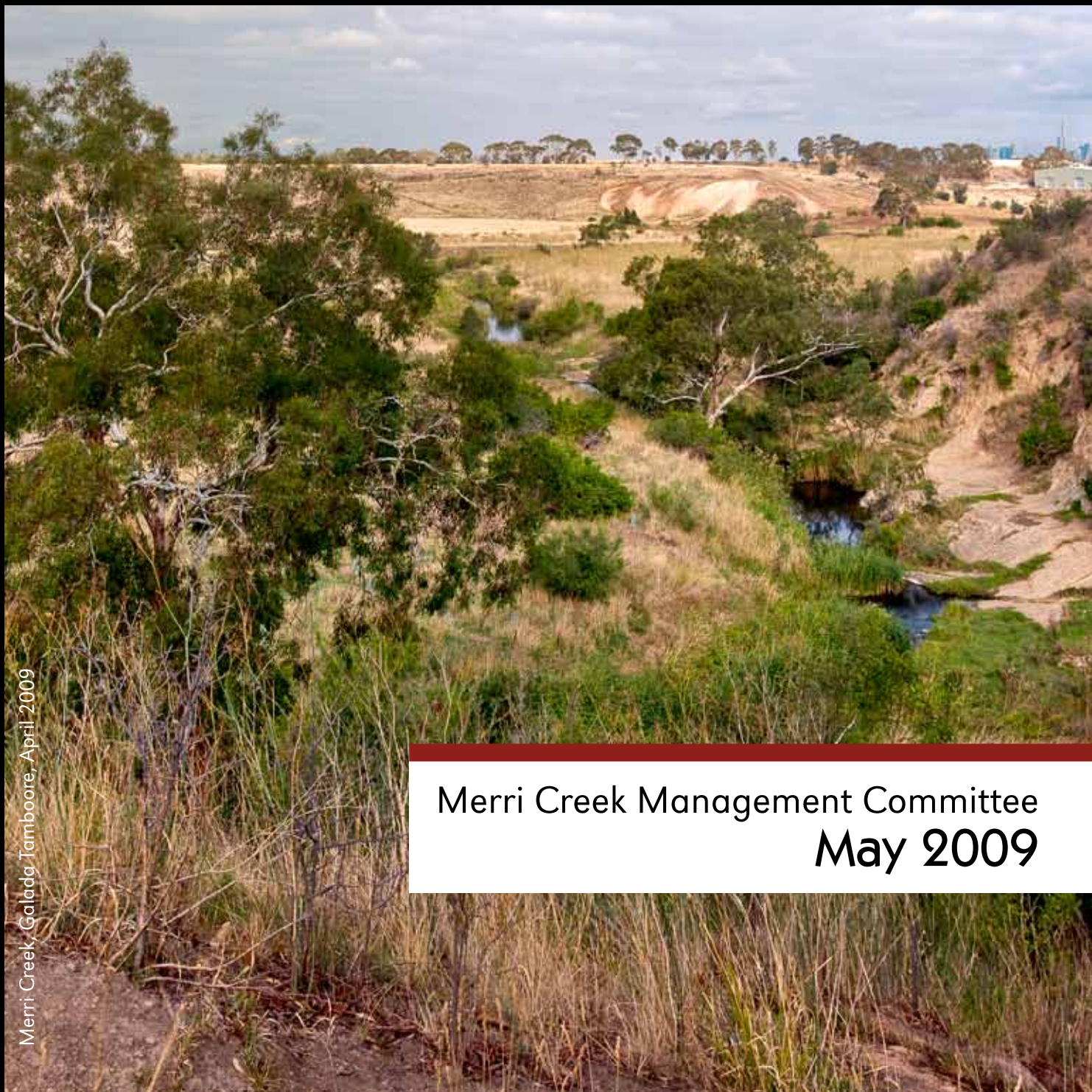
Merri Creek and Environs Strategy
2009 – 2014



Merri Creek, Galada Tamboore, April 2009

Merri Creek Management Committee

May 2009

ACKNOWLEDGEMENTS

The Merri Creek and Environs Strategy 2009-2014 is based on a review and revision of the 1999 Merri Creek and Environs Strategy undertaken by Merri Creek Management Committee with input from Councils, State Government Agencies, Friends Groups and the wider community. The 1999 strategy was facilitated by Melbourne Water.

The following organisations and people are acknowledged for their contributions to the preparation of this document:

Merri Creek and Environs Strategy Implementation Subcommittee

Thanks are extended to the Merri Creek and Environs Strategy Implementation Subcommittee – a subcommittee of the Merri Creek Management Committee – for their input to the revision of the Strategy. The Subcommittee's membership over the period of the preparation of the revision included the following organisations and people:

City of Darebin	Adam Shalekoff
City of Hume	Karen Wilson, Rebecca Brown, Anna Zsoldos
City of Moreland	Karin Hartog, Eamonn Fennessy
City of Whittlesea	Felicity Ayres
City of Yarra	Silvana Predebon, Craig McGrath
Mitchell Shire	Mitchell Shire, whilst not formally represented on the Committee has made detailed comments on various drafts of this version of the strategy.
Merri Creek Management Committee	Tony Faithfull, Judy Bush, Luisa Macmillan, Ray Radford, Katrina Roberg
Friends of Merri Creek	Alan Brennan, Allie Dawe, Harold Mackrell, Pascale Pitot, Paul Prentice, Ruth Shiel
Friends of Wallan Creek	John Robinson

Report Production

Research and production of the document was undertaken by Tony Faithfull (Project Officer, Merri Creek Management Committee).

Cover Photo

Merri Creek at Galada Tamboore, looking upstream

What is Merri Creek Management Committee?

Merri Creek Management Committee Inc. (MCMC) is an environmental coordination and management agency formed in 1989 to achieve a shared vision for the waterway corridors of the Merri catchment. Its members include all municipalities in the catchment: Darebin, Hume, Moreland, Whittlesea, Yarra and Mitchell, plus the Friends of Merri Creek and new member (as of 2006), the Friends of Wallan Creek. Representatives of these member groups form the Committee of Management that guides MCMC's activities.

MCMC's primary aim is to ensure the preservation of natural and cultural heritage, and the ecologically sensitive restoration, development and maintenance of the Merri Creek and tributaries, their corridors and associated ecological communities. It employs specialist and dedicated staff and its' programs are funded by Council members, by state and federal grant programs, by competitively won tenders, by grants from philanthropic organisations and through sponsorship.

MCMC's mission

MCMC respects and honours the spirit of the land and its peoples, indigenous plants and animals, and works with the community to preserve, restore and promote the Merri Creek, its catchment and neighbouring region as a vital living system.

MCMC prize winner

MCMC was awarded the 2002 Theiss Services National River*prize* for excellence in waterway management.

FOREWORD

The Merri Creek Management Committee has been a vibrant, innovative and effective community-based environmental organisation since its formation in 1989.

The implementation of much of the *Merri Creek and Environs Strategy 1999* has been a great achievement that has benefited the creek and the local communities. Now, having reviewed the challenges that exist for the Merri Creek and identified the current issues, objectives, targets and actions, the committee has produced the *Merri Creek and Environs Strategy 2009-2014.*

A feature of the new strategy is the way it addresses local priorities and issues whilst also aligning with region-wide priorities. The strategy specifically uses the objectives and targets of the *Port Phillip and Westernport Regional Catchment Strategy* to frame and guide local objectives, targets and actions. The strategy also provides a very strong basis for monitoring and evaluating the implementation of actions and the improvements to the Merri Creek and environs.

On behalf of the Port Phillip and Westernport Catchment Management Authority, I congratulate the Merri Creek Management Committee and commend the *Merri Creek and Environs Strategy 2009-2014*. I look forward to the benefits that its implementation will bring for river health, native habitat, native species, ecosystems, water quality, partnerships, social and amenity improvement and community awareness.

DAVID BUNTINE

CEO, Port Phillip and Westernport Catchment Management Authority

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OVERVIEW OF THE STRATEGY

The **Executive Summary** briefly outlines the key goals and objectives for the Catchment, and summarises issues and actions in the strategy chapter by chapter.

The **Introduction** outlines the origins and purpose of the Strategy. It provides an overview of the location of the catchment and the waterways that drain it as well as the lands and communities.

The overarching goals for the Merri catchment are listed, and the vision and objectives for the waterway corridors of the Merri catchment are set out. An overview of the roles and responsibilities of agencies and stakeholders along the corridor is given.

The Strategy then moves into consideration of issues under its four **Parts** - land, water, community and management. **Chapters** within the parts begin with a detailed background followed by a summary of key issues, objectives and targets.

Appended to the end of the document is the **action program** under chapter headings.

Part A – Land

This part deals with natural and cultural heritage, visual character, and land management.

Section 1 – Cultural Heritage and Visual Character

This section gives background on and deals with the management and protection of:

- **Aboriginal Heritage** (Chapter 1.1), especially in the light of the Aboriginal Heritage Act 2006
- **Historical Heritage** (Chapter 1.2),
- **Visual character** (Chapter 1.3), that is the landscape values and visual elements that make Merri Creek an appealing place.

Section 2 – Natural Heritage and Land Management

This section provides background on the issues relating to:

- **Biodiversity (Chapter 2.1)**
- **Geodiversity (Chapter 2.2) – that is geological and geomorphological sites of significance**
- **Land management (Chapter 2.3) – especially dealing with pest plants and animals, erosion and salinity**

These issues are then examined according to three broad reaches:

- **Merri Creek headwaters to Craigieburn - largely rural but at least on the west side of Merri Creek is rapidly being developed for residential and industrial purposes although establishment of an open space system is just beginning;**
- **Craigieburn to Mahoneys Road - already largely developed for industrial purposes; but includes some major new developments and some significant grassland reserves,**
- **Mahoneys Road to the Yarra River, long urbanised, with well established fairly narrow reserves along the waterways.**

Part B – Water

This part deals with issues relating closely to the waterways, including:

- **Drainage, Waterway and Floodplain management (Chapter 3.1),**
- **Water Quality in terms of physical and chemical parameters and litter (Chapter 3.2); and**
- **Waterway Ecosystem, management of the conditions required for stream health and species diversity (Chapter 3.3).**

Part C – Community

This part looks at the Creek corridors as open space and recreational resources, and avenues for involvement and learning. Chapters include:

- **Community Involvement and Education (Chapter 4.1)**
- **Recreation (Chapter 4.2)**
- **Trails and Access (Chapter 4.3); and**
- **Public Safety (Chapter 4.4)**

Part D – Planning and Management

On-ground management requirements having been dealt with in earlier parts this part deals with:

- **Planning (Chapter 5.1) including strategic and statutory planning processes;**
- **Management Coordination (Chapter 5.2) including the role of MCMC;**
- **Implementation of the strategy (Chapter 6.1)and**
- **Monitoring and review of the strategy (Ch 6.2).**

A list of references is given, and a table of acronyms.

Part E – Action Program

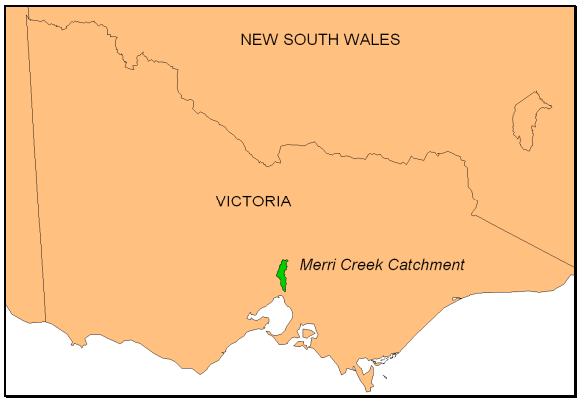
An **Action Program** arranged by chapter concludes the Strategy.

EXECUTIVE SUMMARY

Merri Creek is a tributary of the Yarra River and flows south from the Great Dividing Range through rural lands and the northern suburbs of Melbourne, Victoria.

The Merri Creek and Environs Strategy (MCES) is a document intended to give direction to managers of the waterway corridors of the Merri catchment. While the title indicates it has a strategic intent, it also captures some important, often site-specific actions, which underpin its strategic direction. This new version of the strategy includes numerous changes resulting from the incorporation of many goals, objectives, targets and actions from the Port Phillip and Western Port Regional Catchment Strategy 2004-2009. It also responds to Melbourne Water's request not to be assigned the lead role for any actions in the Strategy, and their reliance instead on the Regional River Health Strategy and the Melbourne Water Water Plan together with Management Unit Investment Plans for strategic direction. Melbourne Water broadly supports the intent of the MCES.

The principal users of the MCES are the members of Merri Creek Management Committee (MCMC), being the Cities of Darebin, Hume, Moreland, Whittlesea and Yarra, the Mitchell Shire, and Friends of Merri Creek, Friends of Wallan Creek and Friends of Aitken Creek, as well as MCMC itself.

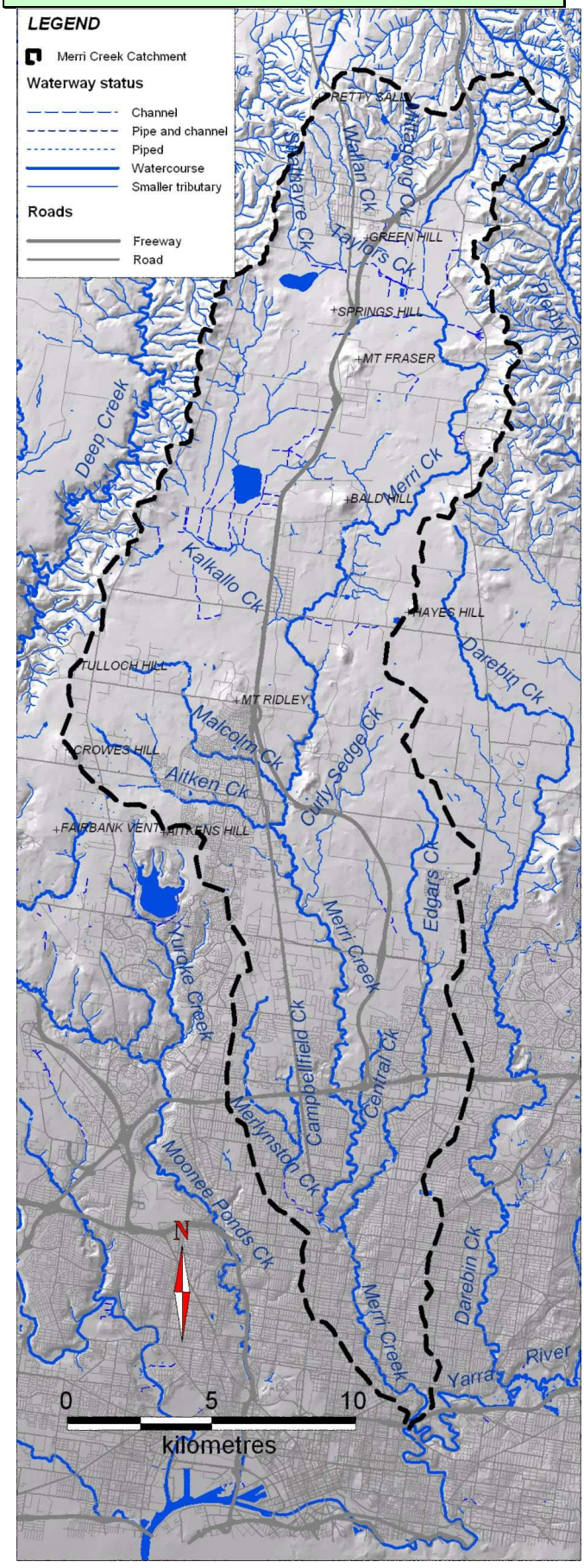


Map 1 - The location of the Merri catchment

Merri Creek Management Committee

Merri Creek Management Committee Inc. (MCMC) is an environmental coordination and management agency formed in 1989 to achieve a shared vision for the waterway corridors of the Merri catchment. Its members include all municipalities in the catchment: Darebin, Hume, Moreland, Whittlesea, Yarra and Mitchell, plus the Friends of Merri Creek and the Friends of Wallan Creek. Representatives of these member groups form the Committee of Management that guides MCMC's activities.

MCMC's primary aim is to ensure the preservation of natural and cultural heritage, and the ecologically sensitive restoration, development and maintenance of the Merri Creek and tributaries, their corridors and associated ecological communities. It employs specialist staff to achieve this aim.



Map 2 - The Merri catchment and its waterways

Overarching Goals for Merri Catchment

Water goal

Sustainable water use and healthy waterways, wetlands, estuaries, coasts and bays

Land goal

Healthy land used appropriately and productively

Biodiversity goal

Healthy and enduring ecosystems with a diversity of habitats and native species

People goal

The community valuing, understanding and celebrating the region's catchment assets and working to achieve sustainability

The overarching goals for the Merri Creek and Environs Strategy are drawn from the Port Phillip and Westernport Regional Catchment Strategy 2004-2009.

Each chapter of the strategy includes background, discusses catchment issues, and identifies objectives, targets and actions relating to the targets. Where appropriate objectives have been drawn from the Regional Catchment Strategy, but other objectives come from relevant State legislation, or have been developed for the Merri Creek and Environs Strategy.

Vision for the Merri catchment waterway corridors

To achieve healthy living streams flowing through attractive environments which provide habitat for native animals and are valued by the community as peaceful, passive open space havens. To protect the natural and cultural features of the Merri catchment waterway corridors through sensitive management which will provide a lasting benefit for the community.

Central Creek Grassland

Part A - Land

Section 1 – Cultural Heritage and Visual Character

Chapter 1.1 -**Aboriginal Heritage** identifies that the Merri Creek waterway corridors are very important sites for Aboriginal Heritage. It describes protection available for the sites, especially in the light of the Aboriginal Heritage Act 2006.

Objectives for Aboriginal Heritage are derived from the Aboriginal Heritage Act:

- *Recognise, protect and conserve Aboriginal cultural heritage in the catchment in ways that are based on respect for Aboriginal knowledge and cultural and traditional practices.*
- *Recognise Aboriginal people as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage.*
- *Accord appropriate status to Aboriginal people with traditional or familial links with Aboriginal cultural heritage in protecting that heritage.*
- *Promote the management of Aboriginal cultural heritage as an integral part of land and natural resource management.*
- *Promote public awareness and understanding of Aboriginal cultural heritage in the catchment.*

The actions provide for protection of identified sites of Aboriginal heritage significance, compliance with the Aboriginal Heritage Act, development of a protocol for dealing with planning applications affecting known sites and areas of sensitivity, further survey work along unsurveyed tributaries, community information, extending the Merri Creek Environmental Significance Overlay to include areas of Aboriginal Heritage significance, as well as specific on-ground actions to manage sites.

Chapter 1.2 - **Historical Heritage** summarises what is known of the post-contact non-Aboriginal heritage of Merri Creek and its tributaries.

The objective is drawn from the Planning and Environment Act:

- *To conserve and enhance those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value.*

Actions include having sites listed in Heritage Overlays, the Victorian Heritage Register, and the National Heritage Register, providing community information and interpretation, and further work to survey tributaries and update existing studies.

Chapter 1.3 - Visual Character describes the visual character of Merri Creek, and discusses threats to the visual character and opportunities for its improvement.

Objectives are drawn from the State Planning Policy Framework and from the Merri Creek Environmental Significance Overlay:

- *To protect and enhance the natural and visual character of the waterway corridors.*
- *To protect sites and features of high landscape value.*
- *To ensure development responds to its context and reinforces special characteristics of local environment and place by emphasising the underlying natural landscape character.*
- *To create a peaceful, passive open space quality in the creek parkland and valley.*

Actions include improvements to the visual character by improved design and built form, screen planting, relocation of powerlines, improvement of drain outfalls, control of rubbish dumping, limiting creek crossings, protecting escarpments, using basalt rocks in creek works in basalt areas, planting indigenous plants, deterring inappropriate artwork, removing graffiti, preventing encroachments, and carrying out a new landscape study.

Section 2 – Natural Heritage and Land Management

This section considers the biodiversity, geodiversity and land management issues of Merri Creek and its tributaries. Three broad reaches are then examined - the headwaters to Craigieburn, Craigieburn to Mahoneys Road, and Mahoneys Road to the Yarra River.

Chapter 2.1 - Biodiversity summarises biodiversity planning in the catchment and the biodiversity assets within. Most of the types of remnant vegetation present have a very high priority for protection, restoration, and revegetation. Threatened species management is discussed, as well as reservation, protection, and the establishment of habitat corridors.

Objectives are drawn from the Port Phillip and Westernport Regional Catchment Strategy:

- *Achieve a net gain in the quantity and quality of indigenous vegetation.*
- *Maintain the diversity of indigenous habitats and species in terrestrial and aquatic environments.*
- *Achieve sustainable populations of indigenous flora and fauna species.*
- *Improve the connectivity and long-term security of indigenous habitats and species.*
- *Encourage intelligent use of introduced flora and fauna species with minimal impacts on indigenous habitats and species.*

Actions include the preparation of a biodiversity plan for the catchment followed by municipal biodiversity plans incorporating revegetation plans, application of the Native Vegetation Clearance Controls, education programs about and monitoring and enforcement of the native vegetation clearing controls, encouraging the use of local native species and the control of environmental weeds, additional planning scheme protection needed to protect native vegetation, re-publishing *Plants of the Merri Merri*, encouraging the use of covenants to protect remnant vegetation, advocating for the reservation of remnant vegetation areas with high priority ecological vegetation classes, and monitoring of rare species and reserve management.

Chapter 2.2 - Geodiversity discusses the geology and the many sites of geological significance along the waterways and more generally in the catchment. It outlines studies to date and identifies a lack of site protection.

An objective has been developed for the Strategy:

- *Sites of geological or geomorphological significance are identified, protected and used for interpretation of the catchment's geological history.*

Actions are to protect sites through their inclusion in planning controls, commissioning new study of sites, especially on tributaries, creating educational material, and providing information on sites to Councils.

Chapter 2.3 – Land Management discusses pest plant and animal control, as well as salinity and erosion management. Pest plants are a major problem in the catchment. Foxes, rabbits, feral cats and straying domestic dogs and cats are identified as problem pest animals. Salinity and erosion in the upper catchment are identified as issues to be managed.

Objectives for land management are derived from the Port Phillip and Western Port Regional Catchment Strategy:

- *Protect and improve the health of land.*
- *Ensure sensitively located and functional urban and urban-rural fringe areas with minimal impacts on the catchment's biodiversity, water resources and heritage values.*
- *Match rural land-use, development and management to land capability and minimise impacts on the catchment's biodiversity, water resources and heritage values.*
- *Provide a high-quality network of parks and open space across urban and rural areas managed for community and environmental benefit.*

Actions include planning for pest control, and undertaking it, educating others about pest control and encouraging them to control pests on their own land, monitoring pest species and where appropriate developing local laws. Other actions are to assist with pest research, undertake training, coordination of pest control programs, encouraging uptake among private landowners of Melbourne Water's River Frontage Management Program, and undertaking further research into salinity in the catchment.

The catchment, section by section

Chapter 2.4 – Headwaters to Craigieburn outlines some of the key natural features of the reach including the now largely drained Hernes Swamp, Camoola Swamp, the Bald Hill grassland, the Kalkallo to Craigieburn section of Merri Creek, (including the Summerhill Road area where Platypus was last seen on Merri Creek), and the Mickleham-Mt. Ridley grassland site to the west of the middle catchment.

Looking southeast across Wallan and the upper Merri catchment

Actions include:

- Working with other agencies to coordinate protection of sites (including grasslands, grassy woodlands and swamps) as well as their habitat links, and to implement land protection programs.
- Strategic and statutory planning to protect sites especially Red Gums and Grasslands and to prevent rock removal.
- Strategic planning for Hernes Swamp and Bald Hill Grassland.
- Promotion of programs such as rate rebate schemes, Landcare, Land for Wildlife, Conservation Covenants, and supporting private landowners to conserve remnant vegetation.
- Habitat corridor development and revegetation.
- Implementation of local biodiversity plans.

Chapter 2.5 – Craigieburn to Mahoneys Road
This reach possesses some significant grassland remnants including the nationally significant Craigieburn grassland. Also described within this reach are the Cooper Street grassland, the Barry Road to Horne Street sub-reach including Galada Tamboore (formerly the Campbellfield Retarding Basin), Horne Street to Mahoneys Road, and the Edgars Creek headwaters.

Galada Tamboore

The actions include:

- Finalising concept plans for and implementing the proposed Merri Creek Park, and detailed management planning for the park.
- Developing an action plan to protect sites and habitat links.
- Reserving open space along waterways, and consolidating public ownership.
- Screen plantings.
- Vehicle access control and anti-rubbish dumping measures.
- Implementing site plans.
- Working with Melbourne Water to improve sediment control and improve water quality in the vicinity of the Campbellfield Landfill site.
- Preserve and expand opportunities for open space provision, flora and fauna conservation and habitat links between sites.
- Preparation of a Merri waterways open space manual.
- Training for Council and MCMC staff.
- Improving habitat values on tributaries.

Chapter 2.6 – Mahoneys Road to Yarra River deals with the most urbanised section of the catchment. The chapter discusses the highly fragmented land ownership, and identifies opportunities to consolidate the open space corridor. It describes how successful the program to revegetate this section has been. In this section planning centres around open space nodes and links, and existing node plans are listed and priorities for future plans discussed. Other improvements highlighted include screening, biodiversity preservation and revegetation.

Looking south from Blyth St along Merri Creek

Actions include

- Developing specified node plans, and continuing the implementation and updating of existing plans.
- Conducting regular reviews of land ownership and zoning opportunities to consolidate open space corridors.
- Developing access arrangements where land is not clearly open space.
- Preparing a Merri waterways open space manual.
- Training for Council and MCMC staff.

Part B – Water

Merri Creek south of Blyth Street, Brunswick East as a flood recedes

Section 3 – Surface waters, Creeks and Wetlands

This section focuses on water within the catchment. The roles and responsibilities of agencies involved and the concept of water-sensitive urban design are described.

Chapter 3.1 – Drainage, Waterway and Floodplain Management starts by describing the morphology of the Merri Creek and its tributaries and swamps. It describes the need for willow and other woody weed control, and the constraints on native vegetation management. The flooding history of the Merri Creek is described, along with Melbourne Water's role in preparing drainage schemes to provide for drainage needs in a comprehensive fashion, and the need for water-sensitive urban design as part of urban planning down to the individual lot level.

Objectives are derived from the Port Phillip and Westernport Regional Catchment Strategy:

- *Protect and improve the environmental health and social and economic values of waterways and wetlands.*
- *Management of water resources to minimise risks to natural ecosystems, public land, private assets and public safety.*

The chapter contains few actions, since most responsibilities are Melbourne Water's, and Melbourne Water is not one of the participants in the Merri Creek and Environs Strategy. The actions are control of development within the flood zone, reporting on Council stormwater management plans and their refinement, and assessing the incidence of and controlling woody weeds.

Chapter 3.2 – Water Quality describes legislation and policy related to water including the Victorian River Health Strategy and the State Environment Protection Policy Waters of Victoria. Water quality studies of Merri waterways are summarised, and significant faecal and heavy metal contamination identified as issues. Changes in water quality along Merri Creek tend to be related to changes in land use, and these are described and opportunities for improvement identified. Litter is also identified as a significant issue.

The objective is taken from the Port Phillip and Western Port Regional Catchment Strategy:

- *Improve water quality in catchment waterways, aquifers, and wetlands, and consequently estuaries, bays and seas.*

Actions include implementation of water-sensitive urban design, working with Melbourne Water to restore wetlands, construct litter and toxicant traps and investigate removal of contaminated sediments, working with the Environment Protection Authority and Yarra Valley Water, hosting Waterwatch, and a labelling program for drains entering the Merri Waterways to facilitate pollution reporting.

A polluted stormwater drain north of Blyth Street, Brunswick East

Chapter 3.3 – Waterway Ecosystem outlines the conditions required for stream health, and describes what is known of aquatic mammals, frogs, reptiles, birds and plants in the Merri waterways. The factors which have caused waterway ecosystem degradation are described, in particular changes to stream form, farming and urbanisation, the role of riparian vegetation and weeds, and stream flow.

The objective is derived from the Regional Catchment Strategy:

- *Protect and improve the environmental health and social and economic values of waterways and wetlands.*

Actions include investigation of environmental flow requirements, platypus and native fish reintroduction, recording native fish populations, impacts on stream life and human health from heavy metals, assessing the potential to improve habitat at Coburg Lake, and installing a fish ladder at Edwardes Lake.

A Racali (Water Rat) feeding platform with evidence of clam shell

Part C – Community

A snake information day at Central Creek Grassland

Section 4 – Recreation, Trails, Safety, Community Involvement & Education

This section deals with the importance of the waterway open space for people.

Chapter 4.1 – Community Involvement and Education highlights the role the community has had and continues to have in Merri waterways, and shows how important it is to continue and enhance that involvement.

Two Objectives are drawn from the Regional Catchment Strategy and the third created for this strategy:

- *To increase the capacity and participation of people and organisations in catchment management.*
- *To reduce the overall impact of the regional community on catchment assets.*
- *To encourage community custodianship and interest in the Creek Corridors.*

The actions include developing community liaison and participation in events, supporting Friends groups, developing recreation and education programs, including for people of non-English-speaking background (NESB) and schools, working with the CMA to support Landcare groups in the rural parts of the catchment, providing community information about facilities and open space, seeking representation from Aboriginal and NESB groups, involving the community in planning and restoring waterway open space, providing interpretation, undertaking an oral history program, surveys of creek users, and preparing a community engagement strategy.

Chapter 4.2 – Recreation describes how Merri waterways are used for recreation, what features are important, and looks at areas for improvement.

One objective is derived from the Regional Catchment Strategy and the second is developed for this strategy:

- *Provide a high quality network of parks and open space across urban and rural areas managed for community and environmental benefit.*
- *Provide passive recreation, education and information facilities along Creek corridors.*

Actions include continued development of creek-side open space for passive recreation, promoting the creeks through events and interpretation, conducting programs utilising the waterways passive open spaces including for users not normally catered for, developing sportsground perimeters as passive open space, developing facilities and providing access, managing 'wild and informal' bush play, providing water-based recreation, enforcing, monitoring and reviewing pet control, and continuing to build linear parkland north along Merri Creek and along tributaries.

Chapter 4.3 – Trails and Access describes the history and planning of shared paths in the catchment, and improvements needed, especially in the light of the Merri Creek Trail Review. It considers other paths, signage and guides for the paths, walking routes and access.

One objective is drawn from the Regional Catchment Strategy, and the second developed for this strategy:

- *Provide a high quality network of parks and open space across urban and rural areas managed for community and environmental benefit.*
- *Provide recreational cycling and walking trails along Creek corridors.*

Actions include extending mapping of the Merri Creek and its open space, preparing a signage strategy and improved signage, making access improvements including for disabled people, investigating walking/trekking trails, extending the shared path to Craigieburn, establishing links to other trails and important facilities, improving the standard of the Merri Creek Trail, improving paths along tributaries, and implementing the Merri Creek Trail Review.

Chapter 4.4 – Public Safety examines a number of known and perceived hazards which may be encountered by people using the waterway open space. Strategies to control the hazards are discussed.

One objective is from the Regional Catchment Strategy, and the second developed for this strategy:

- *Provide a high quality network of parks and open space across urban and rural areas managed for community and environmental benefit.*
- *Create a safe environment and a perception of safety along creek corridors.*

Actions include implementing a Merri Watch program, promoting a positive interface between development and waterway open space, constructing facilities to standards, focussing use at major open space nodes, researching data on safety in open space, undertaking discussions with the Police, appointment of a ranger, minimising lighting impacts on biodiversity, involving the community in open space design, providing signage to safe areas, phones, etc, investigating unsafe bicycle use, increasing By-Law surveillance, improving dog on-lead signage, and preparation of a coordinated fire management plan for the outer urban part of the catchment.

Part D – Planning and Management

An extract from the Planning scheme at Cooper Street Epping.

This part of the Strategy deals with issues of planning and management coordination, and monitoring and review of the Strategy.

Chapter 5.1 – Planning describes different levels of planning that affect the Merri waterways, including planning schemes, urban growth planning, Green Wedge Plans, catchment planning, employment precinct planning, the Development Guidelines for Merri Creek, open space management planning, and statutory planning, and the opportunities these levels of planning provide.

Objectives are drawn from the Regional Catchment Strategy:

- *Ensure sensitively located and functional urban and urban-rural fringe areas with minimal impacts on the catchment's biodiversity, water resources and heritage values.*
- *Match rural land-use, development and management to land capability and minimise impacts on the catchment's biodiversity, water resources and heritage values.*
- *Provide a high quality network of parks and open space across urban and rural areas managed for community and environmental benefit.*

Actions include considering waterway issues in strategic growth planning, addressing zoning anomalies, making the Merri Creek Development Guidelines available and incorporating them in the Environment Significance Overlay, preparing developer guidelines for industrial areas, reviewing the Cooper St Precinct Strategy, preparing a Merri Waterways Plan, introducing public acquisition overlays, preparing a developer contribution discussion paper, conducting reviews of land ownership and zoning, extending the Environmental Significance Overlay further along Merri Creek and its tributaries, and aligning local government strategies with the Regional Catchment Strategy.

Chapter 5.2 – Management Coordination traces the evolution of **coordination** structures for Merri Creek and the development of the Merri Creek Management Committee (MCMC) and Friends of Merri Creek (FOMC), and outlines the role of the Catchment Management Authority. Management coordination principles are then listed.

Objectives are derived from the Regional Catchment Strategy:

- *Enhance Merri catchment and regional planning, coordination, monitoring and reporting.*
- *Increase the capacity and participation of people and organisations in catchment management.*

Actions include reviewing MCMC, preparation and circulation of MCMC annual reports, establishing the frequency of management coordination reviews, resource sharing, inter-catchment coordination, and continuing community involvement in management coordination.

Chapter 6.1 – Implementation discusses the need for participating agencies to delegate responsibility for achieving actions amongst their staff and contractors and create works plans to deliver actions. It highlights the role of MCMC's Merri Creek and Environs Strategy Implementation Subcommittee in facilitating implementation of the strategy.

The objective is adapted from the Regional Catchment Strategy:

- *Enhance catchment planning, coordination, resource allocation, monitoring and reporting.*

Actions include developing yearly priority activity plans to assist implementation of Strategy actions by major stakeholders and so that budget bids might be prepared accordingly, participation in the Merri Creek and Environs Strategy Implementation Subcommittee by sending a representative to meetings, and Councils adopting the Merri Creek and Environs Strategy as a Council document.

Chapter 6.2 – Monitoring and review procedures considers how to monitor progress of the Strategy and renew it after the current strategy becomes dated.

Objectives for the chapter are drawn from the Regional Catchment Strategy:

- *Adequate, appropriate, efficient and cost effective monitoring of catchment assets, ecosystem processes, trends, risks, implementation of actions and outputs.*
- *Timely, rigorous and cost effective evaluation of catchment management planning and implementation.*
- *Timely, tailored, efficient and cost effective reporting on catchment assets, ecosystem processes, trends, risks, catchment management planning and implementation.*

Actions include convening the Merri Creek and Environs Strategy Subcommittee, preparing reviewed versions of the Merri Creek and Environs Strategy every 5 years, and publishing the document as an interactive website.

Full copies of the Strategy are available at Libraries in the catchment, from MCMC at 2 Lee Street East Brunswick (phone (03) 93808199, or on the web at www.mcmc.org.au/mces.

INTRODUCTION

ORIGINS AND PURPOSE OF THE STRATEGY

Origins

This 2009-2014 Strategy represents a major revision of the 1999 Merri Creek & Environs Strategy. The 1999 Strategy itself evolved from a review of the Merri Creek Concept Plan Final Draft (Melbourne Parks and Waterways and Merri Creek Management Committee, 1994). The 1999 Strategy was jointly prepared and owned by Melbourne Water, the Dept. of Natural Resources and Environment and the municipalities of Darebin, Hume, Moreland, Whittlesea and Yarra.

A major change from the 1999 Strategy has come about because Melbourne Water and the Department of Natural Resources and Environment (now Department of Sustainability and Environment) are no longer a party to it. Whereas Melbourne Water had played a major and active role in facilitating the development of the 1999 Strategy on behalf of the Steering Committee, Melbourne Water's primary planning documents are the Regional River Health Strategy (MW & PPWCMA 2007) and its Addendum, the Melbourne Water Waterways Water Plan (MW 2008b) and Management Unit Investment Plans. As a result it has requested not to be assigned the lead role for any actions under the MCES. However Melbourne Water still broadly supports the intent of the MCES.

Another significant change is the inclusion of Mitchell Shire, thus giving complete local government coverage to the Strategy.

The process of revision of the Strategy required recognition of the role of the Port Phillip & Western Port Catchment Management Authority and close review of the PPWCMA's Regional Catchment Strategy (RCS) and associated 'sub-strategies'. Every effort has been made to ensure consistency with the RCS. Specific reference is made to the RCS objectives, targets and actions where relevant.

Revision of the Strategy was undertaken by the Merri Creek & Environs Strategy Implementation Sub-committee of the Merri Creek Management Committee. This committee undertook a review, completed in 2004, of the implementation of the 208 actions in the original Strategy. A summary of the results of the review is shown in Table 1 below.

26	Actions were completed and then deleted.
11	Actions were deleted as they were considered to be the responsibility of Melb. Water.
9	Actions were deleted as they were considered to be no longer appropriate/applicable.
7	Actions were deleted as they are now covered by a revised action.
11	Actions were completed and the wording was altered.
40	Actions (other than the completed Actions above) had their wording altered.
104	Total of the Actions themselves that were either deleted or had the wording altered.
55	Actions were altered in some way other than the actual Action wording.
159	Total Actions that were either deleted or altered in one way or another.
9	Completely new Actions were inserted.
164	Total of Revised Actions.

Table 1 - Outcome of 2004 Action Review.

Completed actions have not been reproduced in the 2008-2013 Strategy.

Purpose

The purpose of the Strategy is to provide an overview of important issues along the waterway corridors of the Merri Creek and its tributaries and to document agreed objectives, targets and actions to achieve their resolution. Many of the objectives and targets are derived from the Port Phillip and Western Port Regional Catchment Strategy 2004-2009[1], from Victorian legislation or from the Planning Schemes of member Councils. This means the Merri Creek and Environs Strategy is a tool for achieving state and regional level objectives, at a Merri Creek catchment level.

The Strategy's further purpose is to facilitate coordinated action by responsible agencies. The underlying principle of the Strategy is that such coordinated action will ultimately enable protection and rehabilitation of the stream corridors in the Merri catchment.

In addition, as the community sector is recognised as a critical player in stream corridor

[1] Port Phillip and Westernport Catchment Management Authority (2004)

protection, the Strategy is intended to help articulate community expectations and needs, and involve them in the ongoing achievement of the actions.

The document is intended to operate as a useful planning tool with relevance for the next five to ten years. The Strategy is an implementation aid providing agencies with a coordinated and principled planning framework to address actions along the stream corridors.

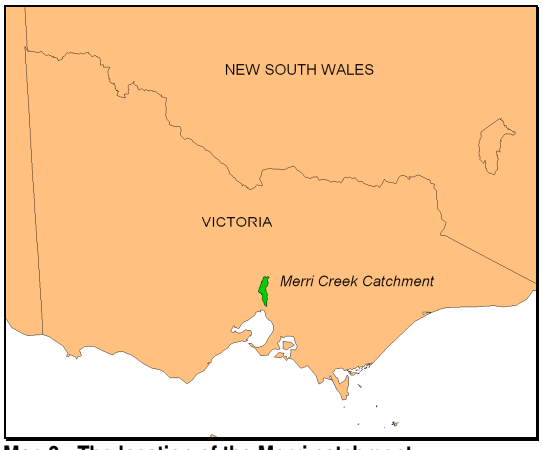
The Strategy covers the key issues with recommendations for broad actions of a strategic nature. Actions relating to each chapter are included in the appendix, each listing responsible agencies and giving an overview of the likely notional costs of implementation by all responsible parties and the priority attached to actions.

The document thereby provides a planning framework which each accountable organisation can use to develop their own plans and programs for implementation of actions.

MERRI CATCHMENT WATERWAYS- AN OVERVIEW

Merri Creek and Its Catchment

The main stem of Merri Creek rises in the foothills of the Great Dividing Range, north of Melbourne, around Heathcote Junction. It winds some sixty kilometres south to its junction with the Yarra River at Dights Falls in Abbotsford. It is one of the Yarra's major tributaries draining water from a catchment covering some 390 square kilometres.

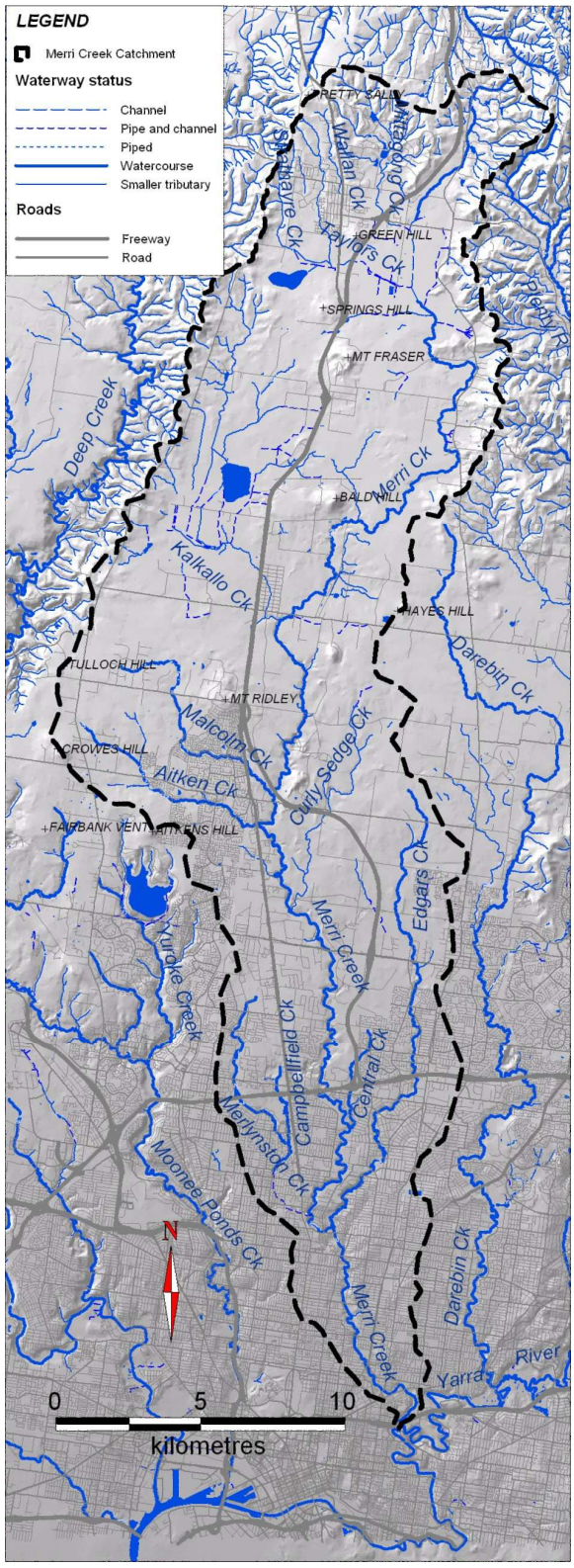


Map 3 - The location of the Merri catchment

The catchment consists of nine major tributary systems including Wallan, Taylors, Kalkallo, and Curly Sedge Creeks, in predominantly rural areas; Aitken and Malcolm Creeks which drain the expanding suburb of Craigieburn; and Merlynston, Central and Edgars Creeks which flow predominantly through established urban areas (see Map 4).

Much of middle and upper reaches of the catchment is rural with the rapidly growing town of Wallan, and the small townships of Beveridge and Kalkallo. Further south on the urban fringe are the residential and industrial areas of Craigieburn and the new suburb of Aurora (North Epping). The southern part of the catchment, south of the Western Ring Road, is entirely urban.

The catchment includes parts of the municipalities of the Mitchell Shire and the Cities of Whittlesea, Hume, Moreland, Darebin and Yarra.



Map 4 - The Merri catchment waterways

Land

Land uses through the Merri catchment include pastoral, and increasingly industrial, extractive and urban/residential. Issues affecting the creeks reflect this changing pattern of land use.

Cultural heritage sites – both Aboriginal and non-Aboriginal – are plentiful along the catchment's waterways.

Most native vegetation in the catchment has been cleared and what remains is highly significant. The Grasslands and Grassy Woodland remnants of the catchment are ecosystems which are threatened nation-wide. Some have been reserved for conservation purposes but many remain on private land. A range of endangered species occur in the catchment and this has many implications for land management.

The catchment's geology, dominated by the geologically recent volcanic eruptions which generated the lava flows forming the basalt plains, includes a number of sites of geological significance.

Pest plants and animals are major issues in the catchment. Erosion and salinity are issues also.

There are many opportunities to extend and improve parks along the waterways.

Water

Like many tributaries of the Yarra River, Merri Creek contributes significant sediment, nutrient and litter loads to inner Melbourne and ultimately to Port Phillip Bay from its rural and urban sub-catchments.

Water quality and litter in the waterways are major issues for users of the waterway corridors, as well as for the ecological health of the Creek. Rural and urban land uses have major detrimental effects on the waterways, but methods to minimize these effects are under development.

Merri Creek often floods, and the protection of people and assets from flooding by the Creek is an important objective.

Community

Within the Merri catchment a high proportion of the population belong to culturally and linguistically diverse communities.

The outer suburbs are experiencing strong growth.

In the inner suburbs increasing building density is counterbalanced by declining occupancy rates, meaning relatively stable populations. Melbourne 2030 aims for increasing population densities.

The increased building density in the catchment has implications for open space provision and development, for stormwater runoff quality, quantity and management.

There are many opportunities and benefits to the community to be gained from the ongoing development of creek corridors in the Merri Catchment as open space corridors. These Corridors have the potential to:

- 'green' the northern suburbs;
- provide city to country open space links;
- offer a source of healthy recreation; and
- provide an educational asset.

Much of the catchment outside the urban growth boundary is rural, and through these areas Merri Creek and its tributaries are in private ownership. Rural landowners can contribute significantly to the objectives of this strategy, and many already are. Improving relationships with rural landowners would provide an opportunity to create further gains, and avoid losses.

Recreation and open space

Merri Creek and its tributaries and their immediate surrounds provide important recreation opportunities for nearby communities. Recreation needs studies of the last two decades have identified a clear community preference for more recreation opportunities within informal passive open space. Such a recreational resource can be provided along the waterway corridors.

The lands of the Merri Creek and Edgars Creek corridors provide a link from the inner to the outer suburbs and a potentially diverse range of recreational and open space features. The existing open space and trail system along the Merri Creek corridor as far as the Western Ring Road is a valuable component of the metropolitan-wide network. The Merri Creek Shared Path provides links to Yarra Bend Park and the Yarra River trails, and to the Inner Circle trail and the Metropolitan Ring Road trail.

In their lower reaches, Merri Creek, Edgars Creek and Merlynston Creek flow through urbanised suburbs many with comparatively poor open space provision. The creek corridors provide a limited opportunity for such suburbs to improve their quantity and quality of open space.

Vision

The vision and goals for the Port Phillip and Western Port Catchment (see box) have been adopted as overarching principles for the MCES 2008-2013.

Vision and Goals for the Port Phillip & Western Port Catchment

The vision for the future described in the Port Phillip and Western Port Regional Catchment Strategy is as follows:

The Port Phillip and Western Port region will have people working to achieve productive land, habitat for native plants and animals and clean water in the catchments, rivers and bays, making it a healthy, attractive and prosperous place to live, work and visit.

Water goal
Sustainable water use and healthy waterways, wetlands, estuaries, coasts and bays

Land goal
Healthy land used appropriately and productively

Biodiversity goal
Healthy and enduring ecosystems with a diversity of habitats and native species

People goal
The community valuing, understanding and celebrating the region's catchment assets and working to achieve sustainability
(RCS p.16)

The vision for the Merri catchment waterway corridors was developed in the early 1990's and is still appropriate today.

Vision for the Merri catchment waterway corridors

To achieve healthy living streams flowing through attractive environments which provide habitat for native animals and are valued by the community as peaceful, passive open space havens. To protect the natural and cultural features of the Merri catchment waterway corridors through sensitive management which will provide a lasting benefit for the community.

Objectives

Objectives adopted from the Regional Catchment Strategy

The following objectives were adopted or adapted from the Port Phillip and Western Port Regional Catchment Strategy 2004-2009 (the RCS). Not all objectives were adopted, as the scope of this strategy is more focused on the waterway corridors.

RCS Land objectives

LO2 Protect and improve the health of land

LO3 Ensure sensitively located and functional urban and urban-rural fringe areas with minimal impacts on the catchment's biodiversity, water resources and heritage values.

LO4 Match rural land-use, development and management to land capability and minimise impacts on the catchment's biodiversity, water resources and heritage values.

LO5 Provide a high-quality network of parks and open space across urban and rural areas managed for community and environmental benefit.

RCS Biodiversity objectives

BO1 Achieve a net gain in the quantity and quality of indigenous vegetation

BO2 Maintain the diversity of indigenous habitats and species in terrestrial, and aquatic environments.

BO3 Achieve sustainable populations of indigenous flora and fauna species.

BO4 Improve the connectivity and long-term security of indigenous habitats and species.

BO5 Encourage intelligent use of introduced flora and fauna species with minimal impacts on indigenous habitats and species.

RCS Water objectives

WO2 Protect and improve the environmental health and social and economic values of waterways and wetlands.

WO4 Improve water quality in catchment waterways, aquifers, and wetlands, estuaries, bays and seas.

WO5 Management of water resources to minimise risks to natural ecosystems, public land, private assets and public safety.

RCS People and organisations objectives

PO1 Enhance catchment planning, coordination, resource allocation, monitoring and reporting.

PO2 Increase the capacity and participation of people and organisations in catchment management.

PO3 Reduce the overall impact of the regional community on catchment assets.

RCS Monitoring objectives

MO1 Adequate, appropriate, efficient and cost effective monitoring of catchment assets, ecosystem processes, trends, risks, implementation of actions and outputs.

MO2 Timely, rigorous and cost effective evaluation of catchment management planning and implementation.

MO3 Timely, tailored, efficient and cost effective reporting on catchment assets, ecosystem processes, trends, risks, catchment management planning and implementation.

Objectives adopted from the Aboriginal Heritage Act 2006

Recognise, protect and conserve Aboriginal cultural heritage in Victoria in ways that are based on respect for Aboriginal knowledge and cultural and traditional practices.

Recognise Aboriginal people as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage.

Accord appropriate status to Aboriginal people with traditional or familial links with Aboriginal cultural heritage in protecting that heritage.

Promote the management of Aboriginal cultural heritage as an integral part of land and natural resource management.

Promote public awareness and understanding of Aboriginal cultural heritage in Victoria.

Objectives from the Planning and Environment Act 1987

To conserve and enhance those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value.

Objectives adopted from the Merri Creek Environmental Significance Overlays[2]

To protect and enhance the natural and visual character of the waterway corridors.

To create a peaceful, passive open space quality in the creek parkland and valley.

Additional objectives developed for this strategy

Encourage community custodianship and interest in the Creek Corridors.

Provide passive recreation, education and information facilities along Creek corridors.

Provide recreational cycling and walking trails along Creek corridors.

Create a safe environment and improve perceptions of safety along Creek Corridors.

Sites of geological or geomorphological significance are identified, protected and used for interpretation of the catchment's geological history.

[2] The Merri Creek ESO is implemented almost identically in Yarra, Moreland, Darebin, Hume and Whittlesea, but not at this stage in Mitchell

AGENCY ROLES AND RESPONSIBILITIES

There are a number of factors which make for a diversity of agency roles in relation to waterways and their environs. A primary one is land ownership.

Land Owners

Along Merri catchment creek corridors there are a host of different land owners holding properties adjacent to the stream. Private individuals and companies, Councils, the Crown, Melbourne Water, VicRoads, SPAusNet and the Public Transport Corporation are the main land owners.

As separate private and public entities each of these land owners has different purposes and objectives in relation to that land. While most land owners would be sympathetic to environmentally sensitive management of creek corridors, some would not see it as a primary concern in management of their land. Some are unaware of their responsibilities under the Catchment and Land Protection Act or feel hostile about them. This can occasionally create conflict.

Achieving sustainable land management may require a change of ownership through a range of planning processes.

Duties of Land Owners under the Catchment and Land Protection Act

In relation to his or her land a land owner must take all reasonable steps to[3] —
(a) avoid causing or contributing to land degradation which causes or may cause damage to land of another land owner; and
(b) conserve soil; and
(c) protect water resources; and
(d) eradicate regionally prohibited weeds; and
(e) prevent the growth and spread of regionally controlled weeds; and
(f) prevent the spread of, and as far as possible eradicate, established pest animals.

Statutory authorities who manage land must have regard to the Port Phillip and Western Port Regional Catchment Strategy except where a provision of the Strategy conflicts with an Act of Parliament.[4]

Watercourse and Open Space Management Responsibilities

Land ownership along waterways is complex, with various Councils, Melbourne Water, VicRoads, other government agencies, freehold owners and crown land managers all owning and/or managing land within the Merri Creek valley and corridor. These complex arrangements sometimes also apply to ownership and management of paths and trails.

The roles of a number of agencies with management functions for waterway corridors throughout the Port Phillip and Western Port catchment are described below.

The Merri Creek Trail Review discusses management responsibilities for trails in more detail[5].

Australian Government

Australian Government Department of the Environment, Water, Heritage and the Arts

The Department of the Environment, Water, Heritage and the Arts (DEWHA) has a role because it administers the Environment Protection and Biodiversity Conservation (EPBC) Act, which lists a number of species occurring in the Merri Catchment. Current listed species include the Growling Grass Frog, Golden Sun Moth, Grassland Earless Dragon, and Striped Legless Lizard. The Western (Basalt) Plains Grasslands is also listed under the Act.

Waterwatch

Waterwatch is a program of the Australian Department of Water, Heritage, Environment, and the Arts. In Victoria the state level coordinators are employed by Melbourne Water, as are most local Waterwatch Coordinators. However Merri Creek Waterwatch (and also Moonee Ponds Creek Waterwatch) is hosted by MCMC. Funding for the program is provided by the Australian Government, Melbourne Water and local Councils.

[3] Section 20 of the Catchment and Land Protection Act 1994
[4] Section 26, Catchment and Land Protection Act 1994
[5] Thompson Berrill Landscape Design P/L page 11

Victorian Government Agencies

Department of Sustainability and Environment

The Victorian Department of Sustainability and Environment (DSE) has a diverse range of roles in relation to waterways. It plays a role in management of environmental flows, oversees bulk water entitlements and is a support agency in the area of aquatic and freshwater ecology and in-stream habitats. It is the key fisheries manager and this function sits within its flora, fauna and fisheries monitoring and management functions.

DSE assists the work of the Port Phillip & Westernport Catchment Management Authority.

DSE advises government on state-wide policy and undertakes state-wide land use and catchment planning, urban policy and river health policy and planning. Key policies are *Our Water Our Future* (2004), the *Victorian River Health Strategy* (2002) and *Melbourne 2030* (2005)

DSE purchases or requires service delivery from a wide range of agencies including local government. It establishes consistent processes and standards for planning and implementation related to river restoration, and manages government investment in river health.

A further role of DSE is to provide advice to land managers generally (including Parks Victoria), about the management of sites with flora and fauna significance and to administer the State Government's commitment to native vegetation net gain. DSE is also involved in providing for the protection of sites and in some cases this may involve acquisition.

Once key conservation sites have been secured, DSE has a further role in recommending the nature and scope of their management to "provider" organisations such as Parks Victoria.

DSE also administers the Flora and Fauna Guarantee Act, which lists for protection a number of species and ecological communities occurring in the Merri catchment.

Department of Primary Industries

Since 2007 the Department of Primary Industries (DPI) has had the responsibility for monitoring and enforcing the Catchment and Land Protection Act in relation to weeds and pest animals. It is also responsible for licensing of extractive industry. In the Merri Creek catchment this mainly includes basalt and clay quarries.

The Catchment and Agriculture Services division of DPI is responsible for developing, promoting and nurturing partnerships with industries, communities and government agencies for the benefit of Victoria's primary industries. DPI encourages the adoption of new agricultural technologies and practices through a range of community education and extension programs. In water management, this includes programs on nutrient and salinity reduction in rural areas.

DPI also has an enforcement role in the proposed Plant Biosecurity Act (currently the Plant Health and Plant Products Act 1995), the Biological Control Act 1986 and in relation to agricultural and veterinary chemicals amongst other things.

Port Phillip & Westernport Catchment Management Authority (PPWCMA)

The PPWCMA aims to facilitate integrated catchment management and sustainability of the region's catchment assets by building cooperation, coordination and partnerships with stakeholders in catchment management including individuals, community groups, businesses, local government and government agencies. In particular it has the responsibility under the Catchment and Land Protection Act 1994 of preparing the Regional Catchment Strategy (RCS), which was published in 2004. The RCS provides a plan for investment in natural resource management for the Port Phillip and Western Port Catchment until 2009.

The main focus of the Regional Catchment Strategy is management of land, water and biodiversity in the region. Key 'sub-strategies' to the RCS are the Regional River Health Strategy[6], which outlines priorities for the management of waterways as a basis for works programs, the Regional Water Quality Plan (under development) which strategically identifies and addresses key water quality issues, particularly the management of nutrients and sediments, the regional Native Vegetation Plan, the Rabbit Action Plan, Weed Action Plan, and the Strategy for Support & Coordination of Landcare and Community Groups.

A partnership agreement has been established with Melbourne Water such that Melbourne

[6] Melbourne Water (2007)

Water is responsible for delivering river, floodplain and drainage management services.

Melbourne Water Corporation

Melbourne Water is a statutory corporation[7] wholly owned by the Victorian Government.

Under the Water (Governance) Act 2006, Melbourne Water has the powers in relation to the management of the bed and banks of waterways and the land within 20m of a waterway. This extends to the power to make bylaws regarding 'Designated Land' within 20m of a waterway.

Under the Catchment and Land Protection Act 1994, Melbourne Water is the Waterway Authority for Port Phillip and Westernport Catchment. It is designated as caretaker of river health and the authority responsible for drainage, river and floodplain management, as well as management of the environmental water reserve for the entire Port Phillip and Westernport region.

In relation to the Merri catchment, Melbourne Water has the primary responsibility for waterway, drainage and floodplain management along Merri Creek and its major tributaries and main tributary drains. As a rough guide, Melbourne Water manages drains, waterways, stormwater treatment wetlands and retarding basins which have a catchment of greater than 60 ha.

The Melbourne Water "Statement of Obligations" requires "the protection, restoration and care of the physical and environmental health of creeks, rivers and wetlands"[8]

Melbourne Water is required to deliver:

- waterway, drainage, floodplain and riparian zone management, including protection and enhancement of flora, fauna and habitat values within the floodplain; and
- flood protection and flood warning services.

Melbourne Water also facilitates:

- water quality protection and improvement works, (including revegetation on the banks of Merri Creek);
- the monitoring and reporting of the performance of stormwater managers and the state of water environments;
- identification of best practice and the setting of standards and targets for stormwater management;
- the funding of research to identify best practice for stormwater management and the development of new technology; and
- waterway recreation setting provision so others can develop waterway recreation facilities.

Where a trail is located on Melbourne Water land, it requires that an agreement be entered into with the trail owner to recognise use of the land and ensure potential liabilities are addressed. As manager of the waterway Melbourne Water approval is also required for all bridge crossings, road underpasses and infrastructure located within the 1:100 year floodplain. Similarly the Merri Creek Environment Significance Overlay indicates that path projects require the approval of Melbourne Water.

Melbourne Water's *Waterways Operating Charter* (2006) identifies a number of relevant aims:

- To ensure that Melbourne's rivers and creeks are healthy, with increased numbers of native fish, Platypus and plant life.
- To ensure appropriate flood protection standards for existing and new urban areas.
- To ensure that urban development achieves appropriate standards of flood protection and environmental performance.
- In collaboration with others, to achieve objectives for water quality in accordance with State Environment Protection Policies and targets set out in the Regional River Health Strategy.
- To gain a better understanding of waterways in order to manage them efficiently to protect and enhance their values.

Melbourne Water is a referral authority for planning applications for works within the urban floodway zone and inundation and flood overlays. These overlays are designed to include all lands which would be flooded a 1 in 100 year flood event.

Melbourne Water's primary planning documents for river health works are the Regional River Health Strategy 2006 (RRHS) and Regional River Health Strategy Addendum (RRHS Add), which was developed to align the RRHS delivery period to the second Melbourne Water 'Water Plan'. To help ensure that the Regional River Health Strategy is effectively implemented, Melbourne Water are currently developing Management Unit Investment Plans (MUIP's), which will form the basis of 'Capital Works' investment planning for the current Water Plan period. The Merri Creek Waterway Management Activity Plan (Draft 2003) is still utilised by Melbourne Water as a 'support'

[7] Established under the Melbourne Water Corporation Act 1992
[8] Water Industry Act 1994 Statement of Obligations, signed by John Thwaites commencing 1/7/07, page 8.

planning document for River Health works in the Merri Creek catchment; however, future activities will be based on those outlined in the RRHS (Addendum) and defined in the Management Unit Investment Plans.

Other specific responsibilities Melbourne Water holds include:

- Implementation of the Port Phillip & Westernport Regional River Health Strategy;
- Coordination, with EPA, of the development of the Better Bays and Waterways Regional Water Quality Improvement Plan;
- Water quality monitoring;
- Development of Drainage Schemes
- Coordination of Port Phillip and Western Port Waterwatch program;
- Litter collection in waterways bed and banks;
- Development of a Floodplain Management Strategy

Melbourne Water also hosts and supports "Clearwater" a not for profit program which provides practical and informative training sessions on stormwater, reuse, and integrated urban water management.

Most stream bank revegetation work along the waterways in the catchment is carried out by Melbourne Water. Melbourne Water also has two funding programs for revegetation work: the Stream Frontage Management Program which allows for a wide range of river health activities including funding private landowners to fence and revegetate stream frontages, weeds control, off stream watering provision and community education, and the Corridors of Green Program which also funds community organisations including Councils.

Melbourne Water's investment in river health is based on its 5 year water plan which is subject to approval by the Essential Services Commission. Funding for this investment is from Melbourne Water drainage rate income etc.

Melbourne Water does not consent to being assigned actions under the MCES as it already has a primary planning document for Merri Creek which sets its direction for future activities. It has requested being withdrawn from actions assigned under the MCES[9]

Parks Victoria

Parks Victoria (PV) is a statutory body[10] which provides services to the Victorian Government and its agencies in the management of parks and reserves and other land in the control of the State. It is the custodian of a diverse estate of significant parks in Victoria and of the recreational management of Port Phillip Bay, Western Port and the Yarra and Maribyrnong Rivers. Specifically the estate includes:

- 40 national parks
- 13 marine national parks
- 11 marine sanctuaries
- 3 wilderness parks
- 27 state parks
- 31 metropolitan parks
- 63 other parks (including regional and reservoir parks)
- 2785 natural features reserves and conservation reserves
- 8400 Aboriginal Affairs Victoria registered Indigenous cultural heritage sites/places
- 2500 (non-Indigenous) historic places.

These assets total approximately 3.96 million hectares (17 per cent of Victoria).

Along Merri Creek, Parks Victoria currently manages the 330 ha Craigieburn Grassland Reserve (Galgi ngarrk) and the 35 ha Cooper Street Grassland Reserve (Bababi marning). It also manages Yarra Bend Park.

Parks Victoria is also responsible for developing and ensuring the planning and implementation of a major new park in the Merri Creek corridor from the Western Ring Road north to Craigieburn Road East. It is anticipated that although the new park will be a multiple-ownership park, there will be a substantial increase in the area of land directly managed by Parks Victoria (see chapter 2.5).

In the urban area Parks Victoria has a lead role in the planning for the entire open space network, producing documents such as *Linking People and Spaces – A Strategy for Melbourne's Open Space Network*[11]. An annual grants program administered by Parks Victoria provides funding to local councils to undertake trail construction and improvement works as listed in Linking People and Spaces.

Environment Protection Authority

The EPA is responsible as the regulatory body to set long-term water quality objectives, manage licensed discharges, investigate pollution incidents and take enforcement action. It sets objectives through State Environment

[9] Correspondence from Michelle Ezzy, Program Leader, Waterway Planning – West River Health, Melbourne Water to Luisa Macmillan, Manager MCMC dated 18 June 2008.

[10] PV is established under the Parks Victoria Act 1998.

[11] Parks Victoria (2002)

Protection Policies (see chapter 3.2) and is jointly responsible with Melbourne Water for the development of the Better Bays and Waterways water quality improvement plan. It conducts auditing and reporting of environmental conditions.

EPA also licenses discharges to waterways and has a key role in responding to pollution events. It can also take a proactive role, for example the Merlynston Creek "Strike Force", and the Edwardes Lake Neighbourhood Environment Improvement Program.

EPA also has a role in emergency pollution management, and can issue pollution abatement notices. It encourages the preparation of Neighbourhood Environment Improvement Plans.

VicRoads

VicRoads has an interest in the Merri Creek corridor due to the Metropolitan Ring Road and the Craigieburn Bypass which cross Merri Creek and traverse remnant grasslands in the region of Barry Rd, Thomastown. Runoff from the Bypass is treated in bio-retention trenches and wetlands which eventually drain to the Merri or tributaries.

VicRoads also manages a number of other major roads in the catchment, such as Cooper Street, Edgars Road extension, Donnybrook Road etc, and works on these roads can have major effects on Merri Creek or its tributaries.

VicRoads owns a number of parcels of former freeway reservation land in Coburg North and Fawkner, which it is currently (2009) divesting itself of. Moreland Council has been given the option of buying it at market rates.

VicRoads manages the Principal Bicycle Network which is a network of mostly on-road cycle ways criss-crossing Melbourne, some of which cross Merri Creek and its tributaries and link to waterway trails in the catchment.

Growth Areas Authority

The Victorian Government's Growth Areas Authority works with Victorian Government agencies, Councils and developers to:

- deliver communities in the Growth Areas that are socially, environmentally and economically more sustainable,
- improve the operation of the regulatory environment and administrative processes in order to reduce costs and increase efficiencies for developers and local government, and
- work with industry and councils to ensure the government's economic, employment and housing policy priorities are achieved in the growth areas.

Sustainability Victoria

Sustainability Victoria is a State Government agency responsible for waste management and recycling, developing litter campaigns and programs, and administers litter grant programs and plastic bag reduction programs. It also has a major role in promoting energy conservation.

Local Government

Local Governments (i.e. Councils) in the Merri Catchment include the Cities of Darebin, Hume, Moreland, Whittlesea and Yarra, and the Mitchell Shire.

Councils have a key responsibility for open space and amenity provision and development on lands that they own, and Crown lands they manage.

Open space along waterways is also important for local government in terms of recreation provision.

Councils play a key role in the health of waterways through their management of streets and local drains which feed into the Melbourne Water regional drainage system. As a rough guide councils are responsible for waterways, drains and wetlands with catchments of less than 60 ha. Councils thus have an important role in protection of water quality and quantity prior to discharge to main drains and waterways. They have a key role in implementing water-sensitive urban design (see below) and statutory requirements of the planning scheme including Clause 56 controlling residential subdivision.

Councils have Stormwater Management Plans to guide their actions in managing stormwater and will be reviewing these periodically. Many are also developing water conservation plans and are considering options for the capture and reuse of stormwater.

Councils are required under the EPA Act to develop Domestic Waste Water Management Plans for the control of domestic septic tank effluent. Effective use of these strategies contributes to the control of septic discharge to waterways.

A number of Councils have their own revegetation programs along waterways.

Councils are planning authorities under the Planning and Environment Act 1987, making

them responsible for preparation of planning scheme amendments (with the Minister's prior approval). They are also responsible authorities under the Planning Act empowering them to administer planning schemes, determine development applications and issue permits etc.

Councils are required by the State section of the Planning Scheme to assist in the protection of habitats of threatened and endangered species, and to manage applications to clear native vegetation and achieve net gain in native vegetation under the Victorian Native Vegetation Management Framework[12].

In their roles as planning and responsible authorities, Councils can influence planning requirements to assist in stormwater quantity management and the protection of water quality (e.g.: through implementation of Water sensitive urban design requirements), (see further section 3.1 and 3.2). There is also scope to influence the visual character of developments within the viewshed of the waterway and to require landscaping and screening vegetation to protect waterway amenity. They have lots of scope to ensure that public open space is established along waterway corridors during the development process. They can also establish planning controls such as Environmental Significance Overlays which have been established along some sections of waterway in the catchment.

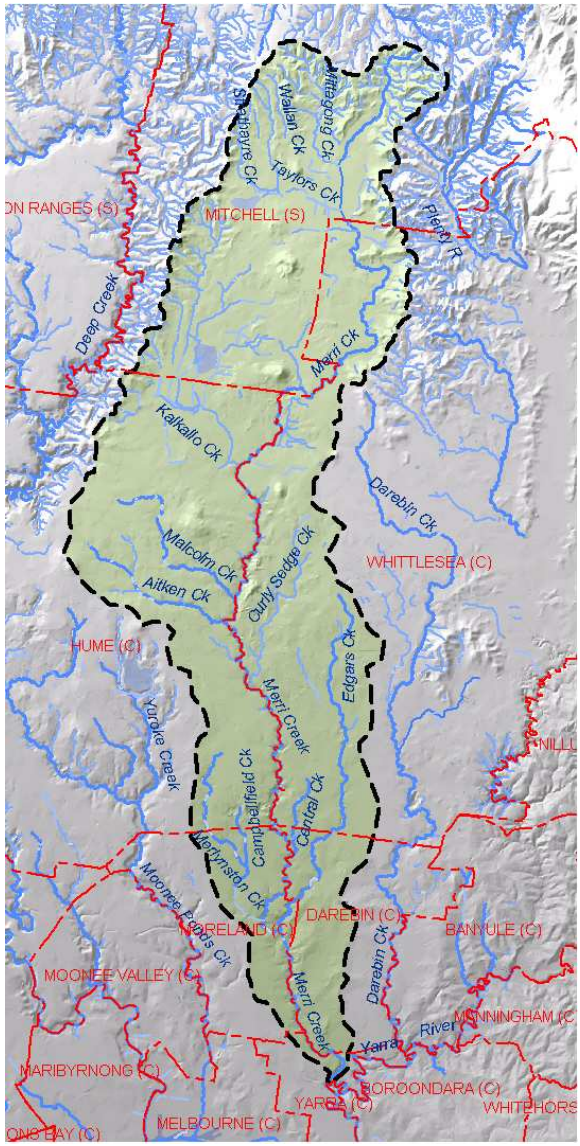
Similarly Councils are required to identify, conserve and protect places of natural or cultural value from inappropriate development. These include places of Aboriginal cultural heritage significance and historical and archaeological sites. They also must take account of the requirements of the Aboriginal Heritage Act 2006.

Councils are taking an active role in combatting climate change which is likely to have a major impact on Merri Creek.

Councils have an important role in environmental education, and incentives and support for good land management.

Councils also have the power to create and enforce their own local laws, providing these do not conflict with State or Federal Government laws.

Council health departments also respond to complaints about discharges to creeks.



Map 5 - Merri Creek Catchment showing municipal boundaries

Utility managers

Victorian Rail Track (VicTrack) is a State Government-owned utility which owns the rail reservation land which includes highly significant conservation areas, e.g. the Beveridge rail reserve grassland remnant. It conducts some land maintenance activities associated with rail reserves adjacent to the waterway corridors (e.g. near Rushall Station).

Yarra Valley Water is a water retailer wholly owned by the Victorian Government. It is responsible for the operation of the Craigieburn and Wallan Sewage Treatment Plants and the Aurora Treatment Facility which is under construction, a combined sewage treatment and recycled water treatment facility that will service the new suburb of Aurora. The Craigieburn STP is has an EPA licence to discharge treated sewage into Merri Creek.

[12] DNRE 2002e

Yarra Valley Water is also responsible for developing major infrastructure for water supply and sewerage. Together with Melbourne Water, it is implementing the Northern Sewerage Project, which will help meet the rapidly growing demand for services in the northern suburbs. It will also help to protect the Merri Creek from wet weather sewage overflows from Yarra Valley Water's emergency relief structures which allow diluted raw sewage to overflow into the waterway during extreme wet weather events.

Trade Waste Agreements with Yarra Valley Water are an important mechanism for ensuring industrial waste is not discharged to the stormwater system.

SP AusNet manages the high voltage transmission line between Thomastown and Brunswick Terminal Stations and its extension via an underground cable along the creek valley to Queens Parade Clifton Hill, before ultimately connecting to the Richmond Terminal Station. SP AusNet has responsibilities to maintain its easements to provide for safe and secure power supply, and this has implications for vegetation management along waterways adjacent to their assets.

Citipower and **Solaris Power** have distribution power line assets within the creek corridor

Melbourne Water and **Yarra Valley Water** sewer lines and water mains, and **AGL Energy Limited** high pressure gas pipelines are also located within various parts of the creek corridors.

Merri Creek Management Committee

The MCMC is an incorporated association whose current members are:

- the municipalities of Darebin, Hume, Mitchell, Moreland, Whittlesea and Yarra; and
- the Friends of Merri Creek and the Friends of Wallan Creek.

Representatives of its members form a Committee of Management which meets regularly to discuss policy and issues, oversee MCMC's operations, and to coordinate management.

As an incorporated association the MCMC is required to act in accordance with its Statement of Purposes[13].

[13] MCMC's Rules and Statement of Purposes are available at MCMC's website www.mcmc.org.au

The MCMC was set up to do this through the employment of a dedicated works team; and through its Committee of Management bringing together representatives of its member groups and acting as a vehicle for "overseeing" its operations, and for providing advice and coordination on management related issues through its meetings.

Historically, a large component of the MCMC's works have been vegetation management on open space and other lands associated with the urban sections of the waterway corridors. While, since its inception, the MCMC has been responsible for the majority of revegetation along the creeks, other works have also been conducted by Councils, Community groups, the former Yarra Bend Park Trust, and increasingly for the creek banks, Melbourne Water.

In addition to delivery of vegetation management, the MCMC has provided advice to member Councils and others in the areas of: environmental, strategic and statutory planning; community education and water quality monitoring activities; and other land management and conservation works.

MCMC's key activities include: revegetation and restoration of remnant vegetation; community education and water quality monitoring activities (particularly in schools); and environmental, strategic and statutory planning advice. The MCMC has developed a significant knowledge base in relation to the waterways of the Merri catchment and associated issues.

MCMC also works collaboratively with its neighbouring creek committees, the Darebin Creek Management Committee and the Moonee Ponds Creek Co-ordination Committee.

Funding of MCMC

The MCMC currently receives income from a number of sources. Member agencies provide core funding to support the MCMC's management component (Manager and administrative assistance). As well, most local government members provide core funding to the Parklands Management Program to carry out revegetation and restoration works, and to the Catchment Program to carry out environmental education and water quality monitoring activities. Various grant programs provide additional funds for specific projects. For example, the Natural Heritage Trust has granted monies to the MCMC to conduct major revegetation and restoration works. Other grants have been received from organisations such as Sustainability Victoria and philanthropic trusts.

MCMC's Statement of Purposes

The primary purpose of the Merri Creek Management Committee (MCMC) is to ensure the preservation of natural and cultural heritage, and the ecologically sensitive restoration, development and maintenance of the Merri Creek and tributaries[1], their corridors and associated ecological communities.

MCMC acknowledges that the Merri Creek flows through the cultural landscape of the Wurundjeri and that recognition, reconciliation and engagement with Aboriginal people is necessary to achieve its primary purpose.

In order to achieve its primary purpose, MCMC:

- consults, co-ordinates, informs, advises and provides a forum for member organisations and other stakeholders;
- participates in strategic and statutory planning and development assessment processes;
- advocates for policy, development and resource allocation decisions that are complementary to the primary purpose;
- carries out conservation and restoration programs and works;
- develops and maintains skills and expertise in ecological restoration of waterway corridors, and shares these with member organisations and other stakeholders within and beyond the Merri catchment;
- informs, educates and involves the community;
- provides support, resourcing and facilitation of skills development to community groups;
- seeks the consolidation and expansion of public open space along the Creek corridor, particularly in urban and urban fringe areas;
- undertakes and supports research and monitoring;
- maintains a gift fund known as the Merri Creek Environment Fund to support MCMC's primary purpose.

The geographic coverage to which this Statement of Purposes applies is the Merri Creek and its catchment, including its tributaries and their sub-catchments. MCMC may also undertake works in adjoining catchment areas, where such works will contribute to the financial health, knowledge and skills development and maintenance and/or work team viability of MCMC, and where such works are not at the expense of MCMC's core role.

MCMC also undertakes works as a contractor, mostly to Councils. This work has included mainly revegetation and weed control work, but also at times strategic work, such as mapping and site survey towards preparation of open space strategies and stormwater education.

Friends of Merri Creek

Friends of Merri Creek is a voluntary incorporated association established in 1989 which undertakes activities which support community interest and involvement in the care of the Merri Creek, its tributaries and their environs. It is a strong advocate for creek conservation. The Friends conduct a range of activities to engage the community including planting, talks and walks, litter collection and participation on the Committee of Management of the MCMC, where it has six representatives.

Friends of Merri Creek includes a number of key sub-groups:

- Friends of Edgars Creek,
- Friends of Malcolm Creek
- Friends of Merri Grasslands
- Friends of Edwardes Lake
- Merri and Edgars Creek Confluence Area Restoration Group (MECCARG)

Friends of Wallan Creek

Friends of Wallan Creek is a voluntary incorporated association established in 2004 with the aim of restoring and enhancing the environment of the Wallan Creek (an upper tributary of Merri Creek). It plays an active role in advocating the protection of Wallan Creek environs.

Friends of Wallan Creek is a member group of MCMC and participates on the Committee of Management of MCMC where it has one representative.

PART A - LAND

SECTION 1 – CULTURAL HERITAGE AND VISUAL CHARACTER

Chapter 1.1 Aboriginal Heritage

Introduction

The participants in this strategy acknowledge the prior occupancy of the Merri catchment by the Wurundjeri-willam people, and the damage to the people, communities, traditions, and to the land which was done in the settlement process.

We respect the rights of the descendents of the Wurundjeri-willam to preserve their cultural heritage and be involved in land management decision-making.

This chapter covers both archaeological (pre-contact) Aboriginal heritage as well as "living" (post-contact) Aboriginal heritage.

Despite the damage which was done to Aboriginal culture by settlement, the Aboriginal community's knowledge of the Merri catchment is important to respect, to nurture and to take into account in management of the catchment.

