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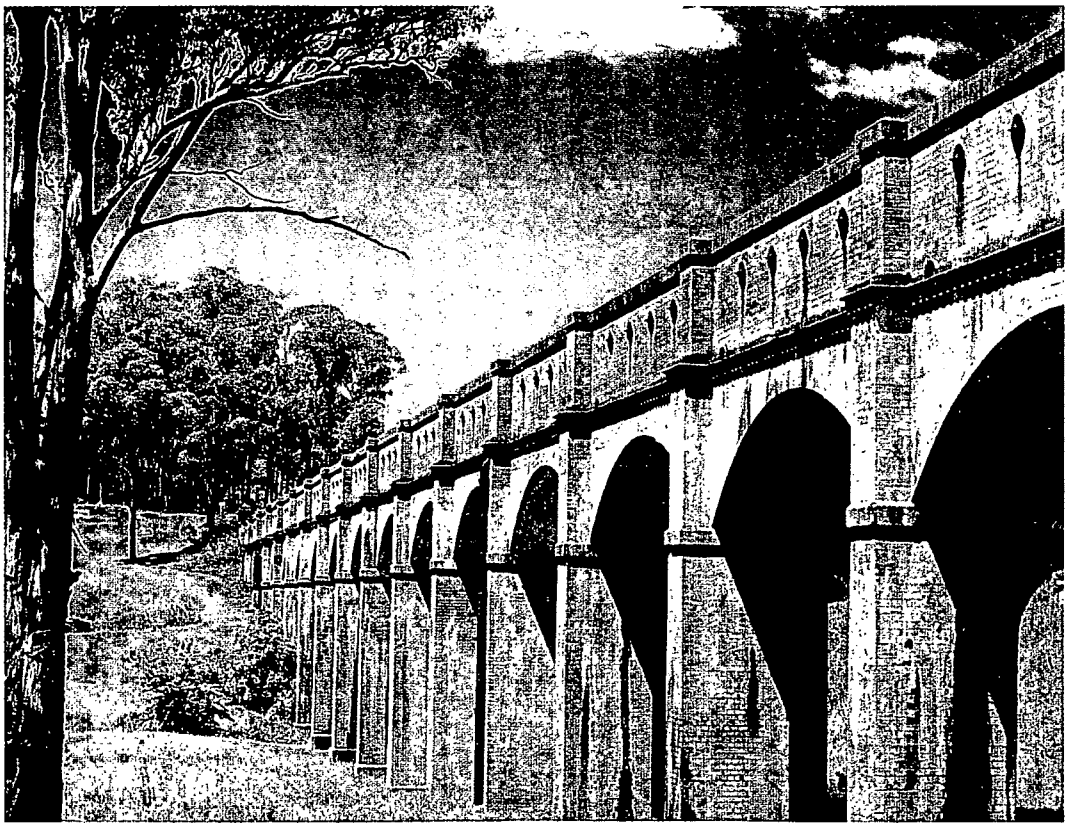
MAES

LOWER PROSPECT CANAL

Plan of Management

VOLUME 1



March 1999

Prepared for

National Parks and Wildlife Services,
Metropolitan Regional Parks Unit

Prepared by

Environmental Partnership

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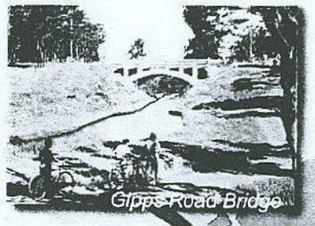
LOWER PROPSPECT CANAL RESERVE

A draft Plan of Management was prepared in 1998 to develop this corridor as public open space. In conjunction with Council, NPWS and the then DUAP, CRAG (Canal Reserve Action Group) have been instrumental in having the canal preserved and modified to be used as a bicycle/pedestrian path. Congratulations is extended to all stakeholders particularly Steve Norton and members of CRAG.

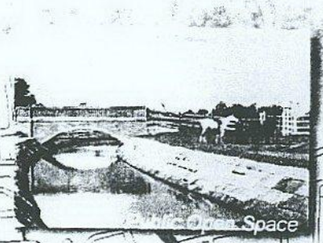
This shared pathway provides users with access from the Prospect reservoir through to the Guildford pipehead, a length of 7.7km. The Lower Prospect Canal corridor provides an additional 62 hectares of open space (an additional 22% to Council's current open space area), generally to be kept in its natural condition.

The work undertaken in this project has delivered to Holroyd and the users of the reserve an example of maintaining heritage with the needs of the modern day. As you travel along the pathway you will encounter the sedimentation channel, the boothtown syphon and the boothtown aqueduct. It was the clear intention of the project to ensure these aspects of Holroyd's, and Sydney's, heritage were preserved. With the assistance of a Federal Government Federation Grant Interpretative signage has been installed along the route.


Valve House & Outlet Basin


Gipps Road Bridge


Boottftown Aqueduct


Open Space


Sedimentation Channel

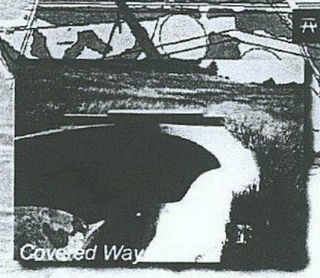
information

toilets

picnic area


Historic Sugar Gums


Smithfield Tank


Covered Way

During the 1860's the Sydney area suffered a number of crippling droughts.

Significant action was not taken until 1876 when a Civil Engineering expert from Britain, William Clark, arrived in Sydney.

Evaluating several different schemes for the supply of water to Sydney, Clarke found that an earlier scheme developed by Professor John Smith of Sydney University offered a practical solution that could be developed as the need for water grew.

Known as the Upper Nepean Scheme, the proposal aimed to transport water from the Southern Highlands by way of a canal system to the Sydney City Reservoir in Crown Street Surry Hills via several storage reservoirs.

The Lower Prospect Canal Reserve is a legacy of the Upper Nepean Scheme which following completion in 1888 served as an integral part of the Sydney water supply network for over 107 years until decommissioning in 1995.

The canal reserve serves as a tribute to the ingenuity of its designers, to the Cumberland Plain vegetation which has been preserved within its boundaries, and to the community which argued for the conservation of the canal as public open space.

A feat of engineering

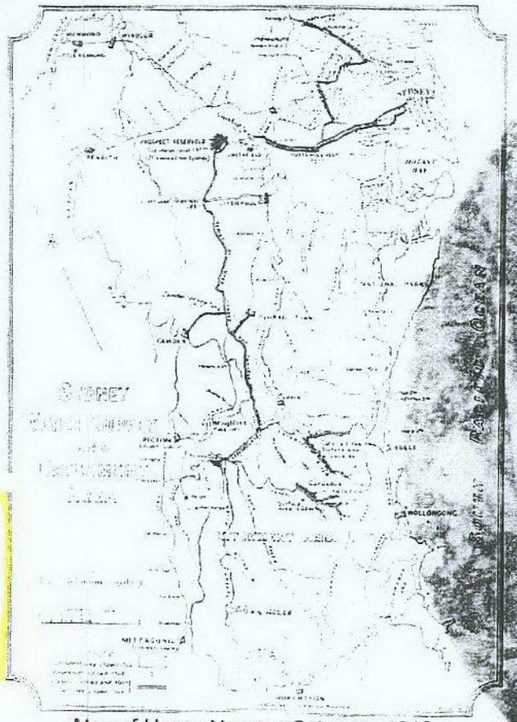
One of the outstanding features of the Upper Nepean Scheme was that the passage of water was all gravity fed. The canal structure itself drops only 70 centimetres from Prospect Reservoir to the Guildford pipe head. The canal features many striking engineering characteristics all of which are described as you ride, walk, or jog along the canal cycle path.

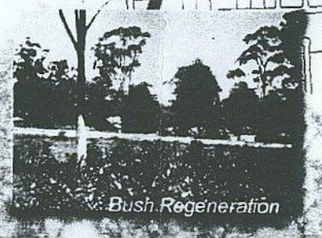
Conservation at work

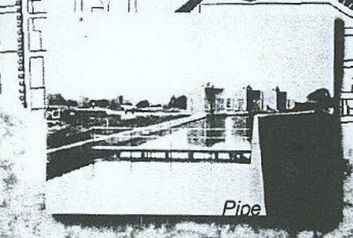
During the 1980's decisions needed to be made concerning the security of the city's water supply, and so it was decided that piping via a tunnel of the section between the pipe head and Prospect reservoir was needed to safeguard water quality.

A local community interest group the Canal Reserve Action Group (CRAG) along with Holroyd Council promoted the conservation of the corridor as a valuable addition to the open space of Holroyd. The fencing of the canal lands for over one hundred years had enabled the preservation of "Cumberland Plains Woodland" vegetation, an important native vegetation community.

Following the decommissioning of the canal in 1995, the Lower Prospect Canal Plan of Management was prepared in 1998. The plan provides for the dedication and improvement of the canal lands as public open space.


Map of Upper Nepean Scheme -1918


Bush Regeneration


Pipe

Planning for the future

The plan of management prepared by Landscape Architects, Environmental Partnership, reviewed options for the conservation of the canal, including its re-use for the movement of storm water.

As the canal structure had severely degraded since being emptied of water, the most practical option was the filling of the canal and the creation of a cycle and pedestrian path along its route. The canal structure remains intact under the fill which you will pass on the pathway.

Did you know ?

The canal's original capacity was approximately 87 million gallons (395 million litres). After rebuilding sections of the canal, including relining, were completed in 1914, the capacity was increased to 100 million gallons (450 million litres). This is the equivalent of approximately 235 Olympic pools per day.

Holroyd City

NATIONAL PARKS & WILDLIFE SERVICE

1901 - 2001

A Commonwealth Government Initiative

lower prospect canal

the canal reserve

lower prospect canal - open space corridor

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EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Lower Prospect Canal Plan of Management prepared for the NSW Government under the guidance of the Metropolitan Regional Parks Unit of the National Parks and Wildlife Service, marks a significant milestone in the history of this valuable community asset. From 1994 there has been ongoing liaison between government departments and the local community as to the most appropriate actions required to enable the corridor to be opened for public benefit, and to ensure that it's range of environmental and cultural heritage values are conserved and optimised. The formation in 1994 of the Canal Reserve Action Group Inc has provided an organised and informed basis community input to occur.

This document is the culmination of 5 months work in which the community has been actively involved in the review of significant issues, and development of planning and management strategies for the site. The plan now provides the basis for the process to be progressed towards implementation, and opening of the site for public use. Following the public exhibition period and review of comments received, the plan will be finalised and presented to State Government for ratification.

The plan has involved a collaborative project team effort involving specialist inputs in a number of key areas. These include:

•Structural, civil, and hydraulic engineering	Ove Arup and Partners
•Flora and Fauna Management	Lesryk Environmental Services
•Social Planning and Consultation	PPM Consultants

The report is presented in three volumes as listed, with this volume A, summarising the key study findings and recommendations:

Volume 1:	Draft Plan of Management
Volume 2:	Background Information (studies and reports)
Volume 3:	Consultation

1.2 STUDY AREA

The site area for the Lower Prospect Canal Plan of Management comprises the land holdings acquired by NSW Treasury from Sydney Water in 1995. This ranges from the boundary of Blacktown Local Government Area in the west (currently marked by a quarry access road and fencing), to the Guildford Pipehead in the east (Albert Street). Extending eastward for 7.7km from the Prospect Reservoir Dam wall to Guildford Pipehead, the Lower Prospect Canal corridor covers approximately 62 hectares.

For the purposes of regional access and open space connections planning recommendations have incorporated the necessary linkage along Sydney Water land holdings to Prospect Reservoir (refer 2.2 History and Ownership) through Blacktown Local Government Area.

1.3 STUDY OBJECTIVES

As outlined in the study brief prepared by the Department of Urban Affairs and Planning in January 1997:

"The purpose of the plan is to facilitate the development and implementation of a linear park along the existing canal and to enhance the open space values of the site by rehabilitation of the site's natural and built features and through the creation of recreational facilities for active and passive use. The development should be a viable and environmentally appropriate mixture of active and passive open space and form links to other regional facilities such as cycleways and Prospect Reservoir".

The project concept as envisaged at that time incorporated the following features:

- Development of a linear park;
- Preservation of recognised and outstanding built features of the sites such as the Greystanes (Boothtown) Aqueduct;
- Conservation of flora and fauna particularly rare or threatened species; and
- Appropriate treatment of the channel in the final realisation of the park design and implementation.

Desired Outcomes

A series of desired outcomes that generally build upon the objectives listed on the previous page were developed as part of the plan of management, in particular the community workshop groups as described in 4.0 Consultation.

Natural / Environment • retain and enhance flora values of corridor • retain and enhance fauna habitat values of corridor • improve stormwater management and water quality • maintain and enhance visual and landscape quality	**Social** • balance local residential issues with regional open space values of corridor • minimise adverse impacts of regional open space usage • optimise potential for community involvement in park management and maintenance
Recreational / Open Space • develop the corridors potential as part of a regional open and access space network (recreational and commuter) linking the city to the Blue Mountains via Prospect Reservoir and the Western Sydney Regional Park • optimise passive recreational quality and opportunities • integrate with existing or future recreational facilities and amenities • optimise potential for cross canal pedestrian links to improve public circulation	**Educational** • develop the corridors potential as outdoor classroom for environmental and heritage education • optimise spatial and access connections between corridor and schools **Visual** • optimise elevated outlook • ameliorate and enhance areas of poor visual quality
Heritage • optimise heritage conservation values of the site in a cost effective and sustainable manner • protect heritage qualities from adverse impacts of wider public exposure • facilitate Heritage interpretation through conservation presentation and signage • integrate regional Aboriginal heritage into heritage interpretation.	**Cultural** • promote profile of corridor as valued community asset • optimise potential for community activities within corridor
Intrinsic • maintain innate site qualities - peaceful character - urban bushland - cultural heritage significance	**Legacy for future generations** • future generations to recognise and understand the significance of the corridor in environmental, heritage and open space terms • optimise role of corridor in Holroyd's open space system • optimise role of corridor in the regional open space system
Management • establish appropriate management structure that maximises benefits of stakeholder inputs • establish a staged programme of improvements works • identify appropriate development / management responsibilities • identify funding requirements and facilitate the funding of required open space improvements • establish an appropriate maintenance plan, identify costs, and facilitate funding.	

1.4 CONSULTATION

The plan of management study has incorporated several consultation components aimed to both assist in the sourcing of information and development of planning and management strategies, and to inform relevant stakeholders and the local community of the study and project outcomes as they have developed.

A Steering Committee was establishment under the chair of the NPWS Metropolitan Regional Parks Unit, to oversee the study process and programme. The committee involved representatives of:

- Metropolitan Regional Parks Unit (NPWS) - 1 representative
- Department of Urban Affairs and Planning - Land Management Branch - 1 representative
- Holroyd City Council Councillors - 2 representatives.
- Holroyd City Council Engineers Department - 1 representative
- Canal Reserve Action Group Inc. - 2 representatives
- NSW Heritage Council - 1 representative

As part of the plan of management process the following consultation strategies were also carried out:

1. **Press Releases**
Press Releases were provided through Holroyd City Council's Corporate Column in the Parramatta Advertiser notifying the local community of the project and seeking interest in involvement in the community working group workshops. Organised groups within the community as identified by the Project Steering Committee were also contacted

2. **Community Working Group Workshops**
Respondents to the press releases and other stakeholders sourced through organised groups were invited to participate in community reference group workshops for each of the key Plan of Management phases. The workshops were chaired by Carolyn Stone, a Social Planner and Consultation Facilitator. The evenings involved varying degrees of technical input by the consultants to initiate discussion of topics and issues on the agenda, however the emphasis was on involvement and input by the community representatives.

3. **Public Exhibition**
Public exhibition of the Draft Plan of Management will invite general public inspection and comment. Following the public exhibition, comments will be considered after which the Final Plan of Management will be finalised and issued.

1.5 LOWER PROSPECT CANAL TODAY

The Lower Prospect Canal corridor today is an opportunity awaiting realisation for provision of a regionally significant open space and environmental resource. The corridor in it's current form provides benefits to the environment and community in a range of aspects, including visual relief to what is a heavily developed residential area. However, the plan of management has identified that these benefits can be improved in all areas in particular in optimising open space and access connections, and facilitating improvement of flora and fauna habitat values on the site. The safety concerns related to the open channel and associated limitations for public recreational usage is probably the single most significant constraint for the site currently.

The corridors pivotal location and potential to link Western Sydney Regional Park and Prospect Reservoir with Homebush Bay and Botany Bay by an integrated system of existing and proposed cycleways, has been identified. The Lower Prospect Canal can enhance the environmental experiences provided along the proposed Bay to Mountains Cycle Route (refer Bay To Mountains Cycleway - Greener Games Watch 2000) through the provision of high quality ecological habitats and a heritage resource of singular importance.

1.6 THE LANDSCAPE MASTERPLAN

The Landscape Masterplan - Figure 5.1 describes the major planning and design recommendations for the Lower Prospect Canal lands developed in response to the objectives, issues, and opportunities identified in review and consultation, and based upon the Management Strategy Framework. Key recommendation are as listed:

1. **Cycleway located to centre of filled canal alignment**

Of a range of options the preferred approach to rendering the Lower Prospect Canal safe for public use and retarding it's ongoing degradation was to fill the Lower Prospect Canal to its full depth retaining the edge alignment and the level character of the structure. It is proposed that a regional cycleway is located in the centre of the filled canal alignment with the existing canal edges visually reinforced with concrete edge capping with a turf "river" provided between.

Use of the Lower Prospect Canal in such a literal form provides a direct interpretation of the canal's heritage values in recognising the alignment and engineering levels of the canal structure.

2. Establishment of Low Maintenance Bush Protection Areas

In order to facilitate regeneration of the Grey Box woodland community on the site along with consolidation of communities of threatened species such as Pimela spicata and Acacia pubescens, it is proposed that large areas of the site be designated as low maintenance bush protection areas. The Concept Masterplan identifies the preferred locations of these zones which have generally been related to corridor edges formed by residential development. This will assist in providing a buffer between residential areas adjoining the Lower Prospect Canal.

3. Passive Use Grassland Areas

The existing open grassed areas adjoining road frontages should be predominantly retained as maintained grasslands for passive recreational use. Where existing tree planting provides pockets of potential native vegetation regeneration these zones should be delineated for establishment as additional low maintenance bush protection areas and ideally defined by path links or if required post and wire fencing.

4. Heritage Conservation

The masterplan proposals aim to optimise the value of the site's heritage elements, and their beneficial relationship to the corridor as an open space area. Interpretive displays and signage related to all significant heritage items are a fundamental component of the recommendations.

5. Screen/Buffer Planting

Due to the visual exposure of the adjoining residential and industrial development to the Lower Prospect Canal particularly on its southern boundaries, it will be necessary to provide buffer tree and shrub planting to selected areas to both improve visual quality for Lower Prospect Canal users and to provide additional privacy to adjoining residences.

6. Signage

In line with the nature of the usage of the corridor as a recreational and commuter cycleway, and as a focus for heritage conservation, an integrated system of signage will be required.

Key issues to be addressed in developing signage strategies include:

- establishment of durable materials palette for both types of signage
- possible integration of cycleway signage with an overall Bay to Mountains signage strategy
- location of signage to respond to key locations and avoid proliferation of signage elements.

7. Public Art

The development of the concept proposals outlined on the Masterplan provide a range of opportunities for the incorporation of public art institutions into design development and implementation. These include:

- Horseshoe Basin Water Feature and Channel Re-creation
- Viewing points to either end of covered way
- Artwork installation in bush protection zones but visible from path alignments
- Design of metal grilles to viewing windows and sedimentation channel gallery
- Smithfield Tanks rest area
- Bridge underpass (concealment treatments to bridge substructures)

1.7 IMPLEMENTATION

The implementation of Concept Masterplan proposals will involve a range of preparatory, design development, and construction works that will be required to be staged to enable issues such as capital works funding and supply of suitable fill material for Lower Prospect Canal filling to be sourced and programmed.

As such the proposals have been identified as a series of works stages that can enable the implementation to progress in a logical series of similarly sized works packages. The key criteria used in establishing this staging approach were:

1. Resolution of highest priority environmental issues
2. Establishment of functional path linkages that can provide recreational and commuter benefit
3. Provision of practical works stages that have readily definable limits and allow completed works to be functional and useable until such time as ongoing stages are completed.

Figure 6.1 describes the staging zones recommended for phased implementation. These are:

Stage 1 Gipps Road to Bayfield Road
Stage 2 Bayfield Road to Cumberland Highway
Stage 3 Gipps Road to Prospect Reservoir
Stage 4 Cumberland Highway to Sherwood Road
Stage 5 Sherwood Road to Guildford Pipehead

The period over which such a programme is implemented is subject to availability of funding and (for the Lower Prospect Canal project) the availability of suitable fill material. In the vicinity of 150 thousand cubic metres of fill will be required to infill the 7 kilometre length of the canal.

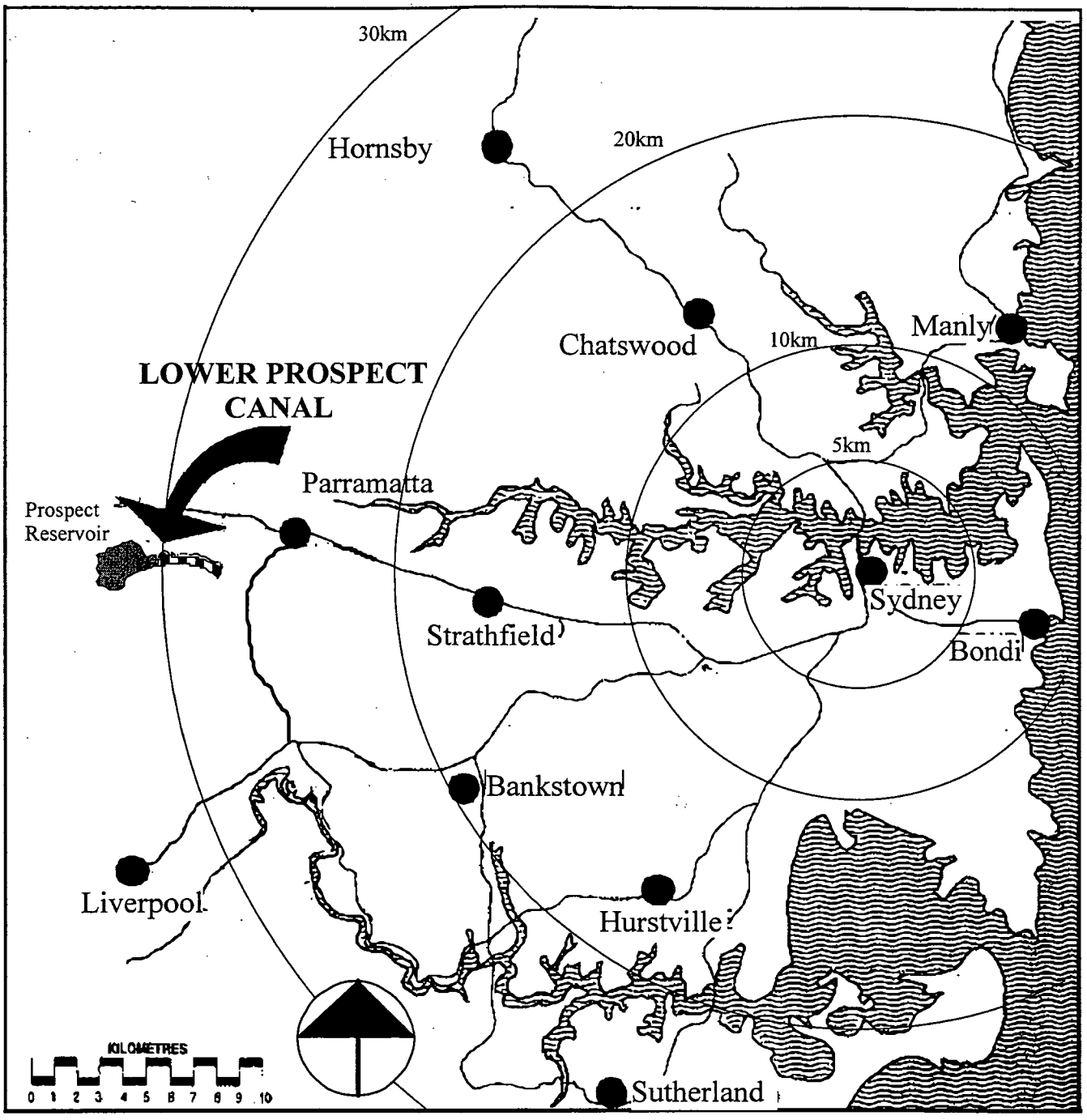
1.8 KEY BENEFITS OF THE PLAN

The benefits accrued through the development of the Lower Prospect Canal as a public open space resource will be significant both for the local community and broader regional population.

Key benefits will include the following:

- expanded network of regional cycleway and pedestrian access links providing access to a greater range of recreational opportunities;
- improved passive recreational opportunities for local and regional users;
- improved access for local residents;
- conservation and interpretation of important cultural heritage items;
- conservation and enhancement of significant flora and fauna habitat resource

Figure 2.1
Location Plan



Legend

- Arterial Roads
- Major Centres
- Lower Prospect Canal

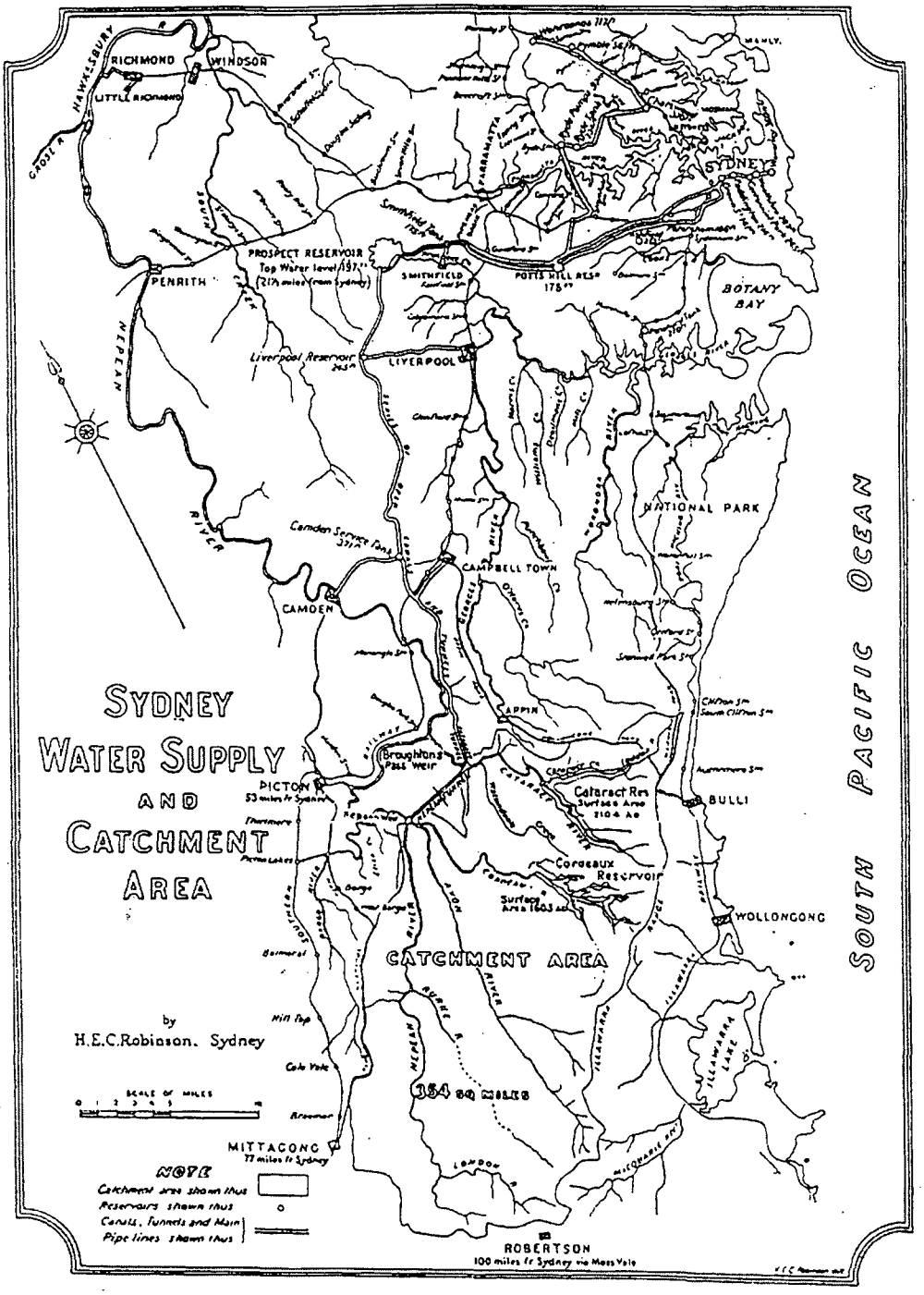
Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:
Metropolitan Regional Parks Unit
National Parks & Wildlife Service

Environmental Partnership Pty Ltd

Figure 2.2
Upper Nepean Scheme



Source:
Sydney Water Supply and Sewerage 1788 - 1918
Commemorative Volume - Govt Printer 1918

Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:
Metropolitan Regional Parks Unit
National Parks & Wildlife Service

2.0 REVIEW

2.1 CONTEXT

The Lower Prospect Canal study area is located within the Holroyd City Council Local Government Area, approximately 28km west of the Sydney Central Business District. (refer Figure 2.1) The site area for the purposes of this study comprises the land holdings acquired by NSW Treasury from Sydney Water in 1995. This extends from the boundary of Blacktown Local Government Area in the west (currently marked by a quarry access road and fencing), to the Guildford Pipehead in the east (Albert Street).

For the purposes of regional access and open space connections it is considered that the planning recommendations must incorporate the necessary linkage along Sydney Water property to Prospect Reservoir (refer 2.2 History and Ownership) through Blacktown Local Government Area. This currently exists as a narrow link to the south of the Boral quarry land holdings.

Extending eastward for 7.7km from the Prospect Reservoir Dam wall to Guildford Pipehead, the Lower Prospect Canal corridor covers approximately 62 hectares. Neighbouring suburbs to the north include Greystanes, Merrylands West and Merrylands, and to the south Smithfield, Woodpark and Guildford.

Much of the surrounding area is residential development, although to the south of the Lower Prospect Canal corridor there is a large area of general industry which adjoins the study area between Percival Road and Cumberland Highway. As noted, at the western end of the Lower Prospect Canal corridor the Boral Basalt Quarry adjoins the site and the Sydney Water lands of Prospect Reservoir

A number of open space reservations adjoin the Lower Prospect Canal corridor on the northern boundary providing opportunities for consolidation into an integrated open space area (eg. open space north of Hyland Road, Canal Road Reserve). Sherwood Grange Public School directly adjoins the Lower Prospect Canal east of the Cumberland Highway, whilst several schools have strong connections to the corridor across local roads (Holroyd High School, Merrylands West Public School, Merrylands High School, Widemere Public School, and Greystanes Public School).

The corridor lies in close proximity to arterial road links. The Great Western Highway and Western Motorway run 2.5km north of the site. The Cumberland Highway and Gipps Road cross the Lower Prospect Canal corridor in a north-south direction in the centre and west of the study area respectively.

The context of the site in relation to open space both locally and regionally is outlined in section 4.0 - Strategic Planning Context.

2.2 HERITAGE

Aboriginal Heritage

The book "Holroyd - A Social History of Western Sydney" by Grace Karskens identifies that the European settlers of the Cumberland Plain were largely ignorant to the fact that the area had supported Aboriginal communities for thousand of years. Karskens suggests that this is possibly due to the lack of visual evidence of impact on the landscape. The regions undulating shale topography saw Aborigines "camping in open or scattered sites" (Karskens 1991), some located near rivers or watercourses. It is noted that the riverside sites were in intensive use over thousands of years providing chert "for tools with sharp cutting edges, and basalt pebbles for chopping tools and hatchet heads".

In the late 1700's the inland people of the Sydney basin - The Dharug, habitated the area to the west of where Parramatta today lies. Within the Dharug group were many sub bands of people. These included the groups that occupied the present day Holroyd area:

- Bool-bain-ora — around Wentworthville
- Burramattagal — Parramatta
- Warmuli — Prospect
- Cannemegal — south of Prospect
- Toogagal — Toongabbie
- Warrawarry — Blacktown

(Karskens 1991).

The first form of contact of the European settlers with the local Aboriginal bands was recorded as being when Governor Philip and a party of men travelled up the Parramatta River and explored the area to the west, reaching Prospect Hill on 22nd April 1788. Traces of Aboriginal settlement were identified but no physical contact was made (Karskens 1991). As European settlement extended further west form Sydney Cove contact between Europeans and Natives became more frequent - often in poor circumstances as clearing for agriculture and homesteads alienated traditional tribal lands. In 1814 a Native Institution was established at Parramatta intended to educate black children for employment as domestic or farm help, although the local bands were unwilling to forsake their children and the use of force later became common. (Karskens 1991).

Bands of Aborigines continued to live adjacent to European estates with some maintaining a semi tribal existence. Various diseases ravaged the Dharug populations over the years from white settlement and by 1840 there were less than 300 Dharug people alive (10% of the 1788 population) (Karskens 1991).

In the 1990's there are approximately 314 Aboriginal people living in Holroyd Local Government Area, although these are a mix of peoples from other areas of the state along with some Dharug descendants. (Karskens 1991).

Archaeological Sites

With regard to the presence of recorded Aboriginal sites in the study area Karskens identifies that the major development drive in Holroyd Municipality occurred in the 1950-60's, at a time when the recognition and or recording of Aboriginal sites was not common, and before legislation was enacted to investigate and protect Aboriginal archaeological sites subject to development. As such it would be fair to assume that with the construction of the Lower Prospect Canal corridor in the late 1800's that the lack of knowledge and general disregard for Aboriginal culture would mean that archaeological sites along it's course may have been built over. The nature of the works along the corridor are such that in most situations the Lower Prospect Canal has required varying degrees of cut and fill to establish the highly accurate falls to the channel. This means that sites may potentially be buried under fill materials in a reasonable condition. In consideration of the topographic context of the Lower Prospect Canal lying just below a ridgeline for much of it' s length - it is not a typical location for major archaeological sites (such as on river banks). However the potential for archaeological observation of any future earthworks along the corridor could ensure that the opportunity for identification of sites, should they exist is optimised.

A search by the National Parks and Wildlife Services of it's Archaeological site register (April 1998) identified that no recorded sites were located in the Lower Prospect Canal corrdior. It was noted that due to the issues listed previously related to the era of the canal works that it was unlikely that sites would have been recorded. The NPWS response states that a "survey for Aboriginal sites may be required should any development be proposed that would affect the Lower Prospect Canal site. As such liaison with the Sydney Zone Cultural Heritage Office would need to occur prior to works commencing on the site.

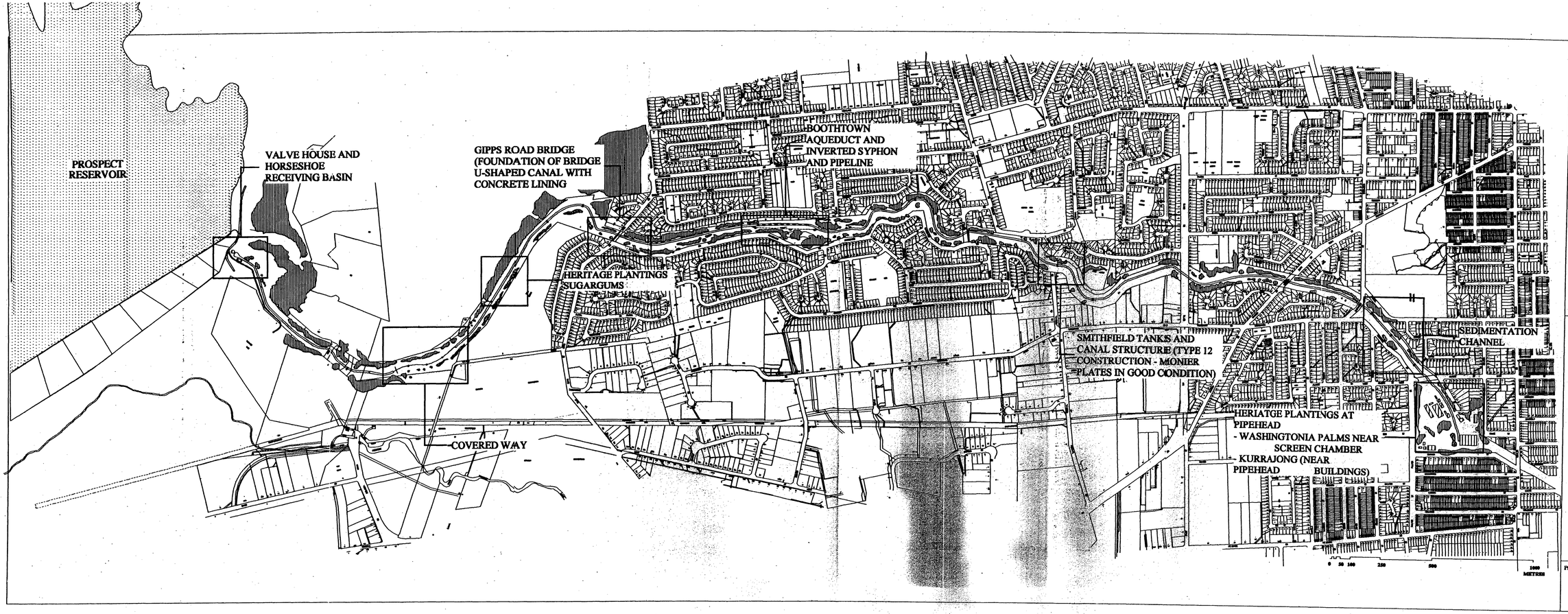


Figure 2.3
Heritage Significance

Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:
Metropolitan Regional Parks Unit
National Parks & Wildlife Service

Prepared By:

European Heritage

The following review of European heritage has been derived from the Heritage Study carried out by Edward Higginbotham and Associates on the upper and Lower Prospect Canals, and Prospect Reservoir in 1992. Higginbotham and Associates will provide Heritage Management recommendations based on the preferred Planning directions for the Lower Prospect Canal corridor developed in this study.

In the late 1860's, with the expansion of Sydney and repeated dry seasons, the need for an adequate water supply to replace the Botany Swamps as a water source was a most pressing concern. In 1867 the Governor, Sir John Young, appointed a Special Commission to investigate the establishment of a new water supply for Sydney.

The Special Commission reported back to the Governor in 1869, recommending the Upper Nepean Scheme as an adequate water supply. By sourcing the Upper Nepean River and its tributaries, the Avon, Cordeaux and Cataract Rivers the water was to be channelled, using the force of gravity, through tunnels, pipes and open canal to a reservoir at Prospect. From there the water would be carried by open canal to a water basin at Guildford Pipehead then by pipe to Potts Hills for distribution throughout Sydney (refer to Figure 2.2).

Several years passed until a decision was made to proceed with the Upper Nepean Scheme. The project was endorsed by English Civil Engineer W. Clark in May 1877. Work commenced in 1880 and by 1888 the Upper Nepean Scheme was commissioned.

The section of open canal running from Prospect Reservoir to the Guildford Pipehead water basin is now known as the Lower Prospect Canal. Along the canal (which is itself of heritage significance), a number of items of particular cultural heritage significance have been identified (refer Figure 2.3). These include:

The 'Covered Way'
The covered way was initially constructed in the 1880's, but collapsed when the Lower Prospect Canal was emptied during relining work in 1904. The covered way was re-built in 1905.

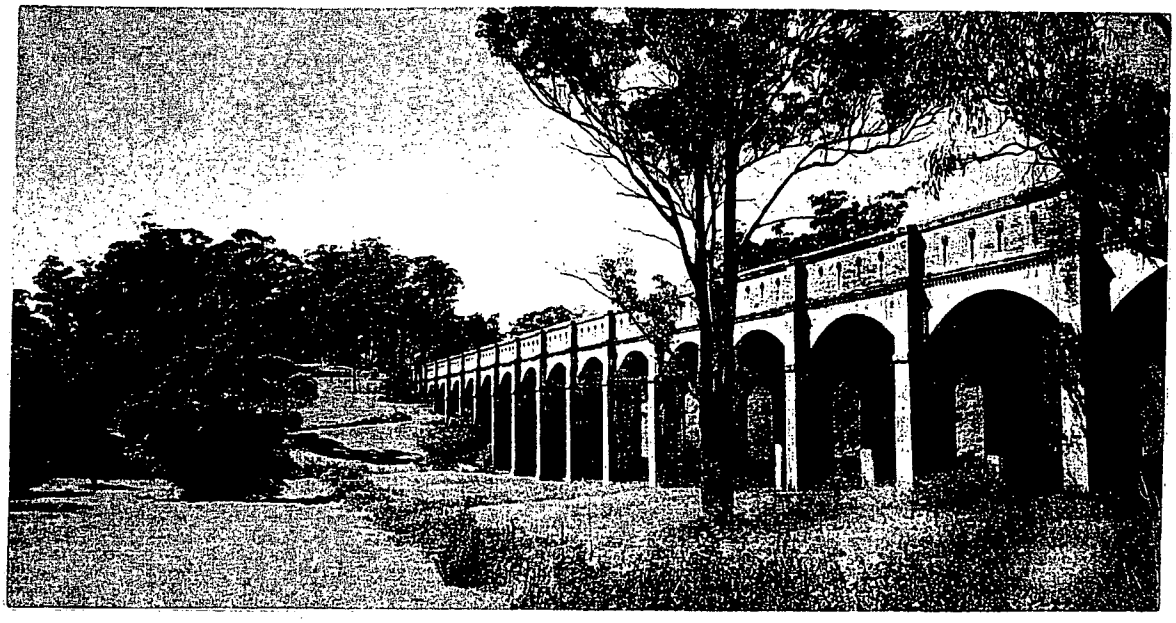
Greystanes (Boothtown) Aqueduct (refer photographs on following page)
The Greystanes (Boothtown) Aqueduct was completed in the 1880's, for the opening of the Upper Nepean Scheme in 1888. Constructed from brick the Greystanes (Boothtown) Aqueduct is 225 metres in length and has 22 arches, each with a 9.1 metre span. The Greystanes (Boothtown) Aqueduct failed in 1892 and was subsequently reinforced with a concrete lining and tie rods. In 1907 the Greystanes (Boothtown) Aqueduct was by-passed, due to its failings, with the construction of the concrete inverted syphon. The Greystanes (Boothtown) Aqueduct was retained for stand-by use if required. Large concrete plugs were installed to prevent water from the Lower Prospect Canal entering the Greystanes (Boothtown) Aqueduct.

Boothtown Syphon
The Boothtown Syphon was constructed in 1907 to replace the Greystanes (Boothtown) Aqueduct. The inverted syphon is 3.15 metres in diameter and is composed of reinforced concrete on concrete piers. The concrete towers house the sluice gates which control the flow of water from the Lower Prospect Canal. Both towers are constructed in a castellated style. At the time of its completion the Boothtown Syphon was the largest continuous concrete work of its kind constructed in Australia.

Sedimentation Channel
The sedimentation channel and by-pass located east of Sherwood Road was constructed as part of the rebuilding of the Lower Prospect Canal in 1913. It was constructed to reduce the work required at the Guildford Pipehead Screening Chamber. Turbid water in the Lower Prospect Canal was passed over a filter medium in the side chambers which allowed suspended matter to settle.

Apart from the above major elements, several other features of the Lower Prospect Canal are also of high significance, including the construction of the canal itself, an overflow weir, a cottage site, several canal overbridges, the Gipps Road Prospect Reservoir, and a number of culverts, flumes, and scour valves. A number of sections of the canal have been identified as good examples of the different construction techniques used in the re-construction of the canal. The original construction of the Lower Prospect Canal in the 1880's was masonry lined, but early this century the canal was relined with concrete in some sections and pre-cast Monier concrete plates in others.

The 200m section under the Gipps Road overbridge, where the canal narrows, is a good example of the relining of the canal with concrete. Between Bayfield Road and Cumberland Highway a section of the Lower Prospect Canal has been identified as a good example of the precast Monier concrete plate relining of the canal.



Above:
View to south east of Boothtown Greystanes (Boothtown) Aqueduct

Above:
The Greystanes (Boothtown) Aqueduct structure is of high heritage and visual quality

Chronology of works for the Lower Prospect Canal:

The following chronology outlines some of the key events in the history of the Lower Prospect canal following its principal development in the 1880's.

- 7 January, 1892 - Collapse of parapet walls of Greystanes (Boothtown) Aqueduct on Lower Prospect Canal into creek below. Re-built (Ann Rep, 1892, 38)
- 1892 - Fence lining the canal made dog-proof (Ann Rep, 1894, 47)
- 1895 - Water supply for Smithfield. Circular concrete tank, of 100,000 gallons built next to canal three miles below Prospect (Ann Rep, 1895, 3).
- 1895 - Walls of Greystanes (Boothtown) Aqueduct and by-wash at Boothtown raised (Ann Rep, 1895, 49)
- 1897 - New offtake from Lower Prospect Canal at Parramatta-Smithfield Road, to supply Prospect and Sherwood (Ann Rep, 1897, 2)
- 1897 - Girders supporting scour valves replaced. Extensive repairs to traffic bridges (Ann Rep, 1897, 57)
- July 1897 - Covered way temporarily strengthened (Ann Rep, 1898, 81)
- 1900 -Greystanes (Boothtown) Aqueduct rendered internally with cement mortar (Ann Rep, 1900, 73)
- 1903 - First section of Lower Prospect Canal to be relined was the section with the long concrete bank near Pipe Head (Ann Rep, 1903, 4)
- 1904 - Collapse of roof of covered way when Canal emptied (Ann Rep, 1904, 55)
- 1905 - Covered way roof upgrading completed (obs.)
- 1906 - Wrought iron flumes replace original timber flumes (Ann Rep, 1906, 51)
- 1906 - Side drainage by additional underway culverts (Ann Rep, 1906, 51)
- 1907 - Relining of Lower Prospect Canal from Prospect to Boothtown Bridge completed (Ann Rep, 1907, 4)
- 1907 - Reinforced concrete inverted syphon constructed alongside Greystanes (Boothtown) Aqueduct to replace the aqueduct in normal use. Built 10 feet 6 in in diameter. This syphon was then the longest reinforced concrete work in Australia (Ann Rep, 1908, 4)
- 30 June, 1908 - Western tower of Boothtown inverted syphon complete along with 950 feet (Ann Rep, 1908, 4) (Figure 2.24)
- 1909 - Boothtown inverted syphon in service (Ann Rep, 1909, 4)
- 1911 - Construction of reinforced concrete bridge for Smithfield Road at foot of Greystanes Hill (Greystanes Road) over Lower Prospect Canal (Ann Rep, 1911,4; Photo, Water Board Historic Research Unit)(Figure 2.25)
- 1911 - Long bank section of Lower Prospect Canal unsatisfactory since lined with concrete to PWD plans. Long transverse cracks appear (Ann Rep, 1911,4).
- 1912 - Relining of Lower Prospect Canal completed relining hoped to increase capacity from 50 million galls per item to 87 million (Ann Rep, 1912, 65)
- Walls of Smithfield Tank raised (Ann Rep, 1912, 65)
- 1912 - Bridge at Cumberland Highway crossing under construction (Ann Rep, 1912, 65)
- 1914 - Enlarging of Lower Prospect Canal completed (Ann Rep 1914,3)

- 1914 - Occupation bridges re-built in steel with trough decks covered by tarred metal (Ann Rep 1914, 67)
- 1914 - Side drains remodelled (Ann Rep 1914, 67)
- 1914 - Canal road re-constructed and ballasted (Ann Rep 1914, 67)
- 1915 - Windmill pump erected near Boothtown Bridge for Board cottages and local supply (Ann Rep 1915, 3, 72)
- 1916 - High level tank built at Cumberland Road which would be filled with water pumped from Pipe Head. Tank was old one removed from Ashfield built 1888 (Ann Rep 1916, 3, 72)
- 1918 - Foundations of Cumberland Road tank strengthened (Ann Rep 1918, 50)
- 1919 - Length of 300 yards of Monier lining of Lower Prospect Canal settled (Ann Rep 1919, 50)
- 1921 - Thirteen chains of fencing renewed with concrete posts (Ann Rep 1921, 44)
- Three culverts and drains along Macquarie Road built of spare (Monier) lining plates to take water across road (Ann Rep 1923, 28)
- 1924 Old bypass header at Sherwood Road removed (Ann Rep 1924, 28)
- 1924 - Bypass of 30 in cast iron pipes connecting Upper Canal to 48 inch pipe running from Prospect Reservoir to Lower Prospect Canal, diverted to discharge directly into Lower Prospect Canal (Aird, 35)
- 1926 - Connection installed between Lower Prospect Canal and new Smithfield Reservoir (Ann Rep 1926, 36)
- 1927 - Slip in Monier plates on west side of Lower Prospect Canal near Greystanes (Photo, Water Board Historic Research Unit)
- 1930 Reconstruction of bridge carrying Albert Street over Lower Prospect Canal completed (Ann Rep 1930, 9)
- 1935 - Repair of longitudinal cracks in Monier lining of Lower Prospect Canal (Photo, Water Board Historic Research Unit)

Cultural Heritage Significance of the Lower Prospect Canal

The Higginbotham Study of the Upper Canal, Prospect Reservoir and Lower Prospect Canal (Upper Nepean Scheme) establishes that the system, and many of the elements which make it up, have considerable heritage significance.

Higginbotham states in Volume 3, Conservation Policy, of the study that:

"to fully appreciate the significance of the system one needs to be aware of the context of its original realisation. The world in the late 1880's was a different place. The very concept of supplying a city's water from remote storage dams was new internationally. Even today, many world cities operate their water supplies on quite different systems."

At that time the horse was the main form of private transport and Sydney's first railway was less than 40 years old. The construction of the Upper Nepean Scheme was an enormous challenge. Much of the effort required had to be met with horsepower or manpower. The combined length of the various canals and tunnels, and the extremely small gradients achieved, required high levels of managerial and engineering skill. The technology available in those days fell well short of what we now take for granted. A small error in the construction of any one part could have rendered the system as a whole inoperable.

In 1881 metropolitan Sydney had just under a quarter of a million people, about one fifteenth its present size. It was however growing at an annual rate of about 5.5%. Simply supplementing existing water supplies was recognised as an inadequate response. As such the project represents the realisation of a far sighted vision. The system has continued to play a major role, as part of the city's water supply, for over 100 years. No significant modification was ever necessary and the relative intactness of the system now adds to its heritage significance. This was how it was built and how it operated, more or less from its first day.

Undoubtedly, this is a case where the whole is far greater than the sum of the parts."

Volume 1, Historical & Archaeological Assessment, includes the following Statement of Significance, for the whole system.

"1. It functioned as part of the main water supply system for Sydney for over 100 years, and apart from development in supply and improvements has changed little in its basic principles since the day it was completed.

