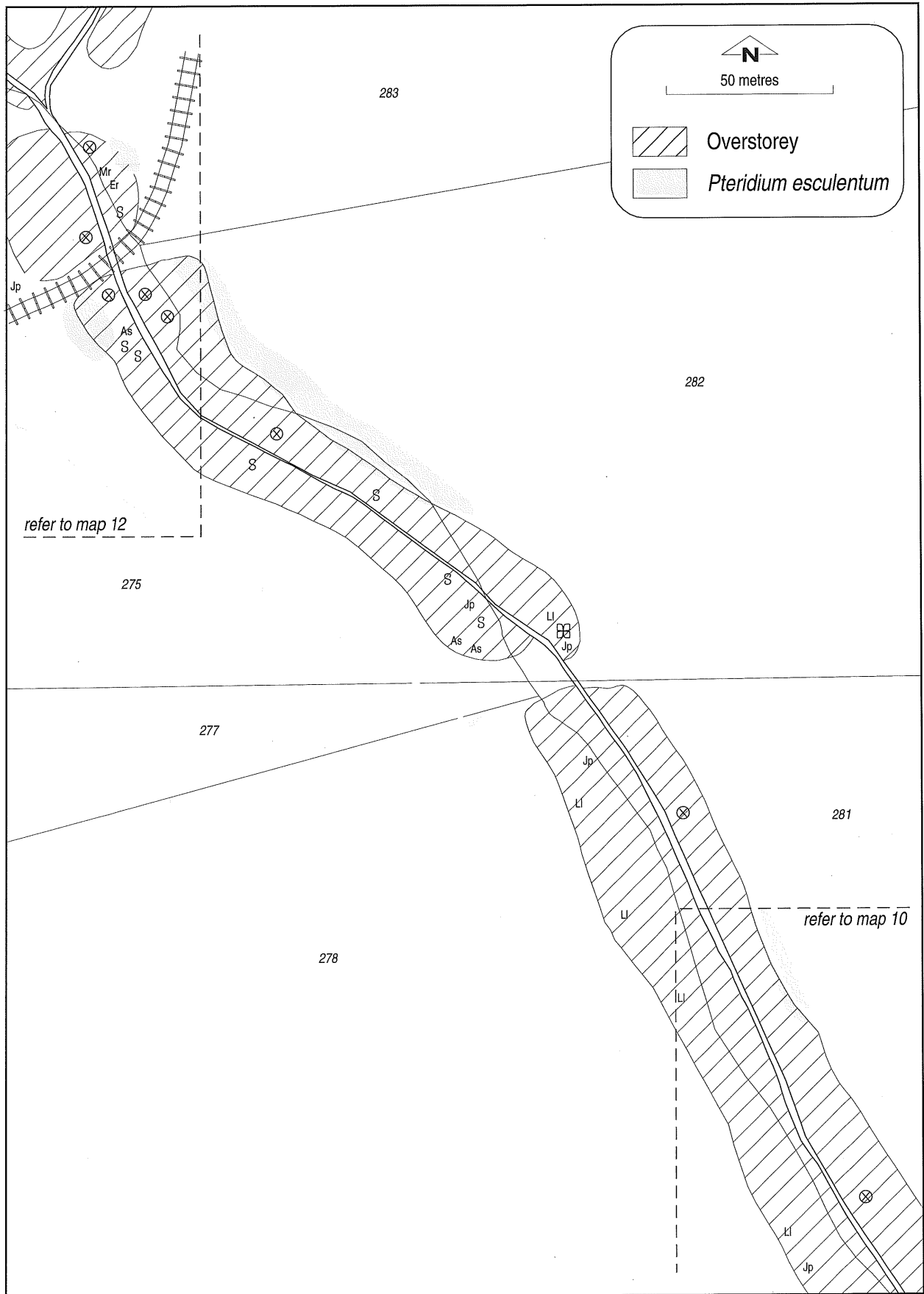
- Hand weed Nightshade and Fleabane prior to flowering and fruiting to reduce the rate of spread from seed. Remove from site.
- Re-establish emergent species in small dense patches and following establishment, implement gradual hand removal of aquatic weeds (note plantings of emergent species should occur in bands across the channels to reduce the potential for erosion in peak flows).

- Re-establish emergent species in small dense patches and following establishment, implement gradual hand removal of aquatic weeds (note plantings of emergent species should occur in bands across the channels to reduce the potential for erosion in peak flows).
- Retain instream logs and branches where they do not exacerbate erosion problems within the main channel.

- Ensure replacement of weeds following control activities with indigenous species as soon as possible using all strata of vegetation.
- Plant middlestorey and understorey species along the foreshore to increase stream cover once weeds have been eradicated.
- Retain instream branches and logs where they do not pose a threat to bank stability.

- Undertake weed control near the Railway line.





Bennett Brook Map 11



Bennett Brook — Map 12 (Section L)

Length of section (m): approximately 280 m
Recorder's name: Kelly Shepherd
Date surveyed: 15/10/98
Nearest road access: Whiteman Park
Lot number: Left bank — 277, 275 Right bank — 282, 283

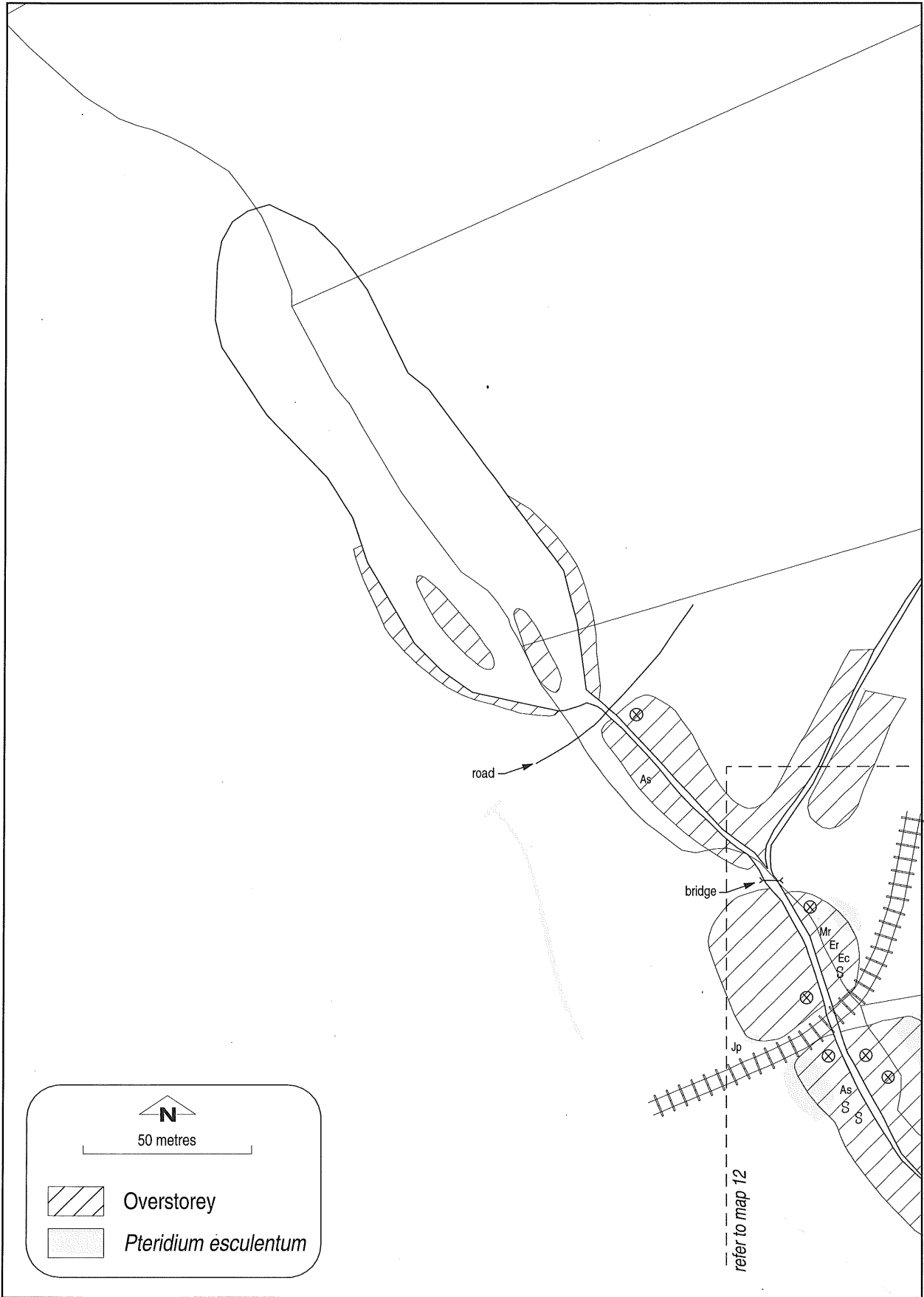
Summary of river health:

Bank Stability	Foreshore Vegetation	Stream Cover	Habitat Diversity
Yellow	Red	Red	Red
Moderate	Poor	Poor	Poor
4	2	2	2

Stream Condition
Red
Poor
10

Refer to previous description and recommended strategies for Section L (Map 11)

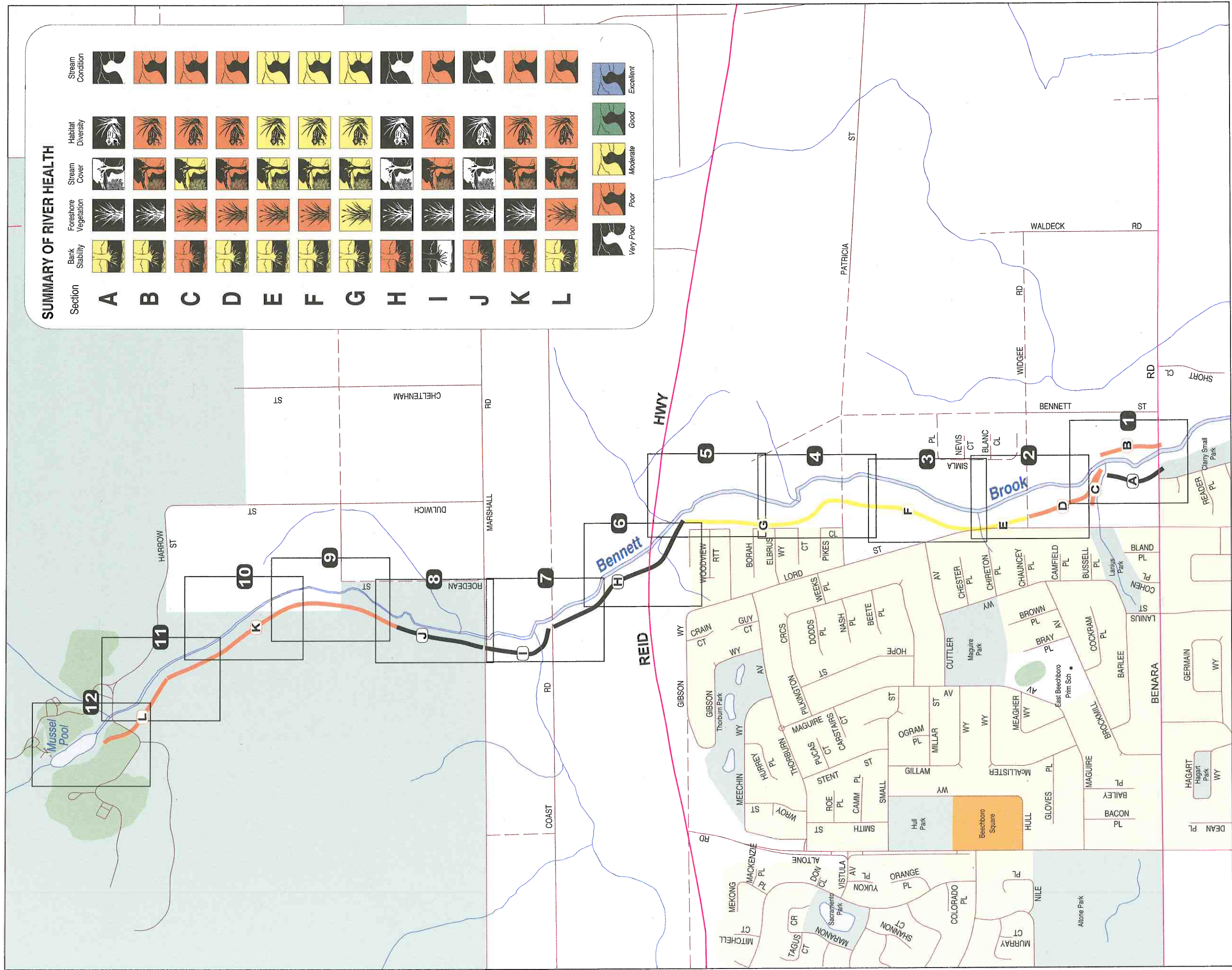




Bennett Brook Map 12







Bennett Brook - Locality Map

5. General recommendations

A number of general recommendations can be identified which apply to all of the sites. These are divided into the core activities, which will be required for groups to successfully develop and implement rehabilitation strategies.

