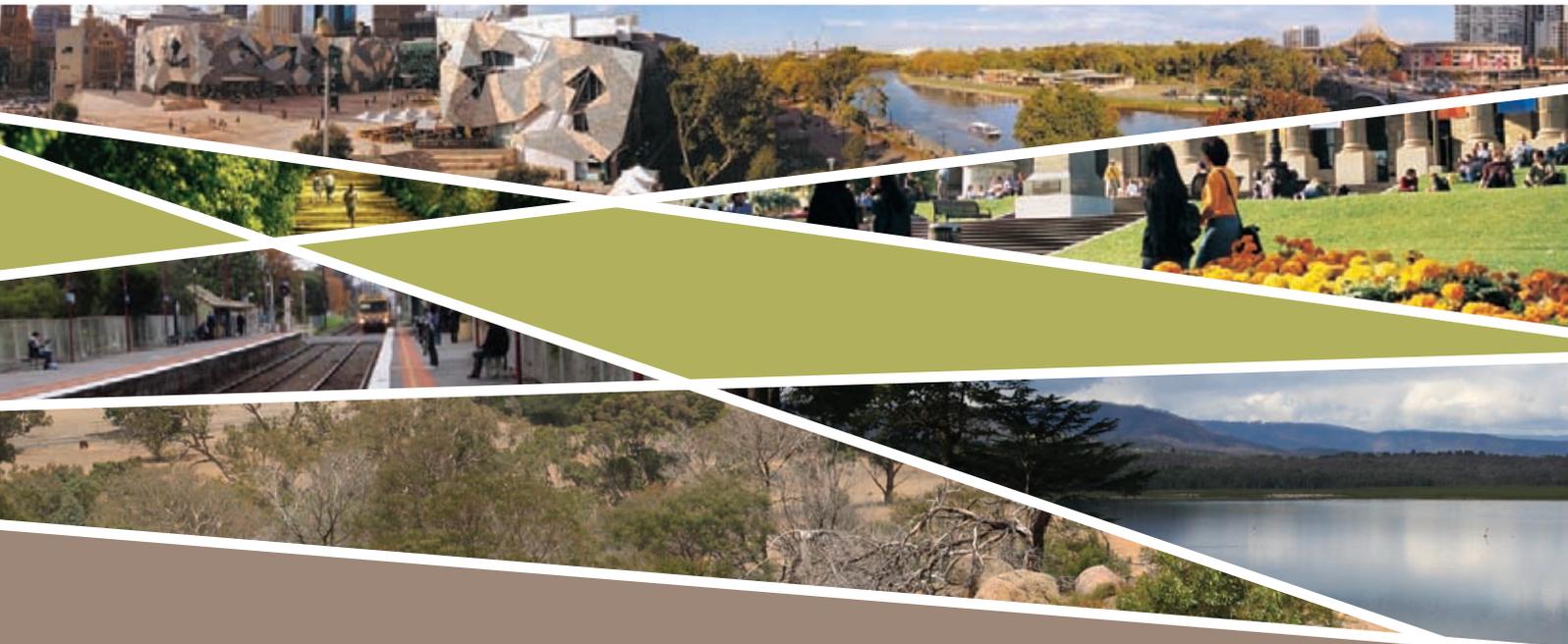


Metropolitan Melbourne Investigation Discussion Paper

FOR PUBLIC COMMENT



October 2010

WHAT IS THE VICTORIAN ENVIRONMENTAL ASSESSMENT COUNCIL?

The Victorian Environmental Assessment Council (VEAC) was established in 2001 under the *Victorian Environmental Assessment Council Act 2001*. It provides the State Government of Victoria with independent advice on protection and management of the environment and natural resources of public land.

The five Council members are:

Mr Duncan Malcolm AM (Chairperson)

Duncan Malcolm is a former dairy farmer and horticulturalist from east Gippsland, with extensive experience in natural resource management, particularly in the water sector and in coastal management. He has chaired many natural resource management bodies including the Gippsland Coastal Board, Lakes and Wilderness Tourism, Watermark Inc, the Irrigation Association of Australia Ltd and the East Gippsland Catchment Management Authority. Duncan is a member of the board of Gippsland Water, a Trustee of the Australian Landscape Trust and Deputy Chair of the Monash University Gippsland Advisory Council. He has been a VEAC member since 2002 and Chairperson since 2004.

Mr Barry Clugston

Barry Clugston is a farmer from Stawell in western Victoria, with extensive experience as a land manager with farms and natural ecosystems, particularly relating to biodiversity, salinity and Landcare. Barry is chairman of Grampians Wimmera Mallee Water Corporation and a former board member of the Wimmera Catchment Management Authority and Wimmera Leadership. He is an exhibiting artist and heavily involved in community affairs. Barry is a naturalist who for many years presented a regular wildlife program on ABC radio.

Mr Ian Harris

Ian Harris has had over 30 years experience in the planning and management of land for public use and conservation at both state and local government levels. He has been responsible for on-ground land management in regional Victoria and urban Melbourne as well as statewide policy development and program implementation for national parks and flora and fauna protection.

Mr Ian Munro PSM

Ian Munro is a consultant for the Department of Innovation, Industry and Regional Development (DIIRD), a board member of the Growth Areas Authority and the former Deputy Secretary and CEO, Invest Assist for DIIRD. He has a comprehensive knowledge of government across areas including regional development, infrastructure, technology, the environment, and has chaired or been a member of numerous government expert committees and policy review committees.

Dr Airlie Worrall

Airlie Worrall is a policy analyst by profession and a historian by training. She specialises in rural industry and community policy development. Airlie trained in Australian history at Melbourne University, researching 19th century land reform movements and the Victorian wool textiles industry. She has been an academic and an industrial heritage consultant, serving on the National Trust and the Victorian Historic Buildings Council classifications committees. As a policy analyst, she has worked in the Victorian food, textile, wool processing and timber harvesting industries and served as Senior Adviser to several Agriculture Ministers.

HOW TO MAKE A SUBMISSION

Written submissions are invited on this Discussion Paper.

The closing date for submissions is Monday, 20 December 2010.

You may make an online submission via VEAC's website at www.veac.vic.gov.au or send your written submission to VEAC by post, by fax or by email (see contact details). Only submissions sent directly to VEAC will be treated as submissions.

There is no required format for submissions, except that you must provide your name and your contact details, including an email address if you have one. All submissions will be treated as public documents and will be published on VEAC's website. The name of each submitter will be identified as part of each published submission, but personal contact details will be removed before publishing. Confidential submissions are discouraged. If there are exceptional circumstances that require confidentiality, please contact VEAC before making your submission.

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Metropolitan Melbourne Investigation Discussion Paper

FOR PUBLIC COMMENT

October 2010

Acknowledgment of Country

The Victorian Environmental Assessment Council acknowledges and pays its respects to Victoria's Native Title Holders and Traditional Owners within the investigation area, their rich culture and their spiritual connection to Country. These include the *Wurundjeri*, *Wathaurung*, *Boon Wurrung* and *Bunurong* peoples. The Council also recognises and acknowledges the contribution and interest of Indigenous people and organisations in the management of land and natural resources.

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CityWide Service Solutions	page 123 national tree day

Council members (left to right):
Ian Harris, Barry Clugston,
Duncan Malcolm (Chairperson),
Airlie Worrall, Ian Munro



FOREWORD

Melbourne has been the subject of several investigations by VEAC's predecessor, the Land Conservation Council. The initial investigation in 1977 was followed by two more, in 1987 and 1994. The current study, however, is the first investigation of public land in the inner and middle suburbs of metropolitan Melbourne and the first investigation covering the area where most Victorians live.

The majority of public land in the metropolitan area provides services and utilities for Melbourne's 3.7 million residents. Some of this public land serves all Victorians. Places such as Parliament House, the Royal Children's Hospital, the St Kilda Road arts precinct and the Melbourne Cricket Ground are just some examples.

Public authorities own or manage considerable areas of public land in the investigation area. Crown land (excluding most roads) makes up about 65 per cent of the public land and the remaining 35 per cent is owned by more than twenty-two public authority landholders, including Melbourne Water, VicRoads, the Department of Education and Early Childhood Development, VicTrack, the Department of Human Services and the Port of Melbourne Corporation. This is the first time that detailed information about Melbourne's metropolitan public land has been brought together in one inventory.

This investigation is the first to have terms of reference that require VEAC to report on the contribution of public land to Melbourne's liveability and the opportunities for enhancing this contribution.

The Community Reference Group for this investigation has provided valuable guidance to the Council. The Council and its staff have also been supported throughout the development of this discussion paper by significant contributions from, and discussions with, government departments and agencies, public authorities and the 29 local councils covering the investigation area.

Public land has contributed to Melbourne's liveability since the early days of European settlement when Crown land was allocated for public purposes. But Melbourne is changing and population growth and increasing urban density put pressures on the lifestyles of residents.

Public land has a role in alleviating this pressure and in protecting and enhancing Melbourne's liveability. Land is being added to the public land estate in outer and growth areas to provide for new roads, schools and other public purposes for our growing population.

Public open space, whether it is small neighbourhood parks, sports fields or large parks such as Warrandyte State Park, makes a particularly important contribution to Melbourne's liveability. VEAC has mapped these open spaces across the investigation area, including areas owned by local councils. We believe this to be the first time that this information on the location, type, and ownership of public open space across the investigation area has been brought together.

It is important to protect the existing open space network and, where appropriate, take opportunities to enhance it. While additional open space will be needed in growth areas, opportunities to meet the open space needs of increasing populations in established municipalities are more limited than in outer and growth municipalities. Despite this, some opportunities have arisen – Federation Square and Birrarung Marr on the north banks of the Yarra River and the various open space areas in Docklands are the most prominent examples of new inner urban open spaces.

Melbourne's landscape has dramatically changed since European settlement, and protection of the remaining natural environments is critical. Within the investigation area, there are approximately 96,000 hectares of native vegetation. About a third of this vegetation is on public land, including 20 per cent which is managed for conservation within the protected areas system. Protected areas include large areas in the Churchill, Dandenong Ranges, Kinglake and Organ Pipes National Parks and the Bunyip, Lerderderg and Warrandyte State Parks. Outside protected areas, Melbourne's naturally vegetated creeks and waterways, coastal reserves, and metropolitan and regional parks, are also key environmental and recreational assets.

The Council invites interested groups and individuals to respond to this discussion paper. Views are sought, in particular, on the statements made in chapters 6 to 10. We are looking forward to engaging with you during the consultation period.

Duncan Malcolm
Chairperson

THE STRUCTURE OF THIS DISCUSSION PAPER

This discussion paper has five parts:

Part A (chapter 1) provides some background to the investigation, explains the role of VEAC and outlines the terms of reference and other matters to be taken into account in the investigation. It also describes the investigation timeline and process, and outlines the community views presented to VEAC throughout the course of the investigation so far.

Part B (chapters 2 and 3) describes the natural environment of the investigation area in terms of its geology and geomorphology, hydrology, biodiversity and climate. It describes the people of metropolitan Melbourne, focusing on Indigenous and non-Indigenous history and heritage, and the current and future population of Melbourne.

Part C (chapter 4) addresses the terms of reference by describing the public land within the investigation area and its uses, resources, values and management.

Part D (chapters 5 to 9) reports on the contribution of public land to Melbourne's liveability (chapter 5) and opportunities for enhancing this contribution. Chapter 6 describes the extent and ownership of public open space across the investigation area and discusses issues associated with, and future options for, providing public open space. Chapter 7 examines the predicted effects of climate change on public land and on liveability and natural values. Chapter 8 discusses the pressures on, and mechanisms for protecting, biodiversity in the investigation area. Chapter 9 discusses the values and scope of surplus land in the investigation area, and reports on future uses of surplus land relevant to Melbourne's liveability and natural values.

Comments are particularly invited on the issues presented in Part D.

Part E (chapter 10) contains draft recommendations confirming the management and use of public land in each category within the investigation area. It also includes draft recommendations for changes in land use category for a small number of sites. These draft recommendations aim to enhance the protection of biodiversity.

Comments are particularly invited on the draft recommendations.

Abbreviations and acronyms and the **Glossary** provide abbreviations and technical definitions of terminology used in the discussion paper.

References are arranged numerically in the order of citation in the discussion paper.

Appendices provide more detail on relevant topics including sites of geological, historical and cultural significance and protected areas in the investigation area, public open space data used for the report and the procedures for disposing of surplus public land.

Maps showing public land and public open space in the investigation area are inserted in the rear pocket of the discussion paper.

Consultants' reports commissioned as part of the development of the discussion paper are published in full on VEAC's website at www.veac.vic.gov.au

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EXECUTIVE SUMMARY



In July 2008, the Minister for Environment and Climate Change requested the Victorian Environmental Assessment Council (VEAC) to undertake an investigation of Crown land and public authority land (i.e. public land) in 29 municipalities* of metropolitan Melbourne.

This discussion paper is the first of two reports published for this investigation. Submissions are welcome on the broad range of issues relevant to the investigation.

PURPOSES AND SCOPE OF THE INVESTIGATION

The purposes of the investigation are to:

- a** systematically identify and assess the uses, resources, condition, values and management of Crown land, and public authority land in metropolitan Melbourne;
- b** assess values of Crown land, and public authority land for areas not committed to a specific use, and report on appropriate future uses relevant to Melbourne's liveability and natural values; and
- c** report on the contribution of Crown land, and public authority land to Melbourne's liveability and opportunities to enhance this contribution.

PUBLIC LAND IN METROPOLITAN MELBOURNE

The *Victorian Environmental Assessment Council Act 2001* defines public land broadly as Crown land and freehold land owned by public authorities.

This is the first investigation by VEAC or its predecessors of the inner and middle municipalities of metropolitan Melbourne. It is consequently the first time that a detailed

* Municipalities of Banyule, Bayside, Boroondara, Brimbank, Cardinia, Casey, Darebin, Frankston, Glen Eira, Greater Dandenong, Hobsons Bay, Hume, Kingston, Knox, Manningham, Maribyrnong, Maroondah, Melbourne, Melton, Monash, Moonee Valley, Moreland, Nillumbik, Port Phillip, Stonnington, Whitehorse, Whittlesea, Wyndham, Yarra.

picture of the use and ownership of public land – including land owned by the Crown and by more than 22 government departments and public authorities – has been summarised for much of the metropolitan area.

The public land estate across the investigation area consists of almost 58,140 hectares of Crown land (excluding most roads) and 32,000 hectares of public authority freehold land. This is 16 per cent of all land within the investigation area.

VEAC has categorised the majority (60 per cent) of this public land as 'services and utilities areas'. This large proportion is mainly due to the extensive network of roads and road reserves and large areas for water and sewerage services. Other categories containing significant areas of public land include national and state parks (more than 15 per cent of public land), water production areas, regional and metropolitan parks, natural features reserves and state forest.

Public authorities with the largest landholdings in the investigation area are Melbourne Water, VicRoads, the Department of Education and Early Childhood Development and VicTrack.

CONTRIBUTION OF PUBLIC LAND TO LIVEABILITY AND NATURAL VALUES

Liveability reflects the well-being of communities. Public land makes a significant contribution to liveability of metropolitan Melbourne through parks, roads, hospitals, schools and other community services.

Unlike private land, public land provides governments with opportunities to improve social, economic, environmental, cultural and governance outcomes (i.e. liveability outcomes). These opportunities generally contribute to the 'public good' through the conservation of the natural environment, opportunities for recreation and relaxation, the delivery of public services and utilities, and securing land for use by future generations.

Public land benefits members of the community, often without the requirement to pay for access to private services and/or landholdings, and generally without being excluded based on ownership or club membership. Most importantly, there is a stability or permanence associated with public land, which may be lacking for private land.

This discussion paper reports on three ways that public land contributes to liveability and natural values:

- ▶ providing public open space,
- ▶ protecting biodiversity, and
- ▶ aiding communities to adapt to and mitigate climate change.

PUBLIC OPEN SPACE

Melburnians consider public open space to be a key contributor to their liveability. It was one of the key issues raised during VEAC's public consultation.

VEAC has developed an inventory and maps of public open space on Crown land, public authority land and municipal land across the investigation area. This is the first time that this information has compiled in one inventory.