2. It provides detailed and varied evidence of engineering construction techniques prior to the revolution inspired by reinforced concrete construction. Although concrete was later used to improve the durability of the System, much of the earlier technology is still evident along the Lower Prospect Canal.

3. It also provides extensive evidence of the evolution of engineering practice, such as the replacement of timber flumes by wrought iron flumes to be followed by concrete flumes. The early utilisation of concrete for many engineering purposes in the System, also demonstrates the growing emergence of an engineering technology based on man-made materials.

4. The Upper Nepean Scheme made the big advance from depending on local water sources to harvesting water in upland catchment areas, storing it in major dams and transporting it to the city by means of major canals and pipelines.

5. It is an excellent example of the ingenuity of late nineteenth century hydraulic engineering, illustrating the techniques of canal building (often at extremely small grades), the progressive improvements in both pipe manufacture and pipeline construction, even by present day standards, of a large earth fill and rock dam. Of particular note is the way in which it was designed to supply a large area of Sydney by gravity.

6. Over 100 years later, its components were still part of Sydney's main water supply System, and in most cases operated in essentially the same way as was originally envisaged.

7. Of the way in which the initial Scheme completed in 1888 lent itself to progressive development over a period of nearly fifty years to meet Sydney's increasing water supply needs.

8. Many of the original control installations such as the "stoney gates", stop logs, penstocks, gate valves, are still in service and continue to illustrate the technology of the time."

The report notes that given the significance of the system as an entity, conservation of all essential elements was the optimum heritage option. This does not make it necessary to maintain the various components as a working system. It is noted that it is desirable that individual elements should be for the most part retained in their operational physical and spatial context.

It is identified that the important test in conservation is whether members of the public, provided with any necessary background information, are able to appreciate the historical role and significance of what they see. If they are unable to imagine what the original was like, or make sense of what they observe, the item will have lost its heritage value.

The Higginbotham report having been prepared in 1992 considered the future of the Lower Prospect Canal prior to it's being dewatered. As such it was strongly recommended that the Lower Prospect Canal was not dewatered until plans for it's future use were finalised, due to the cumulative effects of degradation that would ensue once the canal was decommissioned and non operational. The site assessment carried out for this plan of management has identified that this process of erosion of the heritage fabric is in progress and will worsen if not addressed.

Current Heritage Status

Volume 3 of the Heritage Study states that at present the Upper Nepean Scheme is listed by the National Trust and recorded in the Water Board's own heritage register. The Greystanes (Boothtown) Aqueduct is also recorded on the Register of the National Estate, while Prospect Reservoir is listed by the Institution of Engineers, Australia.

Listings by bodies like the National Trust have no statutory force but are taken into account in assessment by other authorities. There are no orders under the Heritage Act affecting the system.

All "government instrumentalities" in New South Wales are required to maintain a "Heritage and Conservation Register" under Section 170 of the Heritage Act. Details must be recorded of items which are or could be subject to conservation instruments and are in the statutory body's ownership or control. The Upper Nepean Scheme and its major elements are recorded in the Water Board's register."

The Lower Prospect Canal structures would also be subject to the controls of the Heritage Act including the requirements that approval be obtained for any works likely to involve "discovering, exposing or moving a relic". The Higginbotham report identifies that a relic can be defined as " 'a deposit, object, or material evidence' more than 50 years old which relates to the European settlement of NSW.

Descriptions of the levels of significance for identified items of heritage accepted by Conservation Authorities were defined in the Vol. 1 report, as follows:

State
Items have several criteria of significance. Items usually relate to the earliest phase of construction or operation/use of the Upper or Lower Prospect Canals, etc.

Individual items should be ranked at the State level, when they have State significance in their own right, or on the basis of being part of the overall structure.

Regional
Items with fewer criteria of significance. Items relate to later phases of operation, use or amplification or in some cases have been modified or largely destroyed by later works. Items mainly significant because of association or link with the overall structure of the Upper Nepean Scheme.

Individual items should be ranked at the regional level, when they have regional significance in their own right, or on the basis of being part of the overall structure.

Local
Items are relatively recent, ongoing alterations and additions to the system, because of operational requirements, etc.

The accepted approach to conservation of the items under these categories is also listed:

Multiple or repeating items:

1. A selection of examples should be conserved. Any items required to be disturbed should be recorded prior to disturbance. (This recommendation applies to items of local and regional significance)

2. A selection of examples should be conserved. A conservation plan should be prepared prior to disturbance (applies to items of State significance).

Single items or groups of items:

1. This item or group of items should be recorded prior to disturbance. (Items of local significance).

2. This item or group of items should be conserved. If disturbance is unavoidable a conservation plan should be prepared prior to disturbance (State significance)

3. Conservation is the preferred option for this item or group of items. They should be fully recorded prior to disturbance. (Regional significance).

Landscape Features

1. The plantings should be conserved by replanting with the same species when necessary.

As the Lower Prospect Canal has been taken out of service, and if sections of the canal are physically removed, consideration needs to be given to interpretative means of completing the historical picture. Possibilities include signs, plaques and historical photos on display at the site.

The establishment of a repository for the permanent conservation of archaeological and moveable relics should also be considered. All form a part of the Board's history of operation, and a repository could provide a research and educational resource for the future.

Preferred Conservation Strategy

The preferred conservation strategy for the Lower Prospect Canal Corridor as recommended by the Higginbotham Study, is one which involves maintaining as much of the physical fabric of the canal corridor as possible, in situ, as part of a public open space corridor. Maintaining the continuity of the corridor is considered essential, even if some individual items are lost or cannot be maintained.

Conservation Priorities

Several options for the future of the Lower Prospect Canal are identified in Higginbotham & Associates Report Vol. 3. Each option raises a specific set of conservation concerns. In assessing these, the criteria to be applied from a heritage point of view, include the following:

- Options involving covering, filling and concealment of individual items. Loss of view to the public is a concern, but the possibility exists for representative sections of the Lower Prospect Canal to be retained and displayed is a viable possibility. The degree of permanence of any parts of the Lower Prospect Canal that may be covered or filled will need to take into consideration the possibility of future archaeological inspection if required. A related concern that must be considered is whether the covering or concealment will retard or accelerate deterioration of the structure.
- The extent of interference with the fabric must also be a consideration. It currently appears that just to prevent deterioration of the Lower Prospect Canal structure will itself require some alteration to the fabric. If the original fabric is substantially damaged, altered or replaced much of the heritage value is lost. If maintenance of the original fabric is likely to involve great expense it may be necessary to select part only for conservation attention.
- Demolition of fabric is always the last priority. Even replacement with new but identical fabric is of significantly lesser value.
- Fragmentation of the corridor by landuses not in keeping with an open space usage will compromise the integrity of the Lower Prospect Canal as a whole. The continuity of the Upper Nepean Scheme corridor as an open space is significant, in terms of both historic function and cultural landscape.
- Alienation by development goes one step further, making any fragmentation irreversible.

The Higginbotham Report recommends that as a minimum, sections of the Lower Prospect Canal should be conserved. The sections chosen should be as representative as possible of the canal's development. Proximity to other items with high priority for conservation will assist in making a selection. Priority may go to those sections in more stable condition, with fewer anticipated maintenance problems. A conservation plan for items of sufficient cultural significance should be prepared following on from this Plan of Management to determine in detail implementation and management procedures for heritage conservation along the Lower Prospect Canal, based on the broad planning and management recommendations of the report.

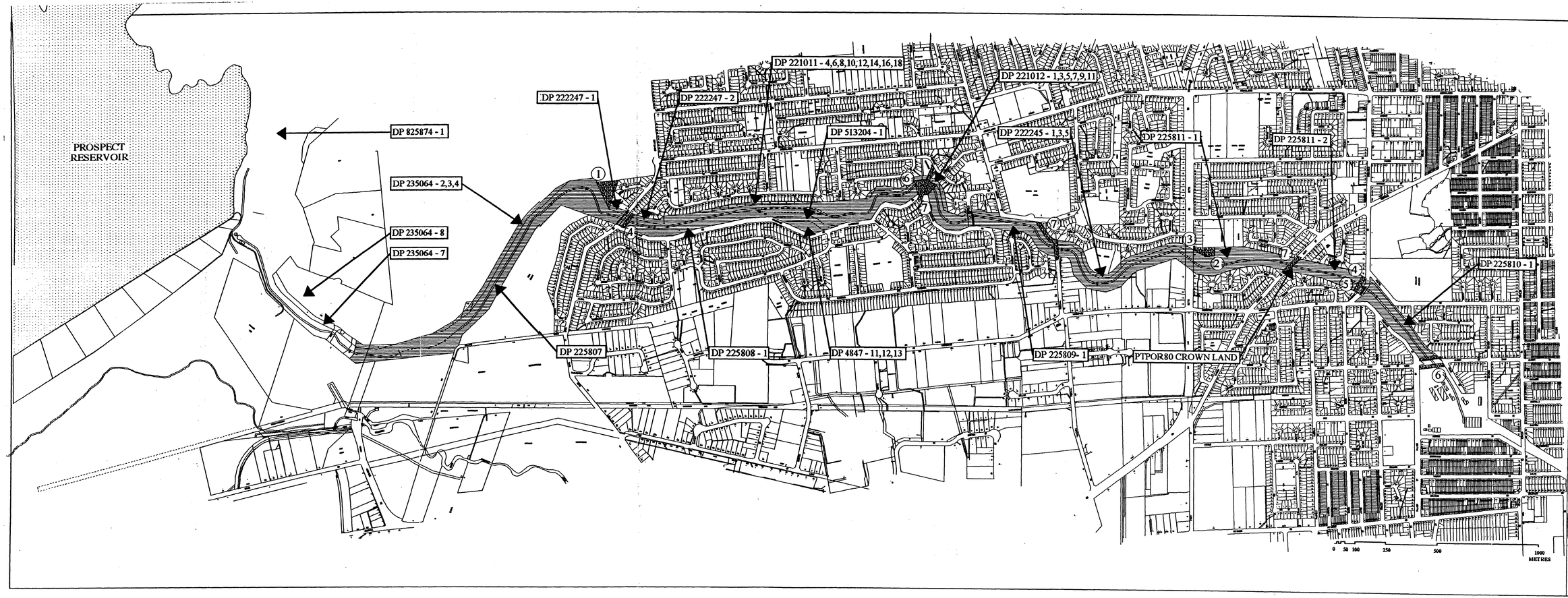


Figure 2.4

Ownership & Leases

LEGEND

LEASES

1. SCOUT ASSOCIATION
2. GIRL GUIDE ASSOCIATION
3. KINDERGARTEN UNION
4. AUSTRALIAN GAS LIGHT
5. TELSTRA
6. HOLROYD CITY COUNCIL
7. INTERGRAL ENERGY

Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:
Metropolitan Regional Parks Unit
National Parks & Wildlife Service

Prepared By:
Environmental Partnership Pty Ltd
Landscape Architects & Urban Planners
7 Fleet Street Darlinghurst NSW 2041
Phone (02) 9557 9255 Fax (02) 9318 0292
ACN 003 854 353

2.3 OWNERSHIP / LEASES

Up until 1995 when the canal was decommissioned, the Lower Prospect Canal corridor was under the ownership and control of Sydney Water. In 1996 the New South Wales Treasury acquired the study area from Sydney Water on behalf of the NSW Government with a pipeline system now carrying water directly from the Upper Prospect Canal to the Guildford Pipehead. At present Treasury holds title to the land and it is proposed that this Plan of Management will identify appropriate responsibilities and provide direction for future care control and management of the Lower Prospect Canal lands.

The Lower Prospect Canal study site comprises the following parcels of land (refer Figure 2.4).

Prospect Reservoir to Gipps Road

Lot 1 D.P. 825874
Lot 7 D.P. 235064
Lots 1-4 D.P. 235064
D.P. 225807
Lot 1 D.P. 222247

Gipps Road to Bayfield Road

Lot 2 D.P. 222247
D.P. 225808
D.P. 513204
Lots 2,4,6,8,10,12,14,16,18 D.P. 221011
Lots 11-13 D.P. 4847
Lots 1,3,5,7,9.11 D.P. 221012

Bayfield Road to Cumberland Highway

Lots 1,3,5 D.P. 222245
D.P. 225809

Cumberland Highway to Sherwood Road

Lots 1,2 D.P. 225811
PT POR 80 Crown Land

Sherwood Road to Albert Street

D.P. 225810

Leases

A number of leases exist on the Lower Prospect Canal study area as summarised below (refer Figure 2.4). Information from Sydney Water does not specify the current status of these leases:

- Scout Association of NSW -Gipps Road to north west of Lower Prospect Canal
- Girl Guide Association of NSW -Cumberland Highway north east of Lower Prospect Canal
- Kindergarten Union of NSW -Cumberland Highway north east of Lower Prospect Canal
- Australian Gas Light Company -gas main - east side Gipps Road bridge
  -gas pipelines - west side of Sherwood Road bridge
- Telstra -cable pipe - west side of Sherwood Road bridge
- Holroyd City Council -construction, existence, maintenance and use of Albert Street bridge and bridge approach
  -construction of Macquarie Road detention basins
- Integral Energy -33kv transmission line crossing Lower Prospect Canal from Warren Road to Duffy Street
  -underground pilot cables crossing canal between Cumberland & Percival Road
  -33kv transmission lines either side of Albert St bridge
  -overhead powerlines crossing Lower Prospect Canal from Macquarie Road to Taylor Avenue.
  -stay pole off Cumberland Road

2.4 FLORA & FAUNA

Review of Flora Issues

1. Surveys Of The Site

Several vegetation studies have been carried out relating to the study area. A botanical survey of the Lower Prospect Canal area was undertaken in 1993 by David Thomas Consultant Botanist. A survey and report on the botanical significance of the Lower Prospect Canal area was undertaken by Teresa James of the Sydney Royal Botanic Gardens in 1994. A review of the botanical significance of the site is also included in the National Parks and Wildlife Service's *Western Sydney Urban Bushland Biodiversity Study* (NPWS 1997).

All of these studies describe the existing vegetation on the site and its condition, identify plant species and communities of conservation significance, note the type of vegetation that would have originally occurred on the site, and assess the general conservation significance of the site. The *Urban Bushland Biodiversity Study* also provides a summary of conservation and management recommendations.

The study by Thomas (1993) divided the Lower Prospect Canal corridor into six sections (referred to as *sites* in the report by Thomas) and included a description of the species occurring within each section, and a comprehensive species list for the whole corridor. These same six sections are used in this assessment. (refer Figure 2.5):

- Section 1. - Guildford Pipehead Section.
- Section 2. - Albert Street to Sherwood Road.
- Section 3. - Sherwood Road to Cumberland Highway.
- Section 4. - Cumberland Highway to Bayfield Road.
- Section 5. - Bayfield Road to Gipps Road.
- Section 6. - Gipps Road to Prospect Reservoir.

The location of each section is shown on Figure 2.5 The Lower Prospect Canal lies within the Holroyd and Blacktown Local Government Areas.

2. Vegetation

The corridor contains scattered remnants of Grey Box Woodland dominated by Grey Box *Eucalyptus moluccana* and Forest Red Gum *Eucalyptus tereticornis* (map unit 10c of Benson 1992), with occasional trees of Broad-leaved Ironbark *E. fibrosa*, Thin-leaved Stringybark *E. eugenoides* and Rough-barked Apple *Angophora floribunda*. Thomas considers that localised concentrations of *Eucalyptus fibrosa* in Sections 3 and 5 may indicate that a *Eucalyptus moluccana - Eucalyptus fibrosa* Association also occurred in the area, although the extensive clearing of the site and surrounding areas makes this unclear. The existence of ironstone gavels in Section 3 would also suggest *Eucalyptus fibrosa* was a co-dominant species in this area.

The shrub layer in all of the remnant woodland areas is generally poorly developed, although species diversity is relatively high considering the level of disturbance and regular mowing that has occurred until recently. The main remnants of native shrubs occur in protected sites below embankments and amongst stands of trees, where mowing was difficult. (see photograph - following page showing regeneration under existing tree stands)

The ground layer contains the greatest species diversity, with native herbs, grasses, and climbers, including many species that are considered rare or vulnerable in the Western Sydney region by Benson and McDougall (1991). The corridor also provides a rare linear, almost continuous bushland corridor through part of Western Sydney that does not occur in other more typical corridors such as roads in the district. James (1994) noted that there is a high turnover of plant species along the Lower Prospect Canal corridor as a result of the changes in soils, nutrient levels, local topography, moisture gradients and climate, that is of particular scientific interest and conservation value.

The majority of the site is covered by regularly mown grassed areas, which vary in composition from purely exotic grass species to predominantly native species.

The Lower Prospect Canal, together with the Boral Quarry site to the west, contains over 50% of the native plant species recorded for the Holroyd Local Government Area (NPWS 1997).

Figure 2.5
Flora Survey Units

LEGEND

EXISTING MAJOR TREE CANOPY

1 SECTION 1 PIPEHEAD SECTION

2 SECTION 2 ALBERT STREET TO SHERWOOD ROAD

3 SECTION 3 SHERWOOD ROAD TO BETTS ROAD

4 SECTION 4 BETTS ROAD TO BAYFIELD ROAD

5 SECTION 5 BAYFIELD ROAD TO GIPPS ROAD

6 SECTION 6 GIPPS ROAD TO PROSPECT RESERVOIR

Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:
Metropolitan Regional Parks Unit
National Parks & Wildlife Service

Prepared By:

Environmental Partnership Pty Ltd

Above:
Native tree regeneration has occurred in areas that have been left free of mowing maintenance

Above:
Sugar Gum avenue south of Gipps Road is significant heritage item

3. Conservation Significance Of The Lower Prospect Canal Vegetation

Plant Species

The surveys by Thomas (1993) and James (1994) recorded a total of 136 native plant species within the Lower Prospect Canal corridor, including 2 nationally rare and endangered species and 33 species that are considered to be vulnerable and inadequately conserved in Western Sydney.

The two plant species of national conservation significance (as listed by Briggs and Leigh 1996) are:

Rice Flower *Pimelea spicata* ROTAP Code 3ECi, Schedule 1 TSC Act (Endangered)
Downy Wattle *Acacia pubescens* ROTAP Code 2VCa, Schedule 2 TSC Act (Vulnerable)

> *Pimelea spicata* only occurs on shale soils and was once widespread on the Cumberland Plain. Clearing for farming and later residential development has reduced its occurrence to only a few small populations, some of which continue to be threatened with destruction by development or weed invasion. The species occurs at one site in Section 6 of the Lower Prospect Canal corridor with a population of around 200 plants (NPWS 1997). This population is one of the largest in the Sydney region (NPWS 1997).
>
> *Acacia pubescens* occurs on shale soils and has also has its distribution reduced by farming and residential development. Two populations occur within the Lower Prospect Canal corridor; in Sections 2 and 3.

A further three species are regionally rare and vulnerable and of particular conservation significance in Western Sydney (Benson and McDougall 1991). These are:

> Native Pennyroyal *Mentha satureioides*,
> Wild Sorghum *Sorghum leiocladum*, and
> the pea flower *Zornia dyctiocarpa.*

A further 30 species found in the Lower Prospect Canal corridor are considered by Benson and McDougall (1991) to be vulnerable and inadequately conserved in western Sydney.

James (1994) states that:

"The high number of vulnerable and inadequately conserved species recorded from the Canal and the occurrence of the rare and endangered *Pimelea spicata*...and *Acacia pubescens*..., highlight the outstanding conservation significance of the area."

Many more species of native plants that have not been recorded in the corridor are likely to regenerate from the existing seed store in the soil if given the opportunity.

Plant Communities

The Grey Box Woodland community is part of the Cumberland Plain woodlands and was previously widely distributed across Western Sydney. Today it occurs as usually small, isolated remnants. These remnants show significant variability over even short distances (NPWS 1997). The Grey Box Woodland community type is listed on Schedule 1 Part 3 Endangered ecological communities of the *Threatened Species Conservation Act 1995* and is protected under that Act.

The Lower Prospect Canal corridor has been listed as one of the key core biodiversity areas for Grey Box Woodland in the Western Sydney region by the *Urban Bushland Biodiversity Study* (NPWS 1997). Core biodiversity areas are key sites containing exemplary remnants of plant communities not represented, or very poorly represented in the NPWS estate in Western Sydney, and considered endemic to the region (NPWS 1997). No area of Grey Box Woodland, apart from an insignificant area in Windsor Downs Nature Reserve, is currently conserved.

The botanical conservation significance of the Lower Prospect Canal corridor is therefore very high and provides outstanding scientific and educational values. These values can be significantly reduced through inappropriate bushland management techniques. However the use of the corridor for passive recreation purposes is not incompatible with the conservation objectives of the site.

Wetlands

The two wetlands identified in the Canal Reserve Action Group Inc. (CRAG) report located behind Munro Street and at the corner of Gipps Road and Hyland Road are within the Gipps Road Open Space area under the care and control of Holroyd City Council.

These wetlands are reported by CRAG to have been supplemented by seepage from the Lower Prospect Canal when it was in use. The three drainage gullies that feed natural runoff from Prospect Hill under the Lower Prospect Canal also appear to have a significant input to the wetlands.

No proposals for the retention or enhancement of these wetlands is contained in the Plan Of Management for the Gipps Road Open Space area, however as identified in the CRAG report, th retention and environmn=ental upgrading of these wetlands is desirable.

The removal of weed species from the drainage lines in the Lower Prospect Canal corridor and their restoration with locally endemic native species is not expected to significantly affect the existing water flows into the wetlands.

Heritage Plantings

Historical landscape plantings within the Lower Prospect Canal corridor include:

- A row of Sugar Gum *Eucalyptus cladocalyx* (from South Australia) (see photograph - previous page) along the southern side of the Lower Prospect Canal service track in Section 6. These may have been planted soon after the construction of the Lower Prospect Canal in 1888 and are of heritage value. Within the last 10-20 years, some of the Sugar Gum trees have apparently been replaced by other non-endemic species, including Spotted Gum *Corymbia maculata*, Yellow Bloodwood *Corymbia eximia*, and Lemon-scented Gum *E. citriodora*, as they have died (Thomas 1993). (refer previous photograph)

- A row of Washington Palms *Washingtonia sp.* and Canary Island Palms *Phoenix canariensis* and one Kurrajong *Brachychiton populnea* near the screen chamber at Section 1, near the Guildford Pipehead buildings and infrastructure.

Weeds

Weed species occur throughout the corridor, with the highest concentrations occurring along the residential and other boundaries, disturbed soil profiles (earthworks for the canal, Greystanes (Boothtown) Aqueduct and bypass pipeline), and in drainage lines.

Weeds are also common around the base of most mature trees, where mowing has not been possible. The most common species in this situation being African Olive *Olea europaea* subsp. *africana* and Asparagus Plant *Protasparagus officinale.*

Creeklines

Only two major creeklines occur within the Lower Prospect Canal corridor;

- the main channel leading into the wetland behind Munro Street, and
- the creekline near the Greystanes (Boothtown) Aqueduct.

The creekline that leads to the wetland includes a channel and basin upslope of the Lower Prospect Canal that is well vegetated with large Forest Red Gums *Eucalyptus tereticornis*, and Hickory Wattle *Acacia implexa* forming an upper and mid strata. Other native shrubs, herbs and grasses also occur in this area. Weeds are also prolific in this area as a result of the moist sheltered conditions, including Small-leaved Privet, Large-leaved Privet, African Olive, and Lantana. The lower section of this creekline, downslope of the Lower Prospect Canal is heavily overgrown by Blackberry, Crofton Weed and other weeds and will require the removal of weeds, the protection of exposed soil against erosion and the planting of some native shrubs to attempt to shade out further weed seedlings.

4. Key native flora management Issues

The key native flora issues associated with the Lower Prospect Canal corridor are:

- Protection of the populations of the nationally threatened species *Pimelea spicata* and *Acacia pubescens*.
- Management of the populations of *Pimelea spicata* and *Acacia pubescens* to retain and potentially increase their size.
- Retention of the existing natural changes in plant alliances along the Lower Prospect Canal corridor.
- Protection of existing regrowth areas, and other areas of high natural regeneration potential. These areas must include the locations of the regionally rare and vulnerable species Native Pennyroyal *Mentha satureioides*, Wild Sorghum *Sorghum leiocladum*, *Brachycome aculeata* and the pea flower *Zornia dyctiocarpa*.
- Provision of interpretive signage.
- Supplementary planting of locally endemic tree species in some areas to link tree canopies or to provide shade in existing open space areas to be used for recreational purposes.
- Compatibility between biological conservation objectives for the Gipps Road Open Space Plan Of Management.
- Weed eradication and control.
- Retention of the historical non-endemic native tree plantings, including the Sugar Gums.
- Replacement of historical Sugar Gum tree plantings in Section 6 with the same species as they die.
- Retention and enhancement of historical precincts through mixed native plantings/ regeneration and exotic plantings.
- Gradual removal of weed species and thickets along watercourses so that native bird habitat is gradually replaced by native species rather than habitat being immediately removed and the wildlife displaced.

Fauna

The fauna assessment for the Lower Prospect Canal Plan of Management aims to identify the diversity of fauna species that utilise and or rely on the habitats present within the Lower Prospect Canal area. By identifying the range of species present within, and adjacent to the study area, and those likely to occur, rehabilitation strategies and management proposals can be developed. These strategies are designed to ensure that the present diversity of native species is maintained, by providing a range of resources which are important to the life cycle requirements of those species identified. These life cycle requirements include feeding, roosting, sheltering and breeding areas. By providing these resources, it is expected that the fauna value of the Lower Prospect Canal area would be maintained, and that opportunities for an increase in the diversity of native species provided.

Methodology

To determine the range of native species known, or likely to occur within the study area, a field survey and literature search was undertaken. Field surveys were undertaken on the 17 February and 4 March 1998 and included a survey of both the habitats present within, and adjacent to, the Lower Prospect Canal corridor. The adjacent areas were assessed to determine if there were any opportunities to link these sites with the habitats present within the Lower Prospect Canal corridor.

Techniques employed for this investigation included:

- habitat assessment,
- direct observation,
- bird watching,
- identification of amphibian calls,
- identification of indirect faunal evidence (such as scratching, scats and tracks), and
- litter and ground debris searches for amphibians and reptiles.

It is noted that no nocturnal work was undertaken. Given the habitats present within the Lower Prospect Canal corridor it is expected that, if this was carried out, microchiropteran (small insectivorous bats) bats and owls would be detected and the diversity of frog species increased.

When surveying the Lower Prospect Canal corridor, each vegetation stand present within and adjacent to the survey area was walked and only fauna species observed or indicated identified. This method enabled all fauna habitats present within and adjacent to the study area to be assessed and surveyed. During the survey sessions, several ten minute listening periods were undertaken at around 250 metre intervals, thereby enabling species not visible to be detected by their distinctive calls.

Other species previously recorded in the region, but which were not observed during the present study, were identified through reference to the National Parks and Wildlife Service Atlas of NSW Wildlife (NPWS 1998), the National Parks and Wildlife Services Western Sydney Urban Bushland Biodiversity Survey Report (NPWS 1997), the Gipps Road Open Space Plan of Management (EDAW 1997), a report prepared for several proposed drying beds within a portion of Prospect Reservoir (Thomas and Engel 1997) and reports prepared for the Lower Prospect Canal area itself (CRAG 1996, Thomas 1993). Discussions were also held with representative of Sydney Water to determine the effectiveness of a habitat recreation programme within a section of the Lower Prospect Canal itself. This section is currently covered and it was thought that it may provide summer roosting habitat for the Common Bent-wing Bat (*Miniopterus schreibersii*). This bat is threatened with extinction and is listed under Schedule 2 of the *Threatened Species Conservation Act 1995*.

Conventions used

Identifications were made according to nomenclature in :

- Cogger (1992)- reptiles and frogs
- Simpson and Day (1996)- birds
- Strahan (1995)- mammals
- Triggs (1996)- identification of scats, tracks and markings.

The conservation significance of native species is determined with reference to the *Threatened Species Conservation Act 1995*, Holroyd City Councils State of the Environment and the National Parks and Wildlife Services Western Sydney Urban Bushland Biodiversity Survey Report (NPWS 1997). These references were utilised to determine the State, regional and local conservation significance of native species recorded or expected.

Results

Habitat types available for native species

Within the boundaries of the Lower Prospect Canal area a number of habitats types occur. These are:

- open woodlands;
- grasslands; and
- aquatic environments.

Adjacent to these, commercial forests, grasslands and disturbed areas are present.

Each of these habitats is described below, along with its value for native species.

Open Woodland

Patches of open woodland are present within the Lower Prospect Canal corridor, with the more developed stands occurring to the west of Bayfield Road. Based on the structure of the habitats present, the open woodland can be divided into two, the areas to the west of Gipps Road and the areas to the east. Trees to the west of Gipps Road are around 25 metres in height, support numerous small (0-100 mm in diametre) to medium (100-250 mm) sized hollows and are of medium density. The understorey is a medium to high density layer of native and exotic shrubs, 3 metres in height. The ground cover consists of saplings, exotic grasses and forbs. Leaf litter and ground debris is common.

The woodland to the east of Gipps Road supports trees which are smaller. These trees are around 20 metres in height, again of medium density but support either small or no hollows. The understorey in these areas is either cleared or consists of a sparse density layer of exotic and native shrubs. These shrubs are approximately 1.5 metres in height. The ground cover consists of exotic and native grasses, weeds and forbs. This is a medium to sparse density layer. Leaf litter and ground debris are not as common, presumably due to maintenance of the area.

This habitat type is expected to provide foraging, sheltering, nesting and breeding resources for a variety of birds, reptiles and mammals. In relation to the mammals, these including a number of the microchiropterans.

Grasslands

The grasslands occur throughout the Lower Prospect Canal corridor and include areas of both native and exotic species. Where not maintained, the grassland layer is of medium to high density. Within the non-maintained sections of this habitat type isolated trees and shrubs, forbs and weeds are present. Within this community, trees vary in height and can be up to 25 metres. Saplings and exotic shrubs/weeds can be to 1 metre.

The grasslands provide sheltering resources for a range of reptiles, foraging resources for a variety of the birds and microchiropterans and nesting materials. Though consisting predominantly of exotic plant species, this habitat type is considered to provide an important array of resources necessary for the life cycle requirements of a number of native fauna species. Management of the Lower Prospect Canal area for native fauna species should therefore include the retention of "unkept" grassland areas.

Where not maintained, adjacent grasslands areas support a similar habitat structure. In these areas the density of the grassland and weed layers are greater.

Aquatic Environments

Excluding the Lower Prospect Canal itself, which at the time of report preparation was either dry or held a small amount of water, the only other water bodies are several small drainage lines. These drainage lines were either dry, or carried a small amount of water. Emergent aquatic vegetation is present at some locations along these drainage lines, though the main vegetation is exotic grasses and weeds. Riparian vegetation consists of casuarina and eucalypt saplings, 20 metres in height. The understorey is a medium to high density layer of exotic and native shrubs, 2 metres in height. The middle and ground cover layers are a high density of weeds, exotic shrubs and grasses and forbs. The tree cover along the length of the drainage lines is not continuous, and occurs mainly as isolated pockets.

Those water bodies observed did not appear to support any populations of exotic fish (*Gambusia* spp.). The lack of occurrence of this fish species suggests that habitat value of these drainage lines is relatively high and would be suitable for a number of frog and aquatic invertebrate species.

It is not certain if the drainage lines are fed by runoff from the surrounding areas, or had been supplemented water seeping out of the Lower Prospect Canal itself but considering the topography of the area, and the drainage works constructed upslope of the Canal to divert water below this structure, it is likely that the flow which feeds these drainage lines is from natural runoff.

Commercial Forests

This habitat type occurs on the slopes of the Prospect quarry (that is outside the study area) and is dominated by commercial pine species. These trees are approximately 15 metres in height and of medium to sparse density. The understorey is essentially cleared and the ground cover appears to be regularly maintained.

As with the open woodland community, this habitat type would provide nesting and foraging resources for a number of native species, including birds, reptiles and microchiropterans. Several of the bird species, mainly the parrots and cockatoos, are also likely to use the pine cones as an occasional food source.

Disturbed Areas

The disturbed areas include residential properties, school grounds, street scape plantings and industrial areas. Within these areas a range of horticultural and landscape plantings, streetscape areas and maintained lawns are present. Given the limited amount of extensive woodland in the region, these areas are expected to be utilised during foraging periods by a range of birds and microchiropterans, and these animals, along with a number of reptiles and frogs may also roost, shelter and breed in gardens and roof cavities.

Value of habitat types for native species

Due to the limited amount of natural foraging, roosting and breeding habitat in the Holroyd area, the more developed stands of fauna habitats present within the Lower Prospect Canal corridor are considered to be of local and regional conservation significance. These more developed stands are those which occur to the west of Bayfield Road. The association of the woodland communities, the adjacent grasslands and aquatic environments is considered to provide resources which are important to the life cycle needs of those birds, mammals, reptiles and frogs known or expected to occur. These resources include roosting, breeding and nesting sites, foraging areas and the provision of nesting materials. To maintain the current level of native biodiversity, observed or known to occur in the study area, it is recommended that this mix of habitat types be maintained. Given the existing "patchy" nature of the fauna habitats present, the location of passive recreation facilities or other compatible land uses is considered possible.

Field survey results

During the present study, 1 native mammal, 32 native birds, 3 reptiles and 2 frogs were recorded (Appendix 2). In regards to the detection of those species observed during the current survey; the Common Brushtail Possum (*Trichosurus vulpecula*) was indicated through the observation of distinctive scratchings on several of the smooth barked trees; all birds and reptiles were observed; the Common Eastern Froglet (*Crinia signifera*) was heard calling from several of the drainage lines and the Brown-striped Frog (*Limnodynastes peronii*) was hand captured. Of the animals recorded during the current survey, one, the Yellow-rumped Thornbill (*Acanthiza chrysorrhoa*), is of regional conservation significance. This species has been identified as being of regional significance because its population numbers have declined due to habitat removal, fragmentation and loss (NPWS 1997). This bird species inhabits open forests, woodlands and grasslands and favours "edge country", that is where woodlands and grasslands meet (Frith 1977). The Yellow-rumped Thornbill feeds on insects, spiders and seeds and nests in the outer foliage of a tree or large shrub (Frith 1977, Simpson and Day 1996). Feeding occurs in trees, shrubs or on the ground (Frith 1977).

Previous studies undertaken either within the Lower Prospect Canal area or in adjacent areas have identified an additional 1 native mammal, 105 native birds, 7 reptiles and 3 frogs (Appendix 2). Of these animals known for the region, 3 are listed under the Schedules to the *Threatened Species Conservation Act 1995* and 23 are considered to be of regional conservation significance as indicated in the National Parks 1997 report (Table 1).

Through reference to the National Parks and Wildlife Service's database, one invertebrate of conservation significance, the Large Land Snail (*Meridolum corneovirens*), was identified as having been found in the vicinity of the Lower Prospect Canal. This species is listed as Endangered under Schedule 1 of the *Threatened Species Conservation Act 1995*. *Meridolum corneovirens* is a small snail, approximately 22 millimetres in height, elliptical in shape and found in remnant pockets of bushland on the Cumberland Plain (Australian Museum pers.comm.). Unlike introduced snails, this snail has no patterning whatsoever and is pale to slightly yellow. The species is never seen above ground and is usually found buried in the loose soil under logs, bark, clumps of grass and sometimes stones (NSW Scientific Committee Final Determination publication, Australian Museum pers.comm.). This species is threatened through reductions in habitat and current development pressures (NSW Scientific Committee Final Determination publication).

Table 2 : Species of Conservation Significance Recorded Within Either the Study Area or Surrounding Region

Large Land Snail	*Meridolum corneovirens*	Schedule 1 *TSCACT 1995*
Regent Honeyeater	*Xanthomyza phrygia*	Schedule 1 *TSCACT 1995*
Swift Parrot	*Lathamus discolor*	Schedule 2 *TSCACT 1995*
Powerful Owl	*Ninox strenua*	Schedule 2 *TSCACT 1995*
Stubble Quail	*Coturnix pectoralis*	Regionally Significant
Brown Quail	*Coturnix ypsilophora*	Regionally Significant
Great Crested Grebe	*Podiceps cristatus*	Regionally Significant
Great Egret	*Ardea alba*	Regionally Significant
Nankeen Night Heron	*Nycticorax caledonicus*	Regionally Significant
Grey Goshawk	*Accipiter novaehollandiae*	Regionally Significant
Peregrine Falcon	*Falco peregrinus*	Regionally Significant
Peaceful Dove	*Geopelia striata*	Regionally Significant
Fork-tailed Swift	*Apus pacificus*	Regionally Significant
Azure Kingfisher	*Alcedo azurea*	Regionally Significant
Striated Pardalote	*Pardalotus striatus*	Regionally Significant
Buff-rumped Thornbill	*Acanthiza reguloides*	Regionally Significant
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	Regionally Significant
Fuscous Honeyeater	*Lichenostomus fuscus*	Regionally Significant
Jacky Winter	*Microeca fascinans*	Regionally Significant
Crested Shrike-tit	*Falcunculus frontatus*	Regionally Significant
Restless Flycatcher	*Myiagra inquieta*	Regionally Significant
Rufous Songlark	*Cincloramphus mathewsi*	Regionally Significant
Zebra Finch	*Taeniopygia guttata*	Regionally Significant
Plum-headed Finch	*Neochmia modesta*	Regionally Significant
Chestnut-breasted Mannikin	*Lonchura castaneothorax*	Regionally Significant
Lace Monitor *	*Varanus varius*	Regionally Significant
Common Scaly-foot	*Pygopus lepidopodus*	Regionally Significant
Red-naped Snake	*Furina diadema*	Regionally Significant

* - this species is considered by Lesryk Environmental Services to be extinct in the study region. The last documented record for this animal was in December 1992 (NPWS 1998) and it is expected that such a large and visible reptile would be regularly observed if it was still in the area.

Other threatened species potentially occurring in the region

The Lower Prospect Canal area occurs within the known home ranges of a number of microchiropterans (Parnaby 1992, Strahan 1995). Of these animals a number are of conservation concern as identified under Schedule 2 of the *Threatened Species Conservation Act 1995*. If present, those threatened microchiropterans likely to occur would either shelter or roost in the small to medium sized tree hollows, or under loose bark, and most would forage along the woodland edges, over the grasslands, along the drainage lines and/or through/over the woodland canopy. Without more detailed night work the exact species of microchiropteran present within the Canal corridor cannot be determined, but it can be assumed that they would constitute one or more of the threatened woodland dependant, or woodland utilising species (Table 2).

Table 2 : Threatened Microchiropterans Potentially Occurring Within The Boundaries Of The Lower Prospect Canal Corridor

Large-eared Pied Bat	*Chalinolobus dwyeri*
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*
Common Bentwing-bat	*Miniopterus schreibersii*
Eastern Freetail Bat	*Mormopterus norfolkensis*
Large Footed Myotis	*Myotis adversus*
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*
Greater Broad-nosed Bat	*Scoteanax rueppellii*

2.5 GEOLOGY & LANDFORM

Geology and Soils

David Thomas, in his Vegetation Survey of the Lower Prospect Canal 1993, describes the geology of the canal corridor as "the Liverpool subgroup of Wianamatta shale". Soils formed from this parent material are generally red or yellow podsolics. Small areas of fine lateritic stones occur in some locations in the corridor. At its western end, the canal passes along the eastern to southern foot of Prospect Hill, a doleritic lacolith. .

It can be expected that the original soils of the corridor lands have been significantly altered through cut and fill earthworks to establish the landform of the canal structure. Material would have been moved along the canal construction site changing the character of site topsoil through these earthworks activities and subsequent landuses and maintenance regimes

Landform

At the western end the Lower Prospect Canal follows the edge of the natural ridgeline between the Parramatta & Georges River catchment areas. Toward the eastern end the Lower Prospect Canal sits within an embankment, forming an artificial ridgeline falling toward adjoining development north and south of the corridor.

The corridor maintains a relative level in the vicinity of 54m AHD along the Lower Prospect Canal corridor. In contrast Prospect Creek falls from approximately 30m AHD at the western boundary of the Local Government Area (LGA) to 6m AHD in the south east of the Local Government Area. Prospect Hill overlooking the Lower Prospect Canal corridor to the north west has a maximum level of 218m AHD.

The earthworks profiles created in construction of the Lower Prospect Canal vary along it's length. West of the Cumberland Highway the profiles are generally moderate with the Lower Prospect Canal structure cut into the existing topography (with the exception of the Greystanes (Boothtown) Aqueduct connection. To the east where the Lower Prospect Canal corridor is narrower and slightly lower in elevation, the canal is constructed in a steeply sided artificial ridge landform. These slopes restrict access to the Lower Prospect Canal structure and also pose ongoing erosion and maintenance problems.

2.6 TRAFFIC & ACCESS

Vehicular Traffic

Major traffic and access aspects of the Lower Prospect Canal corridor are summarised on Figure 2.6. Access to the Lower Prospect Canal corridor at present is only by authorised vehicles. An unsealed maintenance track runs along the south side of the canal with locked gates at all major road crossings.

Two regional roads cross the site:

- Gipps Road (RTA)
- Cumberland Highway (RTA)

Three local roads also cross the site:

- Bayfield Road (Holroyd City Council)
- Sherwood Road (Holroyd City Council)
- Albert Street (Holroyd City Council)

Off street parking is currently provided at Nemesia Street Park and Greystanes Sports Ground.

Pedestrian Access

Currently there is no authorised pedestrian access onto the site. School children currently cross the Lower Prospect Canal using the steel hoop ladders in areas where bridge connections are not available linking to residential areas such as south of Holroyd High School.

By responding to these desire lines used by residents and school students with any opening of the site to public access, a number of permanent links across the site can potentially be developed.

Cycle Access and Linkages

The currently proposed network of existing and potential cycleways within Holroyd Local Government Area are identified in the Holroyd Cycle Route Study. Figure 2.7 identifies the potential role of the Lower Prospect Canal within the regional cycle networks of the Sydney Region. The Lower Prospect Canal can provide a pivotal connection within a network of existing, proposed and potential cycle links through Local Government Area's across Sydney. This can ultimately provide a cycle link east west from Botany Bay to the Blue Mountains, and connect the Lower Prospect Canal to Homebush Bay and further north to the Great North Walk.

The Lower Prospect Canal corridor also potentially provides a link to the south through the Western Sydney Regional Park to Bulli and Wollongong along the Upper Prospect Canal, and to the north to Blacktown along the Eastern Creek Open Space Corridor.

Such linkages have been identified in previous reports including the Sydney Olympic Bicycle Plan - Bay to Mountains Cycleway (Ove Arup - March 1998) prepared for Green Games Watch 2000, and the Eastern Creek Cycleway Study (Ian Jackson - June 1996) prepared for the Eastern Creek Bicycle Track Working Group. The Bay to Mountains Report identifies two potential routes between Homebush Bay (and Botany Bay via existing Cooks River Cycleway) and the Blue Mountains. These are described as the blue route which takes a more indirect alignment through Bankstown and Auburn, and the Green Route which uses prediminantly the Sydney Water Pipeline system. The Lower Prospect Canal lands provide the opportuntiy to take the green route off the pipeline for the seven kilometres between the Guildford Pipehead and the Prospect Reservoir

The particular heritage and urban bushland qualities of the Lower Prospect Canal will provide recreational experiences unique amongst such a Sydney wide cycle way system.

Connections to Prospect Reservoir, Prospect Creek and Sydney Water Pipeline would also provide a local loop cycle route with connections to neighbouring residential and open space areas.

Public Transport

Figure 2.8 indicates the major aspects of public transport facilities with potential significance for the Lower Prospect Canal corridor.

The main southern railway line runs to the east of the site with Railway Stations at Merrylands, Guildford and Yennora.

Three bus companies currently operate in the area. Westbus operates a Liverpool to Blacktown Bus route crossing the Lower Prospect Canal along the Cumberland Highway. Hopkinsons bus company provides bus routes in the local suburbs crossing the Lower Prospect Canal corridor at Sherwood Road and Albert Street. Baxters Holroyd Bus Company operates routes in the local district, provides services to roads adjacent to the Lower Prospect Canal - namely Macquarie Road, Bayfield Road and Bristol Street.

Up until the release of the Liverpool - Parramatta Transitway Overview Report by the Department of Transport in late 1998, a public transport easement for either light rail or dedicated bus use was dedicated within the Canal corridor between the Cumberland Highway and Duffy Street as part of State Regional Environmental Plan (SREP) 18. Based on the findings of the Liverpool - Parramatta Transitway study the NSW Government determined that the Sydney Water Prospect Pipeline corridor and existing road corridors would be used in preference to the Lower Prospect Canal for the transitway route. The Transitway route will cross the canal corridor in the location of the existing Woodpark Road / Sherwood Road bridge.

This decision by the State Government averts a range of implications for the canal corridor and adjoining areas between the Cumberland Highway (Betts Road) and Duffy Street. These include:

- Potential visual and noise impacts on Sherwood Grange Public School and adjoining Pre School Kindergarten.
- Extent of earthworks and tree removal required to execute connection to Duffy Street.
- Conflicts with open space qualities due to intrusion on corridor lands, and necessity to control public access around transport link
- Severing of the open space and visual link between Sherwood Grange Public School and Lower Prospect Canal corridor.

To the west of the Plan of Management study area another potential transport route exists (known as the Prospect Arterial) that links Fairfield with the M4 Motorway. This route would run along the eastern side of Prospect Reservoir and cross existing pipe lines, in addition to the beginning of the Lower Prospect Canal. If such a link was proposed to be pursued for road, light rail, or dedicated bus routes there are potential impacts on both the environmental, visual, and heritage qualities of the open space areas adjoining the Prospect Reservoir wall and the head of the Lower Prospect Canal, that would need to be carefully considered.

Figure 2.6
Traffic & Access

LEGEND

VEHICULAR ACCESS

REGIONAL ROAD

PEDESTRIAN ACCESS

EXISTING PEDESTRIAN ROUTES AND POTENTIAL PEDESTRIAN LINKS

DESIRABLE PEDESTRIAN LINKS (REQUIRING ACQUISTION OR EASEMENT

Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:
Metropolitan Regional Parks Unit
National Parks & Wildlife Service

Prepared By:

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Phone (02) 9776 1000 Fax (02) 9818 5292
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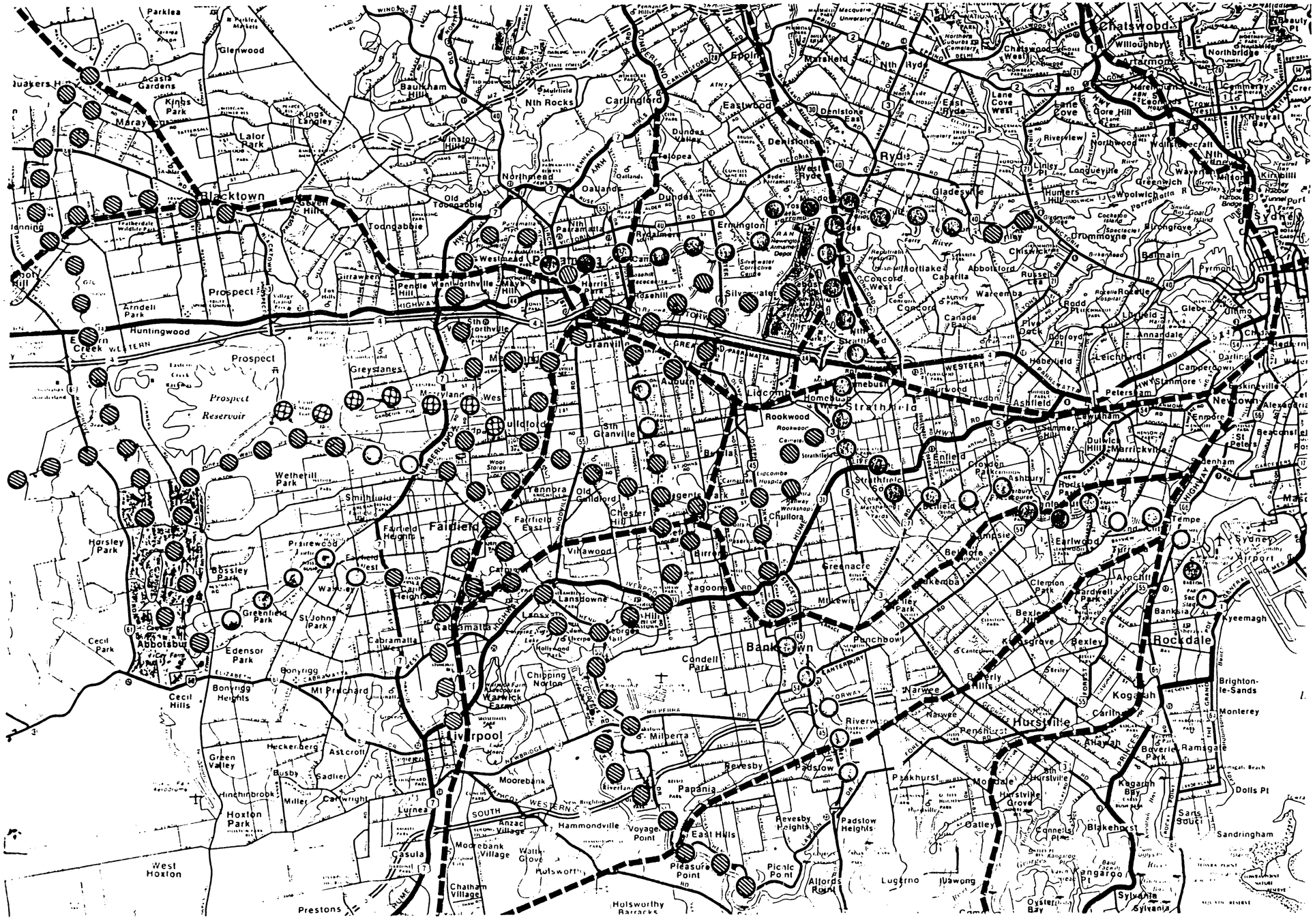

Figure 2.7

REGIONAL CYCLE NETWORK

LEGEND

- Existing Cycle Paths
- Proposed Cycle Paths
- Prospect Canal Corridor
- Rail Corridor

Lower Prospect Canal

Prepared For:
Metropolitan Regional Parks Unit
NPWS

Masterplan and Plan of Management

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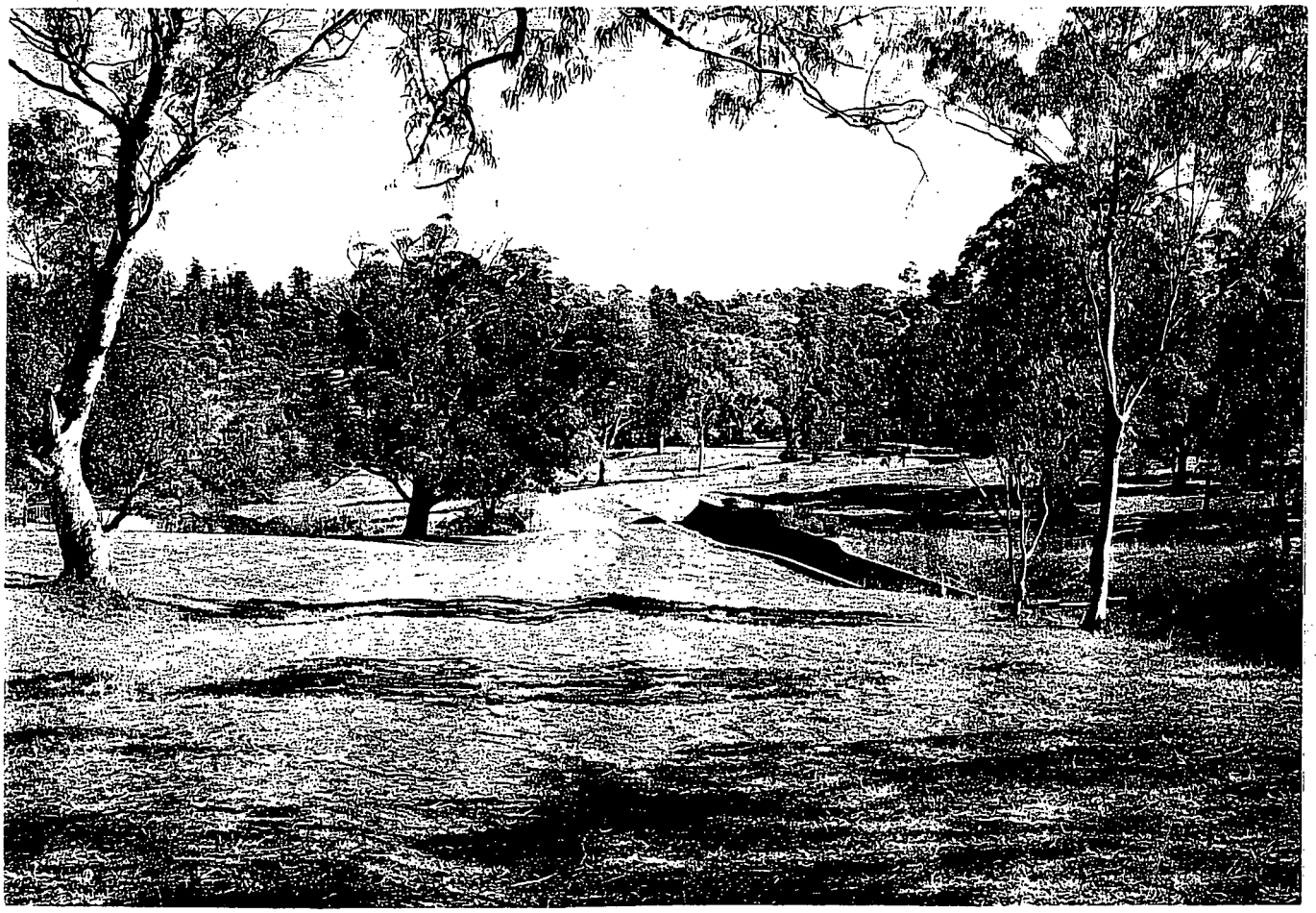
Figure 2.8
Public Transport



Above:
View south from Gipps Road towards Prospect Hill

Above:
View south west across Lower Prospect Canal towards pine plantation

2.7 LAND USE & ZONING

The entire Lower Prospect Canal corridor is currently zoned as Special Uses "A": Water Supply under the Holroyd City Council Local Environmental Plan 1991.