5.1 Planning

- Determine cadastral boundaries and landowner/manager and ensure that they support the foreshore assessment process, and are involved in the development and implementation of any remedial strategies.
- Collate as much existing information about the focus waterway and catchment as possible.
- Focus initial foreshore assessment survey work in areas where future rehabilitation projects may be undertaken.
- Extend future foreshore assessment work from previously surveyed areas along the foreshore, eventually mapping all sites. Future surveys may also include re-assessment of earlier surveys to assess changes to the environment.
- Create herbariums of native and weed species to teach group members and other interested parties to distinguish between native and introduced plants present in the rehabilitation zone.
- Ensure that all works are planned well in advance and that a long-term strategy has been developed and is amended as new information becomes available.
- Ensure that all agencies with statutory responsibilities such as the relevant local government authority, Water Corporation and Swan River Trust is advised of any works within their management areas, to ensure that the works meet all of the legislative requirements.
- Develop information brochures to increase community awareness of the importance of foreshore areas and to encourage community involvement in managing their own foreshores and surrounding reserves.
- Develop an information brochure for the landholder to suggest methods of improved land management practices and encourage rehabilitation of the foreshore area.

- Endeavour to source funds from outside sources to assist both the group and any private landholders that are willing to implement rehabilitation activities.

5.2 Site preparation

5.2.1 Weed control

- Ensure weed control activities are undertaken in manageable sized nodes, reinforcing overstorey species and restoring the middlestorey and understorey species (using species recommended in Appendix 3 of this report) once weeds have been eradicated.
- Tag any native plants present to protect them from weed control activities.
- Hand weed where possible, especially annual weeds and instream weeds.
- Use a qualified herbicide operator if chemical control is undertaken near waterways.
- Always consider the impacts that weed control will have on habitat, particularly for reptiles and small mammals such as bandicoots. Maintain vegetated corridors for animals to move within until sufficient native plants have re-established.
- Ensure that all weeds are removed from the site to limit re-infestation.
- Create buffers around existing clumps of native vegetation to encourage natural regeneration of existing plants e.g. spray Fusillade around native rushes to control introduced grasses and enable the clumps of rushes to spread naturally.
- Ensure the impact on bank stability is considered before weed control works are undertaken. Consider potential for use of erosion control matting as an option to reduce weed re-emergence, support plants installed and improve bank stability on steeper gradient banks.



5.2.2 General site preparation

- Encourage landholders throughout the rural and semi-rural catchments to fence off waterways and tributaries and implement broadscale revegetation program.
- Provide financial support or material assistance to landholders willing to implement rehabilitation activities.
- Define access tracks to weed management areas or where there are planting programs, to minimise disturbance and limit damage to existing vegetation and the substrate.
- Implement intensive weed control activities in manageable sized nodes where planting will be undertaken.
- Remove flower heads prior to seeding to limit reinforcement of the weed seed bank.
- In broadscale areas proposed for future works or in high-risk areas of dense weeds with few native plants where complete removal is inappropriate, ensure either flower removal or repeated brushcutting occurs prior to seeding.

5.3 Planting out

- Ensure planted areas within streamlines are artificially stabilised and planted in low-flow conditions to enable sufficient time for establishment, to reduce the chance for plants to be washed out during peak flows.
- Plant native species only in areas where weeds have been effectively controlled and managed for a preferred minimum of two seasons.
- Encourage landholders to ensure all strata of vegetation including understorey, middlestorey and upperstorey species are included in revegetation works to reinforce bank stability.
- Plant overstorey species initially in highly exposed regions lacking vegetation, to create a level of cover and protection for future plantings.
- Plant emergent and wetland plants in permanent water between September and March, securing those planted in flowing water with 600mm steel “U” shaped pegs.

- Plant dryland plants and seasonally inundated areas in May to July.
- Plant in higher densities than ultimately required to create instant habitat and improve weed exclusion; particularly in the inner urban environments.
- Obtain professional advice about planting densities for each recommended species, to optimise chances of success and re-creating a more natural ecosystem.

5.4 Maintenance

- Ensure the works program includes ongoing intensive maintenance of areas where weed control and planting works have previously been undertaken.
- Implement ongoing weed management, prior to commencing site preparation and planting works in new areas.
- Monitor for any natural regeneration on a regular basis, and undertake weed control around any emerging native plant seedlings.
- Assess the effectiveness of any river restoration works or installation of any products such as hemp matting and modify as required.
- Determine the impact of vandalism if any, and develop and implement strategies to manage this problem.

5.5 Monitoring

- Continue to use the method to assess changes and improvement to foreshore health over time.
- Assess the effectiveness and relative benefits of different management techniques utilised and update the works program accordingly.
- Document the results and learn from experience.
- Monitor the effectiveness of sustaining interest within the project at both the management and implementation level. Develop techniques to support community groups and individuals in undertaking this work.
- Minimise the potential for burnout by not over-extending limited resources, particularly labour.



6. Common issues

6.1 Ownership and access

It is essential that cadastral boundaries are determined at each site and that the people implementing the foreshore assessment are aware of who owns the land. Permission is required from the landowners, who may be State or local government agencies or private landholders, prior to undertaking any survey work. Gaining access to private property may prove to be difficult, whilst permission to enter most government managed lands is generally readily available.

Often property boundaries are fenced and landowners may be suspicious that any information collected during surveys along their foreshore will eventually be used against them. It is important that people implementing the survey are clear about the process and the reasons for the survey and approach all landholders. Where landholder agreement cannot be readily obtained, it is important not to waste time and resources in excessive negotiations. Locate landholders that are interested in improving the health of their foreshore and assist these properties to enhance their land. Healthy foreshores can increase property values and through discussion within communities can ultimately result in peer pressure on others to work on protecting their waterways.

There are often conflicting perceptions about the requirements for managing riparian zones and determining what is a healthy foreshore. Many landholders consider lawn to the high water mark with occasional trees to be healthy and providing sufficient habitat for example, as large numbers of birds e.g. black ducks, may frequently use the foreshore. It is very difficult to articulate foreshore management issues until a common perception of a stable, intact waterway is developed between the group doing the work and the wider community.

A further conflict can arise when landholders consider that their current foreshore management program is adequate. For example, as well maintained lawns reduce the fire hazard, limits uncontrolled weed growth and keep the streambed free of debris, it is argued by these private landholders to be an appropriate management technique to protect the waterway. Frequently this

management regime is in contrast to management practices in neighbouring foreshore reserves that are managed by State and Local government authorities. Extensive weeds, limited access and considerable fire risk are often features of these reserves. As a result it is perceived that there is little management effort. In situations where State and Local government authorities are not demonstrating best management practice, it is difficult to discourage landholders from maintaining their own inappropriate management program.

Both State and Local government and the wider community need to implement improved foreshore management.

6.2 Developing management and rehabilitation plans

Management plans are an important tool used to strike a balance between the multiple use demands of foreshore areas and the protection of flora, fauna and water quality. These documents should have clearly defined aims, objectives and visions as ultimately, the final use of the land will affect how, where and if, rehabilitation plans need development and implementation.

If, for example, a grassed area occurs adjacent to a waterway which is a high use recreation zone, then extensive revegetation works are likely to impinge on the purpose of the land and therefore may be inappropriate. A compromise position may need to be negotiated such as establishing a narrow buffer zone immediately along the stream banks, with well defined access points for viewing the waterway. The buffer zone needs to have a clearly defined boundary between any lawn areas and native vegetation to avoid trampling of native seedlings.

All issues associated with development, conservation and management of the waterway and associated land need to be addressed prior to the development of any plans. Community needs and visions for particular areas need to be canvassed to ensure the document reflects community attitude, which affects whether or not plans get implemented.



At the next level, following management planning there is a need to develop a complete rehabilitation plan for the waterway. It is essential to extend the assessment of foreshore condition to the length of the waterway, prior to any works to gain a complete understanding of current health. This may be limited by access issues, however the broader the understanding of the waterway and their tributaries, the better.

An ecosystem approach to management will ensure that appropriate rehabilitation plans are developed minimizing the impact of any activities. For example complete eradication of dense weeds along the immediate foreshore results in acute loss of habitat and may destabilise foreshore banks increasing the danger of severe erosion and bank collapse. It is necessary to undertake weed control in small, manageable sized nodes to ensure that eradicated weeds are immediately replaced with deep-rooted native species, to minimise the impact on bank stability, and protect native fauna.

Developing detailed management and rehabilitation plans and having a clear understanding of the works required over the long term, enables the development of detailed budgets, allocation of funding or opportunities to raise funds to ensure the completion of any project.

6.3 Long term management

The rehabilitation planning process should include a maintenance schedule for any existing works as well as directing future projects. The importance of continued maintenance within current project sites prior to beginning any new works, can not be emphasised enough. Ongoing management in the long term must be scheduled to ensure the success of any rehabilitation works. Weed control needs to be continued indefinitely as there will always be the threat of reinfestation.

Undertaking works on crown land and reserves requires ongoing community commitment and an interest from state and local government agencies to provide assistance such as fire break maintenance and provision of qualified herbicide operators to undertake weed control.

Private landowners must be strongly committed to any project undertaken on their property to ensure ongoing maintenance. Any change in ownership may require a negotiation with the new owners to determine if management will continue.

Once a rehabilitation project has commenced on a property it will require a significant amount of time to implement weed control, planting and maintenance. Setting manageable areas for work and achievable targets is the most effective way to ensure success. Over-extension of limited resources frequently causes the areas to degrade further, resulting in a situation that is worse than prior to any rehabilitation effort.

There is nothing more disillusioning than having put considerable effort into developing and implementing works for little or no benefit in the medium to long term.

6.4 Surrounding landuse

Adjacent landuse can have a considerable impact on the riparian zone and waterway health. Different landuses have different implications for stream health and therefore the appropriate management regimes required will vary.

Riparian zones are often highly degraded. Foreshore vegetation is frequently reduced to a few metres either side of the watercourse. It is important to provide information to landholders and land managers about the benefits of undertaking remedial works along foreshores, emphasizing the importance of fencing off riparian areas and excluding stock. Sourcing funds and providing support may encourage interested landholders to undertake intensive weed control and revegetation works.

Foreshores in urban areas are frequently high use recreation sites. Traditionally large open areas of maintained lawn were favoured over dense stands of native vegetation. Advertising campaigns and creating signage around project sites are useful tools to increase community awareness. Providing detailed information on the benefits of replanting native species such as stabilizing foreshore banks and increasing stream cover and habitat diversity will increase awareness and may encourage local residents to become involved in the projects.

Sedimentation of watercourses is generally an indication of erosion occurring further upstream. No system can be considered in total isolation, as there will always be impacts from activities further upstream. When undertaking any projects it is essential that groups have a clear understanding of the surrounding landuse and the condition of any tributaries feeding into the main waterway.



The impact of new subdivisions or earthworks upstream should be carefully monitored. Weeds may invade from nearby residential housing. Subdivisions can also have a huge impact on water regimes and sediment loads entering streams and tributaries. Early detection of potential threats minimises the impact on foreshore health in the long term if remedial action is undertaken immediately.

6.5 Gaining support from state and local government

State and local government have a significant role to play in supporting foreshore rehabilitation. Many agencies are also directly involved in managing waterways and foreshore areas. Water Corporation, Water and Rivers Commission, Swan River Trust, Agriculture WA and local government authorities all actively manage some waterways within the State.

Many of these agencies also have statutory requirements to meet, that relate to management of these areas. The Swan River Trust Management Area, for example, relates to the bed and banks of the Swan and Canning Rivers extending across the riparian zone to the limit of the Parks and Recreation Reservation. It is illegal to undertake any works within the SRT Management Area without notifying the Swan River Trust.