Research, including survey work, investigation of archival accounts, and discussion with Wurundjeri-willam descendants along Merri Creek over recent decades has revealed a rich Aboriginal heritage associated with the stream. These surveys have identified a large number of known sites and areas of sensitivity where other sites are likely to occur. Surveys now span the Merri Creek corridor from Hernes Swamp at Wallan to the stream's confluence with the Yarra River at Abbotsford, as well as parts of Curly Sedge and Edgars Creeks.

Background

Aboriginal Habitation

The northern region of Melbourne is the traditional land of the Wurundjeri-willam people, a clan of the Woiwurrung language group (Barwick, 1984 in Ellender, 1993). While descendants of the Wurundjeri willam live in Melbourne and are expected to have authority over Aboriginal Heritage sites within lands defined by the Aboriginal Heritage Act, comparatively little is known of their occupation of the lands before the time of European contact. Their land was rapidly overrun by European settlement and there were few observers to record details of their society, which was quickly and dramatically altered by European occupation.

Perhaps one of the best known sources of contact between Europeans and Aboriginal people was William Thomas, Assistant Protector of Aborigines from 1839, who camped on the Merri Creek in the 1840s and subsequently lived there. The Melbourne Baptist Congregation, with the help of Thomas, established the Merri Creek Aboriginal School on the peninsula of land between the Merri and the Yarra River, now covered by the Eastern Freeway (Hall, 1989). Although the school was apparently established with Woiwurrung support initially, parents later withdrew their children forcing its abandonment (Johnson and Ellender, 1993, vol. 2).

The diaries of William Thomas formed the major source of information for the book *People of the Merri Merri*[14], which provides good background to understanding the period of settlement, and the situation of the Wurundjeri today.

Previous Studies

Prior to the 1980s, Merri Creek was only subject to sporadic discoveries of Aboriginal sites. One of the earliest discoveries was by Brough Smyth in 1887 of a mound site at Donnybrook (in Ellender, 1997b). Further early records were a scatter of artefacts at the Merri/Yarra confluence discovered by Hardy in 1911, and a freshwater mussel midden and artefacts near Pentridge Prison at Coburg discovered by Hanks in 1933, (Ellender, 1997b).

Contemporary Studies

Since the late 1980s, there have been a number of archaeological studies of the Merri corridor. Presland's 1983 survey of the Melbourne area identified the Merri Creek locality as having potential for archaeological significance due to the likelihood of its use by

[14] Ellender & Christiansen 2001

Aboriginal people[15]. This was subsequently confirmed through work by Roger Hall commissioned by the Merri Creek Bicentennial Committee[16]. On the basis of these and other studies, there is strong evidence that the Merri Creek and surrounding lands were important for food, shelter, travel and maintaining cultural traditions for Aboriginal people.

Hall's work was one of the first regional surveys to be carried out in the Melbourne area. In relation to Aboriginal archaeology, Hall found 21 lithic scatters (stone artefacts) and 5 scarred trees to which he assigned a 'high regional cultural significance and at least a medium regional scientific significance'.

Hall further indicated that the area north of Mahoneys Road where the land is unmodified should be considered as archaeologically sensitive. Only a small part of these lands were effectively surveyed during his study, these being mainly at the Merri Gorge (now Galada Tamboore) and a few other sites. This was due to visibility conditions or lack of bare ground. Hall recommended that all sites surveyed should have protection through legislation and be preserved due to their research potential and cultural significance.

Ellender's background study for the 1994 Merri Creek Concept Plan Final Draft[17] included some additional survey work, but focused on preparing recommendations for protection of sites and identifying gaps in knowledge requiring further survey work. Her report made recommendations pertaining to seven specific sites along Merri Creek from Craigieburn Road to near the confluence with Central Creek. These mainly involved preventing disturbance and erosion, and seeking revegetation for protection of the site and its values. A further three recommendations were made for areas of archaeological sensitivity.

Some of the additional work recommended was completed in 1997with a further study which included surveys between Hernes Swamp and Craigieburn[18].This study made twenty-one recommendations about protection of sites, education to engender better levels of community understanding of aboriginal heritage issues and future projects for consideration and funding. The survey work (carried out in mid-1994), brought to over sixty the number of Aboriginal sites from Hernes Swamp to the Merri Creek's confluence with the Yarra River.

These sites included more than 40 registered artefact scatters, exposures in the creek bank and similar sites, and 20 scarred trees in the area upstream of Mahoneys Road. An assessment was also made of the health of the scarred trees, all of which are likely to be over 200 years old. Most (73%) were found to be in poor health and 13% already dead - although dead trees still enjoy legal protection.

Besides documenting the archaeological resources of the middle and upper Merri, Ellender's study also investigated the Merri/Yarra confluence to attempt to discover remains of William Thomas' house/Protectorate Station and the Merri Merri Aboriginal School near Dight's Mill. An attempt was also made to confirm the mound site at Donnybrook recorded in 1878. Attempts to reaffirm these important sites were unsuccessful.

During the period of Ellender's study an application was forwarded to the Register of the National Estate nominating historic and archaeological Aboriginal sites on Merri Creek for registration. The Merri Creek, Barry Road Gorge and Environs site (now know as Galada Tamboore) only ever reached indicative status. The Cooper Street to Craigieburn Grasslands area was listed, but not on the basis of its Aboriginal Heritage.

A further archaeological study applicable to the catchment is that by du Cros and Associates[19] of the Craigieburn area and particularly Malcolm and Aitken Creeks. The study identified both streams as having a zone of archaeological sensitivity on either side for a distance of 50 metres.

A study of a 700 metre section of Edgars Creek between the Kodak bridge and the confluence of Edgars and Merri Creeks[20] was prepared for Melbourne Water as part of its investigation for site works in the vicinity. The survey recorded seven isolated artefacts which were assessed as having low scientific significance.

The confluence of Merri Creek and the Yarra River has been identified as a site of significance in terms of its Aboriginal and European heritage. It was the site of an Aboriginal burial ground, meetings, ceremonies and encampments as well as of the Merri Creek Aboriginal School, the Assistant Protector William Thomas' hut and a number of other features relating to Melbourne's early settlement and contact history. A study of this site published in 1998 described what is known

[15] Presland, 1983
[16] Hall, 1989
[17] Johnson and Ellender, 1993
[18] Ellender, 1997b
[19] du Cros and Associates, 1991 in Ellender, 1997b.
[20] Lane, 1996 p 13

of the history of the area, and concluded that archaeological remains are not likely to be found in the area due to disturbance from Eastern Freeway and oval construction [21].

Further survey work has been undertaken as part of the background research and approval process for a number of developments in the catchment. The principal of these developments has been the Craigieburn Bypass, which resulted in studies by Vines (1996), Newby (1997) and Muir (1998 and 1999). Thirteen new Aboriginal archaeological sites were recorded. The Merri Creek, particularly close to Galada Tamboore and associated tributaries were confirmed as areas of high archaeological sensitivity.

Survey work by Biosis Research Pty Ltd in preparation for the Aurora development in Epping North identified 13 new sites, on the higher stony rises close to Edgars Creek and former swamps.

Yarra Valley Water has also conducted surveys for sites which will be disturbed as part of the Northern Sewerage Project[22], and further work is underway. A large number of artefacts have been found at the Malcolm Place site in Campbellfield.

The City of Moreland is preparing a pre-contact study and has prepared a post-contact (i.e. non-archaeological) study also[23].

In 2008 the Growth Areas Authority commenced an Aboriginal cultural heritage sensitivity study which aims to formalise areas of Aboriginal cultural heritage sensitivity (but not actual sites) The study covers the whole of Whittlesea, and probably[24] other areas within the Melbourne@5 million study area. These areas of sensitivity will be gazetted and be the basis for whether a Cultural Heritage Management Plan is required.

In 2009 Parks Victoria will be commissioning some survey work within the Merri Catchment as part of a Cultural Heritage Management Plan to be developed for the Merri Parklands.

Agencies

Aboriginal Affairs Victoria (AAV) is the Victorian Government's central point of advice on all aspects of Aboriginal affairs in Victoria. This policy advice may relate to services provided by other State Government agencies, Commonwealth departments, or to services delivered within the Aboriginal community. AAV is often the first point of call by members of the Aboriginal community and its organisations requiring information on a wide range of issues.

An important aspect of the work of AAV is to promote knowledge and understanding about Victoria's Aboriginal people within the wider community. AAV also administers legislation that protects Aboriginal cultural heritage in Victoria. This function relies on close co-operation with the various Aboriginal communities around the State. Aboriginal Affairs Victoria's objectives are to:

- promote the social, economic and cultural development of Victoria's Aboriginal communities
- protect and promote Victoria's Aboriginal cultural heritage
- improve coordination and monitoring of the development of government policy relating to the delivery of programs and services to Victoria's Aboriginal people
- promote and strengthen effective relationships between government agencies with Victoria's Aboriginal communities; and
- promote a greater awareness and understanding of Victoria's Aboriginal people.

State-level protection

A new State Act (The Aboriginal Heritage Act 2006) has been enacted which took force in May 2007. It replaces the Archaeological and Aboriginal Relics Preservation Act 1972 and as a result part IIA of the Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act 1984 was repealed, and the rest of the Commonwealth Act applies only as a 'last resort'. Key features of the Aboriginal Heritage Act are listed in the box below.

Areas of Cultural Heritage Sensitivity

The legislation protects known and unknown sites The Aboriginal Heritage Regulations 2007 define areas of cultural heritage sensitivity. Registered cultural heritage places are areas of cultural heritage sensitivity as is land within 50m of the place unless the land has been subject to significant ground disturbance.

Waterways and land within 200m of waterways are areas of cultural heritage sensitivity unless they have been subject to significant ground disturbance. Almost all of the Merri Creek and major tributaries are mapped as areas of sensitivity under the Act. Parks under the National Parks Act are also areas of significance.

[21] Clark & Heydon, 1998
[22] Andrew Long and Associates, 2003, and Terraculture (2005)
[23] Moreland Pre Contact Aboriginal Heritage Study (draft) and Post Contact Aboriginal Heritage Study (adopted 2006)
[24] This could not be confirmed prior to publication

Key features of the Aboriginal Heritage Act 2006[25]

The primary objective of the Act is to recognise, protect and conserve Aboriginal cultural heritage in Victoria in ways that are based on respect for Aboriginal knowledge and cultural and traditional practices.

Aboriginal cultural heritage includes places and objects relating to Aboriginal occupation of Australia as well as places and objects of cultural heritage significance to the Aboriginal people of Victoria.

It establishes an Aboriginal Heritage Council in Victoria consisting of 11 Victorian Traditional Owners. The Council registers Aboriginal parties and advises the Minister on Aboriginal Heritage Management.

Local Aboriginal organisations can apply to become Registered Aboriginal Parties (RAPs). Under the provisions of the Act they are involved in cultural heritage decision making at a local level.

Larger developments and many high impact activities in culturally sensitive landscapes can cause significant harm to Aboriginal Cultural Heritage. The Act prescribes in regulations the circumstances in which a Cultural Heritage Management Plan will be required for certain types of development or activities in sensitive areas before they can commence.

Some activities that will, or are likely to, harm Aboriginal Cultural Heritage will not require preparation of a Cultural Heritage Management Plan. In these cases a Cultural Heritage Permit may be required.

The Act allows the Minister for Aboriginal Affairs to make declarations in order to preserve important Aboriginal cultural heritage places as protected areas for future generations.

Landowners and managers will also be able to enter into Cultural Heritage Agreements with Registered Aboriginal Parties to manage and protect important Aboriginal places on their property.

The Act includes a range of enforcement provisions to provide better protection for Aboriginal cultural heritage in Victoria. This includes higher penalties of up to $1 million and clear powers for Heritage Inspectors.

Causing harm to Aboriginal cultural heritage is an offence under the Act. Stop Orders provide a process for stopping activities that threaten or harm Aboriginal cultural heritage. The Minister for Aboriginal Affairs will also be able to order a person to audit their activity under certain circumstances.

The Act establishes the Victorian Aboriginal Heritage Register to hold details on Aboriginal cultural heritage in Victoria.

The mapping by Ellender 1997 and earlier studies of Aboriginal Archaeological sensitivity may be useful to identify the core of lands needing protection in urbanised areas of the Merri Creek, as well as possible extensions in rural parts.

The AAV website includes a planning tool to help developers and other work out their responsibilities under the Act.[26]

Registered Aboriginal Parties

In the Merri catchment the Wurundjeri Tribe Land Compensation and Cultural Heritage Council, is the approved Registered Aboriginal Party.

Council responsibilities under the Aboriginal Heritage Act

As responsible authorities under the Victoria Planning Provisions, Councils must check whether a Cultural Heritage Management Plan is required prior to determination of applications for planning permits, amendments to planning permits and other statutory authorisations.

Sites and areas of archaeological sensitivity (areas which are most likely to contain Aboriginal sites) have been mapped and the mapping has been provided to Councils. However, the presence of sites may be unknown to landowners. The Aboriginal Affairs Victoria website[27] provides broad scale maps of areas of cultural sensitivity. However, the planning scheme provides a powerful tool for protecting European heritage, and should be able to be used for protecting Aboriginal Heritage also. Critical to protecting Aboriginal sites is protection from ground disturbance. The new Act puts such protection into law. It remains to be seen how this can be best drawn to the attention of those who need to know. A new planning scheme overlay may be appropriate. The Heritage Overlay can be, and in some cases is, used for Aboriginal sites, however it doesn't provide good protection against ground disturbance.

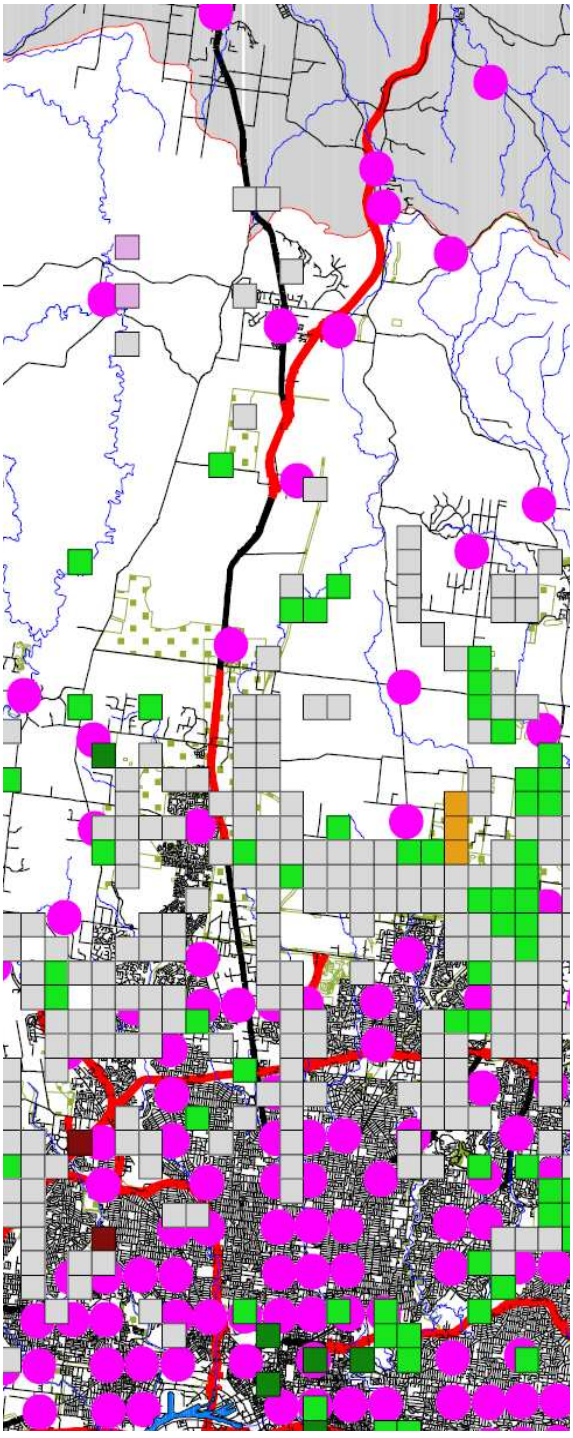
Good protection from ground disturbance is provided in the Environmental Significance Overlay (ESO) which has been applied to much of the Merri Creek. The ESO requires a permit to carry out works (unless the works are exempted in the overlay schedule), and the definition of works includes ground disturbance.

[25] http://www1.dvc.vic.gov.au/aav/heritage/index.htm

[26] http://www.aav.nrms.net.au/aavQuestion1.aspx

[27] http://aboriginalaffairs.vic.gov.au

The other complication relating to Aboriginal sites is that the location of identified sites should



Map 6 - Aboriginal Cultural Heritage Sites (from AAV website)

not be made public without consulting the Wurundjeri. The Heritage Overlay requires explicit listing of sites, thereby making them public. Unknown sites obviously cannot be listed in the Heritage overlay and there is no provision for areas of archaeological sensitivity. The Heritage Overlay also has limitations in dealing with cultural landscapes. Areas of sensitivity can be incorporated into the Environmental Significance Overlay area however, and this can be done without explicitly listing known sites. The Merri Creek ESO implemented separately in five Councils' planning schemes incorporates the objective "To protect areas of sensitivity for Aboriginal heritage."[28] The Merri Creek ESO therefore potentially provides a consistent regional approach to protecting these areas. Unfortunately the boundaries of the ESO in the cities of Hume and Whittlesea are not designed to incorporate the areas of sensitivity for Aboriginal heritage, and the Mitchell Shire does not have a Merri Creek ESO.

Staff Training

Staff training opportunities exist through DSE's PlaNet program, AAV (for free), and Maddocks. Where possible these existing training providers should be used rather than developing new training programs.

The Wurundjeri

The Wurundjeri Tribe Land Compensation and Cultural Heritage Council P/L (WTLCCHC) was nominated for this region for the purposes of Part 2A of the Aboriginal and Torres Strait Islander Heritage Protection Act 1984. Written consent from the WTLCCHC was therefore required before disturbing any identified Aboriginal places, sites or objects. It is approved as a Registered Aboriginal Party under the new Act, and must be consulted regarding local impacts on Aboriginal Heritage within the whole of the Merri Creek Catchment.

Place names

Many existing localities and roads probably reflect Wurundjeri names and words. More

[28] Darebin, Hume, Moreland, Whittlesea and Yarra Councils. Mitchell Shire does not have a Merri Creek Environmental Significance Overlay. Mitchell Shire does have a Watercourse Protection ESO but this doesn't include Aboriginal Heritage protection as an objective, nor is it applied to the bulk of the Merri Creek and its tributaries within the Shire. ESO's are not implemented on many tributaries of Merri Creek in the other municipalities also.

recently the Campbellfield Retarding Basin was renamed Galada Tamboore, after the Friends of Merri Creek invited the Wurundjeri to supply a name. Galada Tamboore means Stream Waterhole. In 2008 Parks Victoria and Friends of Merri Creek invited the Wurundjeri to name the Craigieburn, Cooper Street, Jukes Road and Central Creek Grasslands, and the proposed new Merri Creek Park. Whilst not yet formally adopted, the names shown in Table 2 provided by the Wurundjeri have been incorporated into this document where possible.

Current Name	Wurundjeri name	Meaning
Cooper St Grasslands	Bababi marning	Mother's Hand
Craigieburn Grasslands	Galgi ngarrk	back bone
Jukes Rd Grasslands	Bababi djinanang	Mother's foot
Central Creek Grasslands	Nyarree-jar-rang	thigh
New park on Merri Creek	Marran baba	Body of Mother

Table 2 - New Wurundjeri place names

Reporting possible infringements

Members of the public and community groups are able to report possible infringements of the Aboriginal Heritage Act by calling Aboriginal Affairs Victoria on 1800 762 003. This number is a free call number and generally attended. Before calling note the location of the site in terms of a Melways reference, street address or nearest road intersection, and what you saw happening and when. Note any relevant number plates. If possible take a photo which you can email to Aboriginal Affairs Victoria at aboriginal.heritage@dpcd.vic.gov.au. Individuals or members of community groups need permission from the landowner to enter private land. Enforcement Officers under the Aboriginal Heritage Act need consent of the owner or a warrant to enter private land to investigate possible infringements of the Act .

Key References

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Aboriginal Heritage Issues

1. All sites of Aboriginal Significance along the Merri Creek need to be identified and surveyed so that appropriate measures can be put into place for their ongoing management and protection.
2. The protection provided under State legislation to all Aboriginal sites has not been effectively linked to the planning system for land development and change of use. The result is that the protection of known and yet to be identified sites is currently inadequate.
3. Having a consistent approach between local governments to managing Aboriginal heritage means there is a need for the State to introduce a new planning control.
4. Areas of archaeological sensitivity along Merri Creek and tributaries are subject to a number of threatening processes caused by inadequate, or inappropriate management, or simple ignorance of their values. Still others are under threat due to development planned for the future. In some cases this may mean that archaeological sites are lost even before they have been surveyed.
5. Many sites, especially in the upper and middle catchment, are on private property. Alerting the landowners to the presence of sites and appropriate management of them is critical.
6. Aboriginal sites are fragile and non-renewable, and known sites might only be a fraction of those which could be found to exist with future investigation.
7. Information regarding the location of identified Aboriginal sites held by Councils or MCMC should not be made publicly known except where this is consistent with the new Act and Regulations.
8. Many of the upper tributaries of Merri Creek have not been surveyed for Aboriginal Heritage sites, while some lower tributaries have been only partially surveyed.
9. Agency staff need better training and procedures to effectively fulfil their obligations under cultural heritage legislation and to the community.
10. Impacts of the new Aboriginal Heritage Act for local government, landowners and the Indigenous community are not entirely clear. There is much to learn for Councils and the community, but the level of support from DSE/AAV is unclear.
11. The new Act needs to be linked to the planning system.
12. With the exception of Darebin Aboriginal and Torres Strait Islander Community Council, there is little ongoing involvement of Aboriginal organisations in strategic planning in the catchment.
13. Formal adoption of Wurundjeri place names is not yet complete.

Objectives

The following objectives are slightly amended, from the Aboriginal Heritage Act 2006

1. Recognise, protect and conserve Aboriginal cultural heritage in the catchment in ways that are based on respect for Aboriginal knowledge and cultural and traditional practices.
2. Recognise Aboriginal people as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage.
3. Accord appropriate status to Aboriginal people with traditional or familial links with Aboriginal cultural heritage in protecting that heritage.
4. Promote the management of Aboriginal cultural heritage as an integral part of land and natural resource management.
5. Promote public awareness and understanding of Aboriginal cultural heritage in the catchment.

Targets

1. Implement the Aboriginal Heritage Act 2006.
2. Implement a control in the planning schemes to facilitate protection of Aboriginal Heritage sites and areas of sensitivity under the Act.
3. Provision of notification and information to all land managers, both public and private, regarding the general location of significant sites and their responsibilities for protection and management.
4. Implement landowner agreements.
5. Ensure land management is sympathetic to Aboriginal Heritage.
6. Continued identification sites of archaeological and Aboriginal cultural heritage significance.
7. Involvement of appropriate bodies such as the WTLCCHC in management and interpretation of Aboriginal cultural sites and the recording of knowledge of Aboriginal history, both written and verbal.
8. Appropriate interpretation of sites of Aboriginal cultural heritage significance within a context of ensuring their management and protection.

Actions

See Section E page 179 for actions

Chapter 1.2 Historical Heritage

Background

This chapter deals primarily with the post-contact non-Aboriginal cultural heritage. Aboriginal Cultural Heritage is dealt with in chapter 1.1, although there may be some overlap with this chapter where a place is significant for more than one reason.

Post-contact settlement of the lands of the Merri Creek corridor and catchment is comparatively well documented and can be sourced from local histories[29].

The Merri Creek Study[30] also provides an overview of the early decades of settlement, the growth of industry and its effects on the stream. A more recent account is included in MCMC's education kit Streets and Streams (MCMC 2000).

Since the settlement of Melbourne in 1835 the land along Merri Creek and its tributaries has supported farming, basalt and clay quarries, market gardens, industry, services and residential development.

Objectives

The Planning and Environment Act sets out a number of objectives of planning in Victoria. One objective is "to conserve and enhance those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value".

The Australia ICOMOS Burra Charter (1999) is seen as an important guide to the conservation of all types of places of cultural significance.

The Victorian Heritage Act 1995 has no stated objectives but provides for the protection and conservation of places and objects of cultural heritage significance and the registration of such places and objects, establishes a Heritage Council; and establishes a Victorian Heritage Register.

Historical Heritage Assessment

Hall's *Merri Creek Parklands Aboriginal and Historical Heritage Survey*[31] has supplied an invaluable survey and compilation of information about structures and other evidence of the early years of post-contact settlement, though it did not include areas upstream of Craigieburn or on tributaries. His work also identified significant buildings and other structures along the creek from later times. In all, Hall identified 48 historic sites south of Craigieburn Road. Due to the comparative lack of development upstream of Craigieburn Road it is thought that there is a greater likelihood of the discovery of sites associated with early pastoral development in the middle to upper catchment areas.

The most common remains of early settlement are various types of stone structures, especially stone walls (Hall, 1989). These dry-stone walls date from a period between the 1850s and 1880s and are visible in areas upstream of Mahoneys Road where land has undergone less modification. They were built to provide boundaries for properties, assist with managing stock and clear paddocks of volcanic rubble (ibid, p. 51). There is some evidence that the first non-Aboriginal settlers in these parts chose land which was stony so that there would be plentiful building materials[32].

One of the more intact sites of historical heritage is the remains of a farming complex of dry-stone walls, pens, mud and stone dwellings and out-buildings covering about 11 hectares in an area of the Craigieburn Grassland Reserve (Galgi ngarrk) approximately opposite Patullos Lane, Somerton[33].

Perhaps the most consistent use of the creek corridor in the post-contact period has been for quarrying. The earliest quarries were situated between Heidelberg Road and the Yarra with the Melbourne Corporation Quarry operating from the 1850s at the site of the former Collingwood Tip near the end of Ramsden Street, Clifton Hill (now Quarries Park). The Collingwood Council Quarry opened in the 1880s adjacent to the Quarries Park quarry. Fitzroy Council was also reported to have opened a quarry on the site of the present-day Westfield Reserve, just south of Heidelberg Road in the 1840s. Later Heidelberg Council opened an adjacent quarry below the now MacFarlane Burnet Centre for Medical Research. The remains of a third small quarry are still evident today just south of Westfield Reserve. Other important quarries were the Wales Quarry in Brunswick (later Whelan's

[29] e.g. Broome, 1987; Lemon, 1983, Ellender & Christiansen, 2001
[30] PIRG, 1975
[31] Hall 1989
[32] Wuchatsch and Payne, in ibid, p. 56
[33] Hall, 1989, p. 52-7

Depot), the quarry that the Centre for Education and Research in Environmental Strategies (CERES) is now built on, and just to the east of the old Pentridge Stockade boundary near Coburg Lake. The most notable feature of the Wales Quarry was its depth - 51.8 metres at its western wall[34]. These quarries were all for basalt, however there were also many clay quarries associated with brickworks.

Other important historic features identified by Hall were those associated with water use and transport (e.g. Dights Mill), transport sites (e.g. numerous bridges - Heidelberg Road, High Street, Murray Road), drains (e.g. Green Street Main Drain which enters Merri Creek just north of Heidelberg Road), and a number of gardens, retaining walls and paths.

The work of Johnston and Ellender (1993) built on Hall's research and many additional significant heritage items were added to the database of information. Johnston and Ellender sourced information from local history studies, conversations with long-time residents, urban conservation studies and public authority records. A total of 107 historic sites were identified, of which one was considered of National significance, ten as State, seven as Regional, 67 as Local, one Local/Regional, and some 32 as either not assessed or of uncertain significance (see Map 7 below).

Johnston and Ellender made a series of recommendations for protection of heritage sites. Most of these are incorporated in the action table for this chapter.

Their recommendations included:

- protection for historic places through Council Planning Schemes and State and Commonwealth registers;
- a provision in the Development Guidelines for Merri Creek (MCMC 2004) for protection of heritage sites; and
- mechanisms to ensure development proposals conserve historic buildings and features.

Since 1993 a number of additional places have been identified. These include John Batman's two outstation sites, one just south of Craigieburn East Road on the west bank of Merri Creek, and one just north of Summerhill Road also on the west bank of Merri Creek. A number of sites also came to light through survey work conducted for the Hume Freeway Craigieburn Bypass (Muir 1998), and a thorough cultural heritage survey undertaken for the Aurora development.

A number of sites have also been destroyed, by parkland development (e.g. Butlers Brickworks in East Brunswick), or their level of significance changed by alterations to their fabric or partial destruction, or enhanced understanding.

Darebin City Council adopted the Darebin Heritage Study in 2001. The study focussed on buildings in the southern portion of the municipality. In 2007 it commenced a new Heritage study to encompass the whole of Darebin. The Heritage Study will take place in six stages. The first stage will look at Darebin's history, identify potential sites of significance, set out the key themes and prepare an archaeology report.

Hume City Council conducted a Heritage Review in 2003 updating a 1998 study of the former Bulla Shire, and a 2000 study of the remaining area in the new municipality, combining and validating the information in both studies. A Planning Panel considered the resulting planning scheme amendment and reported in 2005, deleting some of the proposed Heritage Overlay entries, and recommending further study of these sites. A further Heritage Review is underway in 2007.

Mitchell Shire completed stage 2 of a Heritage Study in early 2007 which will feed into its Planning Scheme Review Process. Funding is being sought and received for stage 3 of the study which might see an additional 600 buildings added to the heritage overlay. Council has sought Interim Heritage Protection orders from the Minister which precedes the actual amendment process. The documentation for the two are almost identical and so the Amendment would be placed on exhibition relatively quickly after Council receives the Interim Protection Order. The Heritage Amendment is expected to be on exhibition during the third quarter of 2008 with adoption probably not until early 2009.

Moreland City Council completed a heritage review in 2004. Work for the Heritage Review included a pre-contact study currently in draft form and a post-contact study, and heritage work has been undertaken for planning for the Brunswick and Coburg activity centres.

Yarra City Council recently completed an extensive heritage review[35] to provide support for a an amendment to the Yarra Planning Scheme that is designed to enhance and

[34] Hall, p. 62

[35] Graeme Butler and Associates (2007) supporting Allom Lovell and Associates (1998)

strengthen planning provisions in the City's heritage precincts, and in 2007 exhibited a planning scheme amendment based on this work.

The City of Whittlesea completed a Heritage Study in 1990 which forms the basis of its heritage overlay. In 2003 it began preparation of a heritage sites planning scheme amendment.

Historic Place Protection

International and national significance

Heritage places of national and international significance are protected under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), Commonwealth legislation that provides a national framework for environment protection through a focus on protecting matters of national environmental and heritage significance and on the conservation of Australia's biodiversity.

The National and Commonwealth Heritage Lists were established in January 2004 with an amendment of the EPBC Act. The National Heritage List is a register of places of outstanding Indigenous, historic and/or natural heritage values. The Commonwealth List is a register of important Commonwealth owned places. Heritage places can be on one or both lists. The Australian Heritage Council assesses whether or not a nominated place has heritage values against the relevant criteria and makes a recommendation to the Minister on that basis. No Merri catchment places are on either list.

The Australian Heritage Council also keeps the Register of the National Estate, which since the 2004 amendment to the EPBC Act, affords no legal protection to sites. Prior to 2004 the Australian Heritage Commission was responsible for the Register. Many heritage sites described in Johnston & Ellender are recommended for listing on the Register of the National Estate.

Only one place described in Johnston & Ellender (1993) was assessed as being of National significance – the Westgarthtown Heritage Conservation Area on Edgars Creek in Thomastown. Of the National lists, in 2007 Westgarthtown was only on the Register of the National Estate, and only as an indicative place (meaning that no decision had been made as to whether it should be listed).

Nine other places are registered on the Register of the National Estate, including the Craigieburn to Cooper Street Grasslands (Bababi marning), Dight's Mill, and Pentridge Prison. A further nine are listed as indicative places, and two places recommended to be nominated by Johnston & Ellender are not listed.

No new places are being added to the Register. Other listing options as described below should be pursued for sites previously recommended for the Register which were not registered, as well as for those that were.

State significance

Heritage places of 'state significance' are listed on the Victorian Heritage Register.[36] The Heritage Council of Victoria and the state government agency Heritage Victoria are responsible for maintaining this register and issuing heritage permits for the development of heritage places of state significance under the Heritage Act (1995).

Heritage Victoria also maintains a register of non-Aboriginal archaeological sites confusingly called the Heritage Inventory. Any activities that will result in the excavation or disturbance to an archaeological site on the Inventory, or its objects, must have first obtained the consent of the Executive Director of Heritage Victoria.

A number of sites within the catchment are listed on the Victorian Heritage Register, or have been nominated or recommended for nomination[37]. Sites originally proposed for listing on the Register of the National Estate or which are listed on the Register, together with other sites of at least State significance should be considered for nomination to the Victorian Heritage Register. Of the 18 known places appropriate for the Victorian Heritage Register, in 2007 ten buildings or bridges were listed (see Table 3 below). A number of places are on the Heritage Inventory, although as they are not archaeological sites some may be removed from the inventory.

[36] The Victorian Heritage Register is searchable online at http://vhd.heritage.vic.gov.au/vhd/heritagevic (accessed 7/1/09)
[37] Reports such as Johnston & Ellender (1993) mention the Historic Buildings Register, which became the Victorian Heritage Register.

Code	Place name	Municipality	VHR Status
CB12	Coburg Cemetery	Darebin	Not nominated
NC05	Heidelberg Road Bridge	Darebin /Yarra	Not nominated
WS16	Camoola Homestead etc	Mitchell	Not nominated
CB03	Murray Road bridge	Moreland	Registered H1198
CB06	Newlands Estate	Moreland	Not nominated
CB07	Pentridge	Moreland	Registered H1551
CB04	Newlands Road Bridge	Moreland	Registered H1446
WS04	Farming complex & Ford	Whittlesea	Not nominated
WS07	Westgarthtown Heritage Conservation Area	Whittlesea	Not nominated
WS07c	Westgarthtown Lutheran Church	Whittlesea	Registered H0899
WS07e	Wuchatsch farm	Whittlesea	Registered H0950
WS07f	Graff's Farm	Whittlesea	Registered H0915
WS08	Summerhill homestead & farm complex	Whittlesea	Refused ~1995, re-nominated 2007
	Maltzahn's Farmhouse	Whittlesea	Not nominated
	Siebel's Farmhouse	Whittlesea	Registered H1212
	Ziebell's Farm	Whittlesea	Registered H979
	John Batman's Pastoral run outstation sites	Whittlesea	Not on register, but Inventory Nos. 7822-0295 & 7822-0296
CW01	Dight's Mill Site	Yarra	Registered H1522
FR04	Urban Conservation Area (inc. Old Colonists)	Yarra	Registered H0821

Table 3 – Victorian Heritage Register status of Merri Creek historic places.

Places identified by Johnston & Ellender (1993) or Context (1999) of at least State significance and their status in 2007 with regard to registration on the Victorian Heritage Register

Local significance

Heritage places of 'local significance' (that is, places important to a local community) are usually identified within the local municipal planning scheme and are afforded protection via a Heritage Overlay control. Municipal Councils are responsible for issuing planning permits for the development of heritage places under the Planning and Environment Act (1987).

All Councils within the Merri catchment have heritage overlays in their planning schemes. Many of the heritage places described in Johnston & Ellender are recommended for protection in Councils' planning schemes, however many are not included in the Heritage Overlays (see Table 4 below). An analysis of the themes identified by Johnston & Ellender suggests a bias in planning scheme protection towards housing, residential, educational, penal, German settlement and industrial places which mostly include buildings, and against public works, bluestone quarrying, burial, farming/pastoral, parks/recreation, railways, travel & access and water supply which often do not include buildings (see Table 5 below).

Council	Recommended	Protected
Darebin	12	5
Hume	9	6
Mitchell	2	0
Moreland	18	9
Whittlesea	22	6
Yarra	17	6
TOTAL	80	32

Table 4 – Planning Scheme protection of historic places by municipality.

The number of places recommended for Planning Scheme protection by Johnston & Ellender (1993) and the number actually protected, by Municipality.

Theme	Recommended	Protected
Public Works	2	0
Bluestone Quarrying	5	1
Burial	1	0
Education	1	1
Farming/pastoral	16	3
German Settlement	4	4
Housing/residential	8	7
Industry	2	2
Parks/recreation	12	4, in part
Penal	1	1
Railways	10	4
Settlements	1	0
Travel & Access	12	4
Water supply	4	2

Table 5 – Planning Scheme protection of historic places by theme.

The number of places recommended for Planning Scheme protection by Johnston & Ellender (1993) and the number actually protected, by heritage theme.

Community organisations

The National Trust is a community organisation that works towards preserving and protecting heritage places. The identification and classification of heritage places by the National Trust does not constitute legal recognition of their significance. Although the National Trust plays an important role in advocating heritage protection, it is not responsible for issuing heritage or planning permits. There are many buildings in the catchment which are listed on the National Trust Register, but few if any have a strong relationship with the Creek or its tributaries.

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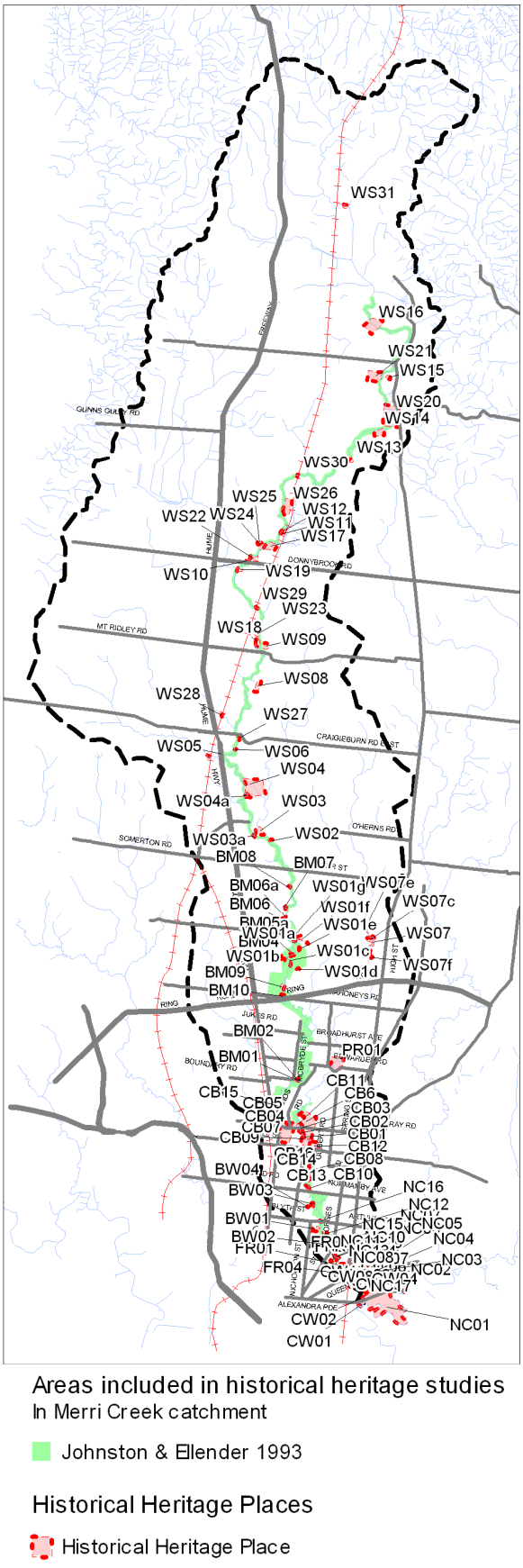

Map 7 - Historical Heritage places identified by Johnston & Ellender (1993)

Historical Heritage Issues

1. Merri Creek upstream from Craigieburn and Merri Creek's tributaries have not been adequately surveyed for historic sites.
2. Historical heritage features along the Merri Creek and its tributaries, apart from buildings, are not well protected under heritage overlays in planning schemes, possibly because often they are not built structures and therefore outside the specialist focus of many heritage consultants, and outside the scope of many heritage project briefs.
3. No heritage places along Merri catchment corridors have been listed or nominated for the National Heritage List, so no places in the corridors have Australian Government protection.
4. There is no guidance as to whether any places should be nominated to the National Heritage List; Merri waterway heritage studies need updating.
5. Appropriate management practices for protection of historic sites have not been consistently implemented or applied along Merri Creek.
6. Since 1993 no further assessment has been made of Heritage places along Merri Creek and its tributaries. Given the amount of work that has been done in other studies a new heritage study for the waterways is needed to consolidate the other studies.
7. All local governments can and should use the HERMES heritage database to store and share information.

Objectives

1. To conserve and enhance those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value. (From the Planning and Environment Act objectives).

Targets

1. All sites identified as being of local or higher significance in Johnston & Ellender protected in Council Heritage overlays by 2010.
2. All sites identified as being of state or higher significance in Johnston & Ellender registered on the Victorian Heritage Register by 2010.
3. Continued identification of sites of heritage significance.
4. Sites are conserved (managed to maintain their heritage features).
5. Sites are not destroyed without a well-considered investigation.
6. Information provided to all land managers, both public and private, regarding locations of significant sites and their responsibilities for protection and management of sites.
7. Interpretation of all sites of significance within a context of ensuring their management and protection.
8. The inclusion of the upper Merri Creek and tributaries as part of heritage reviews.
9. An overall review of Merri Creek historical heritage undertaken by 2012.

Actions

See Section E page 182

Chapter 1.3 Visual Character

State-wide Objectives:

To create urban environments that are of better quality, safer and more functional, provide more open space and an easily recognisable sense of place and cultural identity. (State Planning Policy Framework 12.05)

State-wide strategies (from SPPF 12.05-2):

Requiring development to respond to its context in terms of urban character, cultural heritage, natural features, surrounding landscape and climate.

Ensuring sensitive landscape areas such as the bays and coastlines are protected and that new development does not detract from their natural quality.

Improving the landscape qualities, open space linkages and environmental performance in green wedges and conservation areas and non-urban areas.

Ensuring development does not compromise the Yarra River and Maribyrnong River corridors and other waterways as significant open space, recreation, aesthetic, conservation and tourism assets.

Protecting sites and features of high scientific, nature conservation, biodiversity, heritage, geological or landscape value.

Ensuring development responds to its context and reinforces special characteristics of local environment and place by emphasising the underlying natural landscape character…

Background

The quality of the visual character of the waterway corridors of the Merri catchment is a critical factor in people's interest in using and appreciating the waterways.

Most of the catchment is of volcanic origin and originally comprised sparsely treed or treeless plains, reflected to some extent in the pattern of vegetation in rural parts of the catchment today. These volcanic plains carried Plains Grassland generally dominated by Kangaroo Grass, together with pockets of Plains Grassy Woodland with ancient River Red Gums. These two vegetation communities together with the volcanic cones, stony rises and incised waterways with associated distinctive rock outcrops constitute important elements of the visual character of the catchment. The Silurian foothills which border the upper catchment, and Silurian islands in the basalt plain such as Summer Hill also provide a strong visual element in an otherwise largely flat landscape.

The Hume Growth Areas: Towards Melbourne 2030 report identifies three implications posed by landscape values. They are:

- Key considerations for planning include continued protection of hilltops and ridges, creek corridors and remnant native vegetation and an awareness of catchment boundaries.
- Views from the Hume Highway and other transport corridors are important, since they provide a sequence of visual experiences and an introduction to Melbourne.
- Planning should seek to maintain or enhance landscape qualities, including those of areas to be retained in rural use.

A background study of the visual character of the Merri Creek corridor was conducted by Loder and Bayly in 1993. The study examined eleven landscape character units from Heathcote Junction along the main stem of the Merri to the Yarra and devised themes to improve the visual character.

While visual character is in many ways based upon subjective criteria, factors which can shape perceptions of the visual environment include:

- the extent of preservation of stream geomorphology and valley form (especially visually valuable escarpments and rock outcrops);
- the proximity of nearby development and the extent to which buildings address the creek corridor and are of architectural or historic merit, or are screened by vegetation;
- the presence of indigenous vegetation;
- the extent of intrusion of services (e.g. powerlines) and road crossings;
- intrusion of fill from adjacent development or from dumping;
- exotic vegetation and weed growth cover;
- build up of litter (especially in vegetation) from stormwater and nearby building construction works, and other rubbish (including large items such as car bodies); and
- visible pollution of water bodies.

Clause 22.02 of the City of Hume's and the City of Whittlesea's planning schemes deal with rural visual character. Hilltops, steep slopes and ridgelines are identified for protection from development, along with the patterns of existing vegetation. Views from significant approach roads are also protected. The Mitchell Shire also has hilltop and ridgeline protection.
The City of Whittlesea's clause 22-10 also protects the visual character of a number of River Red Gum areas.

The City of Whittlesea's significant landscape overlay does not apply to the Merri Creek environs - it mainly covers elevated areas in the municipality

The Environmental Significance Overlays (ESO) included in the planning schemes for Darebin, Hume, Moreland, Whittlesea and Yarra include the following objectives for the main stem of the Creek:

- To protect and enhance the natural and visual character of the waterway corridor.
- To ensure that the scenic qualities and visual character of the waterway corridor are not compromised by the inappropriate siting of buildings, the placement of fill, or lack of screening vegetation.
- To restore those sections of the waterway corridor which have been modified to create artificial bed, banks and landforms to a more natural, visually attractive and ecologically diverse landscape.

The tributaries of Merri Creek, significant biodiversity sites adjacent to the tributaries and most of Merri Creek within the Mitchell Shire are not covered by an Environmental Significance Overlay.

In urban areas various other planning scheme provisions also contribute to protecting visual character. For example in Moreland these include clause 21.06-5 Urban Design, Urban Character and Street Landscapes.

Melbourne Water's Merri Creek Waterway Management Activity Plan identifies a number of important visual issues and proposes a number of actions to address these issues.

Planning for the new Merri Creek Park[38] acknowledges the significance of the landscape values of the proposed park area (between the Ring Road and Craigieburn). It identifies roles for parts of the park in protecting and improving visual character, and priority actions to implement these roles.

Overview of Visual Character of Merri Creek

The Loder and Bayly study identified landscape units along the main stem of Merri Creek which are described below. The work assessed views from the Creek assuming that it would be the focus of public use.

However Paths along the Creek often are not immediately adjacent to the Creek and increasingly will be located away from the flood zone for safety reasons. This means that more of the surrounding landscape will be visible from the path than the Loder and Bayly study envisaged.

A detailed landscape analysis has not been carried out along Merri Creek's tributaries, although the Merri Creek Waterway Activity Plan includes short descriptions of the visual character of some of the tributaries (as well as of Merri Creek).

Foothills

The visual character of the Merri Creek corridor varies significantly throughout its length. The main stem of the stream originates in the area between North and South Mountain Roads at Heathcote Junction. There is also a western arm which drains hills immediately to the north of Wallan township via Wallan Creek and Mittagong Creek. Within this unit the stream is contained within fairly steep country of the Great Dividing Range foothills. Pretty Sally, a well known volcanic eruption point, forms the highest point in this area. Loder and Bayly indicated that these foothills form important middle-ground and background views when seen from the Merri Creek.

The Merri Creek and its tributaries also have some steep and partly eroding banks in this vicinity due to the predominantly thin sedimentary soils[39]. Remnants of Herb-rich Foothills Forest of River Red Gums, Narrow-leaved Peppermint, Swamp Gums, Blackwoods and occasional Red Box provide an attractive visual setting, however most of the foothills are cleared.

Hidden Valley is a residential development in this unit, and parts of Wallan Township are located in this unit, with residential and some industrial and business development.

[38] The Proposed New Merri Creek Park Draft Concept Plan February 2006, Parks Victoria Melbourne.

[39] MMBW, 1988

Due to the hilly topography and in some areas denser vegetation the absorptive capability[40] or capacity to absorb visual intrusion (Loder and Bayly, 1993) is medium.

Exotic trees along the waterways through the township of Wallan have largely been removed, through a community-driven project named 'Willows out of Wallan'.

Hernes Swamp/Wallan Floodplain

As the stream falls away from the Great Dividing Range it is contained within the Wallan Floodplain from about the Wallan-Whittlesea Road. Here it has mostly been diverted into a visually unattractive channel constructed for the purpose of protecting the North-Eastern Railway line and draining the once extensive Hernes Swamp.

In places the channel has dense patches of Common Reed and rush. Wallan airfield was developed on the drained Hernes Swamp, because of its flatness. The Wallan Sewage Treatment Plant is sited in Hernes Swamp. Industrial and other development is encroaching on the floodplain which is still largely pasture. Due to the flatness of the broad plain around the Creek and the shallow creek-line, this reach has a low absorptive capability.

Merriang Basalts

Downstream of Hernes Swamp the Creek exits its largest alluvial deposit and enters the area described by Rosengren as the Merriang Basalts (Rosengren, 1993). Lava flows pushed the Creek hard up against the strongly undulating hilly Silurian siltstone and mudstone hills of the upper Plenty River. Once through a short rocky run, it flows in a shallow winding but largely treeless channel as far south as Janna Road (reflecting the extent of the now drained Camoola Swamp).

From Janna Road the Creek heads southwest away from the influence of the Silurian hills and across the undulating terrain of the basalt plain. Fine old River Red Gums line the winding stream between the Merriang Park and Merri Park properties. In places, the 'inner valley' of the Creek is incised five metres below the level of the lava plain which here is a series of subdued stony rises and ridges with a local relief of five to eight metres. The creek is surrounded by pasture, some of which retains elements of the native grasslands characteristic of the plains. Property owners have fenced off and protected many areas of remnant vegetation adjacent to the creek.

The western skyline in this reach is dominated by the Mt Fraser and Bald Hill volcanoes, and the eastern skyline by the steep slopes of the Silurian hills.

From adjacent to Bald Hill the stream channel becomes more strongly defined with the creek flowing in a rocky channel cut into and bounded by lava flows from Bald Hill (Rosengren, 1993).

The North-Eastern Railway Line crosses the Creek south of Bald Hill, and below this point the Creek-side land has been fenced off from grazing, and extensively planted with pines and native trees. To the west, the plain has been divided into strips by dense pine windbreaks.

Due to the flat open nature of pastures, absorptive capability is low. Structures above the escarpment edge are not visible from the Creek if set back far enough.

Donnybrook Road Basalt Plain

From the Donnybrook Mineral Springs Reserve, a privately owned park planted with a mixture of exotic and native trees and shrubs, the creek moves into the Donnybrook Road basalt plain. The Creek is incised into the slightly undulating terrain. Once again there are scattered occurrences of River Red Gums. The North-Eastern Railway line is visually prominent in this reach running in close proximity to the Creek near the Mineral Springs Reserve. There are some dense stands of aquatic vegetation (reeds, rushes and Water Ribbons),in this vicinity.

Downstream of Donnybrook Road the terrain is gently undulating and the stream becomes narrower and the channel deeper with a rocky streambed and basalt escarpments.

Woody Hill to the east is visible on the skyline with its quarrying activities.

The North-Eastern Railway again crosses Merri Creek further downstream below Donnybrook Road. A transmission line also crosses the Creek at the same point.

Due to the very slight topographic variation above the Creek valley and the visually open pastures, absorptive capability in this area is low (Loder and Bayly, 1993).

[40] Absorptive capability describes the degree to which landscape areas can absorb development, depending initially on the topography. Flat open landscapes have low absorptive capability, a deep incised channel with tall escarpments included in parkland would have higher absorptive capability.

Summerhill Road Rapids

At the North-Eastern Railway bridge over Merri Creek the stream exits the Donnybrook Road basalt plain and enters the Summerhill Road rapids (Rosengren, 1993). There is some good quality remnant vegetation in the area around Summerhill Road, where the stream has been noted as having high scenic qualities and a good waterhole (MMBW, 1988; Loder and Bayly, 1993).

The creek remains in a fairly deeply incised valley for its length through this unit to Summer Hill, a high outlier of the Silurian hills to the east. South of Summerhill Road it is flanked on the west by a steep basalt escarpment, and on the east by the slopes of Summer Hill. The topography in this unit is visually interesting, and the creek-bed and escarpments retain some shrubby indigenous vegetation.

Absorptive capability is medium to high, although with the attractive nature of the valley in this stretch structures should be limited (Loder and Bayly, 1993).

Craigieburn North

Adjacent to Summer Hill, the Merri Creek valley widens out and passes under the newly constructed Craigieburn Bypass bridge, and associated batters. This unit is dominated by the bridge and Summer Hill and the brick quarrying operations to the east. Malcolm Creek flows in through bare grazing land from the west just before Craigieburn East Road.

Undulating topography in this unit breaks view lines to structures and allows structures to be less intrusive providing they are carefully sited.

Grasslands

From Craigieburn Road East Merri Creek quickly flows into an incised course. Valley side slopes are uniform and occasionally quite steep. The stream bed is rocky and rock outcrops on the valley edge are common. The Creek banks are sparsely wooded with large old River Red Gums.

Approximately 1.4km south of Craigieburn East Road the Creek swings in close to the Hume Highway at Merri Creek's confluence with Aitken Creek. The Highway confines Aitken Creek to an ugly culvert. The embankment of the Highway constrains the Creek valley here and marks the start of severe visual encroachment on the western side from industrial development and filling, almost continuous from this point to just south of Cooper Street. South of Cooper Street, the western bank abuts the Cooper Street Grasslands Reserve (Bababi marning) which retains the natural landscape character.

South of Craigieburn Road East the Craigieburn Grasslands Reserve (Galgi ngarrk) protects the natural visual qualities of the eastern bank, however views from the Reserve and from the Creek should be protected. These include excellent views to the CBD. Between Cooper Street and Barry Road, land to the east of Merri Creek has been heavily quarried. Most of the quarry holes are now filled, but in any case are protected from view from the Creek by the generally high escarpments. Filling over the edge of the escarpment has led to unsightly weed infestations and modified the form of the Creek banks.

On the west side of the Creek, south from the Cooper Street Grasslands, recent factory development on the old MMBW nightsoil depot has created a negative visual impact from the Creek-side parkland. The Creek itself is incised and to Barry Road is lined by a fairly dense growth of Red Gums.

The absorptive capacity of this section in relation to the creek itself is medium to high due to the well-incised valley form (Loder and Bayly, 1993). However, Loder and Bayly recommended that built structures should be limited to protect the attractive nature of the valley in this reach. As the likely location of the future path in this reach is well above the Creek, the importance of limiting build structures is higher.

Galada Tamboore

Industrial development and filling on the west bank again encroach on the Creek valley for 0.4km south of Barry Road.

At this point the Creek enters a wide bowl known as Galada Tamboore. The site is owned by Melbourne Water which has long term plans to use it to construct the Campbellfield Retarding Basin. Although the Waterway Management Activity Plan (2003) indicated that planning for the retarding basin is imminent, subsequent correspondence from Melbourne Water[41] indicates that it is unlikely that the retarding basin will be required within the next 20 years.

The rocky escarpments of this section are amongst the strongest visual elements of the Creek environment for its whole length. Good

[41] Letter from Grant Wilson to Ray Radford dated 11 July 2006.

views of central Melbourne are to be had from some of the higher points of the escarpments.

Due to the broad opened-out nature of the eastern floodplain, structures will only be able to be absorbed visually when plantings develop.

Campbellfield/Thomastown industrial

Downstream from Galada Tamboore the Creek is wedged between filling associated with the Bolinda Road Tip and industrial development on the east bank. This is a particularly unsightly part of the valley. It passes under the intrusive Mahoneys Road/Metropolitan Ring Road interchange into the established residential suburbs.

Fawkner-Reservoir

In this section, the Merri Creek is quite incised, and the surrounding lands very flat. Rocky basalt escarpments form important visual features.

On the Fawkner (western) bank, development is mostly well set-back from the Creek, having been protected by the now removed freeway reserve. Exceptions to this are at Hare Street and downstream of Imaroo Street. Wide parklands now occupy the ex-freeway land. Some of these parklands remain undeveloped, weedy and unattractive.

On the Reservoir (eastern) bank residential development teeters on the edge of the escarpment above the Creek, often relying on fill to support a flat yard space. Because of the fill, and the lack of space to plant, these visual intrusions are very difficult to treat. South of Lakeside Secondary College, industrial development to the top of the escarpment is highly visible, only sometimes screened with indigenous vegetation. Some particularly unsightly filling has occurred in the vicinity of Edwardes Road. Much of the banks below the industrial area have been unmanaged and weedy. In the last three to four years (to 2008) City of Darebin staff have been treating weeds in this area and have planted out areas to screen some of it. These areas has received extensive works and will continue to do so.

Adjacent to Parker Reserve the creek flows through an aisle of mature weeping willows and other exotic trees, which are the target of a Melbourne Water woody weed control program.

Darebin Council has put a large effort over the last five years (to 2008) to improve the aesthetics of Edgars Creek in Reservoir through weed control and planting. There is still some way to go to improve the visual character of Edgars Creek.

Coburg Lake-Heidelberg Road

Downstream of McMahons Road, parkland again starts to line the Creek, at first on the east bank, and then south of Carr Street on both banks.

The Creek then enters the formal heritage landscape of Lake Reserve in Coburg. Coburg Lake is an artificial lake formed in the old bluestone quarry operated by the Pentridge Prison, some of the walls of which are still visible to the south.

Downstream of Coburg Lake the valley is characterised by relatively well maintained parkland along one or both banks, often with indigenous plantings established in the last few decades. Low density residential development encroaches to within metres of the Creek in places (e.g. just south of Bell Street, in the vicinity of The Grove and Albion Streets). High density multi-storey developments such as at Moore Street and Harrison Street have in the last decade begun to have significant visual impacts on the parkland.

Downstream of Cunningham Street Northcote, exotic trees dominate the Creek banks within a deeply incised valley. Revegetation projects begun during the 90's continue to create a more natural visual landscape character from Merri Primary School to High Street, particularly on the Creek's western bank.

Rocky escarpments between Westgarth Street and Heidelberg Road form important visual features representing the basalt geology of the Creek. On the west side filling to create the Knott Athletics Field has left an unsightly high rubble bank above the Creek.

Heidelberg Road to the Yarra River

Past the gracious bluestone arches of the Heidelberg Road Bridge, the parkland opens out with Yarra Bend Park on the east, atop a high and mostly poorly vegetated basalt escarpment, and Hall Reserve on the west. This reach is well protected by the parkland from visual intrusion, with the exception of the high and noisy Eastern Freeway that crosses Merri Creek before its confluence with the Yarra River. The unsightliness of this crossing is increased by the outfalls of major drains below the freeway, often tainted by unpleasant looking discharges. The freeway unfortunately creates a major visual barrier between the parklands along the Yarra and the Merri Creek Parklands.

Visual Character – Rural Reaches

In many of the rural reaches of the Creek the predominant land use is grazing. Usually the Creeks are fully accessible to grazing stock, leading to deterioration of the water quality and the bank vegetation. Fencing off the stream banks would do much to improve the visual quality of the valley.

Parts of the City of Whittlesea and Mitchell Shire outside the Merri catchment are protected by Significant Landscape Overlays. However there are no Significant Landscape Overlays in the Merri Creek catchment. These overlays could be used to protect significant landscape elements such as the volcanoes, and important stretches of waterways.

Visual Character - Urban Reaches

Many of the urbanised sections of the creek have been drastically altered through modification of the watercourse to increase its capacity. Trapezoidal channels have been created in these sections and many meanders straightened. There has been a loss of stream morphology as well as the loss of floodplains through the filling of lower lying lands. In many situations, opportunities for improvement of the visual environment are few and amelioration of views will only be possible through the use of screening vegetation.

On the other hand some urban sections of the Merri Creek and its tributaries retain fine examples of basalt escarpments and rocky creek-beds typical of the natural stream.

Within the urban reaches of the creek, until recently, there have been few developments which have sought to address the waterway and its open space. A recent example which does address the Creek is the high density development at Moore Street Coburg. Such developments which take advantage of decades of work to create a more natural visual character of the Creek, but themselves destroy that visual character.

An excellent example of a development which both takes advantage of the visual character and respects it is the Aboriginal Community Elders Service at Parkview Avenue in Brunswick.

Older developments have generally not sought to take advantage of the creek setting through the use of boulevard roads within subdivisions. The Esplanade in Clifton Hill is one exception from a much earlier era of urban planning. The Newlands Estate in Coburg North is another example – one of the reasons for its heritage value is that it takes the Creek into account.

Elements worthy of particular attention in the urban reaches include:

(i) Outfall Drains

Outfall drains have been a strong element of visual degradation within urban waterway environments. There are numerous local Council drains entering Merri Creek as well as Melbourne Water Main Drains.

Design guidelines and ameliorative work should ensure the outfalls are made as visually attractive as possible. (See also section 3)

ii) Powerlines

In the past, waterway corridors were selected as appropriate locations for the installation of electricity infrastructure. There are many powerlines in the Merri Creek valley, the most prominent being the high voltage transmission line between Thomastown and the Brunswick Terminal Station. This line is a major visual intrusion to the waterway environment.

There are also a number of lower voltage lines crossing open space areas in the lower catchment. Assistance for their relocation or undergrounding can be sought from the Department of Infrastructure's Powerline Relocation Scheme.

In order to provide for maintenance and public safety, powerline operators are required to maintain the easement associated with their lines. The methods used can have considerable impacts on the visual character of the Merri Creek and its open space. In the past there has been criticism of the extent of vegetation pruning undertaken to achieve these ends. Better coordination of powerline managers' needs with those of the community has been achieved recently and are important for effective development of compatible vegetation along the stream.

(iii) Industrial Developments, Fill and Rubbish

For users of the Merri Path, the intrusion of visual influences from external sources is most apparent within foreground views (Context Pty. Ltd. and Loder and Bayly, 1993). This is especially so where the creek valley is enclosed as a result of the waterway's incision and industrial development has occurred close to the break of slope.

Within the urban reaches of the Creek this applies most particularly to areas of Reservoir. While there have been some positive results from requirements placed on developers to provide screening vegetation (e.g. downstream of Zinnia Street to Australia Post and other factories), there are also many industrial areas in Reservoir which continue to provide an intrusive presence. These especially include the areas below Broadhurst Avenue to Brex Court and again around Edwardes Street.

Beyond the current reach of the Merri Path (but within proposed extensions of it) Campbellfield, Somerton and Craigieburn provide examples of industrial developments and filling which severely intrude into the visual environment of Merri Creek. The worst examples include at Sarah Street Campbellfield and just south of Aitken Creek's confluence with Merri Creek in Craigieburn.

Recent industrial development in outer urban reaches (for example at Frog Ct Craigieburn) has been set back further from the Creek, providing more opportunity for screening, however the height of some of the buildings involved means that screening will only ever be partial.

Visual intrusion and degradation is not confined to industrial developments. The dumping of rubbish and fill within the waterway's open space and on batters adjacent to the break of the valley slope has in places along the Creek created eyesores(for example the Edwardes Street Reservoir "promontory".

The dumping of car bodies and other rubbish is a further source of significant visual degradation of the stream environment. Persistent problems of dumping of cars over the escarpment at Galada Tamboore have reduced in recent years as fencing has been improved and the parkland has been maintained, however the problem is moving north as the urban fringe itself moves outwards.

(iv) Housing and Urban Design

Housing subdivisions perched right at the top of creek escarpments are one of the most significant sources of visual degradation of the urban reaches of Merri Creek and its tributaries. Some of the worst examples of this are between Mahoneys Road and B. T. Connor Reserve on the Reservoir side of Merri Creek, and either side of Aitken Creek west of the North-Eastern (Sydney) Railway Line. In these areas the housing subdivision has been designed in a manner unsympathetic to the preservation of the visual character of the waterway. In some instances the limited amount of public land available between back fences and the Creek will significantly constrain (or even deny), opportunities to provide screening vegetation.

Downstream of Coburg Lake the incidence of visual intrusion from housing and industry is now surprisingly limited for an urban stream. There are often limited opportunities to remedy remaining unattractive views from housing and back fences (e.g. downstream of Bell Street - both sides of stream - and Holden Street). On the other hand, there have also been positive results such as the vegetative screening of the factories downstream of Beavers Road.

Housing outcomes should be encouraged which involve sensitive renovation and redevelopment of housing sites so they interface with the creek in a sensitive and contextually appropriate manner. There have been some good recent examples of this for example renovations maximising views of the creek in a sensitive manner, thus increasing perceptions of safety. Poor examples include high density housing developments and approvals at Moore Street Coburg, and Harrison Street East Brunswick.

(v) Encroachments

Encroachments beyond the back fence of adjacent properties occurs in Fawkner and occasionally elsewhere. These encroachments are often unsightly, and may lead to risk of adverse possession claims[42].

(vi) Litter and pollution

Litter and pollution are discussed in depth in section 3 of this strategy, but it is worth noting here that pollution and litter were identified in community consultations in 1993 (see chapter 4.1) as the two most important issues needing improvement. Downstream of the Ring Road, litter is still a very important detractor from the visual amenity of the Merri Creek, and is also an issue on the urban tributaries.

(vii) Exotic vegetation

Exotic trees along waterways are valued highly by some members of the community, largely for their visual qualities. However they are rarely consistent with improving conservation and habitat values. In some areas e.g. Lake Reserve Coburg, exotic trees are protected through the identification of a section of the park as Heritage Parkland in Moreland's Open

[42] Adverse possession claims against Crown Land, most road reserves or 'Council land', however under the Limitations of Actions Act this is narrowly defined; Council must be listed on title. This can be problematic where for example transfer of ownership to Council has been delayed.

Space Strategy. Much of the rest of the Creek-side parkland is identified in the Moreland Open Space Strategy as either Conservation Parkland, or Habitat, where indigenous vegetation is identified as the appropriate planting treatment. Explicitly categorising the open space appears to be a good way to manage this issue.

Melbourne Water has an active program to remove woody weeds. Where exotic vegetation is to be removed it is important that large areas are not cleared simultaneously, and that the community is made aware in advance that the exotic vegetation is to be replaced by indigenous vegetation. Otherwise community concern at the loss of visual amenity would be understandable.

(viii) Graffiti

Many of the bridges in the urban area are covered by spray painted or felt pen graffiti. Much signage is also affected. Such graffiti is often visually unattractive, and certainly detracts from signage functionality. High Priority should be given to graffiti removal where the graffiti includes obscene language or where it creates a safety issue, or affects the functionality of signage.

Removal of graffiti can lead to water pollution if the chemicals used find their way into the waterway. Care must be taken to avoid this, or if unavoidable, the graffiti should not be removed, or maybe painted over instead.

(ix) Art installations

The Merri Creek Arts Plan was commissioned by MCMC and Moreland City Council in 1995. It is the only targeted investigation of the commissioning of arts along waterways in the catchment. It identified the following key principles for art along Merri Creek:

- Artworks should express the local distinctiveness of the Merri Creek and its environment and community
- Artworks should not be confined to stand-alone commissioned works. Artworks must also contribute aesthetic solutions to functional requirements such as seating, amenities, paths, playgrounds and signage
- Wurundjeri culture and presence is a significant defining feature of the Merri Creek heritage. Artworks reflecting Aboriginal heritage should celebrate local Wurundjeri themes. The Wurundjeri community should be involved in the development of these artworks.
- Where possible, artworks should utilise local materials drawn from the creek valley.
- It is desirable that artworks reflect and/or involve various community groups with an interest in the creek.
- Water should be a significant source of inspiration for artworks.
- The commissioning and construction of artworks should where possible contribute to a local arts economy.
- Artworks should be placed at sites along the creek where they will expand and diversify people's experience of the natural environment.

A number of art works, primarily sculptural, have been installed on the Merri Creek downstream of Mahoneys Road. Such installations should be approved only if they are sensitive to both the natural landscape character as well as the cultural character of the creek parklands.

(x) Views into the valley from bridges and travel routes

Thousands of people view the Creek every day from the rail and road bridges which cross it. These views should be protected, and higher priority given to management of these areas for their appearance. Bridges themselves have a major visual impact on the creek valley.

Future Prospects

In the future, as urban development extends north beyond the current limits of Craigieburn, there will be opportunities to ensure that development is planned in a manner more sympathetic to the waterways' visual environment. The use of boulevard roads (roads abutting the waterway parklands) and other strategies to have development address the waterways should be equally applied to both new residential and industrial development. An approach which considers industrial areas to be less important and, in any case, inherently unattractive, is counter-productive to achieving positive outcomes for protection of the waterway corridor. Experience of recent years along the lower Yarra has shown that industrial development along waterways can sympathetically address the stream.

In the upper reaches of the catchment, urban development poses an opportunity to create public open space along the waterways, which are currently mostly in private ownership.

The Development Guidelines for Merri Creek contain a number of provisions to improve outcomes for the visual environment of Merri Creek and its tributaries. The Guidelines may be enforced through the planning permit/

planning scheme amendment process in those parts of the Merri waterways covered by the Merri Creek Environmental Significance Overlay.

Melbourne Water's Merri Creek Waterway Management Activity Plan Final Draft 2003 (WMAP) contains a number of actions which aim to help to protect/enhance visual character. These include:

- enhancing rock riffles and the pool and run structure of the waterways;
- exotic tree/woody weed removal programs;
- noting of sites of geological significance.

However the Merri Creek WMAP does not incorporate actions to improve the visual amenity of key Melbourne Water drains, or to require the use of basaltic rocks in landscaping.

Key References

Australian Heritage Commission *Australian Natural Heritage Charter for the conservation of places of natural heritage significance* http://www.ahc.gov.au/publications/anhc/index.html

Hume Committee for Smart Growth, *Hume Growth Area: Towards Melbourne 2030 – Final Report*, Department of Sustainability and Environment 2005.

Loder and Bayly (1993), *Visual Analysis Report*, prepared for Melbourne Water and Merri Creek Management Committee, Melbourne.

Melbourne and Metropolitan Board of Works (1988), *Waterways Inventory Merri Creek*, MMBW Melbourne.

Melbourne Water, (2003) Merri Creek Waterway Management Activity Plan Final Draft 2003.

Merri Creek Management Committee, *Understanding planning issues along the Merri Creek and Policy: Development Guidelines for the Merri Creek,* MCMC 20 May 2004.

Rosengren, N. (1993), *Soils Study*, prepared for Melbourne Water and Merri Creek Management Committee, Melbourne.

SPPF 12-05 is the State Planning and Policy Framework which forms a part of all planning schemes in Victoria. http://www.dse.vic.gov.au/planningschemes/

Visual Character Issues

1. Older residential and industrial development which abuts waterways in the catchment is often intrusive and at times dominates the visual environment.
2. Despite a strong emphasis in the Merri Creek Environmental Significance Overlay and the Merri Creek Development Guidelines on protecting the visual character of the Merri Creek and its tributaries, visually intrusive developments are still being approved.
3. Significant sections of the waterway corridors are not covered by the Environmental Significance Overlay and therefore the Merri Creek Development Guidelines.
4. Screening treatments using indigenous plants are needed in some locations to provide important improvements to the visual environment, although good siting and contextually responsive design in the first place is preferable to camouflaging poor built outcomes.
5. Infrastructure management needs and vegetative screening needs can be in conflict. Vegetation screen design needs to take into account the needs of infrastructure and services.
6. There is a tension between the objectives of screening plantings (to screen and to imitate original vegetation types), and the sometimes identified need for "filtered views" or overlooking for improved perceptions of safety.
7. Buildings and bridges taller than mature canopy or located right at the top of steep escarpments can only be partially screened by plantings.
8. Some elements of the landscape (e.g. geological outcrops and natural valley form) which contribute to the visual amenity of the waterway corridors are not well protected. Improved levels of protection may help preserve these elements.
9. The use of waterway corridors by service utilities has often caused visual degradation of the corridor. This is particularly so with the numerous powerlines in the valley. Opportunities for removal or undergrounding of powerlines need to be pursued.
10. Many outfall drains are visually unattractive with design dominated by functional criteria.
11. Works to improve the water quality of the creeks, such as water-sensitive urban design projects and litter traps, need to also improve the visual landscape of the corridor.
12. Exotic vegetation can contribute to a mixed landscape valued by some members of the community. The Merri Creek's value and potential as a habitat corridor obliges management to restore and/or establish indigenous plant communities thereby contributing to a more natural visual character though some prefer exotic landscapes.
13. Excessively large stretches of woody weed removal can be detrimental to visual character.
14. The wide open plains in parts of the catchment make it difficult to preserve visual amenity, but combinations of adequate setbacks and screening vegetation can help.

15. Visual arts can contribute visual interest to the Creek valleys, but depending on their design, may detract from the visual amenity.
16. Litter and pollution are important detriments to visual amenity.
17. The location and design of bridges, paths, visitor facilities, etc can have detrimental impacts on visual amenity.
18. The visual amenity of Merri Creek's tributaries was not assessed in the 1993 Loder and Bayly report.
19. Graffiti on signs and infrastructure along waterways can be unsightly but sometimes also obscene and hazardous. Little effort is currently put into graffiti management.
20. Graffiti removal can cause water pollution if the chemicals used get into the waterway.

Objectives

The following objectives have been adopted from the State Planning Policy Framework (SPPF), or from the Merri Creek Environmental Significance Overlay (ESO). Whilst as part of the ESO they do not apply to waterway corridors not covered by the ESO, their use here implies they should be.

1. To protect and enhance the natural and visual character of the waterway corridors. (from ESO)
2. To protect sites and features of high landscape value (from SPPF 12.05-2)
3. To ensure development responds to its context and reinforces special characteristics of local environment and place by emphasising the underlying natural landscape character (from SPPF 12.05-2).
4. To create a peaceful, passive open space quality in the creek parkland and valley. (from ESO)

Targets

1. To provide for links, views and access from surrounding areas to the creek and open space. (from ESO)
2. To ensure that the scenic qualities and visual character of the waterway corridors are not compromised by the inappropriate siting of buildings, the placement of fill, or lack of screening vegetation. (from ESO)
3. To restore those sections of the waterway corridors which have been modified to create artificial bed, banks and landforms to a more natural, visually attractive and ecologically diverse landscape. (from ESO)
4. To ensure that the natural and visual character of the waterway corridors is not compromised by the siting or design of infrastructure such as drain outfalls, paths, bridges, or powerlines.
5. To strengthen the connection of private gardens and streetscapes adjacent to catchment waterways to the underlying natural landscape character.
6. To protect and enhance stream geomorphology, the valley form and key natural landscape features such as gorges, escarpments and stands of remnant vegetation especially River Red Gums.
7. To refine and document what the underlying natural landscape character of Merri Creek and its tributaries is, what extant features contribute to it, identify sites and features of high landscape value and how these values can be best be protected and enhanced, through a new landscape study covering all the main waterway corridors of the catchment.
8. The natural and visual character of Merri Creek and all major tributaries is protected by an Environmental Significance Overlay (as well as other provisions) in the relevant Council's planning schemes by 2010.
9. To ensure the design of buildings protects and enhances the natural landscape character by making available Development Guidelines relating to all waterway corridors in the catchment, based on the Development Guidelines for the Merri Creek.
10. All new developments within the ESO comply with the Development Guidelines and the objectives of the ESO.
11. To minimize litter build-ups in the catchment. (refer chapter 3.2)
12. Illegal filling and rubbish dumping is detected promptly, prevented from continuing and fill and rubbish is removed.
13. The incidence of illegal dumping is reduced and illegal filling is stopped completely by 2010.
14. To encourage the use of appropriate local native plants (i.e. indigenous plants).
15. Vegetation management and well-designed screening vegetation which enhances the visual environment of the corridor and protects views for creek users, while being sensitive to the need for an active interface with adjoining residential areas.
16. Screening vegetation using indigenous species is designed and planted at priority sites to reduce the impacts from adverse visual intrusion into the creek valley by existing developments by 2010.
17. Escarpments and rocky outcrops are managed as features and restored through

integrated weed control and rubbish removal, and any risk management of such features considers the value of the feature itself prior to applying major changes to the visual character of that feature.

18. In-stream rock riffles are reintroduced or allowed to re-establish themselves in areas where stream morphology has been lost.
19. All new outfall drains demonstrate sensitive design emphasising use of natural rock or other visually pleasing elements, as well as incorporating necessary drainage and stormwater treatments. Ugly existing drains are improved over time.
20. Basaltic rocks are used in landscaping where there are opportunities to emphasise the underlying natural landscape character of the creek corridor.
21. All areas undergoing a weed removal program including willow removal are revegetated with indigenous species (with the exception of Heritage Parkland areas).
22. Obscene or unsafe graffiti is removed promptly, and graffiti on signage is removed within 3 months, unless removal would unavoidably cause water pollution.
23. Where artworks are to be installed along the creek corridors, they are sensitive to both the natural landscape character as well as the cultural character of the creek parklands.

Actions

See Section E page 184.

SECTION 2 - NATURAL HERITAGE AND LAND MANAGEMENT

Introduction

This section gives an overview of the terrestrial issues related to the protection and management of biodiversity, geodiversity and open space values associated with the Merri catchment waterways. It also discusses land management issues and parkland development.

Chapter 2.1 looks at biodiversity[43] in the catchment. It discusses regional objectives and targets for native vegetation, habitats, species and habitat linkages.

Chapter 2.2 discusses the geodiversity[44] of the catchment (that is the geological, geomorphological and soil values),

Chapter 2.3 discusses land management issues including pest plant and animal management, salinity and erosion management.

Chapters 2.4-2.6 focus on management of broad reaches of the Merri Creek Corridor to meet objectives discussed in earlier chapters. The three reaches have been segregated on the basis of the common land use and open space issues which arise in each of them. The reaches are summarised below.

Very significant biodiversity values are present along Merri catchment waterways and their adjoining lands. It is an objective of this Strategy to seek the development, as far as possible, of continuous habitat along the stream corridors principally through a variety of vegetation management means, including revegetation

To provide for long-term protection for the total range of flora and fauna found within the waterway corridors, actions on private land which enhance biodiversity values will also need to be encouraged. This is especially necessary in a context where extensive areas of native grassland can still be found on farming lands in the corridors.

The three main reaches of the creek examined in chapters 2.4-2.6 are:

2.4 Headwaters to Donnybrook Road

This reach comprises mainly rural land with some urban development around Wallan and Beveridge. There are many important sites of biodiversity and geodiversity significance and a number of populations of endangered flora and fauna species.

2.5 Donnybrook Road to Mahoneys Road

This reach covers key parts of the middle to lower catchment and includes grassland and grassy woodland remnants at Craigieburn (including on the Malcolm, Aitken and Edgars Creeks), Campbellfield and Thomastown.

2.6 Mahoneys Road to the Yarra

Within this urban reach there are already identifiable and established open space or public use zones along most of the waterway corridors. The issues in this reach relate to the management of these areas, and to the consolidation of open space along the corridors.

However, there are a small number of sites with significant biodiversity and/or geodiversity values (e.g. Jukes Road grassland) and a large number of often isolated pockets of indigenous remnant plants which are valuable remnants of the original basalt plains grassland flora.

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[43] Biodiversity is defined in the Australian Natural Heritage Charter as meaning the variability among living organisms from all sources (including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part) and includes diversity within and between species and the diversity of ecosystems.