Under title to the NSW Treasury at this stage the Lower Prospect Canal corridor has been identified by Government as a potential open space corridor. This Plan of Management is aimed at defining strategies for the corridors future use and management. Potential uses include those previously identified by a range of studies such as the Higginbotham Heritage Study of 1992, and the Canal Reserve Action Group Inc. Management Plan (1996):

- passive open space
- pedestrian/cycle link
- flora and fauna conservation corridor
- heritage education facility and interpretative site
- plant museum/nursery
- picnic area
- service corridor
- recycled water supply to local industry

2.8 VISUAL & LANDSCAPE CHARACTER

Landscape character is a function of a variety of elements including heritage value, vegetation, context visual links, and general visual quality. It is the combination of these elements that provides the site with its unique open space values and recreation potential.

Given the linear nature of the corridor, and the range of landscape settings and adjoining contexts that the corridor passes through, the visual and landscape character of the Lower Prospect Canal can be best described as a series of units. These units are identified on Figure 2.10.

Unit 1 Western Boundary of Study Area to Gipps Road (refer photographs previous page)
This unit is typified by a generally south to south easterly aspect, with strong enclosure by Prospect Hill and the pine plantation to it's slopes to the north (refer photographs previous page). On the southern side of the Lower Prospect Canal the topography slopes gently away to the south with open grassed areas and scattered native tree canopy allowing views out over the industrial and residential areas of Holroyd and Fairfield. The adjoining reserve areas of Hyland Road Open space area, Gipps Road Park, and Prospect Creek provide an expansive character of open space, not experienced at most other points of the Lower Prospect Canal corridor, where the edges or boundaries of the corridor are visually obvious.

Unit 2 Gipps Road to Greystanes (Boothtown) Aqueduct (refer photographs following page)
This unit is typically 90 metres in width dissected by the Lower Prospect Canal structure running along an artificial ridge falling to the south - south west on the southern side of the canal. The rear of residential properties to Bolaro Avenue forms the northern boundary while Macquarie Road forms the southern. The extent of native tree canopy is almost continuous along the north side of the Lower Prospect Canal, and more scattered to the south. This canopy affords shade and shelter to the corridor. Edges to residential boundaries to the north, and to Macquarie Road (to the south), are visible from the Lower Prospect Canal alignment, however these views are dappled and discontinuous due to the extent of tree canopy and understorey vegetation. No long views from the corridor are available through this unit.

Unit 3 Greystanes (Boothtown) Aqueduct
The Greystanes (Boothtown) Aqueduct structure along with the related syphon buildings are two of the principal heritage components of the Lower Prospect Canal corridor and are located within a north-south valley setting. 40 metres to the north one block of housing separates the corridor from Greystanes Sports Ground. To the south the landform falls steeply towards a weed impacted remnant creekline that drains under Macquarie Road. In this area the corridor extends to 120 metres from the aqueduct and exhibits quality regeneration of Grey Box and Forest Red Gum providing an open woodland canopy, and largely screening the aqueduct to views from Macquarie Road.

As for unit 2, no major views out of the corridor are provided other than foreground views across adjoining residential and playing fields to the north east of the aqueduct. The Greystanes (Boothtown) Aqueduct is also visible from Merrylands Road looking into the site providing a pleasant and unexpected point of interest in an otherwise typical residential setting.

Figure 2.9
Adjoining Landuses

LEGEND

- CANAL SITE
- PUBLIC RESERVE
- RESIDENTIAL
- INDUSTRIAL
- SCHOOLS & COMMUNITY FACILITIES
- EXTRACTIVE INDUSTRIES

NOTE: ZONING AREAS DERIVED FROM HOLROYD CITY COUNCIL LOCAL AND ENVIRONMENTAL PLAN 1991

Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:
Metropolitan Regional Parks Unit
National Parks & Wildlife Service

Prepared By:

Environmental Partnership Pty Ltd

Figure 2.10

Landscape Character Units

LEGEND

- EXISTING MAJOR TREE CANOPY
- 1 UNIT 1 WEST BOUNDARY TO GIPPS ROAD
- 2 GIPPS ROAD TO BOOTHTOWN AQUEDUCT
- 3 BOOTHTOWN AQUEDUCT
- 4 BOOTHTOWN AQUEDUCT TO BAYFIELD ROAD
- 5 BAYFIELD ROAD TO CANAL ROAD
- 6 CANAL ROAD RESERVE TO CUMBERLAND HWY
- 7 CUMBERLAND HWY TO EASTERN EDGE OF HOLROYD P.S.
- 8 EASTERN EDGE OF HOLROYD P.S. TO SHERWOOD ROAD
- 9 SHERWOOD ROAD TO ALBERT STREET

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Above:
Tree canopy with native grass understorey providing effective dappled buffer to residences

Above:
View to south west of edge of Lower Prospect Canal lands adjoining Macquarie Road near existing dry detention basins

Unit 4 Greystanes (Boothtown) Aqueduct to Bayfield Road
East of the Greystanes (Boothtown) Aqueduct structure the Lower Prospect Canal corridor responds to the undulating topography by winding along the RL 54m contour where possible and incorporating filled embankments where required. This unit is typically 100 metres in width and is again bounded by residential boundaries to the north and Macquarie Road to the south. A semi continuous canopy of Grey Box and Forest Red Gum line the Lower Prospect Canal providing shade, shelter and a dappled buffer to adjoining housing. Landform either side of the Lower Prospect Canal is undulating and generally falls to the south. A small open space area adjoins the corridor at Hopman Street providing potential for a linkage to the residential areas to the north. Holroyd City Council has constructed a series of three dry detention basins at this point to assist in stormwater management. The basins are open grassed areas currently with recent undeveloped tree planting.

The Lower Prospect Canal corridor is enclosed by topography and tree canopy through this unit. The evenly curved alignment of the canal structure provides a pleasing and interesting visual element.

Unit 5 Bayfield Road to Canal Road Reserve
On it's northern edge unit 5 adjoins both residential boundaries in addition to a road frontage (Cumberland Road). The unit is widest at the junction with Bayfield Road (90 metres) narrowing to 60 metres opposite Holroyd High School. The zone between the Lower Prospect Canal and Cumberland Road is relatively flat and linear, while the zone on the southern side of the canal slopes steeply down to the back of private residences. The canal alignment being 3-4 metres above the boundary overlooks rear yards in some areas. Tree canopy of Grey Box and Forest Red Gum is scattered only, allowing visual exposure of residential backyards. In the east of the unit towards Canal Road Reserve the steeper slopes away to the south enable views out over factory roofs to the Smithfield industrial area. West of Canal Road Reserve on the southern side of the Lower Prospect Canal the significant Smithfield Tanks (backfilled with sand) are overgrown with grass but offer potential for enhancement as heritage elements.

Unit 6 Canal Road Reserve to Cumberland Highway (Cumberland Highway) (refer photograph following page)
Canal Road Reserve is the largest existing park area adjoining the corridor. Currently separated from the corridor by the Sydney Water security fencing, a gate enables access which appears to be intermittently locked. The park at 60 metres AHD is the highest accessible point from the corridor affording panoramic views out over Holroyd and Fairfield Local Government Area's. Canal Reserve Park itself has only immature native tree plantings providing a somewhat sparse character over much of it's area. The park adjoins Canal Road.

To the east of Canal Road Reserve the corridor slopes away to the south at approximately 1:6 grade. This section of the corridor is devoid of tree canopy in contrast to all other sections. As a consequence the elevated relief provides views away to the south, although the character of the landscape is dry exposed and visually uninteresting. Residential boundaries to the north and industrial to the south form stark, hard edges to the corridor. This character is only broken by the effect of mature native tree canopy adjoining the Cumberland Highway.

Unit 7 Cumberland Highway (Cumberland Highway) to east edge of Sherwood Grange Public School
(refer photograph following pages)
The area of the corridor directly to the east of the Cumberland Highway provide an average 120 metres width of open space that is generally level to undulating on the larger northern side, and slopes away from the Lower Prospect Canal structure to residential boundaries on the south side. The northern space adjoins Holroyd High School with the associated pre-school kindergarten. This space is approximately 60 metres across to the channel edge and provides great potential for open space usage in conjunction with the school grounds - consolidating the open space and tree canopy qualities of this area. Tree canopy through this zone is concentrated on the school boundary and along the southern edge of the Lower Prospect Canal, and is dominated by Forest Red Gum and Broad Leafed Ironbark.

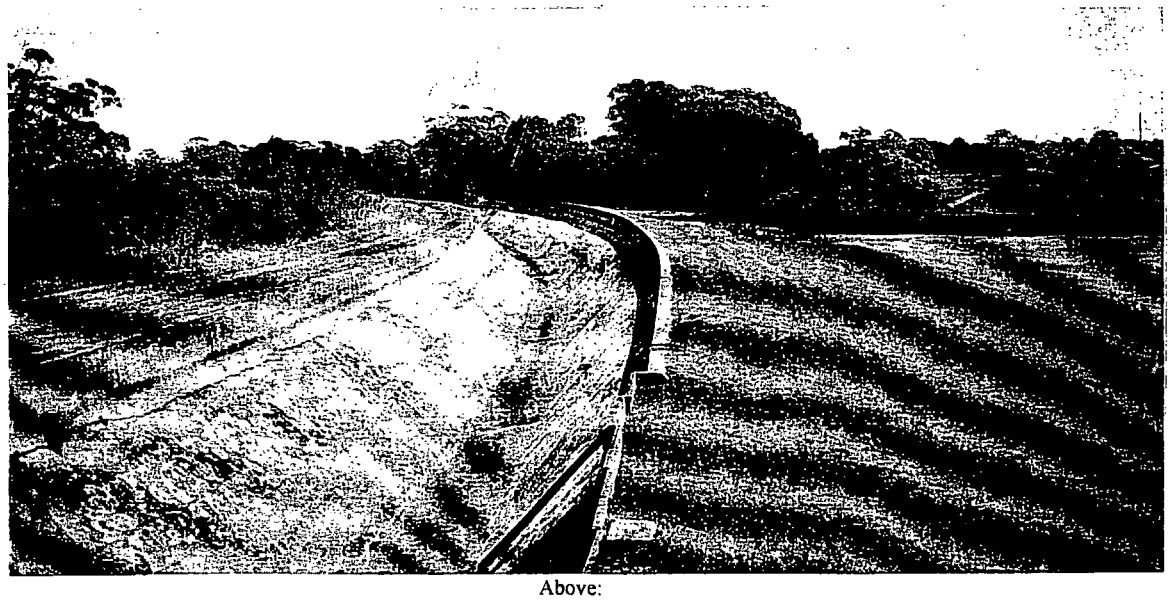
Unit 8 East edge of Sherwood Grange Public School to Sherwood Road (refer photographs following pages)
East of Sherwood Grange Public School the Lower Prospect Canal corridor narrows to 70 metres overall width and is typified by a steeply banked artificial ridge that executes the gully between Cumberland Highway and Sherwood Road (note: lowest point at Duffy Street). This ridgeline visually separates the two sides of the corridor, and due to the gradient of the banks is relatively inaccessible. The banks are typified by mixed groundcovers and grasses and sections of erosion. At the top of the Lower Prospect Canal, views away to the south and north are possible. A narrow band of native tree canopy is present at the base of the canal bank on the north side while on the south side the canopy is more scattered and random.

Above:
View to south west of edge of Lower Prospect Canal lands adjoining Smithfield industrial area

Above:
View to south east of edge of Lower Prospect Canal lands adjoining Smithfield industrial area - Canal Road Reserve adjoins to the left of view

Above:
View south west from western end of unit 7 (adjacent Cumberland Highway) - note quality regeneration and dappled buffer to residences

Above:
View south west from western end of unit 8- note steep banks to Lower Prospect Canal alignment and exposed residential edge



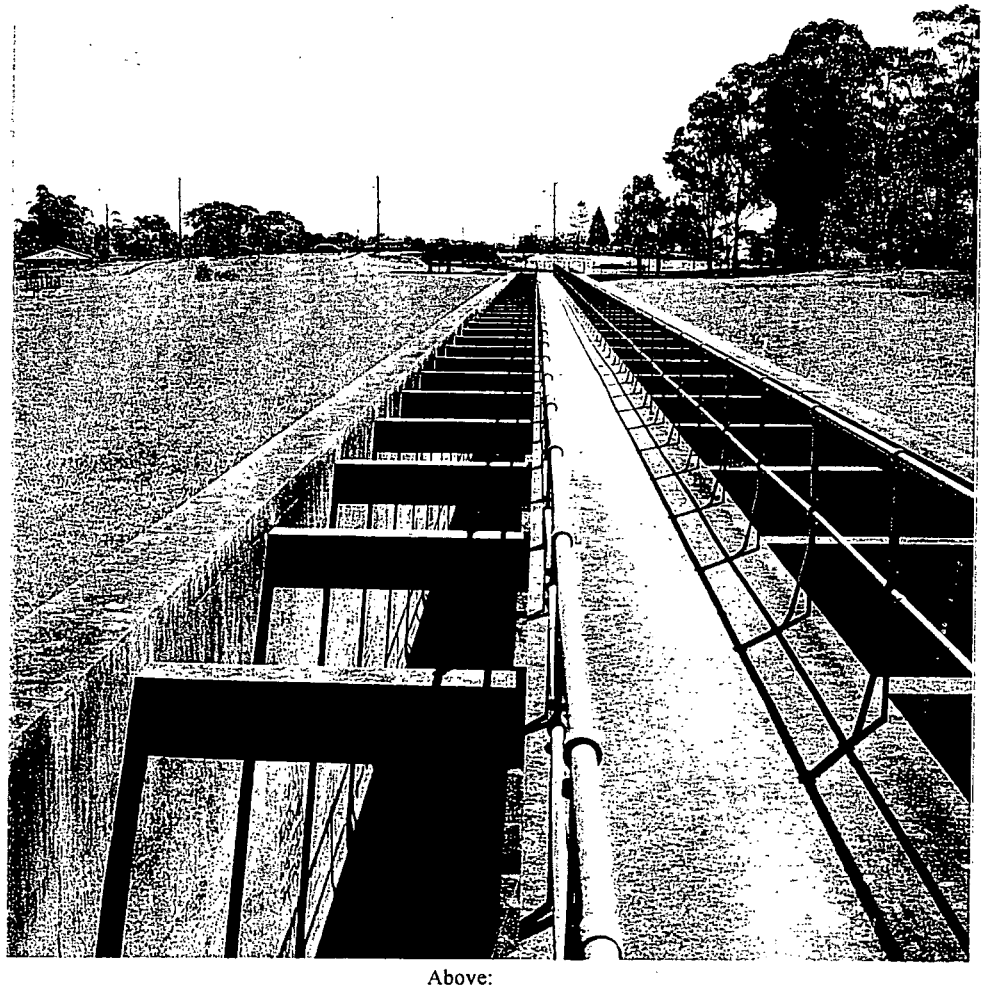
Above:
View to north east of edge of Lower Prospect Canal lands (adjacent Sherwood Road)

Unit 9 Sherwood Road to Albert Street (Guildford Pipehead) (refer photographs - following page)
Unit 9 ranges between 80 and 60 metres in width and adjoins Merrylands High School at Sherwood Road. From the Lower Prospect Canal structure the land again falls away to the south although no major panoramic views are available. Tree canopy on the northern side of the Lower Prospect Canal occurs in large groups one adjacent the school and the other adjacent residences in the centre north of the unit. The southern edge of the unit is formed by Tennyson Street and is predominantly bare of tree canopy. Unit 9 is low in landscape and visual quality relative to the other units. It's major character element is the sedimentation basin of the Lower Prospect Canal - another opportunity for heritage interpretation and generation.

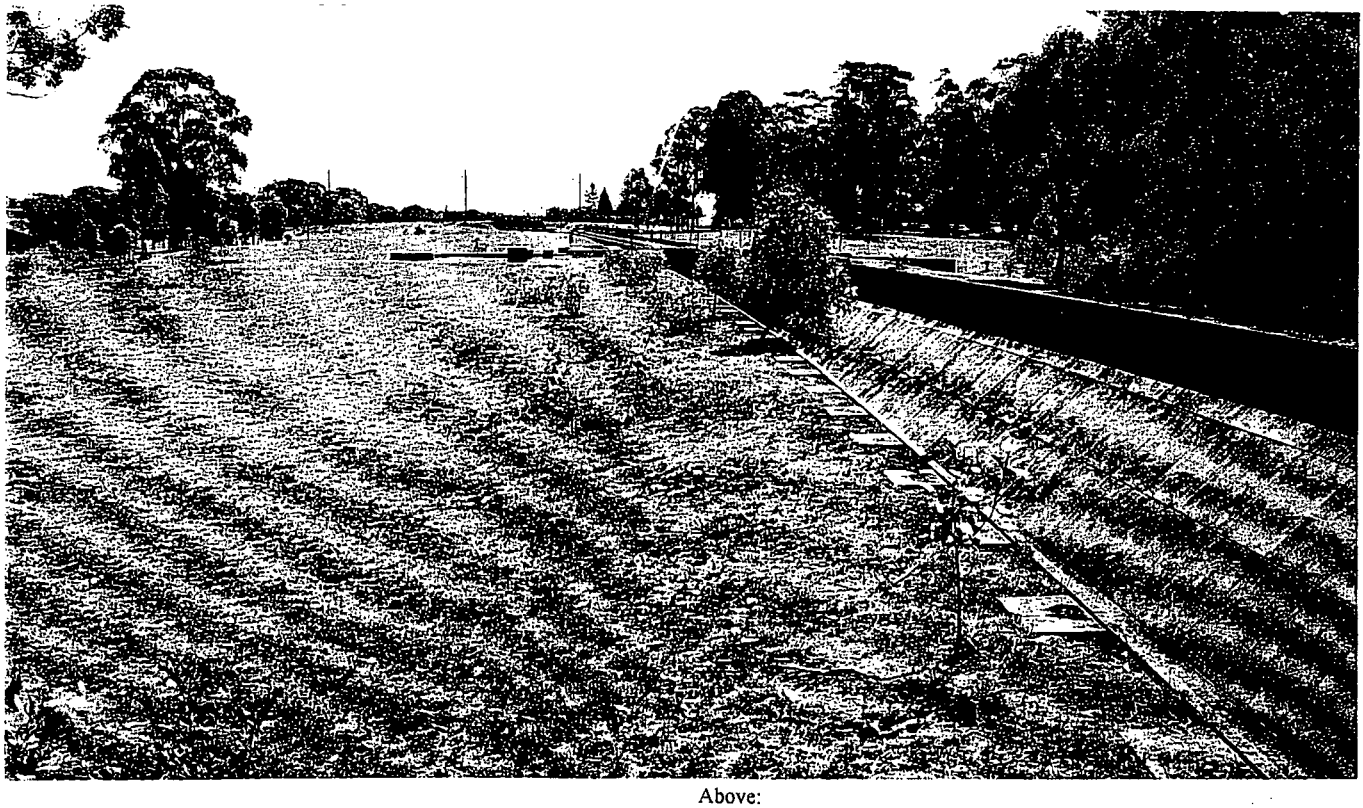
Generally
The key aspect of the landscape character of the site is the remnant Cumberland forest that occurs in the western half of the Lower Prospect Canal corridor. Regeneration of the vegetation is extensive amongst the older species and creates a woodland landscape with naturalistic qualities. These areas provide a contrast to the urban parks situated within the neighbouring residential areas.

The unique cultural heritage of the site is the second major determinant of the corridor's landscape character. The dramatic qualities of the Greystanes (Boothtown) Aqueduct and Syphon towers, and the Lower Prospect Canal structure itself are reminders of twentieth century engineering techniques and skill. A significant factor identified in the Higginbotham Heritage study relates to the importance of visitors being able to interpret the function and character of the Lower Prospect Canal in it's operational condition. As such the empty Lower Prospect Canal makes this challenging. Photographs that show the Lower Prospect Canal with water flow (as late as 1994) indicate that the presence of the water (as in any landscape) adds to the visual and environmental experience of the scene. Possibilities to recreate this context even on a small scale should be explored.

Complementing the cultural heritage, the physical context of the site as an open space, and east west access corridor are also recognised as special qualities to be conserved.



Above:
View to west of Sedimentation Channel



Above:
View to west of Lower Prospect Canal corridor between Sherwood Road and Albert Street

2.9 ENGINEERING REVIEW

An overview of issues pertaining to hydrology of the study area, and the structural condition of the Lower Prospect Canal and related built elements has been undertaken by Ove Arup and Partners for this plan of management. The following provides a summary of the major issues raised in the review. The Plan of Management Volume 2 - Background Information, incorporates the report in full. Also provided is a summary of the key issues identified in Australian Water Technologies Feasibility Study into filling of the Lower Prospect Canal, along with a brief review of the canal lands potential for use as a services and infrastructure corridor.

2.9.1 Drainage & Hydraulic Engineering Issues

The Lower Prospect Canal corridor runs along the southern side of the main east west running ridgeline which separates the catchment draining north to the Parramatta River, and to the south to the Georges River through Prospect Creek. As such the corridor crosses several small valleys in which filling works have modified the local landform to create a secondary ridge. In these locations stormwater drainage has been piped under the Lower Prospect Canal to connect with drainage systems on the southern side - refer Figure 2.10. The only creekline to cross the Lower Prospect Canal corridor is Munro Creek west of Gipps Road. The creek system that passes under the Greystanes (Boothtown) Aqueduct has been developed north and south of the Lower Prospect Canal corridor, with stormwater managed through underground pipe systems.

A dry detention basin system has been constructed by Holroyd City Council in 1994 on the drainage line crossing the corridor adjacent Hopman Street Reserve and Macquarie Road. A series of three ponds linked by pipe connections provides stormwater detention for the 1:100 year storm event.

Holroyd City Council has not identified any areas of specific concern with regard to flooding, other than the high volumes of surface runoff that enter properties on the south side of the Lower Prospect Canal on Daffodil Street and Gardenia Parade west of Canal Road Reserve due to the steep slopes that adjoin them. Holroyd City Council noted that the existing piped system functions adequately up to the 1 in 5 year storm, and that it would support any opportunities for the incorporation of wet or dry detention basins into the Lower Prospect Canal corridor in appropriate locations.

From a review of Holroyd City Councils drainage system as outlined on Figure 2.11 and discussions with Holroyd City Council, it would appear that no significant problems occur with drainage that affect residential properties other than at Daffodil Street and Gardenia Parade. The stormwater line A270 which crosses the corridor under the Greystanes (Boothtown) Aqueduct shows the greatest potential for problems due to the size of it's catchment to the north of the Lower Prospect Canal.

From a preliminary review of the existing drainage infrastructure and natural drainage patterns it would appear that although space available within the corridor restricts potential detention basin construction several opportunities are available. Such detention basins may be feasible to provide peak flow detention, treatment of water quality, increased habitat values, and landscape enhancement:

Potential for Water Quality Control / Retardation Ponds

- *Munro Creek west of Gipps Road*
  The natural creekline which drains through the Hyland Road Reserve offers potential for a basin most effectively located on the southern side of the Lower Prospect Canal partly within the Hyland Road site. The Canal Reserve Action Group Inc. report noted that the dewatering of the Lower Prospect Canal may have affected the streams ecology if it had been fed by leakage from the canal. The significance of leakage to the creek is difficult to confirm without excavation and inspection given the fact that overland drainage is piped under the Lower Prospect Canal from the north.

  As such the potential of a pond in this area would be contingent on the potential impact on Munro Creek and the capacity to maintain an environmental flow to maintain water levels and provide natural turnover

- *The Creekline passing under the Greystanes (Boothtown) Aqueduct.*
  As identified the drainage line A270 under the Greystanes (Boothtown) Aqueduct drains a relatively large developed catchment. The Lower Prospect Canal corridor at this location opens out to provide a wider expanse of open space in which it may be feasible to locate a wet water quality control pond. Given the heritage vales of this zone any pond should be designed to compliment the landscape, heritage, and environmental qualities of this location. Potential impacts on the habitat qualities of the creek system and mature vegetation would also need to be reviewed. Ove Arup indicate that a pond could be located on the northern side of the Aqueduct. As such implications for adjoining residential properties (eg. safety, mosquitoes) would need to be assessed.

Potential sources of environmental (natural) flow to waterbodies

Intermittent sources of stormwater drainage will be unsuitable unless permanent water bodies are able to be established. Dry ponds collect rubbish and are difficult to maintain unless they cater for major storm events only (such as 1 in 50 / 1 in 100 year storm). The existing dry ponds at Macquarie Road have grass cover but are not overly attractive or useable features within a recreational landscape. Potential for additional tree planting should be explored in these areas.

If a permanent water body is to be established a dam type system should be provided which maintains low flow to any downstream water courses. Top up water should be provided from a screened flow from urban runoff or a dedicated line from Prospect Reservoir. The key issue is to keep the retained (potentially stagnant) water "alive" through circulation.

Holroyd City Council has identified that the Cumberland Golf Club is investigating sewer mining on it's site as a potential source of irrigation water. This could potentially provide another source of water if quality was acceptable.

2.9.2 Structural Issues

The Structural Review involving site inspection by Ove Arup Structural Division was undertaken in March 1998. The aim of the review was to identify structural issues that should be taken into account in development of planning and management strategies, or that require further investigation. A summary of the review follows:

Existing Lower Prospect Canal Structure

The Lower Prospect Canal structure has undergone severe degradation since it's dewatering:

- significant levels of corrosion are evident along the length of the Lower Prospect Canal in concrete reinforcement
- many tile fixings have failed and tiles are in many cases out of position, having slipped, being bowed or cracked (refer photograph next page)
- reinforcement bars and external ties between adjacent panels, have undergone severe corrosion and would appear to be liable to failure in the future.

The tiles have undergone severe abrasion by the flowing water that has resulted in an exposed aggregate face to the concrete panels, and reduced cover to the steel ties.

In some areas of the Lower Prospect Canal the in-situ concrete lining has severe predominantly horizontal cracking as shown on the photograph next page, north of the Cumberland Highway. Differential movement has occurred along the sides of the cracks opening these cracks creating an unstable environment.

The current Lower Prospect Canal lining is quite unstable in many locations and if left in its current state will lead to collapse. It is recommended that it not be used for public access until remedial measures take place. Possible remedial measures depend on the future use of the Lower Prospect Canal. If the Lower Prospect Canal is to be opened to public access for example as an open feature, it is recommended that the existing lining be removed and replaced.

It is evident that where the Lower Prospect Canal is cut into the topography with adjoining landsurface sloping towards the canal, that there is potential for subsurface buildup of water. This is not a problem if the Lower Prospect Canal is proposed to be filled however any sections that remain unfilled would require surface and subsoil drainage to the canal edge. This would reduce subsoil pressures on the canal walls. Removal of the top metre of the canal sides would also reduce pressures on the canal structure.

Aqueduct

A cracking pattern is also evident in each arch of the aqueduct. The cracking beings at the first joint in the sandstone block headstock in from each side. The cracks extend for a distance of between 300mm to 2500mm up into the arch structure, not only in the mortar but also through brick coursing. This cracking does not impair the arching action but would impair the transverse stiffness of the Greystanes (Boothtown) Aqueduct. Generally this issue is not considered to be of serious concern if remedial measures are taken. Remedial measures would include:

- the repair of the cracks - to limit water ingress in to the cracks that is likely to increase the crack widths;
- the possible installation of tie-rods around the arch to provide transverse stiffness to the structure, closing the existing cracks and reducing the impact of the cracks on the long term serviceability of the Greystanes (Boothtown) Aqueduct;
- a program of on-going inspection and maintenance

Figure 2.11

DRAINAGE /HYDROLOGY

LEGEND

OPEN WATER COURSES

PIPED DRAINAGE RELATED TO IDENTIFIED PITS WITHIN CANAL CORRIDOR

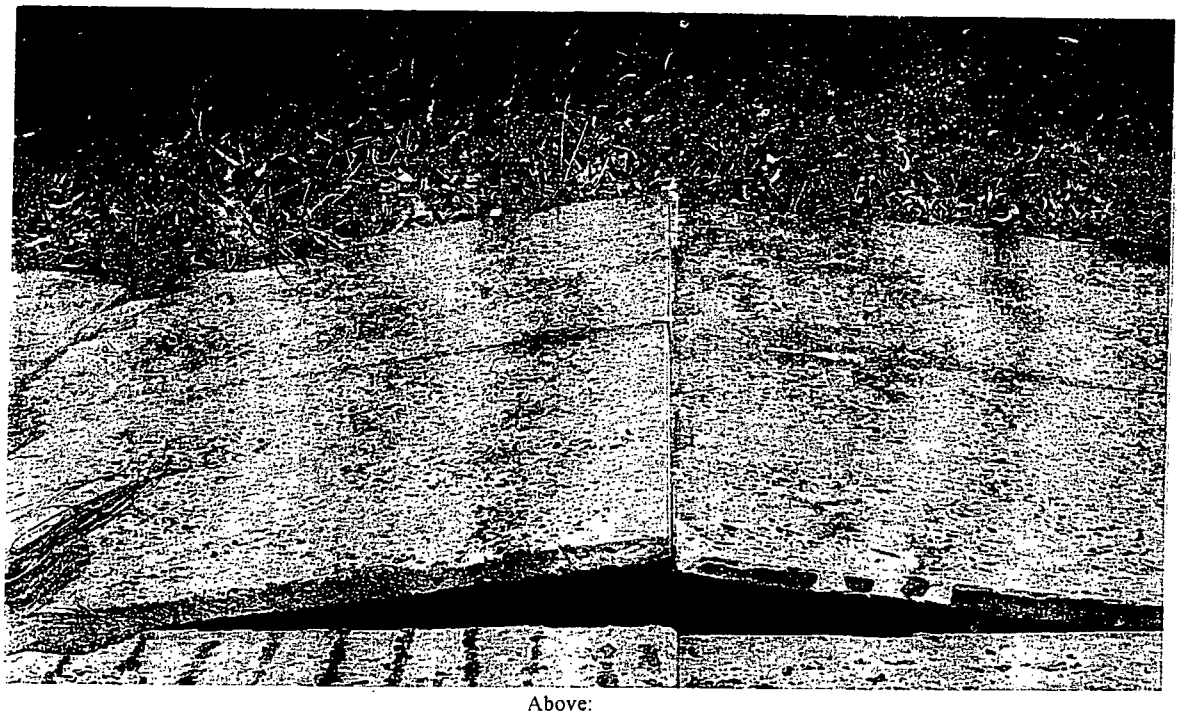
Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:
Metropolitan Regional Parks Unit
National Parks & Wildlife Service

Prepared By

Environmental Partnership Pty Ltd



Above:
Monier Concrete tiles having lifted under heaving of Lower Prospect Canal walls since dewatering of the canal

Above:
Longitudinal cracks in in-situ concrete walls north of Cumberland Highway

The tie-rods currently supporting the Greystanes (Boothtown) Aqueduct walls appear to have corroded considerably and will be required to be replaced. A new support structure could be constructed in the base of the aqueduct, to provide support to the Lower Prospect Canal walls. This support structure could also form the basis of the support frame for a false floor that could possibly be used as a pedestrian or bike path.

Sedimentation Channel (between Albert St and Sherwood Road, Greystanes)
This structure includes footbridges both across and along the length of the structure. The footbridge along the length of the Lower Prospect Canal is supported at regular intervals by beams that span the width of the canal.

The footbridge is a continuous slab over many spans. Cracking has occurred over the top of the majority of the beams as a result of negative (hogging) bending. The reinforcement of this section is unknown. The support beams appear to be UB steel sections encased in concrete.

Significant cracking has occurred to many of these beams:
- longitudinal cracking on the top face at the centre;
- sagging moment bending causing cracking to the underside of the beams which has resulted in the concrete spalling off the surface exposing the bottom flange of the UB section. The bottom flange where exposed is highly corroded.
- diagonal shear cracks are evident near the supports of many beams.

2.9.3 Potential filling of the Lower Prospect Canal

In December 1997 Australian Water Technologies completed a feasibility study into the potential filling of the Lower Prospect Canal structure as identified in previous studies (including the CRAG Management Plan of 1996) as an appropriate measure for rendering the structure safe for public use and to protect it from ongoing degradation.

The study incorporated a complimentary heritage study prepared by AWT EnSight in November 1997 which investigated the potential impacts of filling works on the heritage fabric of the Lower Prospect Canal. This study concluded that the key heritage aspects for consideration related to filling were:

- "The structure of the whole canal and it's ancillaries be repaired" (where necessary) "and then not predjudciced by either the filling or later removal of the fill. Where not filled the structure should be preserved"
- "a documentary record with photos be made of the whole canal before filling"
- "all existing structures over the canal to be retained or adapted for re-use"
- "appropriate control of ground and surface water be provided for around and within the canal"
- "the existing landscape be retained and the canal's existing alignment continue to be defined - this suggests that the filling should not bury the canal copings"
- to preserve the route and historic basis of the canal, a suitable adaptive re-use may be to convert it to a pedestrian walkway or cycleway from Prospect to Guildford"

The structural review concluded with the general recommendation that filling of the Lower Prospect Canal was technically acceptable. The assessment was based on the assumption that the specific gravity of the fill material would be 2.0, thus the loadings "imposed by the equivalent level of fill material will be double that imposed by water". Detailed recommendations were made regarding the structural capacity of the Lower Prospect Canal for filling, and required actions and conditions to precede filling works. Major recommendations are listed below:

- Compaction required to accept large vehicular loadings may be significant with the potential to prejudice the existing concrete structure of the Lower Prospect Canal in particular the sections constructed in fill. As such the AWT recommendations assume that no vehicular traffic would be allowed on the filled Lower Prospect Canal. Holroyd City Council has advised that recurrent maintenance requirements for the site would necessitate vehicular crossings of the canal and cycle path for vehicles up to a maximum of 5 tonnes. As such it is suggested that design of filling works and the canal cyclepath should cater for such loadings. In areas where such loadings are determined by geotechnical and engineering investigations to be problematic (eg. potentially the filled area between the Cumberland Highway and Sherwood Road) maintenance traffic may have to be restricted.

- The report recommends "the fill should be placed in layers and lightly compacted so as to minimise damage. Such damage could not be ruled out without specific detailed structural investigation" possibly resulting in the requirement for localised strengthening in filled areas. The recommendations add that where the Lower Prospect Canal is located in cut or in level ground such measures would be unlikely to be required to cater for cycle and pedestrian use, and controlled maintenance use.

- The report notes that "where the canal is constructed in raised embankment consideration should be taken of the height and width of the embankment to either side". It is added that this may determine that filling should be limited to one metre below the coping. This recommendation has implications either in provision of a safety rail to the edge of the Lower Prospect Canal, or (if it was preferred to remove the top metre of canal wall) potentially conflicts with the AWT EnSight Heritage statement that the Lower Prospect Canal alignment be retailed.

  Note: in this situation it may be preferable that the necessary strengthening works are undertaken to reinforce the Lower Prospect Canal structure and enable filling to full depth.

- Provision is recommended to be made "to ensure that any rain, ground, and some surface water entering the canal will adequately drain and not impose added hydrostatic loads on the structure. To ensure adequate drainage it is recommended the existing scours be fully opened by removal or locking of the valve system and that a layer of drainage material be provided in the base of the canal- say 200mm depth." A geotextile layer to prevent infiltration of fines is recommended. It is also recommended that where the scours are widely spaced there may be a need for additional openings from the Lower Prospect Canal invert to the surrounding stormwater system.

2.9.4 Services Corridor Potential

The Higginbotham Heritage Study (1992) identified that the corridor lands have potential to support essential services easements to provide for amplification / renewal requirements in the adjoining areas. Each of the supply authorities has been contacted to ascertain demand for this type of usage. Through incorporation of underground services provision it may be possible to assist in funding of other works along the corridor.

Trunk Drainage Potential

In theory joining the existing stormwater system to the Lower Prospect Canal would allow redistribution of stormwater from any overloaded catchments to other catchments which have additional pipe capacity. This would also provide additional detention capacity.

However in practise this notion does not appear to be workable. The Lower Prospect Canal currently runs above the surrounding ground level in some areas. As such linking drainage from existing infrastructure would not be possible. In addition the Lower Prospect Canal does not flow towards a natural discharge point (Prospect Creek).

Other services authorities

- Integral Energy
  no immediate plans that would necessitate the need to traverse or use the Lower Prospect Canal route. Future planning may indicate the need for such a corridor in 5-20 years as loads on the network increase

- Optus
  contacted with no reply received

- Telstra
  contacted with no reply received

- Australian Gas
  contacted with no reply received

3.0 BASIS FOR MANAGEMENT

This section summarises the basis from which the plan of management strategies and actions have been developed. Through a synthesis of the findings of the preceding review and assessment phase with the outcomes of the Community Working Groups, a basis for management has been resolved that identifies:

- values and roles of the Lower Prospect Canal;
- issues and opportunities to be addressed in developing planning and management strategies; and
- desired outcomes for the Masterplan and Plan of Management.

It should be noted that the desires and needs of the local community must be rationalised with valid regional open space and recreational objectives. Where these directions have been subject to potential conflict, the text identifies these issues.

3.1 Consultation

The plan of management study has incorporated several consultation components aimed to both assist in the sourcing of information and development of planning and management strategies, and to inform relevant stakeholders and the local community of the study and project outcomes as they have developed.

A Steering Committee was establishment under the chair of the NPWS Metropolitan Regional Parks Unit, to oversee the study process and programme. The committee involved representatives of:

- Metropolitan Regional Parks Unit (NPWS) - 1 representative
- Department of Urban Affairs and Planning - Land Management Branch - 1 representative
- Holroyd City Council Councillors - 2 representatives
- Holroyd City Council Engineers Department - 1 representative
- Canal Reserve Action Group Inc. - 2 representatives
- NSW Heritage Council - 1 representative

Canal Reserve Action Group Inc.

The Lower Prospect Canal site has a history of local community interest, with the Canal Reserve Action Group Inc. (CRAG) having been extensively involved in conservation of the corridor as public lands. CRAG was involved in both the Steering Committee and Community Working Group aspects of this plan of management.

CRAG was formed in September 1994 with the community objective of preserving the Lower Prospect Canal corridor as public lands. CRAG acts to represent the community on issues regarding the Lower Prospect Canal corridor, and lobbied State Government for over four years to have the reserve opened for appropriate recreational uses.

During 1996 CRAG prepared a Plan of Management document aimed to compile and integrate previous discussions and research and provide tangible recommendations upon which Government and the community could act. The plan recommended that the corridor be retained as public open space in it's entirety, and that various environmental and passive recreational objectives be followed through on the site. The CRAG document has been used as an essential reference in the preparation of this plan of management. The Canal Reserve Action Group Inc. Charter as identified in their 1996 Plan of Management is listed below:

- To save and preserve the Lower Prospect Canal and the attached land in its present natural state, with only future passive recreational use.
- To find a range of detailed options for passive recreational use, and to put those before the residents for their approval and democratic choice of the best options .
- To lobby all the authorities to agree with the CRAG Plan of Action 1996, and to ensure vigilance to present development of proposals which may damage the Lower Prospect Canal environment, both now and in the future.
- To put aside individual personal gain or interests and to protect the Lower Prospect Canal area for all residents and the public .
- That these aims and objectives will be pursued in a friendly, legal, business-like and non-violent manner by all members involved, whatever problems or differences occurs.

Plan of Management Consultation

The following summary outlines the key aspects of the community consultation strategy carried out as part of the Lower Prospect Canal Masterplan and Plan of Management study.

1. **Press Releases**
   Press Releases were provided through Holroyd City Council's Corporate Column in the Parramatta Advertiser notifying the local community of the project and seeking interest in involvement in the community working group workshops. Organised groups within the community as identified by the Project Steering Committee were also contacted

2. **Community Working Group Workshops**
   Respondents to the press releases and other stakeholders sourced through organised groups were invited to participate in community reference group workshops for each of the key Plan of Management phases. The workshops were chaired by Carolyn Stone, a Social Planner and Consultation Facilitator. The evenings involved varying degrees of technical input by the consultants to initiate discussion of topics and issues on the agenda, however the emphasis was on involvement and input by the community representatives.

3. **Public Exhibition**
   Public exhibition of the Draft Plan of Management will invite general public inspection and comment. Following the public exhibition, comments will be considered after which the Final Plan of Management will be finalised and issued.

3.1.1 Press Releases

Press Releases were provided in Holroyd City Council's corporate column of the Parramatta Advertiser at key points during the study process to inform the local and regional community on progress for the study. These included:

- Initial project announcement and call for involvement in Community Working group
- Outcomes of Working Group 1 and call for involvement in ongoing Community Working groups
- Outcomes of Working Group 2 and call for involvement in Working Group 3
- Outcomes of Working Group 3 and call for involvement in Public Exhibition

3.1.2 Community Working Group

Summary meeting notes of the community workshops are provided in Volume Three of the Draft Plan of Management. Outcomes have been integrated with the consultancy team assessment and review to develop the values and roles, issues and opportunities, and desired outcomes outlined in section 3.4, along with refining the management framework and planning recommendations developed in sections 4.0 and 5.0. A summary of the community workshop follows:

Working Group No. 1 - 5th March 1998 - Issues Review

A total of 39 persons attended the first Community Workshop held on the 5th March 1998 at 7.30pm at the Holroyd Centre Merrylands.

After an introduction to the study objectives, programme, and methodology by the study team the meeting divided into groups to review particular sections of the site (due to its extensive area). Each group was asked to consider the following topics relating both to the corridor, and specific unit:

- Values and Role of the site
- Issues
- Opportunities
- Outcomes and Objectives for the Plan of Management
- Strategies

Key issues and opportunities to emerge from the discussion included the following (see Section 3.4 for full summary of issues and opportunities, and 3.5 for desried outcomes):

Issues
- Flora and fauna conservation and enhancement must be a key objective
- Public recreational use must not conflict with habitat values
- Public recreational use should not conflict with local resident values (including security and safety)
- Connection to Prospect Reservior is a fundemental requirement of the open space corridor
- Open canal structure is a public safety concern
- Dewatered canal is subject to ongoing degradation
- Availability of funds to complete required improvement works
- Heriatge fabric of canal as a man made structure including canal alignment must be conserved

Constraints
- Enhancement of Grey Box Woodland habitat
- Improved local access for residentail community
- Potential link within a major regional open sapce network
- Heriatge conservation can compliemnt environmental and recreatioanl objectives

Working Group No. 2 - 30th April 1998 - Development of Draft Strategy Framework

A total of 40 persons attended the first Community Workshop held on the 30th April 1998 at 7.30pm at the Holroyd Centre Merrylands.

The major component of the workshop involved the review of the draft Management Framework. Groups were formed to review two sections of the framework and then present their findings to the overall meeting. Copies of the draft Uses Evaluation were also distributed to attendees for their review and comment.

The work discussions and responses received after the workshop were incorporated into the Management Strategy Framework - Section 4.2.

Working Group No. 3 - 14th May 1998 - Masterplan Review

A total of 22 persons attended the third Community. Workshop held on the 14th May 1998 at 7.30pm at the Holroyd Centre Merrylands.

The focus of Working Group Three was the presentation of the draft masterplan proposals by the consultancy team. Following an explanation of the key components of the recommendations an informal discussion developed from the presentation, including the following issues:

- Implementing the cycleway and pedestrian links as soon as possible will provide access to the Lower Prospect Canal corridor as public open space. Other planning recommendations can be implemented during ongoing stages as lower priority items.

- Security of the Lower Prospect Canal corridor when the area is opened as public open space must be subject to ongoing review. It was noted that controlled management of understorey vegetation may be necessary to avoid total screening of residential boundaries. The meeting generally agreed that increased usage of the corridor by the public would increase the benefits of passive surveillance. However, security management is an issue that would need to be carefully monitored to determine any negative impacts of opening the Lower Prospect Canal corridor to general public access.

- Access for emergency and maintenance vehicles needs to recognised.

3.2 Potential Uses Evaluation

Previous studies by various authorities and organisations regarding conservation and managment of the Lower Prospect Canal including the Higginbotham Heriatge Study for Sydney Water - 1992, and the Canal Reserve Action Group Inc. Management Plan - 1996, have canvassed a range of potential uses for the canal., Potential uses have also been identified through the Community Working Group issues and opportunities review, predominantly related to establishment of a passive recreational open sapace corridor, flora and fauna consergvation, and heriatge interpratation. These uses/activities have been consolidated into a listing from which an evaluation is required to determine combatbility with the environmental, recreational, and heriatge conservation objectives as identified through the study review/assessamnt and Community Workshops, and as summarised in Section 3.5 Desried Outcomes.

The summary list of potential uses includes the following:

1. Passive Open Space
2. Cycle / Pedestrian Links
3. Flora / Fauna Conservation Corridor
4. Heritage Museum
5. Outdoor Classrooms
6. Plant Museum / Nursery
7. Picnic Facilities / rest areas
8. Service Corridor
9. Recycled Water Supply
10. Stormwater Trunk Drainage
11. Natural water course in canal
12. Upgrade/reinstate natural watercourses
13. Wet detention basins
14. Treatment of open canal - option

Figure 3.1 on the following page, provides an evaluation of these potential uses/activities against several key criteria aimed at determining the most appropriate and compatible range of uses. The criteria include:

1. Assessment of potential uses in relation to negative/positive impacts on the site and the local area. Is the site and local area able to sustain the preferred uses/facilities.

2. Local role of site in meeting goals identified in Holroyd City Councils Open Space Strategy (currently in draft form) along with providing regional environmental, open space and access resources

3. Establishment of a range of compatible uses that will be able to function in integration, and as complimentary sources of park patronage.

A draft Uses Evaluation was provided to the Community Workshop Group, and Sterring Committee and coments received have been incorporated into the following table.