Some agencies also have community support functions to assist groups to undertake hands on work, prepare management and rehabilitation plans and can also provide some support for administrative and information requirements.

Key contacts include:

Contact	AgencyContact	Number
Ecoplan	Department of Environmental Protection	9222 7000
	Swan Catchment Centre	9221 3840
	Water and Rivers Commission	9278 0300
	Swan River Trust	9278 0400
	Agriculture WA	9368 3333
	Relevant local government authority	White pages

There may be contacts within each agency for on-ground support. The Swan Catchment Centre has a Landcare trailer that is fully rigged for landcare activities and provides the relevant equipment for site preparation, weed control and planting.

Where reserves are managed by a state or local government authority it is essential that the community liaises with the land manager to develop and implement any assessment and rehabilitation projects.

Support from agencies also improves the opportunities for gaining funding from external sources such as Greening WA, Lotteries WA and the Natural Heritage Trust.

6.7 Fire management

Fire is not recommended as a management technique for riparian zones, particularly in the Scarp region and areas with peaty soils. Should fire occur as a result of vandalism or an accidental burn, then advantage should be taken of the increased access to the area for weed control activities.

Prescribed burns are likely to do significant damage to fringing vegetation, the seed bank and potentially may result in reduced bank stability and higher levels of erosion. Fire also often encourages further weed invasion and spread of existing weed species. Autumn burns are particularly risky.

6.8 Access to information

State and local government authorities have considerable information resources about waterways and should be contacted. Many agencies also have libraries that the community can access, however borrowing books is generally not permitted.

Existing information about any particular waterway should be collated prior to development of management plans.

General information about weed control techniques, site preparation and stream and foreshore restoration needs to be obtained prior to the development of rehabilitation plans.



7. Summary

The foreshore assessment process has been developed to aid interested community groups, officers of State and local government authorities and private landholders in urban and semi-rural areas to gain an understanding of the condition of foreshore areas within their own community. By using a standard methodology to gather information it is possible to compare and contrast foreshore condition of the same area over time, or between different sites in the same survey season to prioritise works.

This document provides the results of the first series of foreshore assessments undertaken along sections of Bennett Brook in accordance with the Water and Rivers Commission (1999) foreshore condition assessment method. Testing and refining the assessment protocol in this work was intended to identify any shortcomings or limitations of the method.

Implementing the technique has resulted in a limited number of modifications to the methodology and provided considerable documentation for the surveyed sections of the waterways listed above.

The foreshore sites selected for this baseline study ranged in condition and current management practices. The detailed recommended strategies outlined for each of these sites aim to give suggestions for hands-on works for rehabilitation of degraded foreshore systems. General recommendations have been provided for broadscale long term planning which emphasise the need to consider the implications of any works, and the commitment required to sustain these activities in the long term.

This report of foreshore condition will be the first of many, as the process continues to evolve and be implemented across urban and semi-rural areas statewide.



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Appendix 1

Native and weed species identified
during the foreshore assessment
process (1998)



Appendix 1a: Native Species identified during the foreshore assessment process (1998)

Scientific name	Common Name	Bennett Brook	Bannister Creek	Canning River	Roley Pool	Southernwood Creek	Wright Brook	Ellen Brook	Breera Brook
<i>Acacia alata</i>	Winged wattle		Y		Y		Y		
<i>Acacia pulchella</i>	Prickly moses	Y			Y		Y		
<i>Acacia saligna</i>	Coojong	Y		Y	Y	Y	Y	Y	Y
<i>Acanthocarpus preissii</i>					Y				
<i>Agonis linearifolia</i>	Swamp peppermint	Y	Y	Y	Y		Y	Y	Y
<i>Astartea fascicularis</i>	Common astartea				Y			Y	
<i>Banksia menziesii</i>	Firewood banksia	Y							
<i>Baumea juncea</i>	Bare twigrush		Y					Y	Y
<i>Bolboschoenus caldwellii</i>	Marsh club rush		Y						
<i>Baumea rubiginosa</i>	River twigrush		Y						
<i>Burchardia umbellata</i>	Milkmaid								Y
<i>Caladenia</i> spp.	Orchids	Y							
<i>Carex appressa</i>	Tall sedge		Y					Y	Y
<i>Carex divisa</i>	Divided sedge		Y						
<i>Carex fascicularis</i>	Tassel sedge		Y					Y	Y
<i>Centella cordifolia</i>	Centella	Y	Y	Y				Y	Y
<i>Centrolepis</i> spp.	Centrolepis		Y						
<i>Chenopodium glaucum</i>	Glaucous goosefoot		Y						
<i>Corynotheca micrantha</i>	Sand lily		Y						Y
<i>Conostylis</i> spp.		Y							
<i>Corynotheca micrantha</i>					Y				
<i>Corymbia calophylla</i>	Marri	Y	Y	Y	Y	Y	Y	Y	Y
<i>Cotula coronopifolia</i>	Button weed	Y	Y						
<i>Darwinia citriodora</i>	Lemon-scented darwinia								
<i>Drosera erythrorhiza</i>	Red ink sundew								Y
<i>Drosera glanduligera</i>	Pimpernel sundew								Y
<i>Dryandra nivea</i>	Couch honeypots				Y				Y



Appendix 1b: Weed Species identified during the foreshore assessment process (1998)

Scientific name	Common Name	Bennett Brook	Bannister Creek	Canning River	Roley Pool	Southernwood Creek	Wright Brook	Ellen Brook	Breera Brook
<i>Acacia</i> spp.	Weed wattles		Y	Y	Y		Y		
<i>Allium triquetrum</i>	Three-cornered garlic								
<i>Alopecurus myosuroides</i>	Slender foxtail		Y						
<i>Alternanthera nodiflora</i>	Joyweed	Y	Y						
<i>Anagallis arvensis</i>	Pimpernel					Y		Y	
<i>Aponogeton elongatus</i>		Y						Y	
<i>Arctotheca calendula</i>	Capeweed	Y		Y		Y	Y	Y	
<i>Arundo donax</i>	Giant reed	Y	Y	Y	Y	Y	Y	Y	
<i>Aster subulatus</i>	Bushy starwort		Y						
<i>Avena fatua</i>	Wild oats		Y	Y		Y	Y	Y	
<i>Briza</i> spp.	Blowfly grass, shivery grass		Y		Y			Y	
<i>Bromus diandrus</i>	Great brome					Y		Y	
<i>Canna</i> spp.	Canna lily			Y			Y		
<i>Centaurea</i> spp.	Thistles								
<i>Chenopodium album</i>	Fathen		Y						
<i>Conyza</i> spp.	Fleabane	Y	Y	Y		Y	Y	Y	
<i>Cortaderia seloana</i>	Pampas grass		Y	Y			Y		
<i>Cynodon dactylon</i>	Couch grass			Y		Y	Y	Y	
<i>Cyperus difformis</i>	Dirty dora							Y	
<i>Cyperus involucreatus</i>	Cyperus	Y	Y				Y		
<i>Cytisus proliferus</i>	Tree lucerne						Y		
<i>Cyperus</i> spp.			Y	Y					
<i>Dipogon lignosus</i>	Dolichos pea						Y		
<i>Echinochloa telmatophila</i>	Swamp barnyard grass		Y						
<i>Echium plantagineum</i>	Paterson's curse						Y	Y	
<i>Ehrharta calycina</i>	Perennial veldt grass	Y	Y		Y			Y	
<i>Ehrharta longiflora</i>	Annual veldt grass					Y	Y	Y	



Appendix 2

Suggested weed control methods



Appendix 2: Suggested weed control methods

Some of the information contained in this report has been taken from Dixon and Keighery (1995) in *Managing Perth's Bushlands* or referenced to Kings Park Board.

Species Name:	<i>Acacia spp</i>	Control Priority	Location	Habit	Form
Common Name:	Weed wattles	2	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input checked="" type="checkbox"/>
Seed Form:	Light seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input checked="" type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Species dependent - prior to flowering				Grass <input type="checkbox"/>
Method of Control:	Hand weed juvenile plants. Small plants means they are relatively easy to remove. Once plants are mature or woody stemmed, cut the main trunk/stem below the widest part of the stem beneath the ground. This will effectively kill all wattles.				

Species Name:	<i>Allium triquetrum</i>	Control Priority	Location	Habit	Form
Common Name:	Three cornered garlic	3	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input checked="" type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:			Riparian <input checked="" type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads by bulb or corm growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:					Grass <input type="checkbox"/>
Method of Control:	Apply Glyphosate 1 in 50 or Glean whilst plants are in flower. Repeat applications will be necessary.				

Species Name:	<i>Alopecurus myosuroides</i>	Control Priority	Location	Habit	Form
Common Name:	Slender foxtail	3	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:			Riparian <input checked="" type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:					Rush/Sedge <input type="checkbox"/>
Best Time of Control:					Grass <input checked="" type="checkbox"/>
Method of Control:	Hand weeding prior to seeding is effective. Herbicides are not recommended as this plant occurs in wetlands and there is a threat of contamination.				
	Repeated brushcutting prior to seeding is effective and reduces the rate of spread of this plant.				

Control priority 1 - Major environmental weed, urgent control required

Control priority 2 - Nuisance weed, control as soon as possible

Control priority 3 - Minor weed, control as resources become available

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Species Name:	<i>Alternanthera nodiflora</i>	Control Priority	Location	Habit	Form
Common Name:	Joyweed	1	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	March-April		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads from both seed and vegetative growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Oct-Nov				Grass <input type="checkbox"/>
Method of Control:	Hand weed plants in strips up to 2 m perpendicular to water flow and replace immediately with native emergent species. Carefully bag and remove weed material from the site.				
	Any segment which is broken from this plant is likely to regenerate into a new plant, so using a floating bund with netting or similar device downstream to trap any segments missed.				

Species Name:	<i>Anagallis arvensis</i>	Control Priority	Location	Habit	Form
Common Name:	Pimpernel	3	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light seed		Riparian <input type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:					Rush/Sedge <input type="checkbox"/>
Best Time of Control:					Grass <input type="checkbox"/>
Method of Control:	Hand weeding small populations is effective. Alternatively treat with Glyphosate or Glean at 15g per ha.				

Species Name:	<i>Aponogeton elongatus</i>	Control Priority	Location	Habit	Form
Common Name:		2	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light seed		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input checked="" type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads from both seed and vegetative growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Nov - Mar (access dependent)				Grass <input type="checkbox"/>
Method of Control:	This aquatic weed is difficult to control because it slows water movement, increases sedimentation and reduces erosion which affects bed and bank stability following removal. The recommended removal technique involves manual clearing of a channel and also clearing 5 to 10 m wide bands, 20 metres apart which are perpendicular to the stream flow. This will minimise the potential for de-stabilising the stream bed.				
	Seek expert advice and approvals from the relevant government agencies prior to implementing broad scale works. Herbicides should not be used for this weed. Shading out and planting dense clumps of indigenous plants are the most effective management techniques.				

Control priority 1 - Major environmental weed, urgent control required
 Control priority 2 - Nuisance weed, control as soon as possible
 Control priority 3 - Minor weed, control as resources become available

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Species Name:	Arctotheca calendula	Control Priority	Location	Habit	Form
Common Name:	Capeweed	<input type="checkbox"/> 3	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Coarse seed		Riparian <input type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Oct - Feb				Grass <input type="checkbox"/>
Method of Control:	Hand weeding small populations of this plant is effective. Rotary hoeing broadscale infestations repeatedly can also work. Kings Park Board recommends glyphosate at 100ml in 15l water. Lontrel 1 in 100 has been successful on larger plants in areas without any native vegetation.				

Species Name:	Arundo donax	Control Priority	Location	Habit	Form
Common Name:	Giant reed	<input type="checkbox"/> 2	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Sept - Dec		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads readily from rhizome growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	All year				Grass <input checked="" type="checkbox"/>
Method of Control:	Cut down and spray regrowth when 0.5 - 1.0m high with Glyphosate 360 100ml in 10l of water. An alternative technique is to remove bulk of plant material and pour herbicide down each tube.				
	Ensure removal of seed heads prior to ripening if plant control is not possible. Generally this plant occurs on the banks of streams and rivers. It is important not to dig this plant out if there is a risk of increasing erosion. Onsite poisoning is the preferred option leaving the dense rhizome mat intact.				