[44] Geodiversity is defined in the Australian Natural Heritage Charter as meaning the natural range (diversity) of geological (bedrock), geomorphological (landform) and soil features, assemblages, systems and processes. Geodiversity includes evidence of the past life, ecosystems and environments in the history of the earth as well as a range of atmospheric, hydrological and biological processes currently acting on rocks, landforms and soils.

Chapter 2.1 Biodiversity and habitat networks

Port Phillip and Western Port Catchment Management Strategy

Biodiversity Objectives

BO1 Achieve a net gain in the quantity and quality of indigenous vegetation

BO2 Maintain the diversity of indigenous habitats and species in terrestrial, aquatic and marine environments

BO3 Achieve sustainable populations of indigenous flora and fauna species

BO4 Improve the connectivity and long-term security of indigenous habitats and species

BO5 Encourage intelligent use of introduced flora and fauna species with minimal impacts on indigenous habitats and species.

Relevant biodiversity targets

BT1 The total extent of indigenous vegetation increased to at least 35% of the region by 2030

BT2 At least 95% of the region's ecological vegetation classes represented to at least 10% of their pre 1750 extent by 2030

BT3 A net gain in the quality and extent of native vegetation in the region with the total "habitat hectares" increased by 10% by 2030

BT4 All Ecological Vegetation Classes in the region to have at least 15% of their current extent protected by 2030

BT5 Reduce the number of threatened flora species to less than 250 by 2030 and reduce the number of threatened fauna species to less than 100 by 2030, with no further regional extinctions

BT6 Increase the connections between the region's fragments of native vegetation

BT7 Increase the diversity of native species in modified landscapes and aquatic systems

BT9 No human-induced reduction in species diversity for the freshwater, estuarine and marine environments of the region.

Bioregions

Almost all of the Merri catchment falls within the Victorian Volcanic Plain Bioregion (see Map 8). The ridge to the north and west of the catchment is in the Central Victorian Uplands Bioregion, and the ridge to the east, forming the boundary with the Plenty catchment, is in the Highlands Southern Fall Bioregion.

Victorian Volcanic Plain Bioregion

Eighty-four percent of the Merri catchment falls within the Victorian Volcanic Plain Bioregion, which is dominated by Newer Volcanic deposits[45]. These form an extensive flat to undulating basaltic plain with stony rises (edges of old lava flows), numerous volcanic cones and old eruption points. The soils of the bioregion are variable ranging from red friable earths in drier areas to the west, to grey cracking clays in the Merri catchment. They support Plains Grassy Woodland, Plains Grassland, Stony Knoll Shrubland, and Plains Grassy Wetland ecosystems. Along the waterways a range of riparian and aquatic ecosystems occur.

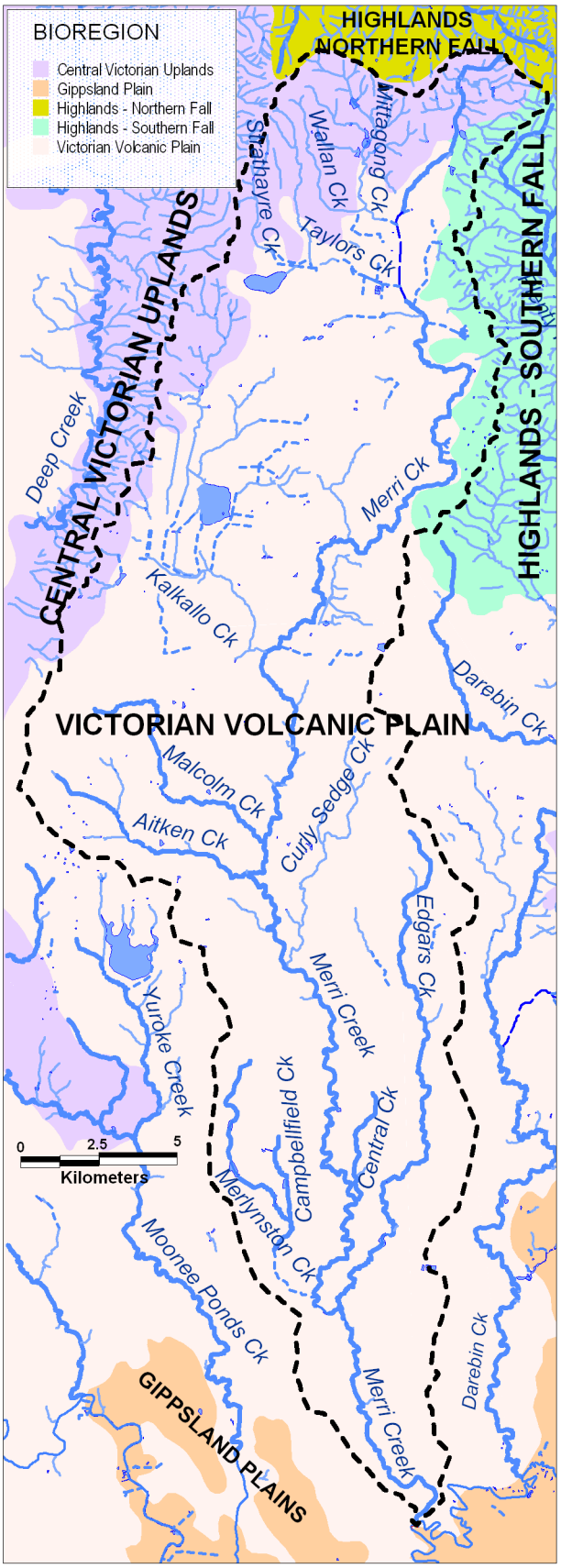
Central Victorian Uplands Bioregion

Twelve percent of the Merri catchment falls within the Central Victorian Uplands Bioregion. Within the Merri Catchment the bioregion is characterised by siltstone and sandstone bedrock and supports Grassy Woodland, Valley Grassy Forest, Grassy Dry Forest, Herb-Rich Foothill Forest and Herb-rich Foothill Forest/Shrubby Forest Complex[46]. This bioregion occupies the north-western slopes of the Merri catchment.

Highlands Southern Fall Bioregion

Four percent of the Merri catchment falls within the Highlands Southern Fall Bioregion. Within the Merri Catchment this bioregion is also characterised by siltstone and sandstone bedrock and supports Valley Grassy Forest, Grassy Woodland and Grassy Dry Forest[47]. This bioregion forms the north-eastern slopes of the catchment.

[45] From the Cainozoic era
[46] From 1750 EVC mapping on the web
[47] From 1750 EVC mapping on the web



Map 8 - Bioregions of the Merri catchment

Biodiversity Planning

Victoria's Native Vegetation Framework

Native Vegetation Management: A Framework for action (the Framework) was released in 2002. It was developed to implement the objectives of Victoria's Biodiversity Strategy and the National Strategy for the Conservation of Australia's Biological Diversity.

'The Framework' is the State Government's strategy to protect, enhance and revegetate Victoria's native vegetation. Its main goal is *to achieve a reversal, across the entire landscape of the long-term decline in the extent and quality of native vegetation, leading to a* ***net gain***.

Net gain is where overall gains in native vegetation are greater than overall losses and where individual losses are avoided where possible.

In applying the policy, there are three key steps for land managers and owners to address when considering vegetation clearing:

1. **Avoid** adverse impacts, particularly through vegetation clearance;
2. If impacts cannot be avoided, **minimise** impacts by careful planning, design and management; and
3. If clearing must occur, the clearing must be **offset**.

The Framework has been incorporated into the State level provisions of planning schemes. A planning permit is required to remove native vegetation. A number of practice notes have been published by DSE to clarify the process[48].

Most concern for native vegetation is focused on clearing, but maintaining good quality native vegetation is just as important for conserving plants and animals and for maintaining our land in good condition. DSE has developed a standard approach for estimating the quality of an area of vegetation. Known as **habitat hectares**, it measures a site's condition and landscape context.

Regional Catchment Strategy

The Port Phillip and Western Port Regional Catchment Strategy identifies many objectives and targets which apply to the Merri catchment. They are listed above. The Port Phillip and Western Port Region is quite diverse with some sections almost completely covered in forest,

[48] Available on DSE website www.dse.vic.gov.au/planning

and others, particularly in the Victorian Volcanic Plain and Gippsland Plain Bioregions largely cleared of native vegetation.

A number of plans sit beneath the Regional Catchment Strategy including the Port Phillip and Western Port Native Vegetation Plan(2006).

The plan maps the original and current extent of native vegetation across the region and identifies four strategic directions:

1. Retain the quantity of native vegetation by minimising clearing
2. Protect native vegetation with reservation and management agreements
3. Maintain and improve the quality of native vegetation; and
4. Increase the quantity of native vegetation

The Native Vegetation Plan identifies Vegetation Protection Priority EVCs for retention, reservation, restoration and revegetation. (see Map 9). It also identifies a number of resource condition targets and management action targets which focus the Regional Catchment Strategy targets to the shorter term – i.e. 2015.

The resource condition targets are as follows:

RCT1. Achieve a net gain for all permissible clearing.

RCT2. At least 1.5ha of each Vegetation Protection Priority EVC or 15% of its 2004 extent (whichever is the greater) to be permanently protected in reserves or under management agreements on private land by 2015.

RCT3. Improve the quality of the region's very high conservation significance remnants to achieve a total of 10% increase in Habitat Hectares for these remnants by 2015.

RCT4. At least 95% of the region's EVCs represented to at least 5% of their pre-1750 extent by 2015.

Appendix 3 of the plan sets out new offset requirements for the planning scheme when applications to clear native vegetation are approved by planning authorities.

Biodiversity Action Planning - Landscape Plan for Craigieburn Zone

The Department of Sustainability and Environment has commenced landscape zone planning for biodiversity across the state, based on bioregions within CMA areas. In 2003 they published the Landscape Plan for the Craigieburn Zone – Victorian Volcanic Plain Bioregion (Ross et al 2003), which includes all of the Merri Catchment within the Victorian Volcanic Plain Bioregion – that is 84% of the catchment[49]. Landscape plans for the balance of the catchment, have not been released.

The Craigieburn Zone Landscape Plan provides a good regional overview of the planning and management of native biodiversity. The report summarises the remaining biodiversity assets across all land tenures, and identifies priorities for conservation and restoration of biodiversity. Mechanisms for more efficiently conserving the bioregion's key biodiversity assets, including threatened vegetation communities, threatened taxa, wetlands and rivers are identified to provide the basis for further biodiversity planning at increasingly finer scales. It identifies priorities, but does not set targets. It puts much more emphasis on the protection and restoration of habitat on private and public land than on revegetation.

The Plan identifies that the focus of biodiversity management should be to:

1. Protect habitat for threatened flora and fauna within reserves and encourage complementary management of habitat on adjoining private land.
2. Protect and enhance large areas of native vegetation on private land through incentives, purchase, covenants or land management agreements.
3. Protect and enhance areas supporting endangered EVCs and threatened species on public and private land.
4. Develop conservation agreements to protect areas supporting threatened EVCs and threatened species on public land.
5. Protect, enhance and restore riverine corridors especially the Jacksons Creek, Maribyrnong River, Merri Creek and Darebin Creek.
6. Implement Recovery Plans and Action Statements for threatened species and communities on public and private land.
7. Develop a Conservation Management Network for the Merri Creek Valley to protect and manage grassland, woodland, riverine and wetland conservation values.

Merriang Local Area Biodiversity Action Plan

As part of the biodiversity action planning process a Local Area Biodiversity Action Plan

[49] The Craigieburn Zone also includes considerable areas beyond the Merri Catchment.

for the Merriang area has been prepared by Department of Sustainability and Environment together with the Merriang and District Landcare Group. The Merriang area is on the basalt plain north from Donnybrook Road to Beveridge Road and east from the Hume Freeway to Epping-Kilmore Road.

The plan area includes 41 rural properties owned by 22 landholders. It aims to promote a coordinated approach to conserve the systems that maintain biodiversity across 5000 hectares of farmland in the district. The plan identifies on-ground management actions at the specific property level as well as for the local area.

Other parts of the catchment are not covered by local area biodiversity plans.

Council Natural Heritage/Biodiversity Strategies

Darebin City Council

A Biodiversity Strategy is under development as part of Darebin Council's Heritage Study which commenced in 2007. The Strategy will review related policies to identify gaps and develop new actions. The Strategy is based on a review (O'Malley and Kern 2004) which discussed biodiversity issues in the municipality and documented sites with biodiversity values.

Hume City Council

Hume City Council's Natural Heritage Strategy (2006) canvasses many of the biodiversity issues raised in the Regional Catchment Strategy and the Australian Natural Heritage Charter, and applies them broadly to the City of Hume. The Strategy addresses four key themes: Geology and Geomorphology, Indigenous vegetation, Native Fauna, and Waterways, Creeks and Valleys.

It includes 150 actions towards conservation and management of natural heritage. Many of the approaches suggested in the Strategy apply to the Merri catchment.

Mitchell Shire

The Mitchell Shire's Environment Strategy discusses the strategic context of Environment for the Shire and lists actions under the headings Land, Water, Air and Community. The Strategy has undergone its second review which was adopted in July 2008.

Moreland City Council

Moreland's Open Space Strategy identifies the need for a Biodiversity Strategy, although preparation of the strategy has not yet commenced.

Whittlesea City Council

Whittlesea's Local Conservation Strategy 2000 includes a section on flora and fauna which needs updating in the light of the Regional Catchment Strategy and the Regional Native Vegetation Plan. A new Local Sustainability Strategy is in preparation which will supersede the Local Conservation Strategy 2000. An extensive consultation process will be undertaken to inform key directions and actions. The strategy will be developed over a 12 month period, with a draft anticipated by August 2009. Biodiversity planning is a recognised gap and will be a key priority in the new strategy.

Council is also in the process of developing a Green Wedge Management Plan in consultation with the local community and stakeholders. A key objective of this plan will be the long term sustainability of the natural values of our rural areas. A draft Green Wedge Management Plan is likely to be release mid to late 2009.

Yarra City Council

The Yarra Environment Strategy 2000 foreshadows the preparation of a natural Heritage Strategy and Action Plan in 3 stages. The first 2 stages are complete, including desktop and field studies reporting on the significance and condition of Yarra's flora, fauna, geology and geomorphology. The third stage is the preparation of the Natural Heritage Strategy and Action Plan.

The Strategy is to cover:
- habitat restoration works including the development of wildlife corridors;
- development and implementation of management plans for vegetation on Council owned land;
- management of the threats to Yarra's biodiversity and
- the long-term monitoring of different elements of Yarra's biodiversity (vegetation, species distribution etc) and program effectiveness.

The City of Yarra commenced preparation of a new Environment Strategy in 2007.

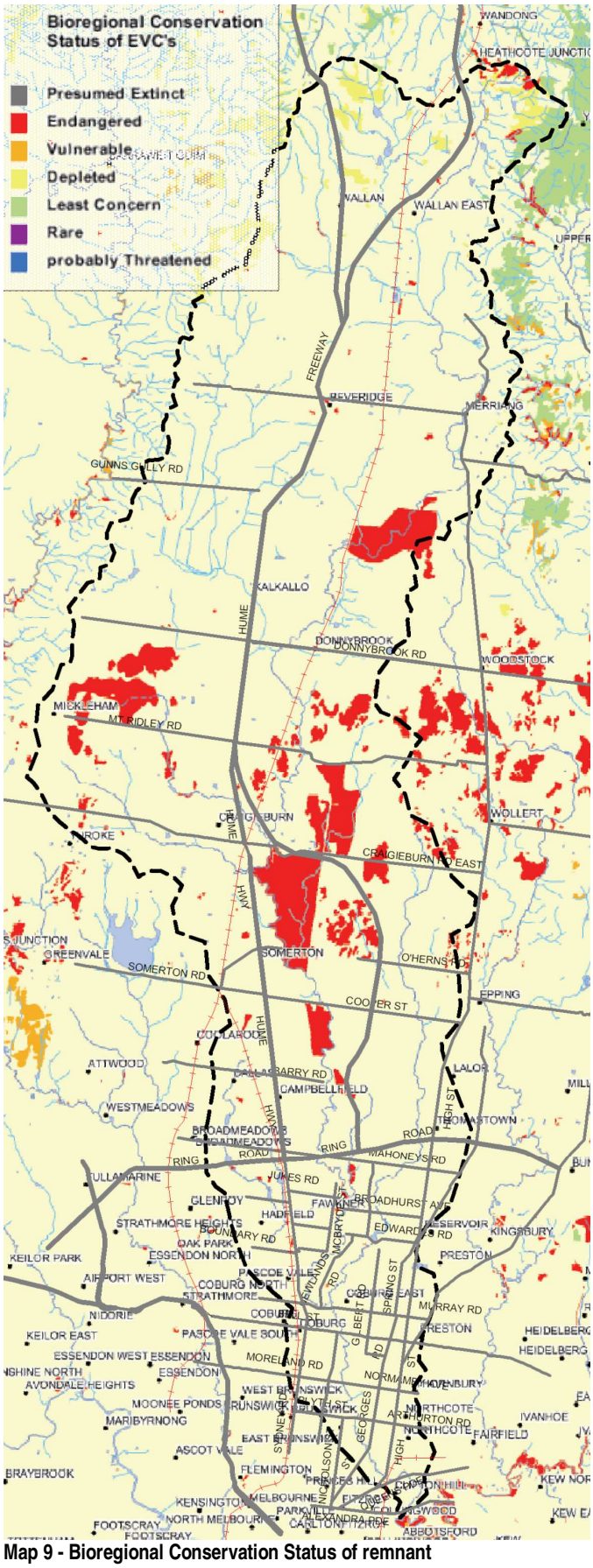
Retaining Indigenous Vegetation

The Merri Catchment, some 39,040 hectares in area, retains only around 3,112 hectares of currently identified native vegetation[50]. This makes up approximately 8% of the catchment. Most of this vegetation is Plains Grassland or Plains Grassy Woodland (see Map 10 below).

If the target BT3 from the Port Phillip and Western Port Regional Catchment Strategy "A net gain in the quality and extent of native vegetation in the region with the total 'habitat hectares' increased by 10% by 2030" is applied to the Merri catchment, achievement of the target would require restoration[51] of degraded grasslands (some of which are so degraded they don't count in current statistics) as well as a dramatically lower rate of clearing of native vegetation in the catchment. Significant recent losses include parts of the Barry Road Grassland destroyed by the Craigieburn Bypass, and parts of the Cooper Street grasslands destroyed by the Metrolink industrial development.

The Port Phillip and Western Port Native Vegetation Plan sets an aspirational target to "minimise clearing of all classes of native vegetation across the region", and a resource condition target of "Achieve a net gain for all permissible clearing". Little can be done about clearing for purposes allowed by exemptions in clause 52.17-6 of planning schemes.

With a significant proportion of the rural parts of the catchment identified for future urban growth, meeting this target will be a challenge. The main mechanism to regulate clearing is the Native Vegetation Retention Controls (NVR) for areas larger than 0.4ha. Responsible authorities, in considering planning scheme amendments for subdivision of land located where remnant vegetation occurs, must take into account the inevitable clearing that will result by requiring a concurrent application for an NVR permit. Where the removal of the native vegetation cannot be avoided, net gain offsets can be required. An offset is an improvement to the status or condition or extent of native vegetation of the same kind elsewhere.



Map 9 - Bioregional Conservation Status of remnant vegetation in the Merri catchment. Data courtesy DNRE 2007

[50] Based on DSE data (DSE 2005), but with some additional areas identified by MCMC staff. It is known that more areas remain to be mapped..

[51] The Australian Natural Heritage Charter defines Restoration as meaning returning existing habitats to a known past state or to an approximation of the natural condition by repairing degradation, by removing introduced species or by reinstatement.

Offsets are a significant opportunity to improve native vegetation along Merri catchment waterways and adjacent lands, however this needs to be facilitated and managed, and a coordinated approach in the three rural municipalities in the catchment.

Recent analysis of changes in distribution of grasslands around Melbourne has shown dramatic reductions in grassland extent over the15 years between 1985 and 2000[52]. 23% of the grassland present in 1985 was destroyed by development, and 21% by degradation. Although significant reservations of grasslands in the Merri catchment have been made in this time, development and degradation are still the key threats to grassland conservation in the catchment.

Reservation and Management Agreements

It is notable that **all** of the Ecological Vegetation Classes[53] (EVCs) listed for the Victorian Volcanic Plain Bioregion within the Merri Catchment meet the criteria set down in the Native Vegetation Plan for the highest priority protection (see Table 6)

EVC	No	Priority for vegetation protection
Plains Grassland	132	Highest
Plains Grassy Woodland	55	Highest
Grassy Woodland	175	Highest
Plains Grassy wetland	125	Highest
Creekline Grassy Woodland	68	Highest
Swampy riparian complex	126	Highest
Basalt Escarpment Shrubland	895	Highest
Streambank Shrubland	851	Highest*
Herb-rich foothill Forest	23	Highest*
Valley Grassy Forest	47	Highest*
Floodplain Riparian Woodland	56	Highest
Grassy Dry Forest	22	Highest*
Scoria Cone woodland	984	Highest
Grey Clay Drainage-line Herbland-Sedgeland Complex	124	Highest
Swampy Woodland	937	Highest*
Riparian Scrub	191	Highest
Riparian Scrub complex	17	Highest
Aquatic Herbfield	653	Highest
Riparian Forest	18	Highest*
Creekline Tussock Grassland	654	Highest
Valley Heathy Forest	127	Highest
Stony Knoll Shrubland	649	Highest

Table 6 – Priority for vegetation protection of EVCs

Priority of EVCs in Victorian Volcanic Plain Bioregion in the Merri Catchment for reservation and management agreements (based on criteria in the Native Vegetation Plan, p 19). * indicates EVCs having a lower priority in one or both of the non-volcanic bioregions

Protection of remnants by permanent State level reserves

Providing adequate management funding is available, the most reliable long term protection for native vegetation is by reservation. Reservation means addition of areas into the system of publicly owned parks and reserves. This is generally interpreted as meaning reserved under the Victorian National Parks and Wildlife Conservation Act or the Crown Land Reserves Act, and DSE's statistics are prepared accordingly. Municipal Reserves dedicated to the protection of native vegetation form a less secure (but very important) category of protection, dealt with below.

Gains in reservation in the Merri Catchment in recent decades include the Craigieburn Grassland (Galgi ngarrk), much of the Cooper Street Grasslands (Bababi marning), of Grassy Woodland at Mt Ridley, and at Central Creek Grassland (Ngarri-djarrang).

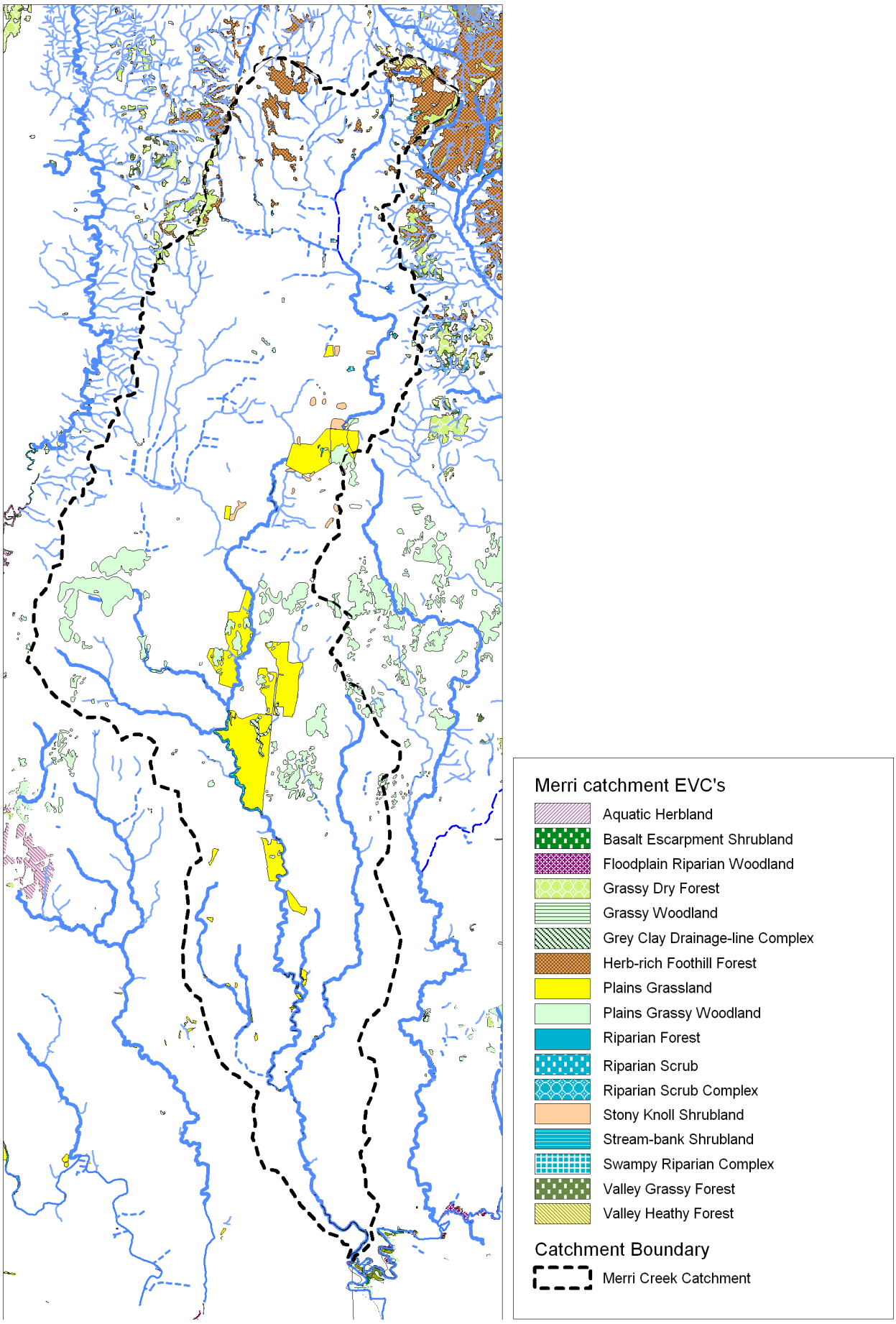
More recently a significant area was added to the Cooper Street Grassland Reserve as an outcome of the Hume Freeway hearings. These reserves total 522 ha of Plains Grassland and Plains Grassy Woodland reserved in the Merri catchment. Nonetheless Plains Grasslands and Grassy Woodlands of the middle reaches of the Merri Creek are recognised as having highest priority for reservation.

The Native Vegetation Plan target tables[54] indicate that reservation or management agreements on another 262 ha of Plains Grassland and another 671 ha of Plains Grassy Woodland are needed by 2015 to meet the targets for the Western Basalt Plains bioregion within the Port Phillip and Western Port Region of 15% of both the EVCs 2004 extent permanently protected in reserves or by management agreements.

[52] Williams et al. (2005)

[53] DSE's website defines Ecological Vegetation Class as meaning a vegetation classification unit defined by a combination of floristics, lifeform, position in the landscape, and an inferred fidelity to particular environments. Each EVC includes a collection of floristic communities (i.e. groups based on co-occurring plant species) that occur across a biogeographic range, and although differing in species, have similar habitat and ecological processes operating. Approximately 300 EVCs have been described for Victoria.

[54] Victorian Volcanic Plains.xls on the CD forming part of PPWCMA (2006)



Map 10 - Remnant native vegetation in the Merri catchment, by Ecological Vegetation Class

It is also reasonable to argue that reservation is the appropriate way to protect all remnants of national or state significance.

Parks Victoria has released a draft proposal for a Merri Creek Park in the middle catchment between the Ring Road and Craigieburn East Road (Parks Victoria 2006). This draft concept is for a park of some 840ha, including the existing Craigieburn and Cooper Street Grasslands, Melbourne Water's Galada Tamboore area, a number of Council-owned parks and reserves, and some additions. Many of the additions contain limited remnant vegetation however.

The nearby Craigieburn East Grassland (280 ha), Craigieburn North Grassland/Grassy Woodland (some 295 ha[55]), and the Grassy Woodland remnants (some 200 ha) to the east of Craigieburn Grassland provide major opportunities to achieve the reservation targets for Plains Grasslands and Grassy Woodlands in the bioregion.

Friends of Merri Creek have published a proposal for a much larger park, which also includes areas of cooperative management by private landowners.[56]

Other opportunities for reservation include the Bald Hill grasslands, which were subject to discussions with Boral in the late nineties to manage and enhance parts of the grassland in an extractive industry interest area as an offset for destruction of other sections. Areas of grassland and woodland in the Merriang area also provide opportunities for reservation.

Protection of remnant vegetation in Council reserves

Whilst not as secure as permanent reserves under the State Acts, Council reserves zoned PCRZ or covenanted to protect remnant vegetation, or to a lesser extent zoned PPRZ also protect remnant vegetation. Statistics on this have not been collected, however in the Merri Catchment a large number of small reserves are managed to protect remnant vegetation.

Protection of remnants on private land

In rural areas of the catchment native vegetation on private land is commonly lost or deteriorating through degrading pressures such as grazing, ringbarking by stock, hydrological changes, clearing of stones, salinity, fertilisers, soil dumping, insect damage, gathering of firewood, clearing for tracks, sheds etc.

As opportunities to establish new public land reserves are limited by funding, long-term permanent management agreements on private land are identified as important measures for long term protection of native vegetation.

Some properties are well-managed for conservation by private landowners. However the long-term reliability of this management is questionable – what happens when a keen landowner sells their land?

The Native Vegetation Plan identifies long term permanent management agreements as the key way forward for protection of remnant vegetation on private land. Legally binding management agreements include:

- Trust for Nature Conservation Covenants,
- Section 173 Agreements under the Local Government Act 1989, and,
- Section 169 agreements under the Conservation, Forests and Lands Act 1987.

The Native Vegetation Plan seeks a substantial increase in the area of priority EVCs protected under management agreements. It recognises that statistics are not compiled anywhere about the number of properties already involved by these agreements. According to the Trust for Nature in 2008 no properties in the Merri Catchment had conservation covenants on them.[57]

The Plan also seeks the continuation of land conservancy and land stewardship programs like the Bush Tender Scheme run by DSE. Councils could have a role in this through their rate rebate schemes.

Native vegetation clearing offsets could be managed as an incentive for protection of native vegetation on some rural properties. MCMC could be a clearinghouse for information about landowners willing to receive offsets and developers trying to find places to spend their offsetting money.

Planning scheme protection of native vegetation using Vegetation Protection Overlays (VPOs) has been somewhat superseded by the introduction of the native vegetation clearance controls. Nonetheless overlays such as Whittlesea's River Red Gum Grassy Woodland Vegetation Protection Overlay draw developers' attention to the presence of these features. Grasslands haven't unfortunately been recognised in this way, but

[55] The Craigieburn North Grassland/Grassy Woodland is mapped on page 122 of Hume Committee for Smart Growth (2005)

[56] http://www.vicnet.net.au/~fomc – see under "News"

[57] Pers comm from Linda Bester, Trust for Nature, 12/8/08

the introduction of a native grasslands VPO would highlight this issue.

Soil dumping seems to be escalating as a problem. Dumped soil smothers vegetation and spreads weeds which can be extremely damaging to native vegetation. Whittlesea will be initiating an education, awareness and compliance campaign in the municipality; however a concerted and consistent effort is required across the catchment to address this problem. MCMC, Hume, Mitchell and Whittlesea need to work together on this issue.

Vegetation quality – remnant vegetation management

Of the areas in the Merri Catchment that are recorded as having remnant vegetation, much of the vegetation is degraded, but represents some of the rare remaining examples of the vegetation of the basalt plains. Vegetation quality of remnant vegetation in the catchment is rarely high. Native grasslands were grazed from early on in settlement, and those areas that remain have suffered from their grazing and management history.

Unfortunately vegetation quality has not been mapped across the catchment, although for some small areas such mapping has been undertaken. In this context the regional target BT3 of a net gain in the quality and extent of native vegetation in the region with the total "habitat hectares" increased by 10% by 2030 should be achievable at the catchment level.

The Native Vegetation Plan identifies high priorities for maintaining and improving the vegetation quality of a remnant where the vegetation has a combination of high EVC conservation status and high vegetation quality. Western Basalt Plains (River Red Gum) Grassy Woodland extending from Whittlesea to Epping and West to Craigieburn and Plains Grassland are given as examples of very high priorities.

Native vegetation that is managed inappropriately will degrade and ultimately disappear. It can be invaded by weeds, can act as harbour for vermin, can become a fire hazard and can lead to erosion. Appropriate management of vegetation on public land not only contributes to biodiversity conservation but also ensures benefits to surrounding properties by reducing off-site impacts.

Managing vegetation on public land

The Merri catchment includes a number of publicly owned reserves where conservation is the primary purpose of the reservation (Craigieburn (Galgi ngarrk), Cooper St (Bababi marning), and Mt Ridley Grasslands managed by Parks Victoria, and Central Creek Grasslands (Ngarri-djarrang) managed by Darebin City Council). The status of some reserves whilst ostensibly for conservation is unclear. These include the Jukes Road Grasslands (Bababi djinanang), Malcolm Creek Grasslands, Maygar Grasslands and the Grey Box Woodland Reserve. Many other areas of public land include areas of remnant vegetation, but conservation is not formally recognised as their primary purpose. These include Council parks and gardens, crown land, drainage and sewerage reserves, electricity easements, road reserves, railway lines, and cemeteries.

The Native Vegetation Plan sets targets for benchmarking the quality of existing vegetation, developing and applying an asset-risk assessment methodology and developing action plans. Local governments are identified as important partners in these programs.

Managers of public land need to recognise their responsibility for retaining and managing remnant vegetation, and to set aside resources for the purpose.

Managing vegetation on private land

Improving the management of native vegetation on private land is necessary to achieve the targets of the Regional Catchment Strategy and the Native Vegetation Plan.

DSE is identified in the Native Vegetation Plan as having the lead role of coordinating, supporting and expanding schemes that assist landholders to protect and improve the quality of priority native vegetation patches on private land.[58] Local Government, the PPWCMA, and community groups are identified as key partners. The Cities of Whittlesea and the Mitchell Shire have effective rate rebate schemes, which aim to improve land management including remnant vegetation retention. These schemes have traditionally been Council initiated, funded, and managed. They are not directed by DSE, other than Council ensuring that the scheme objectives are consistent with state relevant policy and strategy. The participation rates in the schemes could be improved.

Hume is developing a Sustainable Land Management Incentive Scheme which will probably include a component on biodiversity protection and enhancement.[59] Hume currently

[58] Management Action Target 14
[59] Hume City Council 2006 p 3

runs a Rural Areas Plant Donation Scheme by which Council encourages participation by landowners in biodiversity enhancement.

Whittlesea's Sustainable Land Management Rebate Scheme is voluntary and has 190 properties participating, representing approximately 40% of the eligible properties. The scheme only applies to properties larger than 10 ha outside the urban growth boundary and provides a rate rebate of 20 or 30 per cent depending on property size. The scheme has as one of its criteria protection and/or enhancement of native vegetation.

The Mitchell Shire's Land Management Policy 2006 establishes a Land Management Rebate which has as one of its objectives the preservation and enhancement of native flora and fauna. The scheme applies to properties larger than 4 Ha and has approximately 3300 eligible properties. Mitchell Shire also has a conservation covenant annual grant program for privately owned properties.

The Cities of Moreland, Darebin and Yarra, being wholly urban, don't have environmental rate rebate schemes.

Each of the Councils in the upper catchment employs specialist land management officers to provide advice to rural landowners. A good proportion of this advice relates to vegetation management and weed control.

Grant programs for private landowners include Melbourne Water's Stream Frontage Management Program, Melbourne Water's and PPWCMA's combined community grants programs, Landcare grants and Landcare Australia sponsorship programs. Councils also provide grants to landholders for environmental works. For example, Whittlesea has offered the 'Environmental Works Grants for Private Landholders' offered annually since 2002.

Councils also have the opportunity to influence the protection and management of native vegetation on private land via the rural planning application process. For example, for a number of years Whittlesea Council has required the preparation of a land management plan to support rural town planning applications. These plans are based on the principles of whole farm planning and set out a schedule of works for the property, including actions to manage native vegetation. In most cases, council requires the endorsed plan to form a section 173 agreement which carries with the land.

Revegetation

Target BT1 for the Port Phillip and Western Port Region as a whole is to increase the extent of native vegetation to 35% of the region (from 32% existing, i.e. by 3% of the region as a whole). Given the areas set aside for future urban growth, opportunities for increasing the cover of indigenous vegetation in the Merri catchment are limited, however revegetating an additional 3% of the catchment may be possible. This would be an additional 1,171ha by 2030, or 51ha per year.

Target BT2 for the Port Phillip and Western Port region is to have at least 95% of the region's Ecological Vegetation Classes represented to at least 10% of their pre 1750 extent by 2030. The Native Vegetation Plan sets an interim target of at least 95% of the region's EVCs represented to at least 5% of their pre-1750 extent by 2015, which would require revegetation of 480ha per year on the Victorian Volcanic Plain bioregion within the Port Phillip and Western Port region. The Native Vegetation Plan gives detailed targets for each EVC within the region.

The Merri catchment holds 13% of the Victorian Volcanic Plain bioregion within the Port Phillip and Western Port region, so an equal share of the revegetation would see 62 ha revegetated per year in the Merri catchment (totalled across the various EVCs). This is over and above protection of existing remnant vegetation and offsetting plantings.

In the Merri Catchment some increase in native vegetation might result from revegetation of areas set aside for parkland. In other areas private owners might on their own initiative, or with encouragement, revegetate areas. But 62 (or even 50) hectares per year would require a major change in land management strategy. The most effective places to start might be areas which don't currently count as remnant vegetation (under the native vegetation clearance controls) because the native vegetation component is too sparse. Careful management of the grazing regime may lead to these areas partly revegetating themselves. One key opportunity might be in the Hernes Swamp area south of Wallan.

At a municipal level, open space strategies and a range of other documents already provide some guidance on revegetation strategies. These include:

- Vegetation Management Plan for the Merri Creek Tributaries in the City of Darebin (Ecology Australia et al 1999),

- Hume Natural Heritage Strategy (Hume City Council 2006)
- Mitchell Shire Environment Strategy (2008)
- Whittlesea has the following publications available to residents which are relevant to rural landholders within the catchment: Sustainable Gardening in Whittlesea (booklet), Pest Plant Handbook (booklet), Weed Fact Sheets (A4 weed ID sheets based on the 8 weeds listed in the City's local law), Weed Control Seasonal Guide (A4 fold-out brochure) and City of Whittlesea Indigenous Plant List.

None of these reports map areas to be revegetated however, or set targets.

The Native Vegetation Plan encourages local government, private landowners and public land managers to work together and take a strategic approach to revegetation and the creation of habitat corridors. DSE is given the role of facilitating the development of revegetation plans for all local government areas. These would establish municipal targets for revegetation, map areas for revegetation, and identify strategies for reaching the targets.

Analysis is also needed at the Merri catchment level to identify best areas for revegetation of each EVC and to document the gains that could most easily be made, and to design planting targets to help achieve the regional targets.

A number of Councils have prepared information for urban households and businesses regarding the protection and planting of native species and the control of environmental weeds. The City of Moreland has produced a booklet[60] on gardening with indigenous plants.

The City of Darebin has produced a fold-out list of indigenous plants[61] and a booklet on sustainable gardening[62] which advocates the use of indigenous plants, and has a section of its website devoted to indigenous plants and another to environmental weeds.

The City of Whittlesea funded the production of a booklet for rural and urban fringe landowners on indigenous plants[63]

The City of Yarra has produced two guidebooks relating to revegetation – *Gardening with Native Plants in Yarra* which describes indigenous plants suitable for revegetation in the municipality, and *Removing Weeds in Yarra and Planting Indigenous Alternatives*[64]

MCMC's book *Plants of the Merri Merri*[65], which was targeted at urban landowners, has long been out of print.

There is little in the way of demonstration gardens or on-site information in urban areas of the catchment regarding the values of native vegetation. Moreland's Jones Park Masterplan provided space for demonstration home garden plantings but this has not been implemented. Some interpretive signage along the Merri Creek includes these messages, however much more could be done in this area.

In order that revegetated areas have some protection, and are themselves not cleared willy-nilly, it is important that the native vegetation clearance controls apply unambiguously to areas revegetated, and that offsets be required if these areas are cleared.

Species conservation

A threatened flora list for the Craigieburn Landscape Zone is included in the Craigieburn Zone Landscape Plan[66]. The majority of plant species of the basalt plain are ground layer plants, and so have been greatly affected by grazing and soil disturbance, and this is reflected in the threatened flora list.

A threatened fauna list is also included in the Landscape Plan[67].

Not all of the threatened flora and fauna on these lists are priorities for management in the Merri catchment – some may never have occurred in the Merri catchment. A threatened species list for the catchment should be developed, and the conservation status of each species within the catchment analysed. The catchment status together with the bioregional, state and national statuses should be used to determine priorities for species management. In the interim, the lists from the Craigieburn Landscape Zone could be used for decision-making. Species Conservation Action Plans (where these have been developed) should be used in designing works priorities.

To prioritize sites for management for threatened species, the conservation significance of the native vegetation present

[60] Moreland City Council (2005) *Gardening with Indigenous Plants in Moreland*.
[61] City of Darebin (no date) *Guide to the Indigenous plants of the City of Darebin*.
[62] City of Darebin (2004) Sustainable Gardening in Darebin, booklet
[63] Merri Creek Management Committee and Merriang District Landcare Group (2004) *Merriang Plants for Landcare*.
[64] Hood (2001), and City of Yarra (2006?)
[65] Wigney (1994)
[66] Table 12
[67] Table 13

should be used as a guide, along with details of the distribution of the species. Appendix 3.3 of the Native Vegetation Plan identifies criteria for assessing the conservation significance of native vegetation.

The nationally endangered Growling Grass Frog is a species which has been intensively studied in the past few years initially as part of the freeway investigations, but subsequently for other projects also[68]. The species' distribution in the catchment is definitely retracting north and is primarily affected by road density, the distribution of occupied wetlands in the landscape (denser clusters of wetlands are better), the presence of floating macrophytes and submerged *Potamogeton*, and the permanence of the wetlands.

The Golden Sun Moth, nationally endangered, and until recently thought to be extinct in the catchment was rediscovered in 2003 by an MCMC staff member. Subsequent surveys have revealed that the Merri catchment is a stronghold for the species. It is not a very mobile species and seems to depend on Wallaby Grass grasslands for its survival[69]. Knowledge of the species in the catchment is patchy, and it may be found at other sites if/when they are suitably surveyed.

Habitat connectivity

In fragmented landscapes the size and position of remnants plays an important role in their suitability as habitat. Whilst larger blocks can support a greater array and larger numbers of species, the 'connectivity' of blocks is also very important. The connections between blocks of habitat are variously called habitat corridors, habitat links, wildlife corridors, biolinks, or just links. In this strategy the terminology of Bennett (1999) is adopted, that is **habitat corridor** is defined as:
"a linear strip of vegetation that provides a continuous (or near-continuous) pathway between two habitats",
and **landscape linkage** is defined as
"a general term for a linkage that increases connectivity at a landscape of regional scale (over distances of kilometres to tens of kilometres); typically such linkages comprise broad tracts of natural vegetation".

The following terms are also useful:

Stepping stone linkages which discrete habitat patches close enough together to form a movement pathway for relatively mobile species of birds and bats that aren't able to get all their needs met within the surrounding landscape.

Barriers to wildlife movement include roads, railways, powerline easements, culverts, fences.

Passage structures are structures (i.e. not vegetation) designed to facilitate wildlife movement past a barrier; they include wildlife tunnels, underpasses and overpasses.

Habitat nodes are broader habitat areas which are or are potentially linked by habitat corridors.

Habitat corridors do not replace the need for retaining habitat nodes. By allowing for movement between nodes, adequate habitat corridors avoid problems with:

- species becoming locally extinct because of habitat fragmentation
- species overpopulating a habitat node, being unable to move away from the node, and creating damage to the node from excess grazing pressure etc (e.g. Eastern Grey Kangaroos).

Habitat corridors should be as wide as possible. Minimum widths only make sense in a specific context in relation to a specific plant or animal species, and where the species' requirements for movement are known.

Clause 15.01 of the state section of planning schemes requires that planning and responsible authorities where possible should encourage "The retention of natural drainage corridors with vegetated buffer zones at least 30m wide along waterways to maintain the natural drainage function, stream habitat and wildlife corridors and landscape values, to minimise erosion of stream banks and verges and to reduce polluted surface runoff from adjacent land uses". Applying a habitat corridor along a waterway may require a greater width than this clause requires for drainage purposes, depending on what species or combination of species it is designed for.

Clause 15.10 requires that planning and responsible authorities should ensure that open space networks "Incorporate, where possible, links between major parks and activity areas, along waterways and natural drainage corridors, connecting places of natural and cultural interest, as well as maintaining public accessibility on public land immediately adjoining waterways and coasts"

[68] Key reports include *The ecology and Conservation status of the Growling Grass Frog (Litoria raniformis) within the Merri Creek Corridor* (Heard et al 2004) and *Sub-Regional Conservation Strategy for the Growling Grass Frog – Epping/Somerton Victoria*, (Renowden et al. 2006)
[69] Endersby & Kaehler 2006, Bainbridge et al 2006 and Bainbridge & North (2007)

The NEROC study[70] identified Strategic and District Corridors from Merri Creek eastwards based on its analysis of the habitat values. Since 1997 when the report was published, some of the proposed corridors have been effectively severed for non-flying animals by the construction of the Craigieburn Bypass, and are being destroyed by housing developments such as Aurora.

Webster and Schulz identified a number of habitat links and potential habitat links, as well as sites of biological significance. The links they identified included Merri and Malcolm Creeks and Old Sydney Road, and potential links along Donnybrook Rd west of Mt Ridley, from Donnybrook Rd to Deep Creek and from Mickleham Rd to Deep Creek roughly along Bardwell Drive.

Various Council open space strategies identify the location of existing and potential habitat corridors.

The Darebin Open Space Strategy 2007-2017 proposes Edgars and Central Creeks as green corridors leading to Whittlesea, as well as an eastern link from Edgars Creek towards Donath Reserve[71].

The Whittlesea Open Space Strategy shows Edgars Creek as a green corridor from Darebin to Craigieburn East Road, as well as an east-west link from Merri Creek to Darebin Creek along O'Herns Road[72].

The Moreland Open Space Strategy includes an action to assess the feasibility of establishment of several east-west fauna habitat links across Moreland between the Moonee Ponds and Merri Creeks[73], and seeks to establish a minimum 30m wide public open space corridor along Merri and Edgars Creeks[74].

The Hume Open Space Strategy includes a strategy to create ecologically functional green links along waterways and within other areas of open space. It specifically mentions Merlynston Creek from Seabrook Reserve to Laura Douglas Reserve, a link between Broadmeadows Valley Park to Craigieburn and from the Maribyrnong River to Greenvale Reserve and Merri Creek[75]. It also shows Aitken and Malcolm Creeks as linear or regional parks[76]. The Hume Natural Heritage Strategy states[77] that the waterways of Hume provide one of the best opportunities for creating habitat links across the landscape. It states that vegetation should extend at least 100m on either side of a waterway.

The draft Yarra Open Space Strategy identifies primary links along the Yarra and Merri, a secondary link along the inner Circle Railway Line to Royal Park and the Moonee Ponds Creek, and a number of minor links[78].

Mitchell Shire's Recreation and Open Space Strategy doesn't identify habitat corridors, although habitat values along Mitchell's waterways are to be enhanced[79].

Mitchell's Environment Strategy doesn't specifically nominate or map habitat corridors either, however Wallan Creek is mentioned as a revegetation priority, and landowners are to be encouraged to fence off waterways and revegetate them for habitat for local fauna[80].

The Hume Growth Areas Study[81] identifies biolinks along Merri, Aitken, Malcolm, and Kalkallo Creeks, and one coming from Deep Creek through the Mickleham Woodlands to the Mount Ridley Grassland Reserve.

Habitat Corridor Network

Map 11below shows a proposed habitat corridor network across the catchment, linked into habitat corridors in adjacent catchments and the regional network. The network is based on existing and proposed habitat corridors in the range of strategies mentioned above plus a number of additional corridors. The map shows centrelines rather than representing a fixed width as width needs to be determined on a case-by-case basis. Habitat nodes must be retained for the corridors to link. In many cases the habitat values of links and nodes will need to be improved through restoration and revegetation. The wider the links, and the higher the quality of the habitat within the link, and the closer and larger the habitat nodes, the more successful the corridor will be. This map shouldn't be interpreted to mean that a linear corridor link is acceptable as a replacement where there is an existing landscape linkage in place.

Corridor width

Clause 15.01 of the State Section of Planning Schemes indicates a preferred vegetated buffer

[70] Sites of Faunal and Habitat Significance in North-east Melbourne (Beardsell 1997) – NEROC is the North East Region of Councils
[71] Darebin Open Space Strategy 2007-2017 Map p 80.
[72] Whittlesea Open Space Strategy August 1997 Masterplan Map.
[73] Moreland Open Space Strategy 2004 Action 10.10.
[74] MOSS action 10.16
[75] Hume Open Space Strategy 1999 Action 5.1.1
[76] HOSS map 4a
[77] Hume Natural Heritage Strategy October 2006 p56
[78] Draft V6 Yarra Open Space Strategy Nov 2005 drawing YOSS 03.
[79] Mitchell Shire Recreation and Open Space Strategy page 37
[80] Mitchell Shire Environment Strategy April 2005 actions 2.13 and 2.15
[81] Hume Committee for Smart Growth 2005 Figure 15

of at least 60m wide (at least 30m buffer from each side) along waterways, and waterways are defined under the Water Act to include rivers, creeks, streams and watercourses, and in some cases channels (see p 216). The Hume Natural Heritage Strategy identifies the waterways as the best opportunities for creating habitat links across the landscape and specifies a vegetated area 100m wide on both sides of waterways[82].

The wider the habitat corridor the more effective it is likely to be. Bennett (1999) says "Maximising width is one of the most effective options that land managers can exercise to increase the effectiveness of linkages for wildlife conservation". He goes on to say:

> "a linkage is wide enough when it effectively maintains connectivity for the species or assemblage of animals for which it is intended. Thus the optimum width depends upon the purpose and function of the linkage, the behavioural ecology and movements of the key species and the nature of the surrounding land use. Long-term changes in the integrity of the habitat and the intensity of edge effects on fauna must also be considered. There is no single uniform answer."

Clear identification of the purpose/s of a particular link is an essential basis for its design and management. Bennett (1999, p126) lists six commonly recognised biological purposes, including:

- to assist movement of wide-ranging or migrating animals through developed landscapes;
- to facilitate dispersal of individual animals between otherwise-isolated habitats or populations (where populations of many species tend to decline towards local extinction); and
- to promote effective continuity and gene flow between populations in two areas by supporting a resident population within the linkage

In addition to their ecological purposes, it is likely that most corridors in urbanised or fringe urban areas of the Merri catchment will be expected to fulfil recreational functions. They may also have drainage and flood retention functions, filter out pollutants before they enter streams, and be utilised for sewers and other utilities. Within a corridor, there will be multiple demands on space, for example for recreational trails, maintenance vehicle tracks (on both sides of a waterway), screen plantings, a slashed or sealed firebreak/buffer beside adjoining development, sewer and other utilities easements. These requirements not only reduce the space available for habitat, they also have ecological impacts due to noise, disturbance, pollutants and weed invasion. For example, dogs being walked along trails disturb many species of wildlife, which perceive them as potential predators (see Banks & Bryant 2007). The width of a habitat corridor with multiple functions must therefore be adequate to cater for these competing/conflicting demands.

Factors affecting corridor width requirements

There is no single uniform answer to the question, "How wide should a link be?" For a given corridor this depends on many factors, including:

- the species that are being catered for;
- adjoining land uses;
- vegetation type;
- scale and purpose/s of the corridor;
- space needs within the corridor (above);
- the extent of edge effects that affect the ecological function of the corridor.

A few comments can be made about each of these factors in relation to the Merri habitat corridor network.

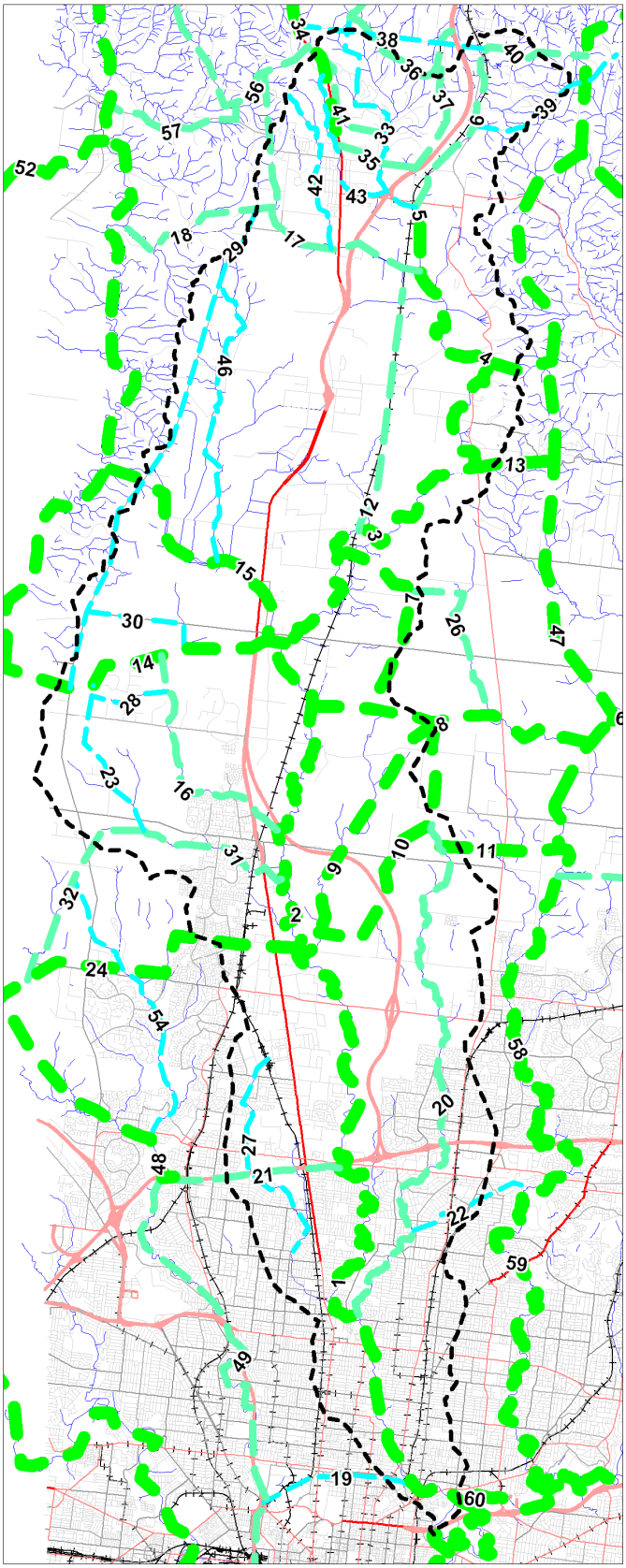
The species to be catered for in a Merri habitat corridor network include large, wide-ranging species such as the Eastern Grey Kangaroo, migratory birds that move through the area twice yearly, and species of conservation significance such as the Growling Grass Frog and Golden Sun Moth. Nomadic species that move around in response to food or water availability could also use the network, particularly when moving south or into the metropolitan region as a drought refuge. Some species, such as the Yellow-rumped Thornbill and Great Striped Skink, have disappeared from suburban areas due to isolation or urban pressures, but could be maintained in future urban areas with an adequate habitat node-link network. The identification of 'focus species' for the design of corridors will simplify the design process.

The behavioural ecology and movements of key species are important factors affecting the space required in links. For example, the Growling Grass Frog is known to travel at least 100m from permanent water as it hunts invertebrates and spiders[83].

[82] Hume City Council (2006) p56.

[83] Heard et.al. 2008

Merri Creek Catchment Proposed Habitat Corridor Network



ID	Type	Name
1	Regional	Merri Creek lower
2	Regional	Merri Creek mid
3	Regional	Merri Creek Bald Hill
4	Regional	Merri Creek Beveridge
5	Regional	Merri Creek Hernes Swamp
6	District	Merri Creek Upper
7	Regional	Bald Hill - Summer Hill
8	Regional	Merri - Upper Darebin
9	Regional	Curly Sedge Ck
10	Regional	Craigieburn E woodlands
11	Regional	Upper Edgars - Darebin
12	District	Beveridge Rail Res
13	Regional	Merri - Eden Park
14	Regional	Mt Ridley Grasslands
15	Regional	Kalkallo Creek
16	District	Malcolm Creek
17	District	Taylors & Strathayre Cks
18	District	Strathayre Ck - Deep Ck
19	Municipal	Inner Circle Rail Link
20	District	Edgars Creek
21	District	Western Ring Road
22	Municipal	Edgars - Darebin Ck lower
23	Municipal	Upper Aitken
24	Regional	Greenvale Corridor
25	Regional	Cameron Rise
26	District	Barbers Creek
27	Municipal	Merlynston Ck
28	Municipal Corridor	Upper Malcolm Ck
29	Municipal Corridor	Old Sydney Road
30	Municipal Corridor	Donnybrook Road
31	District	Aitken Creek
32	District	Aitken Ck - Moonee Ponds Cl
33	Municipal	Mittagong Creek
34	Regional	Northern Highway
35	District	McNaughton/William St
36	District	Disused Rail line
37	District	Eastern Ridge
38	Municipal	Arkells Road
39	Municipal	South Mountain Road
40	District	Junction Rd east
41	District	The Heights
42	Municipal	Taylors Creek
43	Municipal	Wallan Creek
44	Municipal	Wallan Creek Upper
45	Municipal	Taylors Creek upper
46	Municipal	Kalkallo Ck upper
47	Regional	Woodstock - Eden Park
48	Regional	Moonee Ponds Ck - Woodlar
49	District	Moonee Ponds Creek
50	Regional	Lower Yarra
51	Regional	Maribyrnong River/Deep Ck
52	Unknown	Deep Ck
53	Regional	North-east link
54	Municipal	Yuroke Creek
55	District	Unknown creek
56	District	Unnamed
57	District	Darraweit Guim
58	Regional	Eden Park - Mt Disappointme
58	Regional	Darebin Creek mid
59	Regional	Darebin Creek lower
60	Regional	Yarra River
61	Regional	Upper Darebin - Plenty
62	District	Mid Darebin - Plenty

Habitat Corridor Centrelines

Regional corridor
District Corridor
Municipal Corridor

NOTE: Merri Creek catchment boundary shown as a black dashed line.

Merri Creek Management Committee 2007

Map 11 - Proposed habitat corridor network for Merri catchment.
Based on the NEROC report, Webster & Schulz (1991), Council Open Space Strategies, other reports, and new proposals.

If the land uses adjoining the corridor are inhospitable to wildlife (built-up urban areas, busy roads), then the corridor needs to be wide enough to cater for all the needs of wildlife that is resident or passing through. On the other hand, adjoining areas of native vegetation and rural land uses can provide some shelter, feeding and nesting sites and so the reserved corridor could be narrower, especially if there is security of the private land e.g. by covenant.

Edge effects are the physical and biological changes that occur towards the edge of fragmented habitats. Linear linkages are particularly vulnerable to these effects. Edge effects of particular concern for the Merri habitat corridor network include:

- hunting by domestic cats
- wildlife disturbance by dogs being walked
- disturbance by path users
- disturbance by trail bikes and other illegal vehicle use
- light pollution from street lights and effect on nocturnal invertebrates
- noise from roadways
- rubbish dumping
- slashing of grasses as part of fire prevention works
- nutrient-enriched stormwater runoff, which aids the growth and spread of invasive weeds

The width of a habitat link needs to be more than twice that over which edge disturbances influence sensitive species and ecological processes, to ensure that some portion is relatively free of disturbance. Several of the above effects are particularly severe in open grassland and woodland (as found in the Merri catchment), and the effects can extend further into the habitat than they do in forest habitats on which most corridor literature is based.

Studies from three continents show that ecological changes associated with tropical forest edges have marked effects within at least the first 50m and have implications for ecological processes over distances of at least 200m or more (Bennett 1999, p138). Tropical forest linkages therefore need to be at least 400-600m in width in order to retain a core of relatively undisturbed vegetation.

Further work is needed on the proposed network to clarify the roles of the corridors, refine locations, to identify barriers and to prioritise actions to improve the corridors.

Until further analysis proves otherwise, the 200m minimum total width for Regional habitat corridors (similar to Hume's 100m wide on both sides of a waterway) is adopted as a target for this strategy. It is recognised that this will not be achievable in areas which are already fully developed. Where adjacent lands have environmental values or open space values these lands should also be included in the habitat and park network.

The main stem of Merri Creek, being the 'spine' of the habitat corridor network would provide the main north-south link through the catchment, between Kinglake National Park and the continental-scale biolink along the Great Divide, and the major regional-scale link along the Yarra Valley. Given this same spine will also include many of the competing uses noted above a minimum width of 400m is adopted for the main stem of Merri Creek north of the existing urban area.

District Corridors should be at least 100m wide. Municipal corridors are mostly along waterways, and therefore the 30m vegetated buffer on each side required in clause 15.01 of the planning scheme should apply, but this strategy applies a 60m minimum width to all Municipal corridors.

Climate Change

The local impacts of climate change on the biodiversity of the catchment are unclear. At this stage the best management appears to be to maintain as much flexibility in the natural environment as possible. This means that as much habitat as possible should be conserved, and as much scope for movement of populations of indigenous plants and animals through the landscape as it is possible to provide should be provided. These actions are already priorities in the catchment.

As understanding of the likely impact of climate change becomes clearer, a better refined strategy should be developed.

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Issues

1. The original vegetation of the catchment has been severely reduced in extent, and this decline is continuing.
2. Much of the rural parts of the catchment will be subject to urban growth in the future.
3. All remaining native vegetation in the catchment has not yet been identified, particularly west of the Hume Freeway north of Beveridge Road.
4. Ecological Vegetation Classes occurring in the catchment on the Victorian Volcanic Plain bioregion are all of high priority for protection and revegetation.
5. Many of the remnants in the catchment are of an EVC which is of high priority for reservation.
6. Revegetation strategies do not exist at a catchment scale and would be highly beneficial to inform and prioritise revegetation.
7. Revegetation or restoration of very degraded remnants totalling around 50 ha per year in the catchment is required to meet regional targets.
8. Improving the management of native vegetation on private land is needed to meet vegetation targets.
9. Many threatened species occur in the catchment, and require special management.
10. Fragmentation of habitat is a major problem in the catchment. Re-establishing connectivity is a priority, but agreement between Councils, the community and state government authorities on the location and

functions of corridors is needed for a connectivity strategy to work.

11. Risk management needs to take into account the significance of features rather than simply risks.

12. Native vegetation offsets are an opportunity to improve native vegetation along and adjacent to the Merri Catchment's waterways, but this needs to be facilitated and coordinated between the three rural municipalities in the catchment.

13. The likely impact of climate change on biodiversity in the catchment is poorly understood.

Objectives

1. Achieve a net gain in the quantity and quality of indigenous vegetation (Regional Catchment Strategy objective BO1).
2. Maintain the diversity of indigenous habitats and species in terrestrial and aquatic environments (adapted from Regional Catchment Strategy objective BO2).
3. Achieve sustainable populations of indigenous flora and fauna species (Regional Catchment Strategy objective BO3).
4. Improve the connectivity and long-term security of indigenous habitats and species (Regional Catchment Strategy objective BO4).
5. Encourage intelligent use of introduced flora and fauna species with minimal impacts on indigenous habitats and species (Regional Catchment Strategy objective BO1).

Targets

1. Increase the extent of indigenous vegetation by 3% of the catchment by 2030 (see regional target B1)
2. There is no further preventable decline in the viability of any rare species or of any rare ecological community (from Victoria's Biodiversity: Directions in Management p3)
3. A net gain in the quality and extent of native vegetation in the catchment with the total "habitat hectares" increased by 10% by 2030 (see regional target B3)
4. At least 95% of the catchment's ecological vegetation classes represented to at least 10% of their pre 1750 extent by 2030 (see regional target BT2)
5. All Ecological vegetation classes in the catchment to have at least 15% of their current extent protected in conservation reserves by 2030 (see regional target BT4)
6. Full and consistent application of the native vegetation clearance controls achieved and reported upon by all Councils in the catchment by 2009 (See Native Vegetation Plan Management Action Target MAT2)
7. Educate local communities about clearing controls and enforce the controls (See Native Vegetation Plan Management Action Target MAT3)
8. Appropriate planning provision tools applied by all councils in the catchment to protect threatened native vegetation and achieve net gain (See Native Vegetation Plan Management Action Target MAT4)
9. Conflicts in planning scheme overlays reconciled, including those between wildfire management overlays and environmental/ vegetation overlays. (See Native Vegetation Plan Management Action Target MAT6)
10. A Merri catchment-wide biodiversity strategy is prepared by 2010 incorporating a revegetation strategy for the catchment which achieves regional and catchment targets, refining the habitat corridor network and investigating use of the planning scheme to protect/enhance corridors.
11. All Councils to complete biodiversity strategies incorporating revegetation plans outlining how they will contribute to regional and catchment targets by 2012 (Native Veg. Plan Management Action Target MAT19).
12. Establish policy or strategy which identifies a preference for the use of appropriate local native species in landscape plantings on private and public land so as to encourage the use of appropriate local native species in landscape plantings (from Native Vegetation Plan Management Action Target MAT20).
13. Provide information to urban households and businesses regarding the protection and planting of native species and the control of environmental weeds (see Native Veg. Plan Management Action Target MAT21).
14. Provide demonstrations and on-site information in urban areas regarding the values of native vegetation (see Native

Veg. Plan Management Action Target MAT22).

15. Catchment-wide management plans for the most important species in the catchment are prepared to guide strategic planning and site development. These should include the Growling Grass Frog and Golden Sun Moth.
16. The habitat corridor along the main stem of the Merri Creek north of existing urban areas is maintained at 400m width or more.
17. Regional scale corridors identified on Map 11 on page 67are maintained at 200m width or more.
18. District scale corridors identified on Map 11 page 67 are maintained at 100m width or more
19. Municipal scale corridors identified on Map 11 are maintained at a preferred minimum width of 60m.
20. Vegetated buffers of at least 30m wide are maintained on both sides of all other waterways (i.e. total width at least 60m).
21. Revegetation work is based on EVCs and designated habitat corridors and areas are revegetated to EVCs with locally indigenous species of local provenance.
22. Any revegetated areas destroyed are offset with at least the same area.
23. Offsets for vegetation cleared in the Merri catchment are to be carried out within the catchment.
24. At least 75%(of the 2004 distribution) of heavily depleted EVCs (<10% remaining of original distribution) and EVCs with only a small amount remaining (<10ha) are protected in conservation reserves or by conservation agreement

Actions

See Section E page 187.

Chapter 2.2 Geodiversity and Geological Resources

Geodiversity is defined in the Australian Natural Heritage Charter as meaning the natural range (diversity) of geological (bedrock), geomorphological (landform) and soil features, assemblages, systems and processes. Geodiversity includes evidence of the past life, ecosystems and environments in the history of the earth as well as a range of atmospheric, hydrological and biological processes currently acting on rocks, landforms and soils.

Geology

The rock underlying the whole Merri catchment is yellow to brown marine siltstones and sandstones from the Silurian period. These are often heavily folded and faulted. The early Silurian siltstones and sandstones are called the "Andersons Creek Formation" and the late Silurian siltstones and sandstones are called the "Dargile Formation".

During the Tertiary period, volcanoes deposited basalts on top of the Silurian rock (the "Older Basalts"). Sands were deposited over the top of the Silurian rock when the area was submerged again under the sea during the Tertiary period. These sands have been eroded away by the creeks in the last few million years, leaving deposits of Tertiary sands (the "Brighton Group" sands) on the ridges. Since that time the spread of lava southwards from twelve separate eruption points in the area between Wallan and Craigieburn formed the basalt plains characteristic of the catchment. These basalts are called the "Newer Basalts". The youngest of these lava flows was from either Mount Fraser or Hayes Hill some 800,000 years ago[84]. These flows followed and filled former valleys of the Merri and Darebin Creeks extending south to the valley of the Yarra River and then westward along the Yarra valley to the vicinity of Spencer Street in Melbourne.

With the lava surface sloping down towards the east and south from these eruption points, the course of the ancestral Merri Creek came to be determined by natural depressions and ridges in the lava surface and by the major fractures and joints in the volcanic rock.

In places the lava flows blocked the ancestral Merri Creek or its tributaries, creating lakes or swamps that filled with sediment forming flat plains that are characteristic of the area immediately to the south of Wallan. Other such ancient swamps are scattered along the Creek.

Today parts of the beds of the Creek and its tributaries have cut through the basalt to the underlying Silurian rock. An example of the Silurian rock outcropping is in the cliffs of the Edgars Creek valley in the vicinity of Tilley Street Coburg North.

Significance

The assigning or reviewing of geological significance is undertaken in Victoria by the Heritage subcommittee of the Geological Society of Australia Inc (Victoria Division)[85]. The GSA is a volunteer society of qualified geologists. The GSA has developed a methodology and protocol for assigning or reviewing geological significance which has been accepted as reliable and repeatable by organizations such as the Australian Heritage Commission (now Australian Heritage Council).

It is important to note that geological, including geomorphological, significance may not necessarily relate to the aesthetics of a landscape. Some sites of very high significance may not be at all aesthetic, e.g. quarry faces or road cuttings whereas aesthetically pleasing views may not always be assigned a high geological significance.

Merri Catchment Geological Sites

A study by Rosengren (1993a) identified 38 sites of geological or geomorphological significance on Merri Creek between the Yarra River and the Wallan-Woodstock Road. A detailed listing of the sites is available on the MCMC website.

Unfortunately the Merri Creek's natural geomorphology has been extensively disturbed since European settlement and many opportunities to protect and preserve the natural interactive processes between the stream and its floodplain have been lost. Rosengren detailed the nature of human activities over the past 150 years which have significantly altered Merri Creek. Extensive channel modification by Councils and then the Melbourne Metropolitan Board of Works (MMBW) over many decades was principally responsible for the changes to the Creek from Campbellfield to the Yarra River up to the mid 1980's.

[84] Rosengren (1993a) p10

[85] White (2007)

Criteria for significance of Geological Sites

From the Heritage subcommittee of the Geological Society of Australia Inc Victoria Division (White 2007)

Geological sites should possess at least one of the following attributes to be considered for assessment on their significance:

- a type section of a geological unit,
- a fossil locality,
- exposures of a range of features characteristic of the rock unit, or exposures of features which are unusual in the rock unit,
- an unusual occurrence of a particular feature or mineral,
- an illustration of tectonic and/or volcanic processes,
- features which enable palaeoclimatic reconstruction,
- demonstration of the effects of weathering, erosion and/or deposition on landform evolution. This geomorphic process may be active or relict,
- a representative example of a landform type.

The criteria for significance is related to whether a site can be regarded as important with regards to it being representative or outstanding. A choice often has to be made between the most outstanding or unusual example and an excellent representative example from a group of very similar ones.

The representative approach has been found to be the most appropriate in assessing significance but outstanding examples must be considered. Criteria used in such assessment include:

- how representative is the feature?
- how adequately is each type of feature represented over a particular scale?
- which feature is the most appropriate to represent a particular type?
- how many representatives are justified?
- How far would you travel with an interstate or international visitor with an interest in that type of site?
- How does it compare with other similar sites - regionally, in the state, in Australia, Internationally?
- Is it under threat and if so, what is the nature of that threat?
- How common or rare is the feature?
- Is it a particularly good example?
- Is it a type section or type example (for landforms).

Other aspects of the site such as present and past land use, diversity of features present, access, and vulnerability to damage are also considered. Features or areas are also described according to size, physical and/or geological type and age.

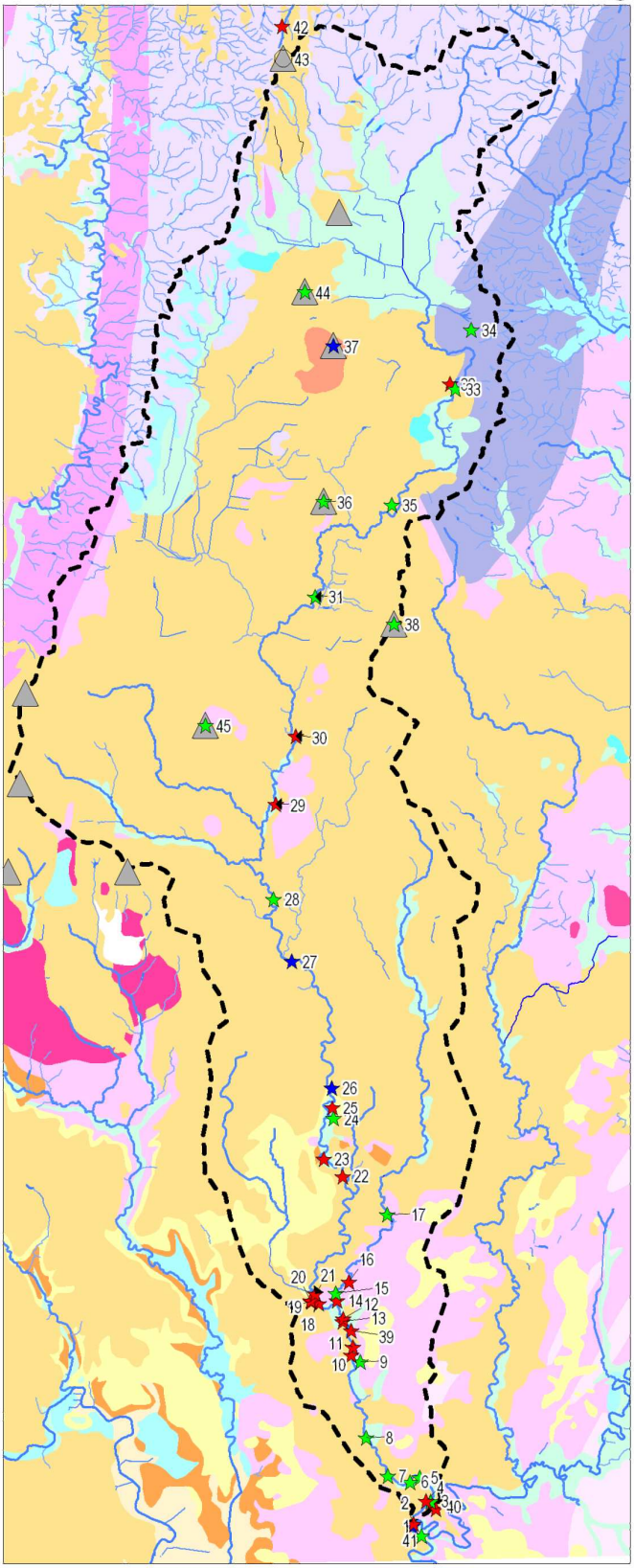
The level of geological significance is classified at local, regional, state, national or international level by documentation, assessment and comparison. The significance rating assigned to a site is periodically reassessed in the light of new information and/or site condition.

The criteria for classification are:

- **International Significance:** These sites are landforms, structures, rock formations or fossils which are rare in the world, and/or by the nature of their scale, state of preservation or display, are comparable with examples known internationally. They may be global type examples and are widely known as reference sites by the international geological community. A site could be included in an international register of sites of scientific significance and would rate listing on the Register of the National Estate by the Australian Heritage Commission (now Council). Forty-five features of international significance have been recognised, documented and assessed in Victoria. Tower Hill is an example of an internationally significant site due to the well-preserved evidence of phreatic volcanic processes.
- **National Significance**: Sites that are rare in Australia or are important nationally by virtue of their scale or state of preservation are assigned national significance. Widely used as reference sites by the Australian geological community, they should be included in a national register of sites of scientific significance and would be considered for listing on the Register of the National Estate by the Australian Heritage Commission (now Council). Seventy sites of national significance have been identified in Victoria.
- **State Significance:** These sites are important in defining the geology and geomorphology of Victoria and may be reference sites or type examples. There are over 200 sites of state significance identified and documented in Victoria.
- **Regional Significance:** These sites include landforms or geological features representative of regions of about 60km radius..
- **Local Significance**: These are features representative of smaller areas in a region. Such sites are usually related to an area of a local municipality or an area with a radius of 20km.
- **Unknown Significance**: Sites are assigned this rating if there is insufficient data to allow a complete assessment to be made. Typically these sites are either under investigation or subject to continual change e.g. active quarry faces.

Sites which are of value for teaching geology may or may not count as sites of significance.

Merri Creek Catchment Geology and Geological Sites



Merri Creek Geology

- Silurian siltstone/sandstone (Andersons Creek Form
- Tertiary Sands (Brighton Group)
- Devonian granite (Bulla Granodiorite)
- Quaternary lagoon deposits (Coode Island Silt)
- Silurian siltstone/sandstone (Dargile Formation)
- Silurian siltstone/sandstone (Deep Creek Siltstone)
- Silurian siltstone/sandstone (Humevale Siltstone)
- Silurian siltstone/sandstone (Kilmore Siltstone)
- Tertiary basalts (Older Volcanic Group)
- Silurian sandstone/conglomerate (Springfield Sandst
- Quaternary Alluvium
- Quaternary Colluvium
- Quaternary Scoria deposits
- Quaternary basalt flows (Newer basalt)
- Quaternary Swamp and lake deposits

Geological sites by Significance

Source: Rosengren 1993, Mitchell et al 2000

- Local
- Regional
- State
- all others

Volcano

No	Site Name
1	Studley Park/Dights FallsKew - Melbourne Formati
2	Merri Ck/Yarra R confluence digitate delta
3	Yarra Bend Park Fairfield - Radial Basalt columns
4	Quarries Park Clifton Hill - Ropy Lava
5	Northcote Park Football Ground - Basalt columns
6	Creek Parade Basalt columns and lava cave
7	Rushall Station North Fitzroy - Basalt structures
8	Sumner Park East Brunswick - Silurian/Basalt uncc
9	Capp Reserve Preston - Melbourne formation
10	Tate Reserve Coburg - Former Creek Course
11	Kendall & Harding Sts Preston/Coburg Melb Forma
12	Connolly Ave, Coburg - Tessellated Pavement
13	De Chene Reserve Coburg - Lava Flow Structures
14	Edgars Creek Coburg - Terrace & Meanders
15	Edgars Creek Coburg - Waterfall and Geological S
16	Kodak, Coburg - Cliff of Melbourne Formation
17	Edgars Ck Reservoir - Dolomite Nodules
18	Coburg Lake east bank - Basalt structures and Unc
19	Coburg Lake Basalt Flows
20	Coburg Lake - Alluvial Terrace
21	Carr St Coburg - Weathered Silurian
22	Moomba Park Reserve - Basalt Escarpment
23	Mahoneys Road Reservoir/Fawkner - Alluvial Terra
24	Retarding Basin Thomastown - Dolomite
25	Retarding Basin Thomastown - Alluvial Basin
26	Barry Road Gorge, Campbellfield - Unconformity
27	O'Herns Road Somerton - Intra-basaltic Sediments
28	Craigieburn East - Stony Rises, Gilgai (Soil Mound
29	Craigieburn East - Alluvial Terrace
30	Summerhill Road - Rockfall
31	Donnybrook Mineral Spring
32	Merriang - Terraced Floodplain
33	Wallan-Woodstock Rd cuttings - Humevale Formal
34	Wallan-Woodstock Rd cuttings - Humevale formati
35	Merri Creek Park - Incised Channel
36	Bald Hill - Eruption Point
37	Mt Fraser - Eruption Point
38	Hayes Hill - Eruption point
39	Elizabeth Street Cuttings, Coburg
40	Eastern Freeway cutting (basalt)
41	Studley Park Pumping Station track cuttings
42	Pretty Sally (gully to northwest), Wallan
43	Pretty Sally
44	Springs Hill, Wallan
45	Mount Ridley, Craigieburn

Geological information courtesy Government of Victoria (GeoVic Map)
Geological sites from Rosengren, N. (1993) and Mitchell et al (2000)
Map prepared by Merri Creek Management Committee Inc 2007

Map 12 - Geology and geological sites of the Merri catchment

Since Rosengren's 1993 study a number of the sites he identified have been destroyed by channel modification and other works[86].