Significant areas (more than 68,000 hectares) of public land and local council owned land in the investigation area are open space. Protected areas, such as national and state parks, make up the largest category of public open space in investigation area. Within the urban areas of the investigation area, the largest category is organised recreation areas, such as sports fields.

Public open space per thousand people is generally higher in growth and outer municipalities and lower in established municipalities of the investigation area. This difference is largely due to non-urban areas and the distinction between established and other municipalities is not as clear when only considering urban areas within the investigation area.

Issues associated with the provision of public open space include the absence of a current metropolitan-wide open space strategy and the pressures on open space from projected increases in population. It will be more difficult to respond to population increases in established municipalities where there is limited scope to create additional open space.

CLIMATE CHANGE AND PUBLIC LAND

Climate change impacts on public land and its management. The recent severe rainfall shortages had a significant impact on Melbourne's parks, gardens and recreation reserves. Bushfires are predicted to increase, as are extreme weather events. Sea-level rise in future decades will affect the coastlines of the Port Phillip Bay and Western Port regions.

Urban public land can play a role in the mitigation of, and adaptation to, climate change through parks and street trees providing cooler areas to reduce the urban heat island effect. Many biodiversity links are on public land and these are important for maintaining biodiversity under the threat of climate change in the long-term.

ENHANCING BIODIVERSITY

Most of suburban Melbourne has been irreversibly changed. This region has the most altered landscape in Victoria, due to the amount of direct habitat loss and because the land and associated land uses between any remaining fragments of habitat are so inhospitable to native biodiversity.

Pressures on the biodiversity in the investigation area include habitat loss, fragmentation, and degradation (particularly from invasive species), altered fire regimes, climate change, and the impact of recreation and tourism. Natural habitats on public land need to be protected, maintained or enhanced wherever possible.

Melbourne's remaining natural environments include some significant protected areas, such as Warrandyte State Park, and other major national and state parks in the outer areas. Native vegetation along creeks and waterways, and large areas of bushland remaining in regional and metropolitan parks and other reserves, are also valuable ecological assets as well as providing a range of other benefits for urban residents.

SURPLUS PUBLIC LAND

VEAC has defined 'Crown land and public authority land not committed to a specific use' as surplus public land. For public authority owners and managers, the value of land that is surplus to current and future requirements tends to be its financial value to be realised on sale and/or the reduction in management costs achieved on disposal.

By contrast, Melbourne communities value surplus public land in terms of its potential alternative community uses, particularly land that is, or could be, public open space.

Some ways of enhancing the contribution of surplus public land to the liveability of metropolitan Melbourne include listing all surplus public land on a central register, retaining Crown land that is suitable for another public use or selling public authority freehold land at a price that reflects its intended public use.

DRAFT LAND USE RECOMMENDATIONS

The draft land use recommendations contained in this report mainly confirm existing land use and management across the investigation area. In addition, VEAC has developed a small number of draft recommendations for areas of public land with biodiversity values. These include draft recommendations for additions to Kinglake National Park and Bunyip State Park and the creation of the Point Cook Coastal Park and Bandicoot Corner Bushland Area.

PART A



INTRODUCTION

This part provides background to the Metropolitan Melbourne Investigation and the Victorian Environmental Assessment Council. It outlines the terms of reference and other matters to be taken into account in the investigation. It describes the investigation process and timeline and the community views presented to VEAC during the course of the investigation.

1

INTRODUCTION

1.1 Background to the investigation

The Victorian Environmental Assessment Council's (VEAC) investigation of metropolitan Melbourne covers 29 of the 31 metropolitan municipalities (see figure 1.1 below). The investigation area is approximately 562,740 hectares (5,627.4 square kilometres) in total, of which approximately 163,000 hectares* (1,630 square kilometres) is public land.

While it is only about 2.5 per cent of the area of Victoria, approximately 68 per cent of Victorians live within the investigation area. Much of this area is modified, largely due to urbanisation and agriculture. It does, however, retain substantial biodiversity values with high diversity of flora and fauna. Twenty-six per cent of land (both public and private) contains native vegetation.

Most public land within metropolitan Melbourne is used for services and utilities to support its residents. VEAC estimates that nearly half is roads. Water supply reservoirs also cover a substantial area. A large proportion of the remaining public land is dedicated to parks and reserves managed for conservation and/or recreation. A smaller, but significant, area of public land is used for schools, libraries, community halls and other community purposes.

Public land in Melbourne and its surrounding areas also supports Victorians who live outside the metropolitan area. Melbourne's public hospitals and cultural, sports and entertainment venues on public land (such as the Melbourne Museum, Melbourne Cricket Ground and the Arts Centre precinct) provide services for all Victorians and visitors from interstate and overseas.

Figure 1.1
The investigation area



* This includes an estimated 73,000 hectares of Crown road reserves.

Metropolitan Melbourne's population is growing and the landscape is becoming increasingly urbanised. In 2002, the Victorian Government introduced *Melbourne 2030*; its 30 year plan to manage the growth and development of metropolitan Melbourne and the surrounding region.¹ *Melbourne 2030* aimed, amongst other things, to protect the liveability of established suburbs by concentrating higher density developments in development sites and limiting Melbourne's outward development with an urban growth boundary (UGB) and the concentration of urban expansion in the designated growth areas.

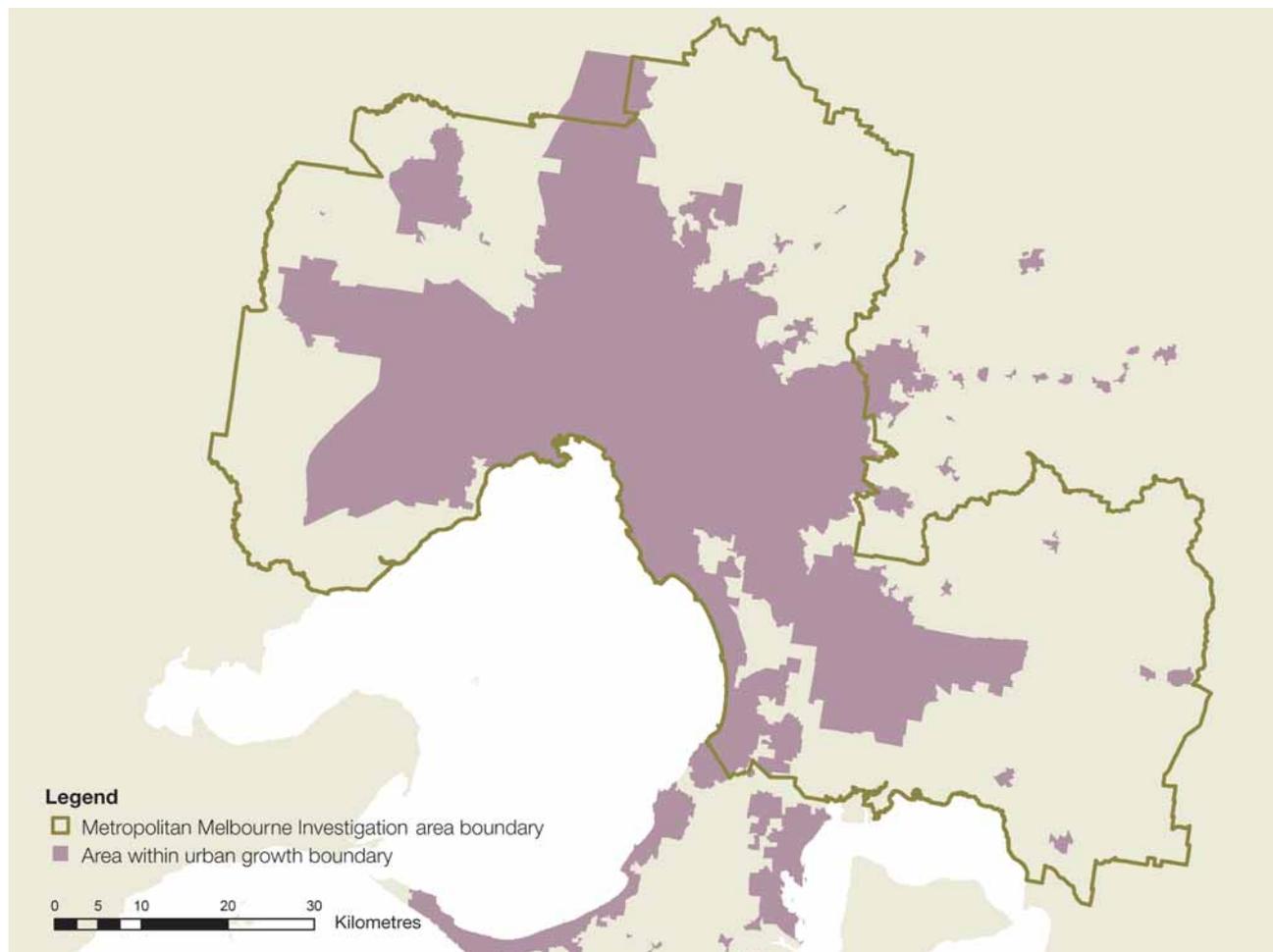
In 2008, in response to projections that Melbourne's population was growing faster than expected and would reach five million by 2030, the Government updated its *Melbourne 2030* initiatives. One of the outcomes of this update was an extension to the urban growth boundary. Approximately forty-four per cent of the Metropolitan Melbourne Investigation area is within the extended boundary (see figure 1.2 below).

Outside the urban growth boundary, the investigation area includes the "green wedges" of agricultural land, conservation and recreation areas and land that supports urban functions such as airports, sewage treatment and reservoirs.

Many of the outer parts of the investigation area have been affected by recent bushfires. In 2009, bushfires at Kilmore East–Murrindindi, Bunyip State Park, Narre Warren North, Endeavour Hills and Plenty Gorge affected 24,438 hectares of land, including 17,249 hectares of public land in the investigation area.

Among the recommendations of the 2009 Victorian Bushfires Royal Commission accepted by the Victorian government was a number that impact on public land in the investigation area. These include increased fuel reduction burning to five per cent of public land annually (385,000 hectares), clearing and fuel reduction along roads, bushfire risk reduction around houses adjoining public land and establishing refuges and shelters.²

Figure 1.2
Metropolitan Melbourne Investigation area with the urban growth boundary



1.2 The Victorian Environmental Assessment Council

The *Victorian Environmental Assessment Council Act 2001* (VEAC Act) came into effect on 31 December 2001. This Act repealed the *Environment Conservation Council Act 1997* and established the Victorian Environmental Assessment Council (VEAC) to conduct investigations and make recommendations relating to the protection and ecologically sustainable management of the environment and natural resources of public land.

The current five members appointed to VEAC are Mr Duncan Malcolm AM (Chairperson), Mr Barry Clugston, Mr Ian Harris, Mr Ian Munro PSM and Dr Airlie Worrall. A brief biography of each of the Council members is provided on the inside front cover of this discussion paper. The Council is supported by research, policy and administrative staff. The VEAC Act requires the Council to consult with departments and public authorities, and requires departments and public authorities to give practicable assistance to the Council in carrying out investigations. VEAC papers and reports are, however, prepared independently.

The Council conducts its affairs in accordance with the VEAC Act. In particular, section 18 specifies that "Council must have regard to the following considerations in carrying out an investigation and in making recommendations to the Minister-

- a the principles of ecologically sustainable development;
- b the need to conserve and protect biological diversity;
- c the need to conserve and protect any areas which have ecological, natural, landscape or cultural interest or significance, recreational value or geological or geomorphological significance;
- d the need to provide for the creation and preservation of a comprehensive, adequate and representative system of parks and reserves within Victoria;
- e the existence of any international treaty ratified by the Commonwealth of Australia which is relevant to the investigation;
- f any agreement at a national, interstate or local government level into which the Government of Victoria has entered, or under which the Government of Victoria has undertaken any obligation in conjunction with the Commonwealth, a State, Territory or municipal council, which relates to the subject matter of the investigation;
- g the potential environmental, social and economic consequences of implementing the proposed recommendations;
- h any existing or proposed use of the environment or natural resources."

1.3 Terms of reference for the investigation

The Minister for Environment and Climate, Gavin Jennings MLC, requested the Victorian Environmental Assessment Council to undertake the Metropolitan Melbourne Investigation in July 2008. The terms of reference for the investigation are copied below.

TERMS OF REFERENCE

Pursuant to section 15 of the *Victorian Environmental Assessment Council Act 2001* the Minister for Environment and Climate Change hereby requests the Council to carry out an investigation of Crown land and public authority land in the cities constituting metropolitan Melbourne* and the Shire of Cardinia.

The purposes of the Metropolitan Melbourne Investigation are to:

- a systematically identify and assess the uses, resources, condition, values and management of Crown land, and public authority land in metropolitan Melbourne;
- b assess values of Crown land, and public authority land for areas not committed to a specific use, and report on appropriate future uses relevant to Melbourne's liveability and natural values; and
- c report on the contribution of Crown land, and public authority land to Melbourne's liveability and opportunities for enhancement of this contribution.

In addition to the considerations specified in section 18 of the *VEAC Act*, the Council would need to take into account the following matters:

- ▶ relevant State Government policies, programs, strategies and Ministerial Statements relating to the use of open space in Melbourne, including *Melbourne 2030* and *Planning for all of Melbourne* and *Linking People & Spaces*;
- ▶ public authority plans and strategies such as the Port Phillip Catchment Management Authority *Regional Catchment Strategy* and *Native Vegetation Plan*; and
- ▶ land required by transport and other utilities for their functions and appropriate access for social, recreational and community activities.

The Council is required to consult with the community in accordance with the *VEAC Act*, to release a Discussion Paper, and to submit a Final Report on the results of its investigation. The Final Report must be submitted by May 2010**.

* Municipalities of Banyule, Bayside, Boroondara, Brimbank, Casey, Darebin, Frankston, Glen Eira, Greater Dandenong, Hobsons Bay, Hume, Kingston, Knox, Manningham, Maribyrnong, Maroondah, Melbourne, Melton, Monash, Moonee Valley, Moreland, Nillumbik, Port Phillip, Stonnington, Whitehorse, Whittlesea, Wyndham, Yarra, Melbourne Docklands

** In July 2009, the Minister extended the timeline for the completion of the investigation until May 2011.

1.4 Scope of the investigation

This investigation has much in common with previous investigations carried out by VEAC and its predecessors in that the terms of reference require VEAC to identify and assess the uses, resources, condition, values and management of Crown land and public authority land (public land) in the investigation area.

Unlike previous investigations, the terms of reference also require VEAC to report on the contribution of public land to Melbourne's liveability and opportunities for enhancing this contribution. Although the role of VEAC is to conduct investigations of public land, the Council has taken the view that the contribution of local government land to liveability should be recognised in this discussion paper (see chapter 6).

In addition, the terms of reference require VEAC to discuss the values and appropriate future uses of public land not committed to a specific use, and report on future uses relevant to Melbourne's liveability and natural values. The Council has taken the view that land not committed to a specific use is public land that is surplus to requirements of its current owner or manager. Chapter 9 discusses the scope and values of this land and the opportunities to use it for other public purposes.

The terms of reference specify that VEAC release a discussion paper and submit a final report. As they do not specify that VEAC is to release a draft proposals paper, the Council has decided to include in this discussion paper invitations to comment on particular issues (see Part D) and a small number of draft land use recommendations (see Part E).

1.5 The investigation process

The process for this investigation is specified in the VEAC Act and the terms of reference for the investigation. The process and timeline are shown below in figure 1.3 below.

Figure 1.3
Investigation process and timeline



1.6 Consultation and information gathering

During the preparation of this discussion paper VEAC sought input from the community of metropolitan Melbourne, Victorian government departments and public authorities and local government. The consultation process provided VEAC with valuable insights into the values and uses of public land in metropolitan Melbourne and the associated issues. VEAC wishes to thank everyone who made a submission or otherwise participated in the consultation process.

1.6.1 SUBMISSIONS

Public submissions are one of the key processes used by VEAC to seek community views on issues associated with public land. The first submission period commenced on 3 December 2008. Submissions were accepted after the end of the advertised 75 day period to enable people affected by the 2009 bushfire season to contribute. The last submission was received on 9 March 2009.