Species Name:	Aster subulatus	Control Priority	Location	Habit	Form
Common Name:	Bushy starwort	<input type="checkbox"/> 3	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light and easily spread by wind		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Aug - Mar				Grass <input type="checkbox"/>
Method of Control:	Hand weeding these plants is easy and effective. It is essential to weed them prior to flowering and fruiting to reduce their spread.				

Species Name:	Avena spp.	Control Priority	Location	Habit	Form
Common Name:	Wild Oats	<input type="checkbox"/> 2	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light, easily spread by wind		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	March - June		Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Aug - Oct				Grass <input checked="" type="checkbox"/>
Method of Control:	Hand weeding small plants in winter is effective for small populations. Blanket/Spot spraying at 2l Fusillade per ha is effective. Brushcutting plants with immature seed heads will aid control in the longer term by minimizing seed spread.				

Dense populations represent a significant fire hazard and threat to remnant vegetation, so repeated brushcutting also assists in reduction of fire hazard.

Control priority 1 - Major environmental weed, urgent control required
 Control priority 2 - Nuisance weed, control as soon as possible
 Control priority 3 - Minor weed, control as resources become available

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Species Name: *Briza maxima* **Control Priority** **Location** **Habit** **Form**

Common Name: Blowfly grass **2** **Dryland** **Bulb/Corm** **Tree**

Seed Form: Light, easily spread by wind **Riparian** **Perennial** **Shrub**

Seeding Time: Sept - Nov **Aquatic** **Annual** **Herb**

Method of Spread: Spreads mostly from seed **Rush/Sedge**

Best Time of Control: June - Aug **Grass**

Method of Control: Hand weeding is effective. **Climber**

Control may be achieved by spot/blanket spraying Sertin or similar at 2l per ha.

Species Name: *Briza minor* **Control Priority** **Location** **Habit** **Form**

Common Name: Shivery grass **2** **Dryland** **Bulb/Corm** **Tree**

Seed Form: Light, easily spread by wind **Riparian** **Perennial** **Shrub**

Seeding Time: Sept - Oct **Aquatic** **Annual** **Herb**

Method of Spread: Spreads mostly from seed **Rush/Sedge**

Best Time of Control: June - Aug **Grass**

Method of Control: Hand weeding is effective. **Climber**

Control may be achieved by spot/blanket spraying Sertin or similar at 2l per ha.

Species Name: *Bromus diandrus* **Control Priority** **Location** **Habit** **Form**

Common Name: Great brome **2** **Dryland** **Bulb/Corm** **Tree**

Seed Form: Coarse seed **Riparian** **Perennial** **Shrub**

Seeding Time: Sept - Nov **Aquatic** **Annual** **Herb**

Method of Spread: Spreads mostly from seed **Rush/Sedge**

Best Time of Control: June - Aug **Grass**

Method of Control: Hand weeding is easy and effective for small populations. The most frequently recommended treatment is Fusillade at between 2-4l per ha, when the plants are actively growing in winter. Repeated brushcutting can also be effective. **Climber**

Note: Correct identification of grasses is important to protect native grasses from removal. The presence of native grasses should be investigated prior to spraying herbicides.

Species Name: *Canna spp.* **Control Priority** **Location** **Habit** **Form**

Common Name: Canna **3** **Dryland** **Bulb/Corm** **Tree**

Seed Form: Heavy seed **Riparian** **Perennial** **Shrub**

Seeding Time: **Aquatic** **Annual** **Herb**

Method of Spread: Spreads readily from rhizome growth **Rush/Sedge**

Best Time of Control: Sept - Apr **Grass**

Method of Control: Dig out small infestations. Selectively spraying the leaves with a systemic herbicide can be effective. **Climber**

Encourage residents to harvest the flowers to reduce seed production.

Broadscale removal of dense stands may threaten bank stability. Remove in nodes perpendicular to the water course or remove the bulk of biomass then treat with herbicide. Ensure the dense rhizome mat intact.

Control priority 1 - Major environmental weed, urgent control required

Control priority 2 - Nuisance weed, control as soon as possible

Control priority 3 - Minor weed, control as resources become available

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Species Name:	Centaurea spp	Control Priority	Location	Habit	Form
Common Name:	Thistles	<input type="checkbox"/> 2	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light, easily spread by wind		Riparian <input type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	April - July		Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Spring / summer				Grass <input type="checkbox"/>
Method of Control:	Hand weeding is effective for this group of plants. Vigilance is required to ensure removal prior to seeding.				
	Some people have adverse reactions to the sap and prickles of these plants. Care should be taken to minimise contact with bare skin and eyes.				

Species Name:	Chenopodium album	Control Priority	Location	Habit	Form
Common Name:	Goosefoot	<input type="checkbox"/> 3	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Heavy seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	April - June and Sept - Oct		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	All year.				Grass <input type="checkbox"/>
Method of Control:	Hand weeding is easy and effective prior to seeding.				
	Make sure that this species is correctly identified as Chenopodium glaucum is a similar native species.				

Species Name:	Conyza spp	Control Priority	Location	Habit	Form
Common Name:	Fleabane	<input type="checkbox"/> 3	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light, easily spread by wind		Riparian <input type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	April - Dec and July - Feb		Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Oct - Mar				Grass <input type="checkbox"/>
Method of Control:	Hand weeding is effective prior to seeding. Needs to be ongoing. Ensure any seed heads present are bagged prior to removal if hand weeding has not occurred prior to this time.				
	Common on roadsides and disturbed areas as a primary coloniser. This species is tolerant of salt, wind and is adaptable to variable soil types and therefore represents a long term problem. It is easy to control and a difference can easily be seen when controlled in bushland communities.				

Control priority 1 - Major environmental weed, urgent control required
 Control priority 2 - Nuisance weed, control as soon as possible
 Control priority 3 - Minor weed, control as resources become available

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Species Name:	Cortaderia selloana	Control Priority	Location	Habit	Form
Common Name:	Pampas Grass	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light and easily spread by wind		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Dec - Feb		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Sept - Nov				Grass <input checked="" type="checkbox"/>
Method of Control:	Cut plumes before seed ripens to limit spread. Remove most leaf material with a heavy duty brushcutter and paint regrowth with Glyphosate 1 in 2. Thoroughly wet both sides of the leaf.				
	In riparian situations do not attempt to dig out these plants, due to the potential to affect bank stability. Should fire occur in a riparian zone, then treat the plants as soon as they reshoot to take advantage of easy access.				

Species Name:	Cynodon dactylon	Control Priority	Location	Habit	Form
Common Name:	Couch	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	May, April		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads readily from rhizome growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Oct - Feb and April - May				Grass <input checked="" type="checkbox"/>
Method of Control:	Hand weeding is very difficult, labour intensive and rarely effective. The most effective method is to spot/blanket spray in late spring - autumn using Fusillade or Targa at 4l per ha. Brushcutting and raking off bulk of plant material prior to treatment often improves ease of removal and spraying.				
	Do not spray over winter as this plant does not actively grow at this time. Flauzifop-butyl can be used on couch occurring amongst native rushes and sedges as they are tolerant of this chemical. Ensure that the population requiring treatment is not Sporobolus virginicus, the native salt water couch.				

Species Name:	Cyperus spp	Control Priority	Location	Habit	Form
Common Name:		2	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	May - July Oct - Jan		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads readily from rhizome growth and seed				Rush/Sedge <input checked="" type="checkbox"/>
Best Time of Control:	Nov - Jan				Grass <input type="checkbox"/>
Method of Control:	Spot spraying in summer using 150ml of Roundup in 15l of water + Pulse. Note, Biactive is more acceptable than other forms of Glyphosate for use over waterlogged areas. Repeated brushcutting to prevent flowering is also effective in the long term.				
	Identification is frequently difficult with these species so it is important to ensure that the plant to be controlled is a weed and not native to the area. Remove seed heads as a minimum control technique until such time as identification has been achieved.				

Control priority 1 - Major environmental weed, urgent control required
 Control priority 2 - Nuisance weed, control as soon as possible
 Control priority 3 - Minor weed, control as resources become available

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Species Name:	Cytisus proliferus	Control Priority	Location	Habit	Form
Common Name:	Tree lucerne	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Coarse seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input checked="" type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	All year				Grass <input type="checkbox"/>
Method of Control:	The most effective method is to cut the plant off at ground level. Treating the stump with chemical is not usually necessary, unless the stump is cut more than 20mm above ground level. Remove all plant material from the site.				
	Kings Park recommends using Glyphosate at 1:15 on the cut stump.				

Species Name:	Dipogon lignosus	Control Priority	Location	Habit	Form
Common Name:	Dolichos pea	2	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:			Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads from both seed and vegetative growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:					Grass <input type="checkbox"/>
Method of Control:	Hand removal of small populations. Spot spraying with Glyphosate 1 in 50 or 1:100, can be effective.				
	At the moment, this plant is not extensively distributed around the waterways in the Perth Metropolitan area. It does have the potential however, to become a serious weed in this region - so works should focus where this species is present.				

Species Name:	Echinochloa telmatophila	Control Priority	Location	Habit	Form
Common Name:	Barnyard grass	2	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Coarse seed		Riparian <input checked="" type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Oct - Dec		Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	July - Sept				Grass <input checked="" type="checkbox"/>
Method of Control:	Remove small populations by hand. Hand weeding is preferred provided it will not increase erosion potential of any areas. As this plant occurs in wetlands, herbicide use is not preferred.				
	Alternatively treat with Fusillade or equivalent prior to flowering. Herbicide rates of 750ml to 2l dependent on plant size - prior to flowering.				

Species Name:	Echium plantagineum	Control Priority	Location	Habit	Form
Common Name:	Paterson's curse	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Coarse seed		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Nov - Jan		Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	July - Oct				Grass <input type="checkbox"/>
Method of Control:	Hand weed small populations. Broader scale populations can be sprayed with Glyphosate. A rate of 75-100 ml per 15l of water is recommended by Kings Park Board staff.				

Control priority 1 - Major environmental weed, urgent control required
Control priority 2 - Nuisance weed, control as soon as possible
Control priority 3 - Minor weed, control as resources become available



Species Name:	<i>Ehrharta calycina</i>	Control Priority	Location	Habit	Form
Common Name:	Veldtgrass	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light, easily spread by wind		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	March, April and Sept, Oct		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Aug - Dec				Grass <input checked="" type="checkbox"/>
Method of Control:	Hand weed localised infestations. Repeated brushcutting of larger stands of the weed, close to root base has been effective, followed by spot/blanket spraying using Fusillade at 4l per ha or Sertin/Targa. It is important to tag any native plants persisting amongst stands of Veldtgrass to protect them from brushcutting activities. Hand weed grasses close to any native plants.				
	This plant represents a significant fire hazard in dense, extensive populations which generally occurs along disturbed road verges and fire access tracks.				

Species Name:	<i>Eragrostis curvula</i>	Control Priority	Location	Habit	Form
Common Name:	African love grass	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light, easily spread by wind		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	June - Nov		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Nov - March				Grass <input checked="" type="checkbox"/>
Method of Control:	Hand weed small infestations prior to mulching. Kings Park have found complete foliar spraying after fire or in summer months using Glyphosate 1l in 100l water and wetter e.g. Agral 60, X77 to be effective. Repeated brushcutting can be effective combined with herbicide treatment of regrowth. This minimises herbicide required by a reducing the amount of leaf material.				
	This plant represents a significant fire hazard and therefore a major threat to native vegetation. Do not set fire to on purpose but take advantage of easier access should any wildfire occur over summer.				

Species Name:	<i>Erodium moschatum</i>	Control Priority	Location	Habit	Form
Common Name:	Musky crowfoot	2	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Coarse seed		Riparian <input type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	June - Sept				Grass <input type="checkbox"/>
Method of Control:	Hand weeding is effective in predominantly native vegetation zones. This species is difficult to control due to the widespread nature of the populations.				

Control priority 1 - Major environmental weed, urgent control required

Control priority 2 - Nuisance weed, control as soon as possible

Control priority 3 - Minor weed, control as resources become available

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Species Name:	<i>Erythrina x sykesii</i>	Control Priority	Location	Habit	Form
Common Name:	Coral Tree	2	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input checked="" type="checkbox"/>
Seed Form:	Coarse seed		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads from suckers				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Sept - Mar				Grass <input type="checkbox"/>
Method of Control:	Inject tree with systemic herbicide at 10 - 15 cm intervals around the trunk. Treatment may be required several times. Cut and paint any suckers with Glyphosate.				
	Remove any branches which fall from the tree, as these can take root. Ensure bank stability is not threatened when removing the dead trunk.				