Figure 3.1
EVALUATION OF POTENTIAL USES

USE	DESCRIPTION OF FACILITIES REQUIRED	POTENTIAL IMPACTS/ CONSTRAINTS	ADVANTAGES/ OPPORTUNITIES	SIGNIFICANCE	COMPATIBLE USES	POTENTIAL FOR STAGING OF IMPLEMENTION
1. **Passive Open Space**	Use of defined areas for informal activities - informal activities/ rest / relaxation as identified in HCC Draft Open Space Plan Usually would require access to toilet facilities - provide access to amenities on adjoining sites to canal	• potential impacts of public access on flora/fauna qualities • need to minimise public access where it may impact on conservation objectives	• located within quality urban bushland area • passive recreation is an identified community value by working group • Identified in HCC Draft Open Space Plan	• potentially located on regionally significant cycle/pedestrian system	• flora/fauna conservation • cycle paths • outdoor classroom • heritage conservation • flora/fauna conservation • picnics/rest areas • service corridor • plant/nursery museum • natural water courses	High potential for staging - identify highest priority areas for : -environ. benefits -areas most suitable for general public access -staging of other uses
2. **Cycle Pedestrian Links**	Develop cycleway link as core access element. Provide complimentary pedestrian path linkages as Stage 2 development.	• preferred scenario for separated cycle/pedestrian paths. • potential conflicts of path crossover points • Requires linkages to be completed in other corridors and land holdings to provide continuous access. • need to control cycle access to minimise potential impacts on vegetation and fauna	• linear path link can strongly reflect canal as design element. • in the short term (whilst other regional connections are being made) can provide a loop system with Prospect Creek. • identified local community use • potential commuter role	• key regional linkage as part of Sydney wide cycle network including: -Botany Bay to Blue Mountains -Western Sydney Regional Park to Homebush Bay	• passive recreation • outdoor classroom • heritage conservation • flora/fauna conservation • natural water courses If planned and designed sensitively: • flora/fauna conservation • picnics/rest areas • service corridor • plant/nursery museum	High potential for staging - identify highest priority areas for : -est . of circuits -local and regional benefit -practicality of construction
3. **Flora/Fauna Conservation Corridor**	Establish bushland protection areas for development of vegetation and communities. Provide fencing to delineate areas and carry out weed management and bush regeneration. Establish habitat protection areas, eg: -bat colony to covered way -amphibians to wetland area	• potential conflicts with recreational usage • bushfire hazard management required	• compatible with NPWS designation of core biodiversity area • identified community value - principal site objective • corridor for bird and fauna movement • regeneration benefits to be facilitated ASAP • use paths to define limits of access and reduce necessity for fencing of regeneration areas	• canal identified as core biodiversity area • Open space corridor within heavily developed LGA • largest open space area in Holroyd of LGA	• passive/open space • outdoor classroom heritage conservation • natural water courses If planned, designed, and managed sensitively: • pedestrian/cycle paths • services corridor • picnic/rest areas • plant nursery / museum	High potential for staging - identify highest priority areas for: -Env benenfits -integration with stagi ng of other components
4. **Heritage Museum/ Heritage Interpret.**	Conservation of heritage elements and enhancement/provision of access for public viewing and interpretation.	• Opening to public access can potentially hasten degradation • Local community prefers no specific Museum structure on canal site - heritage elements only - possible museum at Prospect Reservoir	• Compliments open space and passive recreation values • bushland setting is important component of heritage fabric • Integrate with interpretive signage	• nationally and internationally significant European heritage features.	• flora/fauna conservation • heritage conservation • flora/fauna conservation • picnics/bbqs • natural water courses If planned, des, and managed • plant/nursery museum • cycle paths • servie corridor	High potential for staging - identify highest priority areas for: -Heritage protection -Making safe of structures to public exposure -integration with stagi ng of other components

Figure 3.1
EVALUATION OF POTENTIAL USES

USE	DESCRIPTION OF FACILITIES REQUIRED	POTENTIAL IMPACTS/ CONSTRAINTS	ADVANTAGES/ OPPORTUNITIES	SIGNIFICANCE	COMPATIBLE USES	POTENTIAL FOR STAGING OF IMPLEMENTION
5. **Outdoor Classroom**	Corridor suitable for use by formal or informal educational groups.		• close relationship of schools to canal corridor • will encourage greater knowledge and awareness of canal's heritage and ecological values.	• outdoor education resource related to regionally significant heritage/ecological sites. Could be used by regional educational groups	• flora/fauna conservation • cycle paths • heritage conservation • flora/fauna conservation • picnics/bbqs • natural water courses If planned, designed, and managed sensitively: • plant/nursery museum • servie corridor	High potential for staging - identify highest priority areas for: -integration with stagi ng of other components -relationship to local schools
6. **Plant Museum/ Nursery**	Establishment of native plant nursery on site with potential display/exhibition for educational purposes. Requires built structure for nursery operations and/or museum information.	• security requirements • daily vehicular access required onto site • alienates part of site from general public use • local residents concerened with additional traffic / parking etc	• involves potential adaptive re-use of canal structure as growing area for aquatic species • possible commercial interest to assist with park enhancement - althopugh it is expected benefits would be negligible	• compatible with core biodiversity role of corridor	• flora/fauna conservation • cycle paths • outdoor classroom • heritage conservation • flora/fauna conservation • picnics/bbqs • service corridor • plant/nursery museum • natural water courses	Low potential for staging - most cost effective if implemented to level that will enable commercial operation
7. **Picnic Facilities/ rest areas**	Provide table/seats under shelter structures possibly related to electric BBQ's for public use. Normally related to toilet and water facilities.	• not supported by local community representatives - perceived conflicts with local resident values - noise/ parking, vandalism • rubbish collection and cleaning required • potential conflicts with flora/fauna values	• potential to use facilities on adjoining open space areas - Gipps Rd / Prospect Reservoir • compatible with public recreational use of corridor • potential use by school and community groups	• provide stopover / rest point for regional users • can increase quality of recreational experiences available	• passive open space • cycle/pedestrian links • heritage/museum interpretive • outdoor classroom • natural water courses If planned, designed, and managed sensitively: • flora / fauna corridor	High potential for staging - identify highest priority areas for: -integration with stagi ng of other components
8. **Service Corridor**	Use of corridor levels for renewal/amplification, of essential services - placed underground to minimise impacts on open space	• need for planning / design control or routes coord / liasison with service auth. • potential conflicts with flora/fauna values through maint. and repair works • requirement for maintenance access • preliminary investigations indicate little interest for service authority as supply routes are well established and redirecting would not be cost effective	• potential funding input to open space *Note:* *existing services leases - may be potential to renegotiate financial arrangements for benefit of open space*	• potential public benefit through improved services provision	• cycle pedestrian links • heritage museum interpretive • outdoor classroom picnic facilities • recycled water supply • stormwater trunk drainage • natural water course	Medium potential for staging - potential conflicts for installation after open space enhancement

Figure 3.1
EVALUATION OF POTENTIAL USES

USE	DESCRIPTION OF FACILITIES REQUIRED	POTENTIAL IMPACTS/ CONSTRAINTS	ADVANTAGES/ OPPORTUNITIES	SIGNIFICANCE	COMPATIBLE USES	POTENTIAL FOR STAGING OF IMPLEMENTATION
9. Recycled Water Supply	Use of canal structure for treat. store and transport 'grey water' for use by local industry and housing	• canal struct. does not follow natural drainage path - lies on artifically created topography • as such requirement to predominantly pump stormwater to the canal • use of canal as treatment basins, and carrier may conflict with recreational and heritage interpretation in some areas through requ. to control access • no identified removal for treated grey water by local industry • high capital investment costs • alienation of open space through facilities, plant and access requiremnts • concern expressed by local community as to such a use	• environmental improvements to water entering natural systems. • potential environmental education resource • need to balance with volume effects to lower creeks (ie reduced volume)	• has regional environmental benefits • unique facility within region - test case	• cycle pedestrian links • heritage museum/interpretive • outdoor classroom • natural water courses	Low potential for staging - Would need to be implemented in full to be operational
10. St'mwater/ Trunk Drainage	Use of canal structure to transport stormwater.	• lack of gravity source to canal - would require pumping • canal does not drain to any natural outflow point (eg Prospect Creek) • high capital establishment costs • water usage of canal may alienate recreational usage - need for security fencing (public safety)	• existing piped systems have capacity for 1 in 5 ARI storm event only - storage would increase capacity. • would reinstate visual character of water surface within canal.		• cycle pedestrian links • heritage museum/interpretive • outdoor classroom • natural water courses	Low potential for staging - Would need to be implemented in full to be operational
11. Natural Water Course in Canal	Adaption of canal to provide naturalistic water course	• lack of fall to canal struct. - insufficient for natural flow on porous materials • neccessity to provide reticulation to maintain water flow (flow required to prevent stagnation) • alignment of canal is not a natural drainage course • lack of gravity fed nat. water source • requirement to maintain and repair reticulation system • high capital and maintenance costs • natural water course may detract from man made character / context of structure as heritage item • water course without filling (ie to full depth) would require safety fencing alienating public use/visual quality and would be env. onerous (water demand).	• fauna habitat enhancement • landscape environmental feature adds to open space expanses	• enhances core biodiversity values	• flora/fauna conservation • cycle paths • outdoor classroom • heritage conservation • flora/fauna conservation • picnics/bbqs • service corridor • plant/nursery museum • natural water courses	Medium potential for staging - possible to establish sections of canal although retciualtion stratgey would need to related to final requirements

Figure 3.1
EVALUATION OF POTENTIAL USES

USE	DESCRIPTION OF FACILITIES REQUIRED	POTENTIAL IMPACTS/ CONSTRAINTS	ADVANTAGES/ OPPORTUNITIES	SIGNIFICANCE	COMPATIBLE USES	POTENTIAL FOR STAGING OF IMPLEMENTATION
12. Upgrade/ Reinstate Natural Water Courses	Enhancement/reinstatement of existing creek lines	• Canal structure will provide a barrier to drainage linkages - possible requirement to pipe through canal alignment • Need to limit disturbance to existing native vegetation	• cost effective implementation possible • fauna habitat enhancement • landscape environmental feature adds to open space experiences • reduce flooding of downstream properties (existing system less than 1in 5 ARI capacity)	• improved regional water quality • enhances core biodiversity values	• flora/fauna conservation • cycle paths • outdoor classroom • heritage conservation • flora/fauna conservation • picnics/bbqs • service corridor • plant/nursery museum • natural water courses	High potential for staging - identify highest priority areas for: -stormwater management -environmental benefits -integration with staging of other items
13. Wet Detention Basins/Water Quality Control Ponds	Establishment of wet detention basins/water quality control ponds to existing creeklines	• limitation of environmental (natural) flow to maintain water levels.	• maint existing ntural low lying areas - do not conflictwith habitat values • fauna habitat enhancement • landscape environmental feature adds to open space experiencess • possible supplementation of environmental flow from water recycling programmes in LGA • reduce flooding of downstream propoerties (existing system less than 1in 5 ARI capacity)	• improved regional water quality • enhances core biodiversity values	• flora/fauna conservation • cycle paths • outdoor classroom • heritage conservation • flora/fauna conservation • picnics/bbqs • service corridor • plant/nursery museum • natural water courses	High potential for staging - identify highest priority areas for: -stormwater management -environmental benefits -integration with staging of other items
14. Treatment of Canal to make safe for public usage	Option 1 - Filling	• limits direct visual interpretation of open canal structure • major capital investment • quality of fill material needs to be monitored: -no waste materials -weeds	• canal structure unstable and requiring rectification • minimal ongoing maintenance costs • potential to reflect canal heritage and character through landscape treatments on surface • negates need for safety treatments - fences etc. • potential to retain unfilled - zones of higher heritage significance			High potential for staging - identify highest priority areas for: -integration with staging of other items -staging i relation to availability of fill
15. Treatment of Canal to make safe for public usage	Option 2 - Retain open with safety protection	• canal structure requires major structure remediation to be stable in long term - high capital costs • ongoing structural problem of buckling and heaving - necessity for bracing of canal • ongoing maintenance and drainage requirements • requirements for safety fencing or capping	facilitate viewing of structure in close to original form (notwithstanding structural remediation requirements) • potential for use of themed capping mesh lidding to provide safe treatment.			High potential for staging - identify highest priority areas for: -integration with staging of other items

Potential Uses - Summary

The Uses Evaltion provides a relative assessment of potentila uses against the established criteria, incorporating consideration of the values, issues and opportunities, and desired outcomes identified during this study.

Based on the evaluation, prefered uses/activities are those which compliment the conservation and enhancement of the sites flora, fauna, anf heriatge values.

These include the following:

Environmental Uses/Activities
- Bushland conservation
- Fauna conservation
- Stormwater management

Recreational Uses/Activities
- Cycleway and pedestrian path system
- Passive recreation - cycling, walking, informal activities

Educational Uses/Activities
- Interpretive signage -Heritage interpretation
  -Environmental interpretation

It should be noted that an issue to emerge strongly in the Community Workshops was the concern of local residents that opening of the Lower Prospect Canal corridor to public use did not compromise the current environmental and visual quality of the site, and the benefits provided to local residents by these qualities. This extended to a desire that no facilities that may potentially attract anti social behaviour or vandalism be provided on the site. Whilst amenities such as toilets and Barbecues are provide in adjoining open space areas (eg. Gipps Road and Prospect Reservoir) it is suggested that provision of seating for passive use a appropriate locations should be considered at detailed design stage.

It is proposed that in order to cater for the facilities requirements of both local and regional users that links and directional signage to facilities in adjoining open space areas such as Gipps Road Reserve and Prospect Reservoir are provided to enable shared use of toilet and picnic amenities either existing or planned to be provided in these open space areas.

Open Space Linkages

Figure 3.2

LEGEND

- River/Creek
- Open Space (Above 2ha)
- Prospect Canal
- Railway
- Major Road
- Prospect Reservoir Crown Lands
- Western Sydney Open Space Corridor
- Potential Open Space Link

Western Sydney Open Space Corridor

BLACKTOWN

OLD WINDSOR ROAD

GREAT WESTERN HIGHWAY

WESTERN MOTORWAY

PARRAMATTA

PARRAMATTA RIVER

PROSPECT RESERVOIR

Lower Prospect Canal

CUMBERLAND

HOLROYD

Water Supply Pipeline

WALLGROVE ROAD

HORSELY DRIVE

HIGHWAY

FAIRFIELD

WOODVILLE ROAD

DUCK RIVER

BANKSTOWN

HUME HIGHWAY

Lower Prospect Canal

Prepared For:
Metropolitan Regional Parks Unit
NPWS

Masterplan and Plan of Management

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3.3 Strategic Planning Context

3.3.1 Open Space

Regional Open Space Significance

The cornerstone of open space planning in the south west of Sydney has been the regional open space corridor which extends from Camden Valley Way, Leppington in the south to Dean Park in the north. Incorporated in planning strategies progessively developed for western Sydney, the corridor currently comprises a series of reserved parcels of land that in combination form a corridor of an average 2 kilometres in width and 30 kilometres in length.

A core element of the corridor is the Western Sydney Regional Park. Integrating a range of recreational facilities some of which will play a role in the 2000 Olympics, this site will be a growing source of visitation for residents of adjoining Local Government Area's and of the broader Sydney region.

The opportunity to link the Lower Prospect Canal through Prospect Reservoir to the Western Sydney Regional Open Space corridor will in the long term open a massive open space and recreational resource to off road access from both Holroyd, adjoining Local Government Area's, and those Local Government Area's further to the east, linked by existing and proposed cycle access. It will also enable important urban bushland and wildlife corridor qualities to be consolidated.

The Holroyd Open Space Strategy identifies several creekline systems through the Holroyd Local Government Area that offer existing and future potential for open space and access connections including Greystanes Creek and Finlaysons Creek on the northern side of the ridgeline on which the Lower Prospect Canal runs.

The Prospect Creek corridor has already been developed along part of it's length for pedestrian / cycle access, while Duck River to the east provides an opportunity to link with the Parramatta River, a corridor in which the Department of Urban Affairs and Planning has identified and is encouraging open space and access connections to be further developed.

The water supply pipeline east of Guildford Pipehead also provides potential for linking corridors that otherwise have no open space connections such as the Lower Prospect Canal to the Duck River. This potential along with related technical and security issues should be explored with Sydney Water by Parramtta and Auburn Coucnils, and Green Games Watch 2000, proponents of the Bay to Mountains Cycle Link.

Figure 3.2 identifies the context of the Lower Prospect Canal in terms of Regional Open Space. It can be seen that the canal is a significant east west linkage both in terms of the Holroyd Local Government Area, the adjoining open space corridors being developed to the west, and those available along the Duck River and Parramatta River systems. Previous planning by the Department of Urban Affairs and Planning has not identified the Lower Prospect Canal as part of the regional system (it would appear principally because it's future was uncertain), however a review of the regional distribution and linkages indicates that the canal would be a significant open space and access corridor, and enable consolidation and linkage of numerous existing open space areas.

As identified in chapter 2 - Review, the Lower Prospect Canal corridor is of major regional significance as an open space area based on a number of criteria:

- The national and international significance of the canal and it's related built components as European heritage items;

- The designation of the Lower Prospect Canal as Core Biodiversity Area by the National Parks and Wildlife Service's Western Sydney Urban Bushland Biodiversity Study 1997;

- The potential role of the Lower Prospect Canal within a Sydney wide cycle and pedestrian network including:
  - Botany Bay to the Blue Mountains;
  - Western Sydney Regional Park to Homebush Bay;
  - Homebush Bay to Wollongong; and
  - Link to potential Eastern Creek Cycleway

The Lower Prospect Canal also provides linkages from the Western Sydney Open Space corridor and Western Sydney Regional Park currently under development, through Prospect Reservoir, and the Duck River corridor to Parramatta, and the extensive open space and access linkages that are provided along the Parramatta River.

With the rapid growth of cycling as a recreation and fitness pursuit the potential to develop a network of cycle access that takes in Sydney's major open space resources is enormous. This network will also serve to provide commuter access from residential areas to town centres and places of work, making commuter use of cycles a viable option. The Lower Prospect Canal corridor has been identified by the Cyclist Action Movement (CAM) as a high priority link for it's potential to provide both recreational and commuter cycle access, along with being potentially a key component of the Green Olympics 2000 Bay to Mountains cycle network as identified in section 2.6

The establishment of the Sydney wide cycle network is obviously a mosaic in terms of existing, proposed, and other potential links contained in the Cycle Plans of most Local Government Areas, the RTA's Sydney Cycle Plan, and reports such as the Bay to Mountains Cycleway, and Eastern Creek Cycleway studies. However a programme of progressive implementation will ultimately see the potential for these connections realised. A coordinated approach to ongoing development of these networks through either State Government or Regional Local Government Associations would enable prioritising of linkages, targeting of funding, and completion of meaningful linkages (across local government boundaries).

Local Open Space Significance - The Holroyd Open Space Plan

The Draft Holroyd Open Space Strategy prepared by Manidis Roberts Consultants (March 1998), outlines existing issues and future strategies for the planning and management of open space in the Holroyd Local Government Area. Principal strategies incorporated in the Draft Holroyd Open Space Strategy are to:

1. Position Central Gardens as Holroyd's premier open space area. This involves commissioning the development of a Masterplan with the objective of developing Central Gardens as a Park for the 21st Century.
2. Preserve, rehabilitate and improve access to existing and future bushland areas, particularly adjacent to natural creeks.
3. Re-position Finlaysons Creek, Prospect Creek and Greystanes Creek as Holroyd's new regional passive water-based open space areas with picnic and play facilities.
4. Designate Holroyd City Council Officers to monitor, evaluate and update the Open Space Strategy.
5. Enhance and extend existing linkages, linear parks and cycleways.
6. Improve equity in access to Holroyd City Council's open spaces and parks by the local community by improved signage and information.
7. Provide informal, unstructured recreation facilities for and with young people including basketball facilities in areas of high concentrations of young people.
8. Improve the quality of open space and recreation facilities, particularly for people living in high density areas, including an ongoing assessment of the needs of residents in these areas.
9. Rationalise some existing open space areas including open space areas fronting major roads such as the Great Western Highway.
10. Develop Prospect Canal as Holroyd's passive regional open space area for the community.

Size of Open Space Areas

The report identifies that the size of open space areas in Holroyd varies, but there is a general decrease in the number of areas as the size increases. Key statistics related to open space in Holroyd include:

- 68% of the open space areas are half a hectare or less in size; and
- 6% of open spaces are greater than five hectares and are considered to be significant in size. Seven of these are over 10 hectares in size and together comprise 38% of the open space area in Holroyd. The key large open spaces include open space along Prospect Creek(27 hectares), the Arboretum (15 hectares), the Gipps Road Sports Ground (24 hectares), Central Gardens (12 hectares) and Walpole Street Park (8 hectares).
- Parkland (parkland with some tree canopy) and playgrounds are the most common open space settings, accounting for 65.7% of open space;
- Playing fields are the next most common setting, comprising 7.8%, while other sporting facilities such as courts and pools represent 6.8% of total open space settings;
- There are relatively high proportions of undeveloped land (7.5%) and road closures (5.5%); and
- There is very little open space with bushland (2.3%).

These statistics indicate that the Lower Prospect Canal corridor is highly significant open space within Holroyd Local Government Area inthat it is (at 62 hectares) over double the size of the next largest open space (Prospect Creek - 27 hectares) and in constrast to the majority of open spaces the corridor provides bushland canopy cover to much of its area. As such the corridor will provide tangible benefit to Holroyd in the the quality of open space provosion, and in the variety of recreational experiences available.

Potential Linkages

The potential for the Lower Prospect Canal as a component of regional open space and access linkages has been discussed earlier. The Holroyd Open Space Strategy notes that there are a number of sub - linkages which are available through the Local Government Area. These provide a basis for an open space and access network in which the Lower Prospect Canal corridor will potentially play a central role:

- Greystanes Creek - a green corridor and pathway/cycleway linking Foxhill Golf Course and Toongabbie Shops - nominated by Parramatta City Council as the preferred link between Parramatta town centre and Holroyd Local Government Area.
- Finlaysons Creek - a green corridor and pathway/cycleway running along Centenary Road and linking Wentworthville shops;
- Prospect Creek - a green corridor and pathway/cycleway running along Prospect Creek from Fairfield Road to Gipps Road. There is the potential to extend this corridor east from Fairfield Road to the Horsley Drive, and west to link with Prospect Reservoir;
- a path extending parallel to the M4 linking Ledger Road and Coleman Street, and providing access across the M4;
- a green pathway linking Keene Park and CV Kelly Park; and

These links (with the exception of Prospect Creek) provide connections between various open space, commercial, and residential nodes. However in order to maximise the local and regional benefits of such links they must be integrated with a core corridor such as the Prospect Canal which will extend the scope of access and open space experiences available to the local and regional population.

Population

The report states that the total population of Holroyd has remained fairly stable. However, those suburbs containing residential flat buildings have experienced increases, while the more well-established suburbs containing mainly single detached dwellings have experienced population losses. The 1991 Census population was 79,187 persons, while the 1996 Census population was 80,470 (an increase of 1,283 or 1.6%).

Favoured Recreation Activities

Based on the limited community consultation programme carried out as part of the open space study the report identifies that open space is primarily used by adults in Holroyd for:

- cycling
- walking through
- relaxation
- picnicking
- sport - organised and social
- sitting, watching activities
- swimming
- meeting, socialising; and
- walking and walking the dog

A survey of high school students and the community meetings carried out during the open space study identified uses by adolescents and children:

- football
- soccer
- cycling
- walking and walking the dog
- basketball
- relaxation/recreation
- netball
- swimming
- skateboarding
- play
- picnicking
- swimming; and
- outdoor learning

This summary identifies that cycling is the foremost recreation activity undertaken by residents of Holroyd both adults and adolescents.

Community Desires

Councils Draft Open Space Strategy established in review of Holroyd's Social Plan and Cultural Plan, community consultation and a survey of high school students, that several issues relevant to the Lower Prospect Canal corridor were seen as important with regard to open space:

- enable public use of Lower Prospect Canal as open space
- rationalise existing parks to provide better quality spaces elsewhere and reduce maintenance costs
- improve safety and security, particularly at night
- improve information about parks, open space and facilities
- more amenities including seats, picnic benches, shade/shelter, toilets, bins, sharps bins, bubblers, lighting, bicycle parking facilities and signage
- more trees in all reserves especially around sports fields edges for visual quality, shade and biodiversity
- increased visual quality
- ecologically sustainable development initiatives, particularly regarding water
- linkages for walking and cycling
- facilities for people with disabilities; and
- incorporate public art where appropriate

Values of Open Space

The following key values were identified for Holroyds Open Space system:

Diversity

The community values the range of recreational and other opportunities provided in Holroyd open space, such as organised recreation, casual recreation, and social gathering. The main components of the value of diversity are identified as areas for:

- organised recreation
- non organised passive and active recreation
- multipurpose recreation suitable for a range of ages and users; and
- contemplation/natural environment enjoyment

Useability

The Holroyd community desires open space to be "useable" and accessible to everyone in the community. The main components of the value of useability are identified as:

- access for all users to and within parks
- bicycle and pedestrian links
- carparking
- safety and security
- maintenance
- information and signage; and
- amenities, toilets, bubblers, etc.

Quality
The quality of life and their environment is important to the community. The main components of the value of quality are identified as:

- a clean environment which maintains suitable water and air quality, noise minimisation and native vegetation and wildlife habitat;
- visual character
- shade
- stress release space; and
- well maintained

Conservation
The main components of the value of conservation are:
- biodiversity; and
- heritage (natural, Aboriginal and European)

Recommendations of Holroyd's Draft Open Space Strategies

The Draft Open Space Plan identifies several recommended actions relevant to the Lower Prospect Canal Plan of Management. These include:

1. **Picnic Facilities**
   The corridor is identified as a long term location for picnic facilities with facilities able to cater for large groups including shade, shelter, bubblers, eating, toilets. (note comments of community working group - desiring no such facilities in corridor)

2. **Bushland**
   The report identifies that the corridor is a preferred location for revegetation and rehabilitation. It also notes that linkages through bushland areas should be explored where appropriate.

3. **Recreation**
   It is noted that the Gipps Road Open Space area is largely undeveloped since plans for the Forestry Commission Arboretum were dropped and that it provides a large site suitable for structured and unstructured recreation opportunities.

4. **Open Space & Linkages**
   The expansion of opportunities for off road pedestrian and cycle access suitable for disabled use is identified to be a key objective to be actioned. The Lower Prospect Canal corridor provides opportunities to progress such aims, and is identified as a long term priority for establishment of a major open space corridor.

Plans of Management

In accordance with local government requirements Holroyd City Council has in place Plans of Management for community lands under it's ownership and care control and management. Of these the Gipps Road Open Space POM is the most significant for the Lower Prospect Canal. The plan identifies that it is desirable for the Forestry Commission site north of Hyland Road to be consolidated into the existing Gipps Road open space. The integrated open space has the potential to provide a range of recreational facilities including sports fields, possible indoor sports and community facilities, BMX bike facilities, picnic facilities and amenities, and linkages to open space along Prospect Creek.

There is also a significant opportunity to integrate the Lower Prospect Canal lands to the Hyland Road site to consolidate what would be by far Holroyd's largest open space area with excellent links to Prospect Creek, Prospect Reservoir, and the Lower Prospect Canal corridor.

The Greystanes Creek Reserve Plan of Management also identified the significance of the Lower Prospect Canal as an open space and access linkage. The plan notes potential for connections from the Greystanes Creek on the northern side of the M4 Motorway to Prospect Reservoir.

A plan of management is also under preparation (at the time of writing) for Prospect Reservoir - refer to 3.3.3 Planning Controls - following page.

3.3.2 Landscape

Holroyd City Council prepared a Landscape masterplan for the Local Government Area (EDAW - October 1997) that identifies strategies for landscape enhancement and management of streetscapes, parks, and urban bushland. The primary objectives of the study were to:

- determine an appropriate landscape character for the city of Holroyd;
- protect and preserve Holroyds existing tree stock and natural areas;
- maintain and enhance tree canopy throughout the city of Holroyd;
- foster community ownership and support for implementing the landscape masterplan.

The masterplan examines the Local Government Area in 8 zones. The existing features of the zones are identified along with major landscape elements in terms of roads and open space. Guidelines for the enhancement and consolidation of positive characteristics and amelioration of constraints, are developed and typical treatment guidelines provided as a reference for actions by Council.

Although the report is general in it's scope, there are several recommendations in guidelines and actions that have relevance to the Lower Prospect Canal corridor.

- In terms of regional context it is identified that connections of existing open space to Prospect Reservoir and the new Western Sydney Regional Park should be optimised.
- The Lower Prospect Canal corridor is identified as being a dominant landscape element in particular in it's western zones, where the stands of native tree canopy add character and environmental quality to the locality of Greystanes.

3.3.3 Related Planning Studies

There are several government and authority planning strategies that have implications for the Lower Prospect Canal corridor. These include:

• Liverpool Parramatta Transitway *(superceding SREP 18)*	*Transport linkages*
• Prospect Reservoir Recreation Access (as noted earlier)	*Additional recreation amenity to reservoir- possible catalyst for consolidation on link between Prospect Reservoir and Lower Prospect Canal lands*
• Regional Open Space Corridor	*Opportunities for connections to Lower Prospect Canal corridor*

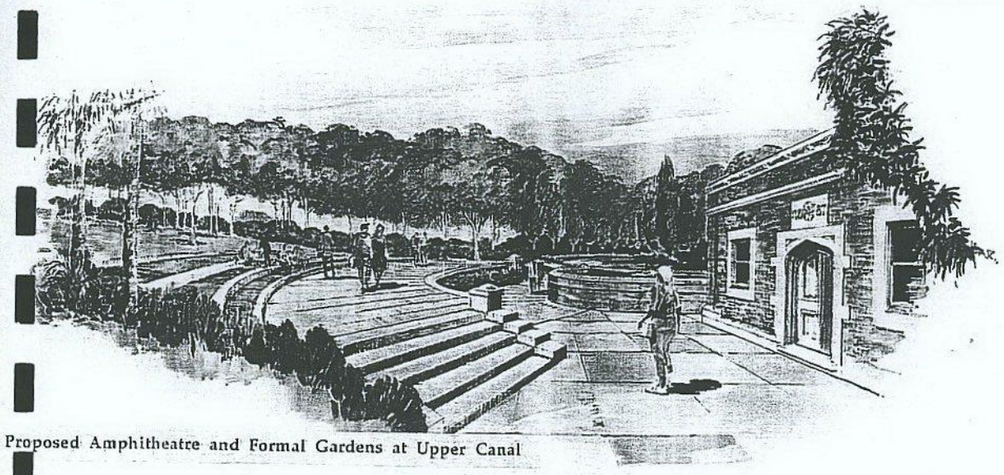
Liverpool Parramatta Transitway

The Liverpool Parramatta Transitway Overview Report outlines that whilst the first consideration of a public transport corridor in the region occurred around 30 years ago, the strategy was only formalised in the gazetting of the Sydney Regional Environmental Plan No. 18 (SREP 18) in 1989. As identified earlier, the SREP 18 corridor defined a zone to the northern side of the canal between the Cumberland Highway and Duffy Street for potential incorporation into the transport link route.

A preliminary feasibility study was undertaken of the SREP 18 corridor during 1997 which suggested that a transitway system would be feasible, and recommended further detailed investigation. It was announced by the NSW Minister for Transport in May 1998 that the government was committed to the development of a 20 kilometre transitway between Liverpool and Parramatta via Hoxton Park, and a detailed feasibility study was subsequently commissioned.

The report identifies that a specific alignment, 30 kilometres in length was developed through the study process: "the route starts at Liverpool Interchange, travelling west along Hoxton Park Road to Hoxton Park. It then turns north through Green Valley, Greenfield Park, and Prairiewood to meet the Sydney Water Prospect Pipeline Corridor". Following the pipeline for approximately 5 kilometres the route turns "north again to follow Fairfield Road, Sherwood Road (where it crosses the Canal Corridor), Centenary Road and the Great Wester Highway into Parramatta" (PPK, 1998)

Whilst the likely impacts of the SREP 18 route on the corridor were potentially harmful to the visual, historical, and environmental qualities of the canal corridor, the new Liverpool Parramatta Transitway which avoids the corrdior as an east west alignment, compliments the recreational and access values of the site. Transitway stations adjoining the corridor at Merrylands High School and at the Gipps Road sports complex will provide additional opportunities for regional users to access the corridor lands



Proposed Amphitheatre and Formal Gardens at Upper Canal

PROSPECT RESERVOIR

Future Recreation & Convention Centre

Bushland Reserve

Lookout Point

Historic Precinct

Education/ Interpretive Centre

Kiosk & Adventure Playground

Existing Casuarina Forest

Upper Macrophyte Filter Lake

Potential Re-vegetation area

Rainforest Study Area

Formal Display Gardens

Interpretive/Educational Walk through Wetlands

WS-2

VPS-200

Buffer Zone Planting

Retain existing Stormwater Detention Pond

Limit of Public Access

Open Grassland

Picnic Areas

Prospect Creek (retain existing hydrology)

WPS-147

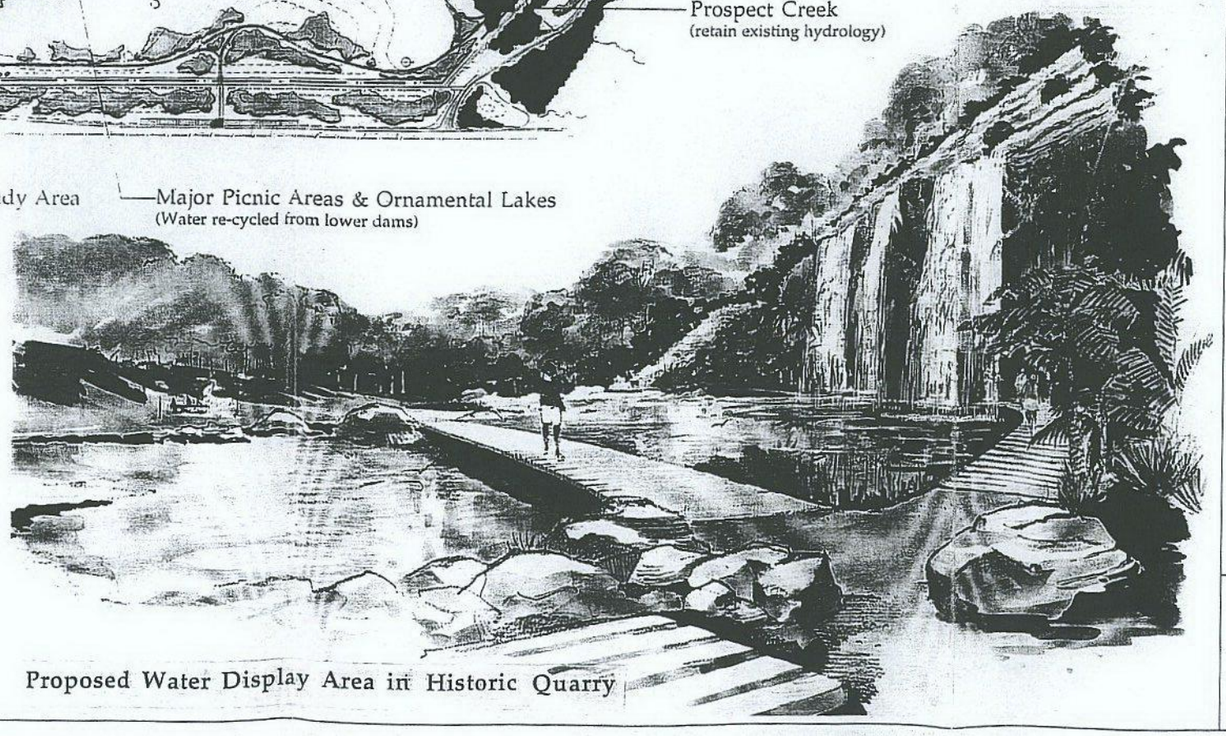
Historic Spillway

Aboriginal Relics

Passive Recreation & Field Study Area

Major Picnic Areas & Ornamental Lakes (Water re-cycled from lower dams)

Car Park & screen mounding to perimeter road



Proposed Water Display Area in Historic Quarry

Note:
Concepts as shown were prepared in 1995 for Sydney Water - Landscape and Recreational Planning, this area is currently under review as part of the Plan of Management being prepared for Prospect Reservoir.

Figure 3.3
Prospect Reservoir Concept

Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:
Metropolitan Regional Parks Unit
National Parks & Wildlife Service

Prepared by:
Environmental Partnership Pty Ltd
Landscape Architects & Urban Planners
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Prospect Reservoir Recreational Access

Sydney Water has recently been examining the potential for expanded recreational access to Prospect Reservoir, both for land and water based recreation. The areas proposed to be opened for public usage include the Casuarina Forest area below the dam wall along Prospect Creek. Previous masterplanning proposals for this area as described on Figure 4.2 included a series of wetland ponds that provide a basis for interpretive and recreational use. Landbased areas also included the head of the Lower Prospect Canal with the Horseshoe Basin and Pumphouse providing potential for heritage usage, possibly establishment of a Water Museum. The eastern foreshores of the Prospect Reservoir were also noted as potential recreation zones including Pelican Point. Water based recreation is proposed to be limited to the south western zone of the Prospect Reservoir to address safety requirements.

The realisation of these proposals would add further importance to the Lower Prospect Canal as an open space and access linkage to Holroyd Local Government Area, and beyond.

Coordination with the Prospect Reservoir Plan of Management being prepared by Sydney Water was carried out during the course of this study. Outcomes suggest that the aims and objectives of the plans are compatible and that most of the objectives relating to the Prospect Reservoir lands contained in this plan will be achievable.

3.4 Significance

3.4.1 Values and Roles

Values are listed under the general headings of natural, social, recreational, educational, heritage, intrinsic, visual, cultural, and legacy for future generations.

Natural / Environment
- remnant bushland - Grey Box Woodland - Core Biodiversity Area (NPWS 1997)
- flora and fauna habitat
- conservation of endangered species both flora and fauna
- potential for open space corridor

Social
- local residents benefit from the sites open space, natural and heritage qualities
- potential for linkages into residential areas and other local and regional open space areas.
- regional significance as open space and access corridor

Recreational
- potential as regional pedestrian / cycle path link (recreational and commuter)

Educational
- heritage awareness and interpretation of engineering features
- botanical and environmental education
- a number of local schools are adjacent to the site, and could use the corridor for outdoor classrooms
- provision of off road links between schools to facilitate resources sharing

Heritage
- Lower Prospect Canal as a component of the Upper Nepean Scheme is a significant item of Sydney's cultural history
- a number of specific items of heritage significance, necessary for conservation and interpretation, exist along the Lower Prospect Canal corridor
- potential integration of recognition of Aboriginal heritage of the Holroyd area

Intrinsic
- peaceful
- bushland character in surrounding developed context
- length of corridor provides for linkages to residential areas and other open space areas
- close proximity to Prospect Reservoir

Visual
- urban bushland is a relief from residential and industrial development
- high elevation of the Lower Prospect Canal affords distant views toward Sydney CBD and south western suburbs

Cultural
- life style enhancement for local residents
- expanded open space and recreation potential for local and regional users
- connection with other open space areas and community facilities
- enhance environmental awareness as community value

Legacy for future generations
- open space
- remnant Cumberland Forest - urban bushland
- conservation of complete fabric of items of heritage significance

3.4.2 Issues and Opportunities

Issues and Opportunities are specific factors to which management and planning strategies must respond, whilst recognising and maintaining the identified values and roles of the site.

Issues relating to the corridor

Issues include impacts on the land or environment, and potential conflicts between users or usage and other qualities of the site.

Natural / Environment

- flora and fauna protection and bush regeneration must be a key site objective - Core Biodiversity area
- mosquito breeding potential at any water bodies
- drainage must be considered as flooding does occur to some residences adjacent to the Lower Prospect Canal corridor
- current maintenance regime compromising ecological values for flora and fauna
- public / recreational use must not conflict with habitat values

Social

- linkages not currently available from Lower Prospect Canal corridor to some residential areas
- potential conflicts between local resident values and regional role of open space and access corridor
- potential requirement for provision of parking for regional users
- potential requirement for provision of amenities for regional users
- flexibility is desirable, within guidelines, for treatment of boundary fences to residences
- vandalism to existing structures. By creating new structures opens potential for vandalism
- fire management and provision of fire fighting access must be considered
- dumping of rubbish and garden refuse requires management / education

Recreational

- extension and linkage of corridor to Prospect Reservoir is a fundamental requirement for an access connection
- regional access function requires linkages in other Local Government Area's to be developed
- underpasses required at road crossings for pedestrian/cycle links
- treatment of open Lower Prospect Canal to make safe for users of the corridor
- security and privacy of neighbouring residents.
- disabled access must be optimised
- structural stability of Lower Prospect Canal and other built elements
- potential conflict of regional role and usage of Lower Prospect Canal as access linkage, with local resident desires for a lower level of usage of the canal corridor
- night time use - potential security problem
- potential impact of SREP 18 transport corridor on recreation values

Educational

- lack of awareness of European Heritage value of Lower Prospect Canal
- lack of awareness about ecological values of Lower Prospect Canal

Heritage

- dewatered condition of Lower Prospect Canal has implications for structural stability
- structural safety of Greystanes (Boothtown) Aqueduct - requires conservation work.
- context of Lower Prospect Canal must be retained for successful conservation (relationship of canal to landscape)
- retention of complete fabric of Lower Prospect Canal is preferred (retention of complete canal preferred - in lieu of complete retention, conserve representative examples)
- any filling of Lower Prospect Canal preferred to be able to be removed in future.
- access to structures - how to manage

Intrinsic

- public / recreational use may potentially conflict with intrinsic peacefulness of site in current state.
- availability of funds to facilitate the opening of whole corridor. - less value for access links if progressively opened in sections
- necessity for connection to Prospect Reservoir through Sydney Water lands required

Visual

- treatment of residential boundaries to optimise urban bushland qualities

Cultural
- corridor has both local and regional role / significance - how to balance these values and promote cooperation
- environmental awareness and custodianship needs to be promoted

Legacy for future generations
- capacity to conserve Lower Prospect Canal heritage values
- potential impact of open space / recreation usage on ecological values

Issues Relating to Specific Units

Issues relating to specific landscape units as identified in the Assessment phase, and in community consultation:

Unit 1 Western Boundary of Study Area to Gipps Road
- public access link to Prospect Reservoir required
- existing wetland along Munro Creek may have been enhanced by leakage from the Lower Prospect Canal corridor and as a consequence may be losing habitat value since dewatering of the canal
- Lower Prospect Canal has influenced and directed local drainage
- conservation and interpretation of the 'covered way' is essential
- conservation of Pimelea spicata plantings

Unit 2 Gipps Road to Greystanes (Boothtown) Aqueduct
- treatment of residential edges required to enhance visual character

Unit 3 Greystanes (Boothtown) Aqueduct
- conservation of Greystanes (Boothtown) Aqueduct and Syphon - protection from vandalism
- treatment of residential edges required to enhance visual character
- poor condition of creekline
- no link to Greystanes Sports Ground
- structural condition of Greystanes (Boothtown) Aqueduct

Unit 4 Greystanes (Boothtown) Aqueduct to Bayfield Road
- sparse landscape character of detention basins

Unit 5 Bayfield Road to Canal Road Reserve
- concerns over Canal Road vacent residential site - implication for Lower Prospect Canal corridor regarding access etc.
- potential conservation and interpretation of Smithfield Tanks
- potential outdoor classroom for Holroyd High School and Greystanes Public School
- runoff to residential backyards to south of Lower Prospect Canal
- implications of possible public transport connection

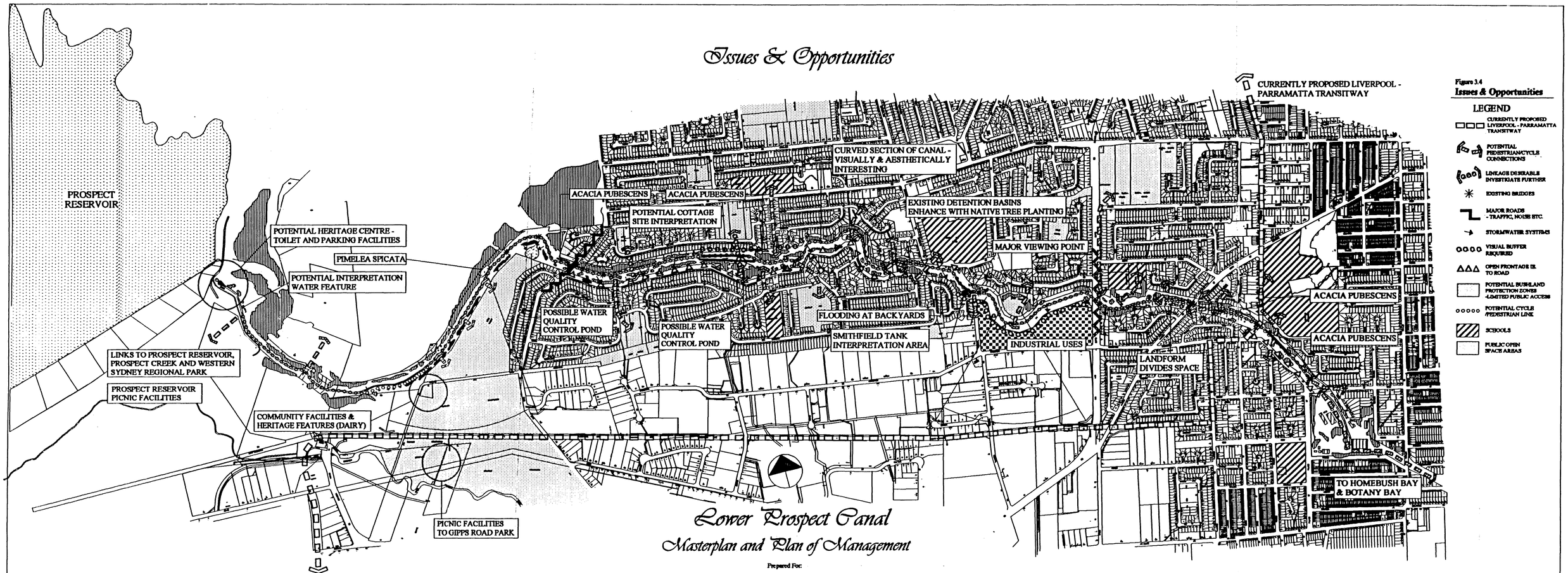
Unit 6 Canal Road Reserve to Cumberland Highway (Cumberland Highway)
- factories adjacent to the Lower Prospect Canal corridor - good neighbour relationship needs to be encouraged
- poor visual quality of edges to industrial and residential development
- lack of tree canopy
- visual and noise exposure to Cumberland Highway

Unit 7 Cumberland Highway (Cumberland Highway) to east edge of Holroyd Public School
- implications of possible public transport connection
- visual and noise exposure to Cumberland Highway

Unit 8 east edge of Holroyd Public School to Sherwood Road
- earthworks to Lower Prospect Canal visually divide the north and south sides of corridor
- steep side slopes of earthworks - erosion prone, maintenance problem, and restrict potential access
- sparse tree canopy to south side
- treatment of residential edges required to enhance visual character
- narrow section of Lower Prospect Canal corridor

Unit 9 Sherwood Road to Albert Street (Guildford Pipehead)
- conservation of Greybox Eucalypts and Acacia pubescens plantings required
- conservation of significant Canary Island Palms to Guildford Pipehead required
- sparse tree canopy to much of the area
- treatment of residential edges required to enhance visual character
- narrow section of Lower Prospect Canal corridor
- structural condition of Sedimentation Basin - requires maintenance work.

Issues & Opportunities



Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:

Metroplitan Regional Parks Unit

National Parks & Wildlife Service

Figure 3.4

Issues & Opportunities

LEGEND

- CURRENTLY PROPOSED LIVERPOOL - PARRAMATTA TRANSITWAY
- POTENTIAL PEDESTRIAN/CYCLE CONNECTIONS
- LINKAGE DESIRABLE INVESTIGATE FURTHER
- EXISTING BRIDGES
- MAJOR ROADS - TRAFFIC, NOISE ETC.
- STORMWATER SYSTEMS
- VISUAL BUFFER REQUIRED
- OPEN FRONTAGE TO ROAD
- POTENTIAL BUSHLAND PROTECTION ZONES -LIMITED PUBLIC ACCESS
- POTENTIAL CYCLE /PEDESTRIAN LINK
- SCHOOLS
- PUBLIC OPEN SPACE AREAS

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Opportunities relating to the Corridor

Opportunities are the qualities of the site which make it suitable for community or recreational uses/ activities, and that should be optimised in management and planning:

Natural / Environment

- extension and enhancement of Grey Box Woodland - Core Biodiversity values
- implementation of bushland management programme to control weeds and encourage regeneration
- improvement of fauna habitat qualities
- provision of detention ponds also acting as fauna habitat and landscape features

Social

- improved social interaction for both local residents and regional users
- potential resident and regional user involvement in park management and maintenance.
- improved access between residential areas north and south of Lower Prospect Canal
- active community groups interested in project

Recreational

- potential regional access connections north and south of the site should be explored -, potential linkages between Botany Bay and Blue Mountains, Western Sydney Regional Park to Homebush Bay, Parramatta to Wollongong amongst others.
- links to adjoining open space - Prospect Reservoir, Prospect Creek, Duck River, Central Gardens, Gipps Road Park, previously proposed Arboretum etc.
- greater local significance and role of open space due to increased areas of medium density housing
- site highly suitable for passive recreation - walking, cycling, jogging
- potential to convert existing maintenance track along Lower Prospect Canal into path linkage

Educational

- potential environmental classroom
- close relationship to several schools - off road access connection
- potential involvement of schools in environmental management
- community bush regeneration programmes

Heritage

- historical preservation will add to character of open space area
- heritage structures in reasonable condition - good potential for restoration and conservation.
- heritage values can integrate well with open space, access, and passive recreation values
- potential for establishment of Sydney Water Supply Museum at either Prospect Reservoir or Guildford Pipehead
- potential for interpretive displays in existing structure (for example Inverted syphon towers).

Intrinsic

- potential to extend urban bushland qualities
- potential regional linkages and connections to open space, facilities, and commercial and industrial areas for commuter and recreational use

Visual

- potential to address areas of poor visual quality to improve overall landscape character
- potential to optimise lookout and vista locations

Cultural

- potential for special events - fun runs, cycle rallies, heritage days, and other community gatherings

Legacy for future generations

- heritage conservation, and biodiversity enhancement.
- off road cycle access network for Sydney

Opportunities relating to specific Units

Unit 1 Western Boundary of Study Area to Gipps Road
- public access link to Prospect Reservoir and Open space corridor to the west (Western Sydney Regional Park).
- potential water quality control pond to head of Munro Creek
- potential link / integration with Hyland Road open space
- potential sharing of facilities with Hyland Road open space
- optimise views to south
- reinforce heritage tree plantings
- proximity to Liverpool Parramatta Transitway

Unit 2 Gipps Road to Greystanes (Boothtown) Aqueduct
- heritage interpretation of previous buildings related to Lower Prospect Canal (Cottage, Store House)
- conservation and interpretation of Gipps Road bridge structure
- enhance bushland regeneration and habitat values of woodland

Unit 3 Greystanes (Boothtown) Aqueduct
- opportunity for conservation of flora and fauna, bushland regeneration
- conservation and interpretation of Greystanes (Boothtown) Aqueduct and Syphon
- potential connection to Nemesia Street Park, Alpha Street Park, and Greystanes Sports Centre
- potential outdoor classroom for Widemere Public School and Greystanes Public School
- potential water quality (and flow retardation) control pond to creekline

Unit 4 Greystanes (Boothtown) Aqueduct to Bayfield Road
- visually interesting curves of Lower Prospect Canal structure should be optimised
- access connection to Hopman Street through adjoining reserve.

Unit 5 Bayfield Road to Canal Road Reserve
- potential conservation and interpretation of Smithfield Tanks
- potential outdoor classroom for Holroyd High School
- optimise views to south

Unit 6 Canal Road Reserve to Cumberland Highway (Cumberland Highway)
- potential connection to existing open space of Canal Road Park
- optimise views to south
- fFactories adjacent to the Lower Prospect Canal corridor - good neighbour relationship can be established
- involvement of businesses in corridor improvement works

Unit 7 Cumberland Highway (Cumberland Highway) to east edge of Holroyd Public School
- potential outdoor education resource room for Merrylands West Preschool Kindergarten and Sherwood Grange Public School
- potential cycle / pedestrian connection to Central Gardens

Unit 8 east edge of Holroyd Public School to Sherwood Road
- elevation of Lower Prospect Canal provides outlook to south
- proximity to Liverpool Parramatta Transitway

Unit 9 Sherwood Road to Albert Street (Guildford Pipehead)
- potential outdoor classroom for Merrylands High School and Cerdon College
- conservation and interpretation of sedimentation channel
- potential link into Guildford Pipehead and beyond via the pipeline corridor
- potential to use Guildford Pipehead grounds as a museum/heritage site

3.5 Desired Outcomes

Desired outcomes are the fundamental expectations and directions upon which planning and management strategies must be developed and evaluated.