Mitchell et al (2000) documented known geological sites in the Melbourne 1:250 000 Map sheet area.

According to the Geological Society of Australia (Victorian Branch), geological significance assessments older than 10 years need to be re-assessed (i.e. the assessments by Rosengren which have not been revised in Mitchell *et. al.*).

No sites of National significance are known from the Merri Catchment.

Four sites of State significance are known, Barry Road Gorge, O'Herns Road Merri Creek Cliff, Mount Fraser, and Dight's Falls.

Nineteen sites of Regional significance, and 21 sites of local significance are known and shown on the map.

Site Protection

Little statutory protection is available for sites of geological significance.

The Merri Creek ESO includes an objective "to protect natural landforms and geological features" in Moreland, Darebin, Yarra, Whittlesea, and Hume. There is no similar objective In the Mitchell Shire's Watercourse Protection ESO. The ESO in Whittlesea and Hume does not cover all the sites associated with the Merri Creek as identified by Rosengren. Where the ESO does cover sites, it has not always been effective in protecting them. For example the Silurian quarry face at Capp Reserve, West Preston, was identified as regionally significant by Rosengren but was buried as part of the development of an adjacent industrial site for housing.

Use of the Heritage Overlay to specifically identify geological sites and their values could be investigated.

Another option for site protection is inclusion in conservation reserves. Dight's Falls is in Yarra Bend Park, and the proposed Merri Creek Park would include the Barry Road Gorge and O'Herns Road Cliff sites. This leaves the only other site of state significance, Mount Fraser, as unreserved.

The significance of some sites depends on their visibility. Management of the geological site may therefore conflict with revegetation and screening objectives. Protection of the values of geological sites needs to be taken into account in site design.

Mineral and Stone Resources

The Merri Creek Catchment has been quarried for sand and gravels but is best known for providing bluestone for road metal, building and paving and clays for brick making.

Quarry Work Authorities

There are eleven current quarry work authorities in the catchment:

- four are for quarrying basalt (bluestone)
- one is for scoria,
- five are for clay or clay/shale
- one is sand/gravel and
- one is "sedimentary".

Boral Resources has lodged an application for a basalt quarry east of Bald Hill (see Map 13 below). This application has potential major impacts on the Bald Hill Grasslands, and on groundwater in the area.

Extractive Industry Interest Areas

One Extractive Industry Interest Area (EIIA) is located in the mid-upper catchment (see Map 13 below). The purpose of EIIAs[87] is to

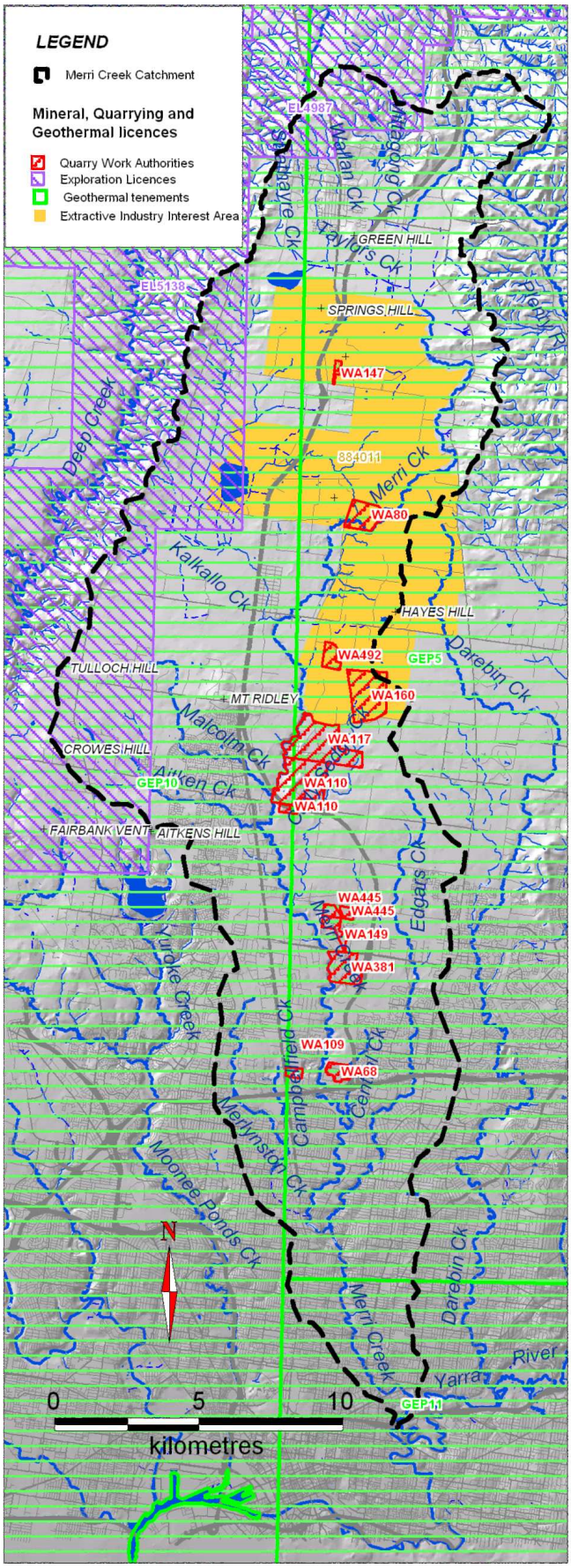
- Provide a basis for the long term protection of stone resources from "sterilisation by inappropriate land uses"
- Provide a basis for ensuring the long term availability of stone resources for use by the community at a minimal detriment to the environment,
- Assist in considering extractive industry values in long term strategic planning as well as local strategy plans,
- Ensure that planning or responsible authorities consult with all relevant agencies about land use proposals which may impact on the reduction of stone resources within these areas, and
- Create awareness that extractive industry is a potential land use in these areas.

EIIAs do not:

- Provide statutory protection for sand and stone resources
- Allow extractive industry as-of-right unless specified by planning schemes,
- Imply that future extractive industry will be confined to these areas, or
- Preclude the use and development of the land for other purposes.

[86] E.g. Rosengren (1993a) site 14 – Edgars Creek Terrace & Meanders was destroyed by channel stabilization works, and site 9 – Capp Reserve Preston – Melbourne Formation was destroyed by filling.

[87] Melbourne Supply Area – Extractive Industry Interest Areas Review



Map 13 - Mineral, quarrying and geothermal licences in the catchment.

Quarry Work Authorities

NO	OWNER	STATUS
WA110	Nubrik Pty Ltd	Current
WA445	Conundrum Holdings Pty Ltd	Current
WA68	Boral Bricks (Vic) Ltd	Current
WA445	Conundrum Holdings Pty Ltd	Current
WA160	Cemex Australia Ltd	Current
WA110	Nubrik Pty Ltd	Current
WA492	Barro Group Pty Ltd	Current
WA147	De La Q Pty Ltd	Current
WA149	Conundrum Holdings Pty Ltd	Current
WA117	Nubrik Pty Ltd	Current
WA381	North West Melbourne Recycling Pty Ltd	Current
WA80	Boral Resources (Vic) Pty Ltd	Application

Exploration Licences

NO	OWNER	STATUS
EL5138	Oroya Mining Ltd	Application
EL4987	Oxiana Minerals Exploration Pty Ltd	Current

Geothermal Tenements

NO	OWNER	STATUS
GEP11	* Granite Power Ltd of Level 6, 9 Barrack St, Sydr	Current
GEP10	* Greenearth Energy Ltd of Level 11, 500 Collins S	Current
GEP5	* Torrens Energy Ltd of 12 Eton Rd, Keswick SA 5	Current

Exploration Licences

There is one current exploration licence which covers part of Merri Creek's headwaters around Pretty Sally for Gold/Silver/Platinum and Antimony. An application for a licence has been lodged covering much of the western slopes of the upper catchment for Gold/Silver/Platinum, Antimony, and base Metals (copper, lead, and zinc)

Geothermal Tenements

The entire catchment is covered by three Geothermal Tenements which give different companies the right to develop proposals for geothermal energy projects within the tenement.

Key References

Mitchell, M.M., Cochrane, R.M. & King, R.L. (2000) *Sites of Geological Significance in the Melbourne 1:250 000 map sheet area.* Geological Survey of Victoria Technical Record 2000/1.

Rosengren, N. (1993a). The *Merri Creek: Sites of Geological and Geomorphological Significance,* prepared for Merri Creek Management Committee, Melbourne.

Rosengren, N. (1993b). *Soils Study,* prepared for Melbourne Water and Merri Creek Management Committee, Melbourne.

White S. (2007) *GSA Protocol for assigning or reviewing geological significance*. Unpublished report.

Issues

1. Sites of geological or geomorphological significance have no formal protection.
2. Sites have been destroyed in recent times with Council and Melbourne Water approval, and continue to be damaged (e.g. Mt Fraser by quarrying).
3. At some sites revegetation and geological site protection objectives may conflict.
4. Much of the catchment has not been surveyed for significant sites.
5. Significance ratings older than 10 years are not reliable
6. Heritage overlay listing may be appropriate for geological sites.
7. The ESO does not protect all identified sites along Merri Creek let alone its tributaries.
8. There are many gaps in the themes illustrated by known geological sites; e.g. gilgai soil formations.

Objectives

1. Sites of geological or geomorphological significance are identified, protected and used for interpretation of the catchment's geological history.

Targets

2. Surveys of geological sites on tributaries of Merri Creek and the headwaters undertaken by 2010
3. Conservation and significance of sites in the catchment reassessed by 2010
4. Sites protected in planning schemes with appropriate controls by 2010

Actions

See Section E page 189.

Chapter 2.3 Land Management

Port Phillip and Western Port Catchment Management Strategy relevant Land Management Objectives

LO2 Protect and improve the health of land

LO3 Ensure sensitively located and functional urban and urban-rural fringe areas with minimal impacts on the region's biodiversity, water resources and heritage values.

LO4 Match rural land-use, development and management to land capability and minimise impacts on the region's biodiversity, water resources and heritage values.

LO5 Provide a high-quality network of parks and open space across urban and rural areas managed for community and environmental benefit.

Relevant land management targets

LT2 No more than a 10 percent increase (from 2004 levels) in the area with shallow water tables (<2m) and the area of saline discharge.

LT3 The structure and biological health of the region's soils maintained.

LT4 No establishment of 'new and emerging' weed species, and no further spread of 'high-priority established' weeds.

LT5 Long term rabbit control achieved on 400,000 ha of rural land by 2008.

LT9 Increase the ratio of urban open space to total urban area and the connectivity between regional open space and habitat assets.

LT10 Increase the environmental quality of parks and other public land and community satisfaction with these features.

This chapter discusses land management issues which haven't been covered elsewhere in the document, and which are of relevance to the Merri waterway corridors.

Background

Land ownership

The Merri catchment includes land in a very diverse range of tenures. There is very little which is unalienated or unreserved Crown Land, with the exception of the bed and banks of watercourses which formed the part of a boundary of alienated land in 1905 when the bed and banks were resumed.

There are many temporary crown land reserves along catchment waterways, particularly on the lower Merri Creek, for example Hall Reserve in Clifton Hill, which is a Public Purposes Reserve, managed by the City of Yarra as a Committee of Management. The Craigieburn and Cooper Street Grasslands (Galgi ngarrk and Bababi marning) are also temporary Crown Land Reserves. Merri Merri Park in Winifred Street Northcote is a Crown Land Reserve managed by Melbourne Water. Temporary reserves may be repealed by Order in Council.

Roads may be Government Roads (owned by the Crown), which date from the early Parish Plans, many of which remain in the catchment, although they may be declared unused and leased to the adjacent landowner. Roads may also be subdivisional Roads shown on plans of subdivision of freehold land, which are generally owned and managed by Councils, or arterial roads such as the Hume Freeway, managed by VicRoads.

There is no land in the catchment which is listed as a permanent reserve under the Crown Land Reserves Act or as a park under the National Parks Act, however Yarra Bend Park has its own Act[88] which reserve the land for a public park and recreation.

Melbourne Water and Councils own and manage a number of reserves identified on plans of subdivision, or under relevant Acts. Many Council Reserves are freehold land owned by Council.

The rest of the land in the catchment is freehold land, which may be owned by individuals, businesses, Councils, or State Agencies.

Land Management

[88] The Kew and Heidelberg Land Act 1933

The health of the land in the catchment is inextricably linked with its biodiversity values, water quality in the catchment's waterways and ultimately the liveability of Melbourne's northern suburbs.

The southern portion of the catchment is urban. Management of these urban lands is dealt with to some extent in other chapters of this strategy.

The health of the agricultural land in the catchment is also linked to the economics of farming in the area.

Farm profitability is an issue because apart from the social consequences of declining profitability, there is less money available for the farmer to implement environmentally sustainable practices. In green wedge zones rising council rates, controls on noisy machinery and machinery movement, controls on use of sprays, straying domestic dogs etc, can significantly limit the flexibility of farmers to farm and so can reduce profitability.

All land managers, including public land managers have responsibilities under the CaLP Act to avoid land degradation and control pests (see box)

Duties of Land Owners under the Catchment and Land Protection Act

In relation to his or her land a land owner must take all reasonable steps to[89] —
(a) avoid causing or contributing to land degradation which causes or may cause damage to land of another land owner; and
(b) conserve soil; and
(c) protect water resources; and
(d) eradicate regionally prohibited weeds; and
(e) prevent the growth and spread of regionally controlled weeds; and
(f) prevent the spread of, and as far as possible eradicate, established pest animals.

Statutory authorities who manage land must have regard to the Port Phillip and Western Port Regional Catchment Strategy except where a provision of the Strategy conflicts with an Act of Parliament.[90]

Pests

In 2002, the Department of Natural Resources and Environment published "Victorian Pest Management: A Framework for action". The Framework identifies that local government has an important role to play in natural resource management as it has relatively broad powers in relation to environmental control, protection and conservation, as well as being a land manager (see Duties of Landowners box above). Local government, through the local planning scheme, determines the appropriate use and development of land. As part of the scheme, they must have regard to relevant aspects of regional catchment strategies and any associated implementation plan or strategy approved under the CaLP Act 1994. Statutory planning provides an essential framework for future sustainable regional development. Local government (when acting as an agent for VicRoads) also has responsibilities for pest management on roadsides under its management[91].

Public land managers are identified as having primary responsibility for ensuring pest management is a component of all public land plans[92].

Hume City Council has prepared a Sustainable Land Management and Integrated Weed Control Strategy 2003-2006 which deals with pest plant and animal control and also erosion. An updated version is in preparation.

Pest plants

Pest plants are a threat to both agricultural and biodiversity values.

In 2002 the State Government published its Weed Management Strategy[93]. The goals of the Weed Management Strategy are:

- Prevent new weed problems.
- A significant reduction in the impact of existing weed problems.
- A Victorian community that is fully aware of the economic, social and environmental impacts and threat of weeds, and has the knowledge to act to minimise their damage.
- Effective working partnerships built for progressive weed management.
- Continuous improvement through review and evaluation.

The principal legislation relating to the control of weeds in Victoria is the Catchment and Land Protection Act, administered and enforced by the Department of Primary Industry. It identifies four categories of weeds – State Prohibited Weeds, Regionally Prohibited Weeds, Regionally Controlled Weeds, and Restricted Weeds. 119 species are listed at present. DPI doesn't appear to have the ability to enforce the

[89] Section 20 of the Catchment and Land Protection Act 1994
[90] Section 26, Catchment and Land Protection Act 1994
[91] DNRE 2002a, p22
[92] DNRE 2002d, p9
[93] DNRE 2002b

control of even the worst of these weeds, and much of the burden falls onto local government to encourage weed control.

The Cities of Hume, Whittlesea and Mitchell employ staff who are responsible for working with the community on weed management.

City of Whittlesea has a pest plant local law that lists 8 priority weeds and requires landowners to remove the weeds when required by an authorised officer to do so.[94]

Urban Councils also have responsibilities to control weeds on their own land and on land they manage as Committee of Management.

The Local Government Act 1989 and the Planning and Environment Act 1987 provide opportunities for local councils to enforce pest and weed control[95].

The Port Phillip and Westernport Native Vegetation Plan encourages Councils to educate their residents on how to control environmental weeds (see Native Vegetation Plan Management Action Target MAT21)

Noxious weeds (including State Prohibited, Regionally Prohibited, Regionally Controlled and Regionally Restricted weeds under the CaLP Act) in the Port Phillip and Western Port region are listed in the regional Weed Action Plan (PPWCMA 2003), along with integrated management actions. A full and updated list of noxious weeds for Victoria is maintained on the DPI website[96].

Weed species which pose a threat to biodiversity values are known as environmental weeds. Environmental weeds in Victoria are tabulated in Carr et al 1992. A list of problem plants along Melbourne's northern waterways was published in MCMC's book *Plants of the Merri Merri*[97]. Most environmental weeds were introduced to Australia originally as garden plants, and gardens are still the source of many environmental weed invasions in the Creek corridors. Weed seed is spread by the wind, by water flow, by animals, in soil, and on machinery but also by dumping of garden refuse which can contain fragments of plants which grow vegetatively.

Control of these species in the Creek corridors also means minimising their spread from gardens, and the best way to do this is for people to not grow environmental weed species, especially adjacent to the creek corridors. Where they do grow environmental weeds residents should manage their gardens to minimise seed production and spread, and certainly refrain from dumping garden refuse on public land.

The Merri Creek Development Guidelines (MCMC 2004) specify in standard MC19 that landscape works should not use environmental weed species, and lists environmental weed species in its table B.

Other species are emerging as environmental weeds, and others have the potential. The importation of new species to Australia by gardening enthusiasts is fraught with the risk that new species will become environmental weeds. As a result, the environmental weed problem is likely to escalate.

Integrated Weed Management.

Management of weeds is an integral element of most environmental restoration projects and wider open space management – both during the initial establishment phase and as part of ongoing maintenance. Weeds can have major impacts on the environment if left unmanaged – through swamping or outcompeting indigenous plants, preventing or smothering regeneration, reducing habitat and biodiversity, and reducing ecological linkages and relationships.

Herbicide usage is sometimes unpopular, and where used irresponsibly herbicides can be environmentally damaging. However, effective management of weeds requires a strategic program that integrates a number of techniques and tools, including careful use of herbicides, use of mulches and mats, design of plantings and selection of species from appropriate ecological communities to maximise indigenous plant survivorship and competitiveness. Prescriptions for integrated weed control minimising herbicide use are listed in the box below.

[94] City of Whittlesea General Municipal Law (No 1 of 2008) Clause 5.6
[95] DNRE 2002b, p5
[96] http://www.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/weeds_noxious
[97] Now out of print

Prescriptions for integrated weed control minimising herbicide use

Plan use of herbicides and adopt processes that maximise their effectiveness

Where herbicides are to be applied as part of the weed management program, carefully plan their application to maximise their effectiveness and minimise the quantities used. Guidelines include:

- Apply herbicide only to actively growing plants to maximise plant absorption and translocation.
- Select the appropriate herbicide that will effectively control the weeds while minimising impacts on the herbicide sprayer, other people and the environment.
- Only apply the herbicide when weather conditions are appropriate (not too hot or cold, not too windy, etc).
- Follow guidelines designed to minimise spray drift and risk of contamination of surface and ground water.
- Use herbicides according to their recommended usages and rates of application as listed on their labels.

Organisations with staff using herbicides should note:

- Field staff applying herbicides must be supervised by Commercial Operators Licence holder and hold Agricultural Chemical Users Permits where required.
- Managers of staff and contractors using herbicides need to be able to ensure standards are being maintained, and staff skills and accreditation are kept updated.
- Use herbicides as a part of identified strategies that lead to minimised herbicide use and avoid ad hoc or perpetually ineffectual applications.
- Ensure actions on priority weeds are coordinated across organisational boundaries to reduce reinvasion. An example is for Blackberry spraying by creek side to be coordinated with treatment on adjoining land.
- Ensure preparation for planting is thorough enough to provide a planting area free of existing weeds and reduced soil-stored seed bank.

Adopt Processes that prevent weed spread and establishment

- Ensure field staff identify unfamiliar plant species so that early, small infestations of weeds are detected and given a high priority for treatment.
- Ensure field staff can recognise and manage invasive species which invade plantings. Some of these species were formerly grown as ornamentals and can be inadvertently fostered.
- Implement machinery and vehicle hygiene processes to reduce spread of weeds.

Integrate non-herbicide treatments that reduce reliance on herbicides

- Hand weeding will rarely be the sole means by which an area can be managed however in certain situations strategic hand weeding will reduce the need for herbicide application.
- Strategically timed brush cutting or mowing can reduce production of weed propagules in some cases.
- Land managers should seek and assess new products and approaches for their capacity to replace or reduce current herbicide use. These products may have their own environmental or health risks.

Use mulches and mats

- Use mulches and jute mat. They can greatly reduce herbicide use in conjunction with other measures.

Design plantings and select species to produce plantings that are resilient to weed invasion

- Select plant combinations that are accurately matched to environmental conditions and are capable of responding to climatic variations. For revegetation, choose species that maximise the chances of natural regeneration. Groundcover plants, trees and shrubs that generate weed-suppressing natural mulches or heavy shade can be used deliberately.
- Herbicide dependent situations should be minimized during landscape design and infrastructure placement:
    - Use existing ‘defendable’ edges (such as paths) for revegetation plots to reduce herbicide use to maintain edges.
    - Avoid placement of infrastructure (including signs and bollards) in lawn areas which require residual herbicide around bases.
- Ensure maintenance resources for planting areas are sufficient to prevent the plantings becoming host to weeds that spread to nearby managed areas.
- Ensure species with weedy potential, especially environmental weeds (see Carr et al 1992), are not included in planting designs.

Pest Animals

Rabbits

Rabbit infestations provide a significant threat to remnant vegetation, to revegetation efforts, and to soil conservation in the catchment. Infestations tend to be worse on the Silurian slopes than on the flat basalt plains.

The PPWCMA's Rabbit Action Plan (2003) identifies the urban parts of the catchment, and the basalt plains to receive only a base level of service from the State Government for rabbit control, whereas areas on Silurian soils are identified as a high priority zone for an enhanced level of service[98]. This however doesn't mean land owners have a reduced responsibility for rabbit control.

Rabbit control in rural areas is best undertaken by groups of landowners to minimise re-invasion. Coordinating this can be a challenge. The challenge is greater in an urban area where many more landowners may be involved. Nonetheless landowners are responsible for rabbit control on their own land. In urban areas any coordination of rabbit control will be up to Councils or community groups.

MCMC has developed a rabbit control strategy for Moreland. Rabbit control in urban areas is difficult because of community sensitivities to seeing dead rabbits, because of the diversity of land owners, and the constraints on control methods imposed by the urban context.

Foxes

The fox is a major threat to the survival of many native mammals, and other wildlife. In Victoria, Bioregional Network analyses have identified 92 priority species of endangered, vulnerable or insecure vertebrates for which predation by Foxes is a known or potential threat[99]. These comprise 53 bird, 15 mammal, 19 reptile and two amphibian species. This list includes the Striped Legless Lizard, Southern Lined Earless Dragon, Plains Wanderer, endangered species known or thought to occur in the Catchment. A large number of other species which aren't endangered on a state level are also adversely affected by foxes.

Foxes populations can survive at higher densities in the urban areas particularly in open space and waterway corridors where there are plenty of drain to use as dens.

No regional fox action plan has been published, and the urban area is considered a low priority by state agencies for fox control. Control of foxes in the catchment will require both public and private landowners to act in an integrated manner.

Fox control in rural areas is the responsibility of the landowner. Assistance in covering the cost of bait may in some cases be obtained from DPI. Little other assistance is available in the Merri catchment.

Landcare Note LC0364 (DPI (2007) indicates that the normal rural methods of fox control (such as shooting, poisoning and trapping) are usually not appropriate in urban and urban-fringe areas. The note outlines fox activity in urban environments and describes actions that can be used to reduce their impact. These include den identification and fumigation, habitat removal, tidying up food scraps etc. The note advises that if a breeding den is identified early in the breeding season, people should contact their Shire or Council ranger. It says many
council staff are trained in the use of humane methods of den fumigation developed for urban areas and that authorised pest controllers may also carry out den fumigation.

Habitat removal should not include removal of habitat for indigenous species.

Feral and straying domestic cats and dogs

Cats are ferocious predators of native animals. Both feral cats and straying pet cats are implicated. Responsible pet ownership programs encouraging the de-sexing of cats and keeping them inside especially at night are key to reducing the toll on native wildlife.

Feral dogs may not be a major problem in the catchment however straying pet dogs certainly are. Straying dogs hunt and kill wildlife (including Kangaroos, reptiles and birds) and also kill sheep and other livestock. Dogs should be kept confined, or be on-lead or under owner control at all times when walked.

Enforcement of domestic animal laws should remain high priority.

Salinity

Salinity poses a mostly low threat to the economic values of agriculture production in the catchment[100]. However, increasing salinity levels in Merri Creek combined with reductions in rainfall may pose a threat to the in-stream habitat values of the Creek.

[98] PPWCMA 2003a p13.
[99] DNRE (2002e) Section E
[100] Port Phillip and Western Port Catchment Management Strategy Fig 21 p 125.

Almost no points of saline discharge are shown on NRE's Catchment Information Mapper in the Merri catchment. On the other hand mapping of the sector of the catchment between Somerton Road and Kalkallo for the Hume Committee for Smart Growth[101] shows a number of salinity hotspots, and salinity hazard areas along Merri, Aitken, Malcolm, Curly Sedge and Kalkallo Creeks – all the Creeks in that sector.

Saline seeps into the Merri Creek are often accompanied by unusual patches of salt tolerant indigenous plant species, suggesting that these seeps have been present for some time, and therefore are natural, and should be protected.

The Mitchell Shire's Planning Scheme incorporates a Salinity Overlay that aims to prevent salinity damage and stabilise and repair areas affected by salinity. The overlay covers much of the northern catchment, however deletion of the overlay in the Merri Catchment has been proposed through a planning scheme amendment. No other municipalities in the catchment have a salinity overlay.

The Department of Primary Industry is preparing a report on salinity in the Port Phillip and Western Port Catchment which is expected to be released in late 2008. Salinity zone 5 east of Kalkallo is the zone impacting most on Merri Creek.

Soil protection

Soil erosion appears not to be a serious problem on the basalt plains, however the Silurian foothills are highly erodable. In Mitchell (but not other municipalities) these slopes are protected by an Erosion Management Overlay which in July 2008 was being reviewed by a planning panel as part of a proposed planning scheme amendment.

An examination of the upper Kalkallo Creek reveals very serious gully erosion in the northern and western tributaries which extends south along Kalkallo Creek until the soil changes at the edge of the old Inverlochy Swamp. In places this erosion has been stabilised, however bare eroded cliffs adjacent to the waterway could add much sediment to the water in heavy downpours. The sediment is unlikely to reach Merri Creek however, as it would probably be caught in the Kalkallo Retarding Basin. Nonetheless, continued erosion poses a serious threat to farmland productivity in the upper Kalkallo Creek catchment.

The upper Wallan and Taylors Creeks also show signs of gully erosion.

Melbourne Water's Streamside Frontage Management Plan aims to stabilise degraded sometimes eroding stream frontages, but there doesn't appear to be a program to address erosion of land in the catchment away from the waterways.

The Regional Catchment Strategy notes that there is insufficient data or understanding about soil condition (in particular erosion, land slip and acid sulphate soils) and land use compared to its capability, and identifies an action (LA3) to develop a Regional Soil Health Plan.

The 1993 Soils Study[102] only mapped the terrain of the inner Merri Creek valley, not on tributaries where the bulk of the erosion is occurring. It sampled soils, and evaluated the state of erosion of the bed and banks of the main stem of Merri Creek. Terrain data, erosion sites along the Merri Creek channel and soil landscape types of the inner valley were recorded on 1:5000 and 1:2500 scale map extracts. Analyses of 55 soil samples taken were also presented.

The study indicated that the hazard from the mapped erosion sites arises mainly in localities where the floodplain is narrow and there is insufficient "buffer" space to allow meander development or bank retreat without causing a threat to properties or other values of the creek[103]. Bank erosion is a significant source of sediment in the Merri Creek. There is a need for a more detailed study to determine the main contributions e.g. runoff in the rural areas of the catchment, bank erosion, stormwater flows in the metropolitan area etc.

Due to the friable and cracking nature of the alluvial soils that flank the Merri Creek, minor bank slumping occurs along many alluvial sectors. There are very few areas where rates of this process exceed that to be expected along an alluvial stream channel. The most vulnerable areas are in the northern floodplain (north and south of Beveridge Road) and at Donnybrook where stock have uncontrolled access to the stream frontage. The dense growth of weed species in many areas of light grazing or where stock are excluded aids in bank stabilisation. There are several naturally eroding meander bends in alluvium between Craigieburn East Road and Summerhill Road.

[101] Hume Committee for Smart Growth (2005) Figure 6

[102] Rosengren 1993b

[103] Rosengren 1993b p20

The study noted deeply incised meanders in alluvium on Edgars Creek just upstream from the confluence with Merri Creek. It indicated that these natural meanders illustrated a natural process of a floodplain stream and provided accessible examples of the structure of alluvial deposits and were one of the few natural examples of soil/sediment profiles available in the metropolitan area of the Creek. It suggested that this process could be allowed to continue. The meanders were stabilised through earthworks and the placement of large basalt rocks by Melbourne Water in the 1990's, destroying the geological value of the site, but it is possible that the meanders might re-establish if allowed to do so.

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Issues

1. Pest plants and animals continue to be a major threat to sustainable land management.
2. Some urban Councils are reluctant to undertake weed control on their own lands even for species for which they are legally obliged to do so.
3. Council and contractor mowing equipment and earthmoving equipment can effectively spread weed seed.
4. Many weeds originate from gardens, and responsible gardening practices can make a difference to weed spread.
5. Early detection of weed outbreaks facilitates their control.
6. Communities in the catchment are not highly aware of their duties to control weeds and ways to reduce their spread.
7. Many environmental weeds are not covered by legislative controls and are under-recognised by the agricultural sector.
8. Pest control strategies integrating a range of measures working together, and a range of adjoining landowners working together are more effective than piecemeal approaches.
9. Participation rates in land management incentive schemes and their effectiveness in protecting biodiversity could be improved.
10. Councils could develop or enhance local laws to increase weed control activity.
11. Councils and MCMC can contribute to pest control research.
12. Training is needed to effectively control pests safely and without harming non-target species.
13. Rabbits are not well controlled in the catchment. Nor are rabbit control works well coordinated across the catchment.
14. Salinity in the catchment is not well understood, nor the extent to which it is a threat to catchment values.
15. Severe tunnel and gully erosion in the upper Kalkallo Creek catchment needs further work to ensure its stabilization.
16. Cats and foxes are a problem in both rural and urban areas.
17. There is a strong resistance from the community to cat curfews and no-dog or dog on-lead areas along Creeks.

Objectives

1. Protect and improve the health of land (from the Regional Catchment Strategy LO2)
2. Ensure sensitively located and functional urban and urban-rural fringe areas with minimal impacts on the catchment's biodiversity, water resources and heritage values. (from the Regional Catchment Strategy LO3)
3. Match rural land-use, development and management to land capability and

minimise impacts on the catchment's biodiversity, water resources and heritage values. (from the Regional Catchment Strategy LO4)

4. Provide a high-quality network of parks and open space across urban and rural areas managed for community and environmental benefit (from the Regional Catchment Strategy LO5)

Targets

1. No establishment of 'new and emerging' weed species, and no further spread of 'high-priority established' weeds (Regional Catchment Strategy LT4)

Actions

See Section E p 190.

Chapter 2.4 Headwaters to Craigieburn Road East

Background

At its upper limits at Heathcote Junction, Merri Creek is contained within steep country of the Great Dividing Range foothills, in the Central Victorian Uplands (CVU) and Highlands Southern Fall (HSF) bioregions. Remaining vegetation on the slopes is Herb-Rich Foothill Forest, with River Red Gums, Narrow-leaved Peppermint, Swamp Gums, Blackwoods and occasional Red Box.

Herb-rich Foothill Forest is depleted in the CVU, but of least concern (that is not a high priority for conservation) in the HSF bioregion.

Other EVCs occurring[104] include Herb-rich Foothill Forest/Shrubby Foothill Forest Complex (depleted in CVU), Valley Heathy Forest (endangered in both bioregions[105]), Valley Grassy Forest and Riparian Forest (both vulnerable in CVU), and Swampy Riparian Complex (endangered in both CVU and HSF).

Major tributaries draining these bioregions include Wallan Creek, Taylors Creek, and Mittagong Creek.

As the streams fall away from the Great Dividing Range they are contained within the Victorian Volcanic Plains bioregion (VVP), or what Beardsell describes as the Merri Upland Volcanic Plains, which covers the area between Wallan East and Donnybrook[106]. Within this reach, Merri Creek is mainly an occasional or ephemeral stream running in winter-spring and after summer rains. In the old swamplands, waterways are often channelised drains.

The most significant remaining habitats within this reach are the Plains Grassland, Plains Grassy Woodland, Riparian Scrub, Swampy Riparian Complex EVCs, all endangered in the Port Phillip and Westernport Region[107].

Old Sydney Road Spur

Southwest of Wallan on the Spur between Deep Creek and the Merri Catchment, Schulz and Webster identified a site of regional biodiversity significance. It contained a moderate diversity of birds, native mammals, amphibians and reptiles, including 22 species of regionally significant fauna, and provides a habitat link between the Deep Creek and forested areas in the Kilmore Gap[108]. The report indicated that this site was being fragmented by farmlet subdivision, land clearance and trampling by livestock. Land protection and public education programs were recommended.

There have been continuing threats to this corridor from development, although there is a vegetation protection overlay along much of the road reserve.

Merri Creek – Wallan East to Hernes Swamp

This stretch of Creek was straightened to drain the upper reaches of Hernes Swamp many decades ago. In 1991 it was identified by Schulz and Webster as of local significance. It has some remnant vegetation but it has faunal significance in that it serves as a partial habitat link with areas of high faunal significance downstream and forested areas to the north of the Merri catchment[109].

Hernes Swamp

In terms of its geological origins, Hernes Swamp, located south of Wallan East, developed from the blocking by lava flows of several drainage lines causing the formation of an alluvial terrace[110]. It was largely drained in the 1940s. Hernes Swamp and its surrounds is a biosite of national significance[111]. Its vegetation is classified as Plains Grassy Wetland within the Swampy Riparian Complex. Its significance is based on the rarity and integrity of the vegetation type, and on the presence of a high number of rare and threatened flora and fauna species including the nationally endangered *Lepidium hyssopifolium* and *Helichrysum* sp. aff. *acuminatum*, Striped Legless Lizard and Growling Grass Frog[112].

Hernes Swamp is a grassy wetland or freshwater meadow which was listed by Beardsell as a Critical Conservation Area for grassy wetland habitat within the north-eastern

[104] Biodiversity Interactive Map accessed 16/5/07
[105] Native Vegetation Plan CD files Central Victorian Uplands.xls and Highlands Southern Fall.xls
[106] Beardsell, 1997, vol. 1, p. 11, Print Version of CD
[107] Native Vegetation Plan CD file Victorian Volcanic Plains.xls
[108] Schulz & Webster, 1991, site R2, pp38 & 39.
[109] Schulz & Webster, 1991, site L8, pp50 & 51.
[110] Rosengren, 1993
[111] Biosite 4854, Biosites Maps and Reports – Port Phillip Region – 2005 CD.
[112] Schulz and Webster, 1991; Beardsell, 1997, vol. 2, p. 22, Print Version of CD

region of Melbourne. It is the only intact wetland of its type remaining north of Melbourne[113]. Although it is now drained and carries little water and few waterbirds most years, before its draining the Swamp would have been an extensive shallow freshwater marsh holding water for up to six months. It would have supported thousands of waterfowl and ibis for extended periods during winter-spring. At the time of European settlement the Swamp would have likely supported the Magpie Goose, Australian Bustard and Brolga[114].

Hernes Swamp would have been part of a wetland complex, including Camoola Swamp to the south-east, and 'Inverlochy' Swamp', together covering over 1,000 hectares in total[115].

While Hernes Swamp has undergone many changes since the 1940s, recent pastoral land management intensification and a change from sheep to cattle grazing has worsened the cause of its preservation[116]. If its flora and fauna values are to be restored, the Swamp will require fencing and blocking of drainage lines to return it to a more permanent marsh.

Some of the integral relationship between Merri Creek and Hernes Swamp has been lost in recent decades. The creek itself has been impacted heavily by grazing with stock having access to both sides of the stream down to the water. The native vegetation is severely depleted and the Swamp Gums are dying from senescence, salinity and grazing related causes. The channelised stream is in poor condition with bank erosion and loss of vegetation[117]. It requires significant improvement in order to transfer better quality water downstream.

Further, Schulz and Webster have remarked that "strict controls must be enforced against contaminated runoff entering this site from the Wallan Sewerage Treatment Area to the north."[118] The Wallan Sewerage Treatment Plant is operated by Yarra Valley Water and is licensed by the EPA to discharge to land only. The plant is being expanded with improved treatment works to produce Class A water, which is piped to the west of the Hume Highway onto pasture land in Beveridge. Class A water could also be distributed to households using a 3rd pipe system.

Schulz and Webster further noted that pasture improvements such as rock clearing, top dressing and sowing of pasture species have, particularly in the southern sections, converted the sparse native tussock grassland into a pastureland sward possibly unable to support Plains-wanderer and Red chested Button-Quail - two species present at the Bald Hill site downstream. They recommended that a survey to assess the distribution and abundance of Striped Legless Lizard be undertaken[119]. During their survey work a single Striped Legless Lizard was found in a deep hole dug on the edge of Hernes Swamp in the V-Line railway reserve. They noted that suitable rocky grassland habitat for the Lizard existed west of the railway line and along Merri Creek.

Hernes Swamp is under threat now from expanding residential development to the east and south-east of Wallan. Hernes Swamp is also discussed in Chapter 3.3 Aquatic Flora, Fauna and Wetlands.

Beveridge Rail Reserve and Camoola Swamp

Directly to the south of Hernes Swamp, another biosite encompasses the vicinity of the North-East (Sydney-Melbourne) Railway line south to Beveridge Road and the Camoola Swamp area. It is listed as being of regional significance[120], but is likely to be upgraded to state significance.

Schulz and Webster recommended that the North-East Railway reserve be set aside as a Flora and Fauna Protection Zone. A prime habitat corridor needs to be established linking Hernes Swamp with the Bald Hill site both along the rail reserve and the creek corridor. The authors argued that this should be part of a regional habitat link strategy. Beardsell has also indicated that the site should form part of the Strategic Habitat Link Network connecting it to the Bald Hill site[121].

Merri Creek- Beveridge Rd

A significant site was assessed by Ecological Horticulture along Merri Creek at Beveridge Road. It was identified as a site of regional to State significance for its floodplain grassland[122]. This site is also included within Schulz and Webster's definition of the State significant Upper Merri Creek and Hernes Swamp area

[113] Beardsell, 1997, vol. 2, p. 20, Print Version of CD
[114] Beardsell, 1997, vol. 2, p. 23, Print Version of CD
[115] Beardsell, 1997, vol. 2, p. 14, Print Version of CD
[116] Beardsell, 1997, vol. 2, p. 26, Print Version of CD
[117] Beardsell, 1997, vol 2, p. 26, Print Version of CD
[118] Schulz and Webster, 1991
[119] Schulz and Webster, 1991
[120] Biosite 5130, Biosites Maps and Reports – Port Phillip Region – 2005 CD.
[121] See map in Beardsell, 1997
[122] Ecological Horticulture, 1993

which extends almost to Merri Creek Park[123]. No Biosite is recorded for this area, and no remnant vegetation is mapped. This site requires further investigation.

Bald Hill

To the east of Bald Hill as far as Merriang Rd and south as far as Donnybrook Road is the nationally significant biosite Bald Hill[124].

Fauna

The Bald Hill site has National significance for fauna on the basis of the presence of species such as the Grassland Earless Dragon seen by Beardsell in October 1988 along the Merri Creek escarpment[125]. There has only been the one sighting due to difficulties in finding the species. The suitability of habitat along both sides of the creek for the Grassland Earless Dragon has been remarked upon in all reports.

The site's rocky grassland appears to be prime habitat for the Striped Legless Lizard[126]. However, the species has not been recorded in surveys of the site[127], although it has been recorded from the local area to the north and south of the Bald Hill site[128].

Amongst other significant fauna species, Plains-wanderer was sighted on rocky grassland in "Braelands" in the summer of 1983 and is likely to still persist[129].

Bald Hill has a number of other significant bird species due to the River Red Gum Plains woodland on the site. These include Tawny Frogmouth, White-winged Triller and Rufous Songlark. The Buff-banded Rail, Brown Quail and Latham's Snipe were also observed in *Poa* grassland in freshwater meadows[130].

Schulz and Webster note that the present high faunal values of the Bald Hill site are due to its size and remoteness. Any future management of the site which saw it subdivided into urban or farmlet development would significantly reduce its faunal values.

A critical element of future management of the site will be preserving populations of the Grassland Earless Dragon. There is concern over whether it still survives in the locality as it was not recorded during pitfall trapping studies in 1995[131]. Beardsell noted that in recent years the habitat of the Grassland Earless Dragon along Merri Creek within the Bald Hill site has been heavily grazed by sheep with a consequent reduction in grassland cover and that these conditions, together with an increase in fox numbers, are not conducive to the Grassland Earless Dragon's survival.

Schulz and Webster's report also makes the recommendation that weed invasion problems (especially Cape Broom and Serrated Tussock), associated with disturbance during installation of the gas pipeline, which crosses the creek adjacent to Bald Hill, be addressed.

Schulz and Webster describe the section of Merri Creek within the Bald Hill site as containing sections of rock riffles, tessellated basalt pavement, rock shelves forming small waterfalls and open water, pools and escarpments[132]. Beardsell records that one of only two known populations of Freshwater Blackfish in the Merri Creek occurs in the reedy pools upstream of the North-East Railway bridge adjacent to Bald Hill[133]. Although there is no operational discharge from the Sewage Treatment Plant at Wallan to Merri Creek, Beardsell has questioned its impacts on water quality as unlikely to be favourable to the Blackfish and observed that stream management to improve water quality and protect the Blackfish is required[134].

Beardsell believes that the Bald Hill site is a critical component in the linking of regional habitats, being between sites to the north, south (e.g. Craigieburn grasslands) and south-east (Darebin and Barbers Creek headwaters). He recommends that conservation management of the Bald Hill site is critical for the successful movement of fauna in the Merri Creek valley. "The long term viability of faunal populations at Craigieburn Grassland depend on protecting upstream native grassland habitat links."[135].

Flora and fauna survey work was undertaken by Larwill *et. al.* in 1994 as part of the background work for the preparation of the Site Management Plan. They were unable to find Grassland Earless Dragon or Plains-wanderer[136].

Flora

[123] see maps appended to Schulz and Webster, 1991
[124] Biosite 3610 Biosites Maps and Reports – Port Phillip Region – 2005 CD.
[125] Beardsell, 1997, vol. 2, p. 35 Print Version of CD; also Schulz and Webster, 1991, p. 14; Larwill *et. al.*, 1994, p. 44
[126]
[127] Larwill *et. al.*, 1994
[128] Schulz and Webster, 1991
[129] Beardsell, 1997, Vol. 2, p. 36, Print Version of CD
[130] Schulz and Webster, 1991
[131] Beardsell, 1997, Vol. 2, p. 35, Print Version of CD
[132] Schulz and Webster, 1991
[133] Beardsell, 1997, Vol. 2, p. 36, Print Version of CD
[134] Beardsell, 1997, vol. 2, p. 36 and 40, Print Version of CD
[135] Beardsell, 1997, vol. 2, p. 39, Print Version of CD
[136] Larwill *et. al.*, 1994

The flora of the Bald Hill site is of at least State significance, due to the presence of *Carex tasmanica* and *Psoralea tenax*[137]. Based upon the area examined by Frood, the site can be said to possess five vegetation communities ranging from *Danthonia* grassland to riparian scrub[138].

This site requires further floral assessment as Frood's survey work only contained limited sampling (nine quadrats) and the extent of the better quality remnant vegetation was not fully determined, nor mapped[139]. The quadrats sampled by Frood were from along Merri Creek and land to its south, and along land to the east of a drainage line situated to the east of the railway line. It was the sample on the drainage line, which Frood described as a Grey Clay Drainage-Line Complex, which contains *Carex tasmanica* and was recommended by him for maintenance of its population as a priority.

Larwill *et. al.* extended the number of flora species listed by Frood.

At Bald Hill, like many other areas in this vicinity, there is some stock access to the creek from insufficient fencing on both sides of the stream. The creek is fenced on one side alternately providing some protection of escarpment areas and the riparian zone. River Red Gums also appear to be dying from salinity related causes. There is also some evidence of bank slumping where stock have trampled vegetation[140].

Much of the significant grassland vegetation at Bald Hill is on or adjacent to land which Boral Resources has an interest in quarrying. Boral owns sites on both sides of Merri Creek and has a proposal for two quarries, one each side of the creek. A Donnybrook Quarry Site Management Plan was developed in 1997 but it was never finalised or implemented. Unfortunately, grasslands on the site have not been well managed. It is important that this site should be properly managed.

Geodiversity

Bald Hill itself is recorded as a site of regional geological significance[141], although it is not included in the biosite.

Kalkallo to Donnybrook

South from Beveridge Road along the rail easement south to Donnybrook Mineral springs and then along Merri Creek to Donnybrook Road is another regionally significant biosite[142].

Beardsell, notes that the Australian Smelt, a notable fish species, was recorded about 1km. below the North-East Railway bridge[143]. It was Beardsell's view that the existence of this species was less secure due to the Wallan Sewage Treatment Plant and runoff from the site. There have been no specific studies which have confirmed that runoff from land irrigation at the Sewage Treatment Plant has been the cause of problems further downstream.

Freshwater crayfish and Short-finned eel have also been recorded in the vicinity[144]. Earthworks associated with dam construction and stock grazing are also contributors to water quality degradation and weed invasion. Again fencing and other stream frontage works are required in this reach.

Beardsell also noted that the creek and rail reserve require a further flora survey.

This reach includes very important breeding sites and dispersal corridors for the Growling Grass Frog.

Kalkallo Common and Cemetery

These biosites are of state significance[145] as remnants of the Plains Grassland EVC.

Beardsell's report placed emphasis on the need to protect the Kalkallo Common and Kalkallo Cemetery as a habitat link with the Merri Creek (they are located adjacent to Kalkallo Creek). He noted that the Kalkallo Common and Kalkallo Cemetery require intensive survey for flora and fauna[146]. The Kalkallo Cemetery is managed by the City of Hume Bush Crew and is included in the Hume Indigenous Vegetation Study[147].

Merri Creek - Donnybrook to Craigieburn East Roads

The Merri Creek between Donnybrook and Craigieburn East Roads is a biosite of State Significance[148]

This reach of the stream is a mid-point between the upland and lowland volcanic plains of the

[137] DCE, 1990, Frood, 1992
[138] Ecological Horticulture, 1993
[139] Frood, 1992
[140] Beardsell, 1997, Vol. 2, p. 40, Print Version of CD
[141] Rosengren 1993 p 110 site 36.
[142] Biosite 5052, Biosites Maps and Reports – Port Phillip Region – 2005 CD.
[143] Beardsell, 1997, vol. 2, p. 44, Print Version of CD
[144] Beardsell, 1997, vol. 2, p. 41 and 45, Print Version of CD
[145] Biosites 3629 and 3630, Biosites Maps and Reports – Port Phillip Region – 2005 CD.
[146] Beardsell, 1997, vol. 2, p.45-7, Print Version of CD
[147] Hume City Council (2003)
[148] Biosite 4855, Biosites Maps and Reports – Port Phillip Region – 2005 CD.

creek system. Merri Creek becomes a perennial stream through this reach.

This stretch of the waterway has been assessed as having State significance for fauna on the basis of a population of Striped Legless Lizard found on the eastern escarpment of Merri Creek, south of the North-Eastern Railway bridge in November 1991[149]. It was noted that, due to the extensive habitat present, there may be a substantial population of the Striped Legless Lizard present in the vicinity of the find.

Freshwater Blackfish was also present in the pool upstream of Summerhill Road. In addition, Flat-headed Gudgeon has been recorded for this reach, as has Platypus which was observed upstream of Summerhill Road bridge in November 1991 and Beardsell thought likely to breed locally and be possibly the last population in the Merri system[150]. Subsequent work by the Platypus Conservancy has been unable to locate a breeding population of Platypus in the Merri Creek.

Although the habitat along Merri Creek throughout the Donnybrook to Craigieburn section is more degraded than at the Craigieburn grassland site, like Beardsell, Schulz and Webster have stressed the importance of this reach for the habitat link which it provides with surrounding significant sites upstream and to the east (Edgars Creek headwaters - see below) and the west (Mickleham-Mt. Ridley site, see below).

This section of the creek has not been subject to exhaustive flora surveys. A significance rating on the basis of flora is thus not possible. However, some locally rare or threatened species (Drooping Sheoak, Rock Correa, Sticky Boobialla) have been recorded on the Silurian escarpments downstream of the North-East Railway bridge. Downstream of Summerhill Road there are also the most extensive stands of Woolly Tea-Tree and other riparian species on Merri Creek[151].

Schulz and Webster (1991) have recommended that a number of management issues be tackled including fencing of the stream and adjacent escarpments to exclude grazing and active discouragement of rock removal along the creek

Curly Sedge Creek upper, Wollert

Beardsell makes separate reference to the Summerhill Road area and the Merri catchment to the east which he deems to include the "Gas and Fuel" Swamp, "Bunker Hill" Swamp and the "Boonderoo" woodlands[152]. This area is generally within the headwaters of the recently named Curly Sedge Creek, or what Beardsell refers to as the Summer Hill drainage line.

Beardsell's site encompasses a number of biosites of State and National significance[153]. It has State faunal significance on the basis of a number of species including the Plains-wanderer, last sighted in 1988, and the Fat-Tailed Dunnart located on a stony rise at the Pakenham Blue Metal site[154]. The "Gas and Fuel" Swamp contains rocky remnant grasslands and forms the headwaters of the Curly Sedge Creek which flows to the vicinity of the O'Herns Road Wetland where it joins Merri Creek.

The "Gas and Fuel" and "Bunker Hill" Swamps carry several hundred waterfowl during wet winter-springs. There have also been several notable (if now dated) recordings of rare fauna at the Summerhill Road sites, including the Eastern Barred Bandicoot and the Eastern Quoll which persisted in the Gas and Fuel Swamp/Summer Hill drainage line area until the 1930s[155].

There are at least three notable flora species in the area: *Carex tasmanica* (Curly Sedge); *Psoralea tenax* (Tough Scurf-pea); and *Amphibromus* sp. aff *nervosus* (Swollen Swamp Wallaby Grass)[156].

Beardsell has designated the site to be part of a Strategic Habitat Link connecting the most significant sites on the Merri and Plenty Volcanic Plains[157]. The Curly Sedge Creek upper catchment area itself has connections to Merri Creek to the west, the Craigieburn grassland (now severed to a large degree by the Craigieburn Bypass which crosses Curly Sedge Creek on a small bridge) and Edgars Creek headwaters sites to the south and the Bald Hill site to the north.

Beardsell also considered the *Poa labillardieri* grass associated with plains grassland and grassy wetland in the valley of Curly Sedge Creek to be one of the largest stands in the north-east of Melbourne. Similarly, the River Red Gums plains woodland on the north-east section of "Boonderoo" and adjoining properties

[149] see Beardsell, 1997, vol. 2, p. 88, Print Version of CD
[150] Beardsell, 1997, vol. 2, p. 89-90 Print Version of CD
[151] Beardsell, 1997, vol. 2, p. 86, Print Version of CD
[152] Beardsell, 1997, vol. 2, p. 112, Print Version of CD
[153] Biosite 4858, 7103, 3628, Biosites Maps and Reports – Port Phillip Region – 2005 CD.
[154] Beardsell, 1997, vol. 2, p. 114-116, Print Version of CD
[155] Beardsell, 1997, vol. 2, p. 115, Print Version of CD
[156] Beardsell, 1997, vol. 2, p. 112, Print Version of CD
[157] Beardsell, 1997, vol. 2, p. 117, Print Version of CD

is one of the largest in the north-east of Melbourne[158].

Increasing evidence of stream and groundwater salinity, poor land management resulting in weed invasion (especially Chilean Needle-grass), potential threats to groundwater from quarrying, and high fox numbers were listed by Beardsell as key issues for the area[159].

Schulz and Webster (1991) have recommended that a number of management issues be tackled including fencing of the stream and adjacent escarpments to exclude grazing and active discouragement of rock removal along the creek and on broad acre areas to the east of Summer Hill.

They also proposed that the area east of Summer Hill be incorporated into a Grasslands and Woodlands Protection Zone within the Planning Scheme due to its function as a habitat corridor and due to the potential presence of uncommon grasslands fauna[160]. A similar zone under the new Planning Schemes might be the Rural Conservation Zone or a Green Wedge Zone. Vegetation Protection Overlays should also be considered. Beardsell further recommended that the area be nominated as a Strategic Habitat Link within north-eastern Melbourne because a link between the Bald Hill and Craigieburn grasslands is critical for the long-term conservation of fauna at the Craigieburn site. This must be recognised during the planning of future urban growth[161].

The Donnybrook to Craigieburn reach is likely to be threatened in future by possible urban development, increased salinity levels and habitat loss. It is imperative that the unsympathetically planned industrial development, which has taken place below Craigieburn Road between Hume Highway and Merri Creek, is not repeated. There are also threats posed by subdivision into small, unproductive farmlets and extensive rock clearing.

Cooperative programs with landowners (e.g. Stream Frontage Management Program, Landcare, Land for Wildlife and Bush Tender) along the stream corridors will be essential to the conservation management of this critical habitat link. Fencing out of stock, staged weed control, fox eradication, incentives for effective land management and other devices will be required to preserve the area's habitat function. Investigation of the source of salinity will also be required as the groundwater which changes the stream from ephemeral to permanent at Summerhill Road may be a contributor.

In addition, it will be necessary to investigate the usefulness of planning scheme overlays to protect such sites from the impacts of development and a habitat protection incentive scheme. This would provide the potential for specific protection of significant rock outcrops or stands of native grassland or woodland vegetation.

Mickleham-Mt. Ridley site

Two key tributaries of the Merri - Malcolm and Aitken Creeks - have their origins near the southern boundaries of the Mickleham-Mt. Ridley site as defined by Schulz and Webster (1991). Cropper and Cherry (1997) identified both vegetation communities and species of State significance. Schulz and Webster assigned it State faunal significance on the basis of repeated sightings of Plain-wanderer and Swift Parrot. The Plains-wanderer inhabits uncultivated short, sparse *Danthonia* grazing land on 'Mount Ridley' and 'Kalkallo Park'[162].

Schulz and Webster recommended that this site be identified as a Grasslands and Woodlands Protection Zone within the local Planning Scheme. They indicated that it should follow the strategy for Red Gum Protection Zones in the Plenty Growth Corridor. They also recommended that landowners be advised of land management requirements consistent with Plains-wanderer occurrence and that encouragement be given for present farm practices which provide such habitat.

Schulz and Webster further recommended that incentives should be negotiated with the owner of the high quality *Themeda* grassland in the north-west of the site, as this is suitable habitat for Plains-wanderer. They also recommended additional survey work to assess floral values, determine the presence of Striped Legless Lizard and the importance of the site for Plains-wanderer. In 1996 management guidelines were prepared for the Mt Ridley Station site[163].

Since Schulz & Webster and Kern reported, a part of the site has been reserved as the Mt Ridley Flora and Fauna Reserve, and part has been destroyed by farmlet development. A large part remains in Green Wedge, Green Wedge A and Farming zones.

[158] Beardsell, 1997, vol. 2, p. 112, Print Version of CD
[159] Beardsell, 1997, vol. 2, p. 117-121, Print Version of CD
[160] Schulz and Webster, 1991, p. 23
[161] Beardsell, 1997, vol. 2, p. 91, Print Version of CD
[162] Schulz and Webster, 1991
[163] Kern, 1996

An eastern portion of the site, within the Urban Growth Boundary (currently Farm Zone) is proposed for transfer to the State Government to form part of the protected Mt Ridley Grasslands as part of a planning scheme amendment (Hume Planning Scheme Amendment C98) to rezone the adjacent land for business purposes. There is an Environmental Significance Overlay over most of the site

Old Sydney Road

Schulz & Webster identified Old Sydney Road between Darraweit Guim and Mickleham as a site of local biodiversity significance with some shrublands and grasslands, a small number of reptiles, a diversity of raptors and shrub layer passerine birds, and the potential for the site to serve as a habitat link between the Old Sydney Road Spur site and the Mickleham- Mount Ridley site. Protection of existing vegetation and revegetation with indigenous shrub species was recommended, along with an additional links along Donnybrook Road to the top of the Mickleham-Mt Ridley site[164].

Malcolm Creek

Schulz and Webster identified the whole of Malcolm Creek as a site of regional biological significance[165]. It has largely been overtaken by residential development, although an open space corridor has been preserved which links across Mt Ridley Road to the Mt Ridley Flora and Fauna Reserve, and which hopefully can be made to link downstream under the highway to Merri Creek. The open space link incorporates a number of large old River Red Gums, as well as some important Plains Grassland remnants.

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Issues

1. Given the above, there are many opportunities to promote the Land for Wildlife program and encourage participation in Landcare activities throughout this reach.
2. There has been a lack of adequate protection measures introduced for many significant flora and fauna sites along the stream and its adjacent private freehold lands.
3. Flora and fauna species which have been determined as vulnerable or endangered require urgent steps be taken to assist their protection.
4. The draining of swamps and wetlands (including Hernes Swamp) has led to the loss of many values and attributes, such as habitat function, stream water quality protection and stream flow volumes and seasonality.
5. A regional habitat link strategy along the lines of that recommended in Beardsell (1997), is needed in order to establish and preserve habitat corridor links between significant sites (Hernes Swamp, Bald Hill, Summerhill Road, Mickleham/Mt. Ridley, and Craigieburn and Edgars Creek Headwaters). Such links are essential if biological values are to be preserved, and particularly fauna passage between sites is to be retained.
6. Additional flora and fauna survey work is required to determine populations of significant species likely to occur (some work has occurred, but not in Mitchell) at sites such as Bald Hill, Mickleham/Mt. Ridley, the Summerhill Road area and others.
7. Improved stream frontage management practices, including fencing in particular, are required at a number of locations to protect rocky escarpment areas, prevent further bank slumping and stock trampling of vegetation and improve water quality. Sites along Merri Creek include:
   - Hernes Swamp;
   - Bald Hill;
   - Kalkallo to Donnybrook; and
   - Donnybrook to Craigieburn.

[164] Schulz and Webster, 1991, site L2, p 46.
[165] Schulz and Webster, 1991, site R4, p41.

8. The Donnybrook-Craigieburn section and its associated Summerhill Road area plays a central linking role between other significant sites to the north, south, east and west. It is part of a link between the Bald Hill and Craigieburn grasslands and is critical for the long-term conservation of fauna at the Craigieburn site and must be recognised as such during the planning of future urban growth. The area's critical role requires recognition as a Strategic Habitat Link within north-eastern Melbourne.
9. Unsympathetically planned industrial development, of a type similar to that which has taken place below Craigieburn Road between Hume Highway and Merri Creek, poses a threat to significant sites, habitat links and the stream environment, if repeated within this reach.
10. Subdivision of large rural areas into small farmlets and extensive rock clearing pose threats to the conservation of significant species and sites.
11. The continuing development of measures within Local Government Planning Schemes will be required to protect significant areas from the impacts of future development. Such measures have been recommended for sites including:
    - the area east of Summer Hill due to its function as a habitat corridor and due to the potential presence of uncommon grasslands fauna (Schulz and Webster, 1991, p. 23); and
    - the Mickleham-Mt. Ridley site due to the presence of Plains-wanderer and Swift Parrot.
12. Investigation of other means by which local government can support sound land management practices and help protect significant sites. For example through means such as a habitat protection incentive scheme, needs to be examined.
13. Negotiations need to continue with land owners at Bald Hill and Hernes Swamp to secure protection for significant sites at these locations.
14. Management of the impacts of the Craigieburn Bypass.
15. A significant part of the increase in native vegetation area discussed in chapter 2.1 will need to be in this part of the catchment. Revegetation and sympathetic land management need to be high priorities.
16. Market-based incentives for indigenous vegetation protection are a likely outcome of the Land and Biodiversity at a Time of Climate Change Green Paper.

Reach Objectives

See chapters 1.1, 1.2, 1.3, 2.1, 2.2 and 2.3.

Reach Targets

1. Protection of all significant natural and cultural heritage sites through acquisition or sensitive management.
2. Maintenance and improvement of populations of vulnerable, rare, threatened, and other indigenous species.
3. Preservation of habitat links with other significant sites within the Merri Creek and neighbouring catchments.
4. Restoration of the marshy herbfield character of wetlands (e.g. Hernes Swamp) to enhance habitat function, assist in protection of stream water quality and aid stream flow volumes and seasonality.
5. Improved stream frontage management practices to sustain indigenous vegetation cover, protect stream morphology and key landscape and visual features and ensure stream stability.
6. An informed and sympathetic rural community able to manage the needs of providing continued habitat for significant species within the context of operating sustainable rural properties.
7. Participation by landholders in Landcare, Land for Wildlife and Bush Tender programs within the reach.
8. Continuing local government and agency support and incentives for rural land owners who manage land for stream frontage protection and habitat preservation and enhancement.
9. Growth corridor and other strategic planning conducted with protection of biologically significant sites and habitat links as a primary consideration.
10. Recognition and protection of the Donnybrook-Craigieburn section and the associated Summerhill Road area as a Strategic Habitat Link within north-eastern Melbourne and critical to the conservation of fauna at a number of other sites in the Merri system.
11. Preservation of Strategic Habitat Links within future growth planning exercises and through the adoption of appropriate zonings and overlays under Planning Schemes.
12. The attachment of conditions to planning permits to require protection and restoration of the creek environment from impacts resulting from development proposals.
13. Increase the extent of indigenous vegetation in this section of the catchment by 1000 ha by 2030 (See chapter 2.1).

Actions

See Section E page 192.

Chapter 2.5 Craigieburn Road East to Mahoneys Road

Background

There are a number of significant flora and fauna sites within the reach which have been documented through a host of studies over the last decade[166]. The significance of these sites has resulted in various moves to ensure their conservation. The initiatives taken by the Department of Sustainability and Environment (DSE) in this regard have been outlined above in the Introduction to this Section.

On the west side of the Creek lands in this reach are largely developed, but with the remaining undeveloped parts being subdivided. On the east, much of the upper catchment of Edgars Creek is planned for subdivision for housing as part of the Aurora development. The lands of this reach are exposed to many potential impacts as Melbourne's development proceeds. Impacts range from:

- the expansion of commercial, industrial and residential premises into areas of remnant vegetation;
- increased disturbance of soils; and the consequent spread of weeds such as the highly invasive and persistent Chilean Needle-grass and Serrated Tussock;
- rock removal from paddocks causing depletion of fauna habitat;

Parks Victoria has released a draft plan for a Merri Creek Park in this reach, connecting Craigieburn Grassland to Galada Tamboore along the Merri Creek. The park would be managed partly by Parks Victoria and partly by the Cities of Hume and Whittlesea and Melbourne Water.

The most significant biodiversity assets of the reach are as follows.

(i) Craigieburn Grasslands (Galgi ngarrk)

From Craigieburn East Road south to Cooper Street, the land surrounding Merri Creek and incorporating the Craigieburn Grassland comprises a biosite of National significance[167].

The Craigieburn grassland covers an area of approximately 400 hectares between Craigieburn Road East and Cooper Street, although parts of the area have little or no significance including a quarry, house and improved pasture[168]. The Craigieburn grassland has six key vegetation communities ranging from Plains Grassland to *Danthonia* Grassland and Stony Knoll Grassland[169]. The site has been assigned National significance for flora[170] due mainly to the presence of *Carex tasmanica, Dianella amoena* and *Amphibromus pithogastris*.

The Craigieburn habitat of *Amphibromus pithogastris* is likely to be critical habitat. This is also likely to be the case for *Carex tasmanica*[171]. There are 10 State significant plant taxa and 114 regionally significant taxa at Craigieburn[172].

The Craigieburn Grassland has also been assigned National significance for fauna due to presence of Striped Legless Lizard and Plains-wanderer[173]. It also has three State significant species (Black Falcon, Red-Chested Button-quail and Freshwater Blackfish), as well as 27 regionally significant species[174]. In relation to the Grassland Earless Dragon, while it has not been recorded at the Craigieburn site, it may occur there, as relatively large areas of apparently suitable habitat are available. These include the bases of Stony Knolls, especially near the top of the Merri Creek escarpment. Given the extent of potentially suitable habitat, the site could prove to be one of the most important sites for this species in Victoria[175].

The critically endangered Golden Sun Moth *(Synemon plana)* was rediscovered in Craigieburn Grasslands in December 2003.

Merri Creek provides a key element of the Craigieburn site and the riparian and escarpment vegetation are of high quality. The creek corridor forms an important habitat link

166 see for example DCE, 1990; Schulz and Webster, 1991; Frood, 1992; Ecological Horticulture, 1993; Peake et. al., 1996; Beardsell, 1997

167 DSE, Biosites Maps and Reports – Port Phillip Region – 2005 Biosite 3619

168 see map appended to Schulz and Webster, 1991

169 Ecological Horticulture, 1993

170 DCE, 1990; Frood, 1992; Ecological Horticulture, 1993; Ecology Australia, 1996; Beardsell, 1997

171 Ecology Australia, 1996

172 Ecology Australia, 1996

173 Beardsell, 1997 & DSE pers comm 2008

174 Ecology Australia, 1996

175 Ecology Australia, 1996

with sites such as Cooper Street to the south and Bald Hill to the north and is an especially important link for ground mammals. According to Beardsell, "the presence of the locally rare Common Wombat and Black Wallaby (not known from closer in along Merri Creek), suggests it acts as a faunal corridor"[176]. He identified the Craigieburn Grassland as pivotal to strategic habitat links between the Merri and Plenty systems[177].

The Merri Creek through this reach contains fast-flowing riffle sections of basalt cobbles and tessellated pavement, slow-flowing open water, reedy pools and a shallow gorge with columnar basalt cliffs and boulder screes and escarpments[178]. Future management of the stream frontage will need to take account of these values.

Beardsell described the Craigieburn Grassland and O'Herns Road Wetland as "the most extensive, intact, rare, diverse and significant volcanic plains rocky grassland, stream and wetland flora and fauna assemblage in Greater Melbourne...No biological reserve containing both of these systems is in existence"[179].

The Victorian Government purchased the bulk of the site in the late 1990's and hearings into the Craigieburn Bypass eventually led to its construction mostly to the east of the grassland. Unfortunately freeway planning failed to provide satisfactory provision for habitat linkages to the north and east, so the potential for movements along these corridors for ground dwelling animals has been severely curtailed.

Issues relating to management of the site include:

- Control of weeds especially stipoid weeds,
- Biomass reduction by grazing needs to be managed to enhance the range of grassland values, including rare plants, stony knolls and riparian verges.

The Craigieburn Grassland Interim Management Statement[180] describes the grasslands and its issues in more detail.

(ii) Cooper Street Grassland (Bababi marning) to Barry Road

This reach of the Merri Creek is a biosite of State Significance[181]. An extensive native grassland remnant occupied lands south of Cooper Street, Campbellfield on the west side of Merri Creek. The grassland extended some 1.5 kilometres south from Cooper Street and west from Merri Creek to factories along Rex and Northbourne Roads. It has Kangaroo Grass Plains grassland and a relatively intact Brown-back Wallaby-grass seasonal wetland.

Twenty-three hectares of the grassland was purchased by the Crown for a reserve in approx 1994 and is managed by Parks Victoria. To the east is a strip of Creek frontage owned by the Istrian Australian Social Club. The F2 Freeway reservation took up another linear strip along the western portion of the site, while the balance of the site was privately owned. As an outcome of the Craigieburn Bypass hearings, a land swap was negotiated with the private landowner so that an additional 15.5 ha of grassland was added to the reserve, in exchange for rights to develop the remaining 50ha of grassland including freeway reserve land. Development of the site for an industrial estate was underway as of 2007.

The Cooper Street site has been determined as having State to National significance for its flora and fauna[182] and has Plains Grassland, Escarpment Shrubland and Riparian Scrub[183]. The Woolly Tea-tree riparian scrub, along with the stand at the Craigieburn Grassland, is considered to be the most intact in North-East Melbourne[184]. The endangered *Amphibromus pithogastris* was also present at the site but was located in the area now under development. The rare species *Agrostis aemula* var. *setifolia* is also present.

In terms of fauna, the Cooper Street site is considered to be of State significance due to the presence of Striped Legless Lizard. Other reptile species recorded at Cooper Street include at least four species of snakes and seven species of skinks and lizards. A Common Long-necked Tortoise was also found in a creek pool in 1988[185].

A number of regionally significant bird (including Swift Parrot) species have been recorded at the site[186].

The Cooper Street site serves as an important node and link in habitat connectivity for the

[176] Beardsell, 1997, Vol. 2, p. 79 Print Version of CD
[177] see Beardsell, 1997, Strategic Habitat Link Network map
[178] Schulz and Webster, 1991
[179] Beardsell, 1997, p. 2, Appendix 2.1 to Vol. 2, Table of Contents Version of CD
[180] Department of Natural Resources and Environment 1998
[181] DSE, Biosites Maps and Reports – Port Phillip Region – 2005 Biosite 3514
[182] Ecological Horticulture, 1993
[183] see Stuwe, 1986; Cheal, 1988; DCE 1990; Frood, 1992; and Beardsell, 1997
[184] Beardsell, 1997, Vol. 2, p. 65 Print Version of CD
[185] Beardsell, 1997, Vol. 2, p. 67 Print Version of CD
[186] Beardsell, 1997, Vol. 2, p. 65-6 Print Version of CD

region, being mid-way between the Craigieburn Grasslands (Bababi marning) and the Galada Tamboore sites[187].

Parks Victoria manages the 38ha Cooper Street Grassland Reserve, although site works are mostly tendered out, some to MCMC. Works have included weed control, and ecological burning.

On the east side of the Creek opposite the Grassland, old quarry land is gradually being filled, and it is expected that a significant corridor of land will be eventually added to the Merri Creek Park. South of the quarry on the east bank, part of a golf course was severed by construction of the Craigieburn Bypass and a significant frontage from this is also expected to be added to the Merri Creek Park[188]. Significant work will be required to restore native vegetation to the Creek banks next to the quarries where overburden has been dumped over the escarpment face.

Immediately on the south side of Jessica Road south to Barry Road on the west bank of Merri Creek an area of industrial land (the former Night Soil depot) has recently been subdivided for industrial development. A reserve area along the creek frontage was created, part of which is owned by Melbourne Water and part by Hume Council.

(iii) Barry Rd south to Horne Street, including Galada Tamboore

This site covers both sides of the Creek from Barry Road south to Horne Street. It is a biosite of State Significance[189]

The City of Hume owns land on the west side of Merri Creek at the Hatty Court and Bambury Court Reserves. Apart from the Hume Freeway Reservation owned by VicRoads, the most significant parcel of land is the 93 hectare Melbourne Water retarding basin site which extends from just north of Barry Road to downstream of Horne Street and includes land on both sides of the stream. This land was purchased in the 1970s to permit retardation of flood waters. The area is now known as Galada Tamboore from the Aboriginal name meaning creek waterhole.

Perhaps the most outstanding feature of the area is its geology and geomorphology with the Barry Road or Merri Gorge having been assessed as being State significant[190]. Rosengren describes the site as having cliffs, alluvial and bedrock terraces and minor floodplains. The major geological and geomorphological feature is the 15 metre high cliff on the west bank. This cliff exposes an unconformity between the bedrock of Silurian sedimentary rocks and the Newer Volcanic basalts.

While these geological features are essential components of the visual character of the area, they have suffered impacts from inadequately planned nearby industrial development in recent years. Such a development was that associated with an industrial sub-division in the Mason Street vicinity in 1989. Open space was not allocated along the creek frontage and the result has been construction of factories perched close to the escarpment of the Barry Road Gorge. To address such inappropriately planned development, it will be desirable to maintain screening vegetation in the short term and investigate means to acquire key blocks adjacent to the escarpment over the long term.

The Gorge downstream of Barry Road and the Galada Tamboore area has regional faunal significance, and particularly for snakes, is the most diverse site remaining close to Melbourne[191].

A Marbled Gecko was also found amongst crevices in the basalt cliffs and a Lowland Copperhead has also been recorded. Beardsell remarked that the site should be considered of comparable faunal significance to the Cooper Street site to the north, while for reptiles it is more diverse. The discovery of Striped Legless Lizard would raise the faunal significance to State level[192]. Beardsell recommended that an appropriate trapping survey to locate it should be carried out[193].

The site has Woolly Tea-Tree riparian scrub and Kangaroo Grass plains grassland[194]. A significant are of Plains Grassland is associated with stony knolls to the immediate east of Merri Creek[195].

Other areas of grassland are associated with a number of remnants on the Thomastown side of the creek located either on VicRoads or partly on privately owned land. The northernmost

[187] see Beardsell, 1997, Strategic Habitat Link Network map
[188] Parks Victoria, 2006, The proposed new Merri Creek Park Draft Concept Plan February 2006, Map 4 – Land Management Zone Framework.
[189] DSE, Biosites Maps and Reports – Port Phillip Region – 2005 Biosite 5054
[190] Rosengren, 1993, Appendix 3
[191] Beardsell, 1997 Vol. 2, p. 62 Print Version of CD
[192] Beardsell, 1997 Vol. 2, p. 61 Print Version of CD
[193] ibid, p. 62
[194] Beardsell, 1997 Vol. 2, p. 60 Print Version of CD
[195] see *Galada Tamboore Future Directions Plan*, Melbourne Water, November 1997

remnant (in the area immediately south of Barry Road and along the frontage to Downs Road) has been identified as being of regional to State significance. The southern remnant is located mostly on the Freeway Reservation opposite Pandora Avenue (Carrington Boulevard to Dakota Drive). It has high local to State significance. Both of these assessments were acknowledged to be preliminary[196]. The riverine zone of the Merri Creek valley and associated escarpments were also identified as having regional to State significance[197].

Further flora survey work has also been conducted more recently by Bainbridge (1997). The report confirmed 82 indigenous species over various parcels of land on both sides of the Creek from Barry Road to the Metropolitan Ring Road.

Perhaps the most significant values of the site stem from its archaeological and geomorphological significance. At the time of Hall's 1989 report the area had eleven known archaeological sites. Since then, one additional site (a scar tree) has been added[198].

A number of these sites are under constant pressure and some have been lost to subsequent development. One example is the largest of the sites in the survey conducted by Hall (1988). It was a diffuse area of approx. 8 hectares which was destroyed through construction of the Mason Street industrial estate. Further survey of the area in March 1997 found no artefacts in association with Site 7822/152 first surveyed by Hall[199]. There is concern that the site has been lost with recent earthmoving[200]. There is also concern that a site on the east side of the creek (7822/161) has almost been destroyed by constant recreational vehicle and trail bike disturbance[201].

However, these problems in no way diminish the archaeological significance of the area or its potential for use by the Wurundjeri community for cultural purposes or its cultural values for the Wurundjeri community, which are partly related to the landscape and natural values of the area.

Beardsell recommended the area between Craigieburn Road East and the Barry Road Gorge (Galada Tamboore) as a key part of the Regional Habitat Link Strategy for North East Melbourne[202].

The Melbourne Water Future Directions Plan for Galada Tamboore identified 44 actions for implementation over a period of up to ten years. The recommendations covered the areas of: waterway management; water quality management; flood management; natural resource management; cultural and historic sites; site amenity and character; and compatible community use. The Plan was developed in consultation with Hume and Whittlesea Councils, MCMC, Friends of Merri Creek and the WTLCCHC. The priority works program will be progressively implemented through a working group of representatives of the above organisations supported by Melbourne Water's Environmentally Significant Sites Program. A key initial step in the implementation of the Plan is deterrence of unauthorised vehicle access to the site. To this end a number of vehicle entry points will be blocked through cooperative works between Melbourne Water and Hume and Whittlesea Councils. This step is seen as an essential precursor to site boundary definition and protection of the core Melbourne Water owned land.

Supplementing Melbourne Water's Future Directions Plan for Galada Tamboore has been the concurrent preparation of a site concept plan for Hume Council's Hatty Court Reserve. The plan outlines future actions for development of the reserve and improvements to its vegetation cover, amenity and recreation facilities (including car park provision). The plan also proposes construction of the Merri Path between Hatty Court and Bambury Court to cater for local pedestrian and bicycle access and link these local reserves. The location of the path will be designed to avoid registered archaeological sites in the vicinity.

In 2004 VicRoads commissioned a report on the natural values of the grasslands on the east of the site in the vicinity of Barry Road[203] The report confirmed the state level significance of the vegetation at the site, and identified weeds as the major management issue.