Species Name:	<i>Ferraria crispa</i>	Control Priority	Location	Habit	Form
Common Name:	Black flag	2	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input checked="" type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Heavy seed		Riparian <input checked="" type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Nov - Dec		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads by bulb or corm growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Aug - Oct				Grass <input type="checkbox"/>
Method of Control:	Hand weed using gloves as this species is highly toxic. Kings Park suggests spot spraying Glyphosate 1 in 100 for control or using Ally/Brushoff and Glean at flowering time.				

Species Name:	<i>Ficus spp.</i>	Control Priority	Location	Habit	Form
Common Name:	Edible fig tree	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input checked="" type="checkbox"/>
Seed Form:	Heavy seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Dec - Mar		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Sept - Nov				Grass <input type="checkbox"/>
Method of Control:	Small plants can be removed by hand. Mature plants can be injected with full strength Glyphosate at 15 cm intervals around the trunk. Fruit removal effectively reduces the rate of spread of this weed.				
	These plants are common in riparian zones. It is important not to disturb their root structure as generally these plants provide considerable bank stability in the absence of native plants. Removing the bulk of the branches and stems in dense areas may be appropriate.				

Species Name:	<i>Foeniculum vulgare</i>	Control Priority	Location	Habit	Form
Common Name:	Fennel	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light seed		Riparian <input type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Dec - Feb		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Aug - Sept				Grass <input type="checkbox"/>
Method of Control:	Hand weeding is effective for small plants. For large plants, cut the stems below ground and remove plant material prior to fruiting to reduce future spread. Alternatively, this weed can be controlled by applying Glyphosate 1 in 100 before or at flowering or repeated brushcutting.				

Control priority 1 - Major environmental weed, urgent control required
 Control priority 2 - Nuisance weed, control as soon as possible
 Control priority 3 - Minor weed, control as resources become available

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Species Name: *Freesia aff leichthnii* **Control Priority** 2 **Location** **Habit** **Form**

Common Name: Freesia **Dryland** **Bulb/Corm** **Tree**

Seed Form: Light seed **Riparian** **Perennial** **Shrub**

Seeding Time: Oct - Nov **Aquatic** **Annual** **Herb**

Method of Spread: Spreads by bulb or corm growth **Rush/Sedge**

Best Time of Control: Aug - Sept **Grass**

Method of Control: Small infestations can be dug out, bagged and removed from site. The sieving method outlined for *Watsonia* can be effective. Care needs to be taken to ensure that no corms are dropped when removing the plants from site - otherwise it will create more work in the future.

For large infestations Kings Park Board Staff recommend applying Glyphosate 1 in 100 or Brushoff 5g per ha just prior to flowering (August). **Climber**

Species Name: *Fumaria capreolata* **Control Priority** 2 **Location** **Habit** **Form**

Common Name: Whiteflower fumitory **Dryland** **Bulb/Corm** **Tree**

Seed Form: Light seed **Riparian** **Perennial** **Shrub**

Seeding Time: Dec - Mar **Aquatic** **Annual** **Herb**

Method of Spread: Spreads mostly from seed **Rush/Sedge**

Best Time of Control: May - Sept **Grass**

Method of Control: Hand weed prior to seeding. **Climber**

Species Name: *Gladiolus spp* **Control Priority** 2 **Location** **Habit** **Form**

Common Name: Gladiolus **Dryland** **Bulb/Corm** **Tree**

Seed Form: Light, easily spread by wind **Riparian** **Perennial** **Shrub**

Seeding Time: Feb-June **Aquatic** **Annual** **Herb**

Method of Spread: Spreads by bulb/corm growth and seed **Rush/Sedge**

Best Time of Control: Aug - Dec **Grass**

Method of Control: Remove flower heads to prevent seed production. In heavy soils, handweed by digging around clump, sieving and shaking back sand. Can hand weed easily in dryland areas (Aug-Sept). Bag all the corms and dispose of carefully. It is possible to use herbicide for severe infestations including Glean, Brushoff and Glyphosate - using hand wiping technique. **Climber**

Species Name: *Gomphocarpus fruticosus* **Control Priority** 1 **Location** **Habit** **Form**

Common Name: Cotton bush **Dryland** **Bulb/Corm** **Tree**

Seed Form: Light and easily spread by wind **Riparian** **Perennial** **Shrub**

Seeding Time: Nov - Dec **Aquatic** **Annual** **Herb**

Method of Spread: Spreads mostly from seed **Rush/Sedge**

Best Time of Control: Sept - Dec **Grass**

Method of Control: Hand weed small plants prior to fruiting. Alternatively cut at or slightly below ground level and remove plant material. Selectively spraying the leaves with Glyphosate 1 in 100 is the suggested herbicide treatment. **Climber**

Some people have adverse reactions to the sap of this plant. Wear gloves and take care when handling plant material.

Control priority 1 - Major environmental weed, urgent control required
Control priority 2 - Nuisance weed, control as soon as possible
Control priority 3 - Minor weed, control as resources become available

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Species Name: *Hesperantha falcata* **Control Priority** **Location** **Habit** **Form**

Common Name: 1 Dryland Bulb/Corm Tree

Seed Form: Coarse seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads by bulb or corm growth Rush/Sedge

Best Time of Control: Grass

Method of Control: Kings Park Board staff have been unable to find little information about controlling this weed. This agency recommends using Glyphosate at a rate of 1 to 100 at flowering time, but because this plant has small leaves it is difficult to target. Trialling Glean/Brushoff is also recommended. Climber

Species Name: *Homeria flaccida* **Control Priority** **Location** **Habit** **Form**

Common Name: One leaf cape tulip 1 Dryland Bulb/Corm Tree

Seed Form: Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads by bulb or corm growth Rush/Sedge

Best Time of Control: Grass

Method of Control: Removing these plants by hand can be effective if care is taken to remove all corms. For extensive populations, it is recommended that the plants are wiped with Glyphosate 1 in 10. Climber

It is important to note that not all corms re-shoot in a given year so it is essential to monitor and treat re-growth annually. This plant is toxic to stock.

Species Name: *Hordeum leporinum* **Control Priority** **Location** **Habit** **Form**

Common Name: Barley grass 3 Dryland Bulb/Corm Tree

Seed Form: Light seed Riparian Perennial Shrub

Seeding Time: Sept - Oct Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: July - August Grass

Method of Control: Hand weeding is effective for small populations. Herbicide treatment using Fusillade at 2l per ha can work in bushland environments. Kings Park recommends spraying in July-Aug. It is important that hand weeding or spraying occurs before seed set. Climber

Species Name: *Hyparrhenia hirta* **Control Priority** **Location** **Habit** **Form**

Common Name: Tambookie grass 1 Dryland Bulb/Corm Tree

Seed Form: Coarse seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: Nov - Mar Grass

Method of Control: Hand weeding small plants prior to flowering is relatively easy. Brushcutting to remove most leaf material prior to herbicide treatment improves the effectiveness of the application. Fusillade at 4l per ha works best on new growth. Repeat treatments are likely to be required. Climber

This is a WA native grass which is extending its distribution as a result of disturbance and vehicle movement.

Control priority 1 - Major environmental weed, urgent control required
Control priority 2 - Nuisance weed, control as soon as possible
Control priority 3 - Minor weed, control as resources become available



Species Name: *Hypochaeris radicata* **Control Priority** **Location** **Habit** **Form**

Common Name: Flatweed 3 Dryland Bulb/Corm Tree

Seed Form: Light and easily spread by wind Riparian Perennial Shrub

Seeding Time: Oct - Mar Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: All year Grass

Method of Control: Hand weeding is fast and effective prior to, or during flowering. Climber

Species Name: *Ipomoea spp* **Control Priority** **Location** **Habit** **Form**

Common Name: Morning glory 1 Dryland Bulb/Corm Tree

Seed Form: Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads from both seed and vegetative growth Rush/Sedge

Best Time of Control: Grass

Method of Control: Cut and remove existing growth, and then treat regrowth as it develops with Glyphosate at 300ml per 15l water with Pulse. This technique is preferred by the Kings Park Board staff. Climber

Continued effort to remove the bulk of the vegetative material, taking care not to drop segments, can also be helpful in minimising the need for herbicide use.

This plant is becoming increasingly dominant in highly urbanised streams and should be controlled.

Species Name: *Isolepis prolifera* **Control Priority** **Location** **Habit** **Form**

Common Name: Budding club rush 2 Dryland Bulb/Corm Tree

Seed Form: Light seed Riparian Perennial Shrub

Seeding Time: Dec - Feb Aquatic Annual Herb

Method of Spread: Spreads from both seed and vegetative growth Rush/Sedge

Best Time of Control: Winter Grass

Method of Control: This plant occurs in homogeneous clumps in seasonally waterlogged area. It may be worth trying to cover this weed with black plastic held down with rocks to drown the plant over winter. Climber

Rotary hoeing and spraying the regrowth with Glyphosate with surfactant can be effective. Kings Park Board suggests Glyphosate 1 to 20 plus Pulse. It is important to do this in summer following the frog breeding season and prior to the bird breeding season. Repeat treatments will be required.

Control priority 1 - Major environmental weed, urgent control required
Control priority 2 - Nuisance weed, control as soon as possible
Control priority 3 - Minor weed, control as resources become available

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Species Name: *Juncus articulatus* **Control Priority** **Location** **Habit** **Form**

Common Name: Articulated rush 2 Dryland Bulb/Corm Tree

Seed Form: Light seed Riparian Perennial Shrub

Seeding Time: Nov - Mar Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: Sept - Mar Grass

Method of Control: Manually weeding all plants is the preferred method for removing this species. Climber

Ensure that the plants to be controlled have been correctly identified as the weed species. If unsure of weed status then removing the flowering heads to minimise spread is helpful and will not seriously interfere with the plants until they have been correctly identified.

Species Name: *Juncus capitatus* **Control Priority** **Location** **Habit** **Form**

Common Name: 3 Dryland Bulb/Corm Tree

Seed Form: Light seed Riparian Perennial Shrub

Seeding Time: Dec - mar Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: Sept - Nov Grass

Method of Control: Manually weed small plants. The preferred method for removing larger clumps involves brushcutting to remove the bulk of material and then digging the plants out and removing the base and leaves from the site. Any regrowth from sections missed can then be slashed and treated with Glyphosate applied at half strength. Several applications may be required. Climber

Ensure that the plants to be controlled have been correctly identified as weed species. If unsure of weed status then removing the flowering heads to minimise spread is helpful and will not seriously interfere with the plants until they have been correctly identified.

Species Name: *Juncus microcephalus* **Control Priority** **Location** **Habit** **Form**

Common Name: 2 Dryland Bulb/Corm Tree

Seed Form: Light seed Riparian Perennial Shrub

Seeding Time: Dec - Mar Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: Sept - Dec Grass

Method of Control: Manually weed small plants. The preferred method for removing larger clumps involves brushcutting to remove the bulk of material and then digging the plants out and removing the base and leaves from the site. Any regrowth from sections missed can then be slashed and treated with Glyphosate applied at half strength. Several applications may be required. Climber

This plant is a serious weed. Ensure correct identification prior to implementing weed control as this plant is similar to native rush and sedge species. Plants occurring on river banks should not be dug out as removal may create a new erosion problem. Use extra care when using herbicides close to the water.

Control priority 1 - Major environmental weed, urgent control required
Control priority 2 - Nuisance weed, control as soon as possible
Control priority 3 - Minor weed, control as resources become available

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Species Name:	Lantana camara	Control Priority	Location	Habit	Form
Common Name:	Lantana	3	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:			Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads from both seed and vegetative growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:					Grass <input type="checkbox"/>
Method of Control:	Hand weed (grub out) small communities. Spray localised populations with Glyphosate 1 in 10 covering all foliage.				Climber <input checked="" type="checkbox"/>
	Monitoring re-occurrence of this plant in areas where previous control work has been undertaken is essential.				

Species Name:	Leptospermum laevigatum	Control Priority	Location	Habit	Form
Common Name:	Victorian coastal teatree	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input checked="" type="checkbox"/>
Seed Form:	Light, easily spread by wind		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	April - October		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	All year				Grass <input type="checkbox"/>
Method of Control:	Hand weed seedlings. For mature plants, cut stems to ground level annually until control is achieved. Remove flowering branches when possible.				Climber <input type="checkbox"/>
	Note, in some cases where this weed provides shelter this should be done only after native plants have grown sufficiently to take their place.				