Natural / Environment
- retain and enhance flora values of corridor
- retain and enhance fauna habitat values of corridor
- improve stormwater management and water quality
- maintain and enhance visual and landscape quality

Social
- balance local residential issues with regional open space values of corridor
- minimise adverse impacts of regional open space usage
- optimise potential for community involvement in park management and maintenance

Recreational / Open Space
- develop the corridors potential as part of a regional open and access space network (recreational and commuter) linking the city to the Blue Mountains via Prospect Reservoir and the Western Sydney Regional Park
- optimise passive recreational quality and opportunities
- integrate with existing or future recreational facilities and amenities
- optimise potential for cross Lower Prospect Canal pedestrian links to improve public circulation

Educational
- develop the corridors potential as outdoor classroom for environmental and heritage education
- optimise spatial and access connections between corridor and schools

Heritage
- optimise heritage conservation values of the site in a cost effective and sustainable manner
- protect heritage qualities from adverse impacts of wider public exposure
- facilitate Heritage interpretation through conservation presentation and signage
- integrate regional Aboriginal heritage into heritage interpretation.

Intrinsic
- maintain innate site qualities
  - peaceful character
  - urban bushland
  - cultural heritage significance

Visual
- optimise elevated outlook
- ameliorate and enhance areas of poor visual quality

Cultural
- promote profile of corridor as valued community asset
- optimise potential for community activities within corridor

Legacy for future generations
- future generations to recognise and understand the significance of the corridor in environmental, heritage and open space terms
- optimise role of corridor in Holroyd's open space system
- optimise role of corridor in the regional open space system

Management
- establish appropriate management structure that maximises benefits of stakeholder inputs
- establish a staged programme of improvements works
- identify appropriate development / management responsibilities
- identify funding requirements and facilitate the funding of required open space improvements
- establish an appropriate maintenance plan, identify costs, and facilitate funding.

4.0 MANAGEMENT STRATEGIES

4.1 Management Approach

The Management Strategies incorporated in this Plan of Management reflect a value based approach as outlined in "Succeeding with Plans of Management" (DLAWC & Manidis Roberts - 1996). As identified in that document this approach is based on the assumption that:

"community values change at a much slower rate than issues. Depending on the population, values may remain constant for up to a generation and beyond. The rationale behind using values is that once they are documented you can easily deal with issues that may arise after the Plan of Management has been prepared".

The first component of the management strategies is the Management Strategy Framework. This establishes a series of responses and required actions to the site's identified values and desired outcomes for the future management of the Lower Prospect Canal site. Whilst broad in their scope the actions identified will provide a basis for the development of planning directions and detailed management strategies.

4.2 Management Strategy Framework

The following Management Strategy Framework has been prepared as a basis for management decisions within the Lower Prospect Canal study area as open space and environmental improvements evolve over the next 10-15 years. The framework establishes principles for development of the Landscape Masterplan. The Masterplan will provide a planning structure on which to formulate detailed design schemes for implementable improvement projects as funding becomes available.

Figure 4.1 on the following page outlines the recommended management responses to the key site issues under the following categories: -definitions are based on those provided in "Succeeding with Plans of Management" (DLAWC and Manidis Roberts - 1996).

Value:	the qualities of community land that are significant, special or important and that we wish to protect or enhance.
Desired Outcome:	the optimum outcomes, expectations, and directions upon which decision making should be based (also known as goals, aims and objectives).
Issues:	opportunities and problems that affect management and usage of community land.
Strategies:	how to achieve the desired outcome.
Action:	practical, achievable and measurable responses to implementing management strategies.

The Management Strategies Framework chart is supplemented by a detailed description of the recommended actions (Chapter 4.3) under specific technical and open space management categories.

Figure 4.1
MANAGEMENT STRATEGY FRAMEWORK - LOWER PROSPECT CANAL

ITEM	VALUE	DESIRED OUTCOME	ISSUE	STRATEGIES	ACTIONS
1.1	Natural / Environment - Bushland (flora habitat)	Conserve and extend bushland areas of site as an identified Core Biodiversity Area (NPWS 1997)	• Protection and enhancement of Grey Box Woodland community. • Retain existing natural changes in plant alliances along the corridor • Compatibility with conservation objectives for Gipps Rd open space • Weed eradication as necessary • Impact of maintenance regime on flora	• Maximise bush areas • Planning for site to incorporate protection and extension of bushland zones. • Improve quality of existing bushland zones through weed management as required • Provide ongoing bushland management to maintain quality flora habitat. • Establish appropriate maintenance regime to optimise flora habitat values	i. Extend native vegetation zones in site planning. ii. Develop detailed bushland management and maintenance plan (based on Plan of Management strategies) as part of coordinated approach for the Lower Prospect Canal iii. Implement coordinated weed eradication and bush regeneration programme for the Lower Prospect Canal site. iv. Provide buffer zone / control access between maintained grassed area and bushland / regeneration zones (eg pathway / fences).
			• Public recreational access has potential to impact on flora values	• Planning and management of recreational activities to avoid impact on flora values	v. Planning to delineate bushland protection areas to control public access
			• Bushfire potential	• Planning to consider fire management and fire fighting access (to minimum required)	vi. Provide for fire fighting access vii. Provide fuel reduced zones (at minimum required) to residential edges where appropriate
1.2	Natural / Environment - conservation of endangered flora	Conserve and extend existing stands of threatened flora.	• Protection and enhancement of populations of nationally threatened species: - *Pimelea spicata* - *Acacia pubescens* and regionally rare species: - *Native Penny royal* - *Wild Sorghum* - *Pea Flower*	• Identify and fence off (note: use minimal fencing required) areas providing habitat for threatened species until new management in place. • Provide for management and extension of nationally threatened and regionally rare species	viii. Prepare species management subplans for threatened and vulnerable species in conjunction with ii. above (Pimelea spicata & Acacia pubescens) ix. Management authority to implement fencing to existing stands of rare species x. Implement species management subplans
1.3	Natural / Environment Bushland (fauna habitat)	Conserve and enhance the fauna habitat qualities of the site.	• Impact of maintenance regime on fauna habitat (disturbance / foraging and shelter). • Public recreational access has potential to impact on fauna values.	• Broaden and thicken bushland zones to provide tangible habitat areas. • Link tree canopy and where possible understorey vegetation to provide fauna movement corridors.	i. Expand bushland zones through site and achieve linking of tree canopies through designation of bushland protection areas
				• Control pedestrian and cycle access.	ii. Ensure pedestrian access caters for desired lines and effectively directs pedestrian/cycle traffic away from natural vegetation areas.
				• Restrict passive recreation uses to defined areas	iii. Site Planning to incorporate usage zones which delineate suitable zones for activities through appropriate landscape treatment.
			• Vegetation management on creeklines - potential impact on bird habitat	• Removal of exotic vegetation along creeklines to be managed to avoid impact on bird habitat	iv. Incorporate in Bushland Management Plan as per 1.1 item ii.

Figure 4.1
MANAGEMENT STRATEGY FRAMEWORK - LOWER PROSPECT CANAL

ITEM	VALUE	DESIRED OUTCOME	ISSUE	STRATEGIES	ACTIONS
1.4	Natural / Environment - conservation of endangered fauna	Conserve and extend suitable habitat for populations of threatened fauna.		• Identification and development of site characteristics that provide habitat value for threatened species and for appropriate introduced bird and fauna species	i. Prepare fauna management plan examining the site's identified threatened species profile and outlining detailed actions for each based on the management strategies incorporated in this POM. ii. Incorporate general fauna management strategies into site planning iii. Implement fauna management strategies on site
1.5	Natural / Environment - Water Quality	Improve stormwater management on the site and to adjoining sites.	• Holroyd City Council's piped stormwater systems downstream of the site have limited capacity .	• Investigate opportunities for provision of detention basins on the canal site to provide storage and water quality improvement for piped systems.	i. Identify suitable locations for detention basins (with regard to engineering, open space planning, and social issues). ii. Carry out detailed assessment and design for implementation of detention basins. iii. Implement detention basins and related landscape improvements iv.Provide ongoing monitoring of storm events and water quality to identify improvements achieved
		Improve quality of stormwater run-off from site.	• Quality of urban runoff that exits or passes through site has impact on ecology of Prospect Creek system		
		Incorporate water management as landscape feature within site. (note retain existing natural wetlands)	• Water will add to recreational experiences available within site.	• Incorporate on site detention into park planning.	As per i. - iii. for 1.4 above iv. Investigate potential for incorporation of water feature elements that aid water management within park planning
1.6	Natural / Environment - Open Space	Conserve and enhance the sites value as an open space corridor	• Retention of full corridor lands as open space is desirable • Need to manage recreational use of the site to avoid conflicts with other values	• Plan of Management to optimise the open space corridor vales of the Lower Prospect Canal through planning and management strategies.	i. Planning strategies to define recreational usage areas and access connections to avoid impacts on environmental values of corridor .
2.1	Social - Benefits to local residents	Balance local resident issues with regional open space values of corridor	• Local residences benefit from the site's natural characteristics (peace, native trees, visual, screening, fauna)	• Planning and management to enhance physical qualities of site that make it attractive to local residents.	i. Extend where appropriate native tree canopy and related understorey communities. ii. Establish rationale for treatment of residential edges that has regard to: - maintaining visual context of open space for residents - enable access links for those residents who wish to access corridor - provide a visual buffer to backyards from the corridor. - recognition of bushfire issues

Figure 4.1
MANAGEMENT STRATEGY FRAMEWORK - LOWER PROSPECT CANAL

ITEM	VALUE	DESIRED OUTCOME	ISSUE	STRATEGIES	ACTIONS
2.1 *continued*	Social - Benefits to local residents	Minimise potential impacts of regional open space usage / role of corridor on local residents.	• Potential for recreational use to create noise, and visual disturbance to residences. • Security.	• Recreational usage to be focussed on those with an acceptable level of environmental effect compatible with the residential context and environmental qualities of the canal.	iii. Selection of appropriate uses for the site to be based upon potential level of environmental and social effects iv. facilities for canal users to be provided through use of amenities in adjoining open space areas eg. Gipps Rd. Prospect Reservoir.
2.2	Social - Potential linkages to residential and open space areas	Maximise linkages to adjoining residential and open space areas	• Some residential areas (eg north west of canal) do not have easy / direct access to canal corridor.	• Identify existing linkage options and reinforce with	Refer to Item 3.1 - recreation
2.3	Social - Regional significance as open space	Optimise the role of the corridor as a regional asset		• Facilitate open space connection to Prospect Reservoir lands and links to adjoining local open space	i. Establish access links as outlined in 3.1 Recreation ii. Liaise with Sydney Water to facilitate incorporation of open space connection to Prospect Reservoir as part of either open space management area iii. Establish visual and functional connections to adjoining open space areas (eg. Canal Rd and Hyland Ave) iv. Monitor ongoing development of recreational foreshores to Prospect Reservoir. v. Monitor development of open space corridor connection to West. Sydney Regional Park. vi. Provide appropriate signage: - directional - interpretive - general information
2.4	Social - Community Involvement	Optimise potential for community involvement in improvement and maintenance	• Necessity for coordination of community inputs through management authority	• Management Authority to facilitate involvement of community in management, enhancement, and maintenance of open space	i. If title transferred to HCC - Park Committee (in accordance with Local Govt Act) to be established to operate under the management authority to have input into: - implementation of the plan of management - funding of open space improvements. - ongoing management decisions - maintenance

Figure 4.1
MANAGEMENT STRATEGY FRAMEWORK - LOWER PROSPECT CANAL

ITEM	VALUE	DESIRED OUTCOME	ISSUE	STRATEGIES	ACTIONS
3.1	Recreation - potential as regional pedestrian / cycle link	Optimise potential of corridor as regional access linkage	• Current site area does not incorporate linkage to Prospect Reservoir - to be followed through as fundamental requirement • Regional access linkages are subject to implementation of other plans and strategies in addition to Lower Prospect canal • Filling works evaluated as preferred method of making canal safe • Signage required that integrates with natural environment	• Develop corridor as pedestrian cycle access of regional significance linking to open space, commercial centres and adjoining residential development	i. Planning to incorporate provision of a pedestrian cycle way with under road connections ii. Planning to incorporate path connections to residential areas and schools through existing frontages and open space easements. iii. Planning to investigate potential for path links to residential areas and schools where none are currently feasible. iv. Implement path linkages in corridor: - cycle pathway (& maint. route) - cross corridor links (cycle / Ped'n) - general ped'n paths to corridor v. Follow through with Sydney Water path connections to Prospect Reservoir in the west, along the Water Supply Pipeline to the east, and to the Upper ProspectCanal vi. Encourage development through other LGA's, government and private lands of corridors proposed in other planning strategies. vii. Liaise with Upper canal and Western Sydney Regional Park Management authorities.
		Optimise commuter access values of corridor	• Access provision must be easily accessible and direct between areas of travel for practical commuter use.	• Provide connections to the corridor through existing open space and street frontages, in addition to following up potential links through residential areas. • Optimise linkages to provide direct access between residential, commercial and industrial areas along with public transport links	as per i. - vii. for item 3.1 above viii. Coordinate with Holroyd Cycle Plan to ensure nominated routes follow through to commercial centres, public transport links etc. ix. Encourage local schools & industries to provide safe bicycle storage areas. Refer 'Bicycle Storage & Parking Facilities: Their provision & management (July 1998)' from Bicycle NSW.
		Optimise passive recreational quality and opportunities	• Potential conflicts with local resident values	• Recognise regional open space significance - enhance awareness amongst local residents of significance and need for acceptance of regional usage with ameliorative actions in planning and management	x. Residents to be made aware through Plan of Management and possible Park Committee involvements of regional significance and the need to accommodate regional use. xi. Planning and management strategies to maximise use of adjoining open space areas for provision of amenities xii. Planning to control / direct passive recreational usage so as to minimise potential conflicts

Figure 4.1
MANAGEMENT STRATEGY FRAMEWORK - LOWER PROSPECT CANAL

ITEM	VALUE	DESIRED OUTCOME	ISSUE	STRATEGIES	ACTIONS
3.1 continued	Recreation - potential as regional pedestrian / cycle link	Optimise passive recreational quality and opportunities	• Safety of canal structures	• Provide infilling or other enclosure measure to make open canal safe for public access whilst keeping with heritage objectives. Make good all other structures to be safe for public access to site.	xiii. Develop filling and surface treatment approach that maintains the character of the canal as a linear element - eg. filling with turf surface. xiv. Carry out detailed structural investigations of issues identified in POM - confirm detailed actions. xv. Implement recommendations of structural review prior to opening of subject areas to public access
			• Implications of possible need to stage filling works: - will enable use of limited areas only by public - complicates management / maintenance arrangements	• Aim to achieve maximum extent of filling to minimise need for staging, and make safe larger extent of site.	xvi. Develop strategy for filling works: - identify potential sources of fill - identify extent of filling likely to be achievable as first works - if require establish priorities for staging that consider: safety, environ. improvement, structural constraints & useability by public - prepare detailed engineering design for filling works
		Integrate with existing of future recreation facilities and amenities	• adjacent areas provide potential for amenities (eg Canal Rd Reserve / Hyland Rd open space) but none are currently provided	• Shared use of amenities (eg. toilets / BBQ's) in adjoining open space areas	xvii. Identify potential locations of shared amenities xviii. Investigate funding provision of shared facilities - both local and regional significance - implement construction
		Provide safe under road links at road crossings		• Use canal corridor to underpass road bridges	xix. Design under bridge crossings based on principles developed in POM xx. Implement under bridge pathways and related lighting
		Provide for effective cross canal access	• Existing bridge accesses provide limited crossing points if the canal is not infilled.	• Identify strategic crossing points for both local and regional use and provide safe and effective access	xxi. Integrate identified crossing points with preferred canal treatment and incorporate in planning recommendations
		Provide effective information system to assist canal access users		• provide themed signage to provide users with information on regional local linkages and facilities	xxii. Prepare information signage strategy xxiii. Implement signage strategy
4.1	Educational - heritage awareness	Conserve and facilitate interp'n of canal heritage values for education		• Establish conservation strategy within POM, and facilitate interpretation of heritage values by the public and educational users.	refer to items i. - iv. item 5.1 - Heritage
4.2	Educational - botanical and environmental education	Conserve and enhance environmental education qualities of the canal		• Facilitate educational use of the corridor	i. Carry out strategies and actions as outlined for flora and fauna enhancement - items 1.1 - 1.5 ii. Prepare botanical and environmental education package for distribution to educational organisations across Sydney.

Figure 4.1
MANAGEMENT STRATEGY FRAMEWORK - LOWER PROSPECT CANAL

ITEM	VALUE	DESIRED OUTCOME	ISSUE	STRATEGIES	ACTIONS
4.3	Educational - use by local schools	Maximise potential for use of corridor for outdoor education and to facilitate links between schools		• Schools to be encouraged to use canal corrdior for environmental and heritage education	i. Management authority to liaise with schools and assist in facilitating using through appropriate means
				• Maximise potential for school involvement in enhancement and maintenance of corridor as educational and community exercises.	i. Schools to be advised on ongoing environmental programmes to facilitate integration with school programmes
5.1	Heritage - specific heritage significance of Lower Prospect Canal Note: *refer to section 4.3.3 - for detailed management strategies*	Optimise heritage qualities of Lower Prospect Canal as nationally and internationally significant cultural heritage item	• Although full retention of canal structure would be a preferred strategy in pure heritage - this is precluded by: - poor condition of canal structure in particular concrete tiles and tie fixings	• Retain appropriate components of the canal structure that provide a representative example of the canals important heritage fabric - and enable the canals heritage significance to be understood by public users	i. Establish conservation strategy and associated management principles in POM ii. Prepare detailed conservation plans on canal components as identified by the POM conservation strategy, including detailed photographic and descriptive survey of areas to be filled/modified
			- necessity to provide a safe environment if public access is to be allowed	• Maintain the essential visual context of the canal (in an open space setting) - which is a significant aspect of its heritage legibility to users. (as identified in Heritage Study- 1993) • Maintain key visual and design references that can assist in understanding of the canal's heritage	iii. Based on the POM conservation strategy, develop a detailed Heritage Interpretation Strtegy for signage requirements etc. iv. Conserve as appropriate existing elements in order to maintain cultural significance and to aid in the interpreation of the place v. Involve relevant heritage organisations in enhancement and management of heritage items under overall canal management, including the Institution of Engineers Heritage Committee vi. Prepare package of heritage information suitable for general distribution and use by schools and other educations and organisations. vii. Follow up with Sydney water the potential for a water supply history museum at either Pipe Head or Prospect Reservoir - to integrate with canal corridor viii. Involve Heritage Council of NSW in Heritage Management of corridors resources
		Optimise potential for interpretation and education of heritage values			refer items 4.1 - vi. - viii. ix. Carry out structural rectification works in accordance with detailed recommendations - refer item 3.1 xi-xii

Figure 4.1
MANAGEMENT STRATEGY FRAMEWORK - LOWER PROSPECT CANAL

ITEM	VALUE	DESIRED OUTCOME	ISSUE	STRATEGIES	ACTIONS
5.2	Heritage - component of Upper Nepean Scheme *refer to section 4.3.3 - for detailed management strategies*	Optimise European heritage qualities of Upper Nepean Scheme as nationally and internationally significant cultural heritage item	• The context of the Lower Prospect Canal as a component of the Upper Nepean System increases it's heritage significance - as such conservation of the heritage qualities of the Upper Canal is also important	• Maintain close links with Sydney Water to coordinate potential for integration of heritage goals and management of the Lower Prospect Canal with the Upper Canal and Prospect Reservoir	refer item 4.1 - vii i. Management authority to maintain close links with Sydney Water to monitor open space potential and heritage conservation of Upper Canal as a complimentary open space resource to the Lower Prospect Canal
5.3	Heritage - Aboriginal culture of the region	Recognise any roles of canal lands in aboriginal heritage / culture and maximise benefits of canal open space for interpretation of aboriginal heritage / culture			i. Identify significance of the corridor for registered archaeological sites ii. Involve a representative of the Dharruk Land Council in detailed design development of park works.
6.1	Intrinsic - peaceful	Open space usage to conserve site qualities of: -peaceful character -urban bushland -cultural heritage	• potential conflicts between local resident values and regional open space significance • close proximity of residential housing to corridor lands	• Reinforce buffer zones to residential areas, and locate high usage areas in areas of lower potential impact to residential uses	i. Reinforce tree and understorey veg'n buffer to north'n side of canal between: - Gipps Rd and Cumberland Rd west, and - to canal lands adjoining residential property boundaries and on southern side of canal between: - Daffodil St and Percival Rd - Betts Rd and Sherwood Rd - Bristol and Albert Streets ii. Establish bushland protection zones to these areas and restrict public access.
6.2	Intrinsic - urban bushland	Conserve and enhance bushland qualities of site	covered by Natural / Environment	covered by Natural / Environment	covered by Natural / Environment
6.3	Intrinsic - strategic location	Optimise open space benefits of site location for both local and regional users	• Regional function relies on other sites being developed for access and open space connections as currently proposed in related planning strategies.	• Develop open space and access qualities of Lower Prospect Canal which can provide impetus to other components of regional open space and access links.	ii. Management Authority to monitor progress of related links to: - Sydney Water pipelines - Sydney Water Prospect Reservoir lands - Cooks River Corridor - Blacktown, Penrith, and Blue Mountain City Council cycle links. iii. Management Authority to monitor progress foreshore recreational open space to Prospect Reservoir
7.1	Visual Urban Bushland	Retain and enhance visual character of corridors urban bushland	refer 1 - 4 - Natural / Environment	refer 1 - 4 - Natural / Environment	refer 1 - 4 - Natural / Environment

Figure 4.1
MANAGEMENT STRATEGY FRAMEWORK - LOWER PROSPECT CANAL

ITEM	VALUE	DESIRED OUTCOME	ISSUE	STRATEGIES	ACTIONS
7.2	Visual Elevated views	Conserve and enhance elevated views to south from corridor.	• Residential and industrial development in close proximity to corridor requires buffer screening with indigenous species that potentially will affect distant views.	• Enhance and focus significant views from corridor to south integrating with screen planting where required.	i. Identify optimum viewing points along the corridor. ii. Reinforce viewing points with planting as appropriate iii. Plan and implement indigenous screen planting to residential and industrial edges requiring treatment
8.1	Cultural Lifestyle enhancement for local residents	Conserve and enhance lifestyle benefits to local residents of canal open space	• Potential conflicts of open space usage of the canal with local resident values if facilities provided in canal corridor.	• Enhance lifestyle benefits of canal to local residents through improved visual, environmental and access qualities.	Refer item 3.1 - vii - ix i. Bush protection zones as identified in 6.1 - i. - ii. to be established ii. Follow through with proposed regional open space and access enhancements as outlined in Chapter 3. that will improve access for locals to commuter and recreational path connections
8.2	Cultural Open space and recreation	Site to become recognised community focus both in local and regional context.	• Site has already been focus of community interest and activity - interest and energy to be focussed positively	• Optimise community interest and input towards implementing POM recommendations	i. Implementation and management authorities to facilitate community involvement by: - local residents - heritage and environmental groups - cycle interest groups - Land Councils
8.3	Cultural environmental awareness	Encourage sense of community pride and custodianship for study area and valley beyond			i. Following public exhibition and finalisation of POM, incorporate community in implementation of park development - eg: - Weed Management - Planting Days
9.1	Future - Relationship to adjoining open space	Optimise links to adjoining local open space areas	• Adjoining local open space areas subject to ongoing development	• Establish Lower Prospect Canal as major open space resource for Holroyd LGA - HCC to follow through with enhancementof adjoining open space areas eg Hyland Rd and Canal Rd as appropriate	i. POM to identify linkages to adjoining open space areas - Canal Rd & Hyland Rd ii. HCC to incorporate complimentary planning and management strategies in future planning and POM development. of these open space areas iii. HCC to incorporate improvements works in corporate plans and grant funding applications
9.2	Future - Access and open space linkages	provide integrated network of access and open space links connecting to Sydney wide system and beyond.	• Full scope of linkages through Sydney region subject to ongoing development • Coordination required with Heritage interpretation of broader region	• Reinforce Lower Prospect Canal as key access connection and cultural and environmental resource through development of path links and conservation and enhancement of environmental and cultural values	i. Follow through with access link recommendations as per Item 3.1 ii. Monitor development of related access connections and follow up potential for coordinated approach to prioritising and funding regional cycle links

Figure 4.1
MANAGEMENT STRATEGY FRAMEWORK - LOWER PROSPECT CANAL

ITEM	VALUE	DESIRED OUTCOME	ISSUE	STRATEGIES	ACTIONS
10.1	Management - Management structure	Establish effective and efficient management structure able to implement both local and regional goals of POM	• mix of management authorities within one site - possible conflicts	• After review of potential options a preferred model for management be established that identifies responsibilities for: - ongoing title / ownership - funding and project management of major park works - ongoing management - ongoing maintenance	i. POM to identify a preferred option for implementation and management from the options as listed for Govt consideration: a. Retain as state lands - management by state Govt authority - *funding, management, and maintenance of open space area by State Govt auth.* b. Retain as state lands - care control and m'ment by HCC - *State Govt to fund and direct major park wks (filling, cycleway, bush regen'n) and rest'n of heritage items - implementation & ongoing m'ment & maint. by HCC* c. Title to be transferred to HCC - *special purposes NSW grants to fund major park wks (filling, cycleway, bush regen) and rest'n of heritage items - ongoing m'ment & maint. by HCC* d. Retain as state lands - care control and m'ment by HCC & State Govt auth for relevant sections of corridor - *State Govt to fund and direct major park wks (filling, cycleway, bush regen'n) and rest'n of heritage items - implementation & ongoing m'ment & maint. by HCC, and State Govt. auth.* e. Retain as state lands - care control and m'ment by Management Trust - *State govt to fund and direct major park wks (filling, cycleway, bush regen) and rest'n of heritage items - implementation & ongoing m'ment & maint. by Trust through state & local govt funding.* Refer to Section 4.4.1 for further info.
10.2	Management - Implementation	Implement POM recommendations in a cost effective manner in a reasonable timeframe		• State Govt. and Management Authority to coordinate and oversee an ongoing programme of implementation works	i. Establish priorities for implementation as a series of practical works packages. ii. State Govt to fund and oversee detailed design and implementation of key park improvement works. iii. Management Authority to coordinate inputs from other stakeholders and authorities / organisations to follow through implementation of other POM recommendations.

Figure 4.1
MANAGEMENT STRATEGY FRAMEWORK - LOWER PROSPECT CANAL

ITEM	VALUE	DESIRED OUTCOME	ISSUE	STRATEGIES	ACTIONS
10.3	Management - Funding	Major open space enhancement works to be facilitated in a reasonable timeframe	• Availability of capital works funding to develop masterplan proposals	• Provide funding resources for key works required for public open space usage commensurate with the regional environmental and recreational significance of the corridor	i. Establish broad funding requirements for implementation of proposed works. ii. Confirm items for high priority implementation for regional open space enhancement. - project will be required to be staged iii. Confirm finding availability from regional open space development sources iv. Management authority to follow through other sources of funding for ancillary works v. Ensure that capital works funding is kept separate from management and mainteance funding
10.4	Management - Maintenance	Provide an appropriate level of maintenance to required areas	• Current maintenance regime impacts on flora and fauna qualities. • Maintenance requirements must be minimised where possible. • Funding of ongoing maintenance costs	• Reduce areas of high intensity maintenance through planning, and facilitate maintenance to high use areas.	i. Planning to limit and define areas requiring high intensity recurrent maintenance. ii. Planning to delineate bushland protection areas where access and maintenance requirements will be minimised.

4.3 Management Strategies

The following policies and actions elaborate on the principles as listed in the Management Strategy Framework.

4.3.1 Context and Landuse

Generally

Context: The heritage study completed in 1993 by Edward Higginbotham and Associates and the Heritage Impact Review of Filling carried out for AWT in 1997 identified that the retention of the manmade character of the Lower Prospect Canal corridor is critical to it's effective heritage interpretation, as is retention of the canal as a continuous corridor. As such ownership, landuse, planning, and design proposals should reflect these objectives whilst ensuring that environmental objectives of bushland regeneration and optimise fauna habitat are achieved.

Landuse: Landuse of the Lower Prospect Canal is recommended to be focussed on passive recreational usage for a range of activities. The Community Working Group indicated it's preference for no facilities such as toilets shelters and barbeques on the site - as such it is suggested that users could adequately source such facilities at adjoining open space areas such as the Hyland Road open space, Gipps Road Park and Community Centre, Prospect Reservoir, and Central Gardens. Likewise there is potential for public facilities to be provided at the Guildford Pipehead with any future public adaptive reuse of this site.

With regard to seating provision the Community Working Group was again concerned that these may attract vandalism and undesirable gatherings. It is suggested that the provision of robust purpose built seating potentially integrated with landform in visible locations should be considered to cater for the needs of elderly, the disabled, and as rest points for park users.

Actions

Context:

- ***Lower Prospect Canal corridor should be retained in it's current form as a continuous land parcel.***

- ***Planning and design proposals should be developed having regard for recognising the site's culturally influenced character while optimising the flora and fauna habitat qualities of the site.***

- ***Site planning to take into account proximity to adjoining land uses.***

  The arrangement of path connections, recreational usage zones, and bush protection areas for native vegetation regeneration should be based on the following principles:
  - providing a vegetation buffer to residential areas without full visual screening (to maintain security surveillance)
  - arrange path links to delineate the edges of bush protection areas where possible
  - arrange path links to avoid random access over bush protection areas
  - provide passive recreational use zones readily accessible from residential areas, and separated by road corridors from residential areas.

Landuse:

- ***Preferred public usage of the site to be focussed on passive recreation to include:***
  - regional commuter and recreational cycle link
  - walking / controlled walking dog (leashed)
  - fitness
  - informal rest and recreation.

- ***Environmental function of the site to be enhanced to include:***
  - improved flora habitat and species diversity through facilitation of bushland regeneration
  - improved fauna habitat
  - ilmproved stormwater management

- ***Education (environmental and cultural heritage conservation)***

4.3.2 Cultural Heritage

General

The cultural significance of the Lower Prospect Canal and the Upper Nepean Scheme in general demands that the water supply system should be conserved and managed with a high level of care. A number of policies are therefore recommended to ensure this outcome.

Policy 1.
The cultural significance of the Upper Nepean Scheme demands that it should be conserved as a whole. While this does not mean that the whole system should be kept in operating condition, it does require that:

1. The whole course of the system should be conserved.
2. All significant elements should be conserved, in accordance with the recommendations of the Heritage Study of the Upper Canal, Prospect Reservoir & Lower Canal (Upper Nepean Scheme).
3. The corridor of the Lower Prospect Canal should be retained as a single element, with connections to Prospect Reservoir and Guildford Pipehead.
4. The upper rim or structure of the Lower Prospect Canal should remain visible or be denoted by some form of linear boundary for its complete length.
5. The deteriorating condition of the Monier plates and their attachment to the sides of the canal should not inhibit the conservation of the Lower Prospect Canal. The infill of the canal channel should stabilise this problem. Advice should be sought on whether this measure would actually slow down the rate of deterioration.

Policy 2.
The Upper Nepean Scheme should be conserved in a manner which retains its significance without bias or distortion. Measures which might distort the cultural significance of the place should be avoided. For example, substantial revegetation of the Lower Prospect Canal corridor with native plantings would distort the significance of the place.

In the conservation and management of a place, it is important to keep the significance of the site as a whole in proper focus. Any action which affects an item or element of the Lower Prospect Canal needs to be assessed for its impact on the whole, in terms of:

1. Minimising the changes to the place as a whole.
2. Avoiding distortion of the evidence.
3. Giving equal consideration to all aspects of cultural significance, without unwarranted emphasis on one aspect over others, or one period over others.
4. The conservation of an appropriate setting for the place.

The backfilling of the Lower Prospect Canal structure would by itself distort the cultural significance of the place, unless it is accompanied by a well designed interpretation and display strategy, including:

1. A selected number of areas where the profile of the canal structure is visible.
2. Sections of canal with running water to indicate its original function.

An important opportunity exists for the interpretation and display of the Lower Prospect Canal at the top end of the canal or Receiving Basin. The Upper and Lower Valve Houses, together with the short section of open canal at the Receiving Basin could be interpreted and displayed to great advantage by the use of running water in the Receiving Basin and along a short section of canal. The water could be recycled by pump, in order not to waste potable water from the Prospect Reservoir.

Policy 3.
The future use of the Lower Prospect Canal should not take priority over the cultural significance of the water supply system.

Future uses should complement the conservation objectives and should enhance the significance of the place. Any use which requires substantial changes to the structures of the Lower Prospect Canal should be avoided.

Policy 4.
Measures used to conserve or develop the Lower Prospect Canal should be reversible, so that the system may be reinstated in future, if required.

The current level of deterioration of the fabric of the Lower Prospect Canal should be addressed in any proposal for future use. Any proposed use should also have a beneficial effect on the stability and maintenance of the structure.

Policy 5.
A high priority should be given to the interpretation and display of the Upper Nepean Scheme.

Apart from the conservation and management of a place, there is also an obligation to interpret and display a significant site, in such a way as to explain the importance of the place to the general public, without bias, distortion or undue emphasis on one item over another, or one period over another. The explanation and interpretation of the place must clearly indicate why the place has been conserved and its heritage values. It should enable a wider appreciation and a greater understanding of the place.

This obligation to interpret and display may be considered in terms of the ability of the place to demonstrate a way of life, taste, custom, process or function of particular interest. This factor was given greater emphasis by J. S. Kerr in the assessment of cultural significance in the second edition of his book, entitled The Conservation Plan. This may be described as its educational or public significance. One of the principle means of imparting the educational or public significance of a place is through interpretation and display.

Policy 6.
Integration of Lower Prospect Canal with neighbouring heritage items.

The Lower Prospect Canal should be linked and connected not only to the remainder of the Upper Nepean Scheme, but also to neighbouring heritage items, for example, the Hyland Road Dairy Farm Complex.

Policy 7.
Repository for archaeological relics and other heritage items.

The conservation of the Lower Prospect Canal requires the retention of all significant fabric, except where heritage items fall into distinctive groups or types. Examples from these groups or types should be conserved, the remainder should preferably be conserved, but if removed, the significant fabric should be retained with a view to future reinstatement.

Provision should be made in a suitable repository for the safekeeping of fabric removed from the Lower Prospect Canal during conservation, maintenance and reuse.

Actions

The following actions for the conservation and management of the Lower Prospect Canal are recommended in accordance with the Heritage Study of the Upper Canal, Prospect Reservoir & Lower Prospect Canal (Upper Nepean Scheme) 1993. The recommendations should be read in conjunction with the 1993 study:

- ***Archival Recording.***

  In compliance with the ICOMOS Burra Charter, Articles 23 and 28, the Lower Prospect Canal should be recorded to archival standard prior to disturbance of the place.

  Guidelines for archival recording were prepared by the NSW Department of Planning in 1994.

- ***Excavation permits.***

1. Prior to the commencement of works on the site, an excavation permit, under the Heritage Act of NSW, should be obtained (See the Relics Provisions of the NSW Heritage Act).

   The excavation permit may be obtained by a qualified archaeologist on behalf of the client. A permit may take 3-4 weeks to obtain from the Heritage Council of NSW.

2. Sufficient time and resources should be made available for the proper excavation and recording of archaeological features, discovered during the archaeological investigation.

3. The standard conditions of the excavation permit require the work to be completed to a high standard. The investigation should include:

   i. A detailed record of all features and structures discovered, using plans, photographs and written records.

   ii. A catalogue of all the artefacts and other relics recovered, including accurate provenance, description and interpretation.

   iii. The stabilisation, cleaning and packaging of all the artefacts, and the placement of the collection in a permanent repository.

   iv. The backfilling of the excavation, where appropriate.

   v. The preparation of a final report, including a description and interpretation of the excavation, detailed historical research, the contribution to research themes, and excavation method.

4. Any archaeological investigation should be carried out in accordance with the NSW Heritage Manual and specifically the *Archaeological Assessment Guidelines.*

- ***Conservation and management***

The Heritage Study of the Upper Canal, Prospect Reservoir and Lower Prospect Canal (Upper Nepean Scheme), makes the following recommendations for the conservation and management of the Lower Prospect Canal:

1. Permanent Conservation

The following inventory items should be permanently conserved.

Inventory Number	Item Type	Type Number
10	Covered Way	
20	Canal	12
28	Greystanes (Boothtown) Aqueduct	5
29	Inverted Syphon	
38	Canal	11
48	Sedimentation Channel	

All sections of the canal should be conserved. This may partly be achieved by infilling of the structure, although it will be necessary to retain some open sections. Advice should be obtained from a qualified conservation practitioner on the method and materials used in backfilling (See Policies 1 and 2).

2. Preferred Conservation

It is preferable that all the following items should be conserved. If this is not possible then the impact of removing an item should be assessed and only removed if the majority of other examples in the group can be conserved.

Item Type	Type Number	Inventory Number	Notes
Canal Overbridge	14	5	
Canal Overbridge	14	42	
Canal Overbridge	18	13	Lower Prospect Canal only
Canal Overbridge	18	15	Lower Prospect Canal only
Canal Overbridge	18	51	Lower Prospect Canal only
Cottage Site	22		
Culvert	4	16	Lower Prospect Canal Type 4 differs slightly from elsewhere in type of stone used.
Culvert	4	18	as above
Culvert	4	26	as above
Culvert	4	33	as above
Culvert	4	35	as above
Culvert	4	41	as above
Culvert	6	17	
Culvert	6	19	
Culvert	6	27	
Culvert	6	32	
Culvert	6	45	
Culvert	8	19	
Culvert	8	27	
Culvert	9	1	Lower Prospect Canal only
Culvert	9	6	Lower Prospect Canal only
Culvert	9	12	Lower Prospect Canal only
Culvert	9	14	Lower Prospect Canal only
Culvert	9	39	Lower Prospect Canal only
Culvert	9	44	Lower Prospect Canal only
Flume	3	3	
Flume	13	4	
Flume	16	8	Lower Prospect Canal only
Flume	16	36	Lower Prospect Canal only
Flume	16	43	Lower Prospect Canal only
Flume	17	9	Lower Prospect Canal only
Flume	17	11	Lower Prospect Canal only
Scour Valve	2	18	Lower Prospect Canal only
Scour Valve	2	31	Lower Prospect Canal only
Scour Valve	2	34	Lower Prospect Canal only
Scour Valve	2	40	Lower Prospect Canal only
Scour Valve	2	49	Lower Prospect Canal only

The minimum conservation requirement of one example in each group, as proposed by the Heritage Study, is no longer considered to be appropriate and should be replaced by this recommendation.

3. Conservation Plans

Conservation plans should be prepared for the following items (refer Figure 4.2) to determine appropriate conservation and management measures:

Item Type	Type Number	Inventory Number	Notes
Aqueduct	5	28	Greystanes (Boothtown) Aqueduct
Canal	11	38	Lower Prospect Canal (Monier Plates)
Canal	12	20	Concrete canal near Gipps Road
Canal Overbridge	14	5	
Canal Overbridge	14	42	
Canal Overbridge	18	13	
Canal Overbridge	18	15	
Canal Overbridge	18	51	
Covered Way		10	
Culvert	4	16	
Culvert	4	18	
Culvert	4	26	
Culvert	4	33	
Culvert	4	35	
Culvert	4	41	
Culvert	6	17	
Culvert	6	19	
Culvert	6	27	
Culvert	6	32	
Culvert	6	45	
Flume	3	3	
Flume	13	4	
Flume	17	9	
Flume	17	11	
Inverted Syphon		29	Greystanes (Boothtown) Inverted Syphon
Sedimentation Channel		48	Sedimentation Channel and Bypass

- ***Interpretation and display.***

  An Interpretation and Display Strategy or Plan should be prepared for the Lower Prospect Canal. It should seek to explain the importance of the place to the general public, without bias, distortion or undue emphasis on one item over another, or one period over another. The explanation and interpretation of the place must clearly indicate why the place has been conserved and its heritage values. It should enable a wider appreciation and a greater understanding of the place.

  The Interpretation and Display Strategy or Plan should seek to place the Lower Prospect Canal in its historical context of the Upper Nepean Scheme, and should also seek to integrate the place with neighbouring and associated heritage items.

- ***Relevant Legislation***

1. Relics provisions of the NSW Heritage Act

The *Heritage Act* contains various legal measures to protect historical archaeological resources.

Where historical research has revealed the location of historic settlement, experience has shown that the discovery of relics is highly likely once the soil is disturbed. When relics are revealed the Heritage Council must be notified. This may involve delay until appropriate arrangements can be made to record the archaeological remains. (Refer to Heritage Study of Upper Canal, Prospect Reservior, and Lower Canal - Higginbotham 1992 for identified archeological sites within the Lower Prospect Canal corridor.)

As a result, developers and others are normally advised that excavation permits must be obtained prior to undertaking works, which involve excavation or the disturbance of historic sites. In this way most delays can be avoided.

The NSW *Heritage Act* defines a 'relic' as:

any deposit, object or material evidence
a) which relates to the settlement of the area that comprises New South Wales, not being aboriginal settlement; and
b) which is 50 or more years old

Section 139 of the *Heritage Act* provides that:

A person must not disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved damaged or destroyed unless the disturbance or excavation is carried out in accordance with an excavation permit.

If a site is the subject of an order under Section 130, an Interim Conservation Order, or a Permanent Conservation Order, approval for an excavation is required under section 60 of the *Heritage Act.*

If a site is not the subject of an order under the *Heritage Act*, an excavation permit is required, in accordance with section 140.

Section 146 of the *Heritage Act* requires that the accidental discovery of relics should be reported to the Heritage Council of NSW.

When an item of heritage significance comes under the ownership or control of a public authority, the authority is required to record it in a Heritage and Conservation Register, under section 170 of the *Heritage Act.* The purpose of the provision is to alert the authority whenever works are proposed, which might affect the item.

2. *The ICOMOS Burra Charter*

Preamble
Having regard to the international Charter for the Conservation and Restoration of Monuments and Sites (Venice 1966), and the Resolutions of 5th General Assembly of the International Council on Monuments and Sites (ICOMOS) (Moscow 1978), the following Charter was adopted by Australia ICOMOS on 19th August, 1979 at Burra Burra. Revisions were adopted on 23rd February, 1981 and on 23rd April, 1998.

Definitions
Article 1. For the purpose of this Charter:

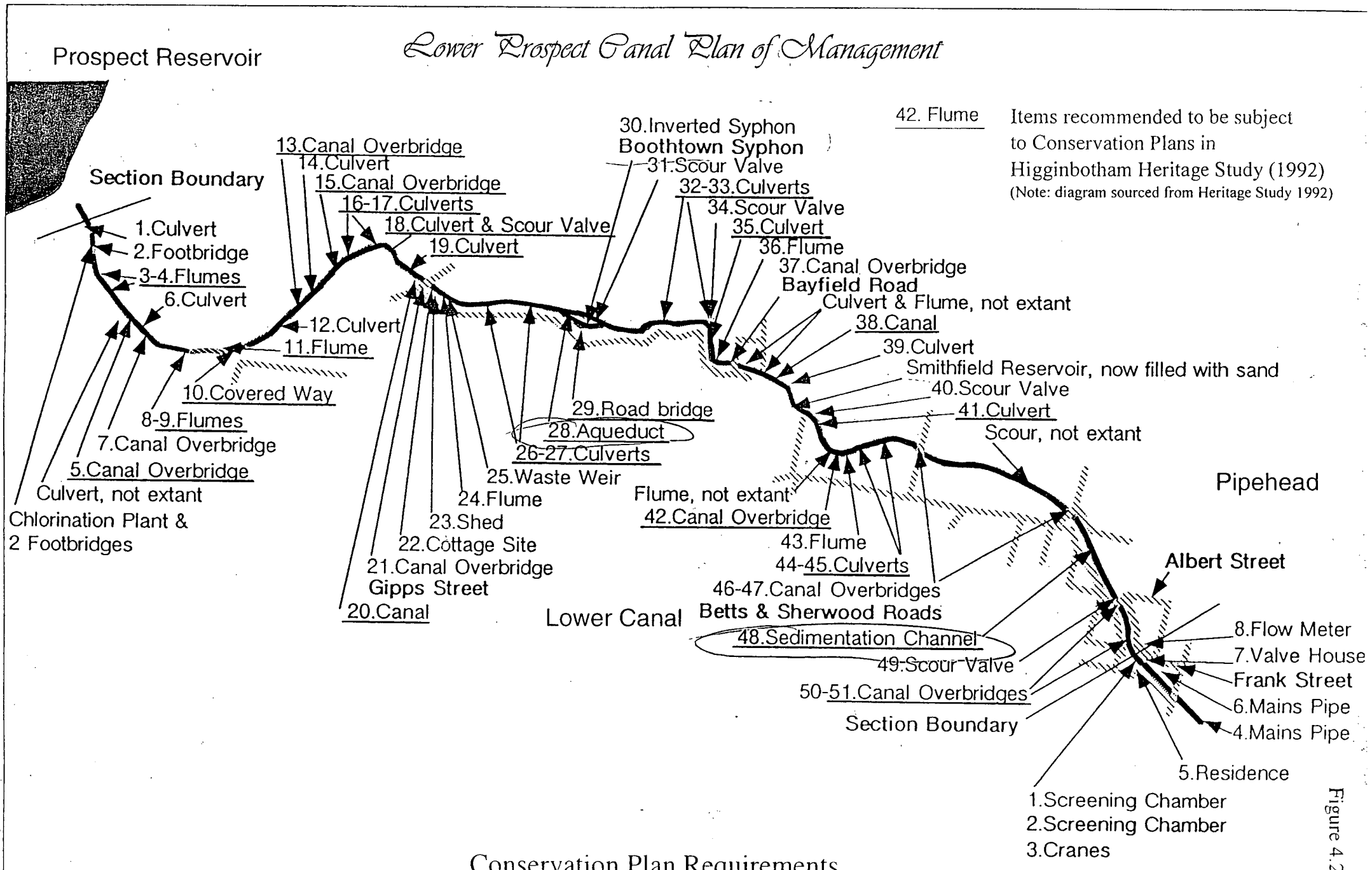
1.1 *Place* means site, area, building or other work, group of buildings or other works together with associated contents and surroundings.

1.2 *Cultural significance* means aesthetic, historic, scientific or social value for past, present or future generations.

1.3 *Fabric* means all the physical material of the *place.*

1.4 *Conservation* means all the processes of looking after a *place* so as to retain its *cultural significance.* It includes *maintenance* and may according to circumstance include *preservation, restoration, reconstruction and adaptation* and will be commonly a combination of more than one of these.

1.5 *Maintenance* means the continuous protective care of the *fabric*, contents and setting of a *place*, and is to be distinguished from repair. Repair involves *restoration* or *reconstruction* and it should be treated accordingly.



Conservation Plan Requirements

Figure 4.2

1.6 Preservation means maintaining the *fabric* of a *place* in its existing state and retarding deterioration.

1.7 *Restoration* means returning the EXISTING *fabric* of a *place* to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.

1.8 *Reconstruction* means returning a *place* as nearly as possible to a known earlier state and is distinguished by the introduction of materials (new or old) into the *fabric*. This is not to be confused with either re-creation or conjectural reconstruction which are outside the scope of this Charter.

1.9 *Adaptation* means modifying a *place* to suit proposed compatible uses.

1.10 *Compatible use* means a use which involves no change to the culturally significant fabric, changes which are substantially reversible, or changes which require a minimal impact.

Conservation Principles

Article 2. The aim of *conservation* is to retain the *cultural significance* of a *place* and must include provision for its security, its *maintenance* and its future.

Article 3. *Conservation* is based on a respect for the existing *fabric* and should involve the least possible physical intervention. It should not distort the evidence provided by the *fabric.*

Article 4. *Conservation* should make use of all the disciplines which can contribute to the study and safe-guarding of a *place*. Techniques employed should be traditional but in some circumstances they may be modern ones for which a firm scientific basis exists and which have been supported by a body of experience.

Article 5. *Conservation* of a *place* should take into consideration all aspects of its *cultural significance* without unwarranted emphasis on any one aspect at the expense of others.

Article 6. The conservation policy appropriate to a *place* must first be determined by an understanding of its *cultural significance.*

Article 7. The conservation policy will determine which uses are compatible.

Article 8. *Conservation* requires the maintenance of an appropriate visual setting: eg.,form, scale, colour, texture and materials. No new construction, demolition or modification which would adversely affect the setting should be allowed. Environmental intrusions which adversely affect appreciate or enjoyment of the *place* should be excluded.

Article 9. A building or work should remain in its historical location. The moving of all or part of a building or work is unacceptable unless this is the sole means of ensuring its survival.

Article 10. The removal of contents which form part of the *cultural significance* of the *place* is unacceptable unless it is the sole means of ensuring their security and *preservation.* Such contents must be returned should changed circumstances make this practicable.

Conservation Processes

Preservation

Article 11. *Preservation* is appropriate where the existing state of the *fabric* itself constitutes evidence of specific *cultural significance*, or where insufficient evidence is available to allow other conservation processes to be carried out.

Article 12. *Preservation* is limited to the protection, *maintenance* and, where necessary, the stabilisation of the existing *fabric* but without the distortion of its *cultural significance.*

Restoration

Article 13. *Restoration* is appropriate only if there is sufficient evidence of an earlier state of the *fabric* and only if returning the fabric to that state reveals the *cultural significance of the place.*

Article 14. *Restoration* should reveal a new culturally significant aspect of the *place.* It is based on respect for all the physical, documentary and other evidence and stops at the point where conjecture begins.

Article 15. *Restoration* is limited to the reassembling of displaced components or removal of accretions in accordance with Article 16.

Article 16. The contributions of all periods to the *place* must be respected. if a *place* includes the *fabric* of difference periods, revealing the *fabric* of one period at the expense of another can only be justified when what is removed is of slight *cultural significance* and the *fabric* which is to be revealed is of much greater *cultural significance.*

Reconstruction

Article 17. *Reconstruction is appropriate only where a* place *is incomplete through damage or alteration and where it is necessary for its survival, or where it reveals the* cultural significance *of the* place *as a whole.*

Article 18. *Reconstruction* is limited to the completion of a depleted entity and should not constitute the majority of the *fabric of a place.*

Article 19. *Reconstruction* is limited to the reproduction of *fabric*, the form of which is known from physical and/or documentary evidence. It should be identifiable on close inspection as being new work.

Adaptation

Article 20. *Adaptation* is acceptable where the *conservation* of the *place* cannot otherwise be achieved, and where the *adaptation* does not substantially detract from its cultural significance.

Article 21. *Adaptation* must be limited to that which is essential to a use for the *place* determined in accordance with Articles 6 and 9.

Article 22. *Fabric of cultural significance* unavoidably removed in the process of *adaptation* must be kept safely to enable its future reinstatement.

Conservation Practice

Article 23. Work on a *place* must be preceded by professionally prepared studies of the physical, documentary and other evidence, and the existing *fabric* recorded before any intervention in the *place.*

Article 24. Study of a *place* by an intervention in the *fabric* or by archaeological excavation should be undertaken where necessary to provide data essential for decisions on the *conservation* of the *place* and/or to secure evidence about to be lost or made inaccessible through necessary *conservation* or other unavoidable action. Investigation of a *place* for any other reason which requires physical disturbance and which adds substantially to a scientific body of knowledge may be permitted, provided that it is consistent with the conservation policy for the *place.*

Article 25. A written statement of conservation policy must be professionally prepared setting out the *cultural significance* and proposed *conservation* procedure together with justification and supporting evidence, including photographs, drawings and all appropriate samples.