(iv) Horne Street to Mahoneys Road

This area is bounded on the east by industrial development with severe problems of fill dumping and a generally narrow drainage reserve along the Creek. Some parts of the Creek frontage are privately owned. On the

[196] Ecological Horticulture, 1993
[197] Ecological Horticulture, 1993
[198] Ellender, 1997b
[199] Ellender, 1997a
[200] Ellender, 1997b
[201] Ellender, 1997b
[202] Beardsell, 1997, Vol. 2, p. 68, Print Version of CD
[203] Walters & Frood, 2004b

west, filled tips, or currently operating tips, predominate.

The Pipeworks Leisure Market occupies a critical position adjacent to Mahoneys Road, and a path alignment has been set aside through the Market as a planning permit requirement. The construction of the Metropolitan Ring Road, result in the construction of a new section of path from south of Mahoneys Road to north of the Ring Road (where it stops) and linking to the path east and west along the Ring Road.

The Somerset Road Main Drain enters Merri Creek within this sub-reach. It has recently been converted from an open channel for some 300 metres to a piped drain with 2 treatment ponds to remove it from the grounds of the Campbellfield Landfill Disposal Site and provide additional fill capacity.

(v) Edgars Creek Headwaters

This area is located to the north-west of Epping and is between Cooper Street in the south, Epping Road in the east and Boundary Road (a continuation of Bridge Inn Road) on the north side. It is a biosite of State significance[204]. The area supports extensive areas of volcanic plains landforms including stony rises and crests, stony plains, gilgai plains and ephemeral creek valley/floodplains. It has broad sections of relatively unmodified grassland and grassy woodland which are "fine illustrations of the natural character of the landscape"[205].

The Edgars Creek Headwaters has State faunal significance based upon populations of Striped Legless Lizard. It has been designated as a habitat link to the Craigieburn grasslands[206]. In identifying it as a Strategic Habitat Link, Beardsell stated it is "critical in maintaining the population viability of grassland fauna at Craigieburn Grassland."[207]. Unfortunately the construction of the Craigieburn Bypass has effectively severed this site and the link except for flying animals. For these species the site links Craigieburn Grassland to the west with the Darebin and Barber Creek grassy woodlands to the north-east. Much of the site to the east of the Bypass is in the process of development for industrial and residential purposes. Isolated fragments are to be preserved as open space, but may not incorporate contiguous linkage to Edgars Creek, let alone to Darebin Creek.

[204] DSE, Biosites Maps and Reports – Port Phillip Region – 2005 Biosite 4857
[205] Beardsell, 1997, Vol. 2, p. 105, Print Version of CD
[206] Schulz and Webster, 1991
[207] ibid, p. 105

Some of the notable features of the area are remnant grassland on 'paddock' stony knolls at Hendon Park and properties fronting Harvest Home Road.

The Edgars Creek River Red Gum floodplain becomes a large swamp during wet years with a host of water birds appearing on the freshwater meadows. The site has not been comprehensively surveyed for its flora.

Edgars Creek Cooper St – Mahoneys Road

Edgars Creek passes through a former waste disposal site, then the established residential areas of Lalor and Thomastown, under the Ring Road and through another industrial area to Mahoneys Road. Narrow open space reserves line the creek through the residential areas, but habitat values are poor.

Merri Creek Park

Zanon (2001) examined the accessibility of major parks across Melbourne and identified a major gap in the outer northern suburbs, and Parks Victoria (2006) proposed the creation of a new park including the Craigieburn and Cooper Street Grasslands and Galada Tamboore as well as various lands between, some of which are currently in private ownership.

Not all land to be included in the Park will need to be acquired. Where private land is included, its formal designation as park will take affect by agreement with the private landowner, or upon acquisition or transfer of land into public ownership. DSE is responsible for negotiating land transfers.

Whether land is formally acquired or an agreement is created to include private land as part of the public park, protection of habitat values and access for managing natural assets remain the critical issues. So if the private land owner refuses to create a covenant or agreement over their high habitat value land, a public acquisition overlay needs to be considered otherwise ther is no guarantee or trigger to protect important areas of privately owned land.

Parks Victoria has proposed naming the park "Merri Creek Parklands". Applying this name only to the park between Mahoneys Road and Craigieburn is problematic given the popular use of the term "Merri Creek Parklands" to refer to the largely Council owned and run parklands south of Mahoney's Road. If it were an extension of these parklands that would make sense. A Wurundjeri representative has

provided a Wurundjeri name "Marran baba" for the park, and use of this name would be unambiguous and reflect the fact that the grasslands within the park are a cultural landscape of the Wurundjeri. MCMC has resolved to support the use of the Wurundjeri name.

Growling Grass Frog conservation

Renowden et. al. (2006) identify the following site as essential for the conservation of Growling Grass Frogs in the Merri catchment and which should be added to the Merri Creek Park:

- The block of land which contains the O'Herns Road Swamp
- The privately owned former Lalor Golf Course (western side of the Craigieburn Bypass)

The study identifies the Merri Creek Parklands as the greatest single opportunity to conserve Growling Grass Frog habitat in the study area.

Major developments in this reach of the Creek (for example the Melbourne Wholesale Market development south of Cooper Street) will do significant damage to Growling Grass Frog habitat and habitat connectivity. The study identifies mitigation measures (on-site) and offset measures (off-site) to best protect the frog population.

Issues

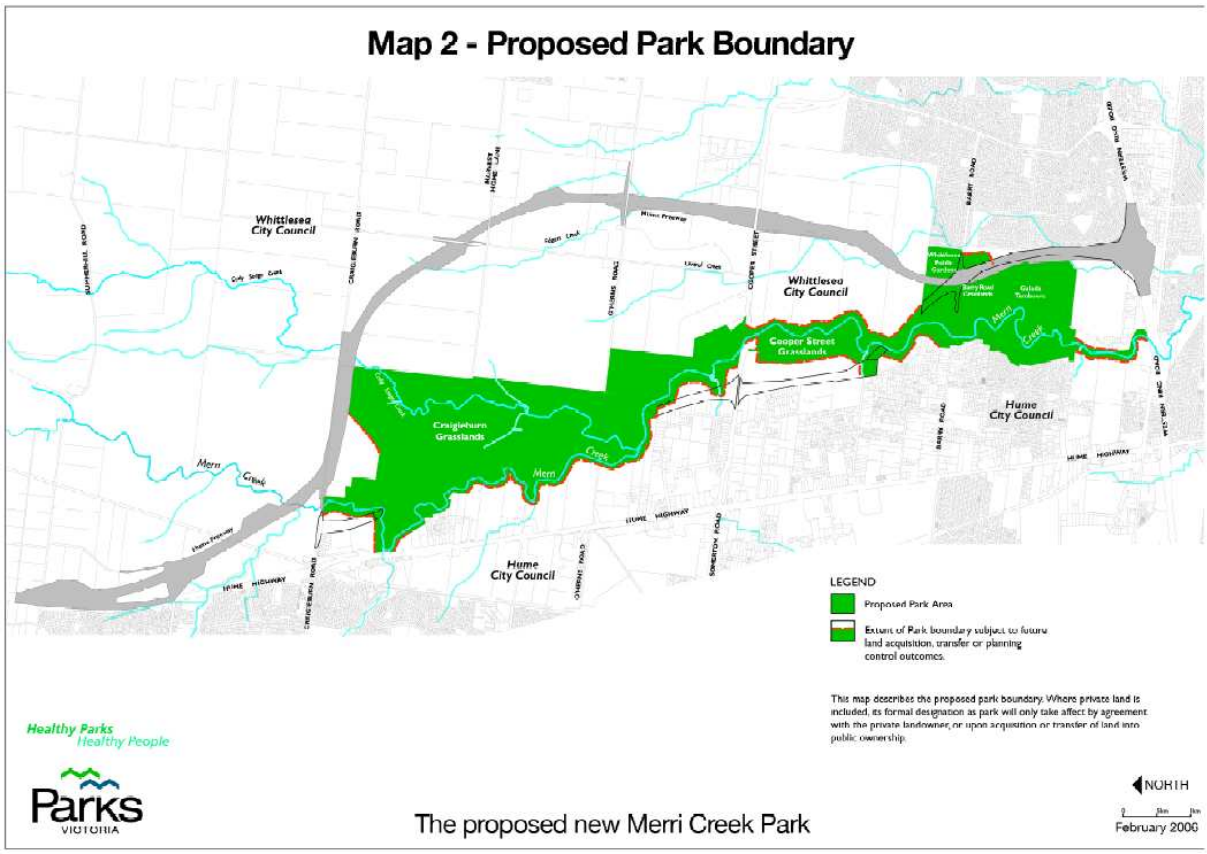
1. The current Hume Highway is a barrier to fauna movement in a westerly direction and the Craigieburn Bypass is a barrier in an easterly direction from the Merri system, but some opportunities exist for protection and enhancement of habitat links east to adjacent waterway systems.
2. Some areas in private ownership could be effectively protected through programs promoting sympathetic management.
3. The proposed Merri Creek Park requires much planning for its management, including issues like faunal movement and population management, location of visitor facilities to avoid impacts on fragile environments and neighbouring properties, habitat restoration etc.
4. The proposed park will require acquisition of a number of Merri Creek frontage properties.
5. Parts of the creek frontage which have adjacent industrial uses (e.g. Rushwood Drive, Dunlop Olympic, the Victorian Transport Centre and the Mason Street Industrial Estate) will provide a challenge for the development of linked open space along the waterway corridor. Developer Guidelines for industrial areas are required to assist this process (see also chapter 5.1).
6. The reach is comparatively rich in Aboriginal archaeological sites and these require protection from disturbance.
7. Parts of the reach are currently being degraded by weed invasion, rubbish dumping, illegal vehicle access or inadequate management.

Objectives

See objectives listed in chapters 1.1, 1.2, 1.3, 2.1, 2.2, 2.3.

Targets

1. The conservation of areas identified as being of National or State significance for flora, fauna, geology and geomorphology and archaeology.
2. Establishment of Merri Creek Park.
3. Protection of archaeological and Aboriginal cultural sites.
4. Provision of recreation opportunities which are compatible with, and highlight the conservation and Aboriginal cultural heritage values, of the sites within the reach.
5. Preservation of the flood retention and water quality treatment capability of the Campbellfield Retarding Basin.
6. Cooperative and sympathetic management by private landholders of stream frontages and other lands to complement protection of significant sites of the reach.
7. Protection and consolidation of an open space and access linkage between the Metropolitan Ring Road and Horne Street.
8. Provision for continuous access along the reach corridor (see further chapter 4.2)
9. Provision for an open space corridor supporting flora and fauna habitat.
10. Achievement where possible, of softening of interfaces between industrial/residential areas and waterway and open space areas (see also chapter 1.3).



Actions

See Section E page 194

Map 14 - the proposed Merri Creek Park (from Parks Victoria 2006)

Chapter 2.6 Mahoneys Road to Yarra River

Introduction

Within the urbanised reaches of the corridors of Merri Creek and its tributaries, the ownership and nature of lands adjacent to the waterway varies significantly. The land abutting the waterway is predominantly in public ownership, with a small but significant number of private freehold titles extending to the edge of the watercourse. Much of this land is available for multiple recreation purposes and with some exceptions, this land can be broadly considered as open space. Provided they are adequately connected, and have habitat, these lands form an open space and flora and fauna habitat corridor.

There are numerous benefits which can accrue to people and the stream's ecosystem from an appropriately vegetated waterway open space corridor. Continuity of indigenous vegetation provides shade, food and nutrients, and a passage and home for wildlife. Native vegetation supplements the physical habitat of the corridor with its rocky escarpments, stream pool and run formations and grassy plains. A well-vegetated and maintained open space corridor also provides a source of recreation in a comparatively natural and often tranquil setting.

The function of various parcels of land varies with ownership but also based on zoning, overlays, the existence of easements, and design. For instance, some lands along the creek have a primary purpose for flood protection and may be zoned or be subject to overlay controls accordingly. Other lands located well away from the floodplain, are used as sporting fields and can be zoned Public Park and Recreation. In addition, easements over lands along the waterway have also been created (e.g. in favour of power companies such as GPU PowerNet).

Planning for the corridor needs to work within the constraints of multiple ownership and planning controls. A focus on achieving a consolidation of the open space and waterway corridor, known as the Merri Creek Parklands is required.

Some land parcels may be subject to review for disposal or transfer when they are no longer required for core activities of agencies. A thorough review of conservation and open space needs should accompany a rationalisation of land holdings affecting the corridor.

Background

In times prior to European settlement, Aboriginal communities appear to have been protective of the creek environment and its associated lands. The twentieth century though, has seen a host of different notions emerge about treatment of the creek corridor below Mahoneys Road. Few have been particularly favourable to preservation of the stream, its floodplain and lands, though some were no doubt well-intentioned.

In the early years of Melbourne's settlement, noxious industries were attracted to areas close to waterways in order that they might conveniently discharge their wastes to the streams. Their occupation of the lands near the creek set an unfortunate precedent for treatment of the stream corridor.

While effluent was poured into Merri Creek for many years as European settlement expanded north to areas such as Preston, some visionaries of the time persisted with ideas of using the creek as a municipal show-piece. One idea to emerge in the early years of the First World War, was the construction of a small lake at Northcote's gateway - presumably as a means to create some identity for this new municipality (Lemon, 1983). Though it was condemned at the time as "a menace to the health of the district", the lake idea persisted until times following the sewering of the inner suburbs and the alleviation of many concerns about the creek's threat to public health.

The re-emergence of the lake concept came with the release of the Metropolitan Town Planning Commission's (MPTC) landmark report of 1929. This suggested boulevard roads along Melbourne's arterial waterways and the use of creek corridors to produce a system of radial "parks" for Melbourne. In the case of Merri Creek there was to be a lake north of Arthurton Road, "extending for nearly the whole distance between Beavers Road and Bell Street." (MTPC in Lemon, 1983, p. 210). The plan, incidentally, also showed a major area of open space on Merri Creek above Mahoneys Road.

While this grand metropolitan plan never came to fruition, due to its expense (over one million pounds), and then the onset of the Great

Depression and the Second World War, a smaller lake on Merri Creek was finally constructed with the development of the Coburg Lake during the Depression years.

While the early and middle decades of the twentieth century was clearly a time of isolated "garden-esque" treatments of the creek corridor, the last three decades has seen a concerted effort to consolidate an open space corridor and to replicate and rehabilitate the valley's original vegetation cover.

Confirmation of this came with the coining of the term "Merri Creek Parklands" by the Merri Creek Bicentennial Committee in 1987. The phrase was thought necessary to provide an identity for the waterway's diverse and, even then, still disparate open space. Its adoption was thought desirable to assist with efforts to achieve recognition of the emerging value to the community of the creek's open space and to encourage its protection. The adoption of the term was also an outcome of the MMBW's new-found commitment to waterway open space management. This became one of the MMBW's responsibilities in the mid 1980s. It ceased to be their responsibility in 1993 with the formation of Melbourne Parks and Waterways (now Parks Victoria).

However, there can be little doubt that the efforts to consolidate and extend the creek's open space have produced significant results. Two sections of F2 freeway reservation (south of Bell Street and later Mahoneys Road to Bell Street) have been deleted. Much of this land, especially south of Bell Street, has resumed an open space status. Councils have also gradually acquired parcels of land where opportunities arose or where lack of connection between open space areas made acquisition an imperative.

The Central Creek grasslands in Reservoir is one significant area that has now been reserved, although not without a substantial trade-off to nearby residential development.

In addition, increased amounts of land owned by public authorities have become available, through a variety of means, for recreational use. These lands sometimes have a primary purpose for flood mitigation. More notable examples in this regard are the former MMBW store yard at Winifred Street Northcote and land in the Strettle Reserve/Anderson Road area of Thornbury.

However, perhaps the most significant change to the lands of the creek corridor over the last decade has been the vast improvement in its vegetation cover. This has been brought about by many years of revegetation works, primarily through the Merri Creek Management Committee's works capacity and Council efforts supported by the former MMBW and now Melbourne Water. Control of prolific weed species like Fennel has also been a noticeable change. Areas which were inaccessible and weed-infested wastelands as recently as the early 1980s (e.g. between High Street and Rushall Station, as well as many others) have become a frequently-used natural resource for the community.

Impetus for Council investment in the open space of the creek corridor - a trend which gained momentum from the late 1970s - was in part a result of their recognition of the relative open space deprivation of inner urban areas (see Ministry for Planning and Environment, 1988). Especially in the old municipalities of Fitzroy and Brunswick, the creek corridor provided one of the few opportunities for an effective increase in the open space provision of those municipalities. An even smaller proportion of the open space of these areas was available for passive recreation pursuits. As municipal recreation and other studies (e.g. Morris, 1976) of the 1970s and 80s demonstrated, traditional municipal open space usage patterns tended to persist with a strong bias towards provision of playing fields and active recreation facilities.

Opening up of the creek corridor through the provision of bicycle and walking paths, weed control and extensive revegetation have transformed many areas into popular open space with a primarily passive recreation focus.

Management Planning Priorities

(i) Primary Node Plans

Node plans are important mechanisms for planning the future development and management of sectors of the creek's open space. They ensure priority issues are addressed and resources allocated on a strategic basis.

Node plans are of greater importance in areas where past land development has reduced available open space. Where the land is used for residential purposes resumption of the land for open space is expensive and so unlikely. There will never be a uniform and adequate open space corridor along the waterways, especially in established urban areas. Links should be retained or created between "nodal"

areas of significant open space, and the open space designed and developed accordingly.

Where most parkland development work has already been done, node plans will be more oriented towards ongoing management. Where the node has received little previous attention they should focus on parkland development.

In their preparation, Node Plans will derive guidance from suggested broad treatments of reaches of waterway open space recommended in revisions being undertaken by Merri Creek Management Committee to the Merri Creek Plan (1987), which aims to provide for continuous habitat along one side or other of the Creek.

Ideally, nodal plans should cover an area spanning both sides of the creek and/or include some key open space reserves. This will create a larger planning and development impact, provide some possible economies of scale and permit Councils to work cooperatively to plan and resource development of open space on both sides of the stream. A list of sites recommended for development of Primary Node Plans is contained in the action tables.

Completed node plans are shown in Table 7. Other relevant plans for directing site management are listed in Table 8.

Many of these plans are dated, and the momentum of preparing and revising plans seems to have been lost.

Node	Plan	Date
Merri Creek		
Central Creek Grassland (Ngarri-djarrang)	Ecology Australia, Central Creek Project Grassland EMP 2000; Also Bush, Miles & Bainbridge, Central Creek 5 year works Plan. MCMC 2003	2000, 2003
Moomba Park	Taylor and Cullity Landscape Architects Pty. Ltd. (1997) Moomba Park Concept Plan	1997
Jukes Road Grasslands (Bababi djinanang)	Mueck, S. (1997) *Vegetation Survey and Management Plan for Remnant Native Grassland at Jukes Road Fawkner*	1997
Carr St to Queens Parade Coburg	Merri Creek improvement Plan: Carr St to Queens Parade Melbourne Water/ Thompson Berrill Pty Ltd	In prep (draft Nov 2006)
Coburg Lake	Bainbridge & Bush (1999) *Lake Reserve Coburg Aquatic Vegetation Management Plan*; Also Collie Landscape Design Pty Ltd (1998) *Coburg Lake Management Plan*	1998, 1999
Northcote Golf Course	Melbourne Water (200?) *Northcote Golf Course Riparian Zone Management Plan*. City of Darebin *Northcote Golf Course Masterplan* (in prep)	200?
Allard/Jones Parks & Roberts Res.	Urban Initiatives Jones Park/North East Park Landscape Master Plan	1994
CERES	*CERES Site Management Plan*	?
Arthurton Road to St Georges Road	Thompson Berrill Landscape Architects (2005?) Arthurton Rd to St Georges Road Landscape Plan for Melbourne Water Corp Land Systems EBC 1991	2005? 1991
Merri Park (Northcote)	Thompson Berrill Landscape Design Pty Ltd (2005) *Merri Park Management and Masterplan*	2005
Normanby Ave to St Georges Rd Northcote	Melbourne Water *Merri Creek Improvement Plan: Normanby Ave to St Georges Rd*	2004-5
Groves Land (St Georges Rd to railway bridge)	*Groves Park Concept Plan*, Northcote City Council, MCMC& Melbourne Water	1992
Heidelberg Road to Eastern Freeway	Murphy Design Group and Jan Bruce and Associates, 2002.	2002
Yarra Bend Park	*Yarra Bend Park Strategy Plan,* *Yarra Bend Park Environmental Action Plan,* *Draft Cultural significance and Conservation Plan,* *Yarra Bend Park Trails Strategy Master Plan.*	1999 2000 1998 2001
Edgars Creek		
Edwardes Lake Park and Edgars Creek Wetlands	Edwardes Lake Concept Masterplan Rush/Wright Associates August 2000	2000

Table 7 - Node plans south of Mahoneys Road

(implementation may be complete or underway or not yet started)

(ii) Linking Site Prescriptions

Urban land use and/or ownership has on occasions constrained the amount of open space available along Merri Creek. In these cases "linking sites" provide a "linking" function between larger nodal points.

Within these linking sites, open space management efforts should concentrate on establishing or maintaining a satisfactory path link and undertaking revegetation to provide a habitat corridor, but with little other recreational facilities.

(iii) Secondary Sites - Node Planning

After the completion of all Primary Node Plans, there will still be many kilometres of land adjacent to the creek requiring rehabilitation.

As Primary Node Plans are completed, sites from the secondary list should be investigated for the development of Node Plans. The absence of a node plan does not preclude secondary sites from works if responsible agencies choose to direct resources to a certain location or unanticipated funding or other opportunities arise.

Report	Date published
Merri Creek Waterway Activity Plan Draft Melbourne Water	2003
Vegetation Management Plan for the Merri Creek and Tributaries (in the City of Darebin), Darebin City Council	1999

Table 8 - Other plans relevant to site management south of Mahoneys Road

The secondary sites are listed in the action tables. Emphasis has again been placed upon identifying significant tracts of open space spanning both sides of the stream.

Management Principles

As important as site planning in securing a cooperative and unified approach to treatment of the Merri Creek Parklands will be commitment by Councils and other agencies to the following management principles:

- Before embarking on any project along the Merri Creek or its tributaries, to properly consult with MCMC and relevant agencies;
- To conserve cultural heritage, biodiversity and geodiversity;
- To ensure that remnant vegetation is not damaged;
- To only plant indigenous vegetation of the local provenance;
- To avoid spreading weed seed by ensuring proper hygiene practices for vehicles and equipment;
- To control environmental weeds
- To control rabbits, foxes and other pest animals
- To ensuring recreational or infrastructure development is sympathetic to the existing and potential natural heritage of the parkland.

In terms of planting or revegetation or restoration design, reference should be made to the Management Guidelines for the Native Grasslands of the Merri Creek[208], Merri Creek Aquatic and Semi-Aquatic Planting Guide[209], and other guides as they are prepared.

Consolidation of the Linear Corridor

It is crucial that lands along the linear corridor be acquired to fill gaps in nodes or links whenever possible. Lands zoned Public Park and Recreation Zone (PPRZ), Urban Floodway Zone (UFZ) and Public Conservation and Resource Zone (PCRZ) are considered relatively secure where they are owned by Council.

Land zoned PUZ 1 – Service and Utility is usually managed by Melbourne Water for flood protection purposes or for sewerage or water supply. It is possible that Melbourne Water would find these lands in excess, but not likely. A notable example of this is Merri Merri Park in Northcote, where the land is used for flood protection, with a levee between the houses and Merri Creek, and a retention basin. As well as these service purposes the land is used and managed as parkland.

Land zoned PUZ2 – Education is used for schools. The only example of this is below Lakeside Secondary College. As the land below the college is flood prone, acquisition for parkland would be more appropriate.

Land zoned PUZ4 – Transport zoned land in the vicinity of the Edgars Creek confluence, owned by VicRoads is in the process of disposal in 2009. Its retention as open space is important to linkage along Edgars Creek as well as to the value of the node at the confluence.

Land zoned PUZ7: This is a remnant of the old F2 freeway reserve adjacent to McBryde St

[208] Bush & Faithfull 1997
[209] Bainbridge, 1999

Fawkner. It is owned by the Crown and includes land contaminated by dioxins from the Agent Orange production plant during WW2.

Industrial lands in the vicinity of Newlands Road Coburg North are in many places zoned industrial right to the Merri Creek's bank, and despite recent transfers to Council of reserves at the rear of 3A and 3B, are still in some cases privately owned right to the Creek. Reserves through these properties must be a high priority for acquisition and rezoning. Some additional open space adjacent to Edgars Creek should be excised from the redevelopment of the old Kodak land which is currently underway.

Land at 168 Arthurton Road and at 177 Beavers Road Northcote is still privately owned to the Merri Creek bank. This must be a high priority for rezoning with acquisition and/or a land management agreement attached to the title via a Section 173 agreement or covenant.

Residential zoned lands impinge in many places on the Creek, however, the highest priorities for acquisition would probably be at Elizabeth Street Northcote, the VicRoads land at Golf Road Coburg, and upstream of Derby St Fawkner. Inappropriately close subdivisions in Reservoir are probably irreversible.

Urban Floodway Zoned land in private ownership should be acquired by Melbourne Water for floodway management purposes.

Screening

There are a number of stretches from Mahoneys Road to Coburg Lake where the valley is deeply incised and adjacent residential and factory development tend to be perched over the valley. Some are on fill pushed to the limits of the natural valley form immediately adjacent to the break of slope. It may be decades before the industrial lands are rezoned to residential, and it is unlikely that the existing developed residential land will ever be acquired, so the establishment of screen planting is a priority.

While there have been some success stories where owners have faithfully implemented conditions of permits and screening vegetation is established on slopes below factories, a number of areas are still poorly screened.

Such problems are particularly evident at:
- Brex Court, Reservoir;
- Edwardes Street, Reservoir.
- Newlands Road, North Coburg; and
- Acheson Place, North Coburg.

Biodiversity Preservation

Most native vegetation in this reach was removed by the 1980's. Nonetheless, Merri creek from Mahoneys Road to Coburg Lake supports occasional remnant trees, shrubs and ground flora. There are also two small remnant native grasslands areas of significance. The Central Creek Grasslands Reserve (Ngarri-djarrang) in Reservoir is of State significance[210]. Darebin Council is responsible for its management.

The second grassland site is at the end of Jukes Road in Fawkner (Bababi djinanang) and is owned by Parks Victoria. A survey and site management report revealed that the grassland contains one plant species (*Dianella amoena*) considered to have national significance for conservation[211]. Overall the Jukes Road site is thought to have State to National significance[212].

Flora and fauna survey work was undertaken in 1993[213] and 1997[214]. Merri Creek from Mahoneys Road to Marlborough Street including Central Creek Grasslands is a biosite of State significance. From Normanby Ave to Heidelberg Road is a biosite of Regional significance, and downstream of Heidelberg Road part of the Yarra Bend Park Biosite of State significance.

Edwardes Lake on Edgars Creek is a biosite of Regional significance [215] .

Revegetation

Perhaps the most remarkable feature of this urban reach has been the vast improvements to the extent and nature of open space over the last 20-25 years. Revegetation programs have without doubt made significant improvements to the habitat values of the Creeks. This program should be continued, and form a high priority as part of Moreland, Darebin and Yarra's revegetation strategies.

Fire

An identified hazard for this section of the Creek is a wildfire burning from the north, or starting within the section and burning south on a hot northerly wind day. This is discussed further in Chapter 4.4.

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[210] Robinson and Duggan, 1994; Robinson and Morgan, 1997
[211] Mueck, 1997
[212] G. Carr, pers. comm.
[213] Ecological Horticulture Pty Ltd, 1993
[214] Beardsell, 1997
[215] DSE, Biosites Maps and Reports – Port Phillip Region – 2005 Biosites 7137, 5051, 3558 and 4967 respectively

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Issues

1. An open space corridor with a sustainable and linked indigenous vegetation cover and multiple habitat opportunities is required in order to provide benefit to the community and to the waterway ecosystem.
2. Urban and industrial development has on occasions encroached into the stream valley making the provision of an open space corridor difficult.
3. While much has been achieved during the last 20 years, there are still many decades of work to be done to control weed problems, revegetate areas and protect and extend the small remnants of indigenous vegetation within the Merri Creek Parklands. Agreement about priorities is an essential part of planning future development of open space.
4. Mechanisms need to be introduced to ensure that open space lands and floodplains are protected in the long term from the effects of changing responsibilities of state agencies which own those lands.
5. Where there are areas of private ownership of creek frontage it may often be necessary to negotiate improved management of those frontages.

Objectives

See objectives listed in chapters 1.1, 1.2, 1.3, 2.1, 2.2, 2.3.

Targets

1. Continuous open space corridors along Merri Creek and the main tributaries of the reach (Central Creek, Edgars Creek and Merlynston Creek) where opportunities permit.
2. Consolidation of open space by:
   - using statutory planning mechanisms;
   - negotiating agreements with landowners for sympathetic management of private frontages to the stream, lease of land for open space purposes or other arrangements which facilitate public access to private land forming stream frontages;
   - purchase or re-zoning, transferring or otherwise incorporating strategic parcels of government and private land into the Merri Creek Parklands.
3. Adequate, strategically located open space appropriately zoned and treated in Planning Schemes (e.g. as Urban Floodway or Land Subject to Inundation, Public Park and Recreation, or similar).
4. Where subdivisions and re-developments adjoin waterway open space, and the open space is inadequate for linear parkland connectivity (either for recreational or habitat corridor purposes), open space contributions of land are required. Where open space is adequate, cash contributions may be levied
5. Sympathetic public works, private development and private land-use adjacent to the creek which aids the development of an open space corridor.

Actions

See Section E page 196.

PART B - WATER

This part consists of one section (Section 3) which focuses on water within the catchment, specifically the catchment's surface waters – the waterways and wetlands. As the catchment has no declared Groundwater Management Areas and no parts of the catchment are used for potable water supply these issues are not considered in the current document.

Chapter 3.1 looks at the drainage functions of the waterways, wetlands and floodplains, and at their management. Chapter 3.2 focuses on water quality of the waterways, and the influences from the catchment and opportunities for water quality improvement. Chapter 3.3 looks at the animal and plant life of the waterways and wetlands, how they are influenced by water quality and quantity, and how habitat can be improved.

The waterways of the catchment support important, and in many cases endangered, communities of native plants and animals and are in turn improved by these biota.

The waters of the Merri and its tributaries are highly valued by the community. The waters provide a fundamental recreational element of the linear parklands of the waterways. This is largely through a visual contribution to the recreational experience as the waterways are generally too small, and/or too polluted to allow for contact recreation. The urban lakes at Lake Reserve Coburg, Edwardes Lake Reservoir and Jack Roper Reserve Broadmeadows are especially important in this regard. The waters and floodplains provide important habitat for flora and fauna of the corridor, and these elements also contribute to the recreational experience. Park users are acutely aware of and concerned about the quality of the water in the catchment waterways, and in particular about litter levels in and near the water (see section 4).

In terms of drainage and flood management, the waterways provide an important stormwater and flood conveyance service. The channel cannot (and should not) convey larger flood events and floodwaters spill out into adjacent floodplains where they are available and have not been lost to development.

The problems of water quality and litter (discussed in chapter 3.2) and flooding (chapter 3.1) in the waterways must be managed at a catchment level, because the sources of these problems are distributed across the catchment. Management of these issues only within the waterway corridors can be only of limited effectiveness. On the other hand, reliance only on catchment-based solutions requires the cooperation of everyone in the catchment. In practice both strategies are needed. It also is important that activities to improve water quality, reduce litter, and protect people and property from flooding are integrated with habitat protection and improvement.

Whilst no parts of the Merri catchment are used for potable water supply, waters of the catchment do form an important resource for stock watering, and a small amount of irrigation for agriculture and recreational purposes.

Groundwater has been an issue in planning for quarries along Merri Creek – as the Merri is largely spring-fed in its middle reaches, quarrying may lead to reduced flows.

The Port Phillip and Westernport Regional Catchment Strategy forms the starting point for considering objectives for water. All of the regional objectives (shown below) are relevant to the waters of the Merri Catchment, even RCS-W03 as pollutants in the Merri largely end up in Port Phillip Bay, and a number of migratory fish rely on marine areas as part of their lifecycle.

Regional goals and objectives

The regional goal for water resources from the Port Phillip and Westernport Regional Catchment Strategy is:

Sustainable water use and healthy waterways, wetlands, estuaries, coasts, bays and seas.

Port Phillip and Westernport Regional water objectives (WO's) are:

RCS-WO1 Ensure efficient management of water resources with minimal new impacts

RCS-WO2 Protect and improve the environmental health and social and economic values of waterways and wetlands

RCS-WO3 Protect and improve the environmental health and social and economic values of estuarine, coastal and marine systems

RCS-WO4 Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas

RCS-WO5 Ensure the management of water resources minimises risks to natural ecosystems, public land, private assets and public safety

SECTION 3 - SURFACE WATERS, CREEKS AND WETLANDS

This section includes chapters:

3.1 Stream Morphology, Drainage, and Flood Management

3.2 Water Quality and Stream Health

3.3 Aquatic Flora, Fauna and Wetlands

Background

Water flowing in Merri Creek comes from its tributary creeks and drains, and ultimately from their catchments. Merri Creek and its tributaries within the Merri catchment are shown on Map 4.

Agency roles and responsibilities are summarized in the Introduction, and key water policy documents are shown in Table 9

Water Sensitive Urban Design is mentioned in many places in this section and is described in the box below.

Water Sensitive Urban Design (WSUD)

WSUD is a developing body of principles and practices involving integration of water cycle management into urban planning and design. Water cycle management includes the management of drinking water, stormwater run-off, waterway health, sewage treatment and water re-cycling.

In relation to stormwater, WSUD key principles include:

- Protection of natural systems
- Integration of stormwater treatment into the landscape
- Improvement of the quality of water draining from the urban environment
- Reducing runoff and peak flows especially from urban development
- Adding value while minimising development cost

Melbourne Water advocates WSUD and provides developers with financial incentives for implementation. Integrated water cycle management is now a requirement for residential subdivisions under Clause 56 of the state planning policy framework.

Agency	Key Water Policy Documents
DSE (Dept. of Sustainability and Environment)	Our Water Our Future Victorian River Health Strategy
EPA (Environment Protection Authority)	State Environmental Protection Policies (SEPPs) Neighbourhood Environment Improvement Plans Better Bays and Waterways (Water Quality Improvement Plan) in progress
PPWCMA (Port Phillip and Western Port Catchment Management Authority)	Port Phillip and Western Port Regional Catchment Strategy 2004-2009 Port Phillip and Westernport Regional River Health Strategy 2007
Melbourne Water	Merri Creek Waterway Management Activity Plan Final Draft 2003 Waterways Operating Charter 2006 Port Phillip and Westernport Regional River Health Strategy 2007 Regional River Health Strategy Addendum 2008 Better Bays and Waterways (Water Quality Improvement Plan) in progress Drainage Schemes Yarra River Action Plan Floodplain Management Strategy (in development)
Councils	Stormwater Management Plans Water Plans

Table 9 - Summary of key water policy documents

Chapter 3.1 Stream Morphology, Drainage and Flood Management

Port Phillip and Westernport Regional Catchment Strategy

Relevant Objectives:

RCS-WO2 ***Protect and improve the environmental health and social and economic values of waterways and wetlands.***

RCS-WO5 ***Ensure the management of water resources minimises risks to natural ecosystems, public land, private assets and public safety***

Relevant Regional Targets:

RCS-WT6 Improve the condition of the region's waterways so that:
- at least 50% of all the natural waterways will be in good or excellent condition by 2015
- All natural waterways will be in good or better condition by 2025.

RCS-WT7 Progressive improvement in the condition of waterways across the region, as measured by the Index of Stream Condition, including the bed and banks, streamside zone and aquatic life.

RCS-WT9 No loss of hydraulic capacity and environmental values of floodplains.

RCS-WT10 Timely flood warnings provided for all major waterways and risks to infrastructure minimised.

RCS-WT15 No net loss in the extent and health of wetlands of each existing type.

RCS-WT16 Progressively improve the overall health and social value of natural wetlands, including those that are nationally and internationally recognised.

Note that in these objectives and targets, RCS stands for Regional Catchment Strategy, and W stands for water.

Stream morphology

The alignment and geomorphological form of Merri Creek and its tributaries originates from the uplift of the underlying Silurian siltstones and mudstones creating a fall towards the south. More recently (geologically speaking) the spread of lava southwards from twelve separate eruption points including Mount Fraser, Green Hill, Bald Hill and Hayes Hill in the area between Wallan and Craigieburn formed the basalt plains characteristic of the catchment. The youngest of these lava flows was from either Mount Fraser or Hayes Hill some 800,000 years ago. With the lava surface sloping down towards the east and south from these eruption points, the creek's course came to be determined by natural depressions and ridges in the lava surface and by the major fractures and joints in the volcanic rock (Rosengren, 1993). Today parts of the beds of Merri Creek and its tributaries have cut through the basalt to the underlying Silurian rock.

Merri Creek's natural geomorphology has been extensively disturbed since European settlement. Opportunities for preservation of the stream geomorphology and the protection of some of the natural interactive processes between the stream and its floodplain have been largely lost. PIRG (1975) and Rosengren (1993, p. 8-9) have detailed the nature of human activities over the past 150 years which have significantly altered Merri Creek and identified those sites most affected. Rosengren concludes that a highly modified environment has been produced over long sectors of Merri Creek, "especially at Wallan East, south of Bald Hill, Donnybrook and Craigieburn East, and virtually continuously from Campbellfield to the Yarra River." Merri Creek's tributaries have suffered similar fates. Known sites of geological significance are discussed in chapter 2.2 of this report, and Melbourne Water's Merri Creek Waterway Management Activity Plan indicates a number of sections which are less disturbed and of value because of their relatively intact stream morphology.

In the upper reaches the most significant changes to stream and floodplain morphology have come about because of works to improve drainage and mitigate flooding. These involved straightening and channelisation of significant segments of the Merri Creek and tributaries Wallan, Mittagong, Taylors and Kalkallo Creeks, and drainage of extensive swamps in the early to mid 1900s.

Prior to being drained in the 1940s Hernes Swamp, on the main stem of the Merri, covered about 300 ha when full and held water for up to six months. It supported thousands of waterfowl and ibis. Together with the former 600 ha

Inverlochy Swamp to the west of the Hume Highway in the Kalkallo Creek sub-catchment and the 100 ha Camoola Swamp to the south-east on the Merri these swamps formed a shallow freshwater marsh system of over 1000 ha.[216] Although drainage channels have been constructed through the swamps, some of the areas are still prone to flooding and retain significant amounts of water after heavy rains.

Apart from their important nature conservation role, these swamps had a vital hydrological role in retaining flood waters, a role which although diminished is still partly present (see section on Flooding).

Floodplains and wetlands such as at Sumner Estate, Northcote, and Northcote Golf Course were reclaimed in the early 20th century.

Extensive channel modification work by the Melbourne Metropolitan Board of Works (MMBW) over many decades up to the mid 1980s was principally responsible for the changes to the urban reaches of the creek and its tributaries. Bends were straightened in many places, the channel form was deepened and modified to a trapezoidal shape, Edgars Creek in Reservoir and Thomastown was converted to a concreted channel, and Merlynston Creek in Coburg was piped underground. In-stream woody debris was removed to the extent that in many reaches, none is now present.

In the upper catchment, until recently outside the area of Melbourne Water responsibility, parts of Wallan Creek and Taylors Creek in Wallan have been piped underground. Many smaller tributaries throughout urban parts of the catchment have likewise been piped.

Many of these works were designed to increase the capacity of the waterways to carry flows from flood events. While these works may have solved short-term local concerns, they have also reduced opportunities to manage the streams as a natural resource due to loss of natural morphology. Loss of the streams' natural floodplains through filling and development is a further element in the degradation of these natural systems.

Typically, streams across the basaltic soils of Melbourne's north and west display a "pool and run" form where they successively pond at regular points before entering a "run" or "riffle" sequence. Where modification of the creek channel has caused the complete loss of natural form (such as concreted sections of Edgars Creek) only comparatively minor improvement works in the form of retrofitting riffles can be undertaken to alleviate some of this loss and create a more natural stream form. Some sections of the waterways which were channelised but not concreted are beginning to re-form a more meandering pattern with occasional pools and riffles more closely resembling the natural morphology. Other sections of the creeks (e.g. parts of Edgars Creek in Coburg North or Merri Creek through Galada Tamboore) retain good natural morphology. Opportunities are present in some reaches of the creeks to modify the trapezoidal channel form through earthworks to achieve a more natural bank profile.

Besides protection of the creeks' remaining morphology, a related key element of waterway management is protection of the existing channel and bank stability. Creek banks which are subject to erosive forces can, if left untreated, contribute massive amounts of sediment to the creek, the Yarra and Port Phillip Bay. Excessive sediment levels are a major contributor to loss of stream life and its diversity.

The mid to lower reaches of the Merri Creek and tributaries on the whole do not suffer significant bank erosion problems. In some parts this may be due to the restriction on valley widening brought about by the toughness of the lava flows defining the stream. Rosengren (1993) describes Merri Creek as having, for the most part, well-defined flows within a narrow valley bounded by steep slopes and bluffs with rocky cliffs and gorge sectors.

The upper reaches of the Merri Creek are described as suffering moderate to extensive bank instability (Amenta 2002) due mainly to stock access. Some parts of the upper reaches also display active gully erosion and slumping of banks. Kalkallo Creek is described as experiencing active gully erosion, extensive scour on bends and undercutting of banks. This is particularly the case for its western most tributary which rises on sedimentary rock.

Edgars Creek where it flows through the base of an ancient swamp at North Coburg is one of the few sites within the urban section of the Merri system where significant erosion of the stream bank has taken place in recent times. Bank reinforcement works involving the placement of large basalt boulders were undertaken by Melbourne Water in 1996/7.

The Port Phillip and Westernport Regional River Health Strategy (2007) has a target of improving the condition of stream habitat and stability for the Merri Creek in urban reaches,

[216] Beardsell Vol. 2 p. 14

from 'moderate' to 'good'. In rural reaches it aims to prevent any further damage to habitat and stability which is rated as being in 'moderate' condition.

Stream Flow and Hydrology

Stream flows and their effects on the waterway ecosystem have been inadequately studied along the Merri waterways. In pre-European settlement times flows were probably minimal during late summer/autumn with even major creeks such as the Merri reduced to a series of pools. Smaller tributaries probably dried up entirely and wetlands seem to have been seasonal. Today the effects of summer drying are exacerbated by diversions, including farm dams for stock and domestic purposes in rural areas and for commercial or irrigation purposes.

Urbanisation also exacerbates summer drying (see Box below) although water main leakage may offset this somewhat at present. Yarra Valley Water has a program in place to actively identify points of leakage in the water main system and eliminate them. This work is possible following the installation of zone metering, which enables us to more accurately pinpoint areas in which unaccounted-for water use is high.

URBANISATION AND HYDROLOGICAL CHANGES

Typically, urbanisation leads to an increase in impervious area and decreases in infiltration, use by vegetation, and natural valley storage. This results in well documented hydrological changes including increased storm peak flows, higher storm runoff volumes, more frequent higher-flow events and bank-full flows in the receiving waters, and less base flow.

Where the stormwater drainage system is directly connected to local waterways (i.e. without end of pipe wetlands), even quite small rain events produce increased stream flow compared to non-urban catchments.

Use of water sensitive urban design features which provide for reuse of stormwater (e.g. rainwater tanks) or greater infiltration of stormwater (e.g. vegetated swale street drainage, raingardens) can greatly reduce the extent of these hydrological changes, reducing the frequency and intensity of higher flow events, and improving base flow.

Extension of the metropolitan sewerage system to the outer northern suburbs of Melbourne has led to the redundancy of the Craigieburn Sewage Treatment Plant (STP), which discharges treated sewage to Merri Creek. In order to meet State Environment Protection Policy requirements the level of treatment of the effluent must be improved or discharge cease. The base flow provided by the STP may be beneficial in some ways to the Creek; in other respects it may be having detrimental effects[217].

Any assessment of the situation is complicated by the fact that areas upstream of the STP are rapidly urbanising bringing predictable hydrological changes. Of key concern is the downstream population of Growling Grass Frogs. It is not possible to determine with any certainty whether this population would be adversely effected by closure of the STP and it has been suggested that the most prudent approach would be to maintain a flow[218]. In 2003 Yarra Valley Water proposed closing the plant, and replacing its discharge with a discharge from the Aurora Treatment Facility being built to recycle water for the new suburb of Aurora to the east.

The possible removal of the STP flow raised the question of what is the desired flow regime for the Creek. This matter is complicated by the fact that in many respects Merri Creek is highly modified, and by the unknown impacts of such things as rural dams, and the extent of new urban areas. The latter will undoubtedly lead to changes in stream hydrology, but the extent of this depends on the degree to which water-sensitive urban design is implemented and the extent to which stormwater use or reuse occurs.

In established urban areas stormwater runoff has led to increases in both peak flows and peak velocities. Further, the removal of stream meanders has meant that quiet areas of water for fish breeding and habitat have been virtually lost in the lower catchment (see Deep pool refugia below).

Melbourne Water has undertaken limited analysis of flows in Merri Creek as part of their Stream Flow Deviation Project. However, an understanding has not been achieved of what the Merri Creek's 'natural' flow regime is. Such an analysis would be part of a Stream Flow Management Plan, which Melbourne Water has undertaken for a number of waterways, but is not planning to do for Merri Creek.

[217] see Egis, Frood, YVW
[218] Robertson & Heard

Yarra Valley Water has recently revised its strategy for the provision of sewerage services to the Craigieburn area. This has resulted in the continued operations of the Craigieburn STP. In consultation with Melbourne Water, EPA and other relevant stakeholders such as MCMC, it is also undertaking a FLOWS study to determine an ideal flow regime to sustain the habitat for key values of the Merri Creek downstream of the Craigieburn STP discharge point such as the Growling Grass Frog. The results of this study will contribute to the long term operating strategy of Craigieburn STP and may result in a change to the EPA operating licence in terms of minimum daily flow to be discharged to the Merri Creek (which is currently not specified).

YVW's Aurora STP, although located in close proximity to Merri Creek, will have no discharge to the Merri Creek as long as Craigieburn STP remains in operation. Effluent treated at the Aurora STP is stored in a 280 ML open storage dam and is then used to produce Class A recycled water from their Aurora Recycled Water Treatment Plant (RWTP). This recycled water is supplied to customers via a third pipe system. The Aurora RWTP is currently being commissioned and is expected to be operational in early 2009.

According to the Port Phillip and Westernport Catchment Condition Report 2004/5, 'environmental flows' are in place for Merri Creek; however it is not clear how this assessment has been made given the lack of understanding of what natural or desirable flows are.

Diversions from Merri Creek are controlled by Melbourne Water's Local Management Rules. The rules aim to limit diversions to a sustainable diversion limit for the Creek (derived from the Stream Flow Deviation Project), and to stop diversions when the flow in the Creek drops to an identified minimum level. The minimum flow is based on the flow that was exceeded at least 95% of the time since 1986. Farm dam licences issued before July 2004 are exempt from the flow requirements.

Deep pool refugia

Areas with permanent water are more likely to contain the highest aquatic biodiversity and have greater significance as refuge sites from where biota can recolonise areas in favourable seasons, particularly where these are located in reaches which regularly dry out. Such refugia can be particularly important for fish species as they can be long lived and disperse widely. Protection of these deep pools and their immediate environs should be a high priority.

Flood Management

Types of Flooding

Flooding can be classified into two main types:

- **riverine flooding**, which occurs when water spreads out from a creek or river when it overtops its banks; and
- **overland flooding**, which occurs when localised stormwater flows from intense rainfall events exceed the capacity of underground drains, and travel overland finding the lowest path to the nearest waterway.

Underground drainage infrastructure is generally designed to cater for up to 5-year Average Recurrence Interval (ARI) events although there are examples in older parts of the Merri catchment where capacity is exceeded more frequently than this.

ARI: **Average Recurrence Interval**

The average interval in years between the occurrence of a flow, discharge or rainfall greater than or equal to a specified amount.

It is implicit in this definition that the periods between exceedances are generally random.

In more recent urban design larger events are accommodated through overland flow paths designed into the road network or through reserves set aside as floodways. Storms can therefore result in localised flooding when the capacity of the drainage system is exceeded, the overland flow path is poorly defined or non-existent, becomes blocked for some reason, or is inadequate for a larger storm event.

In older parts of the Merri catchment, developed prior to the 1970s, numerous properties are affected by overland flows because dedicated paths to carry excess stormwater along roads and reserves were not adequately created when the areas were subdivided. This results in flows following natural drainage paths through valley lines and properties. Properties in Thornbury in the subcatchment of the Preston Main Drain (a tributary of the Merri), which were flooded following extreme rain events in December 2003 are in this category.

In all of Melbourne there are about 80,000 properties exposed to risk of flooding from overland flows.

Major floods on Merri Creek in 1963 and 1974 affected numerous properties through riverine flooding. Subsequent works have reduced this flooding risk (see below).

Flood Protection

After the major flood along Merri Creek in May 1974 the then Melbourne and Metropolitan Board of Works acquired several parcels of land for construction of retarding basins to manage such events. A major retarding basin was constructed on Kalkallo Creek in Mickleham, below Gums Gully Road, as well as retarding basins on Campbellfield Creek in Fawkner and Merlynston Creek, Dallas. Land was also purchased at Galada Tamboore, in Campbellfield/Thomastown for the proposed Campbellfield retarding basin on Merri Creek itself. Due to the completion of the other retarding basins and levee works at Thornbury, Northcote and Brunswick (see below), this retarding basin is unlikely to be required within the next 20 years.[219]

As mentioned earlier the swamps of the northern catchment still perform some flood control function. In a 1974 evaluation of the severe flood on Merri Creek in Brunswick and Northcote that year, MMBW's Chief Engineer of Main Drainage, C.T. Earl said these swamps are "of importance in the natural regime of the Merri Creek and it is considered these formations, with the associated barriers of rock across the valley control peak flooding along the downstream sections of the creek". At times of high rainfall in the Merri catchment "….several thousand acre feet of water is stored temporarily on these lands during major flooding and as a consequence potential peak flows from the upper catchment are retarded by 'in-catchment' storage". 2006 correspondence from Melbourne Water indicates that the Hernes Swamp area provides valuable reduction in flows to the downstream creek system, reducing flows to about 25% of inflows[220].

In the 1980's numerous flood mitigation works were also carried out by the MMBW in the lower catchment. Examples are earthen levee projects integrated into parkland at Strettle Reserve/Anderson Road in Thornbury, Winifred Street in Northcote and Alister Street in East Brunswick. These sites demonstrate that flood mitigation works can be designed in a manner which is environmentally sensitive and which meet multiple-objective waterway management requirements.

Retarding basins can be designed in such a way as to enhance waterway habitat values. The Merri Park wetland in Northcote is located within a small retarding basin and provides a range of ephemeral wetlands and indigenous vegetation. The Campbellfield Creek Retarding Basin has also been redesigned to provide a full water quality treatment wetland within the base of the retarding basin. Other retarding basins have potential to be similarly transformed.

Despite these works a number of urban properties are still located within areas prone to flooding. The presence of floodplains is generally indicated in the planning scheme through the Urban Flood Zone, the Land Subject to Inundation Overlay and the Rural Flood Overlay. Information for these overlays is provided to Councils by Melbourne Water, with the Councils being responsible for the appropriate amendments to incorporate the overlays into the planning scheme.

The susceptibility of properties to overland flow flooding is usually indicated in local planning schemes through designation of a Special Building Overlay. This overlay triggers a requirement for a planning permit and typically requires that floor levels be raised a specified height above the 100 year ARI when new building works are being undertaken.

Although overland flooding often results in community demands for the building of new drainage infrastructure to give better protection to properties affected by flooding, this is often very expensive and can to be quite disruptive in existing urban areas.

Melbourne Water has developed a Flood Management and Drainage Strategy for the Port Phillip and Western Port region. It covers roles and responsibilities for urban drainage management, targets, service level standards and methods for prioritising mitigation works to reduce intolerable flood risks. Importantly it identifies the need to better understand how communities are affected by flooding and the need to increase community understanding and preparedness for floods. A key target is that all Councils have Flood Management Plans in place by 2013.

Urban Development and Flood Protection

Current standards require that Merri Creek, its tributaries and associated floodplains should be capable of storing and transmitting the 100 year

[219] Letter to Friends of Merri Creek from Melbourne Water 11 July 2006.
[220] Letter to Mr. Ray Radford from Grant Wilson, Melbourne Water, dated 20/7/06

ARI flood event generated from the catchment, without impact on life and property. Achieving and maintaining this capacity is primarily Melbourne Water's responsibility.

The conduct of this responsibility means that Melbourne Water and Councils implement appropriate drainage strategies and works to address the provision of that level of flood protection (see Drainage Strategies below). Critical to this is ensuring that no development is permitted that would reduce the hydraulic capacity of floodplains. In practice this does not mean no development at all in floodplains. The conditions under which such development can occur are described in Melbourne Water's Land Development Manual (Melbourne Water 2008).

Drainage strategies may be written with knowledge of environmental values, but do not necessarily seek to implement outcomes other than flood protection. For example, other relevant targets include WT9 "No loss of …environmental values of floodplains" and WT16 "Progressively improve the overall health and social value of wetlands…" from the Port Phillip and Western Port Regional Catchment Strategy.

Melbourne Water's area of responsibility was expanded in 2005 to include the upper Merri catchment (mainly in the Mitchell Shire). Flood modelling is being undertaken in the upper Merri catchment to determine floodplain capacity needs, including potentially, the re-establishment of lost capacity. This is particularly important given the extent of urban development occurring in the Wallan, Taylors and Kalkallo Creek sub-catchments.

All new urban developments, both residential and industrial/business are required to meet urban drainage standards (Standard C25 from clause 56.07 of the planning scheme) which importantly should not increase flood levels on upstream or downstream properties. This is an ongoing challenge as urban development extends northwards from Craigieburn and Epping, and as Wallan and Beveridge in the upper catchment expand. Generally land needs to be set aside for retardation purposes. This is because the increased proportion of hard surfaces associated with urban development leads to increased volumes and accelerated velocities of stormwater runoff. According to the Hume Growth Area Report approximately 10 per cent of the land area for each stormwater sub-catchment will be required for retardation purposes.

The lack of oversight of the upper catchment by a water authority prior to 2005 has meant that some inappropriate rezonings have been approved that now require fixing. For example the Mixed Use Zone and Development Plan Overlay southeast of Wallan encroach significantly on Hernes Swamp, which is useful as documented above for holding floodwater, and inappropriate for development because:

- Development within the flood zone of Hernes Swamp will affect its hydrology and capacity, and ultimately Merri Creek downstream
- The development will drain into Merri Creek and development should not occur unless water quality, storm water flows, and flood protection measures are in place
- Plains Grassy Wetlands are so rare they are considered extinct in the Victorian Volcanic Plain[221], and associated species are in decline, so these are the areas most in need of protection and restoration.

Developers seem keen to develop these areas despite the flood hazards and environmental values.

Willow and other woody weed control and drainage function

A key and sometimes controversial element of waterway management is willow control. Willows are a problem because of their capacity to spread rapidly from branch fragments, and their ability to change stream form due to their matting root form. In some reaches they can retard flood flows and in a severe flood, break off, be washed downstream, lodge against a bridge, capture large volumes of debris putting pressure on the bridge and ultimately cause the bridge to fail. Willows also diminish stream eco-systems through shading, and reduced food availability and habitat quality. In particular growth of macrophyte plants in the stream, which provides much of the in-stream habitat, is severely reduced by dense overhanging willows.

Nonetheless, sections of the community value mature willows (especially Weeping Willows) for aesthetic reasons and control works must be managed with these sensitivities in mind. Generally weeping willows are only removed if their health is declining and they are showing signs of breaking up. Willow control works along Merri Creek have been conducted for many years by Melbourne Water, Councils and the Merri Creek Management Committee

[221] PPWCMA (2006) file Victorian Volcanic Plains.xls on enclosed CD, although small areas do persist in the Merri catchment.

(MCMC). Melbourne Water has developed a control procedure for willows which sets out the scope of the issues and the methods for control (Melbourne Water 1997).

Other exotic 'woody' weeds such as Desert Ash can cause similar problems. Methods to optimize environmental benefits of woody weed removal are discussed further in chapter 3.3.

Various Melbourne Water woody weed and revegetation projects have seen severe infestations of woody weeds replaced with indigenous vegetation especially in the last five years. Works have occurred along reaches of Merri Creek in Brunswick/Northcote, and Queens Parade to Carr St in Fawkner-Coburg.

Native vegetation management and drainage function

Melbourne Water, Councils, MCMC, Parks Victoria and private landowners are involved in management of the remnant flora and fauna of the waterways and their riparian zones as well as revegetation and habitat enhancement (discussed further in Chapter 3.3 and section 2)

An important consideration in revegetation works is the need to maintain the essential drainage function of the waterway, especially its ability to handle major flood events. Excessive use of shrubby species in revegetation works, particularly immediately upstream and downstream of major road crossings or critical culverts, can slow flow during major flood events and raise flood levels. In some instances along Merri Creek this may endanger the structural integrity of crossings and even threaten the ability of nearby levees to hold back flood waters. As a result, Melbourne Water's bank revegetation projects limit the use of shrubby species. Details of this approach are described in the Merri Creek Waterway Management Activity Plan.

The Port Phillip and Westernport Regional River Health Strategy (2007) has a target of improving the condition of streamside vegetation for the Merri in urban reaches, from 'very poor' to 'poor'. In rural reaches it aims to prevent any further damage to streamside vegetation condition.

Urbanisation and waterway hydrology

Implementation of water-sensitive urban design (WSUD) is likely to become an integral part of new development and has a positive benefit in reducing the impacts of hydrological changes associated with the increase in impervious surfaces in urbanised catchments.

As urban consolidation in the lower parts of the catchment proceeds, resulting in a reduction in permeable area of private gardens, retrofitting of WSUD features will play an important role in reducing (or even reversing) the impact on hydrology. The redevelopment of activity centres and large infill sites provide opportunities for large scale incorporation of these features. For individual houses, the installation of a reasonably large water tank or rain garden can make a measurable difference. Standard C25 in Clause 56.07-4 of the State section of the planning scheme specifies stormwater drainage standards. Melbourne Water has identified the need to review these to better reflect the need to manage physical impacts of increased urban runoff on waterways (Waterways Water Quality Strategy 2008).

The City of Whittlesea has some concerns with lot-scale rain gardens because of potential access and maintenance problems (assuming Council may be required to maintain this infrastructure, or that residents may not adequately maintain lot scale rain gardens themselves.

Urbanisation and the protection of ephemeral streams – the Edgars Creek example

One of the impacts of the hydrological change which accompanies urban development is the change to local waterways, as described in the stream flow and hydrology section (above). These changes are perhaps seen most dramatically in ephemeral streams in which increased flows not only change their basic flow characteristics, but also lead to changes in bed and bank form and higher rates of erosion because of the greater flows. An innovative approach to this problem has been proposed for the new suburb of Aurora in North Epping. Aurora is located on the upper reaches of Edgars Creek, a major tributary of the Merri. In this location the Edgars Creek drains surrounding rural land and is ephemeral. Although in poor ecological condition, the creek is considered to have at least "local" geomorphological significance and to be at risk of increased bed and bank erosion after urbanisation (Prentice 2007). In order to retain the ephemeral nature of the creek and reduce the risk of erosion and minimise the impact on the existing geomorphology, the waterway concept for Aurora involves:

- Treating most of the stormwater runoff at the street scale in local bioretention systems and discharging the water to pool sections of the creek via pipes;

- Modification of short sections of the creek corridor to create pools within the existing drainage line;
- After rainfall, treated runoff will enter the pool sections of the creek. In heavy events the creek will flow, but in less intense events only the pools will collect water.
- A parallel low flow pipeline will minimise the number of stormwater outfalls to the creek and avoid having to deepen the channel to carry increased stormwater volumes.

Development Services Drainage Schemes

Melbourne Water's **Development Services Schemes** provide the orderly provision of infrastructure in growth areas such as underground drains, overland flow paths, retarding basins, wetlands and stormwater treatment measures, and specify the appropriate treatment and protection of rivers and creeks.

Redevelopment Services Schemes ensure that redevelopment in existing urban areas is properly serviced and that higher density development does not reduce existing levels of flood protection

Drainage schemes enable appropriate planning to recover costs of infrastructure necessary to ensure urban development meets the current Melbourne Water standards for flood protection and environmental protection.

Merri Catchment Drainage Schemes:

Aitken Creek (Craigieburn Area)

Malcolm Creek (Craigieburn Area)

Kalkallo Creek (in prep)

Taylors Creek (in prep)

Wallan Creek (in prep)

Roxburgh Park (Patullos Lane)

Roxburgh Park (Coopers Rd)

Roxburgh Park (Craigieburn South)

Edgars Creek

Redevelopment Schemes:

Merlynston Main Drain (from Ring Road south)

The best practice approach to stormwater treatment utilising distributed Water Sensitive Urban Design (WSUD) requires significant resourcing at the local level. This is because distributed WSUD can occur right down to individual lot level (i.e. in catchments much smaller than 60ha and hence Councils' responsibility, not Melbourne Water's). The switch from end-of-pipe wetlands to distributed WSUD treatment entails some change in management and maintenance responsibility from Melbourne Water to local government. Funding arrangements must therefore be developed to ensure that WSUD management and maintenance costs are born equitably across the community, in concert with a better understanding of the lifecycle costs of WSUD.

As an incentive, developers who implement WSUD on their properties are given a discount on the stormwater quality component of the drainage scheme charge.

Drainage schemes first require the development of a drainage strategy with mapping and designation of flood prone areas to ensure these areas are protected from filling and other potentially inappropriate impacts of development.

Climate change

The identified likely climate change trends for southern Victoria include increased average and summer temperatures, reduced rainfall, reduced stream flows, and more extreme events with more hot days, more dry days and increased rain intensity during storm events. More intense storms may cause more frequent overland floods in some urban areas.

Melbourne Water has identified climate change as a challenge for management of river health and flood protection. Current modelling is based on past pattern of rainfall, utilising Australian rainfall standards. Revision of modelling and flood extent mapping will need to take into account potential long-term pressures on the existing drainage system created by urban consolidation and climate change[222]. It is unclear when this will be done and what it means for the Merri Catchment.

Relevant Regional Actions

RCS-WA7 Implement the Port Phillip and Western-port Regional River Health Strategy (MW with local govt and community, etc)

RCS-WA11 Reduce by 500 the number of properties vulnerable to a one in 100 years flood. (MW with local govt)

RCS-WA12 All new developments constructed with floor levels at the required safety margin above one in 100 years flood levels (MW with local govt)

[222] Draft Melbourne Water Waterways Operating Charter 2008/09 to 2012/13

RCS-WA13 Develop and incorporate into planning schemes, protocols that contribute to the protection of the environmental values of floodplains (DSE with MW, local govt, CMA)

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Issues

1. Sections of creek with relatively intact stream morphology are valuable and should be protected.
2. Swamps in the upper catchment still have a vital role in retaining floodwaters.
3. These swamps also provide opportunities for wetland rehabilitation.
4. Channel modifications have reduced opportunities to manage streams as a natural resource. Where the waterway is not re-establishing a pool and run form, opportunities are present in some reaches of the Creeks to re-form the channel to achieve a more natural profile, including retrofitting of rock riffles, in part to help re-create pools.
5. Some tributaries are suffering moderate to extensive bank instability (e.g. Kalkallo Ck). The resulting sedimentation can cause loss of stream life and diversity.
6. Desirable flow regimes for the Merri Waterways are not yet known, and catchment changes may be making the flow regime worse. A stream flow management plan would address this.
7. Protection of deep pool refugia is a high priority.
8. Many older urban areas in the Merri catchment do not have adequate overland flow paths.
9. Construction of the Campbellfield Retarding Basin at Galada Tamboore, or restoration of the storage capacity and function of the Hernes, Inverloch, Inverlocky or Camoola Swamps may be required to avoid worse floods.
10. There is scope to transform additional retarding basins in the catchment to improve habitat values and provide full water quality treatment wetlands within the floor of the retarding basin.
11. Some existing urban areas are still prone to riverine flooding and many more to overland flow.
12. Urban consolidation in the lower catchment has the potential to increase the amount of stormwater runoff and worsen flooding. On-site management using water-sensitive urban design features can help manage this to some extent, as can Redevelopment Services Schemes.
13. Greenfield development on the urban fringe has the potential to increase runoff volumes and rates and worsen flooding downstream unless appropriate measures are taken to reduce runoff and retard flows back to pre-development conditions.
14. Completion or preparation of Melbourne Water drainage schemes is needed to ensure flood levels do not increase upstream or downstream.
15. Localised water-sensitive urban design features are helpful in controlling runoff increases for lower end rainfall events. Councils need to be alert to these opportunities and the requirements of the planning schemes in their administration of planning processes.
16. A better understanding of lifecycle costs of WSUD is needed so that equitable funding arrangements for WSUD can be developed between local governments and Melbourne Water.

17. On an individual household level, and where applied extensively, installation of water tanks of a reasonable size and/or rain gardens can contribute to reducing the rate and volume of runoff.
18. At the street level, bioretention systems, such as grassed swales and raingardens can reduce the contribution of road runoff and its pollutants to waterways.
19. Waterways and floodplains in the catchment have lost much of their native vegetation, particularly in the urban area. Major revegetation programs are needed.
20. It is unclear what impact climate change will have on the Merri catchment and when flood modelling will be able to take this into account.
21. Willows and other woody weeds can create flooding problems (as well as ecological ones), but exotic tree removal can be controversial and should not be undertaken without adequate community consultation processes.
22. Inappropriately located shrubby vegetation immediately upstream and downstream of critical culverts (road crossings), has the potential, in major flood events, to raise flood levels and threaten the functioning of the culverts and nearby levees. Revegetation works need to be designed to avoid making flooding worse.

Objectives

1. Protect and improve the environmental health and social and economic values of waterways and wetlands (RCS-WO2).
2. Management of water resources to minimise risks to natural ecosystems, public land, private assets and public safety (RCS-WO5).

Targets

1. No loss of hydraulic capacity and environmental values of floodplains (see RCS-WT9).
2. Risks to infrastructure and life and property by flooding are minimised (see RCS-WO5).
3. Urban runoff from all new developments meets Standard C25 in the planning scheme.
4. Flood control works are aesthetically pleasing and capable of supporting a range of other uses especially recreation and habitat.
5. Design of greenfields urban developments incorporates water-sensitive urban design features at allotment (e.g. rainwater tanks & raingardens), streetscape (local bioretention swale systems in road reserve) and neighbourhood (local wetlands and/or swales, raingardens) scales to achieve optimum infiltration and minimise hydrologic changes.
6. Greenfields development takes into consideration the ephemeral nature of many of the waterways of the upper Merri catchment and the desirability of retaining the geomorphological character of these ephemeral streams.
7. Infill urban development incorporates water-sensitive urban design measures to reduce runoff volumes and rates and improve water quality.
8. In existing residential areas measures are encouraged which reduce peak runoff, including water tanks, infiltration beds, porous surfaces etc.

Actions

See Section E page 199.

Chapter 3.2 Water Quality and Stream Health

Relevant Port Phillip & Westernport Regional Catchment Objectives:

RCS-WO4: Improve water quality in waterways, aquifers, wetlands, estuaries, bays and seas.

Relevant Regional Targets:

RCS-WT8: Improve water quality in rivers and streams so that:
- At least 80% of monitoring sites attain State Environment Protection Policy (SEPP) objectives or regional targets by 2009
- All monitoring sites attain SEPP objectives or regional targets by 2030

RCS-WT21: Improve water quality in estuaries, bays and seas so that all monitoring sites attain SEPP objectives or regional targets by 2030

RCS-WT22: Reduce the average annual nitrogen levels entering Port Phillip Bay by 1000 tonnes by 2006

RCS-WT24: Reduce the amount of litter and other gross pollutants entering Port Phillip Bay and Western Port by 70% by 2015

Relevant Regional Actions:

RCS-WA10: Meet best practice standards in urban stormwater discharges in new urban areas

RCS-WA17: Review and implement a surface and ground water quality monitoring system to ensure adequate and coordinated coverage across the region, including reservoirs, high discharge areas, bays and seas, high rainfall events and nutrient loads.

RCS-WA44: Implement the Port Phillip Bay Environmental Management Plan to reduce the average annual nitrogen input into Port Phillip Bay by 1000 tonnes, and review and extend the plan to address additional risks to the Bay.

RCS-WA47: Refine and implement key actions in municipal Stormwater Management Plans to reduce inputs of nutrients, toxicants and litter to the bays.

Background

Legislation and Policy

The *National Water Quality Management Strategy* is implemented in Victoria through the *Victorian River Health Strategy* (VRHS) (Government of Victoria 2002) and the *State Environment Protection Policy* (SEPP) (Waters of Victoria) (WoV).

The *Victorian River Health Strategy*[223] provides a state-wide policy framework for managing the health of Victoria's rivers.

State Environment Protection Policies (SEPPs) are the state-wide policy instrument for the protection of beneficial uses of water environments in Victoria. Beneficial uses are defined as the uses and values of the water environment that the community and Government want to protect.

Many factors affecting run-off quality and the health of waterways and the bays are not directly under Melbourne Water's control and require cooperative endeavours with Councils and landholders.

Stormwater quality is managed through a memorandum of understanding between Melbourne Water, EPA and the Municipal Association of Victoria. The agreement focuses on sharing accountabilities and costs for stormwater quality management between Melbourne Water and councils. Council stormwater management plans support the intent of the Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO 1999). Meeting these Guidelines is now a statutory requirement for residential subdivisions under Clause 56 of state planning policy.

At a regional level, the *Port Phillip and Westernport Regional Catchment Strategy* (RCS) sets natural resource objectives, targets and programs, and identifies priorities for investment across land and water within the region. The *Regional River Health Strategy* is a strategy under the RCS that details river health objectives, targets and programs in the region. Targets include meeting the SEPP objectives for aquatic life. Overall River Health is assessed using the Index of River Condition (see below)

[223] Melbourne Water (2007)

INDEX OF RIVER CONDITION (IRC)

The index of river condition is an integrated measure of environmental condition based on five sub-indices:

- Naturalness of flow regime
- Condition of channel (bed & banks)
- Type & extent of Streamside vegetation
- Water quality (physical & chemical characteristics)
- Aquatic life (macroinvertebrates)

Assessments for each sub-index are based on one or more characteristics. Each sub-index is rated on a scale from 0-10. These ratings are then combined to produce the IRC which has a maximum value of 50. River condition is then identified on 1 -5 scale ranging from 'very poor' to 'excellent'.

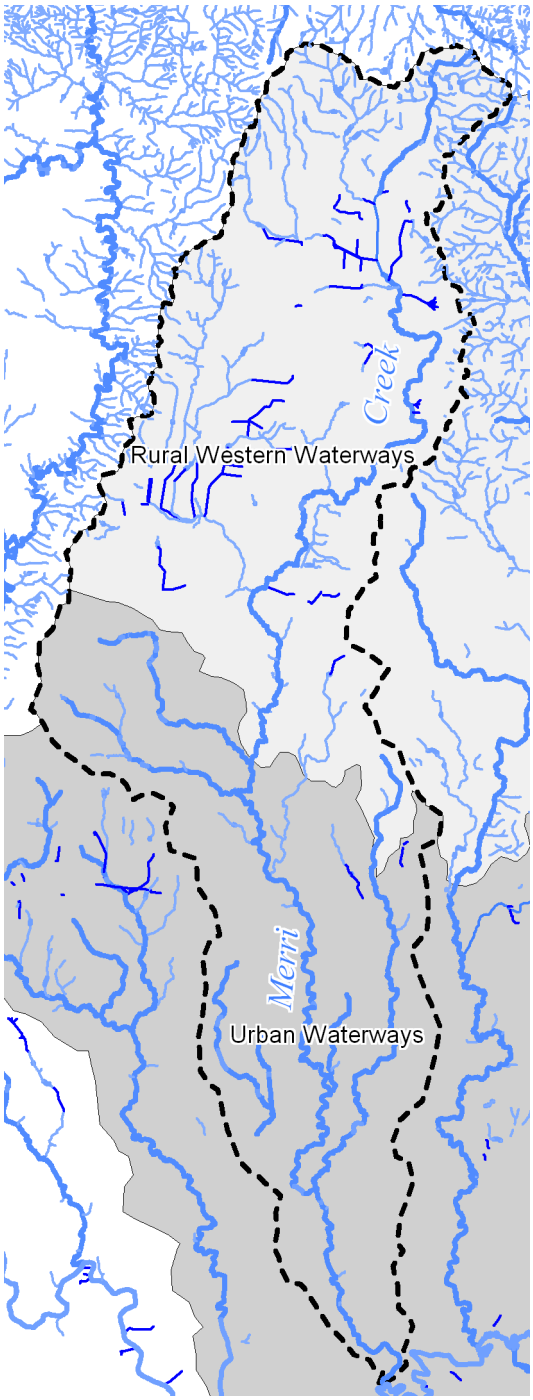
State Environment Protection Policy (SEPP) objectives for the Merri

The SEPP of relevance to the Merri is *State Environment Protection Policy (Waters of Victoria),* and in particular *Schedule F7 Waters of the Yarra Catchment*. This states the objectives required to protect beneficial uses of the Merri waterways. It has provisions binding on all individuals and organisations, government departments and agencies.

The SEPP identifies the upper Merri Catchment as belonging to the *Rural Western Waterways* segment and the lower catchment area as being part of the *Urban Waterways* segment.

The beneficial uses to be protected for each segment are at present identical. They are:

- maintenance of aquatic ecosystems and associated wildlife within modified ecosystems[224];
- passage of indigenous fish;
- maintenance of indigenous riparian vegetation;
- recreation (conditional primary contact e.g. swimming, secondary contact e.g. boating and fishing, and passive recreation);
- production of edible fish and crustacea;
- agricultural (and parks and gardens); and
- other commercial purposes (industrial water).



Map 15 - SEPP Schedule F7 segments in the Merri Catchment

Schedule 7 to the SEPP establishes water quality objectives for each segment using various indicators.

Physico-chemical indicators of environmental quality include temperature, pH (acidity/ alkalinity), salinity, dissolved oxygen, turbidity, suspended solids, toxicants[225], taints, *E. coli* organisms, coprostanol (a faecal sterol which can distinguish faecal contamination of human

[224] There are five levels of ecosystem protection in the SEPP. 'Modified ecosystems' are the second most modified category; the least modified are the 'natural ecosystems'. 'Modified ecosystems' are described as being 'highly disturbed'.

[225] 'toxicants' includes various heavy metals. SEPP water quality objectives relate to levels in water rather than in the waterway sediments.

origin from other sources) and nutrients (phosphorus and nitrogen).

Ecological indicators of environmental quality include the macroinvertebrate community (using the SIGNAL index score and other measures) and fish, based on presence of certain native fish species.

SIGNAL INDEX

The SIGNAL index (Stream Index Grade Number – Average Level) for biological assessment of water quality allocates pollution sensitivity grades (scores 1 -10) to common Family level groups of macroinvertebrates ('water bugs') found in streams. The score is calculated by summing the grades and dividing the total by the number of Families. The condition of a stream site is assessed according to ratings and placed in one of four categories ranging from 'clean water' to 'probable severe pollution'.

A recent development of the SIGNAL index (SIGNAL 2) has produced a more versatile and reliable version of SIGNAL (Chessman 2003) which can respond to a range of forms of stream degradation.

The SEPP objectives are based on the earlier version of SIGNAL (see Box). Use of SIGNAL 2 could provide more meaningful monitoring results for the Merri waterways although Pettigrove & Hoffman (2003b) have stated that SIGNAL 'is not suited for assessing the effects of toxicants on urban aquatic ecosystems.' As discussed later, toxicants are a major problem in the Merri.

In addition Schedule 7 specifies that there must not be any litter, anthropogenic floatable materials, foams or scums, materials causing objectionable colours or odours, or visible films of oils, greases and petrochemical products or odours from such products.

The objectives for the urban segment are less stringent than the rural segment.

Also of relevance to the Merri waterways is the *State Environment Protection Policy (Waters of Victoria) - Schedule F6 Waters of Port Phillip Bay* which identifies nitrogen reduction objectives for the waterways entering the Bay. These objectives are specified in the *Port Phillip Bay Environmental Management Plan* and are based on the findings of the CSIRO Port Phillip Bay Environmental Study. This study found that the greatest threat to the health of the ecological process in the bay was increasing nitrogen, particularly from urbanisation of the catchment. Annual Bay Action Reports outline progress to meet these objectives and reduction in nitrogen loads to the Bay is a critical focus for the *Better Bays and Waterways* Water Quality Plan.

River Health Objectives for Merri waterways

The Regional River Health Strategy bases its assessment of river health and targets for future improvement on the Index of River Condition (IRC). IRC assessments were conducted for a total of 15 reaches in the Merri catchment - nine reaches on the Merri, one on Kalkallo Creek, one on Malcolm Creek, one on Aitken Creek, two on Edgars Creek and one on Central Creek[226].

The objectives in the Regional River Health Strategy for the Merri are:

For rural sections:
Prevent further damage in the condition of rural sections, i.e. maintain at current overall condition of 'poor'. IRC ratings for sub-indices are:

- Water quality – poor
- Aquatic life – moderate
- Habitat & stability – moderate
- Vegetation – poor
- Flow – excellent

For urban sections:
Within 5 years[227] improve the overall condition of urban sections from 'very poor' to 'poor'. Targets for IRC sub-indices are:

- Water quality – improve from 'very poor' to 'poor';
- Aquatic life – maintain at 'poor';
- Habitat & stability – improve from 'moderate' to 'good';
- Vegetation – improve from 'very poor' to 'poor';
- Flow – maintain at 'poor'.

Regional Water Quality Improvement Plan

A Regional Water Quality Improvement Plan, "Better Bays & Waterways", is due to be completed by the end of 2008. It will identify and address risks to environmental values of Port Phillip and Westernport Bays and waterways and provide direction for investment in water quality improvement.

Waterways Water Quality Strategy

[226] Results of these assessment are available on the Melbourne Water website www.melbournewater.com.au/content/rivers_and_creeks/river_condition/index_of_river_condition.asp

[227] Presumably 5 years from the approval of the final document.

Melbourne Water's Waterways Water Quality Strategy (2008) is specifically for waterways. It sets the following ten year resource condition targets:

- Significantly counteract the effects of growth in greater Melbourne and achieve a net reduction in pollutant loads for the Port Phillip & Western Port region from 2001 levels;
- 80 per cent of monitoring sites meeting SEPP objectives or regional targets established through the Better Bays and Waterways Plan of action;
- Achieve a net reduction in effective imperviousness[228] from 2007 levels;
- Achieve specific water quality targets for rivers and creeks set out in the RRHS and the Victorian Ten Year River Health Plan.

Water Quality and Stream Health Studies of Merri waterways

In the wider Port Phillip and Western Port catchment urban areas contribute disproportionately to poor water quality. For example urban areas occupy about 27 per cent of the regional catchment yet account for 73 per cent of the nitrogen load.