Species Name:	Lolium spp.	Control Priority	Location	Habit	Form
Common Name:	Rye grass	2	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light, easily spread by wind		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	March - June		Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Dec - Mar				Grass <input checked="" type="checkbox"/>
Method of Control:	Handweeding is preferred, except for extensive populations. Spot spraying of Sertin, Targa or similar at 4l per ha prior to flowering can be effective.				Climber <input type="checkbox"/>
	In areas where steep banks are present and this species is dominant removing the seed heads to limit spread is preferred to complete removal, in order to ensure that bank stability is protected.				

Species Name:	Lupinus angustifolia	Control Priority	Location	Habit	Form
Common Name:	Lupin	2	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Heavy seed		Riparian <input type="checkbox"/>	Perennial <input type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Oct - Dec		Aquatic <input type="checkbox"/>	Annual <input checked="" type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Aug - Oct				Grass <input type="checkbox"/>
Method of Control:	Handweed small populations. Alternatively, spray the plants selectively with Glyphosate 2% solution.				Climber <input type="checkbox"/>

Control priority 1 - Major environmental weed, urgent control required
 Control priority 2 - Nuisance weed, control as soon as possible
 Control priority 3 - Minor weed, control as resources become available

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Species Name: *Medicago spp* **Control Priority** **Location** **Habit** **Form**

Common Name: Medics 3 Dryland Bulb/Corm Tree

Seed Form: Light seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: June - Sept Grass

Method of Control: This plant may be controlled effectively with Glyphosate. Kings Park Board recommends a rate of 75-100ml in 15l of water. Climber

Species Name: *Monopsis debilis* **Control Priority** **Location** **Habit** **Form**

Common Name: 3 Dryland Bulb/Corm Tree

Seed Form: Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Rush/Sedge

Best Time of Control: Grass

Method of Control: Pull out small populations to prevent them from spreading. Repeated rotary hoeing/mowing to prevent flowering can be helpful. Climber

Kings Park Board staff suggest Glyphosate at 75-100ml in 15l of water prior to flowering.

Species Name: *Myrsiphyllum asparagoides* **Control Priority** **Location** **Habit** **Form**

Common Name: Bridal Creeper 1 Dryland Bulb/Corm Tree

Seed Form: Light seed Riparian Perennial Shrub

Seeding Time: Oct - Dec Aquatic Annual Herb

Method of Spread: Spreads from both seed and vegetative growth Rush/Sedge

Best Time of Control: Jul - Sept Grass

Method of Control: Remove young plants by hand as they appear. If spraying, remove the bulk of the plant material prior to spraying then treat the smaller biomass of plants approximately a fortnight later. Kings Park currently recommends using either Glyphosate 360 at a rate of 1 in 100, or 2.5 to 5g per ha in 250l of water. Repeat applications will be required for either chemical. Climber

Kings Park may have more up to date control measures. It is essential to take extreme care when treating this plant as it generally occurs within close proximity of native plants, and causing the unintentional death of non-target plants is possible.

Species Name: *Narcissus tazetta* **Control Priority** **Location** **Habit** **Form**

Common Name: Jonquill 2 Dryland Bulb/Corm Tree

Seed Form: Coarse seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads by bulb or corm growth Rush/Sedge

Best Time of Control: Winter - Spring Grass

Method of Control: Removing these plants by hand can be effective if care is taken to remove all corms. For extensive populations, it is recommended that the plants are wiped with Glyphosate 1 in 10. Climber

It is important to note that not all corms re-shoot in a given year so it is essential to monitor and treat re-growth annually. This plant is toxic to stock.

Control priority 1 - Major environmental weed, urgent control required

Control priority 2 - Nuisance weed, control as soon as possible

Control priority 3 - Minor weed, control as resources become available

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Species Name: *Nerium oleander* **Control Priority** 3 **Location** **Habit** **Form**

Common Name: Oleander **Dryland** **Bulb/Corm** **Tree**
Riparian **Perennial** **Shrub**
Aquatic **Annual** **Herb**
Seed Form: Coarse seed **Rush/Sedge**
Seeding Time: **Grass**
Method of Spread: Spreads from both seed and vegetative growth **Climber**
Best Time of Control: All year
Method of Control: Dig out the individual plants. Otherwise cut the stumps and paint with full strength systemic herbicide.

Species Name: *Olea europaea* **Control Priority** 2 **Location** **Habit** **Form**

Common Name: Olive tree **Dryland** **Bulb/Corm** **Tree**
Riparian **Perennial** **Shrub**
Aquatic **Annual** **Herb**
Seed Form: Heavy seed **Rush/Sedge**
Seeding Time: Nov - Jan **Grass**
Method of Spread: Spreads mostly from seed **Climber**
Best Time of Control:
Method of Control: Hand weed juvenile plants. For small plants, selectively spray foliage with full strength Glyphosate. Larger trees can be managed by either cutting the stump and painting with Glyphosate or Garlon (recommended by Kings Park Board staff), or alternatively injecting into the stem at 15 cm intervals. Follow up treatments may be required.
 Encouraging fruit harvesting by residents will reduce the rate of spread of this weed.

Species Name: *Oxalis pes-caprae* **Control Priority** 2 **Location** **Habit** **Form**

Common Name: Soursob **Dryland** **Bulb/Corm** **Tree**
Riparian **Perennial** **Shrub**
Aquatic **Annual** **Herb**
Seed Form: Light seed **Rush/Sedge**
Seeding Time: Sept **Grass**
Method of Spread: Spreads by runners **Climber**
Best Time of Control: July - Sept
Method of Control: Hand weeding can be effective provided that care is taken to trace all runners from the parent plant and that no stem and root is left behind.
 Apply Glyphosate 75ml in 10l in winter or before foliage starts to yellow.

Species Name: *Panicum capillare* **Control Priority** 3 **Location** **Habit** **Form**

Common Name: Witchgrass **Dryland** **Bulb/Corm** **Tree**
Riparian **Perennial** **Shrub**
Aquatic **Annual** **Herb**
Seed Form: **Rush/Sedge**
Seeding Time: **Grass**
Method of Spread: Spreads mostly from seed **Climber**
Best Time of Control:
Method of Control: As with most introduced grasses, Fusillade at 2l per ha can be effective. The herbicide should be applied prior to flowering.
 This species has the potential to spread rapidly through wetland environments.

Control priority 1 - Major environmental weed, urgent control required
Control priority 2 - Nuisance weed, control as soon as possible
Control priority 3 - Minor weed, control as resources become available
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Species Name:	<i>Paspalum spp</i>	Control Priority	Location	Habit	Form
Common Name:	Paspalum	<div style="border: 1px solid black; padding: 2px;">2</div>	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Heavy seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Dec - Jan		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads from both seed and vegetative growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Aug - Mar				Grass <input checked="" type="checkbox"/>
Method of Control:	Repeated brushcutting/slashing can be effective in controlling this plant - provided it occurs prior to seed development. The accepted herbicide treatment is the application of Fusillade at 4l per ha.				
	It is possible to reduce the volume of herbicide required by slashing/rotary hoeing and then treating the regrowth.				

Species Name:	<i>Pelargonium capftatum</i>	Control Priority	Location	Habit	Form
Common Name:	Rose pelargonium	<div style="border: 1px solid black; padding: 2px;">1</div>	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light, easily spread by wind		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Jan - April		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads from both seed and vegetative growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Spring				Grass <input type="checkbox"/>
Method of Control:	Hand weed in autumn / winter, trying very hard not leave any stem or root behind as the plants will reshoot. Kings Park suggests the two herbicide treatments listed. Spot Spray with Ally/Brush 5g per ha or spray with Glyphosate 1 in 100 with wetting agent in early September.				
	This plant is an effective coloniser and it may smother any small native plants present.				

Species Name:	<i>Pennisetum clandestinum</i>	Control Priority	Location	Habit	Form
Common Name:	Kikuyu	<div style="border: 1px solid black; padding: 2px;">1</div>	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Sterile or non seed producing		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads readily from rhizome growth				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Sept - Dec				Grass <input checked="" type="checkbox"/>
Method of Control:	The most effective technique recognised is the application of Fusillade at a rate of 4l per ha while the plant is actively growing.				
	Fusillade should not be applied over open water. Native rushes and sedges are not at risk when using this chemical.				

Species Name:	<i>Plantago lanceolata</i>	Control Priority	Location	Habit	Form
Common Name:	Ribwort plantain	<div style="border: 1px solid black; padding: 2px;">3</div>	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Coarse seed		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Nov - Dec				Grass <input type="checkbox"/>
Method of Control:	Pull Ribwort by hand ensuring that tap root is properly removed. Generally populations of this weed are limited and can be managed effectively using manual weed control methods. Kings Park Board recommends wiping with Glyphosate 100ml in 15l water.				

Control priority 1 - Major environmental weed, urgent control required
 Control priority 2 - Nuisance weed, control as soon as possible
 Control priority 3 - Minor weed, control as resources become available

Ecosystem Management Services 1999



Species Name:	<i>Populus spp</i>	Control Priority	Location	Habit	Form
Common Name:	Poplar	2	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input checked="" type="checkbox"/>
Seed Form:			Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads from suckers				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Oct - Feb				Grass <input type="checkbox"/>
Method of Control:	Experience indicates that injecting concentrated systemic herbicide at 10 - 15 cm intervals around the trunk can be effective, and reduces the number of suckers which can occur following the cut stump technique. Kings Park considers this plant difficult to control and recommends the cut stump method with Garlon 600.				

Species Name:	<i>Raphanus raphanistrum</i>	Control Priority	Location	Habit	Form
Common Name:	Wild radish	3	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Dec		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Sept - Nov				Grass <input type="checkbox"/>
Method of Control:	Removing these species by hand is easy and can be done very quickly. Removal should occur prior to the plants flowering and seeding to reduce the rate of spread. Bagging and cutting the seeding stems, from any plants, should be undertaken prior to removal.				
	The alternative is to paint with Glyphosate 1 in 10.				

Species Name:	<i>Rhynchelytrum repens</i>	Control Priority	Location	Habit	Form
Common Name:	Red natal grass	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light and easily spread by wind		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Sept - Nov		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	June to Aug				Grass <input checked="" type="checkbox"/>
Method of Control:	This plant is effectively controlled using Fusillade at a rate of 4l per ha (as for most other introduced grasses).				

Species Name:	<i>Ricinus communis</i>	Control Priority	Location	Habit	Form
Common Name:	Castor Oil	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input checked="" type="checkbox"/>
Seed Form:	Heavy seed		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Nov - Jan		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Any time but best prior to fruiting				Grass <input type="checkbox"/>
Method of Control:	Small populations can be removed by hand. Individual plants can be cut and painted with Glyphosate. Populations of seedlings can be sprayed with Glyphosate 1 in 80, while injecting large plants with a systemic herbicide is effective.				
	The seed from this plant has been shown to be viable more than 1 000 years later, so vigilance is required to remove plants prior to seeding.				

Control priority 1 - Major environmental weed, urgent control required

Control priority 2 - Nuisance weed, control as soon as possible

Control priority 3 - Minor weed, control as resources become available

Ecosystem Management Services 1999



Species Name: *Romulea rosea* **Control Priority** **Location** **Habit** **Form**

Common Name: Guildford grass 1 Dryland Bulb/Corm Tree

Seed Form: Light seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads by bulb or corm growth Rush/Sedge

Best Time of Control: Grass

Method of Control: In areas with homogeneous populations, Kings Park Board suggests Brushoff / Ally can give good control and can be used over some turf species. Repeated rotary hoeing and slashing prior to flowering can assist in managing populations. Climber

Species Name: *Rorippa nasturtium-aquaticum* **Control Priority** **Location** **Habit** **Form**

Common Name: Watercress 2 Dryland Bulb/Corm Tree

Seed Form: Light seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads from both seed and vegetative growth Rush/Sedge

Best Time of Control: Access dependent Grass

Method of Control: This aquatic weed is difficult to control because it slows water movement, increases sedimentation and reduces erosion which means implementing control can affect bed and bank stability. The recommended removal technique involves manual clearing of a channel and also clearing 5 to 10 m wide bands, 20 metres apart which are perpendicular to the stream flow. This will minimise the potential for de-stabilising the stream bed. Climber

Seek expert advice and approvals from the relevant government agencies prior to implementing broad scale works.