VEAC received 189 submissions, 102 of which were from private individuals. The remaining submissions were from environment groups, friends groups, committees of management, residents' groups, recreation and other specific interest groups, local governments, Victorian government departments and public authorities and Victorian and federal members of parliament. Submissions can be viewed at www.veac.vic.gov.au.

A summary of the issues and themes outlined in submissions is provided in section 1.6.5.

1.6.2 COMMUNITY REFERENCE GROUP

VEAC established a Community Reference Group (CRG) for this investigation in accordance with section 13 of the VEAC Act. Members of this group represent a broad range of interests related to the investigation. The CRG met four times in 2009 and 2010. Appendix 1 lists the CRG members. The issues and themes raised by the CRG are also included in section 1.6.5.

1.6.3 STATE AND LOCAL GOVERNMENT STAKEHOLDERS

VEAC received valuable input from a range of departments and public authorities, particularly those that own and or manage public land, and the local councils within the investigation area. This input included advice on public landholdings from departments and public authorities and participation at three roundtables on public land issues. It also included advice from local councils on the distribution of public open space within their municipalities.

1.6.4 EXPERT CONSULTANCIES

VEAC commissioned six expert consultancies to inform the investigation. The reports from these consultancies are listed in box 1.1 below and are available at www.veac.vic.gov.au.

Box 1.1

Expert reports commissioned by VEAC

- ▶ *The contribution of public land to Melbourne's liveability*³
- ▶ *Demographic characteristics of communities within the Melbourne Investigation Area*⁴
- ▶ *Biodiversity of metropolitan Melbourne*⁵
- ▶ *Sites of geological and geomorphological significance on public land*⁶
- ▶ *Indigenous cultural heritage and history within the Metropolitan Melbourne Investigation Area*⁷
- ▶ *Non-Indigenous cultural heritage and historic places on public land In VEAC's Metropolitan Melbourne Investigation Area*⁸

1.6.5 COMMUNITY VIEWS

This section discusses the issues and themes outlined in submissions and at meetings of the Community Reference Group. Although they are presented under a number of broad headings, most issues are interrelated.

Terms of reference

Many submissions commented on particular issues raised in the terms of reference including on the appropriate future uses for 'land not committed to a specific use' and the contribution of public land to Melbourne's liveability.

A small number of submissions commented that land owned by the Commonwealth and local governments and private land should be covered under the terms of reference. Several submissions suggested the investigation area should be extended to include the Shires of Mornington Peninsula and Yarra Ranges.

Uses, resources, condition and values of public land

Many submissions responded to the terms of reference for the investigation by documenting the uses, resources, condition, values and management of Crown land and public authority land. Many of these highlighted the community uses of public land including formal

sporting facilities and parks, gardens, conservation areas, kindergartens, libraries, health services and arts venues, schools, police stations and social housing; utilities infrastructure like retarding basins, pipe tracks and transmissions lines and transport infrastructure such as linear trails, rail and tram networks and roads and freeways.

Some noted commercial uses such as the Grand Prix and Caulfield Racecourse, the use of parkland for car parking, and public land sold for development. A significant number of these submissions supported public land being used for public purposes.

Most submissions, and the CRG, valued public land very highly and described it as an essential community resource. It was particularly valued as a major contributor to the liveability of Melbourne through the provision of public open space and the conservation of natural values. Submissions commented on the recreational, social, heritage and environmental values of public land.

The condition of public land was described in varying terms. Some submissions described the public land they enjoyed (such as their local park) and others expressed concern about the condition of particular land.

Open space

Most submissions and CRG discussions stressed the value of public land that provides public open space. It was mentioned more frequently in the submissions than any other issue and was regularly linked to Melbourne's liveability.

Relief from the urban environment and the opportunity to be in contact with natural environments were highlighted by many submitters as contributors to improved mental health. Submissions drew attention to the physical health benefits associated with recreation which are made possible by ready access to public open space. Many submissions also placed a high value on the protection of native vegetation and habitat links that public open space provides. The CRG and a number of submissions also recognised the ecosystem services supplied by public open space which cannot be provided by the built environment. High visitation rates at Melbourne's premier parks and gardens and national parks were noted by a small number of submissions as a substantial contributor to Victoria's tourism revenue.

Over two thirds of submissions expressed support for the protection of existing open space and the provision of more public open space. Almost half of the submissions expressed concerns that the community was effectively losing public open space through the sale or development of public land, allocation of open space to sporting activities

in a way that restricts public access and the decrease in per capita provision of open space as Melbourne's population grows.

A number of submissions commented that the current legislative mechanisms for setting open space contributions from developers are not effective. It was considered that they do not provide for sufficient public open space given population growth, higher density living and the loss of private open space.

Suggestions to increase the amount of public open space included expanding existing parks and developing a strategy for the purchase of new parks and conservation areas.

Some submissions suggested that a state-wide approach to open space management would ensure consistency across all state and local government land managers. Clarification of responsibilities and improved communication between different land managers (including volunteers) was also suggested to facilitate better coordinated public land management.

Many submissions commented on the need for improved management and funding for public open space. Management of remnant native vegetation and control of weeds and pests were two of the management issues raised.

Biodiversity conservation

Many submissions and the CRG commented on the important role played by public land in the conservation of biodiversity and natural values. Particular types of public land mentioned included national parks, regional parks, linear reserves, wetlands, foreshores and stream frontages.

The failure to recognise biodiversity values before disposing of, or building on, public land was considered to be a threat to biodiversity in the investigation area. Extensions to the urban growth boundary and the loss of green wedge land (both public and private land) were also seen as contributing to the loss of biodiversity. The visual amenity and conservation values of natural areas were also thought by some submitters to be under threat due to development occurring in close proximity to natural areas.

Opportunities identified to protect biodiversity included creating or extending existing national parks, protection of road reserves, creeks and linear trails, and better management of pest species.

It was suggested that public land used for services and utilities, cemeteries and schools often has significant conservation values and that relevant sites be managed to protect these values.

Recreational opportunities

The recreational values of public land were acknowledged, mostly in relation to the opportunities for non-organised and informal recreation provided by public open space.

Linear trails were discussed in a number of submissions, with an emphasis on the need to upgrade and close gaps in the metropolitan trail network and increase linkages to public transport.

There were some comments on the importance of sports fields and other built facilities for organised recreation. A small number of recreational groups and individuals expressed interest in continued or increased access to public land in order to pursue their particular recreational activities.

Other submissions considered that sports fields restricted use of public land to a proportion of the community. They tended to support open space that is available for a wide range of users (such as non-organised recreation and conservation areas). The CRG also expressed strong support for multi-purpose spaces that would meet the recreational needs of a wide range of users.

Cultural and heritage values of public land

The cultural and heritage values of public land were acknowledged in submissions that referred to important Indigenous and European cultural heritage sites on public land. Some commented that public land helps preserve Melbourne's heritage and contributes to tourism revenue through iconic cultural sites such as the National Gallery of Victoria, Federation Square, the Melbourne Museum, Scienceworks and the State Library.

Climate change and sustainability

A number of submissions commented on how public land can aid climate change mitigation and adaptation. Increased revegetation of public land was suggested for carbon sequestration, to reduce the urban heat island effect and to create habitat links. Some submissions also suggested that public land should be used to extend and improve the public transport system and trail network to reduce transport emissions, and to adapt to lower rainfall (e.g. with water tanks in parks and water-sensitive urban design).

Fire-risk management

Fire management was raised in relation to the 2009 bushfires. Issues raised included using public open space as evacuation areas during emergencies, a government 'buy back' of private land in high fire-risk areas, and concerns about fuel reduction burning.

Public land governance

A large number of submissions advocated the protection of public land with community and environmental values. Current legislative protections for public land were viewed as inadequate with several submissions citing the loss of areas of parkland as evidence of the lack of legislative protection afforded to public land.

There were a number of calls for the state government to develop a state-wide approach to public land and open space planning and management. Some submissions suggested that the protection and management of public land currently relies too heavily on the use of volunteers.

Inappropriate use of public land

Many submissions highlighted uses of public land that they considered inappropriate. Examples included the use of public open space for commercial activities or major sporting events that restrict public access to open space. More than a quarter of submissions argued for the use of public land for public purposes only. Activities damaging to the environment, such as car-parking in parkland and some recreational activities in conservation areas, were also thought to be inappropriate uses of public land. Commercial developments along waterways and foreshores were also considered damaging to sensitive coastal and riparian environments and inappropriate where climate change posed increased flood risk and coastal erosion.

Disposal of public land

Disposal of public land was raised in more than one quarter of submissions and frequently in CRG discussions. It was generally considered that all surplus public land should be assessed for its community and environmental values before being sold and that the disposal process should be more transparent and consultative. There were some suggestions that, given Melbourne's increasing population, current or potential public open space should not be sold.

The requirement for public authorities to sell public land at market value was considered to be a barrier to achieving more public open space. Some submissions wanted particular public land sites to be transferred to local councils at no cost.

Population growth

The pressure on Melbourne's liveability caused by rapid population growth was a commonly expressed concern. CRG discussions and many submissions raised concerns about the resulting increased demand for open space, public transport, water resources and other services that contribute to liveability in Melbourne.

1.7 Policy context

1.7.1 INTERNATIONAL AND NATIONAL CONTEXT

The investigation is carried out in the context of a number of international and national agreements and strategies.

The World Heritage Convention was adopted by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) General Conference in 1972 and came into force in 1975. The Convention aims to promote cooperation among nations to protect heritage around the world that is of such outstanding universal value that its conservation is important for current and future generations. Australia became one of the first countries to ratify the Convention in 1974.

In 2004, the Royal Exhibition Building and Carlton Gardens became the first property in Victoria to be inscribed on the World Heritage List.

*The Convention on Wetlands of International Importance*⁹, known as the Ramsar Convention, is an inter-governmental treaty that provides the framework for the conservation and wise use of wetlands and their resources. Australia is a contracting party to the Ramsar Convention.

The Ramsar Convention encourages the designation of sites containing representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity. Once designated, a management framework aimed at conserving the wetland and ensuring its wise use is established. Victoria currently has 11 Ramsar sites, three of which overlap with the investigation area.

*Australia's Strategy for the National Reserve System 2009-30*¹⁰ is a long-term strategy for the protection of Australia's biodiversity. The strategy aims to enhance the National Reserve System (the national network of protected areas set aside to protect natural values) over the next twenty years. It focuses on improved design and selection, accelerated establishment and effective planning and management of protected areas, and strengthened partnerships and increased community support.

1.7.2 VICTORIAN GOVERNMENT POLICIES AND STRATEGIES

The terms of reference specify that VEAC should take into account:

- ▶ relevant State Government policies, programs, strategies and Ministerial Statements relating to the use of open space in Melbourne, including *Melbourne 2030*, *Planning for all of Melbourne* and *Linking People and Spaces*.
- ▶ public authority plans and strategies such as the Port Phillip Catchment Management Authority *Regional Catchment Strategy* and *Native Vegetation Plan*.

Some of the key policies and strategies are outlined below.

*Melbourne 2030*¹ was developed in 2002 as a strategic plan to manage Melbourne's growth and development planning over 30 years. It provides a long-term framework to reduce urban expansion, consolidate an increased share of urban development around transport nodes to more efficiently use existing infrastructure and improve access to services and facilities.

The core of *Melbourne 2030* is a series of directions which include a more compact, prosperous, green and well-connected city, and better management of metropolitan growth.

*Planning for all of Melbourne 2008*¹¹ is the Victorian Government's response to the *Melbourne 2030* audit undertaken by an independent Audit Expert Group between 2007 and 2008. The audit provided recommendations on strategic and implementation priorities for *Melbourne 2030*.

Key actions of the strategy include increasing coordination across government for the implementation of *Melbourne 2030*, planning and managing Melbourne's current and future transport needs, increasing Melbourne's environmental sustainability in the face of climate change and managing urban growth and change.

*Melbourne @ 5 million*¹² is a planning update for *Melbourne 2030*, providing a long-term framework for managing Melbourne's growth. It outlines the implications of the *Victoria in Future 2008* growth projections for Melbourne, which indicate that the city's population is likely to reach five million before 2030.

Melbourne @ 5 million provides complementary policy initiatives to the directions in *Melbourne 2030*. Key policy initiatives include the creation of Central Activity Districts and employment corridors, and the expansion of Melbourne's urban growth boundary.

*Linking People and Spaces 2002*¹³ was developed in 2002 as a strategic plan for the growth and improvement of Melbourne's regional open space network. This includes regional parks, shared use trails, coasts and bays and area with important environmental and cultural values.

It focuses on ensuring equitable access in the development of major parks and trails, and on protecting and enhancing conservation values and sites of significance.

*Victoria's Land and Biodiversity White Paper 2009*¹⁴ is a long-term, strategic framework to secure the health of Victoria's land, water and biodiversity in the face of ongoing pressures and a changing climate over the next fifty years. The White Paper describes a new focus on ecosystem resilience, ecological connectivity and high value asset areas. The White Paper has five inter-related goals:

- ▶ To safeguard Victoria's land, water and biodiversity by building ecosystem resilience, maintaining ecosystem services and improving connectivity
- ▶ To reform and realign Victorian Government processes and institutions which lead and facilitate the sustainable management of Victoria's land, water and biodiversity
- ▶ To increase market demand for land, water and biodiversity outcomes
- ▶ To encourage all Victorians to work together as responsive and effective stewards of our land, water and biodiversity
- ▶ Building healthy and resilient ecosystems across the landscape.

Victoria's Biodiversity Strategy 2010 – 2015 (consultation draft) aims to implement the White Paper's policy agenda for biodiversity over the next five years in partnership with the biodiversity sector.

To take better account of both pattern and process in framing policy and program objectives, the strategy recognises the twin drivers for biodiversity conservation are minimising loss of biodiversity and maximising the functionality of ecosystems.

*Victoria's Native Vegetation Management – A Framework for Action*¹⁶ was incorporated into the Victoria Planning Provisions in 2003. Under the Framework, the key goal for native vegetation in Victoria is for "a reversal across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a Net Gain".

This framework promotes a three-step approach to apply the principles of net gain, namely *avoid* the removal of native vegetation, *minimise* the removal of native vegetation through appropriate planning and design and appropriately offset the loss of native vegetation.

*Port Phillip and Western Port Catchment Management Authority Regional Catchment Strategy 2004-2009*¹⁷ provides a framework for managing the natural assets of Port Phillip and Western Port catchment in a sustainable and integrated way. The main focus of the strategy is the management of land, water and biodiversity, including coastal and marine areas. The strategy also covers air and atmosphere, cultural heritage, planning and urban form, particularly where these relate to catchment management.

The strategy provides guidance to the government and community on important catchment management issues throughout the region, including the sustainable use and management natural assets and investment in catchment management. It lists a series of priority actions to achieve these goals.

*Port Phillip and Western Port Native Vegetation Plan 2006*¹⁸ provides a coordinated and strategic approach to managing, protecting and restoring native vegetation in the Port Phillip and Western Port region, with the aim of achieving a net gain in the quality and extent of native vegetation. It is consistent with the statewide approach to native vegetation management outlined in *Victoria's Native Vegetation Management: A Framework for Action*.¹⁶

The plan provides detailed information about the region's native vegetation, while also identifying knowledge gaps for management of native vegetation. It establishes regional priorities and targets for retaining, protecting, enhancing and restoring this vegetation.