Article 26. The organisation and individuals responsible for policy decisions must be named and specific responsibility taken for each such decision.

Article 27. Appropriate professional direction and supervision must be maintained at all stages of the work and a log kept of new evidence and additional decisions recorded as in Article 25 above.

Article 28. The records required by Articles 23, 25, 26 and 27 should be placed in a permanent archive and made publicly available.

Article 29. The items referred to in Articles 10 and 22 should be professionally catalogued and protected.

Words in italics are defined in Article 1. of the charter

4.3.3 Bushland Management

Flora

General

The strategy for the rehabilitation and management of the native vegetation cover and the floristic diversity in the Lower Prospect Canal corridor is for "assisted natural regeneration". This involves principally, fencing off of areas and the cessation of mowing in those areas. This method exploits the existing factors which result in natural regeneration. The cessation of mowing in many areas has already resulted in significant regeneration of native species.

The regeneration of the native vegetation would aim to create a largely continuous woodland canopy, with a native understorey of variable species mix and height. The woodland corridor is not proposed to occupy the entire width of the Lower Prospect Canal corridor, but be created as a meandering woodland corridor that crosses the canal and allows ample space for open recreation areas, including historic precincts. The tree canopy of the woodland would therefore be linked through the whole corridor, including across the canal. The understorey of the woodland would not be continuous but would be broken by the canal and any pathways, cycleways or maintenance roads.

The infilling of parts of the Lower Prospect Canal would enable the understorey to be continuous in some sections and would assist in the movements of terrestrial fauna.

The safety of pedestrians and cyclists using the corridor has also been considered. In this respect the meandering bushland corridor would reduce the length of areas enclosed by bushland and improve the visibility of park users to adjacent residential areas. Although the Grey Box Woodland does not naturally have a dense understorey and the visibility (and hence safety) is high, regrowth areas may be dense for some time.

The cessation of mowing in some areas along the Lower Prospect Canal has resulted in the strong regrowth of native tree, grass, herb and some shrub species. The regrowth shows a high diversity of species given the long history of frequent mowing. Even in areas that appear to have been mown with the last few weeks, regrowth is well advanced. The principle method for re-establishing the native flora along the Lower Prospect Canal corridor is therefore to fence off areas and to stop mowing in those areas to allow natural regrowth to occur.

Regeneration and Revegetation Techniques

Fire

The use of fire as a tool in natural regeneration of the native bushland should be considered in consultation with Sydney Water, the National Parks and Wildlife Service, the local bushfire brigade or NSW Fire Brigades, and local residents.

With the revegetation of the corridor, the danger of bushfires will increase and hazard reduction burns are likely to become necessary at some stage. The use of fire would serve the dual purpose of reducing fuel levels and assisting the natural revegetation of the corridor.

Native sclerophyll forests and woodlands are adapted to fire as part of their natural cycle and many species need either fire or very dry conditions to split woody cones or capsules and release their seeds. Fire also clears the ground of leaf litter, providing open areas for seedling growth (bare soils favours small seeds such as eucalypts), stimulates seed germination and provides an influx of nutrients to the soil (Buchanan 1989). Fire is also effective in controlling many common weed species by killing the mature plants and the seed store in the ground. In the absence of fire the native bushland will survive but will become increasingly dominated by a smaller range of native species (Benson and Howell 1990). Moist sites such as the creeklines in the Lower Prospect Canal corridor, are particularly susceptible to the dominance of weeds such as Privet, Lantana and native species such as *Pittosporum undulatum* (Benson and Howell 1990). This effect is already evident in the two main creeklines in the Lower Prospect Canal corridor; at Munro Creek west of Gipps Road, and under the Greystanes (Boothtown) Aqueduct. In other areas species that are able to resprout, such as Bladey Grass and Bracken Fern will be favoured over plants needing to reseed (Benson and Howell 1990).

Any proposed controlled burning of the bushland remnants within the corridor should be undertaken according to the ecological needs of the vegetation. In this respect the following considerations are necessary: frequency, season intensity and location. In the situation of the Lower Prospect Canal, it will not be possible to undertake high intensity fires due to proximity of residential areas, nevertheless some changes in intensity should be possible.

Frequency: Burning should not occur every year. If burns occur at too regular an interval some species may be disadvantaged and reduced or even wiped out in the long term. Different species require different periods between fires to enable them to set seed.

Season: Burning should not occur at the same time of year, rather it should be undertaken say in spring during one year and early autumn the next time it is burnt. Burning in late autumn or winter may result in conditions that are too cold for successful germination and also leave bare erodible soil for several months (Buchanan 1989).

Location: Regenerating areas should not be burnt all in the same year. The areas to be burnt should be assessed for their level of regrowth and the available fuel. This approach would also reduce the amount of smoke created during any one time and maintain local air quality.

In addition, the timing of a fire should consider the native fauna likely to occur in the area. Burning in winter, when most hazard reduction burning occurs, coincides with a lowered activity level for many animals, when they are least able to escape the flames. Some animals such as bats, reptiles and frogs enter torpor and are particularly vulnerable during winter.

Pimelea spicata

Studies of two populations of the rare plant *Pimelea spicata* have shown that it responds well to burning, with vigorous regrowth, prolific fruiting and numerous seedlings occurring at known sites (Nash and Matthes 1993). The use of fire to suppress weeds at the *Pimelea spicata* site should be investigated further with the National Parks and Wildlife Service and the Sydney Royal Botanic Gardens.

The site in the Lower Prospect Canal corridor is affected by Fennel and African Olive, both of which are reduced by fire.

A site-specific burn could be undertaken at an early stage of the *Pimelea spicata* site manangement, before other areas are considered for burning.

Potential Strategy: In the case of the Lower Prospect Canal corridor, a preferred strategy may be to allow natural regeneration to occur in most fenced areas for up to five years before it is burnt, while the creeklines and the *Pimelea spicata* site could be burnt as soon as possible to help remove weeds and stimulate native seeds to germinate. Very little fuel is currently available and the bushfire threat is very low. The timing of burning should be dictated by the level of regrowth and the amount of fuel available.

Planting Of Trees In Open Grassland Areas

If open areas are required to be planted with trees to provide additional shade it is recommended that only locally endemic tree species such as *Eucalyptus moluccana, E. tereticornis* and *E. fibrosa* are used. These should be propagated from seed collected in the Lower Prospect Canal corridor to maintain the genetic integrity of the area. Alternatively, already established saplings that are currently resprouting after mowing could be surrounded by a protective fence to prevent further mowing, and left to grow.

Weed Management

The management of weeds within the Lower Prospect Canal corridor should take several forms according to:

- the habitat,
- the level of native species diversity,
- whether rare native species occur, and
- level and type of weed infestation.

Fencing

Fencing should be aesthetically compatible with a natural bushland recreational park and need only be of a structure that delineates the regeneration sites and dissuades people from entering the areas. The fencing must also allow any terrestrial fauna to freely move through it. Steel star picket fencing with occasional rough cut timber posts and strand wire would be suitable.

Interpretive Signage

Signs that provide information on the reasons for fencing off regrowth areas should be erected. Details of the populations of the rare plants *Pimelea spicata* and *Acacia pubescens* should not be provided on signs. A good example of a suitable sign is located at a fenced regrowth area at the entrance to the Scout Hall off Gipps Road.

Interpretive signage providing information on the type of vegetation occurring in the corridor and its once widespread distribution, the history of its clearance, its conservation value, and identifying the main species present would help to provide an appreciation of the botanical and ecological values of the corridor.

Adjacent Open Space

The only major area of zoned open space near the Lower Prospect Canal corridor is the Gipps Road Open Space area. The Plan Of Management for this area (Holroyd City Council 1997) shows areas of woodland plantings along the boundaries with the Lower Prospect Canal corridor. The proposed regeneration of native woodland along the Lower Prospect Canal corridor in this area is consistent with this plan.

Educational Resource

There are several aspects in which the educational value of the Lower Prospect Canals flora should be explored:

- For general outdoor education on flora at the local area and urban bushland issues.
- Potential for long-term study of natural regrowth of Grey Box Woodland.
- Four schools are located adjacent to the Lower Prospect Canal corridor and may be enlisted to assist in regeneration activities and monitering: Merrylands High School, Sherwood Grange Public School, Holroyd High School, Widemere Public School, Cerdon College, Greystanes Public School

Bushland management on the site is a major component of the Plan of Management recommendations. The fundamental requirements include the protection of all existing natural bushland stands and the selective extension of these stand with site endemic plant material ideally propagated from site stock. Bushland management actions are able to be commenced from the finalisation of the plan of management due to the relatively low costs of weed management and planting procedures.

Actions

- ***Liaise with NPWS for preparation of species Recovery Plans for Pimelea spicata and Acacia pubescens***

  Liaise with the National Parks and Wildlife Service Threatened Species Unit regarding the protection of the populations of *Pimelea spicata* and *Acacia pubescens*. It is the responsibility of the NPWS to prepare a species recovery plan for these populations and their on-going management should be a co-operative effort between the management authority for the lands and the NPWS.

- ***Cease mowing activities in the areas that are to be left to naturally regenerate.***

- ***Set out on site Bush Protection Areas***

  Identify areas that are to be set aside for conservation purposes and are to be left to naturally regenerate. These must include all of the northern side of the Lower Prospect Canal, existing areas of regeneration on the southern side, and the areas containing the species *Pimelea spicata*, *Acacia pubescens*, *Zornia dyctiocarpa*, *Sorghum leiocladum*, *Brachycome aculeata*, *Mentha satureioides* and *Eucalyptus fibrosa*.

  Areas set aside for conservation purposes must also preserve the existing change in plant species alliances along the corridor.

- ***Implement Species Recovery Plans***

  When the Species Recovery Plans are available, implement protection measures for the populations of *Pimelea spicata* and *Acacia pubescens*.

- ***Provide buffer / edge to Bush Protection Areas***

  Establish buffer zones between regeneration areas and maintained areas

- *Conserve Heritage Plantings*

  Retain the existing historical plantings of Sugar Gum, Spotted Gum , Lemon-scented Gum and Yellow Bloodwood along the upper section of the Lower Prospect Canal (south of Gipps Road), and the Washington Palms, Canary Island Palms and Kurrajongs at Guildford Pipehead.

- *Weed Management Programme*

  Prepare a specific weed management program for the site to incorporate progressive weed eradication that does not result in a significant loss of existing fauna habitat and soil erosion.

- *Deliniation of bush protection areas to south side of Lower Prospect Canal*

  The boundaries between conservation areas and passive recreation areas on the southern side of the Lower Prospect Canal should be post and wire fenced to prevent uncontrolled access.

- *Remove non endemic plantings*

  Non-endemic native species recently planted in certain parts of the corridor and which do not form part of the historical plantings should be removed.

- *Construction Management*

  Ensure sediment contaminated runoff from the development or fill stockpiles during the construction does not enter bushland regenerating areas or local properties.

- *Interpretive Signage*

  Provide interpretive signage that explains the importance of the vegetation in the corridor.

- *Fire Management*

  Develop a fire management strategy that addresses the requirements of both the safety of park user and adjacent residential areas, and the ecological requirements of the vegetation in the corridor.

Fauna

Generally

The following table identifies the management recommendations presented to ensure that the existing fauna assemblages are maintained. The management recommendations presented have been designed to :

a) protect and enhance the habitat value of the area for threatened species ; and
b) protect and enhance the habitat value of the area for regionally significant species.

In presenting the following recommendations, efforts have been made to ensure that they are compatible with the "original" fauna habitats present, and the resources these provided to native species, and that they aim to enhance the fauna habitat value for species which would rely on the area for their life cycle needs. For example, the Powerful Owl, though recorded from the Lower Prospect Canal area, is unlikely to be a resident species. This species is more likely to have been recorded in the area during one of its foraging movements, and therefor recommendations are presented which assist its movement and foraging patterns, as opposed to its breeding and/or roosting needs.

It has been assumed that measures proposed for the provision of habitat for regionally significant and threatened species would also benefit the protected, though common-to-abundant resident fauna populations.

Figure 4.3
FAUNA MANAGEMENT ACTIONS

ISSUE	STRATEGY	ACTION	TIME FRAME
Large Land Snail	• Preserve and enhance habitat • Retain Cumberland Woodland • Provide sheltering sites	• Enhance and connect stands of Cumberland Woodland. • Cease mowing under woodland areas. • Cease mowing of regrowth areas. • Retain fallen logs and other natural debris. • Provide sheltering sites (logs, branches, rocks) in stands of woodland. • Retain grassland, woodland edges.	• Endeavour to link patches of woodland over next 5 years. • immediately. • immediately. • immediately. • over next year. • immediately.
Threatened birds	• Provide a relatively continuous canopy through or over which bird can fly. • Ensure that connection to Prospect Reservoir is maintained.	• Link stands of woodland as identified in Flora report.	• Endeavour to link patches of woodland over next 5 years.
Provide roosting and foraging habitat for microchiropterans	• Provide roosting hollows • Provide a relatively continuous canopy through or over which bats can fly. • Maintain the grassland, woodland edge.	• Planting of eucalypts • Erection of nesting boxes • Monitoring of nesting boxes to ensure introduced species does not occur • Restrict moving of grassland, woodland edge.	• immediate and up to 5 years. • immediate and ongoing. • immediate and ongoing. • immediately.
Retain roosting , nesting and breeding habitat for regionally significant birds and reptiles	• Provide stands of native shrubs. • Provide eucalypts. • Maintain some areas of dense grasslands for foraging and nesting needs. • Retain trees with hollows. • Retain dead trees.	• Establish dense stands of acacias and similar plants at selected locations within study area. • Plant eucalypts and supplement existing stands. • Maintain some areas of existing grassland areas. • Cease maintaining some of the existing areas of mown grassland. • Maintain existing stands of exotic shrubs till native species have established. • Retain existing natural debris.	• Endeavour to provide natural shrublands over next 5 years. • Endeavour to link patches of woodland over next 5 years. • immediately and ongoing • immediate • at least 3 years or till acacias etc form dense stand • immediately and ongoing
Retain foraging habitat for regionally significant birds and reptiles	• Provide shrubs which attract insects. • Provide nectar and pollen producing plants. • Provide woodland areas. • Provide dense stands of plants for small birds to shelter in.	• Plant locally occurring native shrub species including eucalypts and acacias. • Maintain existing privet stands till acacia shrublands are established. • Maintain corridor value of Lower Prospect Canal area through supplementary plantings which link woodland patches.	• Endeavour to provide additional woodlands and shrublands over next 5 years. • at least 3 years or till stands of native shrubs become established. • Endeavour to link patches of woodland over next 5 years.

4.3.4 Civil & Structural Engineering

General

The following recommendations outline civil and structural actions to be undertaken in upgrading of the Lower Prospect Canal corridor for public use. Actions are listed related to the major structural elements of:

- Canal Structure
- Greystanes (Boothtown) Aqueduct
- Sedimentation Channel
- Road underpasses
- Covered Way

Canal Structure

As identified in the structural review the Lower Prospect Canal structure is in a range of conditions along it's length, ranging from reasonable to severely degraded and in danger of collapse. The filling of the Lower Prospect Canal to full depth for most of it's length is the preferred strategy in addressing public safety issues, rendering the structure stable, and recognising heritage concerns. In carrying out such works a range of issues will need to be addressed. These should be read in conjunction with Road underpasses in this section (for treatment of canal walls to road underpasses) and 4.2.5 Stormwater Management (for drainage requirements to canal).

Actions - Planning

- *Undertake geotechnical investigation of surrounding soil in level ground, cut, and fill situations to determine stability of the canal*
- *Develop drainage strategy for releasing drainage from canal as per 4.2.6 Stormwater Management*
- *Review proposed fill material and conduct geotechnical analysis to determine required compaction levels based on projected traffic loads (Note: filling strategy and design of concrete cyclepath to facilitate controlled use of canal by Council maintenance vehicles to 5 tonnes maximum) - as such a consistent type of fill material would be desirable.*
- *Integrate civil filling strategy with drainage strateg y- refer figure 4.4 - Indicative Filling Strategy*

Actions - Implementation

- *Prepare relevant environmental impact assessment for filling process, relevant transport and stockpiling as part of stage Development Application to Holroyd City Council.*
- *Prepare filling and drainage strategy design and documentation*
- *Adjust and lift tiles as required to provide an even / stable surface where damage has occurred.*
- *Carry out drainage and filling works*

Actions - Ongoing Management and Maintenance

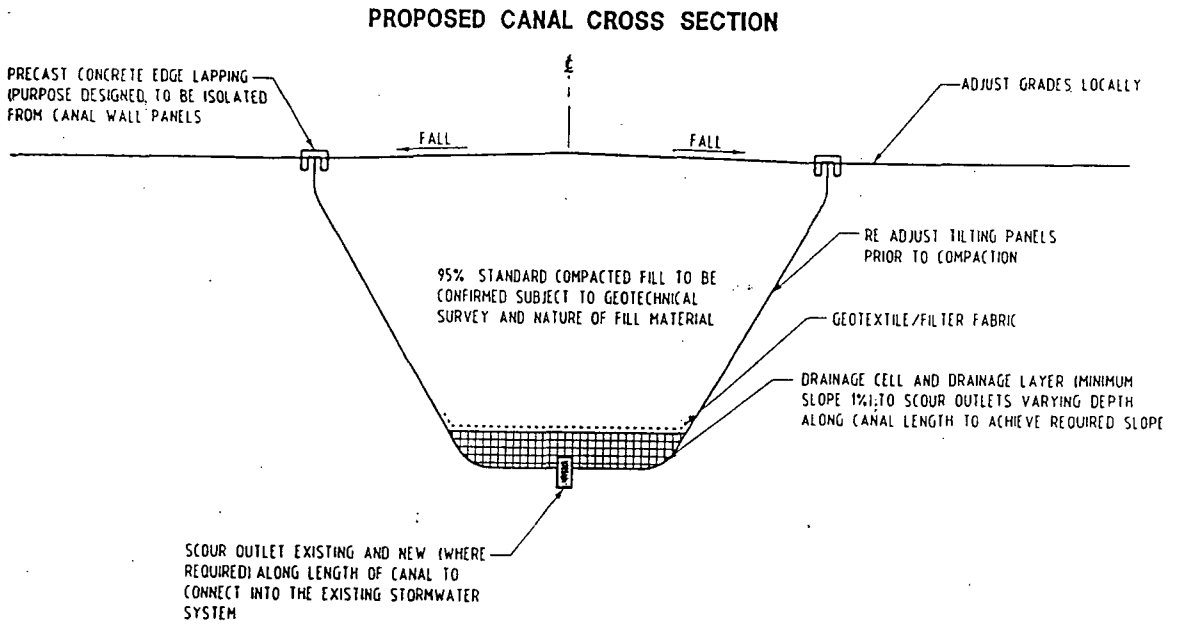
- *Carry out drainage monitoring and maintenance as noted in 4.3.6 Stormwater Management*

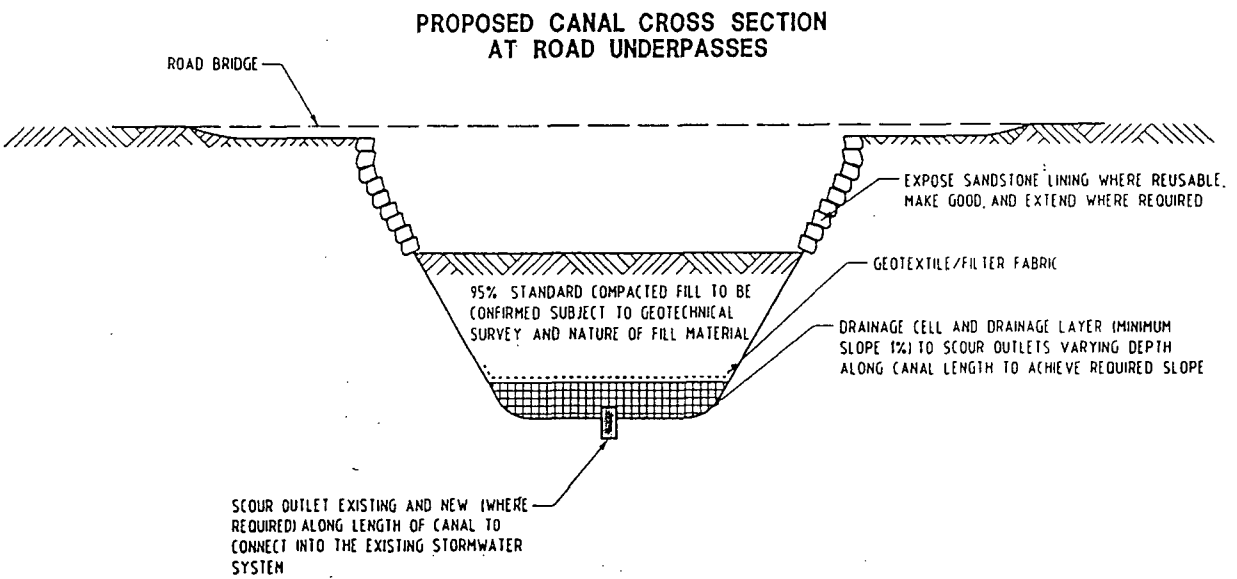
Greystanes (Boothtown) Aqueduct

The Greystanes (Boothtown) Aqueduct is generally in good condition and is suitable for use as a significant component of the design strategies. It is proposed that as a longer term (that is lower priority) component of cycleway and pedestrian access developemnt along the corridor, that pedestrain access be provided across the aqueduct structure.

As identified in Section 2.9 - Engineering Review, a cracking pattern is evident in each arch of the Greystanes (Boothtown) Aqueduct. The cracking begins at the first joint in the sandstone block headstock in from each side. The cracks extend for a distance of between 300 - 2500mm up into the arch structure, not merely in the mortar but also through bricks. Significant efflorescence is evident at the cracks probably the result of water ingress reacting with the cement mortar. This cracking does not impair the arching action of the Greystanes (Boothtown) Aqueduct but would impair the transverse stiffness of the Greystanes (Boothtown) Aqueduct.

Figure 4.4





PROPOSED CANAL FILLING TREATMENTS

Actions - Planning

- *Undertake full detailed structural inspection of the Greystanes (Boothtown) Aqueduct including structural inspection of tie-rods and tie-rod anchorages*
- *Determine the heritage significance of the tie-rods and tie-rod anchorages as part of the Greystanes (Boothtown) Aqueduct*
- *Design new cycleway decking to be constructed within the waterway of the Greystanes (Boothtown) Aqueduct, including provision for replacement of tie-rods or incorporating tie-rods into design.*
- *Determine the cause of the existing cracks in the brick arches from detailed inspection and structural analysis to determine if modification or repair of structure is required*
- *Design repair method for existing cracks in the brick arches*
- *Design drainage of new Greystanes (Boothtown) Aqueduct cycleway, and floor of aqueduct waterway. Note, adequate drainage of the aqueduct is critical to the long-term viability of the structure.*

Actions - Implementation

- *Prepare Greystanes (Boothtown) Aqueduct cycleway (and possible tie-rod replacement system) design and documentation. (Refer to Engineering Review - Volume 2 of Plan of Managemnt)*
- *Repair existing cracks in arches or undertake modifications of Greystanes (Boothtown) Aqueduct.*
- *Commission construction of precast concrete hollowcore plank units and fabrication of steelwork..*

Actions - Ongoing Management and Maintenance

- *Determine maintenance program required for all structural elements. Note, inspection must take place prior to the expiry of the defects liability period.*

Sedimentation Channel

The sedimentation channel has a rectangular cross-section with vertical retaining walls of approximately 2500 mm high. The channel is approximately 4000 mm wide. The structure also includes footbridges spanning both across and along the length of the structure. The footbridge along the length of the channel is supported at regular intervals by beams that span the width of the channel.

As identified in the structural review the sedimentation channel exhibits a significant amount of corrosion to all exposed steel and large cracking to the concrete structure. The longitudinal footbridge is a continuous concrete slab over many spans. The reinforcement in this slab is unknown. Cracking has occurred over the top of the majority of the beams. Significant spalling of the concrete on the underside of the longitudinal footbridge support beams has occurred. The spalling shows that the beams have been constructed from concrete encasement of steel UB sections. Where spalling has taken place the steel UB sections exhibit significant levels of corrosion. Diagonal shear cracks are evident near the supports of many beams.

It is considered that the structure is unsafe and public access to the channel should be prevented. If the structure is to be opened to the public modification, repair or replacement would be required.

A number of options exist for the presentation of this component of the Lower Prospect Canal:

Option 1 -

Demolish and reconstruct the Sedimentation Channel in total, replicating the existing structure. This would allow for full public access to all parts of the Sedimentation Channel, allowing the Channel to be used for a wide variety of purposes. The structure could be replaced with an identical structure designed for longterm stability and durability.

Option 2 -

A short section of the sedimentation channel could be demolished and re-built for use by the public. The remainder of the channel could be filled or fenced to restrict public access to those areas.

Option 3 -

The footbridge and its supports only could be demolished and a new footbridge provided that could serve two purposes. First, it would provide access to the sedimentation channel for the public. Secondly, it could be used as a horizontal strut that would provide lateral stability to the channel, in a similar way to the existing supports.

Option 4 -

Maintain the structure in its current state. If the existing structure is to be maintained it is recommended that public access to the structure be restricted.

The preferred options should be resolved upon the completion of further investigations. However in terms of costs and potential benefit of the structure from an education and heritage perspective it may be possible to demolish and rebuild a section of the channel at it's western end near Sherwood Road. It should be noted that the use of the Sedimentation Channel as a feature of the Lower Prospect Canal Reserve development is of low priority relative to establishment of a cycleway link.

Actions - Planning

- *Determine the preferred future use of the sedimentation channel.*
- *Determine the heritage significance of the sedimentation channel to determine whether the preferred treatment complies with heritage requirements.*
- *Preliminary Design of structural treatment of the sedimentation channel to determine feasibility, taking into account aspects of durability and long term performance of the structure.*

Actions - Implementation

- *Prepare structural treatment design and documentation.*
- *Undertake repair or modification works prior to construction and prior to opening to the public. OR undertake demolition works.*
- *Commission construction of precast concrete hollowcore plank units and fabrication of steelwork..*

Actions - Ongoing Management and Maintenance

- *Determine maintenance program required for all structural elements. Note, inspection must take place prior to the expiry of any construction defects liability period.*

Road Underpasses

It is recommended that any cycleway design incorporate the existing Lower Prospect Canal to provide underpasses to the road crossings. The preferred treatment for the underpass is to remove the existing precast concrete tiles to expose the masonry blockwork lining below (refer diagram - Figure 4.4, and to Figure 5.3). It is anticipated that the masonry blockwork will not be to ground level.

Actions - Planning

- *Remove existing precast concrete tiles in the required locations and undertake a structural inspection and analysis of the masonry blockwork lining to determine its suitability for the purpose.*
- *If the masonry blockwork is determined to be unsuitable, design modification or replacement.*
- *The surrounding ground level may require modification to the level of the masonry blockwork, or the blockwork may be extended to the ground level.*
- *Design drainage of canal. The underpass sections are to be designed in conjunction with the drainage system for the entire canal, refer to the stormwater management section of this report.*

Actions - Implementation

- *Remove all precast concrete tiles to expose the masonry blockwork lining below.*
- *Repair and modify blockwork lining as determined in design phase.*
- *Undertake earthworks in the surrounding areas as determined in design phase.*
- *Fill the canal as described elsewhere to the required leve.*

Actions - Ongoing Management and Maintenance

Determine maintenance program required for all structural elements. Note, inspection must take place prior to the expiry of the defects liability period.

Covered Way

Due to it's security screening at either end the covered way was unable to be inspected as part of this study. It is not recommended that any uses other than general passive recreation occur over the covered way due to it's structural limitations. In this regard appropriate signage or markers should be provided to prevent vehicular access over the structure.

Actions - Planning

- *Undertake structural assessment / investigation of the covered way to ensure it's safety for general public use of the site over head.*

Actions - Implementation

- *Provide warning signage / markers to prevent heavy vehicle access over the covered way.*

4.3.5 Stormwater Management

General

The Lower Prospect Canal runs through a number of stormwater catchments in which Holroyd City Council is responsible for the stormwater infrastructure. The availability of the land surrounding the Lower Prospect Canal provides the opportunity to improve water quality and existing capacity of the existing stormwater system.

Water quality and system capacity in the area can be improved through the creation of water quality control / retardation ponds. Two potential areas should be identified in the Masterplan. These are located at the Greystanes (Boothtown) Aqueduct adjacent to Macquarie Street and Munro Creek west of Gipps Road.

As well as addressing stormwater drainage in adjacent catchments areas it is important to address the issue of draining stormwater which falls within the Lower Prospect Canal structure and within the canal reserve. The existing canal drainage system will require analysis and appropriate upgrading will be required. If the Lower Prospect Canal is to be used as cycleway, the base of the canal would need to incorporate a drainage cell with increased grades to existing and new outlets. These outlets would be connected to the existing stormwater system.

Actions - Planning

- *Undertake hydraulic analysis of the surrounding drainage catchments. Analyse the capacity of the existing system and recommend upgrading requirements. Analysis may require the physical inspection of pipes and other structures.*
- *Design water quality control / retardation ponds. Identify possible locations for the ponds and optimise system configuration.*
- *Assess the impacts of water quality / retardation ponds on the surrounding hydrology and surrounding community, eg safety.*
- *Investigate existing drainage of the canal structure. Investigate the condition of the existing outlets and identify the upgrading requirements or the need for augmentation with additional outlet points to meet the drainage requirements of the canal and future use as a cycleway.*
- *Design canal drainage in conjunction with the design of the cycleway. Determine use of drainage cell independent to, or in conjunction with the regrading of the canal base with concrete. The canal base will require a minimum grade of 1 % to provide sufficient fall to canal outlets.*

Actions - Implementation

- *Prepare basin design and documentation and commission installation. Incorporate requirements for planting within basins.*
- *Prepare subsoil drainage design and documentation and commission installation of subsoil drainage along the top of the canal where the canal is in cut.*

Actions - Ongoing Management and Maintenance

- *Establish maintenance requirements for water quality pond/ retardation basin.*
- *Initiate program for mowing of banks and harvesting of macrophytes, weed removal, removal of accumulated sediment by dredging or after draining of basins and litter removal.*
- *Monitor and inspect every six months and after large storm events.*
- *Maintain access track for maintenance vehicles.*
- *Any wetland ponds will require a major retro fit or decommissioning when the wetlands reach their design life.*
- *Unblocking outlet structures on the drainage infrastructure.*
- *Inspect the truck drainage system to determine condition of grates, pits, pipes and control structures. Repair and replace as required.*

4.3.6 Pedestrian / Cycle Access

General

The Plan of Management has identified that the Lower Prospect Canal corridors key roles is in the continuation of regional access routes in particular an off road cycle network. The Bay to Mountains Cycleway initiative proposed by Greener Sydney 2000 provides an opportunity for the Lower Prospect Canal lands to be integrated with major regional planning for such facilities. In addition to it's potential regional role the Lower Prospect Canal can also provide important links between residential areas, schools, industrial areas, other open spaces , and public transport.

Actions

- *Planning to establish a regional commuter / recreational cycleway connection from the Guildford Pipehead to Prospect Reservoir along the Lower Prospect Canal corridor*
- *Planning to incorporate pedestrian / cycle links from the cycle path to adjoining streets and residential areas recognising current pedestrian desire lines and functional access routes*
- *Planning of paths to be integrated with bushland management strategies to provide edge definition of protection zones and to direct traffic away from sensitive environmental areas*
- *Planning to incorporate provision of pedestrian / cycle links to adjoining open space and public facilities to facilitate the use of amenities at these facilities*
- *Provide appropriate directional and information signage ideally integrated with an overall Bay to Mountains strategy and graphic format*

4.3.7 Access & Parking

General

In developing the Lower Prospect Canal corridors role as a regional and local cycle and pedestrian link it is evident that the site will in the future be a transit route rather than a destination in it's own right. In light of this function there would appear no current need to provide off road parking for general public use. Destinations such as the Gipps Road Open Space, Prospect Reservoir, and potentially the Guildford Pipehead site at Guildford are expected to adequately cater for parking requirements.

Maintenance and emergency access will be required to the site with 3 metre width access recommended to be maintained between bushland protection areas and residential boundaries. The alignment of the current maintenance track is recommended to be maintained, however not formally surfaced.

Vehicular access from adjoining street frontages is proposed to be restricted through use of appropriately designed car barriers that maintain pedestrian cycle entry.

Actions

- *Provide lockable access for emergency vehicles to access fuel reduced zones to residential boundaries*
- *Maintain 3 metre width fuel reduced zone to residential boundaries*
- *maintain the alignment of the existing access track to the south side of the Lower Prospect Canal - recommended to allow grass cover only to this route*

4.3.8 Recreation and Open Space

Generally

As noted in 4.3.6 the corridor should play a major regional role in open space and off road cycle and pedestrian access. This should be the Lower Prospect Canals only active recreational function. Otherwise the limited width of the corridor and proximity of adjoining residences and industry determine that the area should provide informal passive recreational amenity as identified in 4.3.1 Context and Landuse. As such the existing grassland areas adjoining road frontages such as Macquarie Road and Tennyson Parade on the southern side of the Lower Prospect Canal should be retained as passive recreational grasslands and where stands of trees with related protection zones, or stands of threatened species occur these should be defined by paths where possible and fences where required.

Actions

- *Develop regional cycleway and related local links.*
- *Establish passive recreational grassland areas adjoining road frontages*
- *Provide path links to adjoining open space areas to enable access to range of recreational activities*

4.3.9 Education and Interpretation

Generally

The site provides the opportunity to conserve significant educational resources for interpretation by informal users, school and educational groups. These include: flora ecology, fauna, cultural heritage, engineering.

Actions

- *Ensure conservation of heritage values and conservation and enhancement of flora and fauna habitat qualities.*
- *Develop interpretive signage strategy for the site that integrates heritage with ecological information. In this way signage will be graphically integrated, can expand on the strong link between these two issues, and will be appropriately located avoiding proliferation.*
- *Park management should liaise with heritage authorities for possible assistance with development of information package for school and other educational groups relating to educational value of site, including the Institution of Engineers Heritage Committee.*

4.4 Management Structure

4.4.1 Review of Ownership and Management Options

The Plan of Management Study has identified a range of options for the structure of implementation and ongoing management for the Lower Prospect Canal, of which a preferred option has been determined by the Plan of Management study team as outlined in section 4.4.2. The options involve variations as to responsibilities for key roles including:

- funding of capital works development;
- management and co-ordination of capital works development;
- ongoing management and maintenance; and
- funding of ongoing management and maintenance.

Figure 4.5 on the following page lists the options developed through the Plan of Management and reviewed by the Project Steering Committee and Community Working group. Also listed are advantages and disadvantages of each of these scenarios.

Figure 4.5
OWNERSHIP & MANAGEMENT OPTIONS EVALUATION

STRUCTURE	FUNDING	ADVANTAGES	DISADVANTAGES
1. State Government Ownership and Title Ongoing management and maintenance by State Government authority.	• State Government to fund, manage and maintain site as a Regional Open Space area.	• State Government is more viable source of funding for the level of works that are required than local government or smaller grant schemes.	• More remote management - majority of users will be Holroyd residents with no direct link to management authority. • Management overlap between canal lands and adjoining Council open space
2. State Government to retain title, ongoing management and maintenance by Holroyd City Council	• State Government to fund works for filling, cycle/pedestrian link, and restoration / maintenance of Heritage Items. Implementation management by State Government. • Holroyd City Council to manage and maintain Lower Prospect Canal corridor and adjoining parklands.	• Conservation of lands with State Govt involvements is more secure. • Local Council is in closer contact with majority of users - more accessible. • Adequate funding for appropriate level of enhancement may be achievable from State Government • Site has both regional and local values and roles to play • Management / maint. of canal lands and adjoining open space will be consistent • Community expressed preference for State Government ownership - greater security	• Demand for Council resources required for ongoing management and maintenance must be phased to reduce impact on current resource availability.
3. Title to be transferred to Holroyd City Council. Management and maintenance by Holroyd City Council.	a) Special purpose grant by State Government for implementation of filling, cycle/pedestrian link and restoration/maintenance of heritage items. Implementation management by Holroyd City Council. b) Holroyd City Council to fund through grant sources, sponsorship and capital works. • Holroyd City Council to manage and maintain Lower Prospect Canal corridor and adjoining local parklands.	• Full control of canal lands vested in local authority • Centralised ownership, management responsibilities.	b) Limited Council funds available for capital works. • Site has regional values for heritage, flora / fauna, and access - Council unable to optimise / conserve these adequately with available resources. • Grant funding would enable limited scope and quality of improvements, and require and extended programme of implement'n. • Potential community uncertainty as to future conservation and use of lands
4. State Government to retain title - management and maintenance of appropriate sections of Lower Prospect Canal levels to State Government Departments and Holroyd City Council.	• State Government to fund works for filling, cycle/pedestrian link, and restoration/maintenance of Heritage items. • State Government/Holroyd City Council to fund management and general park maintenance of corridor and adjoining local parklands.	• Adequate funding for appropriate level of enhancement may be achievable from State Government • Council responsibility can link to areas adjoining canal lands	• Lack of cohesive management along the canal - responsibilities difficult to define • Inefficient use of resources - overlapping of roles • Limited local involvement.
5. State Government to retain title - Management Authority (eg Trust) established to manage and maintain.	• Joint funding by State & Local Government.		• Potential for uncertainty in funding availability and subsequently in future of conservation of lands. • Source of political and social tension

4.4.2 Proposed Management Structure and Actions

Ownership and Management

The primary objective for recommendations relating to ownership is to ensure that the Lower Prospect Canal lands are conserved as a continuous corridor for public open space purposes, and conservation of flora, fauna, and heritage values. It was strongly identified in the community workshop forums that the local community would prefer the lands to remain in state ownership to ensure this is achieved. Retention of title by State Government provides a greater level of security that the open space role and function of the lands can be protected - local government is potentially more volatile and susceptible to development pressures.

The alternative of transfer of title to Council would require a caveat (s) to be placed on the lands which although effective in principle, do not provide the long term security of separate ownership, and would require a more cumbersome development application process for implementation of corridor works.

For management and maintenance of the corridor it is evident that Holroyd City Council is best equipped to provide this role for the canal lands due to the site's central location in the local government area and relationship adjoining other Holroyd public open space areas. Also relevant is Council's inherent experience, expertise, and access to equipment and resources required for management of its open space resources.

As outlined in further detail below, whilst the lands are acknowledged as being of strategic regional open space significance, the Department of Urban Affairs and Planning advised that a rezoning of the canal corridor to Public Open Space under Holroyd planning controls is the recommended planning solution for the site. As such the vesting of care control and management with Council is a preferred management approach to the involvement of a state government department such as the National Parks and Wildlife Service. Such an authority would overlap responsibilities with Council as the planning regulator and in relation to Council open space areas adjoining the canal lands which are proposed by the masterplan to provide a seamless continuation of open space.

In summary it is recommended that the title to the Lower Prospect Canal lands be transferred to The Minister for the Environment under the National Parks and Wildlife Service, with care control and management being vested in Holroyd City Council.

Zoning

Whilst the strategic regional open space significance of the site (as a Core Biodiversity Area, regional access linkage, and significant cultural heritage location) has been acknowledged by the Project study team, Steering Committee, and the Community Working Group, the Department of Urban Affairs and Planning has advised that it's location and context do not support incorporation in the Western Sydney Regional Open Space Corridor Regional Environmental Plan. This is due to the canal corridors dual function as a regional and local resource, it's strong context with the Holroyd local area, and it's limited capacity to enhance the recreational benefits of the REP lands other than for access. It is believed that the use of local government zoning controls will enable the regional values of the corridor to be appropriately protected and managed. In this regard the preferred course of action agreed by representatives of the Department and Council is to rezone the corridor from it's current Special Uses 5a - Water Supply, to 6a Public Open Space - Community Lands under the Holroyd Local Environmental Plan. This zoning along with the retention of state government title is believed to be the most effective means of securing the conservation of the corridor as open space.

Park Management Advisory Committee

Due to the range of stakeholders that should potentially be involved in the future conservation and usage of the Lower Prospect Canal open space, it is recommended that a committee be established to facilitate the input of community stakeholders and relevant organisations into the management and maintenance of the Lower Prospect Canal corridor. Such a committee should be established to liaise with Holroyd City Council and provide advice and community relations related to park management and usage.

Confirmation of Preferred Management Option

It is noted that resolution of the preferred ownership and management approach can not be confirmed until the completion of the public period during which further community and authority comment is to be sought, and a from which a preferred solution is aimed to be established.

Ownership Zoning and Management Actions

- *State Treasury as title holder to authorise the rezoning of the corridor lands from Special Uses 5a to 6a Public Open Space - Community Lands - Holroyd City Council to carry out rezoning process in accordance with standard requirements. Holroyd City Council to liaise with Blacktown City Council for incorporation of Blacktown LGA section in rezoning.*
- *State Government to transfer title to Minister for Environment under the National Parks and Wildlife Service*
- *Maintenance responsibilities to be progressively handed over to Holroyd Council as works stages are completed.*
- *Ongoing Management and Maintenance to be vested in Holroyd City Council.*
- *Development applications to be prepared for works and exhibited and assessed through Councils planning department.*

4.4.3 Maintenance

As outlined in the description of the Masterplan proposals, a fundamental objective of planning strategy development was to reduce ongoing maintenance requirements on the site. Since acquisition of the lands by State Treasury the site has been the subject of a contract maintenance agreement with Sydney Water, with the general activities that were carried out on the site up until dewatering of the Lower Prospect Canal in 1995 (ie broadscale mowing) still forming the basis of the maintenance regime.

As noted previously this regime has had significant impact on the species diversity of the corridor as regenerating vegetation has been progressively culled out, through excessive mowing practises.

Activities of the local community and CRAG have been successful in restricting mowing activities, in particular where the threatened species Pimelea spicata and Acacia pubescens have been identified. However, it is essential that mowing activities are further curtailed, particularly in areas of existing tree canopy to enable natural regeneration to occur.

Maintenance Recommendations

The method of implementation of recurrent maintenance requirements will be subject to the final resolution of preferred management structure and allocation of ongoing responsibilities.

However, the maintenance principles list on the following page, are recommended to apply, whichever organisational structure is preferred.

Based on Holroyd City Council's current management practices, park maintenance such as mowing and other recurrent items would then be carried out on specific contract agreement administered by a Park Manager under Holroyd City Council's Parks Improvement and Maintenance Section. The officer would also liaise with the community and relevant authorities, arrange meetings and ensure the management and maintenance actions of the Plan of Management are carried out. This is a different approach to those of adjoining Councils who whilst also implementing major maintenance works by means of external contracts, administer these contracts under a centralised park management group. General management beyond basic recurrent maintenance is also provided by the centralised park management resource.

Maintenance Principles

Major Maintenance Requirements

Passive Grassland Areas

Description:	Existing pasture grassland areas designated as passive grassland adjoining road frontages and to be used for general pedestrian and cycle access, and informal recreation activities will include fire management/fuel reduction zone to residential boundaries adjacent bushland protection areas.
Maintenance	Regular landscape mowing required to 15 mows per annum Trimming of edge situations to paths and kerbs

Area	Total approximate area at full implementation of Masterplan - 26.7 hectares.

Bushland Protection Areas

Description:	Existing grassland areas designated as bush protection zones, in which regeneration of site indigenous tree canopy and understorey is to be encouraged. Selective maintenance to be carried out annually under supervision of NPWS to: -reduce fire hazard -address safety/security issues
Maintenance	annual land slashing of selected grassland and understorey approved by NPWS to address above issues.
Area	Total approximate area at full implementation of Masterplan - 30.5 hectares.

Recurrent Maintenance Items

The following recurrent maintenance tasks are also recommended to be carried out at designated intervals:

Quarterly

- Check all interpretive signage and graphic displays - advice of any damage/vandalism to park management authority - arrange for repair works required (Heritage Authority).
- Check all Heritage Structures - advise of any damage/vandalism to park management authority - arrange for any repair works (Heritage Authority).

Sixth Monthly

- Check post and wire fencing to bush protection areas (where required) - carry out any repair works required (by Holroyd City Council).
- Check all directional signage for damage/vandalism - carry out any repair works required (by Holroyd City Council)
- Check all concrete and asphalt pathways for cracking, settlement etc - organise for any repair works required (by Holroyd City Council).
- Monitor drainage outlets from Lower Prospect Canal to stormwater system - assess any problems identified or possible remedial action.

Yearly

- Check concrete edges to canal for cracks/displacement - carry out any repair works required (Holroyd City Council).
- Check grassed verges and path alignment within canal for differential settlement - report to management authority and review actions required (Holroyd City Council).
- Flush irrigation system with organic cleaning agent (Holroyd City Council)

Five Yearly

- Repaint required elements of heritage structures (Heritage Authority)

5.0 MASTERPLAN

5.1 Masterplanning Principles

Based on the actions defined in the Management Framework, and in response to the values, issues and opportunities. and desired outcomes identified in the basis for management a key set of planning parameters were established for development of concept masterplan directions for the site.

These are listed in the table below.

ISSUES	MASTERPLANNING PARAMETERS
1. Built structure • does not follow natural contours • artificial landform • modified landscape • continuous corridor • heritage significance	Retain built character • retain canal as a level structure at its surface width. • built structures conserved with any required remedial actions. • modified landscape character to be retained while optimising for regeneration of Grey Box Woodland • maintain continuity of corridor • maintain, enhance and interpret heritage items.
2. Part of a larger open space and access network. • potential linkage between regionally significant open space and recreation facilities. • regional cycleways providing for recreational and commuter usage.	By establishing a cycle/pedestrian link as a number one priority • safety issue of the open canal must be addressed (preferred option filling) • long term maintenance costs of the canal structure can be reduced (through filling) • loop cycle routes can be progressively established with regional links achieved in the medium to long term
3. Site to be opened to public access and use	• privacy and security of residential edges to be enhanced. • passive recreation amenity - jogging, cycling, fitness, walking and dog walking. • outdoor education • links to adjoining open space areas providing other facilities.

In responding to these parameters detailed responses to the site have been developed in collaboration in the project team specialists, the steering committee and the community working group. The major design principles for this development that apply to the length of the Lower Prospect Canal corridor are as listed, and as identified on the concept masterplan - Figure 5.1

1. Cycleway located to centre of Lower Prospect Canal alignment

Filling of Lower Prospect Canal:
Several options for treatment of the Lower Prospect Canal to both render the corridor safe for general public usage and halt the ongoing degradation of the Lower Prospect Canal structure were reviewed in Section 3.2 Potential Uses Evaluation. Of these the preferred approach was to fill the canal to its full depth retaining the edge alignment and the level character of the structure. Through this several objectives are achieved.

- The Lower Prospect Canal is rendered safe for public use without the need for extensive use of hand rails or other barrier measures.

- The degradation of the Lower Prospect Canal is prevented - filling (after any required remedial works to the canal walls) will address the principal issue of differential pressures on the canal walls which is causing heaving and cracking of tiles and in-situ concrete sections. If the Lower Prospect Canal was to be retained fully open major remedial works would have to be carried out initially, with further recurrent works in the long term.

- Heritage: As noted earlier in this report the major heritage objective for the Lower Prospect Canal and its related structures is to retain the essential fabric of its construction, alignment and context. Filling is an acceptable approach for protection of the Lower Prospect Canal from a heritage perspective as it addresses degradation concerns as noted above whilst allowing potential for future removal of fill to carry out further historical investigations if these were required.at any time.

Cycleway

In addressing these objectives the filling of the Lower Prospect Canal also provides potential for integration of the canal structure into recreational objectives for the site. The provision of a cycleway connection along the Lower Prospect Canal corridor linking Prospect Reservoir, Western Sydney Regional Park and areas west to the Blue Mountains, with Homebush Bay and Botany Bay has been identified as a fundamental regional value of the Lower Prospect Canal lands.

It is proposed that in achieving this goal that the cycleway is located in the centre of the filled canal alignment with the existing canal edges visually reinforced with concrete edge capping. Turfed verges to the cycleway defined by the concrete capping are aimed to create the visual impression of a continuous 'river' flowing along the canal alignment. This treatment will emphasise the texture and colour contrast with the adjoining native and paddock grasses (to open areas) in particular if the turf is irrigated and maintained as described on Figure 5.2. The filling process will require the resolution of several issues prior to its commencement (Holroyd City Council has suggested that an environmental impact assessment may be required). Issues to be addressed include:

- Volume of fill available and extent of filling able to be carried out based on supply (desirable to maximise amount of filling at any one time).

- Resolution of potential traffic and storage issues (possible environmental impact statement).

- Resolution of potential environmental issues - noise, dust, safety (possible environmental impact statement).

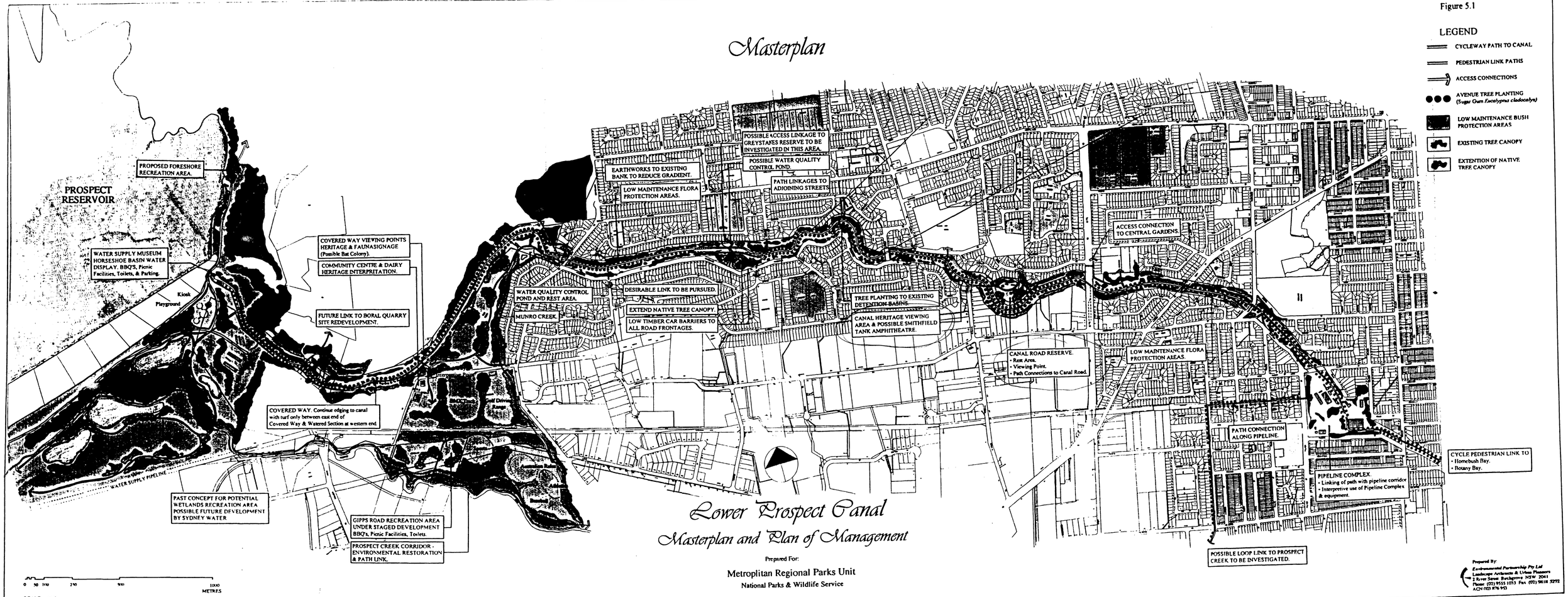
Use of the Lower Prospect Canal in such a literal form provides a direct interpretation of the canal's heritage values in recognising the alignment and engineering levels of the canal structure.