Species Name: *Rubus spp* **Control Priority** **Location** **Habit** **Form**

Common Name: Blackberry 1 Dryland Bulb/Corm Tree

Seed Form: Heavy seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads from both seed and vegetative growth Rush/Sedge

Best Time of Control: Dec - April Grass

Method of Control: Brush cut and remove brambles. Hand weed removing knotty stumps and as much root as possible. Paint regrowth with Glyphosate 12ml to 1l of water. Better control is often achieved with a combination of Brushoff, Garlon or blackberry and tree killer. Biological controls using a rust fungus have been successful. Agriculture WA may be able to assist with this. Climber

Brushcutting these plants can provide very difficult and using a team of goats as the first method of attack can prove very useful in terms of increasing access and removing the bulk of the vegetative material. It is important that any blackberry control takes into consideration fauna corridors in continuous strips of sufficient width to discourage predators, particularly to protect birds and bandicoots.

Control priority 1 - Major environmental weed, urgent control required

Control priority 2 - Nuisance weed, control as soon as possible

Control priority 3 - Minor weed, control as resources become available

Ecosystem Management Services 1999



Species Name:	Rumex spp	Control Priority	Location	Habit	Form
Common Name:	Dock	2	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input type="checkbox"/>
Seed Form:	Light and easily spread by wind		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	March - June		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input checked="" type="checkbox"/>
Method of Spread:	Spreads mostly from seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Nov - Mar				Grass <input type="checkbox"/>
Method of Control:	These plants are readily eradicated through hand weeding. Remove flowering heads prior to seed ripening if complete plant removal is not possible.				
	Always bag plants with seeds and dispose of carefully.				

Species Name:	Salix spp	Control Priority	Location	Habit	Form
Common Name:	Willow	1	Dryland <input type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input checked="" type="checkbox"/>
Seed Form:	Heavy seed		Riparian <input checked="" type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:			Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads from suckers				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	Dec - Mar				Grass <input type="checkbox"/>
Method of Control:	Small plants can be removed by hand. Mature plants can be injected with full strength Glyphosate at 10 - 15 cm intervals around the trunk. Any suckers which appear can be painted with systemic herbicide. It is important not to remove the parent plant until it is dead and no more suckers are being produced.				
	Removal of willows along watercourses can have a detrimental effect through loss of habitat, streamside erosion and exposure of understorey. Consideration should be given to replacing the plants to be removed two years prior to undertaking removal.				

Species Name:	Schinus terebinthifolia	Control Priority	Location	Habit	Form
Common Name:	Japanese pepper	1	Dryland <input checked="" type="checkbox"/>	Bulb/Corm <input type="checkbox"/>	Tree <input checked="" type="checkbox"/>
Seed Form:	Coarse seed		Riparian <input type="checkbox"/>	Perennial <input checked="" type="checkbox"/>	Shrub <input type="checkbox"/>
Seeding Time:	Sept		Aquatic <input type="checkbox"/>	Annual <input type="checkbox"/>	Herb <input type="checkbox"/>
Method of Spread:	Spreads from suckers and seed				Rush/Sedge <input type="checkbox"/>
Best Time of Control:	All year, but in wetlands treat in summer				Grass <input type="checkbox"/>
Method of Control:	Hand weed small seedlings. It is important to monitor for any new germinants to enable rapid removal from the site. Treating the large plants can be undertaken either by cutting the trunk and immediately painting the stump, or alternatively injecting systemic herbicide at 10 - 15 cm intervals around the trunk. Kings Park recommends either Glyphosate, Velpar or Garlon.				
	The seed is spread predominantly by introduced birds and there is some anecdotal evidence that many native birds are poisoned by the seeds.				

Control priority 1 - Major environmental weed, urgent control required
 Control priority 2 - Nuisance weed, control as soon as possible
 Control priority 3 - Minor weed, control as resources become available

Ecosystem Management Services 1999



Species Name: *Solanum nigrum* **Control Priority** **Location** **Habit** **Form**

Common Name: Deadly nightshade 1 Dryland Bulb/Corm Tree

Seed Form: Coarse seed Riparian Perennial Shrub

Seeding Time: Oct - Dec Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: Sept - Oct Grass

Method of Control: Hand weed small infestations. Kings Park Board recommends using Glyphosate 1 in 100. Dessiccant herbicides applied to all parts of the plant can be effective on warm to hot days. Climber

Species Name: *Stachys arvensis* **Control Priority** **Location** **Habit** **Form**

Common Name: Staggerweed 3 Dryland Bulb/Corm Tree

Seed Form: Heavy seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: Grass

Method of Control: Pull out small populations to prevent them from spreading. Repeated rotary hoeing/mowing to prevent flowering can be helpful where there are no remnant native species. Climber

Kings Park Board staff suggest Glyphosate at 75-100ml in 15l of water prior to flowering.

Species Name: *Stenotaphrum secundatum* **Control Priority** **Location** **Habit** **Form**

Common Name: Buffalo grass 1 Dryland Bulb/Corm Tree

Seed Form: Sterile or non seed producing Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads readily from rhizome growth Rush/Sedge

Best Time of Control: Aug - Sept Grass

Method of Control: Hand weeding is very difficult, labour intensive and rarely successful. The most effective method is to implement a minimum of two spot/blanket treatments in Aug-Oct and April-May using Fusillade or Targa at 4l per ha. Brushcutting often improves ease of removal and spraying. Climber

This process typically requires more than two treatments. Can implement spraying amongst native rushes and sedges which have been demonstrated to tolerate flauzifop-butyl.

Species Name: *Taraxacum officinale* **Control Priority** **Location** **Habit** **Form**

Common Name: Dandelion 2 Dryland Bulb/Corm Tree

Seed Form: Light, easily spread by wind Riparian Perennial Shrub

Seeding Time: All year round Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: Sept - Nov Grass

Method of Control: Hand weeding is the most effective means of control ensuring that if seed heads are present, they are carefully bagged prior to removal of the plant. Climber

Wiping with Glyphosate is also effective.

Control priority 1 - Major environmental weed, urgent control required
 Control priority 2 - Nuisance weed, control as soon as possible
 Control priority 3 - Minor weed, control as resources become available

Ecosystem Management Services 1999



Species Name: *Thunbergia alata* **Control Priority** **Location** **Habit** **Form**

Common Name: Black-eyed Susan 2 Dryland Bulb/Corm Tree

Seed Form: Coarse seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads from both seed and vegetative growth Rush/Sedge

Best Time of Control: Grass

Method of Control: Remove small plants manually. Spot spraying with Glyphosate at a rate of 1 in 50 can be effective. Climber

This plant poses a serious threat to the State's waterways and any small populations should be worked on quickly to reduce the potential spread.

Species Name: *Trifolium spp.* **Control Priority** **Location** **Habit** **Form**

Common Name: Clovers 3 Dryland Bulb/Corm Tree

Seed Form: Heavy seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: Grass

Method of Control: Hand weed small populations. Spraying populations with Glyphosate at 75 - 100 ml in 15l of water is recommended by Kings Park Board. Repeated rotary hoeing with follow up spraying can be effective in pasture situations. Climber

Species Name: *Tropaeolum majus* **Control Priority** **Location** **Habit** **Form**

Common Name: Nasturtium 3 Dryland Bulb/Corm Tree

Seed Form: Heavy seed Riparian Perennial Shrub

Seeding Time: Nov - Jan Aquatic Annual Herb

Method of Spread: Spreads mostly from seed Rush/Sedge

Best Time of Control: Aug / Sept Grass

Method of Control: Removing this species by hand is effective. Selectively applying Glyphosate 1 in 100 can be effective. Climber

Awareness campaigns about the implications of dumping garden waste in reserves need to be upgraded and implemented intensively to discourage such activities.

Control priority 1 - Major environmental weed, urgent control required
 Control priority 2 - Nuisance weed, control as soon as possible
 Control priority 3 - Minor weed, control as resources become available



Species Name: *Typha orientalis* **Control Priority** **Location** **Habit** **Form**

Common Name: Bulrush 1 Dryland Bulb/Corm Tree

Seed Form: Light, easily spread by wind Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads readily from rhizome growth and seed Rush/Sedge

Best Time of Control: Winter Grass

Method of Control: Remove seed heads prior to ripening in September - December. Cut stems below water level in May, if sufficient water is present, monitor regrowth and continue to cut until September to drown the plants. Climber

For populations occurring in waterlogged areas only use Glyphosate BioActive 1 to 10 in spring, after slashing plants first and wipe new growth when plants are 1m tall. Take care when using herbicide over water.

The native cumbungi, *Typha domingensis*, looks similar to Bulrush and it is important to ensure that the population being controlled is in fact the weed species.

Species Name: *Ursinia anthemoides* **Control Priority** **Location** **Habit** **Form**

Common Name: Ursinia 3 Dryland Bulb/Corm Tree

Seed Form: Light seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Rush/Sedge

Best Time of Control: Grass

Method of Control: Pull out small populations to prevent them from spreading. Repeated rotary hoeing/mowing to prevent flowering can be helpful. Climber

Kings Park Board staff suggest Glyphosate at 75-100ml in 15l of water prior to flowering.

Species Name: *Vicia sativa* **Control Priority** **Location** **Habit** **Form**

Common Name: Vetch 3 Dryland Bulb/Corm Tree

Seed Form: Heavy seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads from both seed and vegetative growth Rush/Sedge

Best Time of Control: Grass

Method of Control: Kings Park recommends trying Glyphosate 75ml in 15 l when the plants are actively growing. Hand weeding small populations is possible and effective. Climber

Species Name: *Vinca major* **Control Priority** **Location** **Habit** **Form**

Common Name: Periwinkle 3 Dryland Bulb/Corm Tree

Seed Form: Coarse seed Riparian Perennial Shrub

Seeding Time: Aquatic Annual Herb

Method of Spread: Spreads by runners Rush/Sedge

Best Time of Control: June - Aug Grass

Method of Control: It is generally recommended that this weed is managed by applying Glyphosate at 1 in 10 with surfactant. Climber

Applications will need to be repeated several times at intervals of one month.

Control priority 1 - Major environmental weed, urgent control required
Control priority 2 - Nuisance weed, control as soon as possible
Control priority 3 - Minor weed, control as resources become available

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Species Name: *Watsonia bulbiflora* **Control Priority** **Location** **Habit** **Form**

Common Name: Watsonia 1 Dryland Bulb/Corm Tree

Seed Form: Light and easily spread by wind and wat Riparian Perennial Shrub

Seeding Time: March - May Aquatic Annual Herb

Method of Spread: Spreads by bulb/corm growth Rush/Sedge

Grass

Climber

Best Time of Control:

Method of Control: Remove corms by carefully digging a large area around each plant, putting the sand onto flywire, sieving and collecting all the corms. Flowers should also be harvested to prevent the production of seed and subsequent spread. The collected corms should be disposed of carefully.

Broadscale removal of dense stands may threaten bank stability. Remove in nodes along the waterway.

Selectively spray a combination of herbicides between July to August using Glean and Ally/Brushoff and subsequently painting leaf with Glyphosate in September to November can be effective. Remove the bulk of dead biomass leaving the rhizome mats in tact.

Species Name: *Zantedeschia aethiopica* **Control Priority** **Location** **Habit** **Form**

Common Name: Arum lily 1 Dryland Bulb/Corm Tree

Seed Form: Coarse seed Riparian Perennial Shrub

Seeding Time: Dec Aquatic Annual Herb

Method of Spread: Spreads from both seed and vegetative growth Rush/Sedge

Grass

Climber

Best Time of Control:

April - Nov

Method of Control:

Entire plants can be removed by digging - make sure to remove all of the rhizome. Spot spray from April to November using Glyphosate 1in 100 or Glean Ally/Brushoff 1in 50 (20g per ha). Respraying is likely to be required 8 weeks later.

In wetland environments Roundup Biactive should be used to minimise fauna losses.