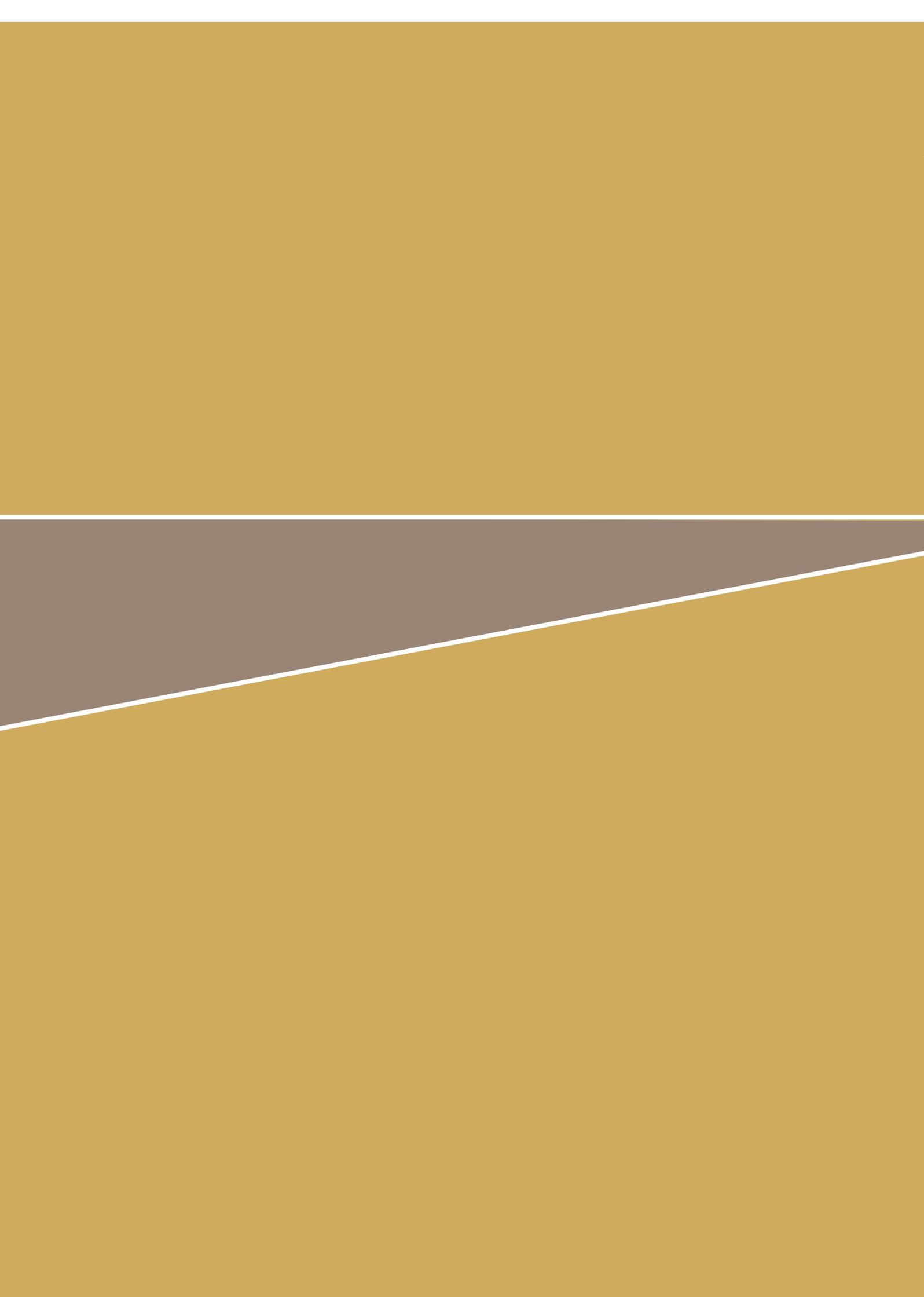
*Taking Action for Victoria's Future – The Victorian Climate Change White Paper Action Plan 2010*¹⁹ sets climate change policy and action benchmarks for the Victorian government. Key actions include reducing Victoria's greenhouse emissions, promoting clean energy, improving household energy efficiency, supporting reduced emissions transport solutions and helping Victorians adapt to climate change impacts.

*Victorian Government's response to the Victorian Bushfires Royal Commission*² supports in full or in part 66 of the 67 recommendations of the Victorian Bushfires Royal Commission. The one recommendation not accepted relates to the voluntary buyback of land in areas of extreme fire danger.

A significant, staged increase in the level of planned fuel reduction burning to five per cent of public land each year is the main focus of the government's bushfire mitigation response. There is an annual target of around 385,000 hectares of prescribed burning, with the focus on protecting lives in high risk areas. Enhanced research and monitoring of the impact on natural assets of increased burning will inform adaptive management. Other key actions include:

- ▶ organisational reforms for emergency and incident management, including the establishment of a new Fire Services Commissioner
- ▶ increased support for volunteer fire fighters
- ▶ better maintenance for powerlines and changes to distribution systems
- ▶ improved community warning systems and a major boost to community education and information about preparing for bushfires
- ▶ new planning controls for building in bushfire-prone areas, and continued roll-out of Neighbourhood Safer Places.

The *Policy and Instructions for the purchase, compulsory acquisition and sale of land*²⁰ were developed to ensure accountability and integrity in land transactions. They set out the role of the Government Land Monitor as overseeing all sales, purchases and compulsory acquisitions of land by the Victorian Government and it outlines a best practice approach that must be implemented by all public authorities undertaking land transactions.



PART B



MELBOURNE – THE PLACE AND THE PEOPLE

Metropolitan Melbourne has been shaped by the natural landscape. Aboriginal family groups have occupied this region for around 40,000 years, adapting to periods of extreme climatic conditions and the isolation of Tasmania from the mainland by rising seas. The initial choice of location by European settlers was largely determined by the presence of freshwater in the Yarra River, with a natural rocky weir preventing the intrusion of saltwater upstream.

During early settlement, the landscape was rapidly modified, most notably the removal of features including Batman's Hill located near Spencer Street, the draining of swamps and the clearing of vegetation for both resource use and establishing both agricultural and pastoral land. The natural basalt weir on the Yarra was removed during construction and repairs on Queens Bridge and tidal influences now extend further upstream to Dights Falls in Clifton Hill.²¹

Large scale changes continue to occur with residential development in established urban areas and expansion outwards along major growth corridors. Some natural values have been diminished by these changes, and some flora and fauna species are now lost from this region. Others are more resilient to change.

Part B of this discussion paper provides information about the investigation area and its residents. It outlines the natural environment of the investigation area in terms of the geology and geomorphology, hydrology, biodiversity and climate of the investigation area. It also describes the Indigenous and non-Indigenous history and heritage of the investigation area and discusses Melbourne's population today and what it will be like in the future.

2 METROPOLITAN MELBOURNE – THE PLACE

CHAPTER 2 provides information about the geology and geomorphology, hydrology, biodiversity and climate of the investigation area.

2.1 : Geology and geomorphology of the investigation area

This section provides a geological and geomorphological history for metropolitan Melbourne and describes important geological sites. Geology encompasses the origin, distribution, physical structure and formation of rocks on the earth. Geomorphology is the study of landforms such as mountains, plains, coastlines and rivers, and the processes that shape them. These may be influenced by land-use practices such as the building of dams, jetties, bridges or other structures.

Across much of metropolitan Melbourne the surface expression of the geological past is obscured by urbanisation. However, in some places such as along streams, railway and road cuttings, coastal cliffs, and in areas of high elevation to the north and east of Melbourne, outcropping rocks still reveal its long geological history.

Melbourne's natural geomorphological processes have been extensively altered. The Yarra River and Moonee Ponds Creek are reshaped, and many waterways have been utilised as drains, and at times, open sewers. Coastal changes such as artificial harbours, groynes and piers affect the seasonal movement of coastal sediments and the natural shape of popular beaches. Many beaches are now artificially renourished because of these alterations to natural processes. New landforms have been created, such as Herring Island located in the Yarra River near Burnley, and other areas have been reclaimed from the sea.

2.1.1 GEOLOGICAL HISTORY OF THE MELBOURNE REGION

The geology of metropolitan Melbourne ranges in age from around 480 million years ago (Ma) in the Palaeozoic era to the last few thousand years. A geological timeline including eras, periods and epochs of geological time is shown in table 2.1. Rocks in this region were formed during two main geological eras and comprise: Palaeozoic era sedimentary and granitic rocks, and Cainozoic era sedimentary and volcanic rocks. Major events in the Earth's history are also described in table 2.1.

The oldest Palaeozoic age (251 to 542 Ma) rocks in the investigation area, and indeed those of south-eastern Australia, are described in terms of a series of geological zones based on changing rock types or character. A geological map of the investigation area showing these zones is in figure 2.1.

These structural zones have experienced a complex history of major mountain building events, burial, erosion, faulting (deformed by breaking) and folding. Two of these zones occur in the investigation area: a small region of the Bendigo Zone in the west and the Melbourne Zone in the east. The Bendigo Zone — folded and faulted Ordovician age deep-sea sediments — occurs west of a major rock break-line exposed at the surface near Heathcote and extending from Sunbury to Werribee in the investigation area.²² These rocks are mostly buried beneath younger volcanic and sedimentary rocks across much of western part of the investigation area. Ordovician through to Devonian age sandstones and mudstones of the Melbourne Zone, once buried to great depths then folded and faulted, returned once again to the Earth's surface across the central and eastern parts of the investigation area.

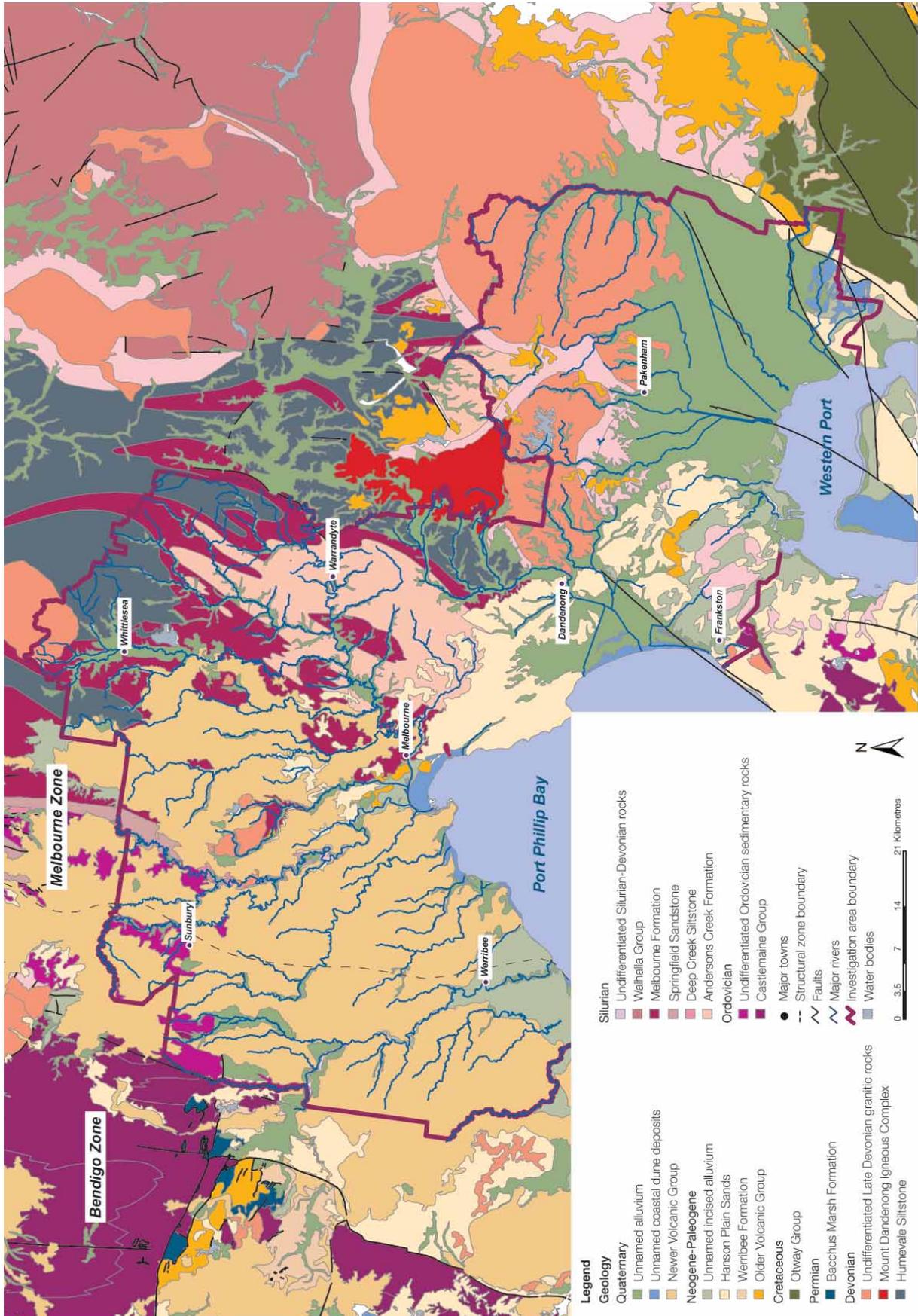
Table 2.1

Geological timescale and major events (Ma= millions of years)

Source: A Geologic Time Scale 2004²³

ERA	SUB-ERA OR PERIOD	EPOCH	MAJOR EVENTS IN EARTH'S HISTORY	
Cainozoic 0-65 Ma	Quaternary 0-1.8 Ma	Holocene	Extinction of most Australian megafauna by ~25,000 years ago. Humans arrive in Australia by 40,000 years ago	
		Pleistocene		
	Tertiary 1.8-65 Ma	Neogene	Pliocene	First upright walking hominids ~4 Ma
			Miocene	Diversification of mammals and birds
		Paleogene	Oligocene	
			Eocene	Australia completes separation from Antarctica
			Paleocene	
Mesozoic 65-141 Ma	Cretaceous 65-141 Ma	Late	Mass extinction of 75% life at 65 Ma Australia separates from New Zealand at ~80 Ma	
		Early	Eastern Highlands uplifted ~90 Ma Otway and Gippsland basins formed across the southern margin rift between Australia and Antarctica	
	Jurassic 141-205 Ma	Late	Break-up of Gondwana commenced initial separation of Australia and Antarctica commences at ~140 Ma	
		Middle		
		Early	First appearance of birds	
	Triassic 205-251 Ma	Late		
		Middle	First appearance of dinosaurs	
		Early		
	Palaeozoic 542-251 Ma	Permian 251-298 Ma	Late	Mass extinction of >80% of all life forms at the end of this era
			Early	Australia as part of Gondwana is near the south pole
Carboniferous 298-352 Ma		Late	First insects develop ~300 Ma	
		Early		
Devonian 352-410 Ma		Late		
		Middle	First land animals ~400 Ma	
		Early		
Silurian 410-434 Ma		Late	First land plants	
		Early		
Ordovician 434-490 Ma				
Cambrian 490-542 Ma				
		First abundant life on Earth		
Proterozoic 542-2500 Ma	Ediacaran 542-600 Ma		Oldest known multi-cellular organisms ~600 Ma	
Archaean 2500-4560 Ma			Oldest life known at about 3,500 Ma	
Hadean >4560 Ma			Origin of the earth	

Figure 2.1
Geology of the investigation area



In the Late Devonian age granites from great depths in the Earth's crust were forced up into both the Melbourne and Bendigo Zone rocks. In some places this lava erupted at the surface as volcanic rocks. These rock types are generally resistant to weathering and form more elevated topography such as the nearby ranges. Examples are at Bulla, Woodlands, Morang, Kinglake, Lysterfield and prominent nearby areas such as Mount Dandenong, You Yangs and the Macedon Ranges. Granitic landscapes are common across central and eastern Victoria and include some of our most scenic regions, such as Mount Buffalo and Wilsons Promontory.

During the Permian period glaciers scoured the land surface across large areas of central Victoria. Permian glacial sediments which were deposited as the glaciers melted are found to the west of Melton and throughout the Bacchus Marsh area. The best of these sites are at Darley and Bacchus Marsh, located just outside of the investigation area. These rocks are historically important as they provide evidence that today's continents were once joined together in a single land mass – Gondwana – and that they separated through continental drift and tectonic processes.