It is proposed that at road bridge crossings of the corridor that the Lower Prospect Canal underpasses would be used to enable the cycleway to continue under the road bridges. This would require filling to be limited in these areas and Lower Prospect Canal walls subject to upgrading, either as a new precast concrete tiled finish to replace the existing, or through stripping back of tiles, to the original masonry capping of the canal and refurbishment (and replacement as required) of stonework (refer to Figure 5.3). This aspect would be subject to review at the detailed design stage however, a refurbished stonework finish would provide an aesthetically pleasing finish. Bridge underpasses would also require works to rationalise services and untidy substructure to prevent vandalism and provide a visually acceptable treatment. In providing 3m head room clearance and the existing channel structure will enable a narrower path (2.5m) to be retained for the cycleway along with a 1 metre pedestrian zone (defined by bollards) at the road underpasses. Approaches to underpasses should provide a 1:20 grade in accordance with standard requirements for cycle access.

The cycleway path is proposed to be 3 metres width constructed from reinforced concrete in accordance with RTA cycleway recommendations. Controlled vehicular traffic for maintenance purposes (up to 5 tonnes) should be catered for in the structural desgn of the cycleway. Implications of traffic for the structural integrity of the Lower Prospect Canal as identified in AWT's May 1997 Assessment of filling of the canal should also be revieweed at the deisgn stage. The cycleway should be serviced by a network of narrower (1.5 metres) asphalt paths that canl link the cycleway with road crossings and provide strategic access links to adjoining open streets and open space areas. In accordance with RTA Cycleway recommendations the cycle path should not initially be defined as cycles use only, however over time usage levels may determine that some separation along the corridor would be desirable. This can be achieved through extension of the asphalt path network.

Figure 5.1

Masterplan



Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:

Metroplitan Regional Parks Unit

National Parks & Wildlife Service

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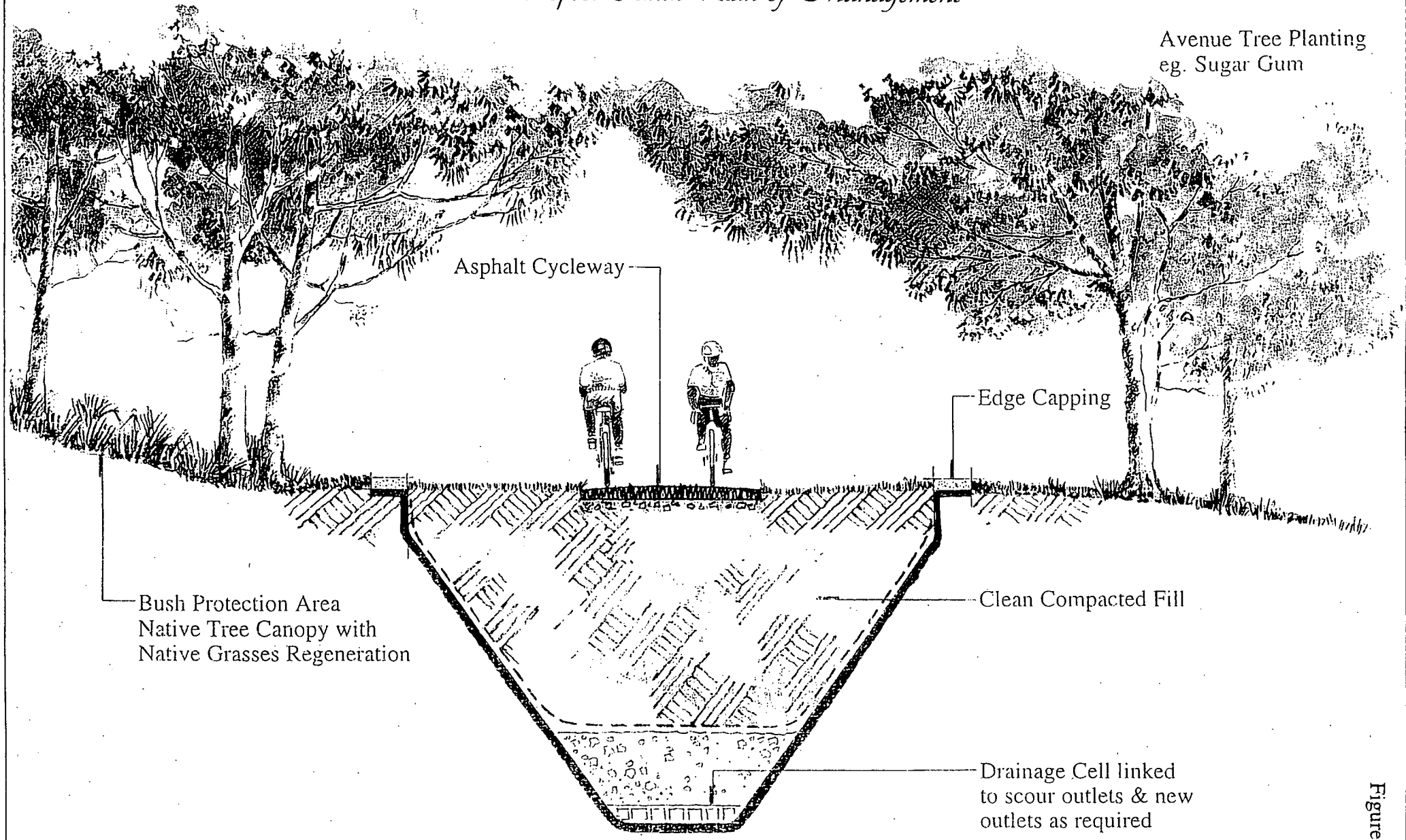
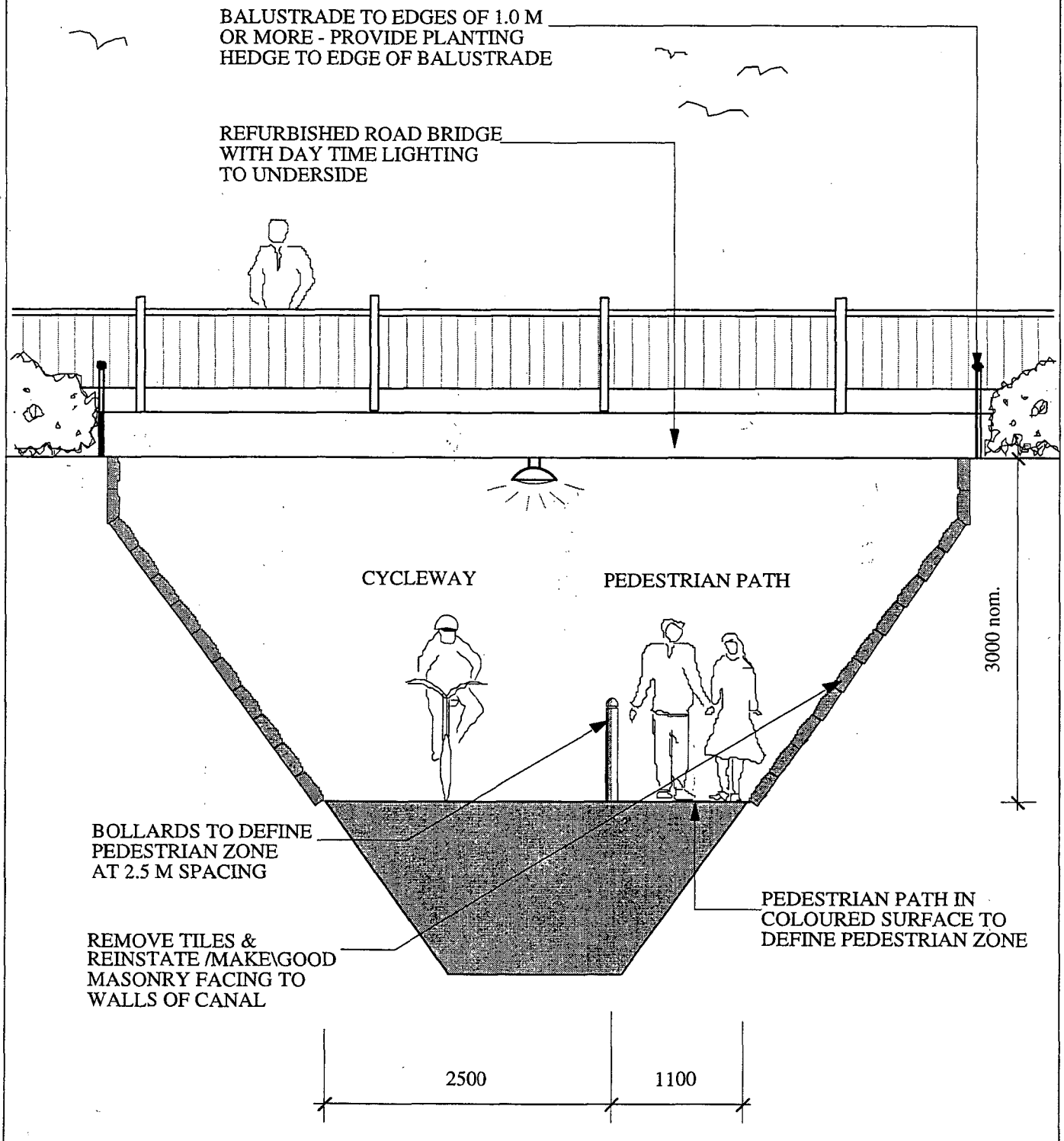


Cross Section Through Canal Cycleway

Figure 5.2

Figure 5.3

Lower Prospect Canal Plan of Management



Cross Section Through Cycleway at Road Underpass

Where existing bridge crossings and scour valve landings cross the Lower Prospect Canal structure, the project team heritage consultants, along with the heritage study commissioned by AWT (1997) have recommended that the structures be retained. In order to achieve this it will be necessary for the cycleway to ramp gradually to provide an at grade crossovers of the bridges. As such the bridge landing becomes part of the cycleway surface and can provide an added dimension to the public experience of the Lower Prospect Canal corridor. Valve wheels and equipment extending above landing level will have to be removed.

2. Establishment of Low Maintenance Bush Protection Areas

In order to facilitate regeneration of the Grey Box woodland community on the site along with consolidation of communities of threatened species such as Pimela spicata and Acacia pubescens, it is proposed that large areas of the site be designated as low maintenance bush protection areas. The objectives of these zones are threefold:

- to provide continuous belts of regeneration areas with a minimal maintenance regime to enable regeneration of native vegetation.
- to reduce overall maintenance requirements on the site.
- to provide visual buffering to adjoining residential edges whilst maintaining a level of visibility appropriate for security and safety.

The concept Masterplan identifies the preferred locations of these zones which have generally been related to corridor edges formed by residential development. This will assist in providing a buffer between residential areas adjoining the Lower Prospect Canal. The corridor edges adjoining residential streets (as described in 3. Passive Grasslands below) will be retained open for general public pedestrian access.

A fuel reduced zone to the rear of residential properties of approximately 3 metres is recommended to enable fire fighting access and reduce fire risk to adjacent property boundaries. This area would be mowed on a regular basis in parallel with maintenance requirements for passive grassland areas. It is desirable that post and wire fence not be installed to this edge due to ongoing cost implications, however the management authority may determine after a trial period that such an edge definition is required to limit fuel reduction maintenance etc. These principles are indicated on the Lower Prospect Canal corridor cross section - Figure 5.4.

The Grey Box woodland is typified by a relatively open understorey dominated by native grasses. It is proposed that each year at least half of native grassed areas are slashed by hand slasher or walk behind slasher (to ensure regenerating vegetation is protected) to enable native grasses to reseed. These works will need to be supervised by a NPWS officer. At this time any regenerating strand planting agreed by NPWS to be in conflict with residential security should also be selectively culled.

3. Passive Use Grassland Areas

The existing open grassed areas should be predominantly retained as maintained grasslands for passive recreational use. Where existing tree planting provides pockets of potential native vegetation regeneration these zones should be delineated for establishment as additional low maintenance bush protection areas and ideally defined by path links or if required post and wire fencing. These areas should be finally designated in detailed design development.

The Community Working Group identified a strong local preference for no park furniture to be provided through passive grassland areas - due to its potential for vandalism, and encouragement of undesirable gatherings. Whilst recognising these issues it is recommended that in detailed design development some localised seating of robust furniture elements (possibly purpose built, eg, low walling or timber benching set into landform) should be located where passive surveillance from adjoining areas (for security) is possible. This will cater for the identified need for rest points for path and park users, in particular the elderly and the disabled.

4. Heritage Conservation

As identified in Section 4.2 Heritage Conservation Plans will be required to be carried out on each of the significant heritage components of the Lower Prospect Canal. Specific details of proposals related to each of the recognised elements of the Lower Prospect Canal having heritage value are provided in Section 5.2 Proposed Concept Masterplan. However, in general terms the proposals aim to optimise the value of these elements as heritage elements, and in their beneficial relationship to the corridor as an open space area. With regard to the Lower Prospect Canal structure itself it is proposed that sections of the canal should remain unfilled (such as that proposed south of Canal Road Reserve (see 5.2 - Bayfield Road to Cumberland Highway) to provide examples of the channel's engineering construction. It is proposed that a section of the canal facing could be reconstructed to show the techniques and materials of construction. A robust form of steel grill and/or see through screen that allows viewing but prevents access and dropping of rubbish would be required to cover the canal in these locations.

It is also proposed that as a recognition of the heritage Sugar Gum plantings and the culturally influenced character of the Lower Prospect Canal that the extension of the avenue plantings at least on the southern side of the canal be further considered. This proposal was supported by both the Heritage and Flora specialists on the subconsultancy team.

5. Screen/Buffer Planting

Due to the visual exposure of the adjoining residential and industrial development to the Lower Prospect Canal particularly on its southern boundaries, it will be necessary to provide buffer tree and shrub planting to selected areas to both improve visual quality for Lower Prospect Canal users and to provide additional privacy to adjoining residences.

Their planting should be from a palette of indigenous shrub and tree species that will provide for long term treatment of screening issues.

Tree planting should be configured to frame panoramic views and to have due regard for potential overshadowing of adjoining properties.

6. Signage

In line with the nature of the usage of the corridor as a recreational and commuter cycleway, and as a focus for heritage conservation, an integrated system of signage will be required. Section 4.3 outlines principles for establishment of a heritage interpretation signage system and information

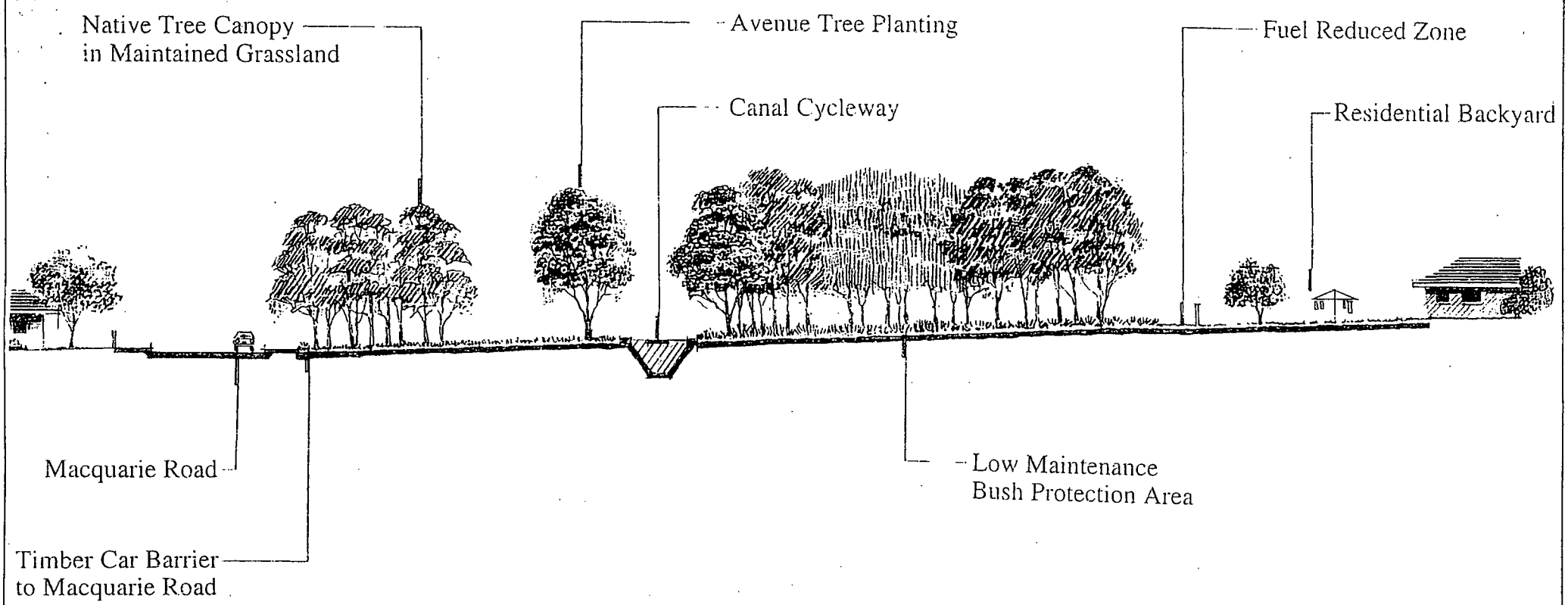
Key issues to be addressed in developing signage strategies include:

- establishment of durable materials palette for both types of signage
- possible integration of cycleway signage with an overall Bay to Mountains signage strategy
- location of signage to respond to key locations and avoid proliferation of signage elements.

7. Public Art

The development of the concept proposals outlined on the Masterplan provide a range of opportunities for the incorporation of public art institutions into design development and implementation. These include:

- Horseshoe Basin Water Feature and Channel Re-creation
- Viewing points to either end of covered way
- Artwork installation in bush protection zones but visible from path alignments
- Design of metal grilles to viewing windows and sedimentation channel gallery
- Smithfield Tanks rest area
- Bridge underpass (concealment treatments to bridge substructures)



Typical Cross Section Through Corridor

Figure 5.4

5.2 Preferred Concept Masterplan

Generally

The concept masterplan (refer Figure 5.1) describes the long term vision for the development of the Lower Prospect Canal corridor as an open space linkage achieving local and regional objectives of environmental, public access, passive recreation, and heritage significance. Whilst Section 5.1 outlined the planning/design principles that apply generally to the whole corridor, this section describes particular recommendations relating to specific situations along the corridor.

Prospect Reservoir to Gipps Road

Linkage to Prospect Reservoir:
The securing of a public access link between Prospect Reservoir and the Lower Prospect Canal lands is a fundamental requirement of the cycleway access proposal. In following through this issue with Sydney Water the Lower Prospect Canal Management Authority should liaise with Sydney Water in exploring all options for enhancing public recreational facilities at Prospect Reservoir. The Prospect Reservoir Plan of Management under preparation concurrently with this study is understood to have established complementary objectives regarding such issues.

Sydney Water Supply Museum:
A major opportunity is the potential for establishment for a Sydney Water Supply Museum at the Horseshoe Basin and Valve House. Located within a major regional open space facility, and along a potential regional open space and access link, this site would be ideally suited to provide such a facility.

Horseshoe Basin
The Horseshoe Basin provides potential for establishment of a water display re-creating the operation of the basin and Lower Prospect Canal system. This display should be extended (ideally) to the existing chlorination plant in the form of permanent water body in the channel. To create the illusion of its previous use a false bottom could be installed to the Lower Prospect Canal to provide a minimal water depth sufficient to create the visual impression of a filled canal. This feature could also provide a summertime usage for children water play if effectively designed to address safety issues.

It is proposed that the water channel display terminated in the vicinity of the existing chlorination plant from where the filling treatment would commence.

Cycleway Linkages to Prospect Reservoir:
It is proposed that cycleway linkages along the south of Prospect Reservoir adjoin the Lower Prospect Canal cycleway at this point. The cycleway will run along the canal alignment to the commencement of the covered way, where a viewing area and interpretive signage will direct the cycleway to the southern side of the Lower Prospect Canal.

Covered Way:
It is recommended that the experiment of establishing a bat colony in the covered way should be revisited by relevant bodies, as it is understood that the process previously followed may not have been optimum for these purposes or in line with current techniques. Interpretive displays and viewing points are proposed at the Lower Prospect Canal ends that will also serve as diversions of the cycle path around the covered way

Linkages to Gipps Road Reserve and Hyland Road Open Space:
Pedestrians/cycle path links to Gipps Road Reserve and Hyland Road Reserve should be provided at the eastern end of the covered way. Directional signage provided at this location will inform cycle users of toilet facilities and other amenities at the Community Centre on Hyland Road. (It should be noted that toilet facilities will need to be made accessible during day;ight hours, seven days per week.)

It is proposed that the boundary interface between the Lower Prospect Canal lands and the Holroyd City Council site north of Hyland Road be integrated to provide a seamless visual and spatial link between the two sites.

Munro Creek Wetland:
At the head of Munro Creek near Gipps Road on the southern side of the Lower Prospect Canal it is proposed that the existing low lying wetland area be upgraded based on natural wetland principles, with removal of weed vegetation and recommended deepening of the wetland to create a permanent water body and landscape feature at this location. (refer Figure 5.5 - Perspective)

Taylor Street:
Where Taylor Street adjoins the site on the northern side of the Lower Prospect Canal (east of the Greystanes (Boothtown) Aqueduct) the opportunity to link pedestrian access to the canal corridor by means of a path link should be followed through,

Gipps Road Bridge:
The cycleway passes under the Gipps Road bridge (as described on Figure 5.6 - Perspective) without any requirement for reducing filling levels to Lower Prospect Canal. The bridge structure is of heritage significance and works will be required to make safe the underside of the structure along with carrying out any necessary finishes improvements in sympathy with heritage requirements.

Gipps Road to Bayfield Road

The section of the Lower Prospect Canal corridor between Gipps Road and the Greystanes (Boothtown) Aqueduct is of undulating topography sloping away to the south. As the Lower Prospect Canal approaches the Greystanes (Boothtown) Aqueduct existing banks to the southern side are recommended to be subject to weed management, and where possible regraded to reduce gradients. Native revegetation should be carried out to the bank establishing a maintenance free solution. East of the Greystanes (Boothtown) Aqueduct the winding canal alignment provides an attractive route for the cycleway set in bushland canopy (refer Figure 5.7).

Greystanes (Boothtown) Aqueduct and Inserted Syphon:
The Greystanes (Boothtown) Aqueduct is the most recognisable of the Lower Prospect Canals heritage features and provides a major visual element to what is a wider section of the canal corridor. It is proposed that subject to detailed structural investigations that a pathway link be carried over the Greystanes (Boothtown) Aqueduct using the existing parapet walls to provide safety balustrades. The path surface itself should be constructed as a platform supported by a reinforced frame to avoid any additional loading of the Greystanes (Boothtown) Aqueduct (Refer Engineering Review - Volume 2 of Plan of Management). It is recommended that bollards and signage be provided at either end designating the Greystanes (Boothtown) Aqueduct as a walkover zone to allow pedestrians and cyclists to integrate in this narrower connection.

Subject to the detailed recommendations of the Conservation Plan it is recommended that the Inverted Syphon buildings provide an interpretive viewing area with required safety and upgrade works being carried out. Interpretive signage and historic photographic images could be placed on the inside of the Syphon buildings. This type of display would require the Syphon buildings to be locked after sunset as part of park operational requirements.

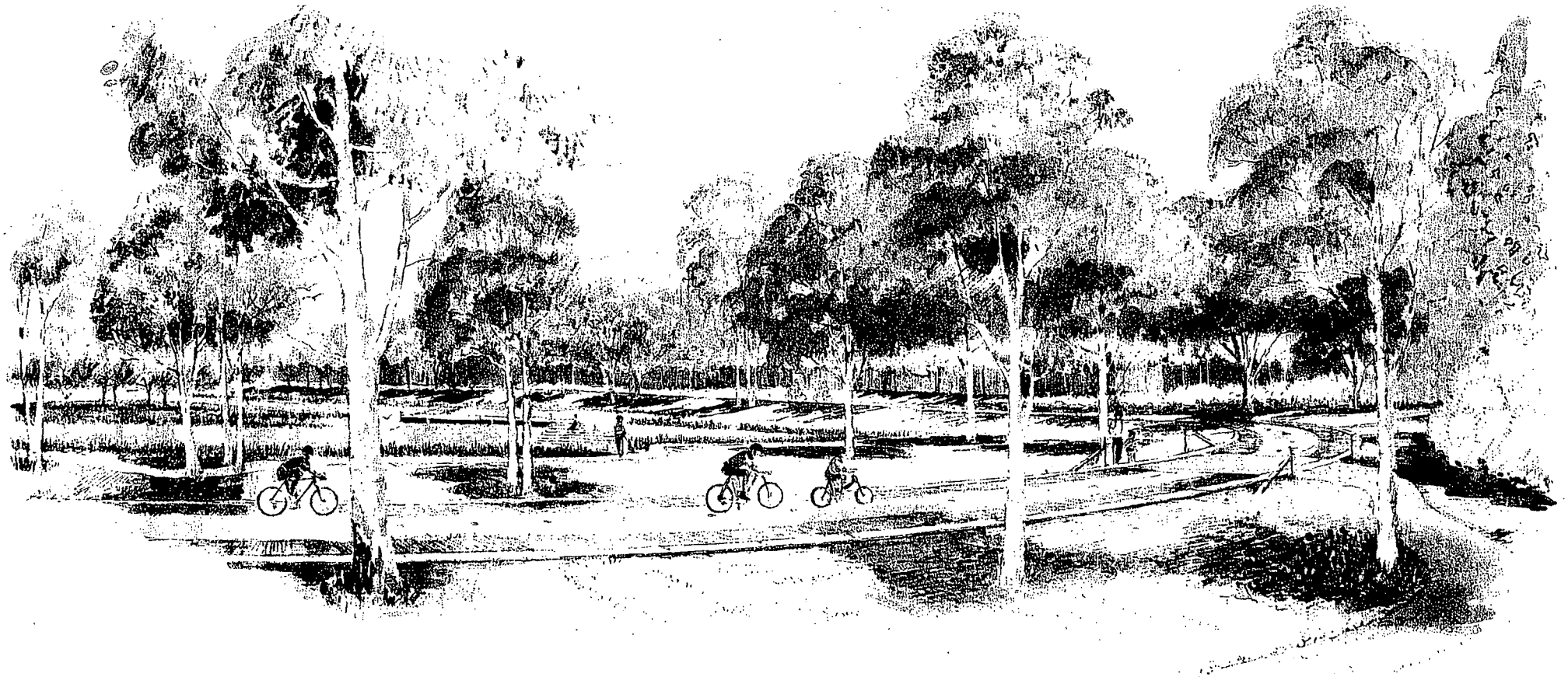
A further proposal to be considered in the context of a detailed Conservation Plan is the removal of earth mounding covering the Syphon bypass pipe. It is suggested that this would assist in the interpretation of the technical operation of the Greystanes (Boothtown) Aqueduct and bypass, create the possibility of an additional engineering feature, and eliminates what will otherwise be an ongoing maintenance and visual problem related to the existing mound. If such a measure was not feasible then the removal of weed vegetation and establishment of a simple grass ground cover would be preferred.

Greystanes (Boothtown) Aqueduct Water Quality Control Pond:
In order to assist in providing additional stormwater storage to the natarul drainage line passing under the Greystanes (Boothtown) Aqueduct it is proposed to establish a water quality control pond on the northern side of the Greystanes (Boothtown) Aqueduct with overflow to the existing creekline to avoid any potential for flooding of residences adjoining the corridor. Integrated with this should be the rehabilitation of the natural creekline to the south of the Greystanes (Boothtown) Aqueduct, making bank erosion safe and progressively removing weeds and revegetating to avoid impact on bird and farm habitat.

Hopman Street Reserve:
The existing reserve provides an opportunity to link the cycleway to Hopman Street and the residential area to the north. This linkage is highly significant as opportunities for connections to residential areas adjoining to the north through this section of the Lower Prospect Canal corridor are infrequent. The path should pass through the lower maintenance bush protection area and provide a linkage to Macquarie Road for north and south cross canal access.

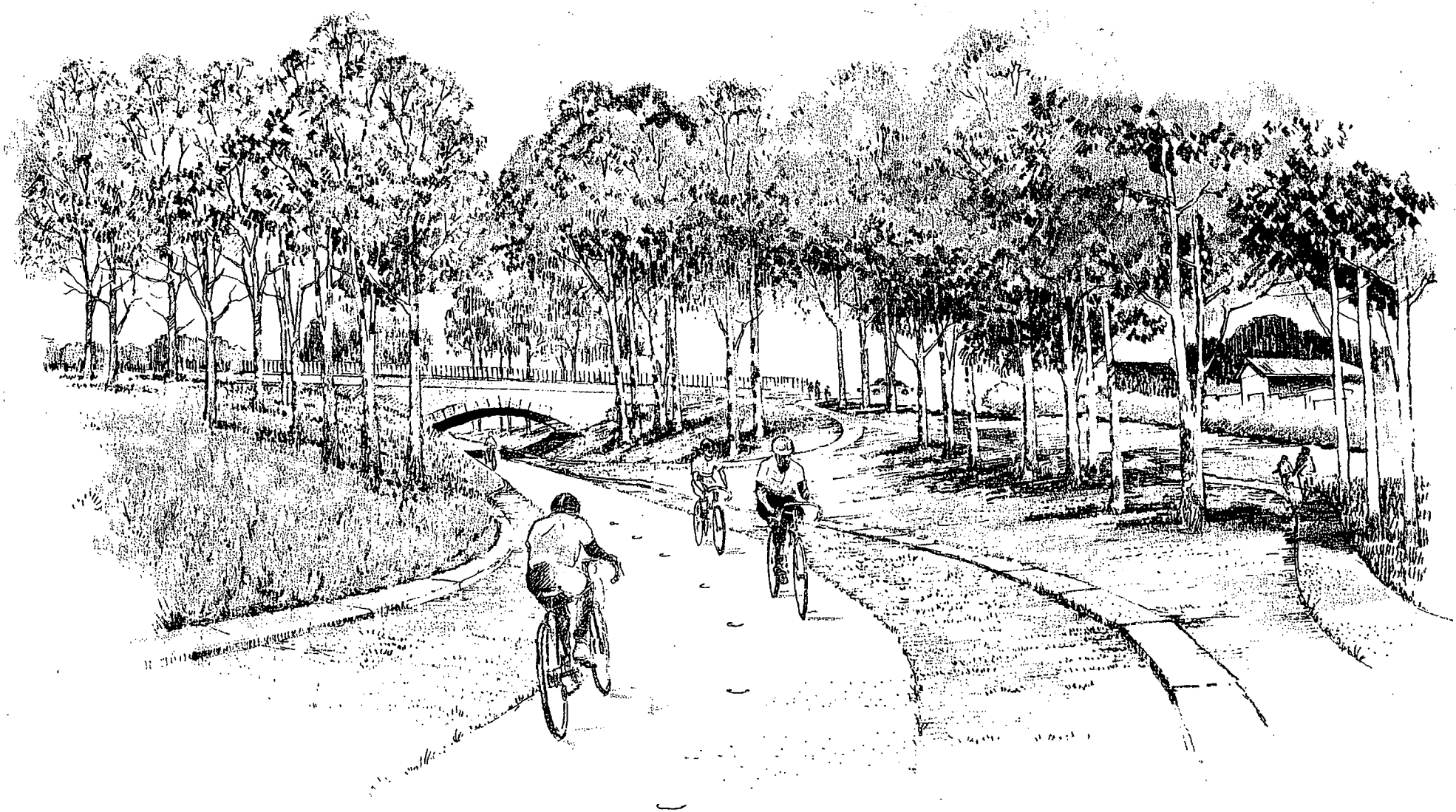
It is recommended that additional native tree planting is carried out to the dry detention basins to improve the visual character of the features and provide additional shade and bird habitat.

Bayfield Road Bridge:
The bridge underpass is recommended to follow the principals outlined in Section 5.1 for the Lower Prospect Canal cycle path. Linkages to Bayfield Road should be provided as per the concept masterplan to the southern side of the Lower Prospect Canal. (refer perspective sketch - Figure 5.8.



View Towards Munro Creek
Water Quality Control Pond

Figure 5.5

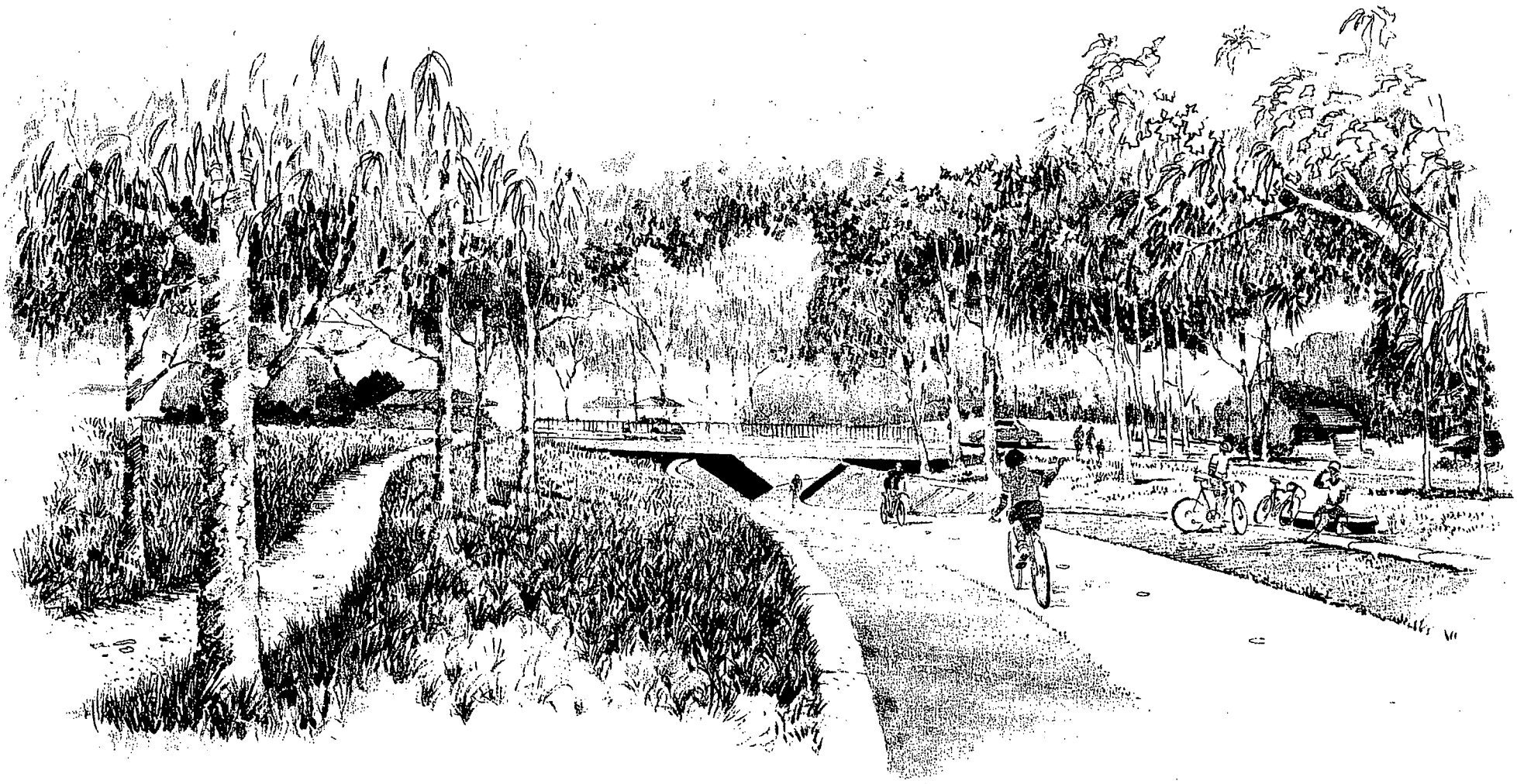


View Towards Gipps Road Bridge

Figure 5.6

View Along Cycleway Corridor

Figure 5.7



View Towards Bayfield Road Bridge

Figure 5.8

Bayfield Road to Cumberland Highway

Smithfield Tanks:
As a means of providing a rest and gathering area at a location which provides panoramic views out over Smithfield and Fairfield it is proposed that a sunken (750mm) space be created using the definition of the existing tank walls. With appropriate treatment of the tank walls, interpretive information could be provided as permanent displays outlining the previous function of the tanks in the water supply system.

The level change creates the opportunity to provide informal seating on steps, and wall edges that will be highly vandal resistant, whilst creating a pleasant area for resting or informal use (see Figure 5.9).

During the detailed design phase excavation works will need to be reviewed to control potential drainage problems with neighbouring residential properties.

Canal Viewing Windows:
As outlined in Section 5.1 it is proposed that in sections of the Lower Prospect Canal where existing canal structural components are in good condition that a void be retained in filling works to enable viewing of the canal structure in its original form. It is suggested that the Lower Prospect Canal wall be deconstructed to provide a portrayal of the structural layers, and construction techniques. Display lighting and interpretive information and photographics will further enhance the viewing windows. In line with the Lower Prospect Canal's functional industrial character it is recommended that the surface treatment of the windows be a heavy gauge steel mesh that enables viewing but presents general public access. Maintenance access would be by way of a lockable hatch while drainage would be required to the Lower Prospect Canal for integrating with existing drainage systems.

Canal Road Reserve:
The reserve provides a further opportunity to link the Lower Prospect Canal cycleway to adjoining residential areas. The reserve also affords the highest viewing point along the Lower Prospect Canal corridor. The reserve can be expected to be a popular stopover/rest point along the cycleway pedestrian network. It is recommended that additional native shade tree planting and further planting to residential fences should be carried out to improve the visual character of Holroyd City Council's reserve.

The reserve's nodal location and optimal view provision suggests that it is an ideal location for additional seating and tables etc for general community use. As noted in Section 3.4, however, the Community Working Group was opposed to such resources as outlined previously. Detailed design development in this area should consider the incorparation of purpose designed seating (to be vandal resistant) located so as to minimise potential for anti social behaviour (that is in good position for passive surveillance from other areas).

Edges to Canal Corridor:
As outlined in 5.1, the boundaries of the Lower Prospect Canal to residential and industrial edges will require selective buffer planting, the section of the canal between Canal Road Reserve and the Cumberland Highway is in particular need of such measures to both north and south edges. To the south it is recommended that the Management Authority liaise with industrial property owners to encourage a 'good neighbour' relationship which aims potentially to:

- ensure that buffer vegetation is maintained and protected
- ensure that any boundary fencing is provided of appropriate materials and character, and maintained to a reasonable level.
- facilitate use of the corridor by employees (eg provide lockable gate access)

Cumberland Highway Bridge:
Being a major arterial road the Cumberland Highway bridge is a significant structure to which significant related works will be required to make it suitable for carriage of the pathway link through the Lower Prospect Canal and under the bridge. Issues to be addressed include:

- concrete slab cover removed to either side of the bridge
- services concealment/rationalisation (subject to leases)
- treatment and daytime lighting of underside of bridge

Contingent on the programming and design of the potential public transport easement to the east of the Cumberland Highway these issues, and the treatment of the underpass may be able to be addressed in the potential upgrading or reconstruction of the bridge.

Cumberland Highway to Sherwood Road

Public Transport Easement:
The status of the public transport easement to the north of the Lower Prospect Canal has a major effect on the configuration of not only the bridge underpass but open space and access provision to the eastern side of the Cumberland Highway. If the transport corridor proceeds, it is preferred that the public transport link be cut into the ground surface. Whilst requiring edge barrier treatment and being of greater cost, this approach will minimise noise and visual impacts on the adjoining residences, school, and open space areas. A bridge link across the cutting would be provided to link Sherwood Grange Public School to the Cycleway.

It is proposed that the area of the corridor adjoining the school be delineated in detailed design development to establish bush protection zones through existing canopied areas whilst retaining open grassland areas for general passive recreational use where appropriate. Where possible bush protection zones should be delineated by path linkages.

Elevated Canal Landform:
A large proportion of the visual corridor between Sherwood Grange Public School and Sherwood Road is elevated onto a steeply sided ridge of fill material. It is proposed that weed removal and regrading where possible to recline grades is carried out to be followed by establishment of a bush protection zone to both northern and south sides of the Lower Prospect Canal. Fire management fuel reduced zones would be provided to residential boundaries (as outlined in 5.1) while path linkages to adjoining streets enabling crossing of the 'artificial ridgeline' would be required as per the Concept Masterplan.

Sherwood Road Bridge:
The Sherwood Road Prospect Reservoir should follow the same principles as the Bayfield Road and Cumberland Highway underpasses with the exception that on the eastern side of Sherwood Road the cycleway/path link is proposed to be brought back up to natural grade by a structural ramp rather than by filling. This is to enable the structure of the existing sedimentation channel to be retained and integrated into an interpretive feature as described below.

Sherwood Road to Albert Road

Sedimentation Channel Gallery:
With retention of the visually dynamic channel profile and intake flues retained and made visible through use of a ramp structure it is proposed to link the ramp with the walkway to the existing gangway to the channel structure. The existing gangway will be required to be considered as indicated in the sketch cross section - Figure 5.10.

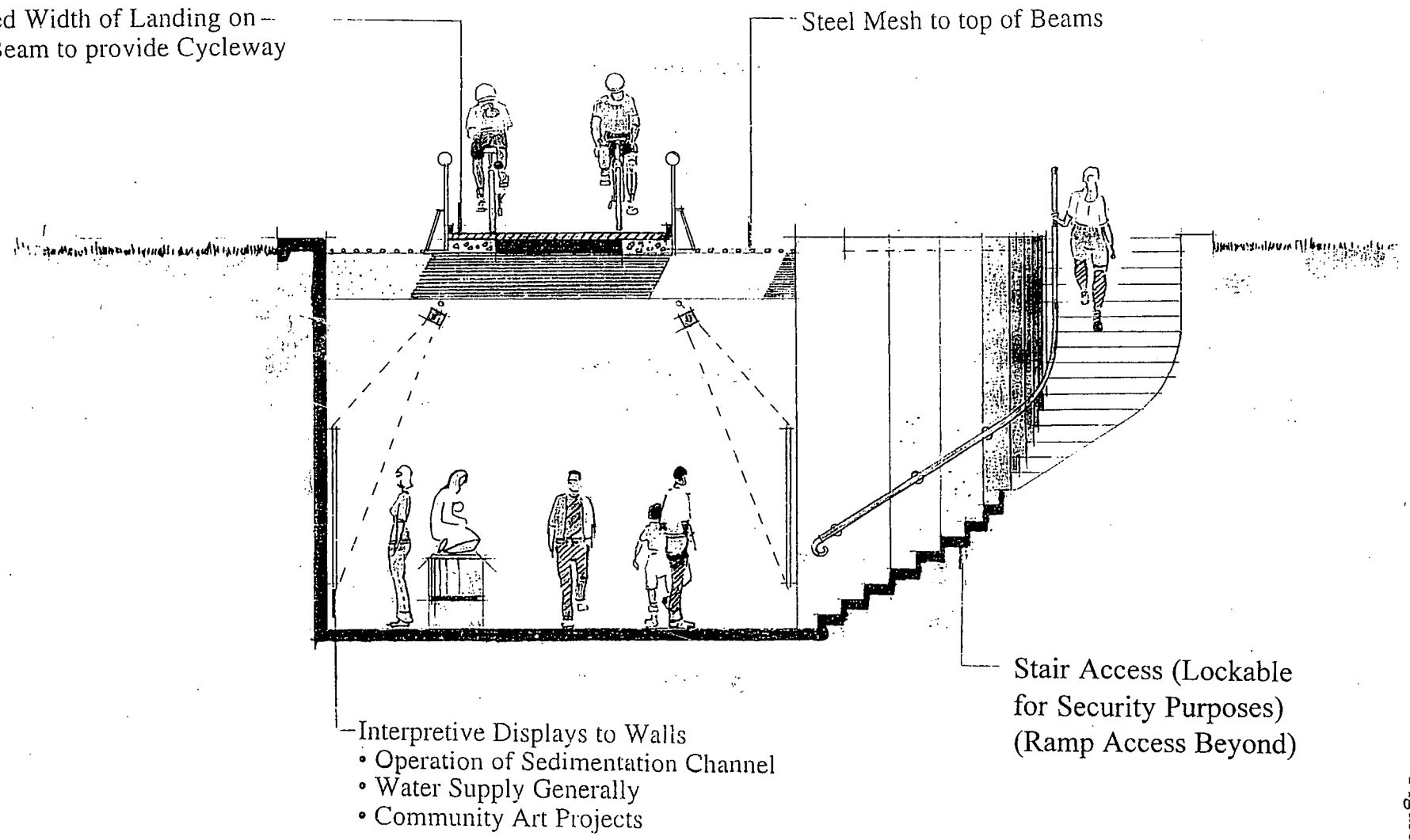
It is proposed that a section of the channel could be established as a gallery area with interpretive information and graphics. The gallery would be secured by way of a see through steel mesh as use for the viewing windows, with public access being controlled. Keys could be provided to relevant groups to enable the gallery to be locked after use. Holroyd City Council suggest that a see through acrylic or other hard wearing material in addition to the steel mesh woulbe desirable to prevent litter being dropped into the gallery. Such measures would need to be integrated with structural reviews of the channel as the preliminary review conducted in this study has identified potential structural problems (refer section 4.3.5)

Albert Road Bridge and Guildford Pipehead:
As at the Lower Prospect Canal's eastern end, the construction of the access heritage to create a regional linkage network is fundamental to the proposals. As the Guildford Pipehead zone remains an operational facility the issue of public access will need to be the subject of further liaison and work with Sydney Water to establish a workable arrangement. As identified earlier in this report, Greener Sydney 2000's Bay to Mountains cycleway proposal identifies the Sydney Water Pipeline which adjoins Guildford Pipehead as a preferred regional access route. This issue is the subject of ongoing investigations by regional cycleway committees involving representatives of all relevant stakeholders.

The Guildford Pipehead itself provides great potential for future adaptive reuse as community or educational facilities with it's rich cultural and technical heritage and visual character.

Tank Heritage
Interpretation Area

Figure 5.9



Sedimentation Channel Gallery

Figure 5.10

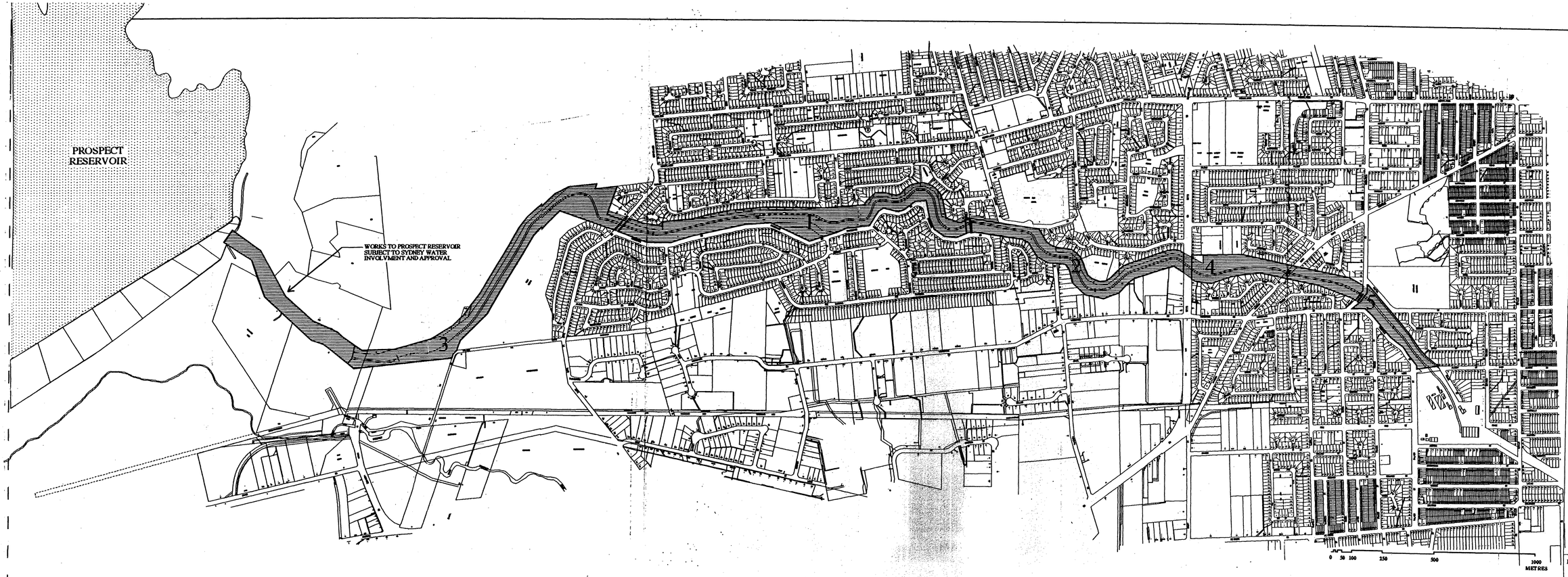


Figure 6.1
Staging Plan

LEGEND

OPTION A - 5 Year Programme

YEAR 1: Stage 1 - Gipps Rd. to Bayfield Rd.

YEAR 2: Stage 2 - Bayfield Rd. to Cumberland Hwy.

YEAR 3: Stage 3 - Gipps Rd. to Prospect Res.

YEAR 4: Stage 4 - Cumberland Hwy. to Sherwood Rd.

YEAR 5: Stage 5 - Sherwood Rd. to Albert St.

OPTION B - 7 Year Programme

YEAR 1: Stage 1a - Gipps Rd. to Bayfield Rd.

YEAR 2: Stage 1b - Gipps Rd. to Bayfield Rd.

YEAR 3: Stage 2 - Bayfield Rd. to Cumberland Hwy.

YEAR 4: Stage 3a - Gipps Rd. to Prospect Res.

YEAR 5: Stage 3b - Gipps Rd. to Prospect Res.

YEAR 6: Stage 4 - Cumberland Hwy. to Sherwood Rd.

YEAR 7: Stage 5 - Sherwood Rd. to Albert St.

Lower Prospect Canal

Masterplan and Plan of Management

Prepared For:
Metropolitan Regional Parks Unit
National Parks & Wildlife Service

Prepared By:

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6.0 ACTION & IMPLEMENTATION PLAN

6.1 Staging

The implementation of Concept Masterplan proposals will involve a range of preparatory, design development, and construction works that will be required to be staged to enable issues such as capital works funding and supply of suitable fill material for canal filling to be sourced and programmed.