The Merri catchment is no different. Changes in water quality along Merri Creek tend to be related to changes in land use.

Rural sections of the Merri Creek are generally healthier than the industrial and urban sections, although they still suffer from a range of problems most notably high nutrient levels and water quality is rated 'poor' (see Box above).

Industrial areas generate high levels of heavy metal pollution and other toxicants. Problems in urban areas are primarily the result of the poor quality of stormwater which, except in newer residential areas, receives no treatment before discharge into the waterways. Water quality in urban sections is rated 'very poor' (see Box above).

Studies of the water quality of Merri waterways have been reviewed and summarised by Amenta (2003), Condina (2003), McGuckin (2002) and Miller (2003). There is general agreement that water quality problems in the Merri system include:

- high levels of heavy metals in the sediments of both Merri and Edgars Creeks as a result of contaminated stormwater from industrial areas; leachates from tip and former tip sites probably also contribute to this problem;
- high concentrations of nutrients throughout Merri Creek, with the Craigieburn Sewage Treatment Plant (STP) a major single source; stormwater runoff, both urban and rural, is also a significant source of nutrients;
- organic pollution still affects parts of Merri and Edgars Creeks;
- salinity levels in parts of the Merri Creek often exceed the SEPP objectives, particularly in rural areas. It is not known if this is a natural feature of the catchment or a result of induced salinity. Stormwater inflows and the STP effluent dilute the salinity in urban areas;
- turbidity and suspended solids periodically exceed SEPP objectives after storm events;
- low levels of dissolved oxygen are a problem at times in rural sections, with lack of stream flow contributing to this problem;
- Edwardes Lake, on Edgars Creek, acts as a sink, trapping pollutants such as nutrients, heavy metals, sediments and toxicants, as well as rubbish;
- Litter has a marked impact on environmental values and aesthetic amenity of urban reaches of the Merri waterways.

Examination of water quality records over the past twenty five years suggest there has been some improvement in water quality in Merri Creek, particularly a reduction in organic pollution, most likely due to the sewering of outer urban areas. Some reduction in total phosphorus levels appears to have also occurred (McGuckin 2002).

However a study in 2000 found there had been no discernable improvement in conditions for aquatic life over the previous ten years (see below).

In-stream biological health

The earliest biological sampling of the Merri Creek took place in 1974 (Public Interest Research Group [PIRG], 1975). It showed a marked deterioration in macroinvertebrate species abundance and diversity downstream of Mahoneys Road, Fawkner.

More recent studies have drawn similar conclusions. In 1990 Mitchell and Clark conducted a comprehensive macroinvertebrate study. They showed a major decline in macroinvertebrate condition beginning downstream of O'Herns Road Somerton with a sharp decline beyond Barry Road, Campbellfield.

[228] Effective imperviousness is defined as the combined effect of the proportion of constructed impervious surfaces in the catchment, and the 'connectivity' of these impervious surfaces to receiving water bodies.

A study by AWT (2000) ten years later found there had been few changes to the macroinvertebrate fauna assemblage since the 1990 study and could find no discernable improvement in aquatic life. SIGNAL scores were below SEPP guidelines for all sites monitored.

AWT found the downstream decline in macroinvertebrates correlated closely with declining water quality, especially increases in heavy metal pollution within the water column and sediments.

A study by Ecowise (2005) in 2003-04 identified the same sharp decline in macroinvertebrate health at site slightly downstream of the Ainslie Rd drain compared to sites upstream of Cooper Street.

Elegant field-based experiments by Pettigrove and Hoffman (2005) have demonstrated that this decline in macroinvertebrate diversity and abundance is *caused* by the toxicity of sediments of the Merri Creek (rather than simply being associational).

Heavy metals and other contaminants

A 2000-2001 study of nine drains in the Merri Catchment identified drains receiving runoff from small to medium sized industries as contributing the highest levels of heavy metals (Pettigrove & Hoffman 2003c). For example, medium concentrations of zinc were from 10 to 100-fold higher in drains from industrial sub-catchments compared to drains from residential sub-catchment.

The vast majority of samples collected in the study exceeded guidelines[229] for one or more metals. For many of the drains, average concentrations of heavy metals were consistently higher on workdays than Sundays, suggesting poor work practices are a key reason for heavy metal contamination.

Samples from the Barry Road Drain in Campbellfield showed the poorest compliance (100% of samples exceeded Zinc and Copper guidelines; 95% exceeded Nickel, 58% exceeded Lead, and 47% exceeded Chromium). Samples from the Ainslie Rd Drain, also in Campbellfield, showed a similar lack of compliance. Both these drains outfall to Merri Creek.

Samples from the Merrilands Drain in Reservoir and the Thomastown Drain, both on Edgars Creek, had between 80-100% of samples fail to comply with Zinc and Copper guidelines.

The Pettigrove and Hoffman (op.cit.) study also investigated the longitudinal profiles of heavy metal concentrations in creek sediments. Substantial increases in sediment concentrations of Zinc and Copper were found in Merri Creek downstream of the Ainslie Rd and Barry Rd drains, corresponding well with the dry weather discharges from these drains.

Of considerable relevance to the Merri is the finding by Pettigrove and Hoffman (2003) that heavy metals tend to reach levels of concern at lower levels of urbanisation (as indicated by percent catchment imperviousness) in streams with soils derived from basaltic rather than sedimentary materials. They suggest this may be related to the different characteristics of water chemistry and sediment size in basalt streams and conclude that "…a greater emphasis should be placed on heavy metal management in basalt rather than in sedimentary streams."

In a separate study, Pettigrove and Hoffman (2005) found that high-molecular weight hydrocarbons derived from crude oil (gasoline, kerosene, fuel oil, mineral oil and asphalt) are a significant pollutant in urban water bodies and have an adverse effect on macroinvertebrates.

The primary effects are through smothering and mechanical interference with activities such as movement and feeding. About 28% of water bodies surveyed in Melbourne had total petroleum hydrocarbon (TPH) concentrations in sediments likely to cause ecological impairment. Merri sites are likely to be at least as bad as the Melbourne average. The authors concluded that freshwater sediment quality guidelines need to be developed for this ubiquitous urban pollutant.

Little study has been done of pesticides (this term includes herbicides, fungicides, insecticides, rodenticides etc), in the water or sediments of the waterways of the Merri catchment. Through Melbourne Water's Research and Technology team, research and monitoring programs are expected begin soon to detect sediment toxicity and measure pesticides, heavy metals and petroleum hydrocarbon concentrations in sediments.[230]

Minimisation of herbicide use is discussed in chapter 2.3 – Land Management.

As noted earlier, contaminants from stormwater drains, particularly the Barry Rd and Ainslie Rd drains, have been shown to have a serious

[229] ANZECC/ ARNCANZ (2000) guidelines 80% Trigger Value

[230] Better Bays & Waterways a Water Quality Improvement Plan for Port Phillip and Western Port Draft 2008

impact on the macroinvertebrate fauna of the Merri. Of further concern is the downstream movement of toxicants in sediments, with heavy rains flushing sediments from the Merri into the Yarra and thence to Port Phillip Bay.

Impact of Craigieburn Sewage Treatment Plant

The only significant licensed discharge to Merri Creek is that of treated effluent from the Craigieburn Sewage Treatment Plant (STP). A biomonitoring program for 2003-2004 (Ecowise 2005) identified statistically significant increases in phosphorus, nitrogen, nitrate, nitrite and ammonia, total Kjeldahl nitrogen and water temperature attributable to the STP and statistically significant decreases in electrical conductivity, dissolved oxygen, suspended solids and *E. coli*.

Breaches of SEPP objectives attributable to STP discharge were detected in total phosphorus, total nitrogen, dissolved oxygen and water temperature. Breaches of ANZECC (2000) toxicant trigger values were detected in ammonia and nitrate concentrations.

For most of the nutrient parameters the extent of the mixing zone[231] varied between 15m to 1km downstream from the discharge. Other water quality parameters had mixing zones up to 150m downstream.

SIGNAL scores generally decreased downstream of the discharge, demonstrating the impact of the effluent discharge on the macroinvertebrates. However in the dry year of 2003, when natural flow in Merri Creek was low, the permanent STP discharge functioned as an environmental flow, allowing sites downstream of the discharge to function as refugia for aquatic organisms. In 2004 when the natural stream flow in Merri Creek was greater, the permanent flow of the STP did not provide the same function and macroinvertebrate health was better upstream than downstream of the discharge. In both years assemblages of macroinvertebrates that were collected downstream of the discharge point were different to those collected upstream of the discharge point.

The Ecowise report concluded that:

> "The water quality impacts that are having the greatest impact on the ecological health of Merri Creek are nutrient enrichment, water temperature increases (28% increase) and dissolved oxygen depletion. Nutrient enrichment of Merri Creek is promoting the growth of macrophytes and algae immediately downstream of the discharge point, which is encouraging the dominance of macroinvertebrates that feed on these plants."
>
> "Although the Craigieburn STP discharge did in effect provide environmental flows, the significance of the ecological benefit to Merri Creek macroinvertebrates is negligible." (p.47)

Yarra Valley Water reported in December 2008 that the effluent discharge standard at the Craigieburn STP will be reviewed in light of their revised strategy to continue to operate the plant. Any proposed changes to the effluent quality will be determined in conjunction with EPA with due consideration to the environmental drivers. Yarra Valley Water added that "it should be noted that the STP is currently operated in compliance with the existing EPA Waste Discharge Licence"[232]

Pollution spills

Pollution spills are not uncommon on Merri Creek. Generally EPA responds by assessing the spill and may involve Melbourne Water in cleaning it up if that is practical. Enforcement is primarily EPA's responsibility.

Photo 1 - A pollution spill in 2008 near Andersons Road Thornbury

Sometimes pollution is first reported to MCMC, whose procedure is to record the report, to

[231] The mixing zone is the defined area around an outfall where pollution is expected.

[232] From Yarra Valley Water's submission to the Draft MCES, 1/12/2008.

encourage the person reporting the pollution to call EPA directly, and if possible to check out the event and assist EPA where possible. Councils have a similar role and procedure.

Pollution spills may be highly visible if they result in foaming or discolouration of the water, but not all spills are so visible.

When a spill is reported it is important that the person reporting the spill can identify unequivocally where the pollution is coming from. Darebin Creek Management Committee has arranged for every pipe outlet to be labelled using a system that EPA, Council and Melbourne Water can use to locate pipes. This system is not at present in place on Merri Creek.

Preventing spills and dealing with them when they happen deserves ongoing attention.

Faecal contamination[233]

A 1997 study by the EPA showed that faecal contamination was at times high in Merri Creek. High herbivore-associated contamination levels were attributed to grazing stock in the upper catchment, and occasionally high human faecal contamination levels due to sewer overflows.

Overflows of raw sewage to Merri and Edgars Creeks occur via emergency relief valve structures during high rainfall events as a result of stormwater entering the sewers and causing sewer capacity to be exceeded. This problem is being addressed by Melbourne Water and Yarra Valley Water through the Northern Suburbs Sewerage Strategy and involves construction of significant additional sewer capacity. Part of the Strategy, is the Northern Sewerage Project.

Once completed in 2012, the project will provide an unrestricted outlet for the major sewers in the northern suburbs. However in order to prevent overflows from all ERS's during rainfall events less than the 1 in 5 year standard, some additional localised upgrade works are still required. YVW has a capital works program in place to address these localised problems and intends to complete this work by 2017/18. At that stage the SEPP requirements, which specify sewerage infrastructure capable of containing flows associated with a 1-in-5-year rainfall event, will be met. During higher rainfall events sewage overflows may still occur.

More recent analysis has identified a number of stormwater drains which contribute faecal contamination to the creek even during periods of low flow. This suggests cross contamination between sewer pipes and stormwater drains is occurring, either through leakage or direct connections. Investigation and remedial action has been established as a high priority by the State Government through the Yarra River Action Plan (DES 2006).

Climate change and water quality

The implications of changing weather patterns on water quality are not yet well understood. For example more intense storms could increase the frequency of sewer overflows, and also lead to greater loads of pollutants bypassing stormwater treatment systems.[234]

On the other hand, reduced rainfall could lead to lesser loads of pollutants entering the stormwater system, but lower flows within the streams could lead to a build up in concentration of pollutants. Combined with higher temperatures this would lead to decreased levels of oxygen and problems of excessive algal growth (eutrophication).

MCMC's Waterwatch monitoring of the Merri has demonstrated some of these factors at work with monitoring in the dry summers of 2006 and 2007 showing some sites had higher levels of salinity and slightly higher levels of phosphate (a nutrient), as well as a visible increase in algal growth. Nevertheless simultaneously there were signs of some improvement in stream health apparently due to the reduction of stormwater runoff. This was illustrated by the occurrence of certain macroinvertebrates not previously seen when there were higher levels of stormwater runoff, due to higher rainfall.

Opportunities to Improve Water Quality

Rural Areas

The Wallan Sewage Treatment Plant (STP), commissioned in the late 1980s and now operated by Yarra Valley Water, is licensed by the EPA to discharge to land. In the past there have been concerns that its operation may generate runoff or cause contamination of groundwater which could be transported to Merri Creek. Beardsell reported that water quality in the Bald Hill area of Merri Creek had declined since the STP's commissioning (Beardsell,

[233] Faecal contamination is usually assessed using measures of E. coli, a bacterium found in the gut of warm-blooded animals. Bacteria and viruses associated with faecal contamination are primarily of concern because of the potential risk to human health. These organisms do not, of themselves, pose a risk to aquatic ecosystems although the nutrients and organic matter associated with faecal pollution do.

[234] All stormwater treatment systems – wetlands, raingardens, bioretention – are designed to cope with /treat a certain ARI event. Bypasses for larger storm events are built into the design of such systems.

1997, Vol. 2, p. 15), although there are no supporting studies to confirm these observations.

Since this time, the area of land available for effluent disposal has been expanded and according to Yarra Valley Water the Wallan STP continues to achieve 100% effluent reuse with no direct discharge to Merri Creek. Class C effluent is currently treated and stored in several large open dams (located at the STP site as well as on its nearby property in Beveridge) and used entirely for irrigation. All users have Environmental Improvement Plans in place to ensure the environment is not impacted in any way through irrigation. Additionally, YVW also conduct annual monitoring of groundwater quality as the Wallan STP site to detect any infiltration impacts from the operation of the STP.

By 2010, YVW plans to start using a portion of the effluent from the Wallan STP to produce Class A recycled water for supply to residential households in Beveridge and South Wallan. They state that this will ensure that the 100% reuse target can continue to be achieved into the future.

There is evidence that some sections of the stream are suffering water quality problems from rural runoff (see IRC assessment). Beardsell records the area around Hernes Swamp as one such example with algal blooms generated by enrichment from stock faeces causing eutrophication of the stream water during the summer (Beardsell, 1997, Vol. 2, p. 17).

Landholders are being encouraged to fence streams from stock grazing and thus reduce bank disturbance and organic pollution contributions. Melbourne Water's Stream Frontage Management Program assists rural landholders through grants to carry out fencing, weed control and revegetation of stream banks.

As identified in its Waterways Water Quality Strategy, Melbourne Water (2008) is developing a rural land management program in consultation with the Port Phillip and Western Port Catchment Management Authority and Department of Primary Industries to encourage the adoption of agricultural best management practices to improve rural run off. In places the program will also provide treatment facilities for rural runoff such as regional wetlands. The program will also integrate with the existing Stream Frontage Management Program to manage stock access and riparian vegetation where stock access is a threat to water quality.

Urban Growth Areas

Active development of land for residential and industrial purposes is occurring in the middle part of the Merri catchment, around Craigieburn and Epping. In the Craigieburn area this includes the Aitken, Malcolm, and Kalkallo Creek sub-catchments as well as the Merri itself. The development in Epping and North Epping falls within the Edgars and Central Creek sub-catchments.

There is also considerable growth occurring in the town of Wallan and in the vicinity of the township of Beveridge, in the upper catchment of the Merri beyond the metropolitan Melbourne urban growth boundary[235], The Wallan development has the potential to impact on Mittagong, Taylors, Wallan Creeks and Merri Creeks. Beveridge lies within part of the upper catchment of Kalkallo Creek.

Greenfields development sites present a significant opportunity to implement best practice stormwater treatment to minimise the extent to which water quality of the Merri system will decline. Increasingly, water sensitive urban design features, focused on structural measures at or near the source, are expected to play a key part in the achievement of water quality objectives.

The recent construction of the Craigieburn Bypass incorporated state of the art Water Sensitive Road Design incorporating sediment ponds, stormwater treatment wetlands and biofiltration trenches to ameliorate runoff from the freeway. Treated water is eventually directed into Edgars and Merri Creeks. Performance of these wetlands in the medium and long term needs to be monitored, as their effectiveness in the long term has not been demonstrated, and the minimum level of maintenance needed is uncertain.

The Victorian State Planning Provisions now require stormwater quality objectives to be met for all new Greenfield residential subdivisions. However there are still no requirements for industrial and commercial development or infill allotment scale residential development to meet these objectives.

Although a vast improvement on earlier practices, the application of current best practice stormwater objectives is not sufficient to prevent an increase in nutrient, suspended solids and toxicant loads.

[235] According to the Wallan Local Structure Plan Draft 2007, population in the Mitchell South Statistical Local Area, which includes Broadford as well as Wallan is expected to grow from 20310 in 2006 to 36,370 by 2030.

The change in land use from rural grazing to urban typically leads to a net deterioration of water quality and adds to existing environmental risks. The Melbourne 2030 Hume Growth Area final report states that: "Future urban growth must be premised on measures to achieve a net gain in stormwater quality discharging to waterways."(p.89).

In recognition of this Melbourne Water's Water Quality Strategy indicates that EPA Victoria may review and strengthen the stormwater quality objectives. The following implementation target is identified:

> New or revised State Government requirements for all industrial, commercial, residential development to meet best practice water quality objectives by 2013 (IT3).

Current Best Practice Stormwater Quality Objectives

80% reduction on suspended solids

45% reduction in total nitrogen

45% reduction in total phosphorus

Adequate management and enforcement of controls during the construction phase of sub-division is an ongoing challenge. These activities are known to regularly contribute excessive amounts of suspended solids and other materials. Monitoring of Malcolm Creek in Craigieburn during construction of the Craigieburn Bypass showed excessively high suspended solids after rain events, apparently due to subdivision construction activity.

Established Urban Areas

As discussed earlier, contaminated stormwater runoff derived from poor work practices and illegal disposal of materials in industrial areas is known to be a continuing problem for the water quality of Merri and Edgars Creeks. This is in addition to the range of activities which generally contribute to poor water quality in residential urban areas. Within established urban area there are many diffuse sources of pollutants of stormwater and streams. Nutrient-containing detergents from street car-washing, road paving material, sediments, oils and other vehicle-sourced materials (e.g. brake linings), vegetative material, and litter of various types all contribute to the poor to very poor quality of water in urban streams.

It is also known that there are contributions to the stream from organic pollutants derived from sewerage. The Craigieburn Sewage Treatment Plant is a significant contributor of nutrients to the stream. Yarra Valley Water operates the STP in strict accordance with its EPA operating licence, which requires regular monitoring of effluent quality at both the plant and within the Merri Creek. Yarra Valley Water revised its strategy for the provision of sewerage services to the Craigieburn area in 2008 , resulting in the continued operations of the STP, and will be reviewing its effluent discharge standard as a result.

In existing urban areas opportunities for installation of off-stream wetlands to treat stormwater before discharge to urban streams have mostly been lost with intense land use for other purposes. One option for some water quality improvement lies in the creation of ephemeral wetlands in the floor of some retarding basins in the urban catchment. Such work has recently been undertaken by Melbourne Water in the Campbellfield Creek Retarding Basin[236] in Glenroy/Fawkner.

Smaller drains can be treated through rain gardens and wetlands such as that installed in 2007 adjacent to Merri Creek to treat stormwater for the Walker Street drain in Clifton Hill (2007). Another rain garden is planned for a nearby drain.

Raingardens have been established in the grounds of a number of schools, including Merri Creek Primary School in North Fitzroy, as part of Melbourne Water's program to develop 10,000 rain gardens in community facilities by 2013 (Waterways Water Quality Strategy IT9).

There is considerable potential for stormwater quality improvement through adoption of WSUD in existing urban areas, as described in a study undertaken for the Association of Bayside Municipalities (2004). This study demonstrated the potential for achievement of improved stormwater quality, even at a single lot level, through use of water tanks, and infiltration techniques such as porous pavements and bioretention rain gardens.

Redevelopment and infill development of existing urban areas provides opportunities to implement such measures through planning permit provisions.

Recent scenario testing for Melbourne Water's Water Quality Strategy (URS 2006) explored the ability of WSUD (biofilters for road runoff, water tanks for roof runoff, and end of catchment stormwater treatment) to improve stream health and attainment of SEPP objectives. In summary, in inner and middle urban areas reduction of effective

[236] Campbellfield Creek is a tributary of Merlynston Creek

imperviousness to five percent (the percentage required to achieve significant stream health improvements) is very difficult to achieve and requires greater than 70% of the catchment area being treated. Significant increases in revenue would be needed to do this. The most effective strategy for reducing pollutant loads was shown to be through the treatment of road runoff. However this in itself would not lead to achievement of SEPP objectives.

The Waterways Water Quality Strategy links the focus on road runoff to Councils' renewal of roads and drainage and commits Melbourne Water to working with Councils to integrate WSUD into planned road renewals. The recent renewal of a section of Martin Street in Thornbury with street tree rain gardens is an example.

However this focus lacks a strategic link to prioritise those roads which generate the most polluted runoff. These are likely to be the busiest roads and roads in industrial areas.

Although short term opportunities to make dramatic improvements to the overall water quality of streams in urban areas are limited, significant improvements to stormwater from industrial areas could be made quite readily. Given the level of impact, industrial stormwater should be a high priority.

Further research on the treatment of stormwater containing toxicants has been identified by Pettigrove & Hoffman (2003) who state that "There is little information regarding the efficacy of artificial wetlands in the GMA [Greater Melbourne Area] in treating common urban toxicants."

A recent trial of a toxicant treatment facility on the notorious Barry Road Drain, Campbellfield, demonstrated that significant reductions in hydrocarbon and heavy metal pollution can be achieved by passive filtration with affordable, locally available materials (Marshall et al 2006).

There is also considerable scope for specific structural measures at individual premises and for improvements in layout of industrial premises, particularly the complete isolation of work areas from the stormwater system with all runoff from work areas being directed to sewer. This latter approach is that taken by the (draft) Hume Industrial Stormwater Code of Practice (2008) which proposes such measures be a requirement of planning permits. It also proposes the use of WSUD at individual lot level to treat all stormwater generated from the on-work areas e.g. roofs and car-parks. This solution is ideal for new premises but there is no regulatory ability to require this for existing premises.

The potential for intensive educative programs to assist in improving small industry operators to understand causes of industrial stormwater pollution, and to implement practices to mitigate pollution, has been demonstrated by Hume Council's Merri Creek Industrial Stormwater Project (2005) and MCMC's 'Catching On' projects. Recommendations from the Hume 2005 Project led to the "Hume Industrial Stormwater Code of Practice" which in addition to the planning regulations covering layout and WSUD requirements (mentioned in the previous paragraph) includes proposals for:

- **Education & Information**: detailed stormwater behaviour and operational information for specific industry types;
- **Engagement**: ongoing Council support information and enforcement program.

Litter

Litter has long been recognised as a significant issue for urban waterways. It detracts from the visual appearance of stream environments, is a health hazard, poses threats to fauna, and can cause blockages to drainage systems causing local flooding. After water quality it is the issue of most concern to Merri Creek Parkland users (see Table 13 on page150)

Legislation and Policy

The Victorian Litter Action Alliance (VLAA), formed in 2000, is the peak body for litter management and prevention in Victoria and aims to provide a coordinated approach to preventing litter in Victoria across state and local government, industry and community sectors. Its membership includes state and local government organisations and key industry sector representation.

In 2005 the state government released its *Sustainability in Action: Towards Zero Waste Strategy* which targeted a 25% reduction of litter and littering behaviour to be achieved by 2014.

In 2006 the state government's *Our Environment Our Future Sustainability Action Statement* identified the need to develop a new litter strategy to replace the 1995 Litter Reduction Strategy (EPA 1995b). The new litter strategy for Victoria is being developed by Sustainability Victoria in partnership with the EPA and the Department of Sustainability & Environment. The draft is due for release in 2008. This follows release of a Litter Strategy Background Paper, a Litter Strategy Issues

Paper (VLAA & SV 2007) and a public consultation process.

Local governments play a central role in litter management through provision of:

- infrastructure - litter bins, litter traps, street cleaning;
- education - running targeted litter prevention programs; and
- enforcement - implementing the litter provisions of the Environment Protection Act 1970 Part VIIA.

A number of local governments have developed municipal litter strategies (e.g. Moreland City Council's Waste and Litter Strategy 2006-2011) or are part of a regional strategy under the auspice of their regional waste management group (RWMG).

Studies of Litter

Over the years various studies have been undertaken of the types and distribution of litter in Victoria. A systematic methodology to identify litter "hotspots" – those areas that generate the greatest volume of litter – using GIS available data has recently been undertaken by Melbourne Water for the lower Yarra (Catchlove and Francey 2007). Hotspots lie predominantly in commercial areas and in the vicinity of food markets and are influenced by transient populations. Trialling of intervention strategies at these hotspots will provide important information for tackling all hotspots over time.

Numerous other studies have included analysis of littering behaviour, attitudes and perception, and actions comparing bin use with littering (VLAA Litter Strategy Issues Paper).

Cigarette butts are the most littered item in Victoria and have been since 1997 when they were first included in counts, followed by beverage containers, paper, organics and chewing gum (Victorian Litter Report 2005). Illegal dumping is also a major litter problem.

Merri Creek was the first stream in the Melbourne area to have a study of its litter problem. The pilot study (Leighty, 1989) found that 66% of total human-sourced litter collected was plastic based, 21% of which were plastic bags. [cigarette butts were not counted in this study]

The Merri Creek study also discovered that considerable volumes of litter, (mainly plastics), were contributed from industrial areas, especially within the Merlynston Creek catchment (ibid, p. 28).

A further important study of litter in the Merri catchment occurred through the trial of the Pollutec (now CDS) litter trap located at McCrory Street, Coburg. This is a continuous deflective separation type trap constructed alongside the 1200mm Harding Street Main Drain. Analysis of the trapped material showed that more than two-thirds of the load was vegetation. Personal litter (plastics and paper) made up most of the remainder of the load (Allison, Wong and McMahon, 1996).

The most recent study of litter in the Merri, though now more than a decade old, is one which focussed on the contribution of Free Advertising Material (FAM) to the litter stream (Murfitt & Le Couteur 1997). It studied an area of approximately 50 hectares in central Coburg which included much of the shopping area of Sydney Road and Waterfield Street. The study found that FAM was the dominant source of paper litter in the residential parts of the study area, comprising between 20% and 52% of the total paper litter. In commercial parts of the study area, as a percentage, FAM was a less significant litter contributor (ibid, p. 25).

In the case of Merri Creek the stream retains the majority of the larger litter items transferred to it, mainly due to the vegetation cover along the stream. While this provides a degree of benefit in that litter is not transferred to Port Phillip Bay, the litter trapping capacity of stream vegetation becomes an obvious visual problem.

Actions on litter

Over the years there has been increased focus on stopping litter at the source and in building the skills of local government to implement best practice litter prevention programs. A range of initiatives have been implemented in various parts of Victoria– these are detailed in the VLAA's Litter Strategy Background Paper.

Structural improvements for litter trapping in the Merri

In addition to specific improvements made by Councils in the provision of bins and litter collection services (especially closed-bin recycling collections) some major litter traps have been installed in the Merri Creek catchment in recent years.

Melbourne Water's litter trap on the main stem of Merri Creek at Rushall Reserve was removed several years ago, but more recently it installed a boom type (Bandelong) litter trap in Merri Creek itself just before its confluence with the Yarra.

Melbourne Water constructed a litter trap on the Preston Main Drain (within Northcote Golf course) in 2003 and there are three other gross pollutant traps in Darebin on Edgars Creek. Two are at the Leamington Street Wetland and one at Edwardes Park Lake. The design might be improved, however they have stopped huge volumes of litter and organic matter from entering Edwardes Park Lake, and the Merri Creek.

Maintenance of these traps is Melbourne Water's responsibility. In high flow events a bypass system comes into effect, meaning that litter is no longer trapped.

Moreland has installed Pollutec litter traps on the Albion Street drain and on the Harding Street Main Drain[237] near the Upfield railway line.

Mitchell Shire Council installed a litter trap on Wallan Creek in 2005. A small litter trap was developed by MCMC in 1996 for a council drain in Moreland at Victoria Street in Phillips Reserve and is now being maintained under contract to Moreland Council.

In various places Councils have installed grid-type litter traps on the side entry pits of the street level stormwater collection system.

New subdivisions

For a number of years all new subdivisions have been required to have in place mechanisms to deal with litter (gross pollutants) as part of the requirements for meeting urban stormwater quality standards (see earlier section).

Whilst local Councils and Melbourne Water have inventories of their litter trap assets there is no systematic mapping of the locations of litter traps across the catchment or identification of the extent to which litter hotspots are being treated.

Education initiatives in the Merri

In addition to numerous Council-based initiatives, Merri Creek Management Committee, in conjunction with a range of project partners, has placed considerable resources into a variety of programs to address community education about litter. Projects with local schools, Sydney Road traders and at Preston Market have been conducted by MCMC in recent years[238]

The Edwardes Lake Neighbourhood Environment Improvement Program has also had an emphasis on litter reduction and a 'Say No to Plastic Bags' campaign is planned as part of the NEIP in October 2008, to be focused on the Reservoir Shopping Centre.

Cigarette butt litter grants from Sustainability Victoria in 2006 and 2007 have provided funding to MCMC to tackle the lack of information and understanding of the problems and penalties associated with cigarette butt littering in culturally and linguistically diverse CALD communities.

The importance of communicating directly to CALD groups was similarly recognised in the Lower Yarra Litter Strategy's Victoria Street (Richmond) project, the success of which was enhanced by ensuring that the audit of trader practices and knowledge was undertaken in Vietnamese (VLAA newsletter – *The Lower Yarra Litter Strategy Hits Litter Hard!).*

In terms of dumping, a new kit from the Victorian Litter Action Alliance *Illegal Dumping Kit – People at Home*[239] is designed for agencies or organisations to help them reduce rubbish dumping.

Litter cleanups

For many years the Friends of Merri Creek have been active in organising regular litter collection efforts along the urban sections of the creek, usually on a monthly basis. The Friends of Malcolm Creek, formed in 2007 had their first litter clean up in this same year, as did the Friends of Edgars Creek.

The Adopt-a-Lake group, based at Edwardes Lake, Reservoir (on Edgars Creek) conducts at least nine litter clean ups per year. The annual Clean Up Australia Day regularly attracts efforts at various sites along Merri Creek.

The development of a Litter Strategy for the waterways of the Merri catchment is needed. It should address identification of litter hotspots and priority treatment of identified problem areas using the well established three critical elements to changing littering behaviours – education, infrastructure and enforcement.

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[237] The litter trap on the Harding Street Main Drain was the focus of the study (Murfitt & Le Couteur 1997) into free advertising material mentioned above.

[238] See various MCMC annual reports

[239] VLAA(2008) Available at http://www.litter.vic.gov.au/resources/documents/People_At_Home_Kit_-_74pp_A4_Lo-Res_part_one.pdf viewed 27-1-09

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Issues

1. Many SEPP targets are not met in the Merri waterways.
2. Water quality in urban areas of the Merri Catchment is very poor and in rural areas is poor.
3. Greater emphasis should be placed on heavy metal management in basalt rather than sedimentary streams.
4. Freshwater sediment quality guidelines need to be developed for total petroleum hydrocarbons.
5. The Craigieburn Sewage Treatment Plant discharge impacts on Merri Creek in complex ways; negative impacts include nutrient enrichment, water temperature increases and dissolved oxygen depletion, whereas the benefit of its environmental flow On invertebrates is negligible.
6. A system uniquely identifying discharge points would assist in spill reporting and response.
7. Preventing pollution spills and dealing with them when they happen is still important.
8. Faecal contamination in Merri Creek is at times high. Emergency sewer overflows will become rarer when the Northern Sewerage Strategy is implemented, but some stormwater drains contribute faecal contamination during dry weather.
9. The impacts of climate change on Merri waterways are not well understood.
10. Grazing contributes to poor water quality in rural sections of the catchment. This can be addressed by fencing off waterways and revegetating banks. In some areas regional wetlands for treatment of rural run-off may be needed.
11. Residential, commercial and industrial development in the northern part of the catchment will lead to degradation of waterways unless higher standards are established for stormwater treatment.
12. Long term monitoring of the effectiveness of wetlands is needed to identify required levels of maintenance.
13. Future urban growth must be premised on measures to achieve a net gain in stormwater quality discharging to waterways.
14. Subdivision construction activities regularly contribute excessive amounts of suspended solids and other materials, requiring improved management and enforcement of sediment controls.

15. There is potential for more retarding basins to have ephemeral wetlands constructed in their floor to treat stormwater.
16. Construction of raingardens can help water quality.
17. Water-sensitive urban design, even at the lot level can contribute to better water quality.
18. Significant reductions in hydrocarbon and heavy metal pollution can be achieved by passive filtration.
19. Structural measures for individual premises can be implemented at the planning permit stage.
20. Education and engagement programs have been demonstrated to improve the understanding of business operators and their uptake of pollution mitigation measures.
21. Water quality and litter are major concerns for users of the Merri waterways.
22. Local governments have a central role in litter management through provision of infrastructure, education and enforcement.
23. There is no systematic mapping of the locations of litter traps across the catchment or identification of the extent to which litter hotspots are being treated.
24. In addition to education programs in English it is important to communicate directly with culturally and linguistically diverse (CALD) groups.
25. Community groups play an important role in picking up litter, which could be encouraged.
26. A Litter Strategy for the waterways of the Merri Catchment is needed.

Objectives

1. Improve water quality in catchment waterways, aquifers, and wetlands, and consequently estuaries, bays and seas (from RCS-WO4).

Targets

1. Halt further decline in water quality in rural sections of the catchment, - currently 'poor' (see Regional River Health Strategy).
2. By 2010 improve water quality of urban sections of Merri Creek from 'very poor' to 'poor' (see Regional River Health Strategy).
3. Improve water quality in catchment waterways so that:
   - at least 80% of monitoring sites attain SEPP objectives or regional targets by 2009
   - All monitoring sites attain SEPP objectives by 2030. (see RCS-WT8).
4. Maintenance of water quality in new urban development areas to levels which existed prior to development, using water sensitive urban design strategies. This includes the Implementation of higher standards and different approaches to the application of water sensitive urban design techniques and stormwater treatment so that urban development does not impact on water quality.
5. Protection and improvement of water quality in rural areas through cooperative means such as the Melbourne Water Stream Frontage Management Program.
6. Ten-fold reduction in heavy metal and other toxicant contributions to stormwater and to the Merri waterways through targeted focus on sub-catchment with small – medium sized industry.
7. Reduction in organic pollutants and nutrient contributions from the Craigieburn Sewage Treatment Plant such that there is no discernable impact on Merri Creek receiving waters.
8. Ensure no impacts from any future expansion of the Wallan Sewerage Treatment Plant.
9. Focus litter control at or near source including structural, education and enforcement measures.
10. Review of Stormwater Management Plans by 2010 and continued implementation by Councils, assisted by Melbourne Water and MCMC.
11. By 2010 label every drain larger than 300mm or similar capacity entering waterways of the catchment with a sign including a unique identification number for the sign and the EPA pollution watch phone number.

Actions

See Section E page 200.

Chapter 3.3 Aquatic Flora, Fauna and Wetlands

Regional Port Phillip & Westernport Catchment Strategy Objective:

RCS-WO2: Protect and improve the environmental health and social and economic values of waterways and wetlands.

RCS-BO2: Maintain the diversity of indigenous habitats and species in terrestrial, aquatic and marine environments.

Relevant Regional Targets:

RCS-WT3: Diversions from all waterways to be within sustainable diversion limits by 2015.

RCS-WT6: Improve the condition of the region's waterways so that:
- at least 50% of all natural waterways will be in good or excellent condition by 2015;
- all natural waterways will be in good or better condition by 2025.

RCS-WT7: Progressive improvement in the condition of waterways across the region as measured by the Index of Stream Condition, including beds and banks, streamside zone and aquatic life.

RCS-WT15: No net loss in the extent and health of wetlands of each existing type.

RCS-WT16: Progressively improve the overall health and social value of natural wetlands, including those that are nationally and internationally recognised.

RCS-BT7: Increase the diversity of native species in modified landscapes and aquatic systems.

RCS-BT9: No human-induced reduction in species diversity for the freshwater, estuarine and marine environments of the region.

Background

Merri Creek, its tributaries and associated wetlands support a range of aquatic and semi-aquatic animals, plants and communities.
Faunal groups include:
- Micro-organisms
- Aquatic macro-invertebrates
- Fish
- Aquatic mammals (Water Rat, occasional visiting Platypus)
- Water-dependent bats (e.g. Myotis species)
- Amphibians (various frog species)
- Reptiles
- Waterbirds

In addition various terrestrial species use the waterways for drinking-water

Floral groups include:
- microscopic and macroscopic algae
- submerged, emergent and floating species of flowering plants
- species of the banks, floodplain and other riparian areas which depend on the waterway environment, including those needing flooding for dispersal.

A healthy waterway requires a suite of physical and chemical conditions in order to sustain populations of animals and plants. For streams, many of these conditions are specified in the SEPP objectives discussed in chapter 3.2.

Physical Parameters
The physical parameters include:
- a stable substrate;
- stable banks;
- variable habitat niches (pools, riffles, woody debris);
- absence of artificial barriers to movement (particularly important for migratory fish);
- variable micro-climate provided by vegetation with a mix of light and shading probably more lightly shaded than waterways to the east of Melbourne;
- provision of a steady supply of energy/food;
- low levels of turbidity/suspended solids such that (a) light is able to penetrate the waters to permit photosynthesis and sustain food sources for in-stream fauna, (b) organisms and substrate are not smothered by excessive amounts of fine sediments.
- temperatures not excessively above or below seasonal norms so that breeding patterns of in-stream fauna are not disturbed and any flow-on effects (e.g. impacts of low dissolved oxygen) are not produced; and
- stream flow and hydrologic conditions which sustain aquatic communities.

In addition, for species which spend part of their life-cycle away from the aquatic environment, e.g. Growling Grass Frogs, the terrestrial environment must also provide suitable conditions to sustain populations and a variety of waterway/wetland types need to be accessible.

Chemical Parameters

The chemical parameters include:

- sufficiently high levels of dissolved oxygen to support the respiration of a diversity of aquatic organisms;
- salinity levels of a sufficiently low magnitude that the diversity of flora and fauna in the stream and its riparian zone is not depleted (n.b. some Merri waterways probably have a natural tendency towards somewhat saline conditions and may suffer if salinity is reduced e.g. saline adapted plant communities upstream of Craigieburn STP) ;
- nutrients (phosphorus and nitrogen) below levels which encourage excessive growth of filamentous and toxic algae growth which alters macro-invertebrate community structure and stream health;
- moderate pH levels such that in-stream flora can grow and the toxicity of other pollutants is not altered or released into the water column;
- Biological Oxygen Demand (BOD - the amount of oxygen required by the biological processes taking place in the water) low enough to not unduly affect levels of dissolved oxygen; and
- levels of heavy metals (e.g. copper, cadmium, chromium, arsenic, lead, zinc, mercury) and other toxicants in water and in sediments below levels harmful to aquatic life.

Where most of these fundamentals are in place, waterways can sustain a diverse and healthy range of aquatic life.

Aquatic macroinvertebrates

Macroinvertebrates are animals without a backbone, visible to the naked eye, and include shrimps, snails, water fleas, worms and insects. They are commonly referred to as 'water bugs'.

As discussed in 3.2 the condition of the macroinvertebrate community provides a sound indication of the level of ecological health of a stream. Macroinvertebrates are a key element of the food chain as they eat organic debris (leaves etc), and plants within the stream, as well as being eaten by larger invertebrates, which in turn are food for birds, Platypus and fish.

Those macroinvertebrates found in Merri Creek tend to be the hardier, wide-spread forms found across lowland streams in south-eastern Australia. This is particularly the case for the urban stream sections. Most surveys have not identified macroinvertebrates to the specific species level, as this is not necessary for assessing general stream health. The vast majority are indigenous species, although a few introduced species, widely found in Victorian streams are found in the Merri including the aquatic snail, *Physa*.

The Ecowise (2005) report commented that sites upstream of the Craigieburn Sewage Treatment Plant "may contain unique aquatic habitats and macroinvertebrate species …that have significant conservation values…" (p.47). In other words, there is a level of detail in the makeup of the aquatic macroinvertebrate communities that is yet to be investigated and assessed.

Fish

Overall there is a paucity of fish numbers and species diversity in Merri Creek[240] (Amenta 2002), perhaps a function of poor water quality and lack of habitat. Koster (2002) recorded Short-finned Eels as the most abundant fish species, in Merri Creek. Common and Broad-finned Galaxias were found only below the Craigieburn Sewage Treatment Plant (STP), and River Blackfish and Flat-headed Gudgeon only found above it, though this apparent relationship may be spurious. Earlier reports have also recorded Spotted Galaxias, Tupong and Australian Smelt. All of the above are native fish species.

The introduced Eastern Gambusia (or Mosquito Fish) was the second most abundant species found by Koster (op cit). Other exotic fish which have been recorded include Goldfish, Carp, Oriental Weatherloach, Rainbow and Brown Trout, and Roach.

There is no specific information available on fish in the tributaries of the Merri.

In the past, barriers in the form of Dights Falls (on the Yarra), and the walls at Coburg Lake (on the Merri) and Edwardes Lake (on Edgars Creek) have prevented fish migration upstream in the Merri. A further 18 less significant barriers in the Merri Creek and tributaries have been reported (Doeg and Curmi, 1994 in Finlay, McGann and Roy, 1996). These barriers, plus the presence of pest exotic species such as Carp and Mosquito Fish, have reduced the numbers of native fish in the stream, although Blackfish is still present in the upper catchment (Schulz and Webster, 1991), and is considered regionally significant due to its rarity in this and surrounding catchments.

A fish ladder was installed in the late 1990's at Dight's Falls, on the Yarra just below the

[240] No fish studies have been carried out on Merri Creek's tributaries

confluence with the Merri. Finger (1998) assessed that the ladder was only partially working as water velocities had not been sufficiently reduced. Melbourne Water is currently investigating the potential to improve the fish ladder as part of a project to rebuild the weir.

In March 2001 a fish ladder was installed at Coburg Lake, and Koster (2002) evaluated the success of this rock ramp fishway by undertaking a pre and post fish survey. He found that the distribution and /or abundance of the three migratory native species, Common Galaxias, Broad-finned Galaxias and Short-finned Eel, was greater post fishway construction. Nevertheless, abundances of migratory species were generally greater downstream of Coburg Lake compared with abundances upstream. Koster suggested upstream passage may have been restricted for a number of reasons including vertical drops within the fishway and high velocity of water. Although Amenta (op.cit.) reports that additional works have been undertaken to remedy the vertical drops, the Merri Creek Waterway Activity Plan (Melbourne Water 2003) notes that some minor improvements to the Coburg Lake Fish Ladder are likely to be needed to improve fish passage to a wider range of species.

The installation of a fish ladder at the Edwardes Lake weir was investigated in 2000 as part of the Edwardes Lake Redevelopment study undertaken for Darebin Council by Woodward Clyde. The draft sketch involved a covered channel in places 4.5 m below ground level and costing around $60,000. The suggestion was shelved without further investigation.

The Draft Merri Creek Waterways Activity Plan (Melbourne Water 2003) mentions investigating whether a historic ford at Craigieburn Grasslands (Galgi ngarrk) is a fish barrier, however fails to mention the two more significant fords downstream at O'Herns Road and just north of Cooper Street.

Amphibians

Melbourne Water's Frog Census reports seven frog species are found in the Merri Catchment. These include the Southern Brown and Whistling Tree Frogs, Growling Grass Frog, Common Froglet, Victorian Smooth Froglet, Pobblebonk Frog and the Spotted Marsh Frog.

In the past five years significant remnant populations of the nationally listed[241] Growling Grass Frog have been identified within the Merri catchment. Some of these are associated with off-stream water-bodies, particularly quarry holes, but breeding habitat for two key populations includes pools within the stream itself (on the section of Merri Creek between O'Herns Road and Cooper Street) and in the Merri and Kalkallo Creeks in the vicinity of Donnybrook/Kalkallo (Heard et al 2004).

Growling Grass Frogs were once far more widely distributed along the Merri and Edgars Creeks than now with (recent) historic records as far south as Fawkner. Heard (2007) has identified 16 sites in the Merri catchment and another 13 nearby at which Growling Grass Frogs appear to have permanently disappeared. Nine sites in the catchment have lost their populations of the frog in the last 8 years. Maintaining connections between on-stream and off-stream habitat and re-establishing habitat linkages at a landscape level is essential for the future conservation of this species. Further information about the Growling Grass Frog can be found in section 2 of this report.

Frog populations are affected by the chytrid fungus, which has been decimating frog populations worldwide, by loss of breeding and feeding habitat, loss of movement corridors (often over land), by exposure to toxins including some herbicides and predation by exotic species, especially Mosquito fish.

The Queensland and NSW Eastern Dwarf Tree Frog (*Littoria fallax*) has unfortunately been introduced into certain wetland habitats along the lower Merri Creek. Its impact is unknown, but there is potential for it to compete with local indigenous frogs such as the Southern Brown Tree Frog (*Littoria ewingi*)

Many frogs can benefit by the creation of intermittent wetlands fed by clean drainage water. They are also known to colonise stormwater treatment wetlands, though this has to be considered a somewhat uncertain habitat because of the build up of toxins in the sediments. It is particularly felt that stormwater treatment wetlands should not be seen as adequate substitute habitat for Growling Grass Frogs in the face of destruction of existing habitat (Heard pers.com).

Reptiles

[241] Listed as 'vulnerable' under the Federal Environment Protection and Biodiversity Act

The only aquatic reptile known from the Merri Creek is the Common Long-necked Tortoise, although a number of terrestrial species use the Creek valley (Beardsell 1997) and may at times swim and feed in the waterways.

Birds

Of the birds known to utilise the Merri Creek corridor at least four of those considered to be of regional significance (Beardsell op.cit.) are likely to heavily depend on the in-stream habitats associated with the waterways – including the Great and Little Egrets, the Nankeen Night Heron and the Sacred Kingfisher.

These and other bird species would benefit from water quality and habitat improvement in-stream, and from an increase in wetland habitat in the catchment.

Aquatic Mammals

The native Water Rat, or Rakali, is still common in Merri Creek, with 50% or more of sites investigated having Rakali present (Williams & Serena 2004).

Although Beardsell (1997) reported a sighting of Platypus upstream of Summerhill Road in 1991 (see section 2.1), Platypus appear no longer to be resident in Merri Creek. Amenta (2002) reported a number of sightings in the lower Merri which she attributed to Platypus visiting the Merri from the Yarra River to forage for food.

Serena and Pettigrove (2005) have identified the availability of macroinvertebrates as a possible major factor limiting the distribution of Platypus in urban streams of Melbourne. Pettigrove has suggested that the toxicity of sediments in the Merri Creek and the subsequent paucity of macroinvertebrate numbers is likely to be the key factor precluding Platypus from the Merri (Pettigrove pers.com).

Aquatic and riparian plants and communities

Terrestrial flora and fauna of Merri Creek and its tributaries are discussed in Section 2 – Flora, Fauna and Linear Parkland.

Aquatic and riparian ecological vegetation communities[242] recognised for Merri Creek and its tributaries include: Creekline Grassy Woodland (EVC68), Grey Clay Drainage-line Herbland-Sedgeland Aggregate (EVC 124), Plains Grassy Wetland (EVC 125), Aquatic Herbfield (EVC 653), Creekline Tussock Grassland (EVC654) and Streambank Shrubland (EVC 851).

One of these EVCs (Plains Grassy Wetland) is considered extinct in the Victorian Volcanic Plains Bioregion[243], and all the others are considered endangered. (See Table 6 in chapter 2.1)

A report by GHD (2004) identified a range of species adapted to the natural salinity in the riparian fringe of Merri Creek above the Craigieburn Sewage Treatment Plant (STP). Some of these species are regionally significant. This community does not exist downstream of the STP, presumably because of the constant and fresh flow provided by the treated effluent from the STP.

Downstream of the STP, sections of the Merri Creek riparian zone are dominated by tall, dense stands of Common Reed *(Phragmites*) the growth of which appears to be stimulated by the supply of nutrients in the discharged effluent. Frood has described this downstream community as simplified compared to the saline-adapted community found upstream (Frood pers. com). The Merri Creek WAP also identifies excessive growth of Phragmites as a problem.

Apart from its intrinsic value, riparian vegetation benefits the aquatic environment by controlling sediment inputs, and providing food, shelter and shade. Where it has been damaged, the vegetative cover of the stream's banks can be improved to provide better habitat for in-stream fauna. .

Photo 2 - MCMC revegetation work at Queens Parade in 2007
Near bank was revegetated in 2001, far bank in 2005

[242] These EVCs do not include algal communities or fully instream communities

[243] It is not extinct however known examples are very degraded. For example small highly weed invaded and degraded examples were detected near Craigieburn in 2006 (Carr et al 2006)

Recent work undertaken by Melbourne Water and MCMC has paid particular attention to the riparian verge habitat. Examples include MCMC's work downstream of Queens Parade Fawkner, and Melbourne Water's work between Normanby Avenue Thornbury and St Georges Road Northcote

Primarily constructed as a sediment detention basin, the Leamington Street Wetlands on Edgars Creek in Reservoir, are a good example of aquatic and riparian revegetation and its role in sediment control as well as for habitat.

Where indigenous vegetation remains on the banks of the waterways it should be retained. Areas of reasonably intact riparian scrub and grassy woodland/floodplain areas along the middle to upper reaches of Merri Creek provide a strong basis for improving the riparian and stream corridor.

Riparian weeds

Many species of riparian weeds are established in the Merri Creek catchment[244]. They have a major impact on the waterway ecosystems. The impact and management of weeds is also dealt with in section 2 and chapter 3.1 of this report.

Non-indigenous trees such as willows, poplars and elms have limited habitat value when compared to native vegetation, and inhibit native vegetation and are classified as environmental weeds. Weed trees may provide some benefits to the stream through shading and cooling the water below, and providing some in-stream shelter to aquatic life. However leaf litter pollution and flow restriction issues outweigh their ecological benefits.

Potential environmental damage done by removal of willows can be minimised by:

- planting indigenous species where possible in the gaps between the willows and allowing their establishment prior to commencement of willow removal (this may not be practical where willow infestation is dense)
- poisoning by drill and fill of live trees long enough in advance of removal to minimize re-sprouting
- removal of standing timber by cutting it from the stump and leaving the dead stump in place, following up for any re-sprouting stumps later.
- treatment in this way of *sections* of a willow infestation and replacement with indigenous species, especially fringing macrophytes, followed some years later by removal of the remaining willows and their replacement with indigenous species. Using this method sections should be no longer than 50m, although many sections may be treated at the same time provided they are separated by untreated sections of around the same length. Works by Melbourne Water have often sought to remove much longer sections of Willows, and it is recognised that there are budgetary savings to be accrued from larger scale works.

Aquatic weeds

A number of serious aquatic weeds are established in Merri Creek. Alligator Weed, a weed of National Significance and State Prohibited Weed because of its potential for choking waterways, was recorded in 1997. Its control is the responsibility of DPI and Melbourne Water, DPI, Melbourne Water and the City of Darebin have been keeping a close watch monitoring and treating the outbreak. However, after being dispersed by flooding by May 2007 Alligator Weed had become a frequent occurrence in Edgars Creek downstream of Leamington Wetlands and Merri Creek downstream of Edgars Creek, although further control work has been carried out in 2008 by Melbourne Water.

Egeria densa (Dense Water Weed) is well established in Merri Creek Northcote and downstream. Whilst not a listed weed, it is likely to be having a detrimental effect by excluding indigenous water plants such as Potomagetons. It is likely to be spreading upstream, but research is needed to evaluate the threat and needed actions.

Waterway Ecosystem Degradation

The waterways of the Merri catchment show indisputable evidence of a significant decline in the diversity of the waterway ecosystem due to:

- degradation and loss of physical habitat, both in-stream and linkages to floodplain (including wetlands);
- degradation and loss of riparian vegetation (especially loss of overhanging Red Gums and weed invasion);
- degradation and loss of instream vegetation;
- hydrological changes typical of urban streams resulting from higher 'flashiness'[245] of flows; stream flow change associated with the constant level of discharge from the

[244] E.g. Bainbridge 2005 identified 49 weed species in a short stretch of Wallan Creek of which 19 were high priority.

[245] 'flashiness' refers to the higher and more frequent peak flows and lower base flows associated with the decrease in permeability of urbanised catchments (see Walsh et al). Greater disconnection of the drainage system from streams using WSUD principles can reduce this 'flashiness'. (Also occurs in rural areas as a result in clearance of deep rooted vegetation and drainage)

Craigieburn STP; impact of farm dams and on-stream dams on some tributaries;
- deterioration in water quality due to stormwater inputs, with toxicants associated with industrial stormwater being the biggest problem;
- deterioration in water quality due to sewage overflows during high rainfall events and illegal connections or leaks from sewerage system.

Opportunities to improve aquatic ecosystems

Improvement to aquatic ecosystems in the catchment requires:
- Reductions of inputs of toxicants, nutrients and sediments from the rural and urban catchments (WSUD, sediment controls as well as appropriate rural land management can help, including protecting smaller drainage lines – see Chapter 3.2)
- Improved fringing and riparian vegetation (Melbourne Water's Stream Frontage Management Program, continued support for Landcare groups, as well as MCMC's, Councils' and other urban revegetation programs)
- Reduced competition for resources from weeds and introduced animal species (Melbourne Water, DPI, MCMC and Councils' weed control programs)
- Improving flow regimes (reducing peakiness of flows especially helps, although some variation in flow is needed)
- Improving structural complexity and stability in the channel (encouraging pool and run form and retention of woody debris)
- Improved connection up and downstream and to the floodplain (continued removal of fish barriers, wetland protection, restoration and creation)

Wetlands

A wetland is a site "...where…wetness of the land is sufficiently frequent and sustained to influence the composition of the associated vegetation." (DSE 2006). Wetlands vary widely and some may not hold water for years at a time. Two wetland vegetation types in Merri Creek are 'Plains Grassy Wetland' and 'Wet Verge Sedgeland'.

Wetlands are productive ecosystems providing habitat for native animals and plants, including rare and threatened species. They assimilate and recycle nutrients and trap sediments. They act as flood control basins, assisting in the hydrological stability of the catchment. Wetlands are sites of cultural, scientific, recreational, landscape and educational interest.

Apart from the waterways themselves, wetlands of the Merri catchment include:
- Shallow freshwater marshes (non-permanent)
- Artificial lakes
- Artificial wetlands
- Quarry holes
- Farm dams

None of these are nationally or internationally recognised wetlands although some are listed on a state level as biosites of national significance (e.g. Hernes Swamp).

Major shallow freshwater marshes include the remnants of Hernes Swamp, Inverlochy Swamp, and Camoola Swamp. The wetlands originally thought to be present in the Merri Creek Catchment are shown on Map 16. The total area of wetlands shown on the map is approximately 2,140 ha. This compares with a total of approximately 83 ha recorded as retaining wetland vegetation in the catchment. Another comparison is with water areas recorded on VicMap mapping, which records a total of 318ha of watercourses, lakes, dams, pondages and areas subject to inundation[246]. No areas are recorded as being swamps in the VicMap mapping.

Clearly wetlands in the Merri Catchment have been decimated by settlement, although the exact extent of remaining swamps is very unclear as there has been no catchment wide wetland study.

There is potential to re-establish a number of swamps, an initiative that would provide enormous habitat benefits as well as flood control and water quality treatment. Wetland ecological communities are identified as a high priority for restoration in the Port Philip and Western Port Regional Native Vegetation Plan. Achieving significant wetland restoration in the Merri Catchment needs a champion, as well as a strategy.

A small ephemeral wetland remains at O'Herns Road. This land has been identified as a high priority for inclusion in the new Merri Park (Marran baba).

Three significant lakes have been established in the urban part of the catchment. They are permanent open freshwater wetlands, and include Coburg Lake (on Merri Creek), Edwardes Lake (on Edgars Creek), and Jack Roper Reserve Lake (on Merlynston Creek).

[246] Based on GIS analysis by MCMC 5/5/07

Coburg Lake and Edwardes Lake were established for ornamental and recreational purposes, although water contact is now not desirable because of water quality issues. Jack Roper Reserve Lake forms part of a retarding basin.

Habitat values of these lakes has been limited given the limited fringing vegetation, hard edges and poor water quality. Recent remodelling of Edwardes Lake has resulted in greatly improved riparian vegetation and a significant wetland area.

Photo 3 - Campbellfield Creek Retarding Basin wetland development

As discussed in 3.2 a few artificial wetlands have been established with habitat provision as their primary purpose; the wetland at Strettle Reserve in Thornbury is an example. However many small wetlands have been established for stormwater treatment with habitat provision as an important additional benefit. These include wetlands at Hall Reserve and Walker St in Clifton Hill, Merri Park Northcote, Campbellfield Creek Retarding Basin, Malcolm Creek Craigieburn, Roxborough Park, and Somerton. Some of these wetlands are providing important habitat functions, for example the wetland adjacent to Frog Court in Craigieburn and the Leamington Street Wetlands on Edgars Creek have been colonised by Growling Grass Frogs.

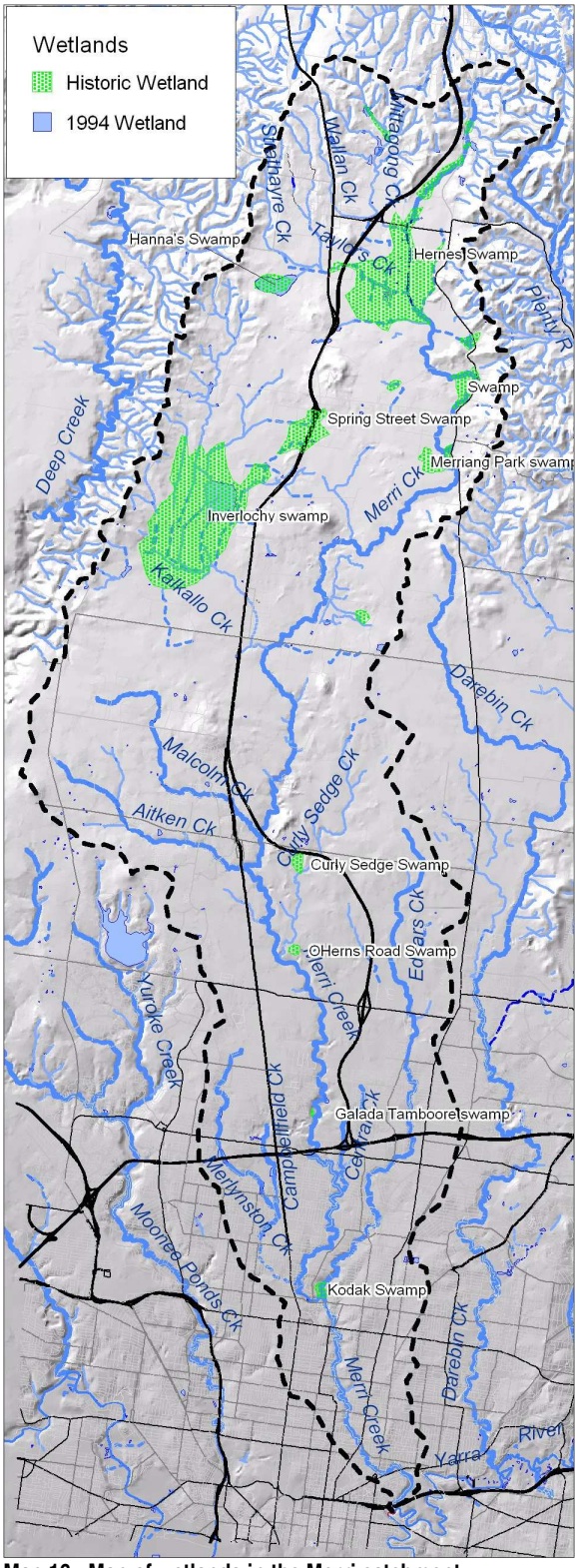
Stormwater treatment wetlands may not provide ongoing habitat however. Periodically they need to be de-silted, and this can severely (but temporarily) impact on habitat values.

The fact that many of the wetlands of Merri Creek are ephemeral does not diminish their value as habitat. Seasonal wetlands were a key characteristic of the pre-European landscape of the Merri catchment.

A number of quarry holes and farm dams provide important habitat for Growling Grass Frogs and other water-dependent species.

Apart from frog surveys there has been no systematic survey of these habitats.

Wetlands off the major channel provide a very important role as habitat, as they can have higher water quality, and may be free of damaging exotic species like Carp and Mosquito fish.



Map 16 - Map of wetlands in the Merri catchment

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Issues

1. Fish barriers, introduced fish species, and poor water quality are limiting fish diversity in Merri waterways.
2. Growling Grass Frog populations need careful management and habitat protection and enhancement.
3. Birds would benefit from improvements to water quality and wetland habitat.
4. Toxicity of sediments in the Merri Creek and the subsequent paucity of macroinvertebrate numbers is likely to be the key factor preventing Platypus from recolonising. the Merri.
5. Unusual and regionally significant instream communities occur in Merri Creek upstream of Craigieburn.
6. Willows and other riparian woody weeds are on balance detrimental to the ecology of waterways, but a sensitive process is needed for their replacement.
7. Alligator Weed has not been eliminated from Merri Catchment despite its status as a Weed of National Significance and state prohibited weed.
8. More research is needed to understand the impact and control of aquatic weeds in the catchment.
9. Improving the aquatic ecosystems of Merri Catchment's waterways requires:
   - Improved fringing vegetation.
   - Reductions of inputs of toxicants, nutrients and sediments from the rural and urban catchments.

- Control of aquatic weeds and problematic introduced animals.
- Improved flow regimes.
- Greater structural diversity in the stream channels.
- Improved connection up and downstream and to the floodplain.

10. Wetlands have been decimated in the catchment, but are a high priority for restoration; a study is needed to strategically plan restoration and management of wetlands across the catchment.
11. Habitat values of artificial lakes in the catchment could be improved by improving their fringing and riparian vegetation.

Objectives

1. Protect and improve the environmental health and social and economic values of waterways and wetlands (see RCS-WO2).

Targets

1. Halt further decline in the condition of rural waterway sections, and by 2010 improve the condition of urban sections of the catchment from 'very poor' to 'poor'. In particular, in the urban sections improve vegetation from 'very poor' to 'poor' (see also section 2), water quality from 'very poor' to 'poor' and habitat and stability from 'moderate' to 'good'. (these targets are derived from the Regional River Health Strategy).
2. Improve the condition of the catchment's waterways so that:
   - at least 50% of Merri Catchment's natural[247] waterways length will be in 'good' or 'excellent' condition by 2015;
   - all natural waterways will be in 'good' or better condition by 2025 (see RCS-WT6).
3. Progressive improvement in the condition of waterways across the catchment as measured by the Index of Stream Condition, including beds and banks, streamside zone and aquatic life (see RCS-WT7).
4. Study of the extent and health of the catchment's wetlands and their restoration and management undertaken by 2010.
5. No net loss in the extent and health of wetlands of each existing type (see RCS-WT15).
6. Progressively improve the overall health and social value of natural wetlands (see RCS-WT16).
7. Return of Platypus by 2016 to the upper reaches.
8. No net loss of Growling Grass Frog populations and key habitats.
9. Diversions from Merri waterways to be within sustainable diversion limits by 2015 (See RCS-WT3).
10. Removal of fish barriers at Cooper Street, O'Herns Road, and Edwardes Lake by 2015.
11. Aquatic weed control strategy undertaken by 2010.
12. Eliminate Alligator Weed from Merri Creek by 2010.
13. Increase the number of wetlands.

Actions

See Section E page 201.

[247] In this context 'natural waterway' is taken to mean one that is not in a pipe or concrete lined.

PART C - COMMUNITY

SECTION 4 – RECREATION, TRAILS, SAFETY, COMMUNITY INVOLVEMENT AND EDUCATION

Background

According to Parks Victoria, "Open space is not only for recreation and conservation of environmental and cultural values; it is the foundation of urban liveability. It underpins many social, ecological and economic benefits that are essential to the healthy functioning of the urban environment". Open spaces are especially valuable assets in the built-up northern suburbs. They are recognised as being important for relaxation, health and well-being, and nature conservation.

The importance of physical activity to people's physical and mental health is being increasingly recognised and documented. Active people are more likely to live longer, have lower risk of heart disease and stroke, and are less likely to suffer stress, anxiety and depression. Open space that is accessible and attractive encourages people to undertake various forms of exercise as part of their daily lives.

Contact with nature is positive for health in terms of recovering from stress, improving concentration and productivity and improving one's psychological state (Maller et al 2002). Open space areas along waterways provide a major opportunity for viewing and experiencing nature in the northern suburbs. Trends towards more intensive development and increased work-related stress indicate a growing need for these green areas of open space.

Parks also play a significant roll in fostering social connectedness, which is important for individual and community well-being.

The twin objectives of providing a habitat corridor following Merri Creek and its tributaries and a high quality linear parkland for primarily informal recreation are objectives which have driven the development of the Merri Creek waterway corridors for three decades.

Parks Victoria's *Linking People and Spaces* strategy for Melbourne's open space network specifically identifies the Merri Creek for:

- The protection, enhancement and where possible linkage of the significant riparian vegetation in order to establish a regional wildlife corridor.
- Definition and development of a new regional recreational and conservation park in order to meet the recreational needs of Craigieburn, Thomastown and Epping North.
- Extending the shared trail northwards initially to Barry Road, but in the longer term as far as Craigieburn Township and Malcolm Creek, as well as closing the gaps in the existing Merri Creek Trail south of the Metropolitan Ring Road.

Melbourne 2030, the State Government's strategy for metropolitan Melbourne aims to continue to protect the liveability of the established areas and to increasingly concentrate major change in strategic redevelopment sites.

- Policy 2.2 establishes growth areas on both sides of the Creek – the Hume Corridor continues growth north from Craigieburn, and the Epping North Corridor north from Epping.
- Policy 5.6 is to "improve the quality and distribution of local open space and ensure long-term protection of public open space". It establishes a Parkland Code which encourages planners to ensure that land critical to completion of open space links is transferred to public ownership for open space purposes.
- Policy 5.7 "to rectify gaps in the network of metropolitan open space by creating new parks and ensure major open space corridors are protected and enhanced". Initiatives listed include reserving land for a new Merri Creek Regional Park, and the extension of the Merri Creek Parklands "chain of parks" to Craigieburn.

Population is increasing quickly in the outer suburbs. For instance, within the City of Whittlesea, population has increased from 118,292 in 2001 to 132,155 in 2006 and is expected to increase to 154,230 by 2011 and to 199,012 by 2021. The Epping North area, which falls almost entirely within the Edgars Creek sub-catchment of the Merri catchment, and includes the development of Aurora, has increased from 228 in 2001 to 2,568 in 2006

and is expected to increase to 10,145 in 2011 and to 28,960 in 2021[248].

In the City of Hume, population is increasing at a rate of 1.9% per annum. It is anticipated that by 2011, there will be a further 35,399 people living in Hume beyond the municipality's 2005 population of 154,213[249]. The Hume Growth area is expected to grow by 52,000 people by 2021.

Urban growth and industrial development in these two municipalities within the Merri catchment will be focussed on the Epping North area in Whittlesea (affecting the Edgars Creek catchment) and the Craigieburn to Mt. Ridley area (affecting the Malcolm Creek catchment and parts of Kalkallo and Merri Creeks).

Population growth and urban expansion are strong reasons why a new regional park is needed in the Merri Catchment.

In addition to the identified urban growth areas, Mitchell Shire (which includes the headwaters of the catchment) is experiencing strong population growth. The Wallan Structure Plan[250] estimates that by 2030 Wallan will have grown from 5411 people in 2006 to 18477 people, an increase of approximately 13,000 people. The open space corridors of Merri Creek and its tributaries form an important recreational resource for residents south of the Great Dividing Range. The parks adjacent to Wallan Creek and Taylors Creek in Wallan already are important recreation areas. Mitchell Shire is preparing a strategy for Taylors Creek which should clarify open space opportunities.

The massive expansion of the urban boundary which might result from the Melbourne @ 5 million investigation may see the population of the Merri catchment skyrocket well beyond the figures mentioned above.

State Government planning for the new Merri Creek Park commenced in 2002, and a draft concept plan was released by Parks Victoria in February 2006. According to Parks Victoria no final concept plan is to be released, but a management plan is being prepared. No formal start had been made to the Park's establishment as of July 2008. Parks Victoria has proposed the name "Merri Creek Parklands" for the park, however this name is already used for the network of parks south of Mahoneys Road. A Wurundjeri representative has proposed the name Marran baba for the Park, which has been adopted by the MCMC Committee.

The State Planning Policy Framework clause 15.10 identifies an objective "to Assist creation of a diverse and integrated network of public open space commensurate with the needs of urban communities and rural areas". It says that networks should be used for recreation and conservation of natural and cultural environments, and that the networks are:

- linked through the provision of walking and cycle trails and rights of way,
- integrated with open space contributions from abutting subdivisions, and
- incorporate, where possible, links between major parks and activity areas, along waterways and natural drainage corridors, connecting places of natural and cultural interest, as well as maintaining public accessibility on public land immediately adjoining waterways and coasts. [251]

All of the Councils in the Catchment have prepared Open Space Strategies. All of these strategies recognise the potential of Creek corridors including the Merri and its tributaries as habitat corridors and recreational parkland. Mitchell Shire's strategy foreshadows a possible trail connection from Wallan to the Merri Creek Trail[252].

Three studies were carried out in 1993 in preparation for the Merri Creek Concept Plan (which evolved into the Merri Creek and Environs Strategy) to help to understand the community's expectations of the Merri Creek Parklands. Jan Bruce & Associates undertook customer research by surveying 587 residents living within 500m of Merri Creek downstream of Barry Road to ascertain their views on the Creek and surrounding parkland. Context Pty Ltd & Diversity Coalition consulted with young people and culturally and linguistically diverse groups, and Context Pty Ltd & Loder & Bailey Consulting Group examined recreation and access needs.

These reports made a number of recommendations which are discussed (along with other information) in the following sections.

Chapter 4.1 below deals with community involvement and education

Chapter 4.2 deals with informal and sporting recreation in the Merri catchment Corridor.

[248] City of Whittlesea (2008).
[249] Hume City Council Population Estimate June 2005
[250] Mitchell Shire Council (2007)

[251] The SPPF forms an identical part of each municipality's planning scheme and can be accessed through the web, e.g. http://www.dse.vic.gov.au/planningschemes/whittlesea/home.html
[252] Mitchell Shire Council (2005) Page 69

Chapter 4.3 deals with the Merri Path and its maintenance and development, and access to parkland.

Chapter 4.4 deals with public safety within the Merri catchment waterway corridors.

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Chapter 4.1 Community Engagement

Port Phillip and Western Port Regional Catchment Strategy

Relevant Objectives:

RCS-PO2 Increase the capacity and participation of people and organisations in catchment management.

RCS-PO3 Reduce the overall impact of the regional community on catchment assets.

RCS-LO5 Provide a high-quality network of parks and open space across urban and rural areas managed for community and environmental benefit.

Relevant Regional Targets:

RCS-PT5 Maintain or increase the number and geographic coverage of community groups participating in catchment management in the region, and increase the active membership of community groups by 20 percent (from 2001 levels) by 2008.

RCS-PT6 Increase community awareness and understanding of the condition of catchment assets and associated trends.

RCS-PT7 Maintain the region's total ecological footprint at or below the 2003 level, and reduce the average ecological footprint (per capita) for the region by 25 per cent by 2030.

Background

Since the 1970's there have been high levels of community involvement in a range of activities associated with Merri Creek. The community sector has been voluntarily involved in the formation and operation of both the Merri Creek Coordinating and Management Committees. The community has also undertaken research, lobbying and direct action, as well as planting, weeding, rubbish collection and participation in community festivals. Since its formation in 1988, much of this community involvement has come through Friends of Merri Creek.

The community of the Merri catchment includes a high proportion of culturally and linguistically diverse (CALD) communities. It also includes highly motivated individuals active in community life. Other individuals and communities require programs that acknowledge their values, resources, interests and understanding. Poorly targeted community engagement programs can do more damage than good.

Community participation is highly desirable in the management of the Merri Creek, its tributaries and their environs. Potential benefits include:

- the achievement of better outcomes from decision-making forums;
- a sense of personal commitment amongst the community to the care of waterway open space;
- reduced maintenance costs; and
- improved community health.

In order to sustain high levels of community involvement, it is necessary to provide opportunities for involvement to a wide cross-section of the community. It is also important to design activities targeted at their interests, and their levels of knowledge and experience.

Significant improvements to the water quality in Merri Creek and its tributaries can only be made through changes to the behaviour of community members living or working in the catchment. Responses to this challenge may include information provision. However programs that engage the community through participation are more likely to be effective in creating behaviour change than information provision.

It is also important for agencies and others involved in the planning of major works to ensure that the community sector has sufficient opportunities to be consulted about proposals so that these works can be developed to meet the needs of local communities. It is often necessary for such consultation exercises to deliberately target groups who might normally be unable to access such processes (e.g. CALD communities or the Aboriginal community).

Members of the community can become involved in volunteer groups like Friends of Merri Creek, Friends of Wallan Creek, and Friends of Edwardes Lake, the Merriang and District Landcare Group, or the Upper Merri Plenty Landcare Group which are active environmental groups in the catchment. Other groups have made significant contributions in the past, and new groups will probably form in the future. After the formation of the Upper Merri Plenty Landcare Group in February 2008, covering that part of Mitchell Shire in the Port Phillip and Westernport catchment, there is only a small gap in Landcare group coverage in the City of Hume between Gunns Gully Road and

Donnybrook Road, west of the Hume Highway. This area abuts the urban growth boundary and is zoned Green Wedge Zone or is part of Melbourne Water's Kalkallo Retarding Basin. It is not considered a priority to fill this small gap through the formation of a new group. It may be more effective to encourage an existing group to cover this additional territory.

In order to have the greatest benefit to community health, groups like MCMC, Friends and Landcare Groups need to be inclusive in their membership and management as well as their programs.[253] A casual look suggests that more could be done to ensure that membership and staff profiles as well as program involvement profiles address the diverse composition of the Merri Creek catchment community.

Member Councils run community involvement programs. Events include Hume's Multicultural Planting Festival, Yarra's National Tree Day, Moreland's Autumn Planting festivals and their support of the Kingfisher Festival, Darebin's Merri Creek Safe Stroll, and Whittlesea's events at the Whittlesea Gardens. Mitchell Shire runs National Tree Day activities, and in June 2008 ran its first Landcare and Friends Group Forum. Many Councils run their own community planting days.

The MCMC has also conducted a number of community involvement and education programs. The federally funded JobSkills program in the early to mid 1990s generated much activity, particularly with CALD communities. Other programs were funded by Parks Victoria. Member Councils continue to fund MCMC's community engagement activities. These attract interest from a diverse range of groups (especially CALD groups) and focus on issues culturally relevant to the participating group, and those which engender group commitments to activity. Activity days have also included participation from Scouts, residents' groups, school groups, neighbourhood and community houses, volunteer coordinating organisations, Green Corps, Landcare, work placements and corporations. MCMC's joint project with Whittlesea, Parks Victoria, Office of Women and Northern Melbourne Institute of TAFE entitled "Bilingual Park Tour Guides Program" is a good example of a project involving CALD groups that can be used as a model.

Since 1997, MCMC has hosted a Waterwatch Coordinator, funded by Councils and Melbourne Water. The Waterwatch Coordinator works with schools and other community groups to educate them about water quality and empower them to work towards its improvement. Part of the role is to facilitate community monitoring of waterway health.

Given the length and linear nature of the creek corridor, it is desirable to encourage the formation of new local interest Friends of, and Landcare groups. Such groups might be helped to form with assistance from Friends of Merri Creek, MCMC, Local Governments, PPWCMA's Landcare Coordinators, or the State Government.

Creek managers also must ensure that the descendents of the original custodians of the Creek (i.e. the Wurundjeri people), as well as the wider Aboriginal community, are respected and have the opportunity to be involved in community activities. It is especially important that interpretation of Aboriginal cultural heritage be done only in consultation with Wurundjeri elders.

DSE and DPI have published an Effective Community Engagement Workbook which provides good background to the skills and tools which can be used to successfully engage the Merri Creek community.

The proposed new regional park for Merri Creek between Craigieburn and the Ring Road provides many opportunities for engaging the community in the catchment's ecology. Currently there are no plans for an interpretation centre in the park[254], however efforts to engage the community would be much assisted by a well-run centre.

Key References

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Issues

1. The community has demonstrated a resource of skills and knowledge and a desire for involvement which should be fostered, expanded and drawn upon to assist the development and management of Merri catchment waterways and their open space.
2. The Merri catchment includes relatively high numbers of people of culturally and linguistically diverse backgrounds who are

[253] E.g. see Galbally (2008)

[254] Letter from Paul Dartnell, Manager Urban Parks, Parks Victoria to MCMC dated 13/11/08.

in many cases disadvantaged in terms of access to information and involvement.

3. While Councils and MCMC have been able to conduct a number of community education programs in recent years, apart from the voluntary efforts of Friends of Merri Creek, there are few ongoing strategic programs directed to those ends.
4. In order to involve the local community, education and recreation programs need to be relevant to the community's interests.
5. In order to create effective behaviour change, programs should identify the target community's existing wants, and craft the message to meet some of these wants.
6. Adequate resourcing is essential for sustaining community involvement.
7. Resources may not always be targeted at the most effective programs.
8. Community understanding of the ecology of the catchment is hampered by the lack of a dedicated natural history interpretation centre in the catchment.

Objectives

1. To increase the capacity and participation of people and organisations in catchment management. (From RCS-PO2)
2. To reduce the overall impact of the regional community on catchment assets (from RCS-PO3)
3. Encouragement of community custodianship and interest in the Merri catchment's creek corridors.