By the end of the Permian period the glaciers had melted and there was a great extinction of life (95 per cent of marine species and 70 per cent of terrestrial vertebrates died out). The next era of Earth history, the Mesozoic (65 to 251 Ma), marked the beginning of a new range of plants and animals, including the rise of the dinosaurs. Triassic and Jurassic age rocks are rare in Victoria and absent from the investigation area. Cretaceous age rocks are also rare in the investigation area. A small area of Early Cretaceous age sedimentary rock can be found near Mornington and near the Strzelecki Ranges and extensive areas of Cretaceous age rocks, containing important dinosaur fossils, can be found in the Otway and Strzelecki Ranges.²⁴

Generally Cretaceous sedimentary rocks were deposited along Victoria's southern coastal margin (Otway, Bass and Gippsland Basins) as it exists today. This coastline was formed when the ancient super-continent of Gondwana separated forming two new continents: Australia and Antarctica. Weaknesses as a result of this rifting process continue to define the shape of this region. Port Phillip Bay (Basin) formed through subsidence of an area bordered by these weaknesses or faults.²⁵ Western Port was formed in similar fashion and shares a common geological history with Port Phillip Basin.

Cainozoic era (up to 65 Ma) rocks are extensive in the investigation area and comprise two main types: volcanic lavas and terrestrial or shallow marine sediments. The volcanic rocks have been traditionally divided into two age groups: Older and Newer Volcanics, and several regions or sub-provinces (for example, Werribee Plains, Melbourne, Tullamarine-Maribyrnong River valley flows). Although the distinction between the two events is somewhat arbitrary, with lava eruptions occurring intermittently for an extended period of time, the division has been retained based largely on geographic locations. Older Volcanics range in age from the Palaeocene to early Miocene with a peak in activity around 22 Ma. These rocks occur at the Pentland Hills near Bacchus Marsh (80-50 Ma), Mornington Peninsula-Cape Schanck and Phillip Island (48-42 Ma), Chirside Park, Greensborough and Tullamarine (22-20 Ma). Other minor occurrences are extremely weathered and difficult to accurately date (e.g. Royal Park railway cuttings).

Pliocene-Pleistocene age Newer Volcanics extend from Melbourne to Mount Gambier in South Australia. The eruption of these lavas has formed a predominantly flat plain punctuated by the weathered domes of extinct volcanoes. In geological terms, this province is still active – eruptions have occurred as recently as the last 10,000 years at Lake Gnotuk near Camperdown and 4,300 years at Mount Gambier.²⁶ Several excellent examples of volcanic eruption points and flows are found in the investigation area including Mount Cottrell (2.2 Ma), Mount Kororoit (2.5-2.2 Ma), Bald Hill at Kalkallo, Williamstown lava flow (2.5 Ma) and the 'Organ Pipes' in the valley of Jacksons Creek (2.5-2.8 Ma) at Sydenham.^{27,28,29,30,31,32} Cuttings for the eastern freeway near Fairfield reveal the internal flow and cooling structures of the Burnley Basalt – one of the youngest flows in the region dated at about 0.8 Ma – that flowed down an early Darebin Creek and along the ancestral Yarra River valley.

Cainozoic marine and non-marine sedimentary rocks are exposed at many localities across the investigation area. They are broadly grouped into the Palaeocene-Lower Miocene age non-marine sandstones, claystones and coals of the Yaloak and Werribee Formations, and are overlain by Miocene marine carbonate Torquay Group and Pliocene sandstones of the Brighton Group. Equivalent rocks in the Westernport area include the Sherwood Marl and Baxter Formation respectively. Examination of subsurface boreholes west of Melbourne indicates that the Werribee Formation may be up to 200 metres thick with brown coal seams up to 40 metres thick in some areas (e.g. Maddingley seam at Bacchus Marsh). Miocene-Pliocene fossil-rich rocks (Black Rock Sandstone and Red Bluff Sands) form scenic coastal outcrops between

Beaumaris and Sandringham. This area also provides a useful series of teaching sites for coastal geomorphology. Royal Park railway cuttings along the operating Upfield railway line expose Brighton Group sediments overlying Silurian age basement rocks, and highly weathered Miocene Older Volcanics.

A veneer of Quaternary age sediments followed the pattern of Tertiary sedimentation. Deposits comprise thin shallow marine, beach, dune and alluvial deposits. In many areas these sediments are derived from erosion of the material from underlying rocks and stream-supplied mud. This is particularly the case in the Bunyip and Yarra rivers deltas and the western margin of Port Phillip Bay where the sediments were stabilised by fringing mangroves and marshes.

Sea level fluctuations and climate changes during the Quaternary period, especially increasing aridity in the Pleistocene epoch, had a major impact on Victoria, and particularly coastal areas such as Port Phillip Bay and Western Port. In places evidence of relict landscape features such as higher sea levels and coastal shorelines remain intact (e.g. in the Altona, Skeleton Creek, Point Cook and Williamstown areas). Sand ridges and dunes south-east of Melbourne formed parallel to the coast during that time. These ridges acted as a barrier to the sea allowing streams to form lagoons or swamplands such as Carrum Carrum Swamp, which extended from Mordialloc to Frankston. Swamps also formed at the mouth of Kororoit, Cherry and Skeleton Creeks near Altona. The Patterson River near Carrum was modified in the late 1800s to facilitate drainage of the Swamp. Edithvale-Seaford Wetlands are one of the few remaining areas of these swamps. One of the largest wetlands in Victoria, Koo-wee-rup Swamp north of Western Port, suffered a similar fate – drainage to provide access to land for the expanding agricultural needs of Melbourne.

At Cranbourne, Langwarrin and areas south of Lang Lang, wind blown sands accumulated in thin sheets during the Quaternary. These fine siliceous Cranbourne Sands form an undulating topography. Cranbourne Sands probably blocked flow of Cannibal Creek, the Bunyip and Lang Lang rivers leading to the formation of Koo-wee-rup Swamp at least 10,000 years ago, before a rise of sea level inundated much of Western Port. The sands were probably blown from dry plains formed where higher sea levels now occupy Port Phillip Bay.

Box 2.1

Geological influences on the development of Melbourne

The diverse geology of Melbourne provided a range of materials for the development of the city and influenced the manner in which the region was settled. The history of Melbourne is presented in chapter 3, but a brief look at some of the important historical connections to the rocks of the region is provided here.

Rocks of the Palaeozoic era, often referred to as basement rocks or bedrock, were exposed to weathering at various times during subsequent eras. Clay formed by weathering those rocks is an important source of brick and pipe clay in this region. Some of the first industries established in Melbourne utilised these earth resources, with more than 40 brickworks and potteries established in Brunswick by the 1860s.³³



The basement rocks also provided more undulating topography, such as Richmond Hill, which became sought after residential locations; flatter volcanic plains were left for industry including pastoral runs, and settlements for the working class. The Collingwood flat is situated on heavy clay soil derived from a Newer Volcanics basalt flow. With ready access to the Yarra River as a drain, this area soon became a focus for those industries specialising in noxious waste such as tanneries, abattoirs, soap and candle manufacturing and wool and sheepskin production.^{34,35}

Newer volcanics basalts are resistant to weathering and were recognised as an excellent building material. This rock is used extensively throughout the region, and known as bluestone and blue metal. The first quarries, which opened in the 1830s and 1840s, were located in the Fitzroy Gardens, Carlton and Clifton Hill.³³ Other building materials were tried over time, including the Permian age sandstones quarried at Bacchus Marsh. Many of these were found to weather over time and proved to be far less suitable than other sandstones procured from more distant areas of the colony such as the Grampians. Tasmanian sandstone was used extensively in early buildings. Other building materials such as sand and gravel were readily available in a number of locations (e.g. Lilydale toppings).

By far the greatest geological influence on Melbourne's development was the discovery of gold in Warrandyte in 1851. Soon followed by discoveries in the gold fields at Ballarat and Bendigo, the riches this mineral resource brought to the city of Melbourne had far reaching effects on the development of the city (see chapter 3).

Left: Old Treasury Building Melbourne (1856-1858) is constructed with a basement and ground storey of bluestone (basalt) quarried from Footscray. The above ground façade is mostly sandstone from Bald Hill, Bacchus Marsh. The Old Treasury Building is significant as one of the earliest undertakings by the Public Works Department and was designed by architect J. J. Clark in the Renaissance Revival style (VHR 1526).

2.1.2 GEOMORPHOLOGY OF THE MELBOURNE REGION

Victoria has a diversity of landscapes formed by variations in geomorphological processes across variable topography, geological history and rock lithology or composition. In addition, climate and sea level changes have also played a role in forming the land surface we see today.²⁶ Victorian geomorphology has been described in terms of regions and smaller units of differing character on a regional or local scale.^{36,37} This section describes geomorphological landforms and processes within the Metropolitan Melbourne Investigation area.

Geomorphological regions

A statewide geomorphological framework has been developed by the Geomorphological Reference Group (GRG) and the Department of Primary Industries (DPI), building upon work started in the 1960s by the Soil Conservation Authority. Under this classification, the investigation area encompasses the six regions described below and shown in figure 2.2.

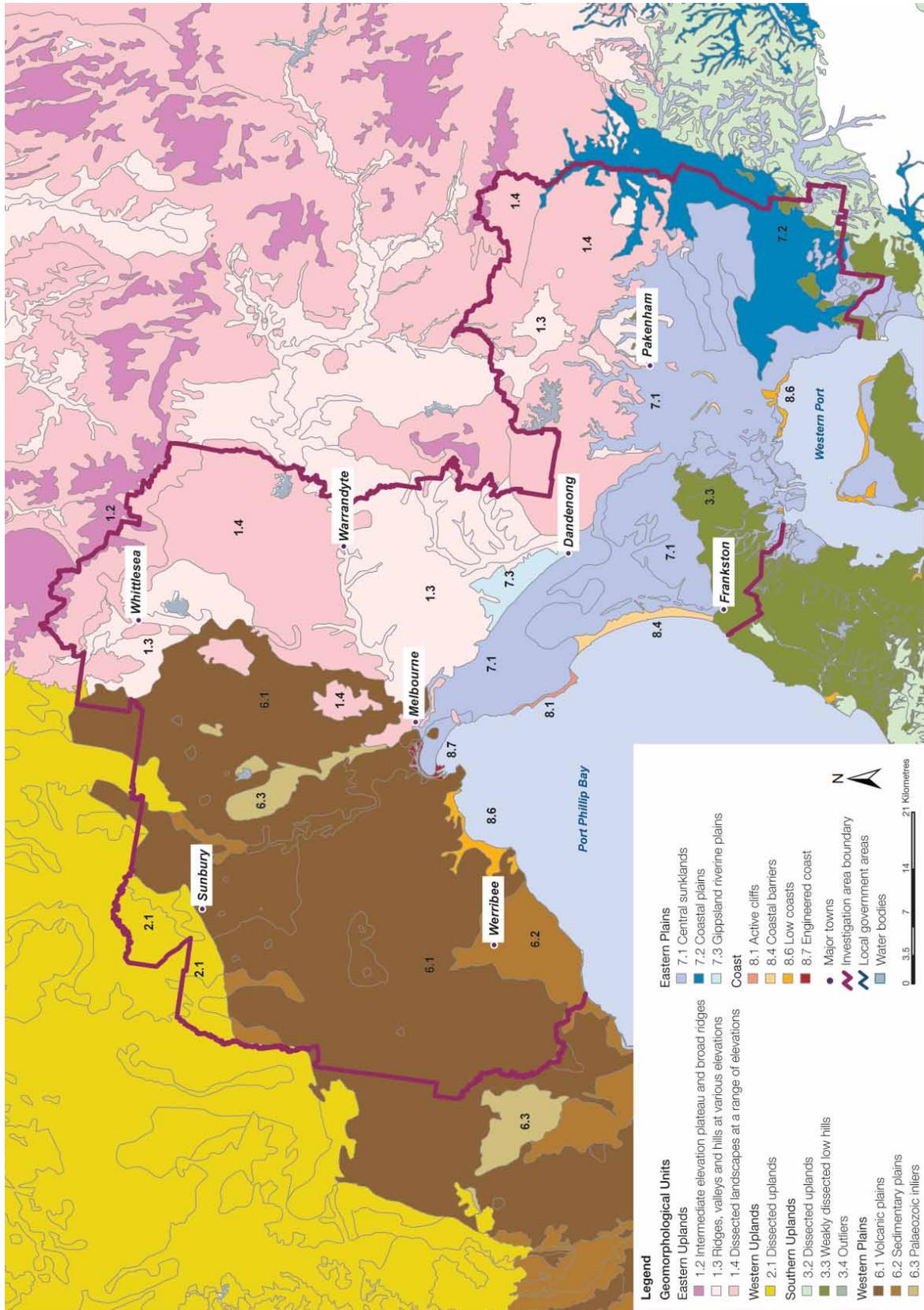
Eastern Uplands

The Eastern Uplands form the Victorian section of the Great Dividing Range encompassing the drainage divide; that is, the area separating streams flowing inland to the Murray River from those flowing south to the coast. In eastern Victoria the uplands are a prominent and rugged mountain region, but much of the western part is at lower elevations. There are also areas of low relief comprising elevated plateaus (Kinglake surface at 275 metres elevation, Bogong High Plains at 1500-1600 metres elevation) as well as highly dissected valleys along the northern and southern slopes. The Yarra River flows southwest from the Eastern Uplands to Port Phillip Bay. The elevated topography of the northern and eastern regions of the investigation area is part of the Eastern Uplands (figure 2.2).

Western Uplands

The Western Uplands extend from Kilmore Gap north of Melbourne westwards towards the Victorian-South Australian border, as a low-relief drainage divide with an average elevation of about 300 metres. A small area of the Western Uplands occurs in the northern and western part of the investigation area from Toolern Vale, north of Melton, to Riddells Creek. The Maribyrnong, Werribee, Lerderderg and Moorabool Rivers flow southeast from these uplands. Rock type and structure strongly controls landform in the Western Uplands. The southern margin has been buried by the extensive lava flows of the Volcanic Plains in many places. Volcanic eruption centres within the Western Uplands have produced valley-filling lava flows and lava plateau which may have developed waterfalls, such as Trentham Falls and Lal Lal Falls.

Figure 2.2
Geomorphological units in the investigation area



Southern Uplands

The Southern Uplands are deeply dissected fault bound blocks. Notable areas include the Otway Ranges, Bellarine Peninsula, Mornington Peninsula, Strzelecki Ranges and Wilsons Promontory. A small area of the Southern Uplands is represented in the investigation area towards the northern end of the Mornington Peninsula (Moorooduc Plains) and northeast of Western Port (western Strzelecki Ranges). The low relief Moorooduc Plains are mainly comprised of Neogene sediments while other areas of Southern Uplands are formed on Lower Cretaceous Otway and Strzelecki groups sedimentary rocks and exhibit higher relief and moderate elevations (Otway and Strzelecki Ranges, Barrabool Hills). Both the Bellarine and southern Mornington Peninsula comprising the headlands on either side of Port Phillip Bay are more geologically varied than the other areas of Southern Uplands and consist of Older Volcanics, Neogene age marine sands, Palaeozoic sediments and granitic rocks.

Western Plains

The Western Plains are a low-lying undulating plain formed on some of the youngest volcanic and sedimentary rocks of Victoria. They comprise the majority of the western portion of the investigation area extending from an area near the Plenty River to the west (and eventually to South Australia). They are bound by Western Uplands to the north, and to the south by the coastline and Southern Uplands (Otway Ranges).

Much of the area is grassland, punctuated in places by volcanic eruption centres. Mount Elephant volcano near Derrinallum in southwestern Victoria is a striking example rising some 240 metres above the surrounding plain to an elevation of 393 metres. West of Melbourne, the Werribee Plain has about a dozen volcanic eruption centres including Mount Cottrell — a large shield volcano south of Rockbank (205 metres elevation). North of Melbourne, the volcanic plains are composed of numerous lava flows extending along the ancestral Darebin, Merri and Maribyrnong stream beds. Many of these streams have excavated new channels along the margin of the valley-filling lava flows. One of the best examples is along Jacksons Creek near Sydenham where columns of lava known as the “Organ Pipes” have been exposed. A prominent scoria cone and crater at Mount Fraser (424 metres elevation) near Beveridge, north of Melbourne, can be readily observed from the Hume Freeway.

Low-lying sedimentary regions occur such as the Werribee River delta-like alluvial plain. This area is fringed by shallow coastal deposits supporting saltmarsh and mangroves.