As such the concept Masterplan proposals have been identified as a series of works stages that can enable the implementation to progress in a logical series of similarly sized works packages. The key criteria used in establishing this staging approach were:

1. Resolution of highest priority environmental issues
2. Establishment of functional path linkages that can provide recreational and commuter benefit
3. Provision of practical works stages that have readily definable limits and allow completed works to be functional and useable until such time as ongoing stages are completed.

Figure 6.1 describes the staging zones recommended for phased implementation. These are:

Stage 1 Gipps Road to Bayfield Road
Stage 2 Bayfield Road to Cumberland Highway
Stage 3 Gipps Road to Prospect Reservoir
Stage 4 Cumberland Highway to Sherwood Road
Stage 5 Sherwood Road to Guildford Pipehead

The period over which such a programme is implemented is subject to availability of funding and (for the Lower Prospect Canal project) the availability of suitable fill material. In the vicinity of 150 thousand cubic metres of fill will be required to infill the 7 kilometre length of the canal. A critical issue will be whether the Lower Prospect Canal project is able to accept the material on site to meet the programme of the works site from which it is being sourced.

In this regard it may be necessary to provide suitable stockpiling areas with access to acceptable haulage routes with appropriate erosion control and stabilisation measures being undertaken. Stockpiling strategies should be developed as required in detailed planning and design of stages, and should incorporate a public information/consultation component to ensure the local community is aware of the background to events occurring on the site.

As noted the implementation timeframe will be ultimately determined by a range of factors, however in general terms the stages provide five separate works components that could be completed back to back over a five year period. As identified in Section 6.2 - Works Action Plan, the scope of proposed Stages 1 and 3 is significantly greater than 2, 4 and 5. Subject to funding availability it may be necessary to extend Stages 1 and 3 over two years each in order to provide a more even budgetary flow over a seven year programme.

6.2 Works Action Plan

The following Works Action Plan identifies tasks and areas of work which need to be addressed in order to implement the Lower Prospect Canal Reserve development works.

The action plan reflects the staging strategy outlined in 6.1, identifying the key components in the development of the stages along with indicative costs for their implementation.

Whilst the implementation works are proposed to be project managed by the State Government it is essential that the design development and documentation process involve the active participation of all relevant departments of Holroyd City Council (with coordination by a Project Officer) and the Park Management Advisory Committee as recommended in the management strategies.

The Works Action Plans are in the form of a schedule that:

- establishes recommended priorities for works items;
- describes the general tasks/works required including pre- construction items;
- recommends possible sources of funding for the works; and
- notes any specific comments relating to the implementation of that item.

Figure 6.2
WORKS ACTION PLAN - LOWER PROSPECT CANAL

No	ITEM	POSSIBLE FUNDING SOURCES	ACTIONS REQUIRED	COMMENTS
1.0	**PRELIMINARY INVESTIGATIONS, PLANNING AND GENERAL WORKS**			
1.1	**Rezoning Process**	Internal HCC and DUAP activities.	• State Treasury to authorise HCC to initiate and follow through re zoning - rezoning to be exhibitied concurrently with POM. • HCC to carry out rezoning process.	
1.2	**Title Transfer**	Internal State Government activity.	• Title to be transferred from State Treasury to Minister for Environment under National Parks & Wildlife Service.	
1.3	**Care Control & Management**	Internal Statement Government activity - NPWS	• Ongoing funding commitments to management and maintenance to be resolved between NPWS and HCC. • Care Control & Maintenance to be vested in HCC for each stage as 12 month maintenance period is completed.	• Implementation of capital works to include 12 month maintenance period
1.4	**Appoint Project Manager**	Capital Works Funding	• Appoint Project Manager to oversee and implement detailed investigations, planning and design, and construction works.	
1.5	**Archival Recording**	Capital Works Funding	• Carry out archival recording of canal is accordance with Icomos Burra Charter Articles 23/28.	• Conservation Plans for required items (see Fig 4.2) to be carried out as part of works stages to precede detailed design and documentation.
1.6	**Excavation Permits**	Capital Works Funding	• Apply for excavation permits under the NSW Heritage Act	• Excavation will primary relate to archaeological investigation of culverts and establishment of drainage system.
1.7	**Geotechnical Investigation**	Capital Works Funding	• Prepare brief for Geotechnical Investigation of canal of full length of canal • Carry out and interpret investigation as a basis for canal drainage and filling design.	
1.8	**Canal Drainage Strategy**	Capital Works Funding	• Carry out investigation of existing scour valve outlets to confirm suitability for long term drainage of canal. • Prepare drainage strategy based on Masterplan canal filling and cycleway proposals confirming outlet points (existing and new) and falls to outlets etc.	
1.9	**Filling Strategy**	Capital Works Funding	• Based on type of available fill material prepare filling strategy for cycleway establishment incorporating transport, access, stockpiling and filling/compaction issues. • Filling approach to be integrated into Development Application process for review and assessment (see stages).	•Whether DA is for full site or stages will be determined by volume of fill material available and subsequent capacity to undertake filling works to whole or part of the canal.
1.10	**Species Recovery Plans for Pinelea Spicata and Acacia Glaucescens**	NPWS	• Project Manager to liaise with NPWS for their preparation of Species Recovery Plan. • NPWS to prepare Species Recovery Plan. • Project Manager to interpret plan for incorporation into on site works.	
1.11	**Weed Management Plan**	Capital Works Funding	• Prepare brief for Weed Management Plan for canal site. • Carry out study • Project Manager to incorporate recommendation into on site works including potential involvement of community groups.	•Weed Management Plan to outline ongoing detailed strategies for weed removal and control integrated with fauna habitat enhancement objectives. •To incorporate recommendations for removal of non endemic plantings.

Figure 6.2
WORKS ACTION PLAN - LOWER PROSPECT CANAL

No	ITEM	POSSIBLE FUNDING SOURCES	ACTIONS REQUIRED	COMMENTS
1.12	**Establish Bush Protection Areas**	Capital Works Funding	• Confirm extent of bush protection areas through on site investigation as required. • Prepare Masterplan confirming scope of protection areas for issue to relevant bodies. • Setout protection areas on site in liaison with Sydney Water Maintenance Contractors assess requirement for delineating star picket and wire fencing (particularly to Pimelea and Acacia zones). • Sydney Water Maintenance Contractors to revise extent of maintenance - delete bush protection areas.	• Nominated areas should include north and south areas of the canal - south areas to be incorporated in detailed design development of stages. • Sydney Water maintenance contractors to carry on current maintenance excluding bush protection areas until commencement of site works to each stage.
1.13	**Remove Non Endemic Plantings**	Capital Works Funding	• Based on the Weed Management Plan Project Manager to coordinate removal of non endemic plantings - potential community involvement, small sucontract, or incorporation into weekly stages.	
1.14	**Habitat Enhancement Works**	Capital Works Funding	• Implement fauna enhancement recommendations (see Figure 4.3) - provide roosting hollows - retain trees with hollws and dead trees	• Potential for supervised community involvement NPWS may be able to provide supervising support.
1.15	**Heritage Interpretation Study**	Capital Works Funding Capital Works Funding NSW Heritage Office	• Upon completion of Archival recording and heritage conservation plans for required items (see stages), prepare integrated heritage interpretation study brief to determine optimum means and methods for enabling interpretation of the canal and its component elements. • Carry out study • Incorporate recommendations of study into work stages as possible - follow up ater path implementation etc if timing and funding allows. • Follow up external sources of potential funding allows.	• Study to incorporate general graphic recommendations, for interpretive signage along with text, graphics, locations, and fixing/mounting strategies. • Study should note potential for canal viewing windows to display canal construction as outlined in Masterplan proposals.
1.16	**Information signage strategy and graphic guidelines.**	Capital Works Funding	• Prepare brief for signage and information strategy to integrate facilities, pathways, points of heritage interest. • Signage strategy to be progressively implemented during stages.	• Should be integrated with Heritage Interpretation - Strategy for signage provision.

Figure 6.2
WORKS ACTION PLAN - LOWER PROSPECT CANAL

No	ITEM	POSSIBLE FUNDING SOURCES	ACTIONS REQUIRED	COMMENTS
2.0	STAGE ONE GIPPS ROAD TO BAYFIELD ROAD			
2.1	Survey - Stage One Area	Capital Works Funding	• Project Manager to confirm brief • Commission and carry out survey	• Ground survey to show all ground features levels, structure, roads, tree and shrub vegetation along with boundaries, kerbs and configuration of bridges. Note: If funding allows it will be more cost effective to carry out survey for all stages as one commission.
2.2	**Structural Assessment of Acqueduct**	Capital Works Funding	• Project Manager to prepare brief for detailed structural assessment and recommend action for acqueduct. • Carry out assessment. • Incorporate outcomes of assessment in design development, and documentation for cycleway. • Incorporate outcome of assessment in heritage works - Item 2.7 below.	• Brief to incorporate planning proposal for cycleway to run across acqueduct.
2.3	**Prepare Conservation Plans**	Capital Works Funding	• Establish brief for preparation of Conservation Plan in accordance with NSW Heritage Act for: - Acqueduct - Sypon Buildings and Pipeline - Creek Bridge Crossing - Culverts • Incorporate actions where relevant into detailed design and documentation for cycleway and in heritage works.	
2.4	**Hydraulic and Environmental Assessment and Design for Wetland Pond**	Capital Workds funding HCC to seek funding assistance for wetland works	• Carry out hydraulic assessment of catchment to determine feasibility of upgraded wetland and environmental impact • Carry out detailed design and documentation of wetland • Implement wetland works and landscape - integrate with general construction works if possible.	
2.5	**Design Development and Documentation**	Concept Works Funding	• Project Manager to confirm project brief • Appoint Detailed Design team: - Landscape Architect - Civil and Structural Engineer - Hydraulic Engineers - Electrical Engineer - Signage Consultant • Prepare Development Application (Note: DA to incorporate filling works for stages if not carried out as single stage. Overall DA should incorporate full cycleway works in one integrated DA. • Confirm budget allowance. • Prepare Documentation • Call tenders for works packages.	• Scope of works to include: - Canal filling and drainage works (unless carried out as one stage) - Earthworks and regrading to canal edge - Cycleway and pedestrian paths - Vehicle barrier to Macquarie Road - Acqueduct cycleway - Soft landscape works - Signage and interpretive information - Creek upgrading - 12 months soft works maintenance

Figure 6.2
WORKS ACTION PLAN - LOWER PROSPECT CANAL

No	ITEM	POSSIBLE FUNDING SOURCES	ACTIONS REQUIRED	COMMENTS
2.6	**Construction Works**	Capital Works Funding	• Implement construction works • Project management and cost control • Construction supervision	
2.7	**Heritage Conservation Works**	Capital Works Funding NSW Heritage Office Grants	• Design/documentation as required carried out in 2.5 • Follow-up alternative funding services - NSW Heritage Office - Implement works in general construction works as feasible • Provide safety protective barriers to areas not available for public access at opening of stage	• Heritage works may be able to be staged separately to major works if required to meet funding requirements.
2.8	**Educational Use**	Capital Works Funding Construction Kind Capital Works Funding	• Project Manager and HCC to liaise with local schools as to potential use of the opened area for outdoor education. • Possible preparation of information booklet to local schools and other bodies on educational resources of canal corridor.	

Figure 6.2
WORKS ACTION PLAN - LOWER PROSPECT CANAL

No	ITEM	POSSIBLE FUNDING SOURCES	ACTIONS REQUIRED	COMMENTS
3.0	**STAGE TWO BAYFIELD ROAD TO CUMBERLAND HIGHWAY**			
3.1	**Survey - Stage Two Area**	Capital Works Funding	• Project Manager to confirm brief • Commission and carry out survey	• Ground survey to show all ground features levels, structure, roads, tree and shrub vegetation along with boundaries, kerbs and configuration of bridges. Note: If funding allows it will be more cost effective to carry out survey for all stages as one commission.
3.2	**Investigations at road bridge Bayfield Road underpass**	Capital Works Funding	• Investigate services leases at Bayfield Road for potential deletion and integration of services with bridge structure. • Structural engineer to carry out investigations of canal structure at road underpass to determine potential for removal of concrete tiles use of exposed sandstone blockwork walls. • Project Manager is liaise with HCC/RTA for assistance in making good of bridge underpass to be suitable for pedestrian/cycle access under - rationalisation and visual improvement of overhead structure.	• Concealment of services within road bridge structure required • Removal of any defunct/disused services should occur
3.3	**Prepare Conservation Plans**	Capital Works Funding	• Establish brief for preparation of conservation plan in accordance with NSW Heritage Act for : canal structure / canal overbridge / culverts • Incorporate actions where relevant into detailed design and documentation for cyclway and in heritage works.	
3.4	**Detailed Design and Documentation**	Capital Works Funding	• Project Manager to confirm project brief. • Appoint detailed design team: - Landscape Architect - Civil and Structural Engineer - Hydraulic Engineer - Electrical Engineer - Signage Consultant • Prepare development application (Note: DA to incorporate filling works for individual stages. If filling carried out as single stage - overall DA should incorporate full cycleway works as one integrated DA. • Confirm budget allowance • Prepare documentation • Call tenders for works packages	• Scope of works to include: - Canal filling and drainage works - Upgrade, extension of s'stone blockwork to canal at underpass - earthworks and regrading to canal edge - cycleway and pedestrian paths - bollards and solar powered lighting to underpass - vehicle barrier to Macquarie Road/Cumberland Road - path linkages to canal road reserve and canal road - rest area to Smithfields Tank area - viewing window to canal - soft landscape works - Screen planting to residential and undustrial boundaries - signage and interpretive information - 12 months softworks maintenance Note: underpass w'ks to adjoin stage 1 works incl. in this stage.
3.5	**Construction Works**	Capital Works Funding	• Implement construction works • Project management and cost control • Construction supervision	
3.6	**Heritage Works**	Capital Works Funding NSW Heritage Office Grants	• Design/documentation as required carried out in 3.4 • Followup alternative funding sources - NSW Heritage Office • Implement works in general construction works as feasible • Safety protection barriers required at areas not open to public.	• For Stage 2 - proposed canal viewing area is provided at location exhibiting canal structure of particular conservation significance (refer Figure 4.2).

Figure 6.2
WORKS ACTION PLAN - LOWER PROSPECT CANAL

No	ITEM	POSSIBLE FUNDING SOURCES	ACTIONS REQUIRED	COMMENTS
4.0	STAGE THREE GIPPS ROAD - PROSPECT RESERVOIR			
4.1	**Survey**	Capital Works Funding	• Project Manager to confirm brief • Commission and carry out survey	• Ground survey to show all ground features levels, structure, roads, tree and shrub vegetation along with boundaries, kerbs and configuration of bridges. Note: If funding allows it will be more cost effective to carry out survey for all stages as one commission.
4.2	**Structural investigation of covered way**	Capital Works Funding NSW Heritage Office Grants	• Prepare brief for detailed structural investigation of covered way to determine ongoing stability and any rectification works required. • Carry out study • Incorporate recommendations into detailed design and documentation of cycleway and related works • Incorporate relevant actions in hertiage works.	
4.3	**Investigation of Road Bridge Underpass - Gipps Road**	Capital Works Funding NSW Heritage Office Grants RTA Funding	• Investigage services easements at Gipps Road for potential rationalisation/integration with bridge structure. • Project Manager to liaise with RTA for assistance in making good of heritage bridge structure.	• Concealment of services is desirable within bridge structure • Removal of any defunct services should occur
4.4	**Covered Way Bat Colony**	Potential External Funding eg Zoo or Research Programme	• Review previous attempt at establishment of Bat Colony and determine feasibility of such a measure with revised methods. • Plan and implement establishment if practical and fundable. Incorporate into interpretive signage displays.	
4.5	**Prepare Conservation Plan**	Capital Works Funding	• Establish brief for preparation of construction plan in accordance with NSW Heritage Act for: - Gipps Road Bridge - Canal near Gipps Road Bridge - Covered Way - Canal Overbridge - Culverts - Flumes • Incorporate actions where relevant into detailed design and documentation for cycleway and in heritage works.	•If bat colony is viable - conservation plan to assess and evaluate any potential impacts •Canal near Gipps Road Bridge appears to be in an unstable condition - filling works should assist in stabilisation of canal walls.
4.6	**Hydraulic and Environmental Assessment and Design for Wetland Pond**	Capital Works Funding HCC to follow up funding assistance for wetland	• Carry out hydraulic assessment of catchment to determine feasibility of upgraded wetland, and environmental impact. • Carry out detailed design and documentation of wetland. • Implement wetland works and landscape - integrate with general construction works if possible.	

Figure 6.2
WORKS ACTION PLAN - LOWER PROSPECT CANAL

No	ITEM	POSSIBLE FUNDING SOURCES	ACTIONS REQUIRED	COMMENTS
4.7	**Detailed Design and Documentation**	Capital Works Funding	• Project Manager to confirm project brief • Appoint Detailed Design team - Landscape Architect - Civil and Structural Engineer - Hydraulic Engineers - Electrical Engineer - Signage Consultant • Prepare Development Application (Note: DA to incorporate filling works for individual stages. If filling carried out as single stage - overall DA should incorporate full cycleway works in one integrated DA. • Confirm budget allowance • Prepare documentation • Call tenders for works packages	• Scope of works to include: - canal filling and drainage works - earthworks and regrading to canal edge - cycleway and pedestrian paths - landscaped areas to wetland area - viewing areas to covered way - soft landscape works - signage and interpretive information - 12 months softworks maintenance
4.8	**Construction Works**	Capital Works Funding	• Implement construction works • Project management and cost control • Construction supervision	
4.9	**Heritage Works**	Capital Works Funding NSW Heritage Office Grants RTA (Gipps Road Bridge)	• Design/documentation as required carried out in 4.7. • Followup alternative funding sources - NSW Heritage office • Implement works in general construction works as feasible • Provide safety protective barriers to areas not availsable for public access at opening of stage.	• To include making good of Gipps Road Bridge and any required works to covered way.
4.10	**Linkage to Prospect Reservoir**		• Project Manager and HCC to maintain liaison with Sydney Water re linkage of cycleway to reservoir • Project Manager and HCC to maintain liaison with Sydney Water re potential Water Supply Museum and Canal Water Feature at Horshoe Basin.	
4.11	**Linkage to Boral Lands /Maintain vegetated Prospect Hill**		• HCC tomaintain liaison with Boral and Sydney Water over linkages to Boral redevelopment to site and masterplanning of the site to maintain visual backdrop of Prospect Hill as revegetated landform.	
4.12	**Linkages to Gipps Road Open Space**	Capital Works Funding Holroyd City Council Metropolitan Greenspace	• HCC to plan and follow through access connections to Gipps Road Open Space and Prospect Creek • HCC to facilitate usage of toilet amenities at Gipps Road Community Centre • HCC to follow through on park planning and improvements to open space area north of Hyland Road • HCC to investigate and implement creekline upgrading and revegetation to Munro Creek.	

Figure 6.2
WORKS ACTION PLAN - LOWER PROSPECT CANAL

No	ITEM	POSSIBLE FUNDING SOURCES	ACTIONS REQUIRED	COMMENTS
5.0	STAGE FOUR CUMBERLAND HIGHWAY TO SHERWOOD ROAD			
5.1	Survey	Capital Works Funding	• Project Manager to confirm brief • Commission and carry out survey	• Ground survey to show all ground features levels, structure, roads, tree and shrub vegetation along with boundaries, kerbs and configuration of bridges. Note: If funding allows it will be more cost effective to carry out survey for all stages as one commission.
5.2	**Liaison with DOT for Cumberland Highway underpass**		• Liaise with DOT for satisfactory integration of cycleway underpass to highway with potential dedicated bus route. • Liaise with DOT for design of bus route to be cut into landform to reduce visual and noise impacts.	NOTE: DOT to assist with investigation and design resolution of canal structure at road bridge overpass - expose and makegood sandstone blockwork. • Upgrading of bridge structure is likely at this time.
5.3	**Detailed Design and Documentation**	Capital Works Funding DOT - For Road Underpass and Pedestrian Bridge Link to School	• Project Manager to confirm project brief • Appoint Detailed Design team: - Landscape Architect - Civil and Structural Engineer - Hydraulic Engineer - Electrical Engineer - Signage Consultant • Note: Liaison co-ordination with DOT design team will be required • Prepare development application (Note: DA to incorporate filling works for individual stages. If filling carried out as single stage - overall DA should incorporate fill cycleway works in one integrated DA. • Confirm budget allowance • Prepare documentation • Call tenders for works packages	Scope of works to include: - Canal filling and drainage works - Making good, extension of sandstone blockwork to canal walls at underpass - Earthworks and regrading to canal edges - Cycleway and pedestrian paths - Bollards and solar powered lighting to underpass - Pedestrian bridge link across busway to Sherwood Grange Public School - Regrading, stabilisation, and revegetation of banks to canal - Soft landscape works - Signage and intepretive information - 12 months softworks maintenance Note: Full underpass works to adjoin Stage 3 works in this stage.
5.4	**Construction**	Capital Works Funding DOT	• Implement construction works • Project management and cost control • Construction supervision	

Figure 6.2
WORKS ACTION PLAN - LOWER PROSPECT CANAL

No	ITEM	POSSIBLE FUNDING SOURCES	ACTIONS REQUIRED	COMMENTS
6.0	**STAGE FIVE SHERWOOD ROAD TO GUILDFORD PIPEHEAD**			
6.1	**Survey**	Capital Works Funding	• Project Manager to confirm brief • Commission and carry out survey	• Ground survey to show all ground features levels, structure, roads, tree and shrub vegetation along with boundaries, kerbs and configuration of bridges. Note: If funding allows it will be more cost effective to carry out survey for all stages as one commission.
6.2	**Structural Investigation of Sedimentation Channel**	Capital Works Funding NSW Heritage Office Grants	• Prepare brief for structural investigation of sedimentation channel and suspended walkway to determine potential for reuse and rectification necessary. • Carry out assessment • Incorporate outcomes of assessment into detailed design of cycleway and related works and heritage works	
6.3	**Investigation at Road Bridge underpass - Sherwood Road**	Capital Works Funding RTA	• Investigate services / areas of Sherwood Road for potential deletion and integration where possible of services with bridge structure. • Structural engineers to carry out investigation of canal structure at road underpass to determine potential for removal of concrete tiles and use of exposed sandstone blockwork walls. • Project Manager to liaise with HCC/RTA for making good of bridge underpass to be suitable for pedestrian/cycle access under - rationalisation and visual improvement of overhead structure.	• Concealment of services is desirable within road bridge structure • Removal of any defunct disused services should occur
6.4	**Prepare Conservation Plan**	Capital Works Funding	• Establish brief for preparation of Conservation Plan in accordance with NSW Heritage Act for: - Sedimentation Channel - Canal Overbridges • Incorporate actions where relevant into detailed design and documentation for cycleway and in heritage works.	
6.5	**Detailed Design and Documentation**	Capital Works Funding	• Project Manager to confirm project brief. • Appoint Detailed Design Team: - Landscape Architect - Civil and Structural Engineer - Hydraulic Engineer - Electrical Engineer - Signage Consultant • Prepare Development Application (Note: Da to incorporate filling works for individual stages. If filling carried out as single stage overall DA should incorporate full cycleway works in one integrated DA. • Confirm budget allowance • Prepare documentation • Call tenders for works packages	Scope of works to include: - canal filling and drainage works - making good, extension of sandstone blockwork to canal walls at underpass - earthworks and regrading to canal edge - cycleway and pedestrian path - vehicle barrier to Bristol Street and Tennyson Parade - sedimentation channel gallery (potentially to follow on as later implemtnation project) - signage and interpretive information - soft landscape works - 12 months softworks maintenance Note: full underpass works to adjoin stage 4 north included in this stage. Connection to Pipehead to be followed through in ongoing works.

Figure 6.2
WORKS ACTION PLAN - LOWER PROSPECT CANAL

No	ITEM	POSSIBLE FUNDING SOURCES	ACTIONS REQUIRED	COMMENTS
6.6	**Heritage Works**	Capital Works Funding NSW Heritage Office Grants	• Design as required carried out in 6.5 • Followup alternative funding sources/NSW Heritage Office • Implement sedimentation channel gallery works in general works if feasible • Provide safety/protection barriers to channel if works to follow on at later stage.	
6.7	**Linkage to Pipehead and Cycleway Network**	Ongoing Works RTA Cycleway Sydney Water	• Project Manager and HCCto liaise with Sydney Water and RTA for confirmation of cycle link along Sydney Water pipeline and through pipehead. • Project Manager and HCC to liaise with Sydney Water as to nature of potential adaptive reuse of pipehead site.	

6.3 Funding

It is proposed that the major capital works in implementation of the plan of management proposals would be funded by State Government. This should include funding of the project management of the development process, along with twelve months establishment maintenance of soft landscape areas.

The following review outlines possible sources of additional external funding that should be pursued by both Holroyd City Council (or the relevant management authority) and the site's active stakeholders, to hasten the progress of lower priority improvements, that will add to the environmental and recreational quality of the site. In particular Holroyd City Council should address the enhancement of the open space related to Hyland Road, and the rehabilitation of Munro Creek. Improvements to Canal Road Reserve as outlined in the masterplan proposals are also required in the long term.

The most applicable sources of funding are listed below, followed by a chart (Figure 6.3) summarising these funding bodies and relevant application criteria.

1. **Metropolitan Greenspace Programme**
   The Metropolitan Greenspace programme was formulated to assist Local Government in the planning and development of regional open space and to enable more effective use by the public. The programme applies principally to regional open space acquired by the Department of Urban Affairs and Planning and its predecessors within the Sydney metropolitan area. This includes land under the care, control and management of Holroyd City Council as well as land yet to be transferred.

   Types of work considered for funding (on a dollar for dollar basis) include landscaping and tree planting, cycle paths and parking areas, interpretative and educative programmes and bush regeneration. Grants would typically be in the range of $10,000 - $50,000.

2. **Environmental Restoration and Rehabilitation Trust**
   The Trust is one of three statutory bodies established in 1990 under the direction of the Environmental Protection Authority, to redirect trade waste charges levied on industries which discharge pollutants into Sydney's water and sewerage system. The aim of the Environmental Restoration and Rehabilitation Trust is to initiate, encourage and support a range or projects in both the private and public sectors which will reduce environmental degradation and to rehabilitate damaged sites and waterways within NSW.

   The Trust Grants would be suitable for possible funding of upgrading / rehabilitation of wetland areas.

3. **Roads and Traffic Authority**
   The Roads and Traffic Authority has dollar for dollar funding with no set limits of assistance for its Bikeways Enhancement Programme. This funding source would be suitable for the construction of pedestrian bicycle links through the site, linking to other regional open space areas.

4. **Environmental Trust Grants (EPA)**
   Are available to community groups for environmental restoration and rehabilitation.

5. **Corporate Sponsorship**
   It is suggested that Holroyd City Council's Public Relations Unit investigate the potential for sponsorship of some park improvements by local industry and business organisations. Works that would be suitable for this type of funding would be improvemements to adjoining open space areas such as Canal Road Reserve which have a strong relationship to industrial areas, community based revegetation initiatives, along with sponsorship of artwork programmes and community events on the site.

Figure 6.4

POTENTIAL SOURCES OF FUNDING FOR IMPLEMENTATION OF WORKS

NAME OF GRANT	PURPOSE	ADMINISTRATING AGENCY	SCOPE AND LIMITS OF ASSISTANCE
National Landcare Programme Save the Bush	Remnant bushland management, revegetation establishment of faunal corridors	Department of Land and Water Conservation	Bushland revegetation. Typical grant $1,000 - $5,000 occasionally up to $10,000. Must be broad community support for the project and subject to establishment TCM framework.
National Landcare Programme One Billion Trees National Landcare Programme National soil conservation programme	Standard revegetation strategies Works directed at soil management	Department of Land and Water Conservation	Typical grant approx. $1,000 Total $180,000 for NSW Granted directed specifically at combating soil erosion. Dollar for dollar grant. Max. $30-$40,000. Total grants $200,000.
Public Reserves Management Fund Programme - Local Parks and Reserves Public Reserves Management fund Programme - Showgrounds Assistance Scheme	Improvements to Crown Reserves	NSW Dept. of Conservation and Land Management	Dollar for dollar funding but level of assistance is limited.
Job Skills	Over 21 year old trained labour for revegetation work	Dept. of Employment, Education and Training	Labour to assist in documented revegetation work. Grant covers funding for a co-ordinator and approx. 20 trainee staff for 12 months.
Landcare and the Environment Action Programme (LEAP) Special Projects	Under 21 year old trained labour for re-vegetation work. Funding for specific projects related to the Job Skills Programme	Dept. of Employment, Education and Training Department of Employment, Education and Training	Similar to the Job Skills Programme Grants to $20,000 to supplement the Job Skills Programme. Must be matched by Holroyd City Council. Be of community benefit and endorsed by the unions.
Capital Assistance Programme	Construction and improvement of public sporting and recreational facilities	NSW Dept of Sport Recreation and Racing	Possible application for some funding under the programme as a dollar for dollar grant. up to 50% of capital costs. Typically $8,000-$10,000.

Figure 6.3

ADDITIONAL SOURCES OF FUNDING FOR IMPLEMENTATION OF WORKS

NAME OF GRANT	PURPOSE	ADMINISTRATING AGENCY	SCOPE AND LIMITS OF ASSISTANCE
• Regional Sporting Facilities Programme (replaced this year by the Development Area Assistance Scheme) • Cultural Grants Programme • Capital Assistance Programme Cultural Grants Programme • Community Arts and Service Organisations	Assistance with the development of spectator facilities at major sporting grounds in regional areas. Funding for facilities for the arts. Support for community arts activities such as open air shows and public projects	NSW Dept of Sport Recreation and Racing NSW Ministry for the Arts NSW Ministry for the Arts	Low interest loans and grants Up to 50% of the cost for such facilities. Application criteria is very strict. Applicant must supply at least 50% of the funding for a project. The programme must provide artistic experience for many people.
• Noxious Plants Control Programme	Financial assistance for control of declared noxious weeds.	NSW Agriculture and Fisheries	Dollar for dollar grant for week removal of declared noxious weeds only. Holroyd City Council must have a weeds inspector, and a weed management programme.
• Enhancement Programme - Bikeways	Funding for the construction of bicycle paths	Roads and Traffic Authority	Assistance with development of regional path networks.
• Environmental Trust Grants	Assistance in bush regeneration and installation of gross pollutant traps.	Environmental Trust	Funding for local government and community projects aimed at environmental improvements in particular related to stormwater management.
• River Care Programme	Funding for restoration and erosion control works to rivers and streams	NSW Dept of Land and Water Conservation	Funding limited to direct restoration works - no recreational component.
• Section 94 Contributions	To acknowledge demands placed on existing infrastructure by developments	Local Government	Funds are subject to nature of development and Development Contribution Plan being in place.
• New Work Opportunity Programme / Job Skill	Focus on employment opportunities	Department of Employment, Education and Training	Project specific grants only.
• Heritage 2001	Funding for physical conservation works on heritage sites & structures	NSW Heritage Office	Additional funding for items being directly from State Treasury. Capital works/project specific funding only, with expectation that Council or other authority will manage and maintain.

6.4 Monitoring and Evaluation

The assessment of performance in all areas of government operations is a fundamental component of Corporate Strategies. For The Lower Prospect Canal Open Space it is important that regular reviews are carried out by the ultimate management authority to ensure that :

- Capital works construction items meet design and quality objectives;
- Stakeholders are meeting individual commitments for operational, management, and maintenance responsibilities;
- Recurrent maintenance is of acceptable standard and regularity; and
- Park facilities are progressively evolving to meet the needs of local and regional recreational users.

Increasingly, park managers are giving attention not just to quantitative measures of performance but also to qualitative measures, based on the satisfaction derived from the public, their use of the park and the short term and long term benefits they accrue from the park experience. The performance indicators identified in this chapter are of no practical value unless data is available to measure them. This is relatively straightforward in the case of some indicators such as incoming revenue, expenditure and comments from users. However, in a number of other areas such as total use figures and qualitative measures such as levels of satisfaction and benefits, appropriate data is not readily available. It is recommended that as part of Holroyd City Council's data base, that information is collated from requests for action, and from ongoing use surveys (in particular of passive recreation use) which may take the form of resident questionnaires on an annual basis across the Local Government Area, if funding is available.

The range of appropriate performance indicators for the Lower Prospect Canal should cover measures of both 'input' and 'output'. Input measures would include but not be limited to:

- *level of ongoing funding*
- *input in kind by stakeholders*
- *incoming revenue (eg leases)*

Output measures for the complex relate to its provision of recreational opportunities and community recreation benefits. This requires measures such as :

- *number and type of recreational and educational users*
- *comments by local residents, lessees or regular users*
- *feedback from organised groups*
- *expenditure and recurrent costs*
- *use for special and community events; and*
- *media articles.*

As defined in "Succeeding with Plan of MAnagements"(DLAWC & Manidis Roberts 1996) evaluation can be used to determine whether:

- the planning process was effective and satisfactory to stakeholders
- the plans strategies and outcomes are being achieved
- the plans strategies and outcomes remain appropriate
- the expectations of stakeholders remain appropriate
- relevant legislative requirements remain appropriate
- the overall plan remains appropriate

Listed on Figure 6.4 are a series of performance indicators related to each of the Management Framework Strategies. These indicators provide a basis for periodic reviews.

Review

The implementation of the Plan of Management recommendations will inevitably be an ongoing dynamic process, that will require flexibility to accommodate changed circumstances and conditions including environmental quality, user preferences, and financial availability.

Therefore, the provisions of this Plan of Management will be subject to regular review, to ensure its implementation programme remains relevant to the objectives and strategies that must be addressed. The plan must also remain consistent with community expectations and changing user requirements. The Landscape Masterplan is provided as a strategic site planning basis for park development. Individual components will require detailed design development taking into account detailed site conditions and design constraints. The final form of such items as the lake water body will be subject to comprehensive hydrological and geological investigations.

Many of the management objectives and principles described in this Plan of Management are likely to remain consistent over time. However, priority works will be influenced by external changes and the availability of funds and therefore must be monitored closely. The Implementation Strategy *(refer Section 6.1 / 6.2)* must be reviewed annually in the context of the normal budget cycle and the allocation of capital and recurrent funds to the improvements works programme.

The Lower Prospect Canal Plan of Management should be subject to a major review within five (5) years of its adoption to ensure that all recommended actions remain relevant, are being implemented to the highest possible standard, and are meeting the prescribed Works Action Plan.

In summary, the following review framework is recommended :

Annually

- prior to confirmation of Capital Works budgets and allocation of recurrent works/maintenance funds, review priorities for improvement projects.
- establish programme for the upcoming year incorporating the Plan of Management's recommended staging/priority with any required adjustments.

Within 5 years of commencement

- review works completed to date with regard to the objectives of the Plan of Management
- examine basis of outstanding works to ensure recommendations remain relevant to changing demographics and recreational usage patterns/requirements.

Review of the Plan of Management will assist in ensuring that the area is developed to provide a major community asset for the people of Holroyd and the Greater Sydney region.

Figure 6.4
MONITORING AND EVALUATION MATRIX

No.	STRATEGY	PERFORMANCE CRITERIA	MONITORING TECHNIQUE	EVALUATION
1.1.1	Planning for site to incorporate protection and extension of bushland zones.	Extent of bushland areas on site to be expanded in appropriate locations.	• Measure extent of quality bushland regeneration on a yearly basis.	To what extent has quality bush regeneration increase on the site on a yearly basis.
1.1.2	Improve quality of existing bushland zones through weed management as required	Weed encroachment through woodland and water course areas to be reduced.	• Measure extent of weed encroachment on a yearly basis.	To what extent has weed encroachment been reduced on a yearly basis.
1.1.3	Provide ongoing bushland management to maintain quality flora habitat.	Improvements gained through bush regeneration and weed control to be sustained.	• Compare rate of improvement between ensuing years.	Have bush regeneration and weed reduction maintained a steady rate of improvement.
1.1.4	Establish appropriate maintenance regime to optimise flora habitat values	Overall performance in relation to Items 1.1.1 - 1.1.3	• As for Item 1.1.4	As for Item 1.1.4
1.1.5	Planning and management of recreational activities to avoid impact on flora values	That passive recreation use of the corridor is undertaken without impact on flora values.	• Assess any reports of problems/issues created for flora systems through recreational use on a yearly basis.	That occurrences of impacts on flora communities through recreational use is minimised.
1.1.6	Planning to consider fire management and fire fighting access (to minimum required)	That functional fire fighting access is maintained.	• Assess any reports of problems/issues for the fighting access through canal corridor.	That occurrences of problems/conflicts with fire fire fighting access as eliminated.
1.2.1	Identify and fence off (note: use minimal fencing required) areas providing habitat for threatened species until new management in place.	That areas identified as containing treatment species are effectively protected.	• Monitor areas of threatened species to identify any conflicts for ongoing regeneration.	That occurrences of problems/conflicts with fire fighting access are eliminated.
1.2.2	Provide for management and extension of nationally threatened and regionally rare species	That communities of treatment/rare species are protected, and areas extended where possible.	• Measure extent of development (and quality) of communities of threatened or rare plants annually.	That areas of treatment/rare species do not decreased and are increased over 5 years.
1.3.1	Broaden and thicken bushland zones to provide tangible habitat areas.	Refer Item 1.1.1		
1.3.2	Link tree canopy and where possible understorey vegetation to provide fauna movement corridors	That the proposed low maintenance bush protection zones provide for extension of tree canopy and understorey cover.	• Measure extent of tree canopy and understorey development through bush protection areas on a yearly basis.	That the establishment of the bush protection zones has a positive effect on tree canopy cover and understorey cover.
1.3.3	Control pedestrian and cycle access	That pedestrian and cycle access is maintained to designated areas.	• Assess the level of pedestrian/cycle access, other than on designated path by means of site assessment and anecdotal records.	That the intrusion of access into bush protection areas is minimised.
1.3.4	Restrict passive recreation uses to defined areas	That park users maintain access and activities to define usage areas.	• Assess the level of user intrusion into bush protection areas on a yearly basis.	That the intrusion of open space usage into bush protection areas is minimised.
1.3.5	Removal of exotic vegetation along creeklines to be managed to avoid impact on bird habitat	That weed removal to creeklines and other areas be effectively managed to minimise adverse impacts on birdlife.	• Assess the level of bird activity in set areas on a yearly basis.	That an increase in bird foraging and nesting is achieved.
1.4.1	Identification and development of site characteristics that provide habitat value for threatened species and for appropriate introduced bird and fauna species	That the natural and cultural environment of the canal lands provide improved habitat values.	• Assess the level of bird and fauna activity on the site in set areas on a yearly basis.	That an increase in bird and fauna activity on site is achieved.

Figure 6.4
MONITORING AND EVALUATION MATRIX

No	STRATEGY	PERFORMANCE CRITERIA	MONITORING TECHNIQUE	EVALUATION
1.5.1	Investigate opportunities for provision of detention basins on the canal site to provide storage and water quality improvement for piped systems.	That downstream flooding conditions and general water quality are improved on existing drainage lines.	• Assess the downstream flooding statistics and water quality levels on a yearly basis.	That downstream flooding and water quality conditions are improved and sustained.
1.5.2	Incorporate stormwater detention into park planning.	Provide detention where possible to improve off site stormwater conditions	Refer Item 1.5.1	Refer Item 1.5.1
1.6.1	Plan of Management to optimise the open space corridor vales of the Lower Prospect Canal through planning and management strategies.	That the site becomes a well used and functional component of the open space resources of the region.	• Assess the level of conflict between usage/and activity on the site. • Assess the level of conflict between public usage and environmental/heritage values.	That conflicts between usage and activities is minimised and conflicts between usage and environmental/heritage values is eliminated.
2.1.1	Planning and management to enhance physical qualities of site that make it attractive to local residents.	That the public usage and open space enhancement of the site does not conflict with local resident values.	• Assess the level of conflict between residents and open space users/or management maintenance practices on a yearly basis.	That incidences of conflict are minimised.
2.1.2	Recreational usage to be focussed on those with an acceptable level of environmental effect compatible with the residential context and environmental qualities of the canal.	That recreational uses carried out on the site do not impact on local residents or environmental quality.	Refer Item 2.1.1	Refer Item 2.1.1
2.2.1	Identify existing linkage options and reinforce with path provision	That path provision caters for pedestrian design lines.	• Assess on a yearly basis the level of usage of paths and any design lines worn in grass areas or bush protection areas.	That constructed paths are increasingly used for pedestrian access.
2.3.1	Facilitate open space connection to Prospect Reservoir lands and links to adjoining local open space	That open space linkages to Prospect Reservoir, Hyland Road Reserve, and Canal Road Reserve are provided in mutual benefit.	• That open space connections are provided reinforced.	That open space connections are provided reinforced.
2.4.1	Management Authority to facilitate involvement of community in management, enhancement, and maintenance of open space	That community involvement in park management is facilitated to sustain the level of positive community input to the canal project to date.	• That broad community involvement in park advisory committee is achieved.	That broad community involvement in park advisory committee is achieved and sustained.
3.1.1	Develop corridor as pedestrian cycle access of regional significance linking to open space, commercial centres and adjoining residential development	That a key regional access link providing a varied environmental setting is established.	• Assess the extent of the required connection network implemented on a yearly basis.	That regional access network is implemented in a reasonable timeframe.
3.1.2	Provide connections to the corridor through existing open space and street frontages, in addition to following up potential links through residential areas.	That access from adjoining residential areas, school, and open space is facilitated and used.	• Assess the extent of local connections provided adjoining the canal corridor.	That adjoining path accesses are implemented in co-ordination with cycleway works.
3.1.3	Optimise linkages to provide direct access between residential, commercial and industrial areas along with public transport links	Refer 1b Item 3.1.2		

Figure 6.4
MONITORING AND EVALUATION MATRIX

No	STRATEGY	PERFORMANCE CRITERIA	MONITORING TECHNIQUE	EVALUATION
3.1.4	Recognise regional open space significance - enhance awareness amongst local residents of significance and need for acceptance of regional usage with ameliorative actions in planning and management	That regional usage of the canal corridor is carried out in conjunction with the lifestyle and quality of life of local residents.	Refer 2.1.1	Refer 2.1.1
3.1.5	Provide infilling or other enclosure measure to make open canal safe for public access whilst keeping with heritage objectives. Make good all other structures to be safe for public access to site.	That safe public usage of the site is made possible whilst retaining the heritage and visual integrity of the site.	• Assess any safety conflicts arising from public usage of corridor. • Assess any impacts noted on heritage conservation values through park development.	That safety conflicts and heritage impacts of park development are avoided.
3.1.6	Aim to achieve maximum extent of filling to minimise need for staging, and make safe larger extent of site.	That the filling process is made cost effective with minimal impact to the local community and environment.	• Review the frame required for filling • Assess any reports of social or environmental conflicts.	That the programme, impact, and cost of filling works are minimised.
3.1.7	Shared use of amenities (eg. toilets / BBQ's) in adjoining open space areas	That the facilities needs of canal users are provided through shared use of adjoining facilities.	• To what extent do facilities on adjoining areas are open for canal user usage. • Assess the level of complaints regarding non provision of facilities.	That complaints regarding the non provision of facilities are minimised.
3.1.8	Use canal corridor to underpass road bridges	That road underpasses are effectively provided.	• Level of pedestrian and cycle usage of road underpasses.	That community use of road underpasses is successful with minimal complaints etc.
3.1.9	Identify strategic crossing points for both local and regional use and provide safe and effective access	That designated crossing points effectively provide for access requirements.	• Monitor crossings of cycleway path at non-designated path crossings.	That incidences of crossings at non designated locations are minimised.
3.1.10	provide themed signage to provide users with information on regional local linkages and facilities	That signage systems effectively direct usage of pathway systems and parklands.	• Assess the level of queries/complaints as to usage of the pathway and park system.	That signage information enables easy park usage and queries/complaints are minimised.
4.1.1	Establish conservation strategy within POM, and facilitate interpretation of heritage values by the public and educational users.	That heritage items are effectively conserved and able to be interpreted.	• Monitor level of awareness, response to interpretive strategies through yearly user surveys.	That level of heritage awareness increases along with recognition of quality to residential and visual experience.
4.1.2	Protect archaeological heritage along the Lower Prospect Canl corridor.	Implementation of recommendations of Higginbotham's Heritage Assessment (1992)	• Assess impacts of works in canal region on archaeological sites.	Archaeological sites are excavated only if necessary.
4.2.1	Facilitate educational use of the corridor	That canal lands provide a useable educational resource.	• Monitor level of usage of site for educational purposes.	That recreational usage of the site increase over the first 5 years and is sustained.
4.3.1	Schools to be encouraged to use canal corrdior for environmental and heritage education	Refer to 4.2.1		
4.3.2	Maximise potential for school involvement in enhancement and maintenance of corridor as educational and community exercises.	That school population and management respect the intrinsic qualities of the canal corridor.	• Monitor school usage of areas adjoining the canal corridor.	That school usage of adjoining areas is carried out in accordance with the objectives of the Plan of Management.

Figure 6.4
MONITORING AND EVALUATION MATRIX

No	STRATEGY	PERFORMANCE CRITERIA	MONITORING TECHNIQUE	EVALUATION
5.1.1	Retain appropriate components of the canal structure that provide a representative example of the canals important heritage fabric - and enable the canals heritage significance to be understood by public users	Refer to 4.1.1		
5.1.2	Maintain the essential visual context of the canal (in an open space setting) - which is a significant aspect of its heritage legibility to users. (as identified in Heritage Study- 1993)	That the man made character of the canal setting be retained as an important component of its heritage interpretation.	• Monitor the effectiveness of planning and maintenance strategies in maintaining the culturally influenced natural setting of the canal.	That the culturally shaped setting of the canal is effectively retained whilst enabling environmental objectives to be addressed.
5.1.3	Maintain key visual and design references that can assist in understanding of the canal's heritage	That the form, alignment and visual setting of the canal is able to be interpreted by users.	Refer to 4.1.1	That the main physical features of the canal structure are retained and able to be understood.
5.2.1	Maintain close links with Sydney Water to coordinate potential for integration of heritage goals and management of the Lower Prospect Canal with the Upper Canal and Prospect Reservoir	That the objectives for heritage, open space, and access linkages outlined in this POM are complimented in the Prospect Reservoir POM.	• Assess to what extent these objectives have been followed through in the Prospect Reservoir POM and in implementation works.	That t objectives outlined are realised for significant regular benefit.
6.1.1	Reinforce buffer zones to residential areas, and locate high usage areas in areas of lower potential impact to residential uses	Provide buffer treatment of residential boundaries to enhance canal open space and supplement screening of residences - Refer to 1.3.4 and 2.1.2	• Monitor development of buffer planting on a yearly basis.	That buffer treatments progressively mature, and that related complements from park users or residents are minimised.
6.2.1	Develop open space and access qualities of Lower Prospect Canal which can provide impetus to other components of regional open space and access links.	That the successful realisation of the Lower Prospect Canal proposals will provide momentum for the completion of other required links and open space enhancements.	• Monitor the level of completion of related access links and open space enhancements.	That related links and open space enhancements are realised in an acceptable timeframe.
7.1.1	Enhance and focus significant views from corridor to south integrating with screen planting where required.	That elevated views are retained and improved through enframing vegetation and screening of undesirable views.	• Monitor the retention of significant views on a yearly basis.	That elevated views from corridor are optimised, and enhanced by related planting.
8.1.1	Enhance lifestyle benefits of canal to local residents through improved visual, environmental and access qualities.	That the canal corridor development provides an improved environmental social setting for all parties.	• Monitor the opinions of local community through involvement on park management advisory committee.	That community feedback determines that responses to park development are generally positive from local community.
8.2.1	Optimise community interest and input towards implementing POM recommendations	Refer 2.4.1		

Figure 6.4
MONITORING AND EVALUATION MATRIX

No	STRATEGY	PERFORMANCE CRITERIA	MONITORING TECHNIQUE	EVALUATION
9.1.1	Establish Lower Prospect Canal as major open space resource for Holroyd LGA - HCC to follow through with enhancement of adjoining open space areas eg Hyland Rd and Canal Rd as appropriate	Refer 5.2.1/6.3.1		
9.2.1	Reinforce Lower Prospect Canal as key access connection and cultural and environmental resource through development of path links and conservation and enhancement of environmental and cultural values	Refer 3.1.1 - 3.1.3 and 1.1 - 1.2		
10.1.1	After review of potential options a preferred model for management be established in the Plan of Manageemnt that identifies responsibilities for: - ongoing title / ownership - funding and project management of major park works - ongoing management - ongoing maintenance	That a management structure mutually agreeable to all relevant stakeholders is established to effectively oversee park management.	• Monitor the performance of the park management structure on a yearly basis.	That the management structure provides a sustainable ongoing basis for decision making which coontinues to be supported by all relevant stakeholders.
10.2.1	State Govt. and Management Authority to coordinate and oversee an ongoing programme of implementation works	Provide an effective project management authority for securing of funding budgets and management of design development documentation and implementation.	Assess the level of implementation achieved on a yearly basis related to POM targets.	That major capital works are implemental within budgetary and programme constraints.
10.3.1	Provide funding resources for key works required for public open space usage commensurate with the regional environmental and recreational significance of the corridor	That funding commitment is received to enable the staged implementation of works to proceed.	Refer to 10.2.1	That the full scope of the concept proposals is implemented in a reasonable timeframe.
10.4.1	Reduce areas of high intensity maintenance through planning, and facilitate maintenance to high use areas.	That areas require high levels of maintenance are minimised and maintenance costs maintained to an acceptable level.	• Assess the total costs of park maintenance on a yearly basis.	That park maintenance costs are maintained at a consistent level (relatively) year by year.

7.0 PUBLIC EXHIBITION

The Draft Plan of Management was exhibited by Holroyd City Council from November 30th 1998 to January 8th 1999 at the following three locations:

- Holroyd City Council chambers
- Merrylands Library
- Greystanes Library

A forth exhibition display was available for temporary display at shopping centres, schools, and for use by interested groups.

In total 18 written responses were received, all in support of the Draft Plan of Management recommendations.

Detailed responses were also recieved from several government authorities with an interest or involvment in the future of the Lower Prospect Canal.

All responses have been considered and incorporated where appropriate into the Final Plan of Management document.

The table below listes in alphabetical order the individuals, groups and authorities that provided submissions,

1.	Mrs. V. E. Anderson	Greystanes
2.	Mrs. Sue Antoniolli	Greystanes
3.	Boral Recycling	
4.	CAMWEST	
5.	CRAG	
6.	Eric & Clarissa Davis	Greystanes
7.	Ann Hobday	Merrylands
8.	William & Narelle Hoffman	Merrylands
9.	Holroyd City Council	
10.	H.P. & M.A. Juhart	Greystanes
11.	Frances Kolomy	Nordson
12.	David McMahon	Greystanes
13.	NSW Heritage Office	
14.	Osvaldo Reinhard	Greystanes
15.	Sara Reinhard	Greystanes
16.	Sergio Reinhard	Greystanes
17.	RTA	
18.	Dot & Don Ricciardiello	Greystanes

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