Targets

1. To develop a greater understanding by agencies of the community in the Merri catchment, their wants, needs and interests, barriers to their involvement, and the most effective ways to engage them.
2. To develop greater appreciation and understanding of the value of the Merri Creek, its tributaries and open space by the community (particularly within the catchment and especially Creek neighbours) through strategic:
   - consultation;
   - provision of information;
   - community education, participation and behavioural change programs; and
   - collaboration.
3. To improve responsiveness by agencies to views from the community.
4. To provide a high level of involvement of the community in planning, decision making and management processes.
5. To provide equitable access to information, consultation and involvement for all members of the community through the development and conduct of programs for CALD groups, and other disadvantaged groups.
6. To consult with and involve relevant Aboriginal groups/agencies e.g.: Aboriginal Affairs Victoria, Aborigines Advancement League, Wurundjeri Tribe Land Compensation and Cultural Heritage Council, and Maya Healing Centre.
7. To facilitate awareness leading to further community involvement.
8. To reduce the overall impact of the regional community on catchment assets. (From RCS-PO3)
9. To create a high level of environmental sustainability by building on current awareness and promotion of a conservation ethic to the community.
10. Maintain or increase the number and geographic coverage of community groups participating in catchment management in the catchment and increase the active membership of community groups by 20 per cent from 2001 levels by 2008. (from RCS PT5) and by a further 20% by 2015
11. Establish a new Friends Group within five years of the establishment of a new suburb on Merri Creek or a tributary.
12. Increase community awareness and understanding of the condition of catchment assets and associated trends (from RCS PT6)
13. Maintain the catchment's total ecological footprint at or below the 2003 level and reduce the average ecological footprint (per capita) for the catchment by 25 per cent by 2030. (from RCS PT7)

Actions

See Section E page 202.

Chapter 4.2 Recreation

Background

The strengths of the Merri Creek waterway corridors as recreation resources are the physical landform and landscape character of the valleys (which provide a 'natural' setting and refuge from the surrounding urban environment), the public land along the waterways, the linear nature of the corridors which makes them accessible to a large number of nearby residents, and the existing recreation facilities and settings. Research highlights the particular strength of the Merri Creek corridor for informal recreation in a natural setting.

Weaknesses of the corridors for passive recreation include the lack of public land frontage on the main stem of Merri Creek north of Campbellfield and the northern tributaries, degraded environmental quality, shortcomings in trail quality and development, and limited access at key points. Additional facilities desired by the community include picnic areas, toilets, barbecues, playgrounds and shelters, although the lack of these facilities in the Merri Creek corridor helps contribute to its natural setting. Providing these facilities not right next to the creek but in nearby parks provides a good compromise.

In the inner northern suburbs (i.e. Coburg and south) the Merri Parklands are well recognised and well used for informal and formal recreational pursuits. Since the 1980's, usage in the Merri Parklands south of Moreland Road has dramatically increased.

Acquisition of parkland, and protection and enhancement of the waterway corridors will play a significant role in satisfying the need for more informal recreation opportunities in the outer and newly developing suburbs. The proposed Merri Creek Park (Marran baba) is expected to include a number of recreational nodes between areas primarily reserved for conservation uses.

Parkland along the waterway corridors is often in a range of ownerships, making coordination difficult. This has been addressed in a number of cases by the joint commissioning of site or precinct master plans or management plans.

The open space of the Merri Creek waterway corridors contains over 28 sporting ovals, five golf facilities, three athletics fields, and a range of other active sporting facilities managed by Councils and Parks Victoria. These sports grounds are generally well utilised, but cater for a relatively small section of the community[255]. In many cases there are opportunities associated with existing sporting facilities and grounds to provide informal recreational facilities on sportsground surrounds.

Combining the results from the two consultation reports done in preparation for the original strategy (Jan Bruce & Associates, and Context & Diversity Coalition, both 1993), a ranking of how people spend time at the Merri Creek was prepared (see Table 10). Most of the respondents to both surveys lived south of Mahoneys Road.

Activity
Walking
Sitting around relaxing
Cycling
Socialising with family/friends
Supervising children's play
Playing
Picnicking
Studying birds, plants or animals
Walking the dog
Relaxing/reading/sunbathing
Jogging
Photography
Golf
Informal sports
Attending special event
Looking at/playing with rocks
Fishing
Courting/romancing
Painting/drawing
Formal sports

Table 10 - Ranking of how people spend time at Merri Creek

(top 20 in order from most respondents to least)

The studies asked what existing features were important to participants' enjoyment of Merri Creek, and a combined ranking of importance was prepared, which is summarised in Table 11.

The studies also asked what features needed improving or additional facilities were important, and a combined ranking of importance was prepared which is summarised in Table 12.

As a result of these studies, interesting differences emerged between the cultural backgrounds, with some cultural groups giving much more importance to informal recreation facilities such as picnic areas and seats. Whereas most groups listed formal sports facilities as their most unwanted features, some listed dog walking and horse riding (Context & Diversity 2003).

[255] E.g. "The use of sporting fields within the parks of Northcote is at a much lower level than the other parkland areas" (Lacey & Bruce 1990 p 42.

Feature
Trees
Walking tracks & trails
Bushland
Wildlife including birds
Nature/conservation areas
The Creek
Plenty of space
Other water features
Bicycle/walking tracks
Bike tracks
Appearance/vistas
Scenic vistas
Not crowded
Lawn areas
Ball games areas
Picnic facilities
Barbeques
Playground equipment
Park/clean park
Sports grounds and reserves

Table 11 - Important existing features of Merri Creek

(top 20 in order of decreasing importance)

Feature
Picnic areas
More trees and bushland areas
Better access to toilets
Quiet areas
More walking paths
Barbeques
Drinking fountains
Separate walking and cycle paths
Better or more playgrounds and children's opportunities
More seats
More areas set aside for conservation
Picnic shelters
Opportunities to view wildlife
Linking of Bike paths
Lighting
Other
Improvement in the quality of existing facilities
More cycle paths
Education/conservation/nature study programs
More or better information

Table 12 - Importance of additional/improved features/facilities

(Merri Creek top 20 in order of decreasing importance)

Experience along the Creek shows that while informal recreation facilities are important, without the prior establishment of an attractive setting which generates a sense of local ownership of the site, informal facilities are not used or valued and are likely to be heavily vandalised (e.g. near Emma Street in Fawkner).

A strategic approach is required for the placement of priority facilities (e.g. toilets, picnic tables) at designated locations along the creek. Establishment of such facilities can commence when the natural setting has been 'created'. However a better understanding is needed of when a suitably attractive natural setting has been achieved.

The lack of facilities sometimes places limits on the types of interpretive activities that can be conducted along the creek, and also deters some sectors of the population from visiting the creek. For example, the lack of seating can make it difficult for older people, and a lack of toilets can be difficult for parents with children.

Community feedback continues to give high priority to the provision of picnic areas and toilets. Their provision will assist in achieving objectives relating to providing fair access to, and engaging, the full spectrum of the community. Designed and placed properly, these facilities will not negatively impact the natural values of the creek.

The two 1993 consultation reports asked about issues that needed improving along the Creek, and a combined table of the most important is included at Table 13 below.

A number of areas within the waterway parklands are identified in Councils' open space strategies as having a district (municipality-wide) catchment, and therefore deserve a higher level of investment in facilities. These include: Moomba Park Reserve (Fawkner-Reservoir), Lake Reserve and downstream to Bell St (Coburg), Roberts Reserve/Jones/Allard Parks (Brunswick East), CERES/Merri Creek (Brunswick East), Sumner/Kirkdale/Merri Parks (Brunswick East/Northcote), Edwardes Lake Park (on Edgars Creek in Reservoir), and Jack Roper Reserve (and areas upstream on Merlynston Creek in Broadmeadows).

Issue
Water quality
Litter along the Creek
Rubbish dumping
Pollution control
Too few trees
Motorbikes/trail bikes
Too much undergrowth
Weeds
Flooding
Suitability of tracks for bike usage
Everything
Fire hazard of undergrowth
Vermin (rats etc)
Snakes
Views of factories
Not enough natural areas
Poor water flow
Personal safety when using area
Walking tracks
Views of commercial buildings

Table 13 - Issues needing improvement along the Creek

(top 20 in order of decreasing importance)

Two areas of Merri Creek parkland are identified as servicing a regional catchment, i.e. extending well beyond the municipality which the park is in. They are Yarra Bend Park/ Hall/Quarries/Ramsden St Reserves including upstream to Miller St Fitzroy (in the City of Yarra), and the proposed Merri Creek Park including the Creek valley from Galada Tamboore to Craigieburn Road (in the cities of Whittlesea and Hume) (Marran baba).

The Merri Creek Trail Review[256] examined usage of the shared pathway along Merri Creek south of Mahoneys Road. Usage of the pathway peaked between Bell Street and St Georges Road, and this section also had a higher proportion of walkers compared to the upper and lower sections. The vast majority of users lived in postcode areas immediately adjacent to the creek, although this may partly reflect the distribution of questionnaires.

Whilst usage of the shared pathway declined, the City of Yarra's Open Space Strategy[257] indicates that the Merri Creek linear reserve is an important component of open space, especially for Fitzroy North and Clifton Hill residents. Reasons to visit Merri Creek included walking, cycling, jogging, dog walking, the views, and to visit a playground. Personal safety concerns topped the list of reasons people didn't visit the Creek, followed by rubbish in the Creek, dangerous cyclists, lack of time, snakes, too far to walk to, insufficient lighting and no shade. More distant users were likely to be cyclists and more distant potential users were more likely to cite lack of parking and lack of toilets as reasons for not visiting.

The Trail Review indicated that in the Heidelberg Rd to Yarra River section of the trail 65% of users were cyclists and only 22% were walkers. However, the Yarra Open Space Strategy shows that for residents of Fitzroy North and Clifton Hill 73% used their local Merri Creek Reserve for walking and 43% for cycling. This suggests that the Trail Review probably attracted a disproportionately high response rate from cyclists.

Key References

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Thompson Berrill Landscape Design Pty Ltd and Environment & Land Management Pty Ltd (2006) *Yarra Open Space Strategy*.

Thompson Berrill Landscape Design Pty Ltd (2007) *Merri Creek Trail Review*

Issues

1. The natural setting, with trees, the Creek, wildlife, nature conservation areas and bushland is of primary importance for the community's recreational enjoyment of Merri Creek. Experience has shown that establishment of picnic shelters, barbeques, interpretive signage, etc in an otherwise undeveloped parkland is likely to lead to them being vandalised. To reduce the wastage of resources is probably better to start with creating an attractive setting before these facilities are set up.
2. On the other hand it is difficult to develop a sense of ownership of open space when the lack of facilities makes it difficult for the community to use the space, and the community has indicated that the provision of picnic areas and toilets are high priorities.
3. Regional and district parks often include land in different ownerships, and need to be planned jointly.
4. The surrounds of sports grounds could often be managed better to provide informal recreation opportunities.
5. Different cultural groups can have different priorities in terms of informal recreation facilities, and site planning should take these into account.
6. Established exotic trees contribute to community appreciation of the Creek. However, sometimes these exotic species are serious environmental weeds, or their presence may be a barrier to creation of a habitat corridor along the Creek. Creek rehabilitation may therefore require their removal. The best way to achieve this is to plan removal with community consultation, undertake removal in stages, preceded where possible with the establishment of indigenous plantings in adjacent areas.

[256] Thompson Berrill Landscape Design (2007)
[257] Thompson Berrill Landscape Design and Environment & Land Management Pty Ltd (2006)

7. In the more highly utilised sections of the parkland, conflicts between users are becoming more common. (See chapter 4.2 – Trails and Access).
8. Poor water quality, litter and rubbish detract significantly from users' appreciation of the parkland. See chapter 3.2 – Water quality for discussion of these issues.
9. Safety for users in some areas could be improved (See chapter 4.3 – Public Safety).
10. A lack of public land frontage on the west side of Merri Creek north of Campbellfield and on both sides north of Craigieburn Road East, and on many major tributaries restricts their use as linear parkland.
11. Access for informal recreation is absent or very widely spaced for extended sections of the waterway parklands.
12. Connectivity of waterway parklands is missing in critical areas e.g. parkland along Aitken and Malcolm Creeks does not link to parkland along the Merri.
13. Proper understanding of community expectations requires up to date survey information.
14. Effective management of the linear parkland would be assisted by usage data collected regularly to create a picture of usage trends over time.
15. Water quality in the catchment is often not sufficient to allow safe provision of water-based passive recreation activities such as boating and fishing.

Objectives

1. Provide a high quality network of parks and open space across urban and rural areas managed for community and environmental benefit (see RCS-LO5)
2. Provide passive recreation, education and information facilities along Creek corridors.

Targets

1. To design and manage the waterway parklands for the joint purposes of habitat management and recreation in a primarily natural setting.
2. To design the parklands to provide for continuous linked habitat corridors, continuous and linked trails and primarily passive recreational nodes at recognised district park locations.
3. To enhance the creek-side parklands to provide continuous linear parkland along Merri Creek between the Yarra River and Craigieburn, and along major tributaries.
4. To provide facilities which the community has indicated are high priorities, including picnic areas and toilets in a strategic way.
5. To establish an attractive recreational setting suitable for informal recreation and generate a sense of local ownership before providing facilities like seats, barbeques, picnic shelters, toilets etc.
6. To achieve a balance between facilities and opportunities for intensive recreation, and less intensive use and conservation areas.
7. To increase appreciation of the creek environment by all communities through providing primarily passive recreation opportunities and programs compatible with the particular waterway setting, and through community engagement (see section 4.1 – Community Involvement and Education).
8. To manage use of the parkland to minimise conflicts and maximise park users enjoyment of the natural setting.
9. To provide fair access to recreation opportunities in the waterway parklands for a spectrum of community needs - the aged, children, disabled, non-English speaking backgrounds or other user groups.
10. To maintain an understanding of current use and future expectations of Merri Creek waterway corridors by the catchment's communities.
11. Continuous linear parkland along both sides of Merri Creek from the Yarra to Craigieburn East Road by 2020.

Actions

See Section E page 204

Chapter 4.3 Trails and Access

Background

The Merri Creek Trail

The Merri Creek Trail, also known as the Merri Path, extends along the main stem of Merri Creek from the Metropolitan Ring Road, where it links with the Metropolitan Ring Road Trail, to the Yarra River where it links with the Yarra River Trail. It is intended to be a shared pathway for pedestrians and recreational cyclists. The ownership, management and maintenance of the Trail rests predominantly with Councils, although the planning and approval of new sections of trail could involve various statutory authorities including, Parks Victoria, VicRoads, Dept of Infrastructure, Melbourne Water and other landowners.

Some sections of the path were first designed and constructed in the early 1980s. At that time design standards for paths were in their infancy and as a consequence some sections of today's Merri Path do not meet current shared pathway design standards. Current standards include those from Austroads and VicRoads, which cover path width, curvature, slope, clearances, signage, surface marking, bollards etc. The intent of theses standards is primarily to provide safety and accessibility.

Councils have progressively been replacing sections of substandard path over recent years with funding from Parks Victoria, VicRoads and Department of Infrastructure, as well as their own rate base. Improvements have also been made to meet access to all abilities standards and improve management access. Map 17 (p. 157) shows the extent of shared paths along waterways in the Merri Catchment.

In 2002 Melbourne Water developed draft guidelines regarding the location of paths and bridges in relation to flood levels and flow rates (Melbourne Water 2002). Path assessment and design should consider these guidelines. The Merri Creek Environmental Significance Overlay requires Melbourne Water's approval for path projects, or otherwise they require a planning permit. In the Draft Guidelines, Melbourne Water flags its ability to object to path projects not conforming with the guidelines.

Whilst formal planning permit applications may not be required for path projects by public authorities, submitting an application will ensure that appropriate parties are provided with an opportunity to comment on path proposals. This is especially necessary where new sections are to be constructed beyond the path's current limits. Planning of paths in these areas will need to take into account a host of factors including land ownership and approved land uses such as quarries.

The risks associated with flooding of the path and bridges need to be managed. There are a range of measures that can be taken to reduce the risk to users, and these measures have been examined in the Merri Creek Trail Review commissioned by the Cities of Darebin, Moreland and Yarra[258] (see below). Chapter 3.1 of this Merri Creek and Environs Strategy also deals with flooding.

The Merri Creek Environmental Significance Overlay, and the Development Guidelines for Merri Creek also inform path planning. For example, the Development Guidelines set a standard (MC8) for shared pathways, which includes setting the design speed to less than 30km/h.

Path design should consider Aboriginal or European heritage sites, flora and fauna, existing infrastructure, and avoid damage to these values.

At present there is no trail along the Merri Creek between the Ring Road and Craigieburn. The trail along the Craigieburn bypass does lead to Craigieburn, but it is at some distance from the Creek and on the opposite side of the freeway from the Creek for much of its length. The Hume Freeway is a major impediment to access to the Merri Creek Parklands for residents of Thomastown and Epping, notwithstanding the pedestrian bridge over the freeway at Barry Road Thomastown.

Extension of the Merri Creek Trail to the urban boundary is an established target of the Merri Creek and Environs Strategy, which is consistent with the State Planning Policy Framework and Council strategies such as the City of Whittlesea's 2009 Draft Public Health and Wellbeing Plan. It will be important to preserve the opportunity to extend the trail as urban growth extends to the north.

[258] Thompson Berrill Landscape Design (2007) Merri Creek Trail Review Draft Report, June 2007

The whole of the current Merri Creek path is part of Parks Victoria's Metropolitan Trail Network, which includes a proposed extension of the path to Craigieburn and along Malcolm Creek[259]. Parks Victoria's draft concept plan for the proposed new Merri Creek Park[260] shows this trail but the section north of Patullos Lane as being long-term and subject to feasibility assessment[261]. It identifies Patullos Lane as a key trail linkage to residential areas west of Sydney Road.

In the vicinity of Rushall Station, Fitzroy, the trail is diverted to adjacent roads. In some cases main road bridges are used as Creek crossing points. These diversions interrupt the experience of travelling within the creek valley, and can disorient path users, especially where signage is lacking.

In order to allow for habitat preservation and rehabilitation to be a greater focus on one side of the Creek, the Merri Creek Design Guidelines specify that a shared pathway be constructed on one side of the creek only at any given point.

The Merri Path has proved highly successful as a strategy to bring people to the Merri Creek Parklands. Since the start of construction of the Merri Path, usage has continued to grow – most particularly in the inner urban reaches. In the higher usage reaches of the path conflicts between cyclists, pedestrians and dog walkers have become more common.

Austroads standards require that two metre wide paths should only be adopted in areas with very low use. Three metre wide paths are the desirable minimum for shared pathways (and this is supported also by Bicycle Victoria), with wider paths (up to 4 metres) being required in areas of higher usage. These standards aim to provide safe clearances between path users. In the higher usage reaches of the path the parkland is often narrow and could not sustain a 4 m wide path without considerable detriment to the visual and environmental values of the parkland. Other methods of reducing conflicts in these areas need to be considered, including speed limits for cyclists, a white line to remind cyclists and pedestrians to keep to the left, education of path users about path etiquette, enforcement of dog on-lead rules, diversion of commuter cyclists to on-road cycle paths etc.

The Merri Creek Trail Review recommends a minimum constructed path width of 2.4m, with a 0.5m clearance to each side of the path to allow space for pedestrians, cyclists, dog walkers and other trail users to negotiate access. The nature of management of these narrow strips is yet to be clarified as the use exotic lawn species is detrimental to adjacent indigenous plantings and requires regular mowing.

In Fitzroy the Merri Path links to the Capital City Trail which follows the old Inner Circle rail reserve. The path also links to municipal bicycle networks in Yarra, Moreland and Darebin.

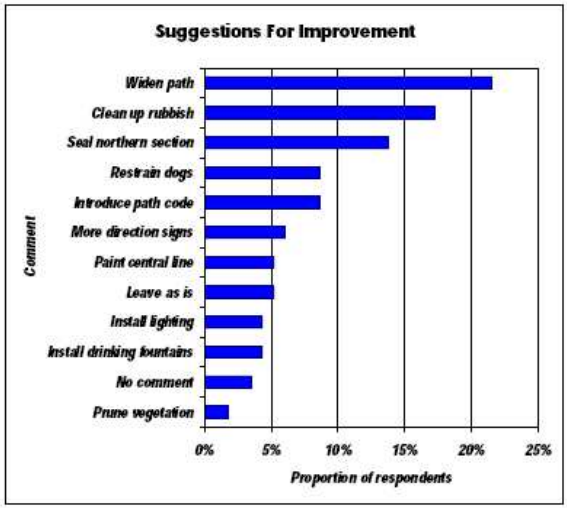
Fawkner and Reservoir sections of the Merri Path are less well linked to other trails and open space networks.

The City of Darebin's Cycling Strategy aims to encourage increased cycling amongst those who already cycle and a greater take up of cycling amongst those who do not cycle at all, through engineering, educational and promotional activities. Improvements to the cycling network proposed include:

- Improved linkage of the St Georges Road trail to the Merri Creek Trail,
- A bridge at Fyffe Street over Merri Creek to better link the Darebin and Moreland cycle networks,
- Improved linkage from Merri Creek along Broadhurst Ave Reservoir to Darebin Creek.

The proposed bridge at Fyffe Street is highly constrained by flood management issues associated with the proximity of the local levee system and would be unlikely to be approved by Melbourne Water. This matter has been recognised in the Trail Review.

Moreland adopted the Moreland Bike Plan in 2000. The plan included a survey of users of the Merri Path, which amongst other findings ranked suggestions by cyclists for improvement of the path (see Figure 1 below).



[259] Parks Victoria 2002 Map 4 – Metropolitan Trail Network
[260] Parks Victoria 2006
[261] Parks Victoria 2006 Map 5 – Park Visitor Experience

Figure 1 - Ranked suggestions for improvement from the survey of Merri Path users.

(Sinclair Knight Merz 2000)

The Moreland Bike Plan recommends:
- Staged path-widening for the south part of the Merri Creek path with line-marking;
- Sealing of the northern section of the Merri Path;
- Development of a shared path code for Merri Creek and other off-road cycling paths;
- Regular maintenance to deal with overgrown vegetation and cracked pavements;
- A signage program that includes both directional and interpretive signs along the Merri Creek route; and
- Improvement to linkages (e.g. at Allard Park East Brunswick),

Merri Creek Trail Review

The Merri Creek Trail Review (see action TA18) was commenced in 2006. It audited and analysed the existing trail and associated infrastructure between the Yarra and the Metropolitan Ring Road

A final version of the report was released in October 2007[262]. The review audited the trail and sought community input to identifying issues relating to the trail. The review indicated that usage of the path drops off rapidly downstream of St Georges Road, and north of Bell Street (see Figure 2, although this conclusion is based on limited survey information, and may be skewed by the survey method used.)

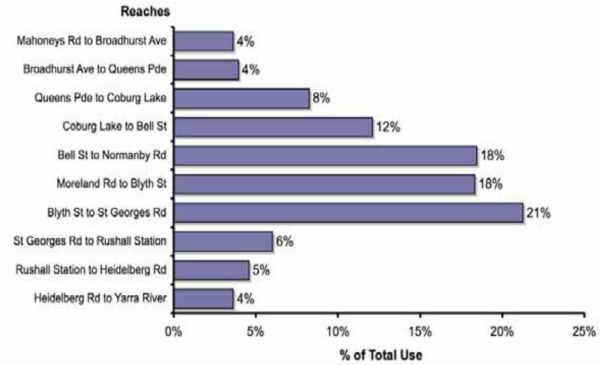


Figure 2 - Sections of path and their total usage.

From Merri Creek Trail Review October 2007 table 11

The overall key recommendations were to:
- Develop and install consistent warning and directional signage and remove redundant signage from along the Creek.
- Develop and implement an improved path maintenance program.
- Implement signed on road bypass routes for areas subject to regular flooding to retain continuous public access in all conditions. Provide advance warning of flooded structures or sections of path using flood markers and recommended control structures.
- Upgrade existing path to minimum 2.5m wide with 0.5m clearance either side to vegetation.
- Investigate options for secondary walking routes to improve looped tracks and reduce congestion on the main trail while protecting existing environmental values.
- Undertake staged replacement/upgrade of bridges, boardwalks and underpasses to meet Australian Standards and Melbourne Water Guidelines.

The package of works recommended totals approximately $5.3 million, but would be implemented in a staged fashion according to identified priorities.

The sections of trail identified as being the highest overall priority for work were Rushall Station to Heidelberg Road, Blyth St to St Georges Road and St Georges Road to Rushall Station. However, improving the condition of the trail between Mahoneys Road and Broadhurst Avenue and better dealing with topography between Edgars Creek and Murray Road were also high priorities.

The highest priorities for improving the safety of bridges were the Hamersley Ct footbridge, the Broadhurst Avenue footbridge and the De Chene Reserve footbridge, although many other bridges also needed improvement.

The standards and design solutions identified in the Trail Review can be applied to other planned and existing sections of waterway trail in the catchment, and reference should be made to it for that purpose.

Standards identified in the Merri Creek Trail Review 2007[263]
- Minimum 2.4m wide
- Retain 0.5m clearance to either side
- Retain head clearance to 2.4m
- Retain minimum curvature inside radius of 15m for a design speed of less than 30km
- Meet AS1428 Access and Mobility Standard gradients of 1:20 where possible
- Meet Melbourne Water Guidelines in respect to flooding where possible

Edgars Creek

[262] Thompson Berrill Landscape Design 2007

[263] Page 16 recommendation B2.1.3.3

Sections of Edgars Creek between Leamington Street and Glasgow Avenue in Reservoir, and between Main Street and German Avenue in Thomastown have relatively short sections of shared pathway.

In 1993, Melbourne Parks and Waterways (now Parks Victoria) undertook a feasibility study for a shared pathway linking Merri Creek to Diamond Creek, via the Maroondah Aqueduct. The study selected a preferred route from Merri Creek along Edgars Creek to Edwardes Lake Park, then following a barrel-drained tributary of Edgars Creek known as the Merrilands Main Drain to High Street, then joining the Maroondah Aqueduct.

Edgars Creek was chosen as the preferred route as it was considered more scenic and therefore lent itself to recreational cycling and walking, and the alternative route had more on-road trail and road crossings.[264]

No action has yet been taken to construct a path between Merri Creek and Edwardes Lake Park, however a walking path does exist between Edwardes Lake Park and High Street along the Merrilands Drain.

The City of Darebin Cycling Strategy includes the construction of a shared pathway along Edgars Creek from the Moreland Boundary to the Whittlesea Boundary.[265] Together with the proposed trail along Edgars Creek from Cooper Street north to Craigieburn Road East shown on comprehensive development plans for this area (mentioned above), much of Edgars Creek will eventually have a shared pathway. Future planning should ensure these sections are linked together and linked to the Merri Creek path.

Tributaries

Aitken Creek in Craigieburn has a shared trail along it within Craigieburn which stops to the west of the Northern Railway Line. Connecting this trail to a future extension of the Merri Creek Trail would be difficult (as it would need to cross the Railway and the Hume Highway) but highly desirable. The trail is being extended upstream as development proceeds west from Craigieburn.

Malcolm Creek in Craigieburn also has a shared trail which is being extended upstream as development proceeds. Its connection to a future Merri Creek Trail extension would require acquisition of land along Malcolm Creek downstream of the Hume Highway, and crossings of the Highway and Hume Freeway.

Other planned trails in the catchment include those along the upper Edgars Creek through the Aurora development[266] and the Cooper Street Employment Area[267]. Little formal pathway exists along the lower Edgars Creek, with the exception of short sections in Thomastown, and also around Edwardes Lake, and north as far as Glasgow Ave, Reservoir.

There are also short shared trail sections along Taylors Creek (in gravel) and in Hadfield Park in Wallan. Paths are planned along the Wallan Creek in Wallan Community Park. Opportunities for future downstream linkage to a future Merri Path extension should be retained wherever possible.

Opportunities for future trail construction along other tributaries should be retained wherever possible.

Other paths

Apart from the formal shared pathway network, there is a network of shorter and lesser standard links and pedestrian paths throughout the Creek parklands. These need to be designed to link with the main shared pathways, and to parkland access points, points of interest, recreation facilities etc. These paths also need to be designed to be safe for users, and appropriate standards applied.

Signage/guides

The Cities of Darebin and Moreland together published a printed guide to the Merri Path in 2007.

Directional signage has been provided in some locations but is often confusing, vandalised or absent. Improved signage and printed guides are needed to meet shared path standards, orient path users and give direction to features and nearby places and facilities such as toilets. This would assist and benefit first-time users especially. The Merri Creek Trail Review recommends the preparation of an integrated signage strategy for the Merri Creek.

Walking

[264] Dunn (1993) p13

[265] City of Darebin (2005) p48.

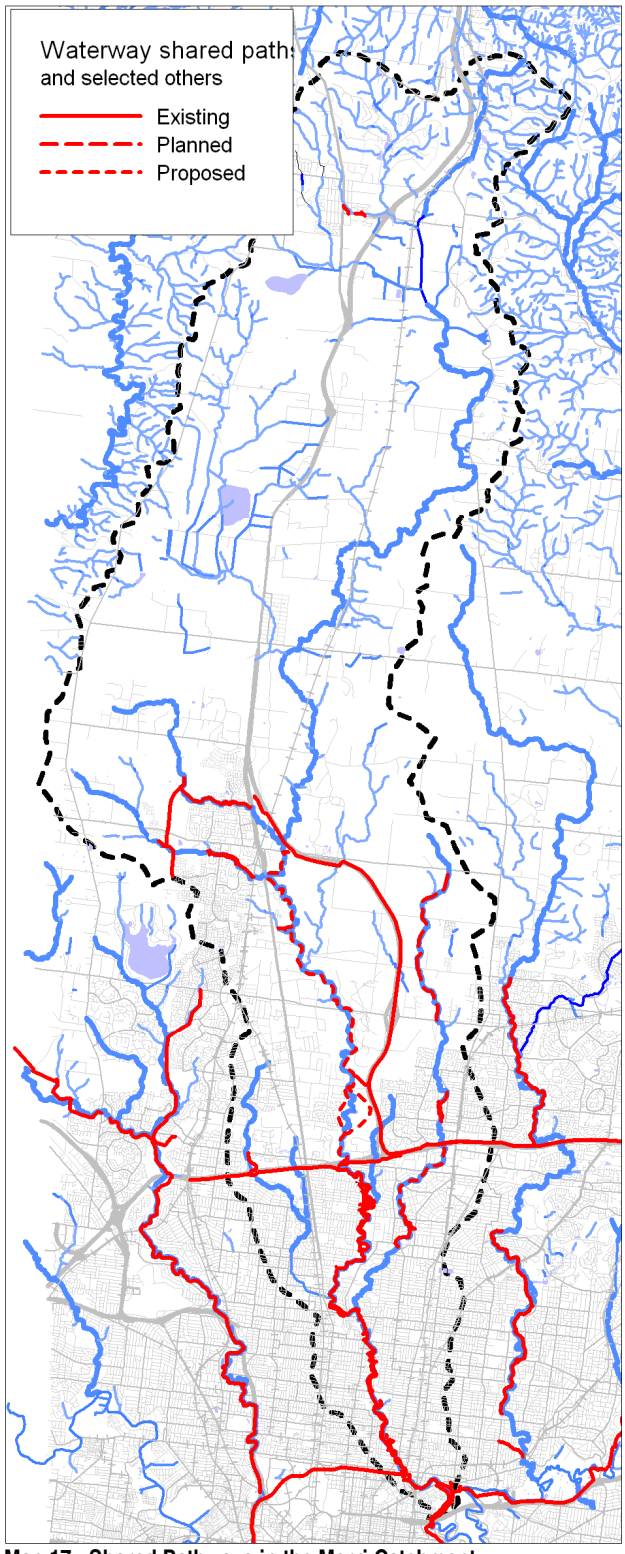
[266] As illustrated on the Aurora Development Plan Part 2 Northern Section VicUrban 15/5/07. Aurora is east of the Hume Freeway, between O'Herns Road and Craigieburn Road East.

[267] As illustrated on the Cooper Street Employment Area Comprehensive Development Plan Panel Version, City of Whittlesea 2005. The Cooper Street Employment Area is located north of Cooper Street Epping, south of O'Herns Road, east of the Hume Freeway and west of Yale Drive. It spans Edgars Creek.

There has long been an interest in the development of a walking route to the headwaters of Merri Creek, generally along the Creek alignment. Whilst some sections are in public ownership (e.g. the west bank for approx 2km south of Donnybrook Road), most of this reach is in private ownership. Issues include safety of users, protection of private owners from liability, provision of basic facilities for fence crossing (gates or styles), path surfacing, cost, demand, maintenance etc. Setting up this path would require negotiation with private land owners before it could be feasible, although it could be implemented in stages. A standard shared pathway north from Craigieburn would be prohibitively expensive and at least at this stage is not under consideration. Establishment of this path would require a specific investigation of the issues involved, and a carefully designed strategy for its staged achievement.

Access to open space

Accessibility for park users in Fawkner, Campbellfield, Thomastown and Reservoir falls well short of the standard (MC6) in the Merri Creek Design Guidelines which specifies that access to the creek parklands should be provided at least every 400m. Achievement of these standards may not be possible due to road layouts, however opportunities should be sought in these areas to improve accessibility.



Map 17 - Shared Pathways in the Merri Catchment

Key References

Austroads Guide to Traffic Engineering Practice, Part 14 – Bicycles
City of Darebin (2005) *Darebin Cycling Strategy 2005-2009*
Dunn, A. (1993) *Trail Feasibility Study Merri Creek to Diamond Creek Via Maroondah Aqueduct*, Melbourne Parks and Waterways Parks and Waterways Planning Division.
Kinhill Pty Ltd Merri Path Design Guide 1982.
Merri Creek Management Committee, *Understanding planning issues along the Merri Creek and Policy: Development Guidelines for the Merri Creek* May 2004.
Parks Victoria (2002) Linking People and Spaces.
Melbourne Water (2002) *Draft Melbourne Water Guidelines for Approval of Constructed Paths (along waterways & within Melbourne Water property)*.
Sinclair Knight Merz (2000) *Moreland Bike Plan*, Moreland City Council.
Thompson Berrill Landscape Design P/L (2007) *Merri Creek Trail Review Report*. October 2007.
VicRoads Cycle Notes 12 – Design Standards for Bicycle Facilities
VicRoads Cycle Notes 3 – Shared Bicycle/Pedestrian Path Design
VicRoads Cycle Notes No 10 (Behavioural Signs)
VicRoads Cycle Notes No 11 (Directional Signs)

Issues

1. The trail is sub-standard in terms of width, slope, curvature, sightlines and flood levels and consequently unsafe in places.
2. On-road sections of the trail disrupt the quality for users as a haven from traffic and noise.
3. The Merri Path at certain locations is below the 1 in 5 year flood line. Hazards to users from flooding in these areas must be managed.
4. The location of parts of the trail within the flood zone increases maintenance requirements and costs, particularly if the trail is not constructed of concrete.
5. Location of the path adjacent to the creek can limit opportunities for stream rehabilitation and improvement of the riparian fringe and habitat. Consideration thus needs to be given to use of ridge lines and other higher vantage points out of the floodplain. However, recreational users like being close to the Creek and such opportunities can be provided at intervals. These factors especially need to be taken into account where path renovation and relocation is under consideration.
6. Sections of the trail do not meet accessibility standards for wheelchairs and pushers.
7. Path maintenance and upgrades require large investments by Councils.
8. Proposed trail additions north of the Metropolitan Ring Road require detailed design and considerable funding.
9. No trails along tributaries link to the main Merri path.
10. Access to the creek corridor is hampered by a lack of access points, especially north of Queens Parade, Fawkner. The standard in the Design Guidelines of an access point at least every 400m is far from being met.
11. Privately owned frontages in the upper catchment limit access to the creek corridor, especially north of the Metropolitan Ring Road.
12. Management authorities need vehicular access to the Creek, but access should be discouraged and restricted for trail bikes, "joy riders" in cars and for rubbish dumping. However, the use of bollards on shared paths is no longer considered safe unless they are accompanied by warning measures.
13. Signage along the trail is substandard, poorly maintained and insufficient to provide orientation and direction to users.
14. The trail is popular with dog walkers, pedestrians and cyclists, but the interests of

the three groups are not always compatible, especially where cyclists do not display due care for pedestrians, but also when dogs are off-lead and pedestrians wander all over the path. This is especially problematic where sections of the Merri Creek Trail carry commuter cycle traffic due to its link into other cycle routes such as the St. Georges Road Principle Bicycle Network and the Capital City Trail.

15. Path construction poses a range of threats to environmental and cultural values. Paths must be designed and constructed carefully to manage these threats.
16. Inconsistencies in style of signage between municipalities detract from a unified Merri Creek style.
17. Rogue unsafe cyclists are ignoring information provided and should be the subject of enforcement action.

Objectives

1. Provide a high quality network of parks and open space across urban and rural areas managed for community and environmental benefit (see RCS-LO5)
2. Provide recreational cycling and walking trails along Creek corridors.

Targets

1. To develop a continuous, off-road shared pathway of consistent and safe design standard on one side at any point of Merri Creek from the Yarra River to the Urban Growth Boundary.
2. To implement Parks Victoria's Metropolitan Trail Network within the Merri Catchment.
3. To implement the recommendations of the Trail Review.
4. To develop a continuous walking route from the northern end of the Merri Creek Trail to the headwaters of the Merri Creek.
5. To preserve environmentally sensitive areas by locating paths away from these areas by careful design, and by directing recreational users to more appropriate areas.
6. To provide a safe environment for the needs of pedestrians and cyclists.
7. To develop trail links between the main Merri Path and new and existing (i.e. Malcolm Creek, Aitken Creek, Edgars Creek) trails, public transport routes, roads and other open space areas as development proceeds in the northern suburbs and opportunities arise.
8. To promote safety and courtesy between cyclists and pedestrians and provision of information about the trail network through the production of guides.
9. To provide access points, paths and facilities for differently abled and special need users, consistent with open space management zone objectives.
10. To provide shared path standard bridges at regular intervals to link urban areas on the opposite side of the Creek to the Merri Path.
11. To design, develop and maintain a network of other linkages of a range of standards from grassed walking routes to full shared pathway, linking to the main shared paths, access points, points of interest, recreational facilities etc.
12. To provide signage to meet shared pathway standards, orient path users, direct users to facilities and to interpret the natural and heritage features of the Creek.
13. To publish and make available printed guides to the Merri Creek and its tributaries as trail development proceeds and makes the waterways publicly accessible.
14. To provide for management access requirements in design of the path network.
15. To consult with stakeholders including the community about significant path upgrades or extensions.
16. By 2012, extend the Merri Path from Mahoneys Road to Galada Tamboore and provide a circuit walk around Galada Tamboore linking to the south, west and east residential areas.
17. By 2012, create a map for the public of Galada Tamboore.
18. By 2010, a continuous sealed trail is constructed between the Yarra River and Mahoneys Road.
19. In urban areas shared trail standard crossings across the Creeks (on shared trail bridges or road bridges) are no further apart than 1 km and are located above 1 in 10 year floods.
20. Access points to Creek parklands in residential areas are no further apart than 400m.

Actions

See Section E page 206.

Chapter 4.4 Public Safety

Background

Like the rest of Melbourne, Merri Creek and its open space pose a number of known and perceived hazards to its users, management staff and to neighbours. These known hazards include:

- Accident or injury on the path, and collisions between pedestrians and cyclists or motor bike riders;
- Drowning, or being caught in the water causing injury especially when the Creek is in flood;
- Injury from entering drains;
- Falling, including over steep banks;
- Dog attacks;
- Snake bite;
- Toxic or allergenic plants;
- Falling limbs or contact with low branches or injuries caused by inappropriate design of plantings;
- Wildfire or ecological burning;
- Rock or earth or fill collapses;
- Toxic or carcinogenic effects from eating fish or sprayed harvested plants;
- Contact with hazardous materials in dumped or tipped waste;
- Attacks by other people;
- Infectious diseases caught from water contact, contact with dog faeces, or needles, broken glass or other rubbish;

It is important that hazards such as these be identified, the risks associated with the hazards assessed and prioritized and control measures identified and implemented, to protect both users of the Merri Creek and agencies involved.

Accidents

The first coordinated look at risks along the Merri Creek are the Merri Creek Trail Review commissioned by the Cities of Darebin, Moreland and Yarra in 2005, and the review of low level bridges across Aitken Creek carried out by the City of Hume.

The Merri Creek Trail Review will audit and then analyse the existing trail and associated infrastructure. It will recommend a path system that meets Australian Standards and is able to provide a trail that runs the length of the creek corridor and addresses risk issues such as low level bridges, local flooding of paths and balance these risks against the community wishes to use the creek corridor and the cost of providing the assets. Recreational, ecological and environmental factors will be taken into account in considering the location of the creek trail.

More information on path design and safety can be found in section 4.3 – Trails and Access.

Drowning hazards are also dealt with in chapter 3.1.

Dog attack

In order to minimise the risk of dog attacks, Councils have identified areas where dogs may only be taken if they are on a lead. The Merri Path is generally included in these on-lead areas in order to minimise this risk. In practice however, Councils rarely police this rule which is widely ignored. The idea of a green muzzle for dogs off-lead (green to flag that the dog is not a declared dangerous dog) has been raised as a way of reducing dog attacks.

Snakes

Tiger Snakes occur along most urban waterways in Melbourne and the Merri Creek is no exception. Brown Snakes and a number of other highly venomous species also occur in the less urbanised sections of the Creek. The perception of risk of snakebite is higher than the actual risk, and snakes are an essential part of Merri Creek's ecological system.

Efforts have been made to make residents and park users aware of what to do to avoid snakebite and what to do if bitten, through a number of Councils' snake education programs.

Plants

A number of toxic or allergenic plants occur along Merri Creek, including the weeds Castor Oil Plant (which has highly toxic seeds), Hemlock (every part of which is highly toxic), American Black Nightshade (which has highly allergenic leaves) and Cruel Vine (which has irritant sap). The pollen of many weed species and some indigenous plant species (e.g. Wattles) is allergenic to some people.

African Boxthorn has long dangerous thorns, and various other weeds have prickly and/or irritating thorns or needles.

The presence of trees leads to a risk of branches falling on parkland users. This risk is highest where trees overhang paths and rest areas. Trees and shrubs growing adjacent to paths pose a hazard if they obstruct the path and people might get head or eye injuries if they

make contact with low branches. Appropriate design and maintenance of plantings and paths should control these risks.

Fire

Wildfire poses a risk to park users and neighbours in the hotter summer months. North of the Metropolitan Ring Road several fires each year have been deliberately or accidentally lit. They can burn fiercely through the native and exotic grasslands along the Creek. On the east side of the Creek, south of Cooper Street, fire control is the responsibility of the Metropolitan Fire Brigade, and north of Cooper Street it is the responsibility of the CFA. On the west side of the Creek the boundary is just south of Patullos Lane Somerton. Land owners are responsible for fire prevention. Rural councils prepare and implement fire prevention plans in partnership with CFA, however to date no coordinated prevention plan for the whole of Merri Creek has been produced.

The City of Darebin have commissioned the Snowy Mountains Engineering Corporation to prepare a draft fire management plan.

Ecological management burns, which are carried out by land managers each year in native grasslands along the Creek, have the potential to injure people if they get out of control. Strict guidelines are in place for carrying out ecological burns.

Bank collapse

Rock outcrops and artificial soil, rock and fill slopes occur along the Creek. Some of these may be unstable. A collapse could injure park users. Work has been carried out by the City of Moreland to stabilise a rocky slope in Coburg which was considered to be unstable, but no overall assessment has been made.

Chemicals

The risk to park users from contact with herbicides sprayed as part of park management is managed by using low hazard herbicides, mixing them with marker dye and the use of signs identifying that spraying is underway and signs indicating an area has been sprayed. There is a risk of people harvesting and eating plants that have been sprayed if they are unable to read or understand the signs that are used.

Procedures to minimise herbicide use are discussed in chapter 2.3 – Land Management.

Water borne Disease

Making the Creek water as safe as possible is dealt with in chapter 3.2 – Water quality

Perceptions

Separate from management of these real risks, people's perception of risk also needs to be managed.

There is a public perception that urban parks, particularly at night time, are unsafe, especially for women or children. However, there is no available data to support a position that Merri Creek is any more, or any less safe, than other open space areas.

The two consultation reports carried out in 1993 as background to this study identified safety as the second most important reason respondents gave for not visiting Merri Creek. A higher proportion of the 50+ age group gave this response.

Clause 56 (Residential Subdivision) of planning schemes across Victoria includes a standard C10: “Subdivision should increase visibility and surveillance by:…ensuring streets and houses look onto public open space and avoiding sides and rears of lots along public open space boundaries, and providing roads and streets along public open space boundaries.” Standard C13 states “Land provided for public open space should be…related to the street and lot layout in a manner that promotes personal safety and surveillance of users of the public open space from streets along public open space boundaries…”. The Development Guidelines for Merri Creek include a number of standards (MC5 and MC14) which are similar to the Clause 56 provisions but without the explicit public safety objective. There is some tension between these standards and the provision of a sense of being in nature, which may require screening of at least the worst visual intrusions into the parkland.

Some people stay away from parks because they fear being attacked by dogs. There is a real but small risk of dog attack, but the perception is greater than the risk. Councils have allocated dog off-lead areas away from the Merri Path, and made the Merri Path itself an on-lead area to address this problem. It appears that the level of policing of these rules is inadequate to keep all dogs on-lead in these areas. Compliance may be improved by signage stating that all of the Merri Path is on-lead.

The study by Context & Diversity found that some respondents felt that toilets made a park unsafe as they attracted “undesirables”, although the lack of toilets was also given as a reason for not visiting parks. The study suggested changes to toilet design to make

them feel safer for users. This study reported a number of suggestions coming from discussion groups including:

- Creation of a Merri Watch program
- Appointment of a Ranger
- Creation of safe hubs

Beyond the general questions asked in the consultation studies no detailed analysis of users' perception of risks in the waterway corridors has been carried out.

Key References

Thompson Birrell Landscape Architects (in prep) *Merri Creek Trail Review*. Report for the Cities of Darebin, Moreland and Yarra.

Context Pty Ltd and Diversity Coalition (1993). *Community Consultation Report*, prepared for Melbourne Water and Merri Creek Management Committee, Melbourne.

Jan Bruce and Associates Pty Ltd. (1993) *Customer Research – Report on Survey of Local Residents*, Prepared for Melbourne Water and Merri Creek Management Committee, Melbourne.

Issues

1. A number of real hazards to park users, management personnel and park neighbours exist. The protection of these people from injury and Merri Creek stakeholder organisations from liability, means that hazards should be identified, the risks associated with the hazards assessed and prioritized and control measures identified and implemented.
2. Personal safety is of concern to a significant number of creek open space users and must be taken into account in planning the development of open space.
3. There is no integrated overall plan for fire prevention and control along Merri Creek.
4. Public concern about snakes needs to be recognised and managed. As snakes are an integral part of a waterway environment, a key element of the fauna of the grassy woodlands of the Merri corridor and protected wildlife, their protection is important. Improved provision of information to residents close to Merri Creek about these issues and ways in which they can make their properties unattractive for snake habitat is essential for better management of public concerns.
5. Increased lighting is often suggested as a solution to some safety concerns. However, it may be counter-productive, and unwarranted where there are few after-dark users of open space and where it is likely to have detrimental impacts on habitat values of the creek corridor.
6. Consolidated statistics for injuries along Merri Creek are not kept, making it difficult to detect inadequate aspects of Creek management.
7. Without careful design and maintenance, revegetation work may create unnecessary hazards for park users.
8. Provision of information to users can be an effective manner of managing risks, however eliminating the hazard, or preventing or minimising exposure to the risk are more effective.
9. Dog on lead rules are commonly flouted by dog-walkers on Merri catchment waterways.

Objectives

1. Provide a high quality network of parks and open space across urban and rural areas managed for community and environmental benefit (see RCS-LO5).
2. Creation of a safe environment and perceptions of safety along Creek Corridors.

Targets

1. Creation of a safe environment through all reasonable and practical means including design, maintenance, surveillance and provision of information including signage and media.
2. Hazards are identified, the risks associated with the hazards assessed and prioritized and control measures identified and implemented, to protect both users of the Merri Creek and agencies involved.
3. Involvement of the community in promoting sensible behaviour and safe use practices.
4. Understanding of and management of the perception of risk so that people do not become unnecessarily concerned about risks.
5. 9 out of 10 of dog-walkers comply with dog-on-lead bylaws.

Actions

See Section E page 208.

PART D - MANAGEMENT

SECTION 5 - PLANNING AND MANAGEMENT COORDINATION

Chapter 5.1 Planning

Port Phillip and Western Port Regional Catchment Strategy - relevant land management objectives

LO3 Ensure sensitively located and functional urban and urban-rural fringe areas with minimal impacts on the region's biodiversity, water resources and heritage values

LO4 Match rural land-use, development and management to land capability and minimise impacts on the region's biodiversity, water resources and heritage values

LO5 Provide a high-quality network of parks and open space across urban and rural areas managed for community and environmental benefit

Relevant land management targets

LT6 All new urban development kept within urban growth and township boundaries

LT7 Increase the area for which rural land use matches land capability

LT9 Increase the ratio of urban open space to total urban area and the connectivity between regional open space and habitat assets

Background

The protection and sustainability of the Merri catchment's waterway corridors depends on good planning. Different types of planning overlap and serve slightly different purposes.

Planning Schemes

Development and land use are controlled by municipal planning schemes under the Victorian Planning & Environment Act 1987. Each Council develops its planning scheme within a framework set down by the State Government.

Changes to a planning scheme are made by "Planning Scheme Amendments" which in most cases must be advertised and ultimately approved by the State Government.

Each Council's planning scheme includes State sections which set down the overall objectives for planning, purposes of the planning scheme, as well as the "State Planning Policy Framework" which sets more detailed objectives and implementation requirements.

The broadest level of planning developed by councils in their planning schemes forms the "Local Planning Policy Framework" section. It includes the council's Municipal Strategic Statement (MSS), and Local Planning Policies.

The MSS provides the justification for applying zones and overlays which are also mapped and described under the planning scheme. Zones control land use in areas, and overlays set out additional requirements for development.

A number of other sections of the planning scheme indicate further requirements for specific uses and developments, provide information on the administration of the planning scheme, define terms, and list Incorporated Documents – reports which by their listing in this section form need to be read in conjunction with the scheme.

Urban Growth Planning

In 2002 the State Government set a interim Urban Growth Boundary (UGB) to set clear limits to Metropolitan Melbourne's outward development [268]. It provided for two growth corridors either side of Merri Creek – the Hume Growth Corridor (this used to be known as the Merri Creek Growth Corridor) and the Epping North Growth Corridor (in the headwaters of Edgars Creek).These two areas were to accommodate future urban growth anticipated for up until 2030. Beyond the UGB the *Hume Committee for Smart Growth Final Report*[269] identified further areas in the Merri Corridor for potential longer term growth which resulted in

[268] *Department of Infrastructure 2002*

[269] Hume Committee for Smart Growth, 2005

extensions in 2006 to the UGB, which are documented in *Growth Area Framework Plans*[270].

The Growth Areas Authority was set up in 2006 as part of the Victorian Government's plan for outer urban development, *A Plan for Melbourne's Growth Areas*. This plan sets out a vision for Melbourne's growth areas over the next 25 years. It includes Growth Area Plans for the Hume and Whittlesea Growth Areas. These outline the proposed development of these growth areas.

Precinct Structure Plans are in development for both growth areas.

Urban growth poses a major threat to the health of the Merri Creek and its tributaries. Advocacy for the environmental and open space values of Merri Creek and its tributaries is necessary. It will also be necessary to proactively identify and conserve natural heritage in the catchment and recreation opportunities associated with the waterways.

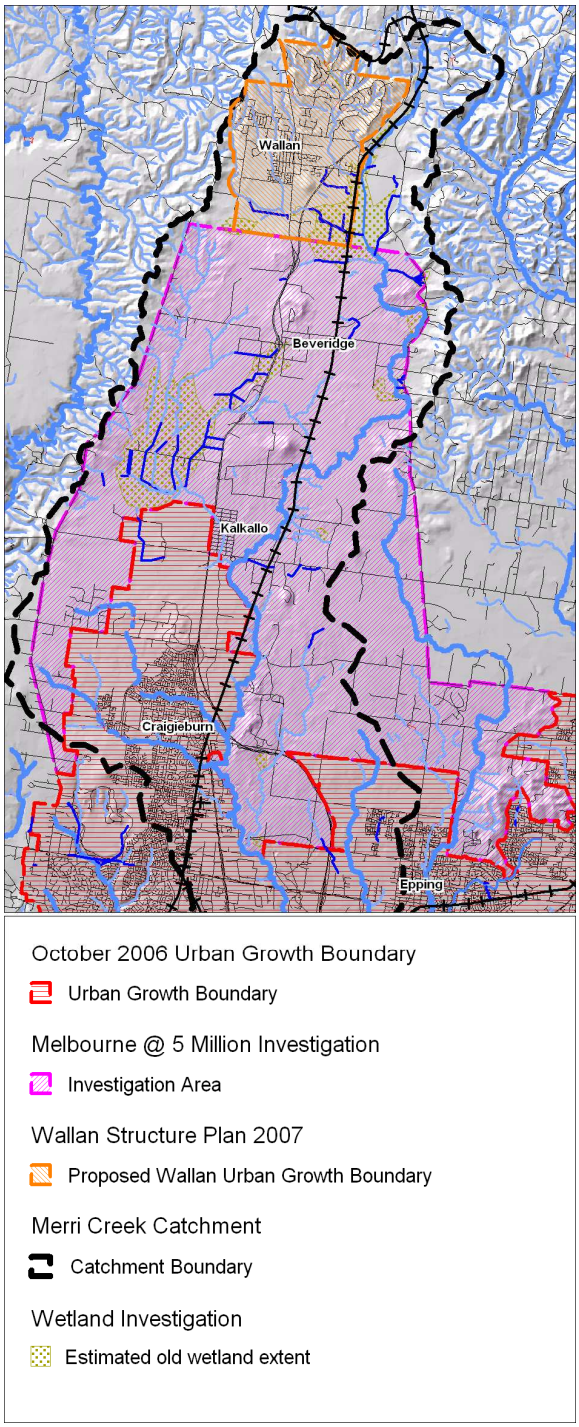
Following comprehensive strategic planning, a secondary stage of strategic planning is required to ensure new urban development adequately provides for its drainage and other infrastructure needs. Too often in the past, drainage has been considered as an after-thought in the development of Outline Development Plans.

Instead, these plans need to consider and provide for:

- adequate protection of remnant of revegetated areas;
- adequate protection of natural streams and open channels including avoiding putting them into pipes;
- the creation of wetland systems to treat stormwater (drainage schemes can assist - see Section 3.1);
- the creation of drainage reserves along waterways so the floodplain is protected;
- allocation of open space such that it complements, and even adds to, those areas provided for stormwater treatment and protection of the floodplain.

In March 2008 an announcement was made that a new blanket zone "Urban Growth Zone" would be applied to all broad acre areas inside the Urban Growth Boundary across the growth areas to assist the Growth Areas Authority and Councils to bring forward enough land for 90,000 new residential blocks. This rezoning was in place by the end of 2008. The new zone merges the strategic planning (Precinct Structure Plan) and land rezoning approval processes into one step.

Once the Precinct Structure Plan is in place, planning permits that are consistent with the strategic intent of the PSP will be able to be issued by the Council without further advertising. This new zone has the potential to reduce protection for remnant vegetation and waterways if it is not designed and managed carefully.



Map 18 - Proposed and potential urban development in the catchment

[270] Department of Sustainability and Environment (2006b)

Apart from growth outward from Melbourne, Wallan is planned to grow considerably in the next few decades. Mitchell Shire Council's *Wallan Structure Plan*[271] identifies a new urban growth boundary around Wallan shown on Map 18 above.

Melbourne@5 million

In December 2008 the State Government announced an investigation area for urban growth covering most of the remaining rural catchment of Merri Creek (see Map 18 above)[272]. This potential massive expansion of the urban area highlights the urgency of habitat network planning beyond Craigieburn Road.

For the Merri catchment the designated Investigation Area is the "Hume-Mitchell-Whittlesea Growth Area". In Whittlesea, the focus will be on areas to the north of Epping North. In Hume a major focus of investigation *"..will be on areas in northern Hume and southern Mitchell Shire to take advantage of the existing road and rail corridors and major opportunities for new employment and freight/logistics functions".* The inter and intra state rail lines and the Hume Highway run north-south through the Investigation Area and the State Government's freight and logistics strategy "Freight Futures"[273] proposes the development of an interstate rail terminal in the area Donnybrook/Beveridge area.

In January 2009 Friends of Merri Creek proposed a Merri Creek Conservation Network[274] which considers the whole Merri Creek catchment, and connects with conservation areas outside the catchment. A strategic approach like this if adopted by MCMC and Councils would go a long way to communicating desirable outcomes in the investigation process.

Green Wedge Plans

Melbourne 2030 identifies a green wedge in the cities of Hume and Whittlesea (not Mitchell) which wraps around the Hume Growth Corridor. Green Wedge Management Plans are to be produced to develop a vision and role for the green wedge, identify the values and features within the green wedge that are to be protected and enhanced, establish a strategic direction for land use and development within the green wedge, articulate this through the planning scheme, establish a framework to encourage sustainable land management, and identify the needs of green wedge landowners and the wider community.[275]

Catchment Planning

The Port Phillip and Western Port Regional Catchment Strategy is the catchment planning strategy which overarches this document. Where relevant and possible its objectives and actions have been incorporated into this document, which is aimed more at municipalities in the catchment, MCMC and Friends of Merri Creek. The Regional Catchment Strategy is identified in the State Planning Policy Framework as a document planning authorities must have regard to.[276]

Industrial Development

A key background study for the preparation of the 1994 Concept Plan Final Draft was the two volume report by Context Pty. Ltd. on Land Use Planning and Interim Policies and Guidelines for Development Near the Merri Creek (Context Pty. Ltd., 1993). The thirty-eight recommendations contained in the report involved actions to address a number of strategic planning issues. Amongst them was one to prepare a Local Structure Plan for the area between the Hume Highway and Merri Creek from Craigieburn to Campbellfield. The intention was to provide a framework for development of this major industrial area. It was recommended that such a plan examine the road and open space systems, urban design standards and detailed landscape guidelines.

Industry has had a strong presence along Merri Creek and at certain points it provides a significant visual intrusion (see section 1.3). While there are already many factories in Craigieburn-Campbellfield vicinity, the development of either a Local Structure Plan or Developer Guidelines is likely to provide benefits for both the development of industry and the waterway and open space corridor.

The Cooper Street Precinct Strategy for Whittlesea and Hume Councils[277] did not specifically address issues associated with the Craigieburn to Campbellfield industrial area and the Merri Creek. The Precinct Strategy provided little certainty for accommodation of biologically significant sites within its study area.

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[271] Mitchell Shire Council (2007)

[272] Melbourne 2030: a planning update Melbourne @ 5 million, DPCD (2008)

[273] State of Victoria (2009) Freight Futures: Victorian Freight Network Strategy.

[274] http://home.vicnet.net.au/~fomc/media/docs/merri_creek_conservation_corridor.pdf accessed 8/1/09

[275] DSE (2005b) *Preparing a Green Wedge Management Plan*

[276] SPPF Section 15.01-2 http://www.dse.vic.gov.au/planningschemes/aavpp/15_sppf.pdf accessed 25/5/07.

[277] Tract Consultants, et. al., 1996

It has been partly superseded by the Cooper Street Development Plan which does provide for open space along the Merri Creek, and Whittlesea Council is preparing a new strategy for the land between the Craigieburn Bypass and the Merri Creek Parklands, to be known as 'Cooper Street West'.

Hume's 2006 Urban Development Program shows proposed industrial development lining Merri Creek south of Beveridge, but open space planning lags behind, with Parks Victoria's planning for the Merri Creek Park (Marran baba) only going as far north as Craigieburn East Road[278].

Major redevelopments

Within the developed urban area occasional strategic planning opportunities arise with redevelopment of sites subject to a change of land use. One such site with implications for Merri Creek has been Pentridge Prison in Coburg. Opportunities for major gains in open space and to have development address Merri Creek on its northern and eastern frontages were ignored and are now lost.

A current opportunity is the redevelopment of the Kodak site in Coburg North.

Planning for future redevelopments should aim to realize improvements to open space provision along Creeks, to stormwater treatment, and implement other objectives identified in this document.

Merri Creek Environmental Significance Overlay

In the early 1990's the Merri Creek Interim Controls were introduced. These consisted of a planning scheme overlay for the creek environs and adjacent private land within the municipalities abutting the creek downstream of Craigieburn Road East. These controls were intended to last until the adoption of the Merri Creek Concept Plan when that document would become a referral document of Council Planning Schemes. However, the Controls lapsed after the Draft Merri Creek Concept Plan remained unendorsed by the State Government.

The 1993 Strategic and Statutory Planning report[279] sought to have amendments to the Interim Controls introduced so that they might act as permanent overlay controls. Its recommendations also provided a legislative and policy framework for protection of the Merri Creek valley, its natural attributes and open space.

In the late 1990's, a state-wide review of Planning Schemes took place which finally provided the opportunity to get planning controls along the Merri Creek in place. MCMC and its then member Councils developed the Environmental Significance Overlay for the Merri Creek corridor and adjacent lands with flora, fauna, archaeological, open space or other values.

The overlay has a number of objectives related to:

- protection of the natural systems of the creek corridor; and
- preservation of recreational uses, landscape character and heritage characteristics and values.

The overlay also sets out decision guidelines for the responsible authority to consider in dealing with an application. It also sets out the circumstances where exemptions apply to provisions of the overlay. These mainly apply to works by a public authority or waterway management agency for works associated with the watercourse and its riparian zone or open space.

As the hearings for the revised planning schemes for each municipality were separate there was not a completely uniform application of the overlay as was proposed by MCMC. However, the overlay much as proposed applies along the main stem of Merri Creek in Yarra, Darebin, and Moreland. A similar overlay applies in Hume and Whittlesea, although its extent is generally limited to a buffer width of 100-150m.

The City of Whittlesea Planning Scheme Amendment C23 further amended the ESO along Merri Creek to include the area within the Cooper Street to Craigieburn area which was listed on the Register of the National Estate.

The Merri Creek ESO needs to be revised and updated to:

- incorporate Merri Creek and tributaries in the Mitchell Shire,
- cover major tributaries,
- incorporate adjacent areas of significance in rural areas,
- be consistent across all local government areas.

To achieve these changes a strategic justification document needs to be prepared.

In 2004 and 2005 the Waterways Policy Review Group convened by the Department of

[278] Parks Victoria 2006
[279] Context Pty Ltd 1993

Sustainability and Environment looked into incorporating the Development Guidelines for the Merri Creek (see below) into the schedule for the ESO, thereby strengthening the Guidelines as well as the ESO. In late 2008 the project was reactivated by the Department of Planning and Community Development. The project currently only involves Moreland, Darebin and Yarra Councils. A separate review is needed for waterways north of Mahoneys Road.

A weakness of the ESO is that "minor works" as defined in the planning scheme are exempt from requiring a permit, and this includes "storm or floodwater drains or retarding basins". Construction of stormwater drains can be quite destructive, and permit applicants often assume that there is a suitable stormwater disposal solution. Works may require a permit to clear native vegetation, and along waterways are likely to require assessment under the Aboriginal Heritage Act, but it would be preferable if stormwater disposal works were subject to a permit.

Land Subject to Inundation and Urban Floodway zones

These zones are used in planning schemes to keep development out of areas subject to 1 in100 year flooding.

Guidelines for Development

A further significant element of the 1993 Strategic and Statutory Planning report, was the Volume 2, "Interim Policies and Guidelines for Development Near the Merri Creek".

This document sought to develop a means by which Council Planning Departments could be provided with additional information which could assist them with determining applications concerning Merri Creek. The Policies and Guidelines document was also developed to assist proponents in the preparation of plans for subdivisions, redevelopments, new urban and other development, and public works. The document was not intended to be part of the Concept Plan, but would be part of a suite of documents (including the Concept Plan and Overlay Controls) for use by Councils and others. It would be supplementary to relevant Planning Schemes and in no way replace their provisions.

The document was looked upon as an interim measure which would be subject to further revision and replacement by a more detailed document in the near future. MCMC commissioned preparation of such guidelines, and approved them in 1999. A revised version, the Development Guidelines for the Merri Creek was adopted by MCMC in 2004[280].

VCAT hearings where the guidelines have been tested suggest ways the guidelines could be made more powerful. One way is to incorporate them into the Merri Creek ESO which would work for those areas covered by an ESO (there isn't a specific ESO covering Merri Creek and tributaries in Mitchell for example). The guidelines could also cover a number of other issues (see Chapter 1.3 targets relating to visual character).

Open Space Management Planning

The first attempt to introduce a classification of open space areas along the waterway corridor came with the development of the Merri Creek Plan by the MMBW in 1987. This plan included a proposal for three management areas within the urban reaches of the stream - "Active Parkland", "Passive Parkland" and "Bushland Conservation". These areas had a set of aims and policies developed for them and were intended to provide a broad guide to Councils and other land managers about management directions of open space areas. The purpose was to seek to establish "a corridor of community open space along Merri Creek" .

While this classification system for open space was used by some land managers, it was by no means intended to be obligatory. It did however guide the development of some areas of open space and discourage uses which may have been incompatible with provision of a predominantly passive recreation function.

The 1993 Strategic and Statutory Planning report recommended a refinement of the 1987 Merri Creek Plan classification categories. The refinement derived from work undertaken for the Northcote Open Space Strategy[281]. The report indicated that Public Open Space zones in planning schemes had a variety of uses, intensities and types of development, ranging from major stadia for spectator sports, to natural bushland reserves with no recreation facilities.

The classification of open space types can become a useful guide to land managers about development of open space. It has the potential to achieve a more uniform approach to open space development across municipal areas along the stream. In the past, problems have arisen through inconsistencies of approach to

[280] MCMC (2004)
[281] City of Northcote, 1992

revegetation, though these have tended to diminish since Council amalgamations.

Whittlesea, Moreland and Darebin have recently applied such a classification system to all open space, including along waterway frontages, through their preparation of Open Space Strategies (Moreland City Council in 1996, revised in 2004[282]; Whittlesea City Council in 1997[283]; Darebin City Council 2000, revised in 2008[284]).

Hume City Council's Open Space Strategy[285] uses a much more complex classification. The City of Yarra published a revised Open Space Strategy in 2006.[286] Mitchell Shire's Recreation and Open Space Strategy 2005[287] looks at open space needs and opportunities in the townships of Wallan and Beveridge as well as others outside the Merri catchment.

At a state level, in 2002 Parks Victoria published *Linking People and Spaces* a strategy for Melbourne's open space network which specifically identifies the Merri Creek for:

- The protection, enhancement and where possible linkage of the significant riparian vegetation in order to establish a regional wildlife corridor.
- Definition and development of a new regional recreational and conservation park in order to meet the recreational needs of Craigieburn, Thomastown and Epping North.
- Extending the shared trail northwards initially to Barry Road, but in the longer term as far as Craigieburn Township and Malcolm Creek, as well as closing the gaps in the existing Merri Creek Trail south of the Metropolitan Ring Road.

In 2006 Parks Victoria published a draft concept plan for the proposed new Merri Creek Park.

It has been a long term project for MCMC to revise the 1987 Merri Creek Plan, to coordinate open space planning between municipalities along the Merri Creek and its tributaries. The plan would need to pull together these diverse open space planning threads.

Statutory Planning

When developments are planned, or proposals are considered by Council staff, Council and the community it is important that all relevant environmental information is available. MCMC has a role in collecting and circulating this information, and Councils have a role in ensuring planning officers have it available also.

Councils should also ensure that planning applications within the ESO, or which are likely to result in impacts on the ESO through construction of drainage or other infrastructure, are referred to MCMC for comment, as MCMC does have a large store of knowledge and information and can advocate for environmental protection.

Sometimes old planning decisions which would not be taken now, but are reflected in the planning scheme or approved development plans, can lead to inappropriate development, or expectations of development years later. One example of this is southeast of Wallan, where a development plan was submitted and approved, then when development actually started it was realised that parts of the development were within Hernes Swamp and potentially flood-prone.

Planning enforcement

Planning schemes are only effective if their requirements are enforced. Local Councils are responsible for enforcing compliance. In some cases there is a community perception that councils lack the resources and/or the commitment to undertake effective enforcement.

In 2008 the Victorian Auditor-General undertook an audit of two Councils (Ballarat and Hume) to assess how effectively these Councils managed the enforcement function regarding compliance with the requirements of planning permits.[288]

The report has 10 recommendations that aim to improve how planning enforcement priorities are determined and resources allocated. These recommendations apply to all Councils, and could be considered by all Councils in the catchment.

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[282] Moreland City Council, 2004

[283] Context Pty. Ltd., Merri Creek Management Committee, Robin Crocker & Associates and EDGe Environmental Design Group,1997

[284] City of Darebin, Sykes Humphreys Consulting & EDAW (2008)

[285] Jeavons and Jeavons, 1999

[286] Thompson Berrill Landscape Design Pty Ltd in association with Environment & Land Management Pty Ltd, 2006

[287] Mitchell Shire Council and @ Leisure Pty Ltd 2005

[288] Victorian Auditor-General's Report Enforcement of Planning Permits November 2008

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Issues

1. Growth of Melbourne's fringe, and of rural centres potentially has serious detrimental impacts on the Merri Creek and environs.
2. Comprehensive strategic planning is required to effectively plan for future urban development in the Merri catchment so that the waterway and open space corridors can be protected and managed in a sustainable fashion. Urgent consideration of Friends of Merri Creek's Merri Creek Conservation Network proposal is needed.
3. Many problems with inappropriate development near the waterways, and lack of provision for drainage and stormwater treatment, stem from insufficient consideration of drainage issues and waterway impacts at the Outline Development Plan stage.
4. The Environmental Significance Overlay does not cover most tributaries and the upper Merri Creek, and as a result protection of these areas is weakened.
5. The effectiveness of the ESO needs to be reviewed and improved.
6. Statutory planning conducted without the guidance of a consistent and agreed approach to treatment of the stream corridor can unintentionally result in incremental degradation through a collection of inadequately informed decisions.
7. The Merri Creek Plan is dated, however a new plan, or something similar could be developed to provide the basis for a contiguous open space corridor.
8. Environmental information is not always considered at planning permit application stage because planners are unaware of the information and because applications are not always referred to MCMC.
9. Stormwater drains and wetlands are exempt from needing planning permits even if they are within the Environmental Significance Overlay, however they can be very destructive.

Objectives

1. Ensure sensitively located and functional urban and urban-rural fringe areas with minimal impacts on the catchment's biodiversity, water resources and heritage values. (See Regional Catchment Strategy objective LO3).
2. Match rural land-use, development and management to land capability and minimise impacts on the catchment's biodiversity, water resources and heritage values. (See Regional Catchment Strategy objective LO4).
3. Provide a high quality network of parks and open space across urban and rural areas managed for community and environmental benefit. (See Regional Catchment Strategy objective LO5).

Targets

1. Increase the ratio of urban open space to total urban area and the connectivity between regional open space and habitat assets (Regional Catchment Strategy LT9).
2. Increase the environmental quality of parks and other public land and community satisfaction with these features (Regional Catchment Strategy LT10).
3. Strategic growth corridor planning takes into account the protection of the stream corridor and its values.
4. Outline Development Plans include consideration of drainage, stormwater treatment, waterway protection and open space provision.

5. Strategic planning for redevelopment associated with changed land use takes advantage of opportunities to have new development better address the stream corridor and acts as a catalyst for development of open space nodes.
6. Incorporation of the revised Merri Creek and Environs Strategy as a reference document in the local section of each planning scheme to which it applies.
7. Published guidelines are available to assist proponents and planners in dealing with specific site proposals, and are used and respected.
8. Councils seek the views of MCMC in consideration of planning applications adjacent to the Creek parklands, or where resulting infrastructure construction will impact on the Creek parklands.
9. Consistent Environmental Significance Overlay controls protect the entire Merri Creek corridor as well as the corridors of main tributaries, and their values.
10. Develop a new Merri Creek Waterways Plan to inform strategic growth corridor planning.
11. Development of Green Wedge Management Plans by 2010 by Hume and Whittlesea.

Actions

See Section E page 210.

Chapter 5.2 Management Coordination

Relevant Port Phillip & Western Port Regional Catchment Strategy objectives

PO1 Enhance regional planning, coordination, monitoring and reporting

PO2 Increase the capacity and participation of people and organisations in catchment management

Relevant RCS Targets

PT2 All Victorian government agencies with key roles in catchment management to be directly implementing the RCS through their annual works programs by 2006

PT3 At least half the region's 38 Councils to have formally adopted the RCS as a reference document by 2008, reflecting relevant sections of it appropriately in their planning schemes and/or implementing relevant actions through their annual programs

PT5 Maintain or increase the number and geographic coverage of community groups participating in catchment management in the region and increase the active membership of community groups by 20 per cent (from 2001 levels) by 2008.

Background

History of Coordination and Evolution of MCMC

Merri Creek has experienced a long history of cooperative management coordination. In 1976, the Merri Creek Coordinating Committee (MCCC) was created to formalise a relationship between local government, State sector agencies and the community to protect and enhance the creek and its environs. Over the thirteen years of its existence, the MCCC had representation from eight Councils along Merri Creek, as well as the MMBW and numerous local community groups. It was an unincorporated association which acted as an advisory committee to Councils and State agencies. The MCCC neither employed staff, nor undertook works by itself. Councils and State agencies remained the vehicle through which waterway and open space improvements were carried out.

This type of cooperation delivered some significant benefits. For example, in the early 1980s funds were obtained through the efforts of the MCCC for a study into the development of a Merri Creek Path. This provided the basis for Council application to Federal labour market programs of the mid 1980s for much of the path's construction and associated revegetation works. The construction of the Merri Path opened up community access to the waterway and provided a focus for continuing improvement of the stream's environs.

The record of achievement which the MCCC had established by the mid-1980s, was in part responsible for the attraction of further funding from external sources[289]. One such source of funding was the Australian Bicentennial Program. Commencing in 1986, the Program allocated $1m for Merri Creek to be administered through the MMBW. This fund provided contributions to a host of initiatives including path construction, bridge crossings and a small amount of land acquisition assistance. It also provided the means by which a program of revegetation works were conducted through a specialist works crew on lands owned by Councils and the MMBW across four municipalities. This model of a specialist works crew was to later provide impetus for the development of a similar, more permanent entity through a new management committee structure – the Merri Creek Management Committee.

The Ernst & Whinney Review

A key step in the evolution of this new structure was the Bicentennial Program's funding of a review of management arrangements for Merri Creek during 1987/8. This review was carried out by independent consultants, Ernst and Whinney Services. Their recommendation was that a new organisation, to be known as the Merri Creek Management Committee (MCMC), be brought into existence with membership from the then eight Councils, MMBW, the then Department of Conservation, Forests and Lands (DCFL) and a new Friends of Merri Creek group representing the community sector.

The report[290] cited five problem areas which formed a basis for recommending a change from the structure provided by the MCCC. The problems were:

[289] Ernst and Whinney Services, 1988
[290] Ernst and Whinney Services, 1988

- the need for a more formal mechanism (beyond that of the MCCC's information exchange function) able to achieve coordinated regional planning, development and maintenance of the waterway's open space;
- the need to replace a volunteer-dependent organisation with one which was better resourced and more sustainable - the impetus for the MCCC's activities and functioning had come almost entirely from the community sector;
- the need for a greater commitment to maintenance of capital works along the waterway and its open space (especially revegetation works);
- the need for provision of specialist additional skills in both planning and creek maintenance and development activities; and
- the need to provide greater forward planning as well as other planning controls to ensure the protection and development of the waterway's open space.

As a result of the report's recommendations, the MCMC would, on behalf of member groups, employ staff to carry out activities deemed essential by the review. Specialist vegetation management works and open space development works, negotiated with, and part funded by, the member Councils were the primary area of activity of the new MCMC - certainly the vast majority of the organisation's funds were to be initially directed to those ends.

The review emphasised that these works were in no way intended to replace those undertaken by Councils along the creek. Instead, they were to be additional to those undertaken by Councils and provide much needed expertise in vegetation management from which Council work forces might derive benefit through provision of training generated by MCMC (Ernst and Whinney Services, 1988).

In addition, the MCMC, through the creation of the Manager's position, would make a significant contribution to the preparation of the Merri Creek Concept Plan and other planning matters, as well as servicing other needs generated by the work of the committee.

A key element in enticing Councils to support the MCMC concept was the continuation of subsidised funding of waterway and open space works on a similar basis to labour market programs and the Bicentennial fund of the mid to late 1980s. To achieve this, the MMBW guaranteed funding of the MCMC for an initial three year period. Other State sector funds were contributed through grants from DCFL under their Urban Nature Conservation Program.

Formation of MCMC

The MCMC was brought into existence as an incorporated association in 1989. It had no statutory powers and acted as an advisory body to its member organisations.

The MCMC has continued as an incorporated association since 1989, with the retention of its core membership, apart from the Department of Natural Resources and Environment which ceased to be a member in 1996 and Melbourne Water which ceased to be a member in December 2000. During the mid-1990s, the MCMC was able to access significant amounts of Federal labour market program funding (especially JobSkills), which added considerable value to Council contributions. The JobSkills program ceased in 1996.

A draft report reviewing the MCMC's operation was prepared by the MCMC in 1995 following consultation with member organisations, but was never adopted by the Committee. The review responded to the introduction by the State Government of compulsory competitive tendering for municipalities, and investigated setting MCMC up as a not-for-profit company. The report was not adopted as it was considered neither necessary nor desirable to make this change.

Northern Waterways Review

The Northern Waterways Review[291] sought to investigate the coordinating of planning and management of waterway related matters across four northern waterways - Moonee Ponds, Merri, Darebin and Plenty (Minutes of Northern Waterways Review Meeting No. 1, April, 1996). Some further assessment of the MCMC was conducted for this review.

The review was unable to achieve the development of a common position between Melbourne Water and Councils over the scope of waterway management coordination structures. Melbourne Water supported an exclusive regional approach across the four waterways of the study area, while Councils tended to support more locally based organisations, while also expressing some interest in potential benefits of regionalism.

As a result of the lack of agreement, the reviews recommendations are accorded no formal status by Melbourne Water but are nonetheless informative. The four

[291] Kunert and Wright, 1997

recommendations relevant for the Merri catchment from the Northern Waterways Review were:

- The development of four separate waterway coordinating bodies to undertake on-ground works and to coordinate the efforts of local people, councils and local works undertaken by public bodies. (i.e. MCMC to remain)
- Broaden the focus of the local waterway coordination bodies to the whole catchment over time and as resources permit. This particularly applies to Darebin Creek and Moonee Ponds Creek.
- Establishment of a regional body and ensuring representation of the local waterway coordination bodies the new regional body.
- Establish clear procedures for tendering for works by local coordination bodies.