A few Palaeozoic outcrops occur within the Western Plains. These inliers are predominantly granitic rocks that were islands rising above the Pliocene sea and surrounded by lava flows. The You Yangs form prominent granite hills above the Werribee Plains. The area encompassing Woodlands Historic Park and Greenvale Reservoir are also low granitic hills rising above the Western Plains landscape.

Eastern Plains

The Eastern Plains lie east of Port Phillip Bay and between the Eastern and Southern Upland regions. They are mostly low relief surficial Quaternary to Recent sediments derived from erosion of the Eastern Uplands. The Eastern Plains range from undulating rises to almost level plains. The youngest sediments are the flood plains, swamps and morasses associated with the present-day rivers and streams. In Western Port and Port Phillip Bay (between Frankston and Mordialloc), swamp and lagoon deposits were drained after European settlement. Recent wind blown deposits include the calcareous and siliceous dunes of the Cranbourne Sand.

Coast

The coastline of the investigation area includes low coastal areas, active cliffs, basaltic headlands, coastal barriers forming lagoons and swamps and sandy beaches. Modified or engineered coastal environments are also present at the Yarra River mouth and the confluence with the Maribyrnong River, as well as the Bunyip River mouth in Western Port.

The northern margin of Western Port and the north western Port Phillip Bay, from Point Cook Coastal Park to Kororoit Creek, are low coastal areas fringed by mangroves and saltmarsh. These areas are strongly influenced by tidal changes.

Active cliffs are present along the margin of the Brighton Coastal Plain exposing Brighton Group sediments. Shore platforms formed by resistant Black Rock Sandstone protect these cliffs from undercutting, and the main erosion in this area is caused by run-off and seepage after heavy rain rather than coastal retreat by wave action.³⁸ These cliffs also provide input of sandy material to the beach; however, landscaping and engineering works such as re-surfacing have altered these natural geomorphological processes. The natural seasonal movement of sandy beach deposits along this coastline caused by seasonal changes in wave incidence have been disrupted by groynes and sea walls leading to the capture of sediments, erosion of beaches, and shallowing of some harbours.³⁸ Restricted sand movement and reduced input of new beach material from the erosion of coastal cliffs has

had a significant impact on many beaches, particularly in eastern Port Phillip Bay. Human engineering intervention is often required to restore sandy deposits. Offshore sands are periodically extracted and pumped onshore to renourish beaches that have been eroded.

2.1.3 SITES OF GEOLOGICAL AND GEOMORPHOLOGICAL SIGNIFICANCE

Geological features and sites help us understand the geological history of the earth. A site of geological significance has special scientific or educational value and forms the basis for geological education, research or reference. Specific geological sites may be significant examples of natural features, landforms or landscape, type localities for rock units, fossils, minerals, or important illustrations of the operation of natural processes. The size and nature of geological sites varies widely, but consist of two main groupings:

- ▶ natural exposures such as in rivers, steep cliffs or mountains and along coastlines
- ▶ those exposed by human excavation in road or railway cuttings and by mining works in quarries.

A total of 153 sites of geological significance* have been identified on public land in the investigation area.⁶ Thirteen sites are of high significance (international, national or state). Sites of international significance are rare or global type localities and are typically well known as reference sites for geologists. Nationally significant sites show features that are rare in Australia or are important by virtue of their scale or state of preservation. Sites of state significance are important in defining the geology and geomorphology of Victoria. Sites of high geological or geomorphological significance located on public land in the investigation area are listed in appendix 2. More detailed descriptions of sites of significance are provided in *Sites of geological and geomorphological significance on public land*⁶ available at www.veac.vic.gov.au.

Seventy-three sites of regional significance are found on public land in the investigation area. These sites include landforms or geological features representative of the Melbourne region and include several examples of the alluvial terraces along creeks or streams. The remaining sixty-seven sites are of local significance.

2.2 Hydrology: rivers, creeks, groundwater, wetlands and coasts

The hydrological system of the investigation area is made up of surface water (rivers and streams), ground water, wetlands and coasts. Each is described below.

2.2.1 RIVERS AND STREAMS

A catchment is an area of land, bound by hills or mountains from which runoff water flows into rivers, streams, bays, wetlands and the coast, eventually entering the sea.³⁹ Five catchments lie either wholly or partly within the investigation area. These are, from west to east, the Werribee, Maribyrnong, Yarra, Dandenong and Western Port catchments.

Almost 9,000 kilometres of rivers and streams (natural and man-made) flow through the investigation area to eventually reach Port Phillip Bay and Western Port. Major watercourses in the investigation area are shown below in table 2.2. Figure 2.3 shows the catchments and major waterways within the investigation area.

Table 2.2
Major watercourses in the investigation area

CATCHMENT	RIVER/ STREAM
Werribee	Werribee River, Kororoit Creek, Skeleton Creek
Maribyrnong	Maribyrnong River, Deep Creek, Emu Creek, Jacksons Creek
Yarra	Yarra River, Plenty River, Darebin Creek, Diamond Creek, Merri Creek, Moonee Ponds Creek
Dandenong	Dandenong Creek, Eumemmerring Creek,
Western Port	Bunyip River, Cardinia Creek

The largest river within the investigation area is the Yarra River which, having formed in the higher country to the east, runs westward some 240 kilometres, passing through the city and across the Yarra delta. The upper reaches of the Yarra River between Warburton and Warrandyte wind through a series of scenic floodplains and gorges. This stretch of the Yarra River, which extends beyond the investigation area, has been protected under legislation as a Victorian Heritage River due to its high environmental and social values. Downstream, the Yarra River is an iconic part of the city of Melbourne. The reliable

* Significance ratings are assigned by the Geological Society of Australia (Victoria Division) Heritage sub-committee. Assessment criteria include the rarity, representation and replication of features as well as site accessibility and management conditions.

freshwater from the river was a key reason for the establishment of Melbourne. Over the years, the river has been altered in many ways by the straightening of several sections and the carving of new channels.

The catchment of the Yarra River is the largest of the region at some 4,000 square kilometres. The upper Yarra catchment provides the majority of Melbourne's drinking water.⁴⁰

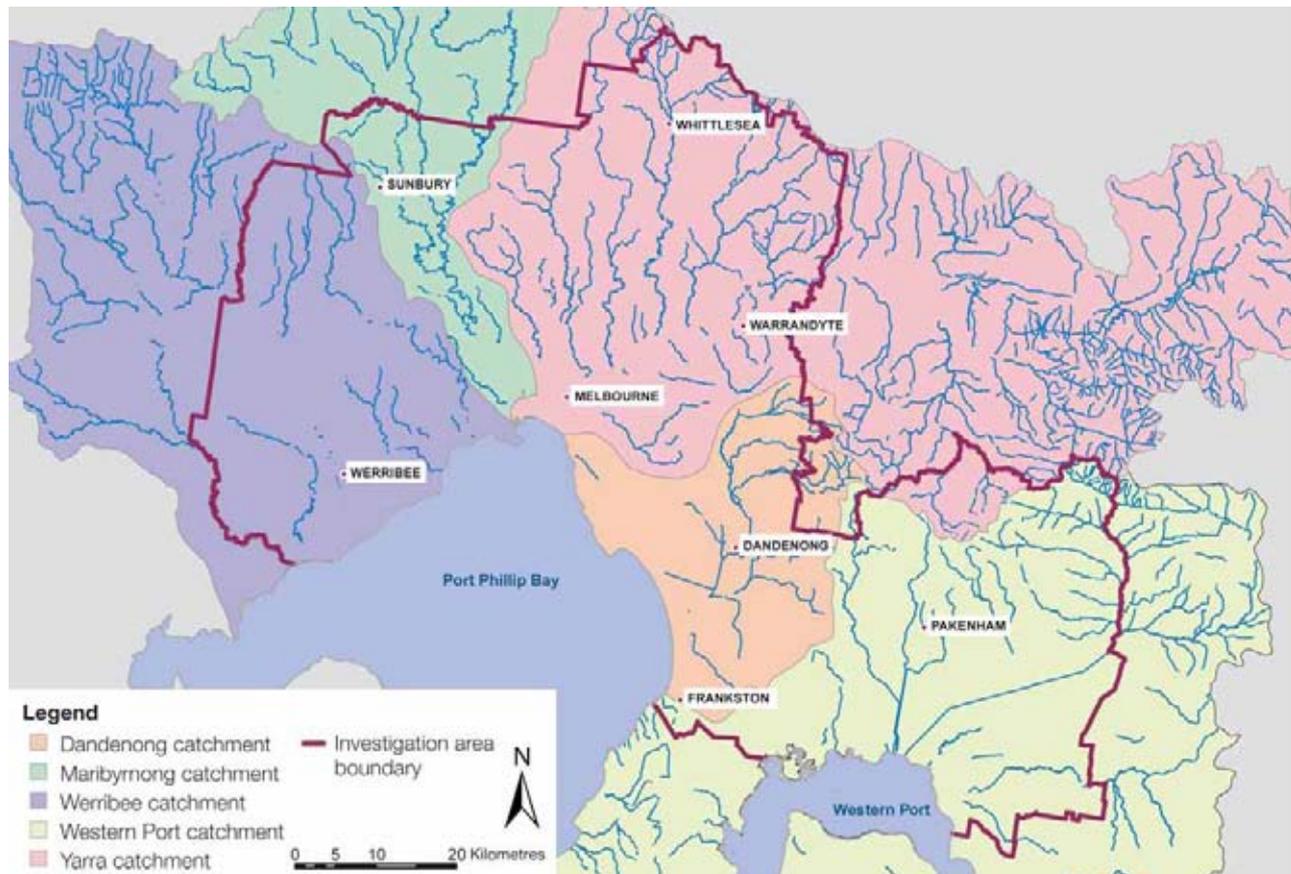
Other major rivers of the region include the Maribyrnong River, one of the few large rivers developed on the volcanic plains north and west of Melbourne, and the Werribee River, which forms a broad, delta-like alluvial plain edged with spectacular cliffs and coastal salt marshes. Many watercourses provide the basis for natural linkages of public land across the investigation area (e.g. Merri Creek trail, Dandenong Valley Parklands, Plenty River Parklands).

River and stream condition

The condition of waterways is measured by the Index of Stream Condition (ISC).⁴¹ It integrates the condition of river hydrology, water quality, streamside zone (vegetation), physical form (bed and bank condition and instream habitat) and aquatic life. The index measures the change from natural conditions and indicates the capacity of the waterway to support a diverse biological community. In essence, it is a measure of change from natural or ideal conditions for all Victorian streams at a common point in time. This allows different types of streams to be compared across Victoria.

River and streams in the hilly, forested areas in the north-east of the investigation area are generally in better condition than those further downstream in more urbanised areas. None of the rivers and streams within the investigation area is in excellent condition, with only a small percentage in good condition. Most rivers and streams are in poor condition, largely due to land use changes such as urbanisation, vegetation removal, drainage and flood control works, stock access, increased storm water runoff and invasion by weeds. The lower reaches of some rivers such as the Yarra and Mordialloc Creek are so heavily modified that they contain almost no natural streamside vegetation.¹⁷

Figure 2.3
Major catchments and waterways in the investigation area



Water quality

Water quality is naturally variable and can be affected by a range of factors. Water quality within the investigation area is generally higher in the forested upper catchments on Melbourne's fringe and lower in urbanised areas closer to the city. The decline in water quality is due to factors such as increased run-off rates, loss of riparian and in-stream vegetation, litter, invasion by introduced plants and animals, pollution and reduced water flows. The following brief description of water quality in Melbourne's catchments is drawn from the *Port Phillip and Westernport regional river health strategy*.⁴²

The Werribee catchment is located in a relatively low rainfall area, with low water flow a major issue for its streams. The condition of rivers and streams in the Werribee catchment is variable, with higher water quality in the upper catchment that decreases progressively downstream. Water quality in streams such as the Skeleton and Kororoit Creeks is generally low.

Water quality in the rivers and streams of the upper Maribyrnong catchment is generally good. However, urban and industrial development in the lower section of the Maribyrnong catchment has led to low water quality in many of its watercourses.

The construction of numerous major water storages and the use of water for agriculture have significantly altered flows in the Yarra River and other tributaries since European settlement. Water quality in the upper Yarra catchment today is generally high, whereas rivers and streams downstream tend to have poor water quality due to changes in land use.

Modifications to rivers and streams for flood protection (for example, concrete lining and channel straightening) have been extensive within the Dandenong catchment. Water quality is generally fair to poor throughout, although some watercourses in the upper catchment still maintain relatively good water quality (for example, Dandenong Creek). While storm water runoff continues to degrade parts of the catchment, there has been a significant improvement in water quality over the last 30 years with the extension of the sewerage system to areas under development and a reduction in industrial discharges to rivers and streams.

Water quality is generally good in the upper Western Port catchment but declines downstream of the Princes Highway. For example, water quality in the middle and upper reaches of the Bunyip River is good but becomes poor to very poor in the lower reaches of the river.

The investigation area contains a number of major reservoirs including Yan Yean, Sugarloaf, Silvan, Cardinia and Greenvale reservoirs. These collect, store and provide water for domestic, industrial and agricultural uses across Melbourne.

2.2.2 GROUNDWATER

Groundwater refers to the reserve of water found below the earth's surface in pores and crevices of rocks and soil. The quality of groundwater across the investigation area is generally fresh to brackish. It is used for irrigation, commercial, stock and domestic purposes.

Three groundwater basins underlie the investigation area: the Port Phillip basin in the west and inner south-east, Highlands basin to the north and east and Western Port basin to the south-east.

The Port Phillip basin underlies and surrounds Port Phillip Bay. The groundwater resource is relatively small and some areas are saline.⁴³ Groundwater extraction in the south-eastern suburbs of Melbourne is largely for watering gardens (especially during periods of water restrictions) and golf courses and for market garden irrigation. West of Melbourne, groundwater is extracted for use in market gardens, and for some industrial use in the western suburbs of Melbourne.⁴³ Some aquifers in western Melbourne are polluted due to past discharges of liquid industrial waste, leaks and seepage.⁴⁴

The Highlands basin covers approximately one third of Victoria, with only a small portion occurring in the investigation area. Much of the groundwater within the basin is fresh water. Within the investigation area, groundwater is generally extracted for stock and domestic use and market garden irrigation.⁴³

The Western Port basin is a relatively small basin.⁴³ Much of the groundwater within the basin is fresh water. Groundwater is generally extracted for market gardening and irrigation.⁴³

Groundwater within the investigation area may be impacted by overuse, poor recharge due to lack of rain, and pollution. The recent drought has increased the demand for groundwater in the investigation area, while reducing natural groundwater recharge from rainfall.⁴⁵

2.2.3 WETLANDS

Prior to European settlement, Melbourne contained extensive wetlands. A description of the widespread wetland systems historically present in metropolitan Melbourne is provided in section 2.3.

Many wetlands across the region were drained and converted to new uses, mostly agriculture. These freshwater habitats are now one of the most depleted and altered environments across the region. Changes to water extraction, river manipulation and the extended dry period are having ongoing and significant impacts on wetland environments.

Victoria has lost more than one third of its wetland area, largely due to drainage, filling and other modification.⁴⁶ This loss of wetlands is reflected within the investigation area. Since European settlement, deep freshwater marshes (such as Koo-wee-rup) have been almost completely depleted, with less than one per cent remaining, and less than ten percent of shallow freshwater marshes (such as Carrum Carrum Swamp) remain. Public land within the investigation area has retained a much higher proportion of original wetlands than private land.

New wetland environments such as reservoirs, storm water treatment ponds and sewerage treatment plants have also been created within the investigation area, and now account for almost three-quarters of wetlands within metropolitan Melbourne.

Major wetlands in the investigation area today include the Edithvale-Seafood Wetlands (the remains of Carrum Carrum Swamp) and Cheetham Wetlands (which were created through the activities of a former saltworks). One of the least known areas is the northern Western Port coastline. This area is the remnant of one of the great swamp landscapes: Koo-wee-rup and Tobin Yallock swamps.⁶ Across the area, channels have been excavated to drain the swamps but in places, natural drainage lines are still present.

2.2.4 COASTS

The coastline is an important resource for Melburnians and all Victorians with our beaches providing important environmental, scenic and recreation values.