Control priority 1 - Major environmental weed, urgent control required

Control priority 2 - Nuisance weed, control as soon as possible

Control priority 3 - Minor weed, control as resources become available

Ecosystem Management Services 1999





Appendix 3

Suggested species for revegetation works



Appendix 3: Suggested species for revegetation works

Species	Common Name	Location						Habitat					
		Roley Pool	Wright Brook	Breera Brook	Bannister Creek	Bennett Brook	Ellen Brook	Southern Wood Creek	Upper Canning	Dryland	Bank	Emergent	
<u>1. Spreading tree</u>													
<i>Banksia attenuata</i>	Slender banksia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Banksia littoralis</i>	Swamp banksia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Banksia menziesii</i>	Firewood banksia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Casuarina obesa</i>	Saltwater sheoak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Corymbia calophylla</i>	Marri	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Eucalyptus marginata</i>	Jarra	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Eucalyptus rudis</i>	Flooded gum	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<i>Eucalyptus wandoo</i>	Wandoo	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Paraserianthes lophantha</i>	Native albizia	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>2. Compact tree</u>													
<i>Eucalyptus todiana</i>	Coastal blackbutt	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Melaleuca cuticularis</i>	Saltwater paperbark	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Melaleuca preissiana</i>	Modong	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Melaleuca raphiophylla</i>	Swamp paperbark	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<i>Nuytsia floribunda</i>	Christmas tree	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>3. Large shrub</u>													
<i>Acacia saligna</i>	Coojong	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Agonis linearifolia</i>	Swamp peppermint	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Dryandra sessilis</i>	Parrot bush	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Grevillea diversifolia</i>	Variable leaved grevillea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Melaleuca incana</i>	Grey honeymyrtle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>Melaleuca teretifolia</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

This information is site specific to the sections of assessed foreshore. Please seek expert advice if placing these species outside of the surveyed sections.

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Species	CommonName	Location							Habitat			
		Roley Pool	Wright Brook	Breera Brook	Bannister Creek	Bennett Brook	Ellen Brook	Southern Wood Creek	Upper Canning	Dryland	Bank	Emergent
<i>Melaleuca viminea</i>	Mohan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Oxylobium lineare</i>	River pea	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Viminaria juncea</i>	Swishbush	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Medium shrub												
<i>Acacia pulchella</i>	Prickly moses	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Astartea fascicularis</i>	Common Astartea	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Darwinia citriodora</i>	Lemon scented darwinia	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Hakea varia</i>	Harsh hakea	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Hibbertia spp</i>	Native buttercups	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Jacksonia furcellata</i>	Grey stinkwood	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Jacksonia stembergiana</i>	Green stinkwood	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Kunzea ericifolia</i>	Spearwood	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Lasipetalum bracteatum</i>	Helena Velvet Bush	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Melaleuca lateritia</i>	Robin Red-breast bush	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Melaleuca viminea</i>	Mohan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Pericalymma ellipticum</i>	Swamp teatree	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Pteridium esculentum</i>	Bracken fern	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Regelia ciliata</i>	Regelia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Thomasia macrocarpa</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Low shrub												
<i>Acacia alata</i>	Winged wattle	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Acanthocarpus preissii</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Bossiaea spp</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Corynotheca micrantha</i>	Sand lily	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Gompholobium tomentosum</i>	Hairy yellow pea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Species	Common Name	Location							Habitat			
		Roley Pool	Wright Brook	Breera Brook	Bannister Creek	Bennett Brook	Ellen Brook	Southern Wood Creek	Upper Canning	Dryland	Bank	Emergent
<i>Hakea prostrata</i>	Harsh Hakea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Hypocalymma angustifolium</i>	White myrtle	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Hypocalymma robustum</i>	Swan River myrtle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Leucopogon spp</i>	Zamia	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Macrozamia riedlei</i>	Featherflowers	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Verticordia spp</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Ground cover												
<i>Centella cordifolia</i>	Centella	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Conostylis candicans</i>	Grey cottonhead	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Cotula coronopifolia</i>	Waterbuttons	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Dryandra nivea</i>	Couch honeypots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Hemarthria uncinata</i>	Mat grass	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Hemiandra pungens</i>	Snake bush	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Paterosnia occidentalis</i>	Western iris	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Sporobolus virginicus</i>	Saltwater couch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7. Climber												
<i>Clematis pubescens</i>	Common clematis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Hardenbergia comptoniana</i>	Native wisteria	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Kennedia coccinea</i>	Coral creeper	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Kennedia prostrata</i>	Running postman	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Rush or Sedge												
<i>Juncus subsecundus</i>	Finger rush	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Baumea articulata</i>	Jointed twig sedge	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Baumea juncea</i>	Bare twig rush	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Baumea preissii</i>	Broad twig sedge	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Species	CommonName	Location								Habitat			
		Roley Pool	Wright Brook	Breera Brook	Bannister Creek	ennett Brook	Ellen Brook	Southern Wood Creek	Upper Canning	Dryland	Bank	Bank	Emergent
<i>Baumea rubiginosa</i>	River twig	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Bolboschoenus caldwellii</i>	Marsh club rush	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Carex appressa</i>	Tall sedge	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Carex divisa</i>	Divided sedge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Carex fascicularis</i>	Tassel sedge	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Carex tereticaulis</i>	Tube sedge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Centrolepis spp</i>	Spike sedge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Eleocharis acuta</i>	Knotted Club sedge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Isolepis nodosa</i>	Tufted sedge	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Isolepis setiformis</i>	Joint-leaf rush	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Juncus holoschoenus</i>	Shore rush	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Juncus kraussii</i>	Pale rush	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Juncus pallidus</i>	Slender rush	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Juncus pauciflorus</i>	Spreading sword sedge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Lepidosperma effusum</i>	Pithy sword sedge	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Lepidosperma longitidinale</i>	Angle sword sedge	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Lepidosperma tetraquetrum</i>	Lake Club Sedge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Restio spp</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Schoenoplectus validus</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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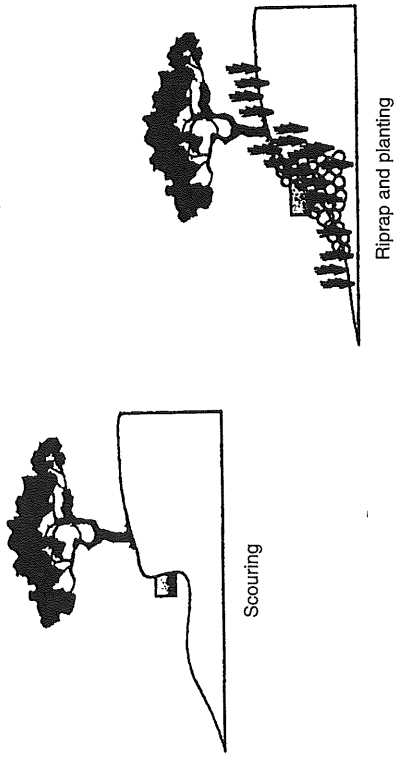
Appendix 4

Suggested soft engineering works

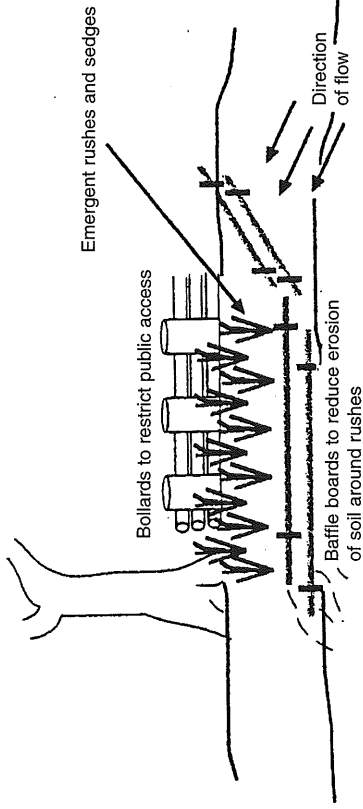


Appendix 4: Suggested soft engineering works

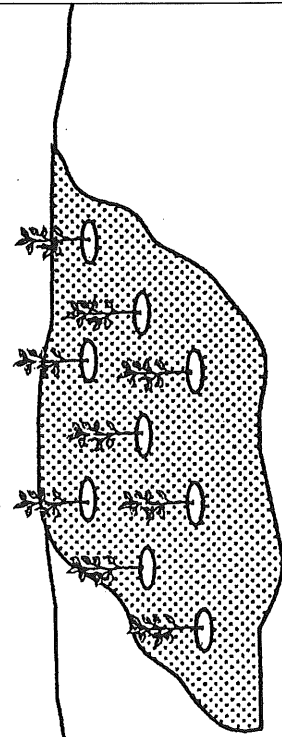
DRAINAGE OUTFALL TREATMENT



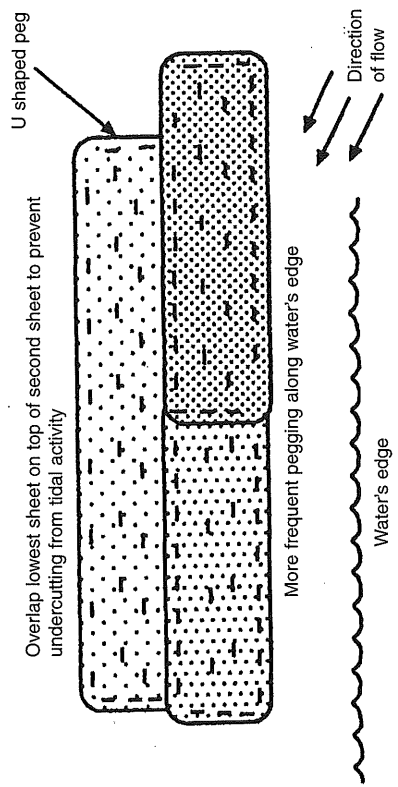
USING BAFFLES FOR PLANT PROTECTION AND SOIL STABILISATION



PLANT ARRANGEMENT THROUGH HEMP MATTING



HEMP MATTING INSTALLATION



Appendix 5

Condition mapping symbols





Weeds

Symbol	Common name	Scientific name
▶◀	Weed wattles	<i>Acacia spp.</i>
	Giant reed	<i>Arundo donax</i>
⊕	Canna lily	<i>Canna spp.</i>
*	Pampas grass	<i>Cortaderia selloana</i>
●	Perennial veldtgrass	<i>Ehrharta calycina</i>
⊕	African lovegrass	<i>Eragrostis curvula</i>
C	Coral tree	<i>Erythrina x sykesii</i>
7	Edible fig tree	<i>Ficus spp.</i>
Z	Cotton bush	<i>Gomphocarpus fruticosus</i>
△	One leaf cape tulip	<i>Homeria flaccida</i>
☾	Morning glory	<i>Ipomoea spp.</i>
⊗	Lantana	<i>Juncus microcephalus</i>
⊕	Bridal creeper	<i>Lantana camara</i>
⊕	Myrsiphyllum asparagoides	<i>Myrsiphyllum asparagoides</i>
∞	Paspalum	<i>Paspalum spp.</i>
◆	Castor oil bush	<i>Ricinus communis</i>
#	Blackberry	<i>Rubus fruticosus</i>
7	Willow	<i>Salix spp.</i>
●	Japanese pepper	<i>Schinus terebinthifolia</i>
S	Deadly nightshade	<i>Solanum nigrum</i>
∞	Nasturtium	<i>Tropeolum spp.</i>
★	Bulrush	<i>Typha orientalis</i>
!-!	Vetch	<i>Vicia sativa</i>
∞	Watsonia	<i>Watsonia bulbifera</i>
⊗	Arum lily	<i>Zantedeschia aethiopica</i>

Native Species

Symbol	Common name	Scientific name
Al	Swamp peppermint	<i>Agonis linearifolia</i>
As	Coojong	<i>Acacia saligna</i>
Ba	Slender banksia	<i>Banksia attenuata</i>
Bj	Bare twigrush	<i>Baumea juncea</i>
Ca	Tall sedge	<i>Carex appressa</i>
Cc	Marri	<i>Corymbia calophylla</i>
Er	Flooded gum	<i>Eucalyptus rudis</i>
Hc	Native wisteria	<i>Hardenbergia comptoniana</i>
Jp	Pale rush	<i>Juncus pallidus</i>
Js	Green stinkwood	<i>Jacksonia sternbergiana</i>
Kp	Running postman	<i>Kennedia prostrata</i>
Li	Pithy sword-sedge	<i>Lepidosperma longitudinale</i>
Lt	Angle sword-sedge	<i>Lepidosperma tetraquetrum</i>
Mr	Swamp paperbark	<i>Melaleuca raphiophylla</i>
OI	Narrow-leaved Oxylobium	<i>Oxylobium lineare</i>
Pe	Bracken fern	<i>Pteridium esculentum</i>
Vj	Swishbush	<i>Viminaria juncea</i>

Cadastral and Streetsmart data supplied by the Dept. of Land Administration (1998)

Map Legend