Legislative Context - Catchment and Land Protection

Since the introduction of the Catchment and Land Protection (CALP) Act in 1994, Catchment Management Authorities (CMAs) have been set up for each of Victoria's ten catchment areas. Merri Creek is within the Port Phillip and Western Port catchment.

The CALP Act sets out a framework for the integrated management of land and water resources, including control of pest plants and animals. It also sets out a process for setting priorities for the management of land and water resources throughout the State.

The CMA's have responsibilities for:

(a) to prepare a regional catchment strategy for the region and to co-ordinate and monitor its implementation;

(b) to prepare special area plans for areas in the region and to co-ordinate and monitor their implementation;

(c) to promote the co-operation of persons and bodies involved in the management of land and water resources in the region in preparing and implementing the strategy and special area plans;

(d) to advise the Minister, and, if requested by any other Minister, that other Minister—

(i) on regional priorities for activities by and resource allocation to bodies involved in the management of land and water resources in the region; and

(ii) on guidelines for integrated management of land and water resources in the region; and

(iii) on matters relating to catchment management and land protection; and

(iv) on the condition of land and water resources in the region;

(e) to promote community awareness and understanding of the importance of land and water resources, their sustainable use, conservation and rehabilitation;

(f) to make recommendations to the Minister about the funding of the implementation of the regional catchment strategy and any special area plan;

(g) to make recommendations to the Minister and the Secretary about actions to be taken on Crown land managed by the Secretary to prevent land degradation;

(h) to advise the Minister and provide information to the Minister on any matter referred to it by the Minister;

(i) to carry out any other functions conferred on an Authority by or under this Act or any other Act.

- preparation of regional strategies for management of natural resources;
- encouraging cooperation of those involved in natural resource management;
- advising the Minister on priorities and the operation of the CALP Act;
- promoting community awareness; and
- recommending measures on Crown land to prevent land degradation.

The Port Phillip and Western Port Regional Catchment Strategy was released by the Port Phillip and Westernport CMA in 2004. It sets out a number of actions in the areas of:

- Water and waterway management
- Land management
- Biodiversity protection and management
- People and organisations,
- Monitoring evaluation and reporting
- Prioritisation and implementation.

Management Coordination Fundamentals

Management coordination is based upon some essential premises. Amongst these, the following are particularly applicable in the case of Merri Creek.

- Management agencies have differing roles and responsibilities in the management of

the waterway, and its lands and open space along the creek corridor.
- Coordination ensures avoidance of duplication of effort, can ensure scarce resources are used to best effect and can bring about consistency of approach to works across municipal boundaries and across agencies.
- The communication and cooperation engendered through coordination produces benefits for participants, on some occasions translating into cost reductions. For example, new approaches to works, especially technological developments and new methods of delivery can come about as a result of communication between parties and the challenging of conventional ideas and approaches.
- Synergistic benefits become available through cooperation, especially on occasions when access to external funding is available. The accessing of additional external funding merely through being a recognised cooperative entity has been demonstrated to be a positive element of the existence of coordinating bodies for Merri Creek.
- Inclusion of views from all sectors (local and State government agencies and the community) potentially means the generation of well considered advice back to member organisations.
- A sounding board and source of comment on proposals is readily available for use by member organisations.

Current Roles and Responsibilities

Roles and responsibilities of the various agencies involved in the Merri Creek are described in the Introduction to this strategy.

Key References

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Issues

1. Coordination is a desirable goal for organisations with differing responsibilities for management of streams and their environs, and improvements to coordination should continually be sought.
2. The Northern Waterways Review in 1997 endorsed the MCMC model, but periodic reviews of MCMC's purposes and structure are needed to ensure it remains relevant.
3. The coordination body across the four northern waterways recommended by the Northern Waterways Review has not been set up and may not be necessary if informally liaison between the bodies is effective.
4. Achievement of a consensual position between Councils and Melbourne Water in relation to the scale of waterway coordination structures was not possible through the Northern Waterways Review, and remains unresolved.
5. Better coordination between utilities with important assets in the creek corridor (e.g. SP AusNet) can assist with the achievement of sustainable vegetation management, improvement of amenity and the visual character of the stream and its environs.

Objectives

1. Enhance Merri catchment and regional planning, coordination, monitoring and reporting (see PPWPRCS objective PO1).
2. Increase the capacity and participation of people and organisations in catchment management (see PPWPRCS objective PO2).

Targets

1. Effective management coordination between stakeholders encompassing the following objectives:
   - recognition of the separate roles and responsibilities of funding stakeholders;
   - inclusion of stakeholders in forums where views can be aired before those with the management responsibility;
   - preparedness to work towards common and shared goals as set out in this Plan;
   - preparedness to adopt a flexible and responsive approach to:
     - the requirements and impacts of organisational and legislative change;
     - delivery of waterway and land management improvement; and
     - contributions from, and involvement of, the community sector.
   - preparedness to recognise catchment generated effects on the waterways of

the Merri system and to address them in line with CALP requirements;
- ability to develop and implement policy and programs through the use of human resources and staff with required expertise in waterway, open space and land management;
- effective use of additional external funding, where it is available, to add value to member organisation contributions;
- development of procedures for the operation of management coordination committees to ensure they operate in an effective, democratic and accountable manner in meeting their objectives and the purposes of their stakeholders; and
- clear understanding of accountabilities and degree of delegation and roles and objectives between member organisations and staff.
- best use of resources provided by funding stakeholders.
- inclusion of the community sector in management coordination structures.

2. Regular reviews of management coordination structures and mechanisms to:

- ensure their continuing relevance to contemporary circumstances;
- provide an important and necessary accountability tool; and
- provide a formal means for advising funding stakeholders of the progress of particular structures.

3. Effective liaison between MCMC and the Moonee Ponds Creek Coordination Committee, Darebin Creek Management Committee and other nearby waterway management bodies.

4. Support for private landholders participating in cooperative stream management programs.

Actions

See Section E page 212

SECTION 6 - IMPLEMENTATION AND MONITORING

Chapter 6.1 Implementation

Background

Too often a Strategy of this type is treated as end in itself. A clear understanding of the ramifications of accountability for actions - as well as a commitment to their periodic review to continue to give them life is needed to ensure strategy plans are effective.

A Strategy of this type should be seen as a tool by which responsible parties can better address issues and actions for which they are accountable. It should be treated as a mere starting point and a vehicle by which agencies have a planning framework and philosophy to tackle the implementation of recommended actions which they have deemed to be acceptable and achievable for their organisation.

In the case of this Strategy, all actions have been scrutinised by the various accountable agencies and accepted as achievable within current budgetary circumstances. In addition, at the time of preparation of the document, all accountable agencies have indicated their preparedness to fund the Strategy's actions. However, funding of actions will be subject to annual budgeting processes. This may mean that Councils and other funding stakeholders are unable to fund actions according to the priority given specific actions by the Strategy Steering Committee.

As for the detail of implementation, it will occur through each agency developing works plans and budgets to prioritise and program works to meet the action requirements. In the case of Councils, these works plans could involve the allocation of a spread of funding directed to:

- various parts of Council and their Parks business units or contractors; and
- the MCMC - to deliver actions where the Council has assigned MCMC responsibility for delivery.

It has not been seen as the role of this Strategy to outline as a set of further appendices these works plans for each Council or agency. This is clearly a matter which only each agency can undertake. The inclusion of such detail could unrealistically raise expectations about achievement of actions and tie Councils to implementation over timeframes beyond the term of current elected Councils and their budgetary commitments.

It will therefore be a matter for each agency to more accurately cost actions and allocate funding for implementation over manageable budgetary periods.

In 1999, it was anticipated that a degree of accountability for implementation would be obtained through presentation of a biennial report on implementation achievements. This was to become part of a biennial review of the Strategy convened between the stakeholders. It was also anticipated that presentation of regular reports to MCMC meetings on achievement of actions would serve as a further means by which the Strategy's actions can be kept before stakeholders.

MCMC's Merri Creek and Environs Strategy Implementation Subcommittee was set up as a response to the need for regular updating of progress on the strategy and is an important forum for updating the strategy and reporting on and consolidating information about progress on actions. However, the anticipated biennial review of the strategy has not taken place (this is the first overall review of the document text and actions since 1999), nor have concise biennial implementation reports or 3-year priority activity plans been prepared. In part this is due to the complexity of the document and the number of stakeholders involved.

Issues

1. Implementation of many actions requires coordinated action by Councils and other agencies
2. Councils and agencies may need some prompting and encouragement to undertake some actions
3. The large number of actions means that a clear way is needed to identify the more urgent actions

Objectives

1. Enhance catchment planning, coordination, resource allocation, monitoring and reporting (adapted from Port Phillip and Western Port Regional Catchment Strategy objective PO1)

Targets

1. Very High priority actions will be completed within a year of this strategy being published
2. High priority Actions will be commenced within a year and completed within 3 years
3. Medium priority Actions will be commenced within 2 years and competed within 4 years
4. Low priority Actions will be commenced within 4 years

Actions

See Section E page 213

Chapter 6.2 Monitoring and Review Procedures

Background

This Strategy will not achieve its full potential unless adequate monitoring and review are undertaken. As indicated above, such processes are a tool for accountability as well as providing an essential opportunity to amend and adapt actions as issues are resolved, actions implemented, and organisation's roles and responsibilities change. In this way a document such as this can maintain its relevance with the detail of actions progressively shaped to meet broad goals set down at the time of the document's preparation.

In order to meet this essential monitoring function, it was anticipated that biennial reviews of the Strategy would be conducted. Such review meetings of stakeholders were to be conducted in the first quarter of the calendar year with an initial meeting scheduled for November 2000. In this way coordination between funding parties would be conducted in the lead up to agency budget preparation.

In practice MCMC's Merri Creek and Environs Strategy Subcommittee undertook quarterly monitoring and review of actions, as there was more than could be dealt with in one biennial meeting. However, the 1999 strategy was submitted to Council meetings for approval by Councils and therefore has a higher level of authority and political support than changes made by the Subcommittee Council Officers representing Councils, but without the power to formally commit Councils to the actions.

Submitting a complete revised document for Council approval is no small task however. The 1997 strategy had a large number of A3 colour maps which were no longer available electronically. Also, with Councils, Melbourne Water and DSE all identified as the responsible agencies rather than MCMC the responsibility for an update was confused. So whilst the 1997 strategy was revised regularly, until this document no adopted reviewed version has been published.

Making MCMC accountable for submitting a biennial review of the document to participating agencies (only Councils at this stage) seems a clear way forward.

In terms of public monitoring of progress, the A3 colour maps in the 1999 document (which could not be made available electronically because of software changes at Melbourne Water) make hardcopy production of the 1999 Strategy expensive, and its availability therefore limited. In order to give the public more easy access to the revised Strategy and to achievement of actions in the document, investigation should be made into its publication as an interactive website.

Objectives

1. Adequate, appropriate, efficient and cost effective monitoring of catchment assets, ecosystem processes, trends, risks, implementation of actions and outputs (Adapted from Regional Catchment Strategy objective MO1)
2. Timely, rigorous and cost effective evaluation of catchment management planning and implementation (See Regional Catchment Strategy objective MO2)
3. Timely, tailored, efficient and cost effective reporting on catchment assets, ecosystem processes, trends, risks, catchment management planning and implementation (See Regional Catchment Strategy objective MO3)

Actions

See Section E page 214.

PART E
Merri Creek and Environs Strategy Action Tables

Action Program Note: If MCMC is listed as a support role, it is assumed that MCMC is working in partnership with the listed agencies unless otherwise noted.
Overall Notional Cost = combined notional cost of action for accountable parties.
Priority = the agreed priority attached to the action by the Merri Creek and Environs Strategy Implementation Subcommittee.
Lead Role = Agency having accountability for the action - the body may delegate delivery of the action to a contract provider.
Key partners = Organisation to provide support and encouragement, and to be actively involved.
For more detail see table at back of report.

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
Chapter 1.1 (LA) - Aboriginal Heritage					
LA1	Implement processes to ensure determination of planning applications meets the requirements of the Aboriginal Heritage Act 2006 and the Aboriginal Heritage Regulations 2007.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC AAVHSB WTLCCHC MW	N/A	Very High
LA2	Convene a working group to prepare a protocol for use by member Councils to guide Aboriginal heritage consideration in planning process. The protocol should include: - processes consistent with the Aboriginal Heritage Act and Regulations - avoiding divulging exact site locations except where consistent with the Act (see also Ellender 1997b Rec 2) - reference to mapping by Ellender of areas of sensitivity.	MCMC	Member Councils	$	Very High
LA3	Again provide copies of the Ellender 1997b report together with mapping of areas of archaeological sensitivity (as denoted on the 1:5000 maps from Johnston and Ellender 1993, and/or Ellender 1997b), in an accessible (preferably digital eg. GIS) form to Councils' strategic and statutory planning departments to assist with guiding planning decisions under Planning Schemes. (Ellender 1997b Rec 10)	MCMC		$	High
LA4	Ensure areas of archaeological sensitivity (as denoted on the 1:5000 maps from Johnston and Ellender 1993, and Ellender 1997b), are mapped in an accessible (preferably digital eg. GIS) form and are readily available within Councils to assist with guiding planning decisions under Planning Schemes.	Darebin Hume Mitchell Moreland Whittlesea	MCMC AAVHSB WTLCCHC	$$	High
LA5	Develop a brochure to share, or identify a suitable existing brochure, and use it to notify landowners of responsibilities for protection of archaeological sites and areas of sensitivity. (See Ellender 1997b site gazetteer and recommendation 21)	Darebin Hume MCMC Mitchell Moreland Whittlesea	MCMC AAVHSB WTLCCHC	$	High
LA6	Implement protection works along the lines of recommendations contained in Johnston and Ellender (1993b) for archaeological sites at:		MCMC AAVHSB WTLCCHC	$	High
	• Central Creek 1;	Darebin			
	• Mahoneys Road 1; Cooper Street 3; Craigieburn Road 3-4	Hume			
	• Central Creek 2; Edgars Creek 1 (near confluence of Merri);	Moreland			
	• Craigieburn Road 1, 2, 5; O'Herns Road 1;	PV			

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
LA7	Where possible use fencing to prevent access by horses, stock and unauthorised off-road vehicles to known sites and areas of high archaeological sensitivity where protection is afforded by Council Planning Schemes or where Council owns the land. (Ellender Rec 11)	Darebin Hume Mitchell Moreland Whittlesea	MCMC KNOCHO AAVHSB WTLCCHC	$$	High
LA8	Extend the coverage of the Merri Creek ESO to incorporate areas of Aboriginal Archaeological Sensitivity as mapped by Ellender 1997b (as per Ellender 1997b Recommendation 2) and others.	Hume Mitchell Whittlesea	MCMC	$$	High
LA9	Before determining a planning permit application consider that - no pruning or cutting down of remnant indigenous trees (especially scar trees) should be permitted prior to inspection by a person qualified to identify an Aboriginal scar (Ellender 1997b Rec 4); - scarred indigenous trees should retain a buffer zone around perimeter twice the canopy diameter within which no works and services should take place other than vegetation maintenance (Ellender 1997b Rec 2).	Darebin Hume Mitchell Moreland Moreland Whittlesea			High
LA10	Following the obtaining of approval from the Registered Aboriginal Party, and after consulting AAV, undertake further archaeological surveys of those parts of Central and Edgars Creeks within the existing urban area which have not been already surveyed. Surveys should include mapping areas of sensitivity, and provide this mapping to MCMC and relevant Councils.	Darebin Moreland Whittlesea	MCMC AAVHSB WTLCCHC	$$	Medium
LA11	Following the obtaining of approval from the Registered Aboriginal Party, and after consulting AAV, and provided these areas aren't part of another survey, undertake further archaeological surveys in the rural part of the catchment: - Merri Creek from Hernes Swamp north to the top of the catchment, - other tributaries of the Merri Creek including Malcolm, Aitken, Kalkallo, Wallan, and Taylors Creeks and - other sites likely to possess archaeological finds (eg. alluvial terraces as in Rosengren, 1993). Surveys should include mapping areas of sensitivity, and provide this mapping to MCMC and relevant Councils. (Ellender 1997b Rec 21)	Hume Mitchell Whittlesea	MCMC AAVHSB WTLCCHC	$$	Medium
LA12	Notify landowners with scar trees of their responsibilities for protection of the scarred trees, including: • the protection of trees in legislation; • the importance of preservation of dead scarred trees; • techniques to stabilise and make safe trees which are dangerous; and • procedures to be followed if lopping or removal is necessary. There may be an AAV poster/brochure on this. (Ellender 1997b recommendation 4)	Hume Mitchell Whittlesea	MCMC KNOCHO AAVHSB WTLCCHC	$$	Medium
LA13	Implement training in Aboriginal and historic places for field staff to: recognise Aboriginal artefacts; identify threatening processes; and understand legal requirements, especially for areas of high archaeological sensitivity. (Ellender 1997b Rec 15)	Darebin Hume Mitchell Moreland Whittlesea Yarra	WTLCCHC MCMC KNCHO PV MW	$$	Medium
LA14	Encourage preventative measures and programs on private rural and urban fringe land deemed to have archaeological sensitivity, to prevent erosion, stock pugging and rabbit warren ripping of known and unidentified sites. Focus on sites nominated by Ellender at: Bald Hill 2; Briggs 1; Summerhill 2-5; Bullock Crossing; Jackhammer; Cooper Street 1-3 and Burgess 1. (Ellender 1997b Rec 5)	Hume Mitchell Whittlesea	MCMC DSE AAVHSB WTLCCHC MW PV	$	Medium
LA15	Encourage Melbourne Water to investigate stream works to address erosion of the Briggs 4 site near Summerhill Road. (Ellender 1997b Rec 6)	MCMC	AAVHSB WTLCCHC	$$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
LA16	Conduct oral history and Aboriginal cultural research programs in the catchment to further document and gather information. (Ellender 1997b rec 21)	MCMC	WTLCCHC AAL	$$	Medium
LA17	Use less ground disturbing techniques (e.g. fire), to manage areas of archaeo-logical sensitivity on publicly owned land if grazing or mowing is currently used (e.g. Patullos sites at Craigieburn Grasslands), and encourage similar measures on State Government or Privately owned land. (Ellender 1997b recs 7&12)	Hume Mitchell PV Whittlesea	MCMC DSE	$	Medium
LA18	Monitor archaeological sites to check for threats and the success of protection measures.	MCMC	WTLCCHC AAVHSB	$	Medium
LA19	Develop and implement Management Plans for scar trees where they occur on Council land.	Hume Mitchell Whittlesea	AAVHSB	$	Medium
LA20	Continue to raise general community awareness and appreciation of Wurundjeri heritage through printed information, 'walks and talks', information boards on linear trails, and seminars. (Ellender 1997b Rec 16)	MCMC	Hume Darebin Mitchell Moreland Whittlesea Yarra	$$	Medium
LA21	Include Ellender 1997b as a reference document in the ESO. (Ellender 1997b Rec 1)	Darebin Hume Moreland Whittlesea	MCMC MW AAVHSB WTLCCHC	$	Medium
LA22	Work with councils and PV and other agencies to encourage the adoption of Wurundjeri place names.	FOMC MCMC		$	Medium
LA23	For archaeologically sensitive areas on publicly owned land, limit use of maintenance tracks by: • provision of fencing and gates; • avoidance of paving; and • prohibiting use in wet conditions; and encourage similar measures on privately owned land. (Ellender 1997b Rec 14)	Darebin Hume Mitchell Moreland Whittlesea	MCMC	$$	Low

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority

Chapter 1.2 (LH) - Historical Heritage

LH1	Include sites not yet protected by the planning scheme, but identified in Johnston and Ellender (1993), together with new sites as identified, in the Schedules to each Council's Heritage Overlay, possibly via a joint planning scheme amendment. (See also Action LH3)		MCMC	$	High
	• CB08 - Merri Creek Reserves (east & west sides) CB12 - Coburg Cemetery PR01 - Edwardes Lake Park NC07 - Northcote Park & Oldis Gardens NC10 - Yan Yean pipe crossing FR02 - Fitzroy-Epping rail bridge NC15 - Charles Street Urban Conservation Area	Darebin			
	• WS01a - Barry Road Gorge Drystone wall complex WS01b - Barry Road Gorge Drystone wall complex WS04a - Ford BM07 - Ford John Batman Pastoral Run outstation site (south of Craigieburn Road) John Batman Pastoral Run outstation site (north of Summerhill Road)	Hume			
	• WS31 - Rail Bridge WS30 - Rail Bridge	Mitchell			
	• BM02 - Quarry CB02 - Fence foundation CB01 - Quarry CB15 - Bakers Road Tram Terminus CB09 - De Chene Reserve & Connolly Ave reserve CB05 - Lake Reserve BM01 - Industrial Site? CB11 - Edgars Creek CB08 - Merri Creek Reserves (east & west sides)	Moreland			
	• BM07 - Ford WS03 - Sheep pens WS27 - House WS09 - Site of former Kinlochewe settlement WS04 - Farming complex WS29 - Rail bridge WS11 - Bluestone outbuilding WS01e - Barry Road Gorge Drystone wall complex WS01c - Barry Road Gorge Drystone wall complex WS01d - Barry Road Gorge Drystone wall complex WS01f - Barry Road Gorge Drystone wall complex BM06a - Ford WS12 - Donnybrook Mineral Spring Reserve WS01g - Barry Road Gorge Drystone wall complex WS04a - Ford BM05a - Pipe Crossing	Whittlesea			
	• NC02 - Fmr quarry CW05 - Fmr Quarries & tip CW10 - Clifton Hill-Alphington rail bridge NC07 - Northcote Park & Oldis Gardens CW06 - Hall Reserve CW03 - Drystone retaining walls CW02 - Terraced garden FR02 - Fitzroy-Epping rail bridge NC08 - High Street bridge NC01 - Yarra Bend Park NC05 - Heidelberg Road Bridge	Yarra			

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
LH2	Lodge nominations to the Victorian Heritage Register through Heritage Victoria for sites recommended by Johnston and Ellender (1993, p. 54) but not yet listed, and other sites of at least State significance ie:		MCMC	$	High
	• CB12 - Coburg Cemetery NC05 - Heidelberg Road Bridge	Darebin			
	• WS16 - Camoola Homestead in Merriang	Mitchell			
	• CB06 - Newlands Estate	Moreland			
	• WS04 - Farming complex & Ford WS07 - Westgarthtown Heritage Conservation Area Maltzahn's Farmhouse	Whittlesea			
LH3	Prepare maps and documentation specifically for each Council identifying sites which should be covered by heritage overlays, and requesting input to heritage studies as they arise, and prepare submissions to such studies.	MCMC	Heritage Victoria	$	High
LH4	Ensure continuing effective coverage of heritage issues through inclusion of heritage management issues when monitoring, reviewing and revising the Development Guidelines for Merri Creek.	MCMC	Heritage Victoria Hume Darebin Mitchell Moreland Whittlesea Yarra	$	Medium
LH5	Provide information and advice to landowners and managers of heritage places so that they might manage those assets effectively.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC Heritage Victoria	$	Medium
LH6	Investigate the provision of planning concessions and the permitting of otherwise prohibited uses, as an incentive for the conservation of regional and State significant places (see further Johnston & Ellender 1993, p. 18 and other relevant local heritage studies).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC Heritage Victoria	$	Medium
LH7	Lodge nominations to the National Heritage List for nationally significant sites:		MCMC	$	Medium
	• Westgarthtown Heritage Conservation Area (Johnston & Ellender 1993)	Whittlesea			
LH8	Develop interpretation programs for cultural and heritage sites where: they have been adequately surveyed and assessed; site stability is not questionable; and where protection can be provided through site supervision and signage.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC Heritage Victoria	$$	Medium
LH9	Commission a revision of Johnston & Ellender (1993) incorporating further knowledge, extending coverage to major tributaries and the upper Merri Creek, reviewing the status of sites already identified, and cross-referencing to other studies, e.g. Moreland Local Heritage Places Review.	MCMC	Hume Darebin Mitchell Moreland Whittlesea Yarra	$$	Medium
LH10	Investigate the relevance of National Trust Landscape Subcommittee's policies for the Merri Catchment.	MCMC		$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
	Chapter 1.3 (LV) - Visual Character				
LV1	Conduct a new landscape study covering all the main waterway corridors of the catchment to: - refine and document what the underlying natural landscape character of Merri Creek and its tributaries is, - identify what extant features contribute to the underlying natural landscape character, - identify sites and features of high landscape value and how these values can best be protected and enhanced. - identify major detriments to the landscape quality and how these might be dealt with. - identify threats to the landscape quality of the waterways when viewed from existing or likely future trail locations and viewpoints, and how these might be dealt with. - to underpin the Development Guidelines and Environmental Significance Overaly. Incorporate recent similar studies where relevant.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$$	Very High
LV2	Advocate for the protection of the Creek Corridor and its values, both ecological and landscape during investigations for expansion of the Urban Growth Boundary.	Hume MCMC Mitchell Whittlesea	FOMC FOWC	$	Very High
LV3	Investigate all available options to reduce the impacts from adverse visual intrusion into the creek valley of existing developments. Include: consideration of seeking a change of activity or land use; improved site design and built form; requirements for screen planting as a condition on permits; enforcement of conditions on existing permits; or the undertaking of revegetation on publicly owned land. Investigate the following specific areas:	Whittlesea	MW MCMC	$$	High
	• Mahoneys Road to B. T. Connor Reserve, Reservoir;	Darebin			
	• Craigieburn south industrial area;	Hume			
	• Merri Creek and tributaries around Wallan	Mitchell			
	• St. Basil's Homes, Fawkner; McBryde Street (downstream of Hood Crescent) Fawkner; Coburg Drive-In vicinity/Trade Place, Coburg North	Moreland			
	• Depot in Clifton Hill	Yarra			
LV4	Maintain and extend existing buffer plantings to screen existing visual intrusions at sites including:		MCMC		High
	• Hardie-Iplex site downstream of Lakeside Secondary College, Reservoir; Broadhurst Avenue to below Brex Court, Reservoir; Newlands industrial estates (downstream of Zinnia Street), Reservoir; Ugly back fences of houses on west side of Willow Street, West Preston.	Darebin			
	• Barry Road/Sarah St., Campbellfield; Craigieburn south.	Hume			
	• Downstream of Bell Street, East Coburg (i.e. back fences of houses in Merribell Ave);	Moreland			
	• Holden Street, Fitzroy.	Yarra			
LV5	Investigate and improve the visual appearance of existing outfall drains owned by Councils and implement the recommendations. Ensure that all new Council and Council-approved drains are consistent with the ESO, go through a planning permit process, and demonstrate sensitive design emphasising use of natural rock or other visually pleasing elements, as well as incorporating necessary drainage and water-sensitive urban design treatments.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC MW	$$	High
LV6	Construct and maintain fencing and control of vehicular access such that abandonment of car bodies, rubbish dumping and access for rock removal can be curtailed.	Darebin Hume Mitchell Moreland Whittlesea	MCMC	$$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
LV7	Promptly remove car bodies, and dumped fill and rubbish in parklands adjacent to waterways [Reserve Manager's responsibility] and where dumping is observed in the waterways make a request to Melbourne Water for removal.	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC MW	$	High
LV8	Seek to limit the number of creek road crossings and ensure designs are visually sympathetic and have adequate off-setting revegetation works and remove redundant creek crossing road reservations.	Darebin Hume Mitchell Moreland PV Whittlesea	MCMC MW	$	High
LV9	Protect and expose escarpments, other rocky outcrops and key waterway and landscape forms through weed control and vegetation management.	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC	$$	High
LV10	Encourage responsible agencies to: - Use basaltic rocks in landscaping basalt reaches of the catchment waterways; - Always use indigenous species of local provenance when revegetating along catchment waterways; and - Promptly remove dumped fill and rubbish in the waterways.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC FOMC MW FOWC	$	High
LV11	Resist the installation of artworks along the Creek corridors unless they feature or reflect the natural landscape of the corridor.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
LV12	Detect, prosecute and deter illegal dumping of fill and rubbish.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
LV13	Remove obscene or unsafe graffiti within 2 weeks of its reporting and on signage within 3 months.	Darebin Hume Mitchell Moreland VicRoads Whittlesea Yarra	MCMC	$$	High
LV14	Encourage Melbourne Water to ensure that all new drains are consistent with the ESO, go through a planning permit process, demonstrate sensitive design emphasising use of natural rock or other visually pleasing elements, as well as incorporating necessary drainage and water-sensitive urban design treatments.	MCMC	Member Councils	$	High
LV15	Enforce a no-encroachments policy to prevent unsightly encroachments into waterway parkland.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
LV16	Seek discussions with the Powerlines Relocation Committee (Department of Treasury and Finance) to develop proposals and seek funding assistance to relocate, remove or underground powerlines, focussing initially on lower voltage lines in the urban catchment initially downstream of Mahoneys Road.	Darebin Moreland	MCMC	$	Medium
LV17	Establish new buffer and screen plantings to screen other visually intrusive structures and sites, with the aim of enhancing the visual amenity values of the Creek environment.	Darebin Hume Mitchell Moreland Whittlesea Yarra		$$	Medium
LV18	When opportunities arise encourage Melbourne Water to investigate and improve the visual appearance of their existing outfall drains. Include investigation of:		MCMC MW	$	Medium
	• Outfall of Edwardes Lake; Sumner Avenue Main Drain;	Darebin			
	• Ainslie Road Drain; Campbellfield Creek diversion Drain;	Hume			
	• Fawkner East Main Drain; Elizabeth Street Main Drain; Harding Street Main Drain; The Avenue Main Drain; Glenlyon Road Main Drain;	Moreland			
	• Lygon Street/Park Street Diversion Main Drain; Green Street Main Drain; Alexandra Parade Main Drain.	Yarra			

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
Chapter 2.1 (LB) - Biodiversity and Habitat Networks					
LB1	Prepare a biodiversity plan for the whole Merri catchment by 2010 to inform individual Councils' own biodiversity and revegetation plans. Incorporate: - collection of data for baseline targets for the catchment, including remnant vegetation on Council land, and vegetation quality assessment. - a revegetation strategy for the catchment which achieves regional and catchment targets, and investigating use of the planning scheme to protect/enhance corridors, - a review of the habitat corridor network considering focal species using the network and producing guidelines for design and management.	MCMC	Member Councils	$$	Very High
LB2	Assess additional planning scheme protection needed to protect threatened native vegetation and to achieve net gain, and establish the new controls by 2010. (see Native Vegetation Plan Management Action Target MAT4).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DSE	$$	Very High
LB3	Advocate for the reservation of high priority EVC's, especially those of State or National significance.	Hume MCMC Mitchell Whittlesea	DSE	$	Very High
LB4	Fully and consistently apply the native vegetation clearance controls as outlined in the planning scheme, guidance notes and Native Vegetation Plan by 2009 (see Native Vegetation Plan Management Action Target MAT2).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DSE	$	High
LB5	Establish or continue education programs for local communities including local contractors about the native vegetation clearing controls (see Native Vegetation Plan Management Action Target MAT3).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DSE	$$	High
LB6	Set up monitoring and enforcement programs for the native vegetation clearing controls (see Native Vegetation Plan Management Action Target MAT3).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DSE	$$	High
LB7	Check for and if necessary resolve conflicting planning scheme overlays including those between wildfire management overlays and environmental/vegetation overlays by 2007 (see Native Vegetation Plan Management Action Target MAT6).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DSE	$	High
LB8	Establish policy or strategy which identifies a preference for the use of appropriate local native species in landscape plantings on private and public land (to achieve Native Vegetation Plan Management Action Target MAT20).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DSE	$	High
LB9	Provide information to households and businesses regarding the protection and planting of local native species and the control of environmental weeds. (adapted from Native Vegetation Plan Management Action Target MAT21).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DSE	$$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
LB10	Ensure revegetation programs contribute to regional, catchment and municipal targets.	Darebin Hume MCMC Mitchell Moreland Whittlesea Yarra	DSE PPWCMA	$	High
LB11	Revise "Plants of the Merri Merri", republish it and also make it available on MCMC's website.	MCMC		$$	High
LB12	Encourage DSE to prepare Merri catchment-wide management plans for important endangered species in the catchment, including Growling Grass Frog and Golden Sun Moth. These plans should be based on national and State recovery plans and action plans but provide more detail about what needs to be done locally.	Hume Mitchell Whittlesea	MCMC DSE	$$	High
LB13	Liaise with Trust for Nature to investigate ways to increase the use of covenants to protect remnant vegetation in the catchment.	MCMC	DSE	$	High
LB14	Continue to monitor rare species populations in the catchment as part of region-wide surveys and existing programs within resources.	DSE	MCMC	$$	High
LB15	Develop a strategic approach to net gain offsets in the Merri Catchment.	Hume Mitchell Whittlesea	MCMC	$	High
LB16	Conduct coordinated education, awareness and compliance campaign to stop soil dumping.	Hume Mitchell Whittlesea	MCMC		High
LB17	Prepare municipal biodiversity strategies incorporating revegetation plans and outlining how municipal programs will contribute to regional and catchment biodiversity goals by 2012. (see Native Veg Plan Management Action Target MAT19). These strategies should draw on the Catchment wide plan to be prepared by MCMC. Revegetation plans must focus on the EVCs that are depleted below five percent of their original extent and on the establishment of corridors and buffers to increase the extent of all Endangered EVCs. They should also link with any Biodiversity Action Plans developed by DSE.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DSE	$$	Medium
LB18	Provide demonstrations and on-site information in urban areas regarding the values of native vegetation (see Native Vegetation Plan Management Action Target MAT23).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DSE	$$	Medium
LB19	Monitor effectiveness of native vegetation management by undertaking 5-yearly habitat hectare assessments, and feed these into catchment-wide and regional statistics.	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC	$$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
Chapter 2.2 (LG) - Geodiversity					
LG1	Investigate appropriate planning controls for protection of sites of geological significance.	MCMC	Councils	$	High
LG2	Ensure Council planning departments have relevant geological site information.	MCMC		$	High
LG3	Commission survey for sites of geological or geomorphological significance on Merri Creek tributaries and in the headwaters of Merri Creek. Report should also review the already known sites' significance and conservation.	MCMC		$$	Medium
LG4	After investigation (see action LG1) include geological sites in planning scheme controls.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	Medium
LG5	Include educational material about the catchment's geology and geological sites on the MCMC website.	MCMC		$	Medium
LG6	Design and install on-site interpretation of geological sites where they are easily accessible to the public.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	Medium
LG7	Investigate the relevance of the UNESCO geopark idea to the Merri Catchment.	MCMC	Councils	$	Low

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
Chapter 2.3 (LL) - Land Management					
LL1	Undertake best practice management of weeds and pest animals on own land and managed land as required by the CaLP Act.	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC Friends Groups Landcare Groups DPI	$$	High
LL2	Reduce the spread of weeds by machinery and equipment (from Port Phillip and Westernport Weed Action Plan).	Darebin Hume MCMC Mitchell Moreland PV Whittlesea Yarra	DPI	$	High
LL3	Inspect land and promptly notify relevant contacts when a new and emerging weed species is detected, and assist government departments to control and monitor infestations of new and emerging weeds. (from Port Phillip and Westernport Weed Action Plan)	Darebin Hume MCMC MDLG Mitchell Moreland PV Whittlesea Yarra	Friends Groups DPI	$	High
LL4	Implement initiatives to increase the community's awareness of new and emerging weeds species and their management, ways to reduce the spread of weeds (from Port Phillip and Westernport Weed Action Plan).	Darebin Hume MCMC MDLG Mitchell Moreland PV Whittlesea Yarra	Friends Groups DSE DPI PPWCMA	$	High
LL5	Investigate/enhance incentive mechanisms e.g. rate rebate schemes to encourage good land management including pest control. (From Port Phillip and Westernport Weed Action Plan)	Darebin Hume Mitchell Moreland Whittlesea Yarra	DSE DPI MCMC PPWCMA	$$	High
LL6	Where appropriate develop local laws to complement weed control programs. (From Port Phillip and Westernport Weed Action Plan)	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
LL7	Undertake appropriate training in noxious and environmental weed identification and management including management responsibilities through accredited training providers e.g. Greening Australia, TAFE, ACE. (From Port Phillip and Westernport Weed Action Plan)	Darebin Hume MCMC Mitchell Moreland PV Whittlesea Yarra		$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
LL8	Land managers to plan and implement rabbit, fox and cat control works, preferably as part of a coordinated local program in partnership with other land managers and organisations. (In part from Port Phillip and Westernport Rabbit Action Plan)	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC	$$	High
LL9	Major land management organisations to participate in annual regional and catchment planning processes so that works programs are coordinated and synergistic. (From Port Phillip and Westernport Rabbit Action Plan)	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC PPWCMA	$	High
LL10	Encourage Melbourne Water to address gully erosion in the upper Kalkallo Creek, including increased adoption of Stream Frontage Management Program by private landholders.	Mitchell	MCMC MW	$	High
LL11	Ensure pest management is a component of all public land plans (from DNRE 2002d, p9).	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	LandownersLandcare MCMC Friends Groups DSE	$	Medium
LL12	Provide integrated priority pest control projects delivering long term outcomes (from Port Phillip and Westernport Weed Action Plan).	MCMC MDLG PV	Councils	$$	Medium
LL13	Where appropriate assist with the conduct of high priority pest research projects. (From Port Phillip and Westernport Weed Action Plan)	Darebin Hume MCMC MDLG Mitchell Moreland PV Whittlesea Yarra	DPI DSE	$	Medium
LL14	Land managers to participate in training in rabbit control, monitoring and assessment techniques. (From Port Phillip and Westernport Rabbit Action Plan)	Darebin Hume MCMC Mitchell Moreland PV Whittlesea Yarra	DPI DSE	$	Medium
LL15	Commission research to better understand the role of salinity in the catchment, and the threat to catchment values. • Prepare report for PPWP catchment	 DPI		$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority

Chapter 2.4 (RU) - Headwaters to Craigieburn Road East

RU1	Establish a working group of local government strategic planning and conservation officers to work with DSE and Melbourne Water to determine planning measures and other mechanisms for identification and protection of significant sites and habitat links for the reach.	Hume Mitchell MW Whittlesea	MCMC PPWCMA DSE	$	Very High
RU2	Encourage Melbourne Water to undertake a short feasibility study of the Hernes Swamp area (as defined by Schulz and Webster), to determine measures able to be implemented to return the site to a more natural marshy herbfield condition, protect significant flora and fauna, and to improve the water quality of Merri Creek.	MCMC Mitchell	DSE	$	Very High
RU3	Examine open space and conservation needs north of Craigieburn Rd East and develop strategies for its consolidation and development.	Hume Mitchell Whittlesea	MCMC DSE PV	$$	Very High
RU4	Negotiate with governments and landowners to secure protection for Hernes, Inverlochy, Gas & Fuel and Camoola swamps.	MCMC	Mitchell Hume Whittlesea DSE	$	Very High
RU5	Encourage Melbourne Water to implement a Stream Frontage Management Program for the reach focussing on priority sites (Hernes Swamp, Bald Hill, Kalkallo to Craigieburn) to assist land owners to protect creek frontages.	Hume Mitchell Whittlesea	DSE MCMC PPWCMA	$$	High
RU6	Actively participate in negotiations to develop a site management plan for future quarrying at Bald Hill so that: • important grassland areas might be conserved; • populations of Carex tasmanica are maintained; • fencing is undertaken; • habitat of Grassland Earless Dragon is preserved; and • creek water quality and River Blackfish populations protected.	Mitchell Whittlesea	MCMC MW Boral DSE	$	High
RU7	Ensure protection of the significant biological and habitat values at Kalkallo Common through statutory planning and site management planning measures.	Hume	MCMC DSE	$$	High
RU8	Ensure in the preparation of Local Structure Plans for developable land between Hume Highway and Merri Creek that impacts of development on significant sites and the stream environment are addressed.	Hume Mitchell	MCMC MW DSE	$$	High
RU9	Investigate appropriate planning controls to prevent rock removal from sites of regional faunal significance and above as mapped by Schulz and Webster (1991) and Beardsell (1997) and refer the matter to the forum established under RU1.	Hume Mitchell Whittlesea	MCMC DSE	$	High
RU10	Investigate a wider application of rate incentive schemes for sympathetic land management to help preserve flora and fauna values.	Hume Mitchell Whittlesea	MCMC	$$	High
RU11	Promote Landcare, Land for Wildlife and Bush Tender programs, as well as Conservation Covenants to rural landholders within the reach to provide improved protection of stream and other habitats and significant flora and fauna species.	Hume Mitchell Whittlesea	Hume Whittlesea MCMC DSE PPWCMA	$	High
RU12	Enforcement of the planning scheme provisions for protection of Redgums and grassland sites in: • The Mt Ridley area, and Craigieburn • Wollert	 Hume Whittlesea	DSE MCMC	$	High
RU13	Develop a habitat corridor along Malcolm Creek between Hume Highway and Merri Creek.	Hume	MCMC MW DSE	$$$	High
RU14	Identify areas suitable for revegetation/restoration to achieve 1000 additional hectares of native vegetation in the catchment by 2030, of types which would contribute to regional, catchment and muncicipal targets. See also Action LB1.	MCMC	Mitchell Hume Whittlesea	$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
RU15	Encourage DSE to continue to implement the actions in the Merriang Local Biodiversity Plan.	Mitchell Whittlesea	MCMC DSE	$	High
RU16	Investigate other ways to support private landowners who manage remnant vegetation on their properties sympathetically.	Hume Mitchell Whittlesea		$$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority

Chapter 2.5 (RM) - Craigieburn Road East to Mahoneys Road

RM1	Ensure implementation of the Merri Creek Park proposal to provide an open space access link through the Merri Creek corridor south of Craigieburn Rd East.	Hume PV Whittlesea	MCMC	$$$	Very High
RM2	Where possible prior to development, but also as development proceeds, seek opportunities to reserve open space along the creek within this reach of the Merri Creek corridor and its tributaries.	Hume Whittlesea	MCMC	$	Very High
RM3	Develop an action program for protection of the sites identified in Beardsell (1997), DSE (2005) and other reports, and habitat links between them.	Hume PV Whittlesea	MCMC DSE	$$	High
RM4	Finalise the Concept Plan for the proposed Merri Creek Park.	PV	Whittlesea Hume MCMC FOMC MW	$	High
RM5	Develop a Merri Creek Park Management Plan and detailed site management plans for grassland sites within the Merri Creek Park.	PV	MCMC Hume	$$	High
RM6	Continue to establish and maintain screen plantings below Sarah Street frontage to escarpment of Merri Gorge and work with Melbourne Water to encourage them to do so on their land.	Hume	MCMC MW FOMC	$$	High
RM7	In line with recommendations of the Galada Tamboore Future Directions Plan, seek means to prevent unauthorised vehicle access to the Galada Tamboore site from external roads and other entry points as a key initial step in the site's management.	Hume PV Whittlesea	MCMC MW	$$	High
RM8	Encourage Melbourne Water to implement other recommended actions arising from the Galada Tamboore Future Directions Plan.	Hume Whittlesea	MCMC PV MW	$$$	High
RM9	Implement actions from agreed site plans to restore flora and fauna values, and continue to maintain remnant and restored areas. • Hatty Court Reserve Concept Plan	 Hume	MCMC PV MW	$$	High
RM10	Implement actions to prevent rubbish dumping at known problem spots within the reach: • - Barry Road area, Campbellfield; - Horne Street Campbellfield; and - Jessica Street Campbellfield. • - O'herns Road • - off Trawalla Ave Thomastown	 Hume PV Whittlesea	MCMC	$	High
RM11	Work with MW to investigate opportunities for sediment control and water quality improvement in the vicinity of the Campbellfield Landfill Disposal Site.	Hume	MCMC MW	$	High
RM12	Prepare and publish a Merri Creek and Tributaries Open Space manual comprising: - recommended standard designs and landscape development treatments; - guidelines for revegetation and remnant vegetation management; - guidelines for location and design of facilities. (see also Action RL5)	Hume Whittlesea	MCMC	$$	High
RM13	Ensure planning and delivery staff are trained in natural area and cultural site management.	Hume Whittlesea	MCMC	$$	High
RM14	In the Aurora development area seek to have a habitat corridor through the site along Edgars Creek and linking to Curly Sedge Creek.	Whittlesea	MCMC	$	High
RM15	Investigate long-term strategies (including a review of setbacks, title and easement infringements and potential for some acquisitions) for key blocks along the Sarah Street frontage to the escarpment of the Merri Gorge area downstream of Barry Road.	Hume	MW MCMC	$$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
RM16	Improve habitat values along Edgars Creek.	Whittlesea	MCMC MW	$$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority

Chapter 2.6 (RL) - Mahoneys Road to Yarra River

RL1	Prepare Development or Management Plans as required for development or consolidation of open space at the following primary nodal points where land use is not at issue, or following the resolution of such issues and those of land ownership (if applicable):		MCMC MW	$$	High
	• - Merri Creek, St. Georges Road to Rushall Station - all lands on both sides of the stream (with Moreland and Yarra); - Merri Creek, Lorne St/St. Basils and Newlands Road escarpment areas opposite - Zinnia Street to Carawa Drive (with Moreland); - Merri Creek, Phillips Reserve, Kirkdale Street Park, Sumner Park and whole of Merri Park (including its Crown Land) (with Moreland) - Merri Creek, Tate/Capp-Robinson/Egan/Strettle Reserves (with Moreland). - Merri Creek, Northcote Golf Course (with Moreland)	Darebin			
	• - Merri Creek, Tate/Capp-Robinson/Egan/Strettle Reserves (with Darebin); - Merri Creek, Coburg Lake Reserve to Bell Street; - Merri Creek, Phillips Reserve, Kirkdale Street Park, Sumner Park and whole of Merri Park (including its Crown Land) (with Darebin); - Merri Creek, Lorne St/St. Basils and Newlands Road escarpment areas opposite - Zinnia Street to Carawa Drive (with Darebin) - Edgars Creek, north of the Merri confluence to the ex-Kodak bridge	Moreland			
	• - Merri Creek, St. Georges Road to Rushall Station - all lands on both sides of the stream (with Darebin and Moreland)	Yarra			
RL2	Continue to implement existing Development/Management Plans as they apply to Council's management of open space at:		MCMC CERES	$$	High
	• - Central Creek vicinity and native grassland remnant; - Broadhurst Avenue to Edwardes Lake Park including Edgars Creek wetlands;	Darebin			
	• - Jukes Road Grassland (with PV input); - Moomba Park and associated lands; - CERES site approaches etc; - Allard Park/Jones Park/Roberts Reserve	Moreland			
	• - Hall Reserve/Quarries Reserve	Yarra			
RL3	Conduct a triennial review of land ownership and zoning along Merri Creek and major tributaries below Mahoneys Road to monitor opportunities to consolidate the open space corridors.	MCMC	Yarra Moreland Darebin MW	$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
RL4	Develop agreements to provide access through the following sites, or secure their whole or partial tenure for an open space, conservation or urban floodway function by: clarification of ownership and planning anomalies at the time of review of Planning Schemes; development of appropriate zoning; negotiation with owners at the time of rezoning; or through land purchase.		MCMC PV MW		High
	● - The urban floodway zone adjacent to Central Creek Reservoir; - Cunningham Street Northcote (Monumental Masons site - potential rezoning at change of land use - aim to secure increased creek frontage); - Elizabeth Street Northcote rear shed which abuts corridor (potential rezoning at change of land use - aim to secure increased creek frontage); - Beavers Road to Arthurton Road, including especially Goldsmith Grove, Northcote (potential rezoning at change of land use of printing factory -with aim of securing increased creek frontage) Also parcels of agreed urban floodway zone lacking a formal exchange of titles including. - Florence Court to B. T. Connor Reserve, Reservoir; - Broadhurst Avenue to Lakeside Secondary College, Reservoir; - Edwardes Street to opposite Queens Parade.	Darebin			
	● - CERES creek frontage Brunswick (currently PPOS, General Industrial); - Parts of former F2 freeway reservation between Mahoneys Road and Bell Street which have not been rezoned (eg. Moomba Park Fawkner; Jukes Road, Fawkner; Derby Street, Fawkner; Bell Street, West Preston at bridge); - Land at end of Queens Parade, Fawkner; land between Trade and Acheson Places, North Coburg; - Golf Road, Coburg; - West bank Edgars Creek - Murray Road upstream to the ex-Kodak land, Coburg (currently PPOS); - Booth Street to Bell Street (east side) Also parcels of agreed urban floodway zone lacking a formal exchange of titles (eg. land between Trade and Acheson Places, North Coburg.	Moreland			
	● - North and south of Barkly Street, North Fitzroy.	Yarra			
RL5	Prepare and publish a Merri Creek Open Space manual comprising: - recommended standard designs and landscape development treatments; - guidelines for revegetation and remnant vegetation management; - guidelines for location and design of facilities and public art.	Darebin Moreland Yarra	MCMC MW	$$	High
RL6	Ensure planning (environment management officers, statutory planners) and delivery staff (bush crews, park management staff and contractors) are trained in natural area and cultural site management.	Darebin MCMC Moreland Yarra		$$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
RL7	Develop Plans for the following list of secondary nodal sites:				Medium
	• - Lands on the Brunswick and North Fitzroy side of the creek downstream of Sumner Park to St. Georges Road, and the (mostly privately owned) Northcote side of the creek downstream of Merri Park to St. Georges Road (with Moreland and Yarra); - B. T. Connor Reserve to Brex Court; - Lakeside Secondary College and lands opposite and downstream (with Moreland); - Lands on both side of the creek from Rushall Station to Heidelberg Road including all Crown land and the steep slopes and escarpment areas below Coulson Reserve and the Knott Athletic field in Clifton Hill (with Yarra).	Darebin			
	• - Parker Reserve and lands opposite (Coburg Drive-In); - Lands on the Brunswick and North Fitzroy side of the creek downstream of Sumner Park to St. Georges Road, and the (mostly privately owned) Northcote side of the creek downstream of Merri Park to St. Georges Road (with Darebin and Yarra), extending the Melbourne Water Improvement Project plans to include adjacent open space; - Lakeside Secondary College and lands opposite and downstream (with Darebin)	Moreland			
	• - Lands on both side of the creek from Rushall Station to Heidelberg Road including all Crown land and the steep slopes and escarpment areas below Coulson Reserve and the Knott Athletic field in Clifton Hill (with Darebin); - Lands on the Brunswick and North Fitzroy side of the creek downstream of Sumner Park to St. Georges Road, and the (mostly privately owned) Northcote side of the creek downstream of Merri Park to St. Georges Road (with Darebin and Moreland)	Yarra			
RL8	Review status and relevance of node plans where they are 10 years old or older.	Darebin Moreland Yarra	MCMC	$$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority

Chapter 3.1 (WH) - Stream Morphology, Drainage and Flood Management

WH1	Ongoing control of development of land within the 1% flood zone through observance of the Land Subject to Inundation Overlay, the Special Building Overlay and the Urban Floodway Zone in Council planning decisions.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
WH2	Ensure reporting of the implementation of Stormwater Management Plans and investigate the potential for additional measures to manage run-off from existing urban infrastructure.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
WH3	Assess the incidence of Desert Ash in the catchment, its impacts on the riparian fringe of the stream and investigate appropriate action to reduce the seed source, including replacement of Desert Ash trees in streetscapes and as amenity plantings.	Darebin Hume Moreland Yarra	MW MCMC	$$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
Chapter 3.2 (WQ) - Water Quality and Stream Health					
WQ1	Working with Melbourne Water, investigate the feasibility of restoration of Hernes and Camoola Swamps and their management as wetlands serving a water quality improvement function.	Mitchell	DSE MCMC	$	Very High
WQ2	Ensure implementation of measures recommended in Chapter 5 - Water Sensitive Urban Design - from the Best Practice Environmental Management Guidelines for Urban Stormwater (Stormwater Committee in prep).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DI EPA	$$$	High
WQ3	Encourage EPA to conduct a regular review of discharge licences within the context of an EPA `pollution hot spots' program and monitor old tip sites along the stream for discharges.	MCMC		$$	High
WQ4	Host Waterwatch Coordinator for Merri Creek and involve schools and community groups in Waterwatch activities.	MCMC	Mitchell Whittlesea Hume Moreland Darebin Yarra MW	$$	High
WQ5	Encourage Melbourne Water to follow through with the construction of visually sensitive litter traps on Merlynston Creek, the Sumner Avenue Main Drain and Coburg Lake.	Darebin Moreland	MCMC	$	High
WQ6	Encourage Melbourne Water to install toxicant treatment traps on other drains implicated in the Pettigrove & Hoffman 2003 study, i.e. Ainslie Road Drain, Merrilands Drain and the Thomastown Drain.	Hume Whittlesea	MCMC	$	High
WQ7	Encourage Melbourne Water and EPA to investigate the feasibility of removal of heavy metals from sediments in Merri Creek.	MCMC	Mitchell Hume Moreland Whittlesea Darebin Yarra	$	High
WQ8	Identify roads generating most polluted runoff and prioritise treatement of runoff from these roads as part of Stormwater Management Plan reviews.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$$	High
WQ9	Develop a litter strategy for the waterways of the Merri Catchment including identification of litter hotspots and priority treatment of identified problem areas.	MCMC	Mitchell	$$	High
WQ10	Encourage Yarra Valley Water to assess any impacts on the water quality of Merri Creek caused by runoff or groundwater infiltration from future expansion of the Wallan Sewerage Treatment Plant.	MCMC Mitchell		$$	Medium
WQ11	Label every significant drain entering waterways of the catchment with a sign including a unique identification number for the sign and the EPA pollution watch phone number.	MCMC	EPA MW Councils	$$	Medium
WQ12	Encourage VicRoads to monitor the effectiveness of the wetlands along the Craigieburn Bypass for the next few decades and to publish the results.	MCMC		$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
Chapter 3.3 (WF) - Aquatic Flora, Fauna and Wetlands					
WF1	Encourage Mebourne Water to research environmental flow requirements consistent with the requirements of the SEPP for the Waters of the Yarra catchment (Schedule F7), and investigate instream barriers, quarries and impoundments in the northern catchment for effects on environmental flows.	MCMC	DSE	$$	High
WF2	Examine options for wetland creation and restoration for habitat with a view to increasing the number of wetlands in the catchment.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MW MCMC	$$	High
WF3	Encourage Dept of Human Services to investigate extent and impacts of heavy metal buildup on streamlife and risk to humans from consumption of fish.	MCMC	MW	$	Medium
WF4	Further investigate options for the construction of a fish ladder at Edwardes Lake.	Darebin	MCMC	$	Medium
WF5	Assist DPI & DSE to investigate and record the diversity of native freshwater fish species in the region and the extent and health of the populations, and establish links between this data and planning approvals processes. (From PPWRCS BA14)	Darebin Hume MCMC Mitchell Moreland Whittlesea Yarra	DSE DPI	$	Medium
WF6	Investigate potential to modify lakes to achieve improved habitat and fringing riparian vegetation: ● Maintain and consolidate work at Coburg Lake	 Moreland	MCMC MW	$	Low
WF7	Encourage Melbourne Water to investigate the potential for reintroduction of platypus into areas of suitable habitat.	MCMC	DSE MCMC	$	Low
WF8	Encourage DSE to investigate the potential for reintroduction of appropriate native fish species (eg. Southern Pygmy Perch) into areas of suitable habitat.	MCMC	MW MCMC	$	Low

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority

Chapter 4.1 (CE) - Community Engagement

CE1	Develop a Merri Creek Catchment Community Engagement Strategy to identify the most effective ways to engage the Merri Creek communities in catchment issues and to discover and understand target communities existing wants.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$$	Very High
CE2	Develop community liaison and participation in major events such Arbor Week, Planting Festivals, Clean up Australia Day, Kingfisher Festival.	Darebin Hume MCMC Mitchell Moreland Whittlesea Yarra	PV FOMC MCMC FOWC	$$$	High
CE3	Support the operation and promotion of Friends of Merri Creek, as part of support for MCMC, in order to provide additional community involvement activities (eg. planting days, litter collection, walks and talks etc.)	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC FOMC PV	$$	High
CE4	Continue to support the establishment of smaller site or purpose specific community groups to achieve local Creek improvement and development purposes e.g. Friends of Aitken Creek, Friends of Sacred Kingfisher,MECARG, FOEdC.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC PV FOMC	$	High
CE5	Develop recreation and education programs using the creek environment - history and land-use; - flora and fauna; - geological sites; - water quality; and - environmental monitoring.	MCMC	CERES FOMC Member Councils	$$	High
CE6	Develop and implement education programs for culturally and linguistically diverse and other target user groups.	Darebin Hume MCMC Mitchell Moreland Whittlesea Yarra	MCMC PV CERES FOMC	$$	High
CE7	Develop and implement school liaison and environmental education programs (eg: Waterwatch).	Darebin Hume MCMC Mitchell Moreland Whittlesea Yarra	MCMC PV CERES	$	High
CE8	Work with Port Phillip and Westernport CMA to support the ongoing operation of Landcare groups in the rural part of the catchment. • Support existing groups and encourage them to expand to cover the small area in the north of Hume not now covered by a Landcare Group • Support existing groups • Support existing groups	 Hume Mitchell Whittlesea	MCMC	$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
CE9	Seek Aboriginal and ethnic community representation on advisory and management groups.	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC FOMC	$	High
CE10	Continue to involve community in planning and design processes of local open space near the creeks, where appropriate (e.g. Merri Park Wetlands)	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC FOMC FOWC	$	High
CE11	Provide as part of site works, and in accordance with the signage plan, informative interpretation at appropriate locations along the creek and within appropriate open space management areas. (E.g. Hall Reserve Wetland signage)	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC DSE MW WTLCCHC	$$	High
CE12	Continue to promote opportunites for further community involvement in restoration within the Creek corridors (e.g. festivals, planting, weeding, harvesting, surveying days).	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC FOMC FOWC	$	High
CE13	Brief MCMC staff and officers, and relevant Council and agency officers about the findings of the Community Engagement Strategy	MCMC		$	High
CE14	Continue to promote facilities (e.g. Merri Path, picnic areas) and open space areas (e.g. Hall Reserve Clifton Hill, Galada Tamboore) along waterways by improved community information such as talks, brochures, advertising, signage, websites etc.	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC FOMC FOWC	$$	Medium
CE15	Investigate potential for an interpretation centre and interpretation programs between Craigieburn and Campbellfield in the new Merri Creek Park.	Hume PV Whittlesea	MCMC DSE	$$$	Medium
CE16	Undertake an oral history recording program focussing on stories and natural and cultural history of the Merri Creek and tributaries.	FOMC MCMC	WTLCCHC AAV Darebin Hume Moreland Mitchell Whittlesea Yarra State Library Museum Maya AAL	$	Medium
CE17	Undertake a survey of creek users to establish usage patterns and determine demand for further facilities.	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC	$$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
CE18	Undertake collaborative programs with CERES, Moreland Energy Foundation and other sustainability organisations to promote environmental sustainability and reduce the ecological footprint of people in the catchment.	MCMC		$$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
Chapter 4.2 (CR) - Recreation					
CR1	In accordance with the revised Merri Creek Plan (see Action MP2) and the Development Guidelines for the Merri Creek (see Action MP5 and 11), continue to develop creek open space on Council owned land for passive recreation (eg. walking and observing and enjoying nature).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC FOWC	$$$	High
CR2	Conduct programs for users not normally catered for, eg. elderly, non english speaking background, people with disabilities.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC FOMC	$$	High
CR3	In accordance with Council policy, enforce, monitor and review pet control by-laws requiring pets to be on leads within public lands along the Merri Creek corridor, except at otherwise designated sites.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
CR4	Continue to build linear parkland north along the Merri Creek and along major tributaries by acquiring Creek frontage lands as opportunities arise, including properties which interrupt an otherwise continuous parkland corridor on both sides of the waterways.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$$$	High
CR5	Promote the passive recreation potential and use of the Creek corridor parklands through:community events; festivals; interpretation of natural and cultural features.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC CERES FOMC FOWC	$	Medium
CR6	Develop programs which utilise the waterway's passive open space, eg: school holiday programs; group excursions; activity days.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC CERES FOMC FOWC	$$	Medium
CR7	Investigate provision of environmental and interpretive programs for: special interest groups; environment monitoring; planting days.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC FOMC CERES FOWC	$	Medium
CR8	Develop sportsground perimeters on Council land as passive open space with a natural theme to complement the creek corridors and their open space.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC Sporting Clubs	$$	Medium
CR9	Develop strategies for managing 'wild & informal' bush play without ruining the wild and creative aspects of what kids do already, but to keep the damage to habitat and facilities, and the risks, to acceptable levels.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	Medium
CR10	Develop facilities and provide access to the creek open space for residents of Roxburgh Park and Craigieburn through Aitken and Malcolm Creeks and investigate use of Patullos Lane.	Hume	MCMC	$$	Low

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
CR11	Where water quality is sufficient, provide water-based (secondary contact - i.e. fishing and boating) passive recreation opportunities at:		MCMC	$	Low
	• Jack Roper Reserve	Hume			
	• Coburg Lake Reserve	Moreland			

Chapter 4.3 (CT) - Trails and Access

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
CT1	Jointly publish a map of the Merri Creek and its open space showing: - entry points/public facilities; - transport routes. • Mahoneys Road north • Mahoneys Road north	 Hume Whittlesea	MCMC BUG PV MW	$	High
CT2	Prepare an integrated signage strategy for the Merri Creek to facilitate consistency of approach to signage. (see also CS9). The plan should be consistent with Trail Review recommendations B5.3.1 to B5.3.5, but also encompass northern municipalities. Types of signage considered should include: - warning, regulatory and directional signage; - interpretive signage; - access/exit points and links to other trails along waterways and rail lines; - directions to facilities near the creek; - distances to next pedestrian/bike crossing of the Creek; - directions to and from major roads. The strategy should consider that signage can have a major impact on the landscape character we are trying to create. Signage should be used sparingly, designed sensitively and placed carefully.	Darebin Hume Mitchell Moreland Whittlesea Yarra	FOMC MCMC BUG	$	High
CT3	Following publication of the final Merri Creek Park Concept Plan by PV (see Action RM4), work with PV to carry out feasibility study and design for a trail between Craigieburn along Merri Creek to join the existing Merri Creek Trail at Mahoneys Road, and including a circuit walk around Galada Tamboore linked to residential areas to the east and west.	Hume PV Whittlesea	VicRoads MCMC	$	High
CT4	Review the actions listed here in the light of the final Merri Creek Trail Review, and begin implementing actions.	Darebin Moreland Yarra	MCMC PV MW	$$$	High
CT5	In accordance with the Merri Creek Signage Strategy (see action CT2), and in line with the Trail Review, put in place clear signage along Creeks including: - access/exit points and links to other trails along waterways and rail lines; - shared trail designation; - directions to facilities near the creek; - distances to next pedestrian/bike crossing of the Creek; - directions to and from major roads.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC BUG	$$	Medium
CT6	Investigate areas for potential access improvements in consultation with interest groups, following assessment of areas requiring improvement, especially steep grades.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$$	Medium
CT7	After completion of the feasibility study (see Action CT3) extend the Merri Path from Mahoneys Road to Craigieburn, starting at the southern end.	Hume PV Whittlesea	MCMC WTLCCHC	$	Medium
CT8	Develop detailed plans for public access along Edgars Creek, including trail link from Merri Creek to Edwardes Lake.	Darebin Moreland	MW MCMC	$	Medium
CT9	Provide access from Coburg Senior High School to Merri Path.	Moreland	MCMC Moreland City College	$$	Medium
CT10	Provide a link from Merri Path to Moonee Ponds Creek Trail along Rennie Street Coburg, possibly in conjunction with a bridge to link with Fyffe Street or Miller Street Thornbury.	Moreland	MCMC	$$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
CT11	When Amalgamated Stone is re-developed, negotiate access route for off-road trail between Cunningham Street and McLaughlan Street and construct trail standard off-road trail, linking Rushall Station and St Georges Road, consistent with Merri Creek Trail Review recommendations.	Darebin PV Yarra	MCMC	$$	Medium
CT12	Consistent with Council Disability Action Plans, as opportunities arise on Council owned land implement disabled access to trails and open space, providing this is feasible and consistent with park objectives .	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$$	Low
CT13	Investigate opportunities for bush walking/trekking trails and links and overnight camping areas between Beveridge and Wallan and Craigieburn.	Hume Mitchell Whittlesea	MCMC PV FOWC	$	Low
CT14	Establish links from the Merri Path to other trails or potential trails:		MCMC VicRoads	$$$	Low
	• Malcolm Creek; Aitken Creek; Roxburgh Park	Hume			
	• Merlynston Creek	Moreland			
CT15	Following detailed plan development, construct trail link from Merri Creek along Edgars Creek to Edwardes Lake.	Darebin Moreland	MW MCMC	$$$	Low
CT16	Investigate assigning a speed limit to the Merri Creek Trail	Darebin Moreland Yarra	MCMC	$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority

Chapter 4.4 (CS) - Public Safety

CS1	Develop and implement a Fire Management Plan for the outer urban part of the Merri Creek Valley in consultation with MFB.	Darebin Hume Moreland Whittlesea Yarra	MCMC MFB PowerNet	$	Very High
CS2	Implement a 'Merri Watch' program on Merri Creek and its tributaries for: - rubbish dumping; - unrestrained dogs (especially those unregistered); - trail bike surveillance and reporting; - public safety; and - possible planning infringements	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC MW VicPolice	$	High
CS3	Promote a positive interface (see Merri Creek Design Guidelines standard MC5 and MC14) in design of new urban and industrial developments near creeks so surveillance is possible from adjacent housing (see further section 5.1).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MW MCMC	$	High
CS4	Construct and maintain Council facilities (eg. paths, crossings) to required standards (eg. paths above 5 year floodline, crossings above 10 year floodline where velocity and depth criteria can be met), in order to reduce exposure to risks, especially those associated with flood events (see also CT4).	Darebin Hume Mitchell Moreland Whittlesea Yarra	MW MCMC	$	High
CS5	Design major open space nodes (see section 2.6 - Mahoneys Road to the Yarra River), to encourage a focus of use at those locations and improve security.	Darebin Moreland Yarra	MCMC	$	High
CS6	Research available data on safety in public open space, including former quarries and fill areas – also research studies of 'over-protection' for safety, and the longer term consequences to human / personal development.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
CS7	Undertake periodic discussions with Police through existing By-Laws officer forums or others, to ascertain current patrols of Creek open space, communicate matters requiring attention and seek increase in patrols as required.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC VicPolice	$	High
CS8	Involve the community where possible, in open space design and development to achieve outcomes supported by the community and improve community desire to care for waterway open space.	Darebin Hume Mitchell Moreland PV Whittlesea Yarra	MCMC	$	High
CS9	As part of the Signage Strategy (see Action CT2) plan for and provide information to the community, including by signage, to indicate where possible nearest safe area, telephone, water and toilets as well as numbers to call in an emergency.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$$	High
CS10	Council By-Law Officers increase surveillance of and education and enforcement activity in creek corridors to address problems of unrestrained and unregistered dogs.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
CS11	Improve signage indicating that all the Merri Path is on-lead.	Darebin Moreland Yarra	MCMC MW	$$	High
CS12	Ensure that lighting does not affect Conservation Parkland and Conservation Bushland so that impacts on habitat values are minimised.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$$	Medium
CS13	Investigate appointment of ranger for creek corridors to improve public safety, provide interpretation and possibly enforce bylaws.	Darebin Hume Moreland Whittlesea Yarra	MCMC	$$$	Low

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
Chapter 5.1 (MP) - Planning					
MP1	Include waterway, drainage, regional flood management, open space and other waterway corridor issues in strategic growth corridor planning exercises.	Hume Mitchell Whittlesea	MW MCMC	$	Very High
MP2	Prepare a new Merri Waterways Plan consistent with the various open space strategies of Councils, Linking People and Places and the Merri Creek Park proposal, to guide strategic planning for waterway open space in the catchment.	MCMC	Member Councils PV	$$	Very High
MP3	Consider FOMC's Merri Creek Habitat Network proposal, adopt a formal position and make input to the Melbourne@5 million investigation to ensure waterway open space, environmental protection and catchment management are taken fully into account.	Hume MCMC Mitchell Whittlesea	FOMC FOWC	$	Very High
MP4	Align future plans developed in the catchment with this strategy.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC		High
MP5	Update and make available copies of the "Development Guidelines for the Merri Creek." to development proponents and consultants.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DI	$	High
MP6	Prepare Developer Guidelines for industrial areas along waterways in the upper catchment.	Hume Mitchell	MCMC MW	$$	High
MP7	Pursue opportunities to Identify, prioritise and introduce Public Acquisition Overlays on land that should be acquired as part of the Merri Creek waterways parklands, then pursue funding for public open space acquisition to realise the vision for waterways and creation of linked parklands.	Darebin Hume Mitchell Whittlesea Yarra	MCMC	$$$	High
MP8	Conduct triennial reviews of land ownership and zoning along Merri Creek and major tributaries to monitor opportunities to consolidate the open space corridors.	MCMC	Member Councils MW PV VicRoads	$	High
MP9	Prepare strategic justification and introduce planning scheme amendments to extend ESO coverage to include all of the main stem of Merri Creek as well as the major tributaries, including adjacent areas of significance, and a buffer. Also reduce ESO coverage where recent development of large blocks adjacent to Merri Creek makes existing ESO coverage excessive.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	Very High
MP10	Strengthen the Development Guidelines by incorporating them into the ESO or otherwise into planning schemes.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC DPCD	$	Very High
MP11	Apply and enforce the Development Guidelines for the Merri Creek to continue protecting the visual character of the corridor from new developments.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MW MCMC	$	High

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
MP12	Align the directions and actions of the Regional Catchment Strategy with Municipal Strategic Statements, planning schemes and other local government processes related to catchment Management. (From Port Phillip and Western Port Regional Catchment Strategy action PA7)	Darebin Hume Mitchell Moreland Whittlesea Yarra	PPWCMA MCMC	$	High
MP13	Address zoning anomalies and inconsistencies as outlined in the Context 1993 Planning report (5.5, p. 43-4), the discussion in chapter 5.1 and the triennial review of zoning and ownership (see Action MP9).	Darebin Hume Mitchell Moreland Whittlesea	MCMC	$	Medium
MP14	Prepare a discussion paper on contributions from developers and how they can be used for land acquisition and/or upgrading of nearby Creek environs.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC		Medium
MP15	Update references to the Merri Creek and Environs Strategy in planning schemes when the revision is approved by Councils.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	Medium
MP16	Advocate for planning scheme changes to make stormwater drains and wetlands works subject to a planning permit at least within the Environmental Signficance Overlay.	MCMC		$	Medium

Chapter 5.2 (MC) - Management Coordination

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
MC1	Prepare and supply annual report to Councils on MCMC works, achievement of MCMC objectives, and Merri Creek and Environs Strategy actions by MCMC.	MCMC		$	High
MC2	Establish frequency of external review of management coordination structures to supply information to members about: - the achievement of agreed objectives; - the continuing relevance of objectives; and - any necessary re-setting of priorities and objectives.	Darebin FOMC Hume MCMC Mitchell Moreland Whittlesea Yarra	MCMC	$	High
MC3	Continue to identify and implement opportunities for resource sharing, cooperative management and avoidance of duplication between Councils and relevant agencies and utilities.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
MC4	Continue community involvement in management coordination structures covering Merri Creek.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
MC5	Review MCMC to identify the most efficient ways to: - Plan and conduct community involvement in integrated catchment management; - Facilitate coordination and share information; - Identify local issues and develop priority programs (Adapted from Port Phillip and Western Port Regional Catchment Strategy action PA1).	Darebin Hume Mitchell Moreland Whittlesea Yarra	PPWCMA MCMC	$	Medium
MC6	Explore opportunities for coordination between the four catchments covered by the Northern Waterways Review.	MCMC	MCMC	$	Medium

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
Chapter 6.1 (MI) - Implementation					
MI1	After a MCMC coordinated public consultation process formally endorse and recognise the Merri Creek and Environs Strategy as a key document to guide catchment management. Ensure the relevant objectives, targets and actions are implemented in accordance with the intentions of the strategy. Commit to providing an officer to coordinate and report on Councils own implementation of the document and attend meetings of the Merri Creek and Environs Strategy Implementation Subcommitte of MCMC.	Darebin Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
MI2	Develop yearly priority activity plans to assist implementation of Strategy actions by major stakeholders and develop budget bids accordingly.	MCMC	Member Councils MW PV	$	High
MI3	Convene MCESIS meetings to identify ways to facilitate implementation of actions.	MCMC	Councils	$	High
MI4	Convene working parties of specialist council officers, other agency staff, and interested community members to forward implementation of groups of actions	MCMC	Councils Agencies	$	High

Chapter 6.2 (MR) - Monitoring and Review Procedures

CODE	ACTION	Lead Role	Key partners	Notional Cost	Priority
MR1	MCMC Merri Creek and Environs Strategy Subcommittee to act as a forum for clarifying objectives, targets and actions, consolidating reports on progress, coordinating actions and reporting to MCMC and Councils on progress. • Convene the subcommittee.	MCMC	Member Councils FOWC FOMC	$	High
MR2	Send a representative to and prepare reports for regular monitoring and review meetings of MCMC's Merri Creek and Environs Strategy Implementation Subcommittee convened to: - receive reports on progress with implementation of actions; - review and amend the contents and actions of the Strategy to continue to make it relevant to the needs of stakeholders; and - make any new recommendations for action as agreed between stakeholders and the accountable organisation.	Darebin DSE EPA Hume Mitchell Moreland Whittlesea Yarra	MCMC	$	High
MR3	Publish this document as an interactive website, including the action tables and progress on the actions.	MCMC	Member Councils	$	Medium
MR4	Prepare reviewed versions of the strategy every 5 years based on input from the Merri Creek and Environs Strategy Implementation Subcommittee, other agencies and the community and submit them to member Councils for modification or approval.	MCMC	Member Councils FoMC	$$	Low

DEFINITIONS

Waterway

According to the Water Act 1989, a waterway means:

(a) a river, creek, stream or watercourse; or

(b) a natural channel in which water regularly flows, whether or not the flow is continuous; or

(c) a channel formed wholly or partly by the alteration or relocation of a waterway as described in paragraph (a) or (b); or

(d) a lake, lagoon, swamp or marsh, being-

(i) a natural collection of water (other than water collected and contained in a private dam or a natural depression on private land) into or through or out of which a current that forms the whole or part of the flow of a river, creek, stream or watercourse passes, whether or not the flow is continuous; or

(ii) a collection of water (other than water collected and contained in a private dam or a natural depression on private land) that the Governor in Council declares under section 4(1) to be a lake, lagoon, swamp or marsh; or

(e) land on which, as a result of works constructed on a waterway as described in paragraph (a), (b) or (c), water collects regularly, whether or not the collection is continuous; or

(f) land which is regularly covered by water from a waterway as described in paragraph (a), (b), (c), (d) or (e) but does not include any artificial channel or work which diverts water away from such a waterway; or

(g) if any land described in paragraph (f) forms part of a slope rising from the waterway to a definite lip, the land up to that lip;

Wetland

A site ...where…wetness of the land is sufficiently frequent and sustained to influence the composition of the associated vegetation.(DSE 2006).

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LA	Aboriginal Heritage	1.1
LH	Historical Heritage	1.2
LV	Visual Character	1.3
LB	Biodiversity and Habitat Networks	2.1
LG	Geodiversity	2.2
LL	Land Management	2.3
RU	Headwaters to Craigieburn	2.4
RM	Craigieburn to Mahoneys Rd	2.5
RL	Mahoneys Rd to Yarra	2.6
WH	Stream Morphology, Drainage and Flooding	3.1
WQ	Water Quality and Stream Health	3.2
WF	Aquatic Flora, Fauna & Wetlands	3.3
CE	Community Engagement	4.1
CR	Recreation	4.2
CT	Trails and Access	4.3
CS	Public Safety	4.4
MP	Planning	5.1
MC	Management Coordination	5.2
MI	Implementation	6.1
MM	Monitoring and Review	6.2

Table 14 - Action Prefixes

Table Symbols and Terms

Term	Meaning
Lead Role	Agency having accountability for the action. That body may delegate delivery of the action to a contract provider.
Key Partner	Organisation to provide support and encouragement, and to be actively involved.
Overall Notional Cost $ $$ $$$	Combined notional cost of action for accountable parties. Up to $10,000 $10,000 + $100,000+
Priority Very High High Medium Low	The agreed priority attached to the action by the Merri Creek and Environs Strategy Implementation Subcommittee. Action to be completed within a year of this strategy being published Action to be commenced within a year and completed within 3 years Action to be commenced within 2 years and competed within 4 years Action to be commenced within 4 years

Table 15 - Table symbols and Terms

Acronyms

Acronym	Meaning
AAL	Aborigines Advancement League
AAV	Aboriginal Affairs Victoria
AAVHSB	Aboriginal Affairs Victoria, Heritage Services Branch
APC	Australian Platypus Conservancy
BOD	Biological Oxygen Demand
BUG	Bicycle Users Group
CALD	Culturally and linguistically diverse (communities)
CALP	Catchment and Land Protection (refers to Board)
CERES	Centre for Research in Environmental Strategies
CMA	Catchment Management Authority
CRC	Cooperative Research Centre
DCE	Department of Conservation and Environment (now DSE)
DCFL	Department of Conservation, Forests and Lands (now DSE)
DNRE	Department of Natural Resources & Environment (split into DSE and DI)
DSE	Department of Sustainability and Environment
DI	Department of Infrastructure
DPI	Department of Primary Industries
EPA	Environment Protection Authority
FAM	Free advertising material
FOMC	Friends of Merri Creek Inc.
ICOMOS	International Convention on Monuments of Significance
KNCHO	Kulin Nation Cultural Heritage Organisation
LGA	Local Government authority
MAV	Municipal Association of Victoria
MCCC	Merri Creek Coordinating Committee (1976-1990 – replaced by MCMC)
MCES	Merri Creek and Environs Strategy
MCESIS	Merri Creek and Environs Strategy Implementation Subcommittee (of MCMC)
MCMC	Merri Creek Management Committee Inc.
MDLG	Merriang District Landcare Group
MMBW	Melbourne Metropolitan Board of Works (now Melbourne Water)
MPW	Melbourne Parks and Waterways (now Parks Victoria)
MTPC	Metropolitan Town Planning Commission
MW	Melbourne Water
NEROC	North East Region of Councils
NESB	Non-English speaking background
NGOs	Non-government organisations
PAMA	Public Authorities Management Agreement
PIRG	Public Interest Research Group
PPWCMA	Port Phillip and Westernport Catchment Management Authority
PV	Parks Victoria
SA	Statutory authority
SEPP	State Environment Protection Policy
VicRoads	Victorian Roads Corporation
VNPA	Victorian National Parks Association
WSUD	Water-sensitive urban design
TNV	Trust for Nature (Victoria)
WTLCCHC	Wurundjeri Tribe Land Compensation and Cultural Heritage Council

Table 16 - Acronyms used in text

Land

Water

Community

Management

MERRI CREEK MANAGEMENT COMMITTEE

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