The coastline of the investigation area stretches approximately 186 kilometres from Port Phillip Bay in the west and south, from Werribee to Frankston; and Western Port to the south-east, from Warneet to Lang Lang. Almost the entire coastal foreshore within the investigation area (94 per cent) is Crown land. About two-thirds of metropolitan Melbourne's coastline is in parks and reserves such as Point Cook Coastal Park-Cheetham Wetlands, Altona Coastal Park, Truganina Coastal Park and numerous coastal and foreshore reserves.

Coasts within the investigation area range from rocky pebble beaches to steep sea cliffs and shallow mangrove-lined mudflats. A description of the geomorphology of metropolitan Melbourne's coasts is provided in section 2.1.2.

The coast contains a range of vegetation communities, including coastal alkaline scrub, coastal dune scrub, coastal saltmarsh and coast banksia woodland. Melbourne's richly diverse intertidal and coastal environment is home to a number of endemic species but also provides important habitat and breeding sites for migratory birds from places such as Japan and China.

Metropolitan Melbourne's beaches and foreshore areas are popular recreation sites. A variety of facilities have been installed such as piers, beach boxes, boat sheds, dressing pavilions, band stands, sailing club rooms and surf lifesaving clubs. Many of these facilities have local and state heritage values, and are evidence of a long and close association with the beach. Most beaches and foreshores provide opportunities for activities such as walking and cycling and group gatherings such as picnics and barbecues. Piers such as St Kilda Pier provide opportunities for other recreation activities such as fishing.

Melbourne's coastal environment is subject to pressures such as increasing urbanisation and recreational use, introduced plants and animals and coastal erosion and sedimentation. The emergence of the "sea change" lifestyle has brought more people to the coast as permanent residents, exacerbating some of these pressures.¹⁷ Coastal environments are also susceptible to the predicted impacts of climate change such as rising sea levels (see chapter 7 for more detail). For example, coastal saltmarsh communities along parts of the western coast of Melbourne grow in muddy intertidal zones that are inundated daily with sea-water. Rises in sea levels due to climate change may lead to the permanent inundation of some saltmarsh communities.⁴⁷

2.3 Biodiversity

Biodiversity refers to the variety of all forms of life, including plants, animals and micro-organisms, their genes and the terrestrial, marine and freshwater ecosystems of which they are a part.⁴⁶

2.3.1 PRE-SETTLEMENT FLORA AND FAUNA OF METROPOLITAN MELBOURNE

The land around Port Phillip Bay historically supported a diverse natural environment, with forests, woodlands, heathlands, wetlands and grasslands all common. The source of the material for this section is *The Encyclopaedia of Melbourne*.⁴⁸

The margins of Port Phillip Bay contained coastal tussock grassland on the sand dunes and coastal scrub in higher, better drained areas. Wetlands were also relatively common along the coast. For example, an extensive lignum swamp system occurred around present day Altona and south-west to Point Cook. West Melbourne and areas adjacent to the southern bank of the Yarra River contained extensive wetlands, as did Prahran, Caulfield and Bulleen. The largest swamps were the Koo-wee-rup Swamp in the south-east, which extended over 40,000 hectares, and Carrum Carrum Swamp, which covered more than 4,000 hectares from Mordialloc Creek to near Frankston. The coast and wetlands supported a great diversity of mammals, birds, reptiles, amphibians and fish.

The area west and north-west of the present city centre contained extensive grassland plains with a wide variety of grasses and herbs. A number of major waterways (e.g. Werribee River and Kororoit Creek) fringed by riparian vegetation passed through the plains. There were also areas of woodland dominated by various species of eucalypt *Eucalyptus spp.* and she-oak *Allocasuarina spp.*

The area south and south-east of the Yarra River (to the edge of Western Port) contained heath and heathy woodland on rolling hills, with patches of dense tea-tree *Leptospermum spp.* Open forest containing large areas of grassland occurred further south-east, from Springvale and Dandenong to the foothills of the Dandenong Ranges and south-east to Western Port. Smaller areas of grassland occurred near Box Hill and Ringwood, generally within river valleys and alluvial flats. These areas supported large groups of eastern grey kangaroo *Macropus giganteus* and emu *Dromaius novaehollandiae*, and a wide range of bird life.

The northern side of the Yarra River contained both wet and dry forests. These stretched into the Dividing Range foothills, and the foothills and uplands of the Dandenong Ranges. The forest understorey supported small mammals, black wallaby *Wallabia bicolor* and koala *Phascolarctos cinereus* (more open forest) and various bird and bat species.

The following sections provide an overview of the biodiversity values of metropolitan Melbourne today.

2.3.2 BIOREGIONS

'Bioregions' are broad geographical regions that share common physical and biological features, such as climate, soils and plant and animal communities. Bioregions reflect underlying environmental features and as such, are used as a broad framework for conservation planning and management.⁴⁹

Australia is divided into 85 regions and into further sub-regions, based on major geomorphic features.⁵⁰ These are referred to as the IBRA (Interim Biogeographical Regionalisation for Australia) bioregions. The investigation area is largely located within IBRA's Victorian Volcanic Plain bioregion (different in area to the Victorian bioregion of the same name) and South East Coastal Plain bioregion with smaller areas of the Victorian Midlands and South Eastern Highlands bioregions also present.

In Victoria, the landscape is divided into 28 bioregions, which correspond closely with the IBRA subregions. As shown in figure 2.4, the investigation area contains parts of six bioregions, namely the Gippsland Plain, Highlands-Southern Fall and Victorian Volcanic Plain bioregions with smaller patches of Otway Plain, Central Victorian Uplands and Highlands-Northern Fall bioregions. A brief description of each bioregion is provided below.

The Gippsland Plain bioregion extends east across to Lakes Entrance and from Foster in the south to Moe in the north. It is characterised by flat to gently undulating, low-lying coastal and alluvial plains. Common vegetation communities include heathy woodland, swamp scrub, plains grassy woodland, grassland and wetland (floodplains and swamps) and lowland forest (higher areas). Approximately 16 per cent of the bioregion occurs in the south-eastern part of the investigation area.

The Highlands-Southern Fall bioregion forms the southern part of the Great Dividing Range and extends from Melbourne to near Omeo. It contains uplands and high plateaus, with alluvial flats along the valleys. The vegetation is dominated by dry and damp forest on the slopes, with wet forest in the valleys. Cool temperate rainforest occurs in protected gullies. Approximately 12 per cent of the bioregion occurs in the north-eastern part of the investigation area.

The Victorian Volcanic Plain bioregion extends west to the South Australian border, south to Colac and north to Broadford. The landscape contains peaks from long-extinct volcanoes, stony rises created by old lava flows, and many large, shallow lakes. Characteristic vegetation communities on the plains include grassy woodland and grassland, with stony knoll shrubland on stone rises. Volcanic outcrops generally support woodland communities. Approximately eight per cent of the bioregion occurs in the western part of the investigation area.

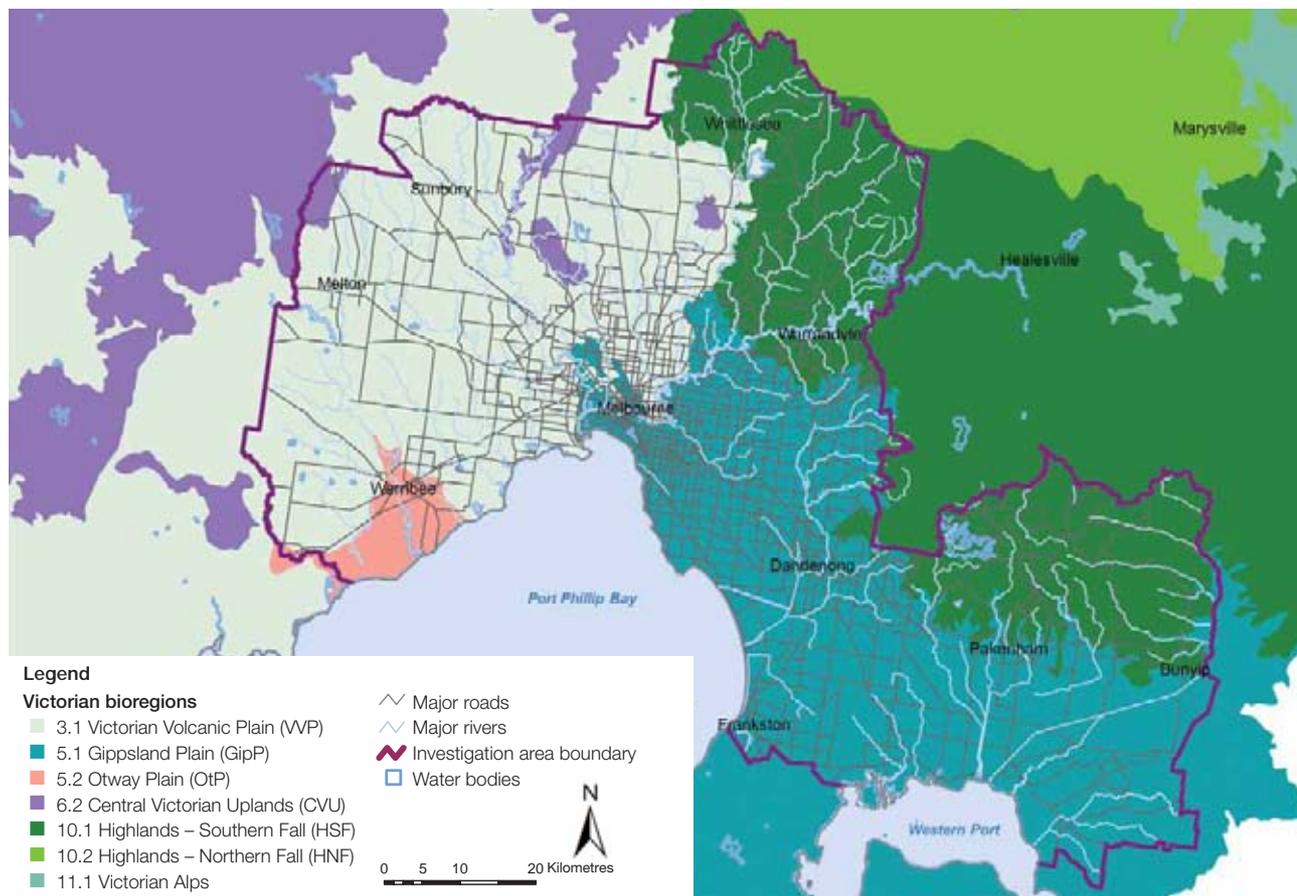
The Otway Plain bioregion extends east of Princetown to the Bellarine Peninsula. It consists of coastal plains and dunes, foothills with river valleys and lowland swamps. The vegetation includes lowland forest, heathy and grassy woodland and plains grassy woodland. Approximately six per cent of the bioregion occurs in the western part of the investigation area.

The Central Victorian Uplands bioregion extends from the Grampians and Ararat in the west to Porepunkah in the east; and from the You Yangs and Lara in the south to Lurg in the north.⁵¹ It contains rugged to gently undulating terrain, with the vegetation being mainly dry forests. Approximately one per cent of the bioregion occurs in the western part of the investigation area.

Less than one per cent (approximately 280 hectares) of the Highlands-Northern Fall bioregion occurs along the northern boundary of the investigation area.

Figure 2.4
Victorian bioregions within the Metropolitan Melbourne investigation area

Source: Department of Sustainability and Environment (2005)



2.3.3 ECOLOGICAL VEGETATION CLASSES

The diversity and complexity of vegetation communities requires a framework that can be used to simplify and identify common features. In Victoria, native vegetation is classified into Ecological Vegetation Classes (EVCs). Approximately 300 EVCs are recognised in Victoria with 85 EVCs recognised within the investigation area. Many of these EVCs also occur outside of the investigation area and within adjoining bioregions.

Most vegetation within the investigation area can be defined within 19 EVCs covering the coastal scrubs, heathland and heathy and grassy woodlands in the south-east; the woodlands and wet and dry forests of the north-east; and the grasslands and woodlands in the north and west.*

Native vegetation extent

The modelled pre-European and current extent of EVCs within the investigation area is shown in figures 2.5 and 2.6. These use the most recent Department of Sustainability and Environment (DSE) 2004-2005 data and mapping of native vegetation extent. DSE's simplified native vegetation groups (groups containing similar EVCs) are used to allow for a simpler representation of the data. A list of all EVCs recorded within the investigation area and their current extent is published at www.veac.vic.gov.au.

Approximately 145,620 hectares (or 26 per cent) of land in the investigation area contains native vegetation. This figure is higher than previously thought, largely due to recent improvements in detection of native vegetation from satellite data (particularly grasslands), rather than any increase in the actual extent of native vegetation. Despite the extensive loss of vegetation within the investigation area, significant areas of native vegetation still remain, particularly on the outer fringes of Melbourne.

Approximately 66 per cent (or approximately 95,980 hectares) of native vegetation within the investigation area boundary is located on private land. The remaining 34 per cent (or 49,640 hectares) is located on public land. Approximately 20 per cent (28,700 hectares) is managed for conservation within the protected areas system.

The remaining native vegetation on public land occurs on land managed primarily for other purposes such as water supply catchments, road and rail reserves and water frontages.

All bioregions, except the Victorian Volcanic Plain bioregion, have been more heavily cleared in the investigation area than in the remainder of the state** (figure 2.7). The Victorian Volcanic Plain bioregion has been heavily cleared both within the investigation area and the state. The portions of the Otway Plain, Gippsland Plain and Victorian Volcanic Plain bioregions within the investigation area have been extensively cleared, with less than 20 per cent of their original vegetation remaining.

This vegetation loss has not been a random process. These areas are suitable for agricultural activities and were developed relatively rapidly following European settlement. Grasslands within the Victorian Volcanic Plain bioregion were heavily targeted for early pastoral settlement (probably because of their suitability for grazing without the need for extensive clearing of woody vegetation), and fertile soils around Werribee in the Otway Plain bioregion were developed for market gardens, poultry farms and orchards in the early 1900s.⁵

The Highlands–Southern Fall bioregion still retains a high proportion of native vegetation cover within the investigation area. The bioregion is characterised by areas with steep terrain or low fertility areas generally considered unsuitable for agriculture.

* The most common EVCs in the investigation area are EVC 16 Lowland Forest, EVC 18 Riparian Forest, EVC 20 Heathy Dry Forest, EVC 22 Grassy Dry Forest, EVC 23 Herb-rich Foothill Forest, EVC 29 Damp Forest, EVC 30 Wet Forest, EVC 45 Shrubby Foothill Forest, EVC 47 Valley Grassy Forest, EVC 48 Heathy Woodland, EVC 53 Swamp Scrub, EVC 55 Plains Grassy Woodland, EVC 61 Box Ironbark Forest, EVC 126 Sumpy Riparian Complex, EVC 128 Grassy Forest, EVC 132 Plains Grassland, EVC 164 Creekline Herb-rich Woodland, EVC 175 Grassy Woodland, and EVC 793 Damp Heathy Woodland.

** The Highlands-Northern Fall bioregion was excluded from the analysis as it only represents a very small proportion of the investigation area (0.02 per cent).

Figure 2.5
 Pre-1750 native vegetation in the Metropolitan Melbourne investigation area
 Source: Department of Sustainability and Environment (2005)

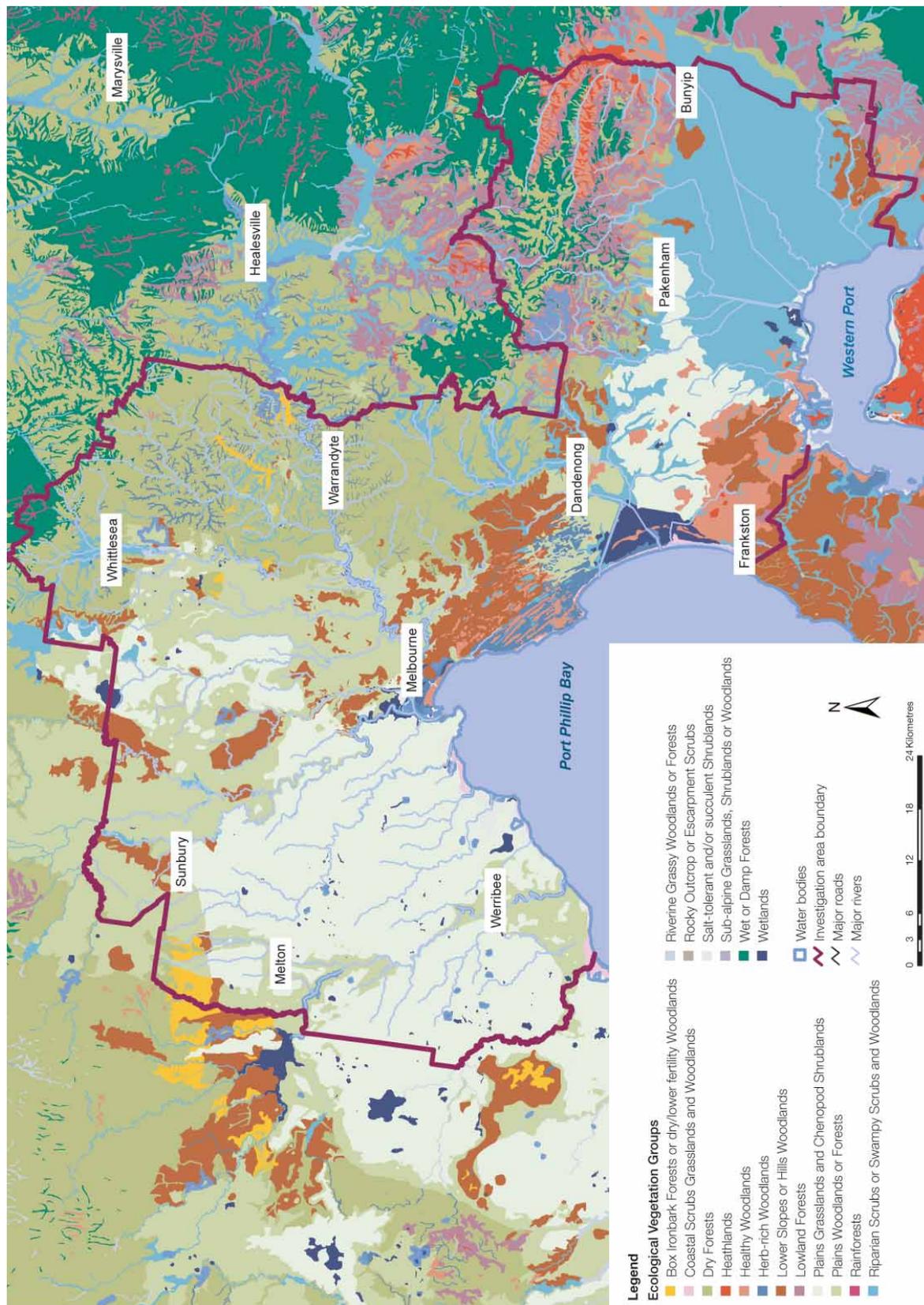


Figure 2.6

Existing native vegetation in the Metropolitan Melbourne investigation area

Source: Department of Sustainability and Environment (2005)

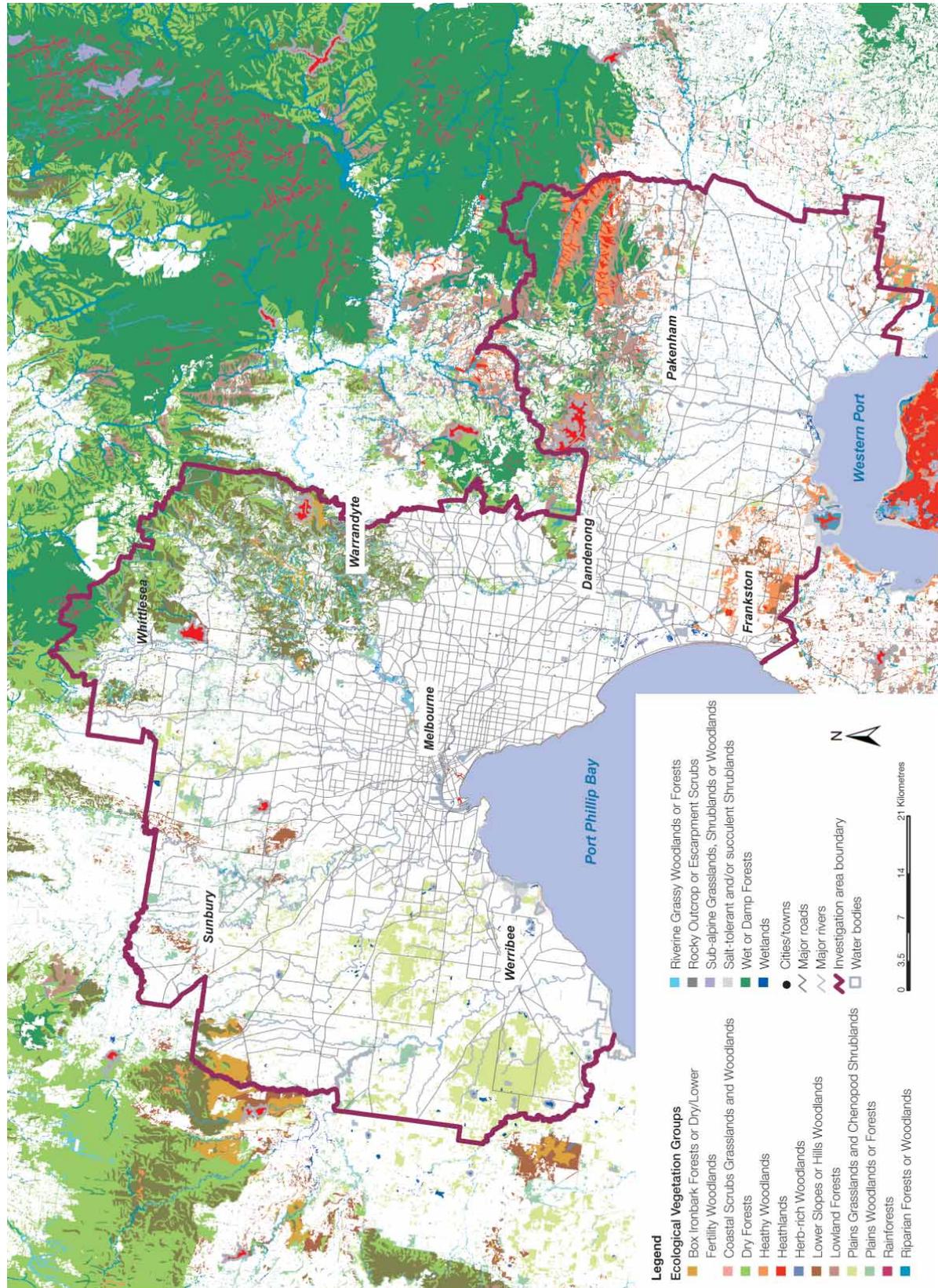
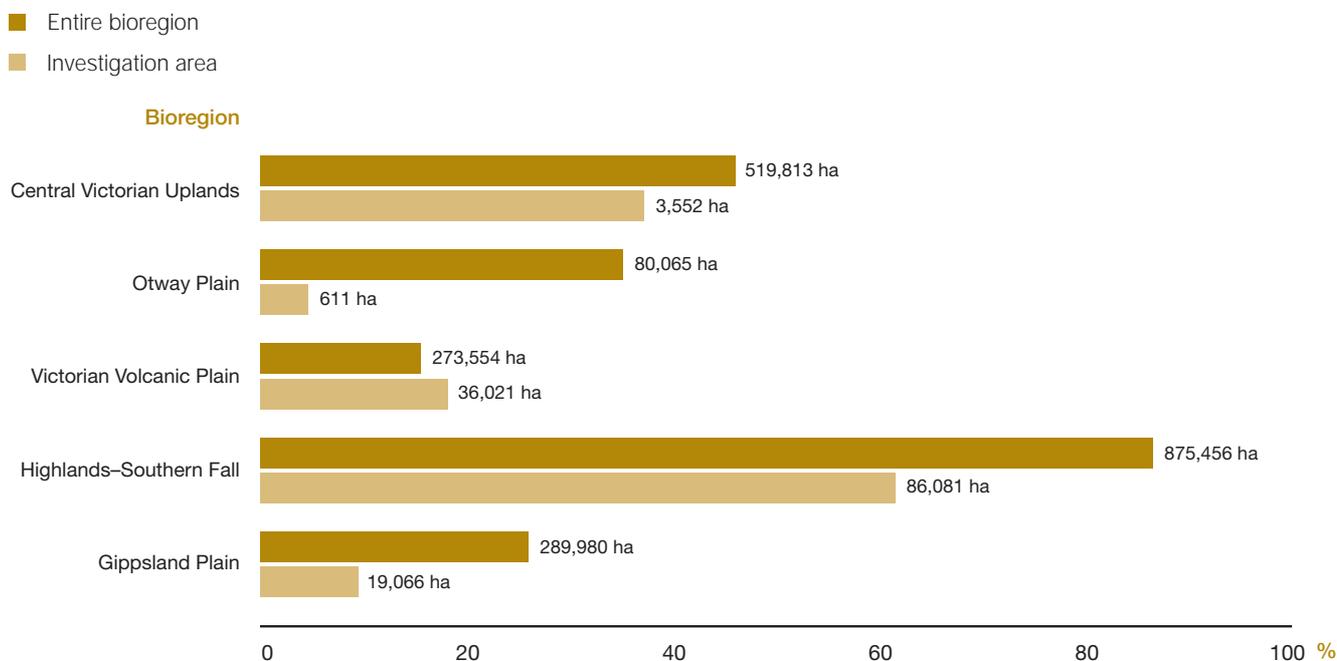


Figure 2.7

Proportion (%) of remnant vegetation remaining within the investigation area and within bioregions as a whole



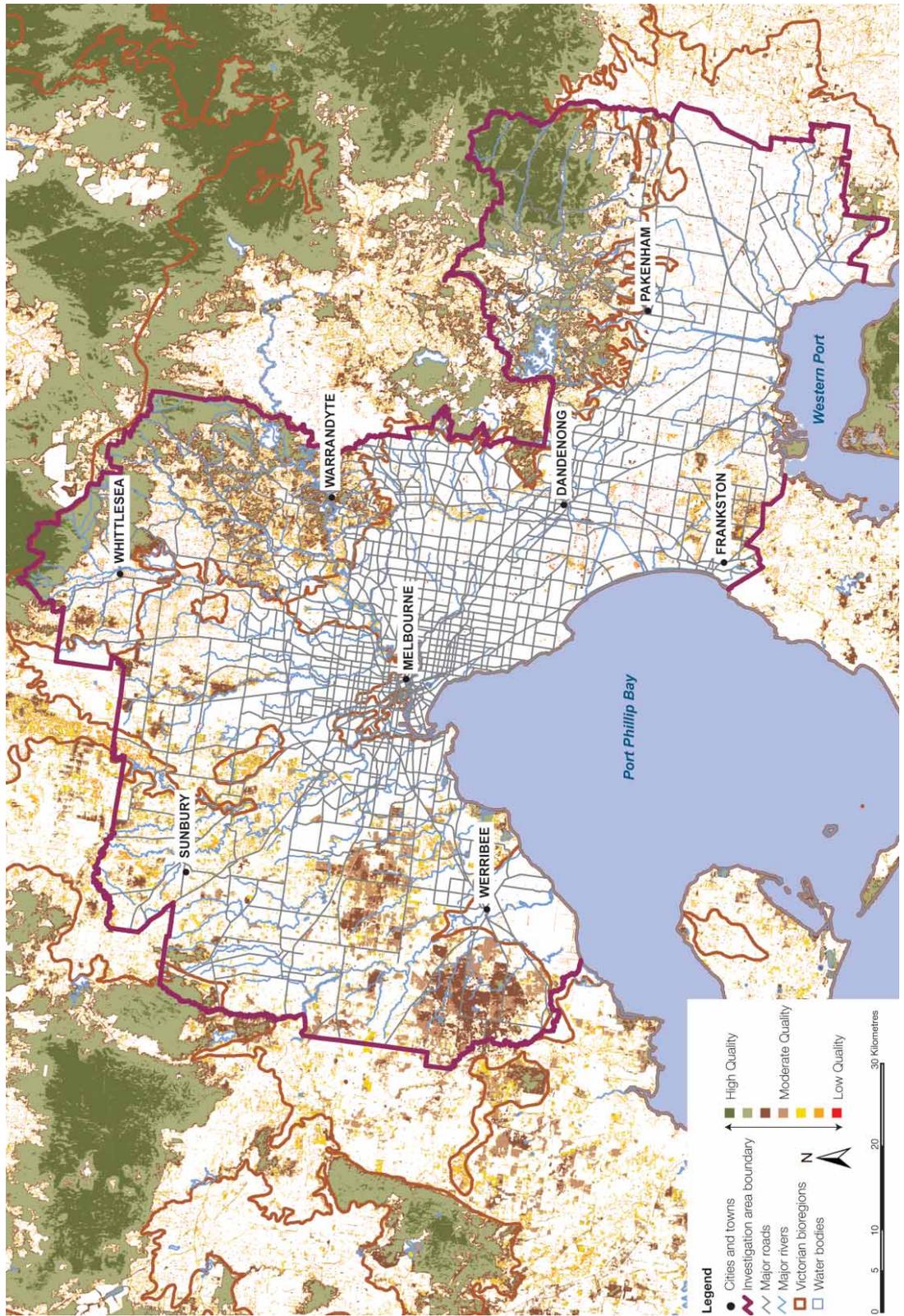
Native vegetation quality

While EVC mapping describes the extent and composition of vegetation within the investigation area, it does not provide information on the quality of the vegetation. DSE has mapped vegetation quality at a landscape scale within Victoria based on assessment of the biophysical components of the site (site condition), the size of the patch and its proximity to other patches of remnant vegetation (landscape context).⁵²

DSE has modelled vegetation quality across Victoria, with categories ranging from 'poor' to 'good' quality. Areas of poor quality, for example, may have remnant overstorey trees remaining but the understorey components are often absent or degraded due to clearing and/or invasion by weeds. Conversely, areas considered good quality, have most or all components of the vegetation community remaining intact.

Vegetation quality within metropolitan Melbourne is highly variable (see figure 2.8). It is generally higher in the north-eastern and eastern parts of Melbourne around Gembrook, Christmas Hills and Warrandyte. Medium quality vegetation generally occurs in the western part of Melbourne around Rockbank, Tarneit, Mount Cottrell and Wyndham Vale while large areas of poor quality vegetation occur in the north and north-west around Sunbury and Craigieburn.

Figure 2.8
 Vegetation quality within the Metropolitan Melbourne Investigation area
 Source: Department of Sustainability and Environment (2005)



Bioregional conservation status of native vegetation

Conservation status is the extent to which ecosystems or species remain in their natural state in relation to their pre-European distribution. A classification system of bioregional conservation status which assesses EVCs as either presumed extinct, endangered, vulnerable, depleted, rare or least concern has been developed by DSE. Threatened EVCs include those listed as either endangered or vulnerable. The bioregional conservation status takes into account how commonly the EVC originally occurred within the bioregion, the current level of depletion and the level of degradation of condition typical of remaining stands or remnants.

As shown in figure 2.9, the western and northern parts of the investigation area contain large areas of threatened native vegetation. Native vegetation in the north-eastern part of the investigation area is generally not considered threatened.

The extent of threatened vegetation within the investigation area also varies by bioregion and land tenure. For example, the Gippsland Plain and Victorian Volcanic Plain bioregions have a higher proportion of threatened native vegetation communities than other bioregions. This is not surprising given their history of early settlement and subsequent land clearance for agriculture.

Threatened vegetation communities predominately occur on private land within the investigation area and are generally poorly represented in the protected areas system. Less than 15 per cent of threatened vegetation communities are protected in metropolitan Melbourne.

2.3.4 NATIVE FLORA AND FAUNA

Flora

A total of 1,753 vascular native plant species has been recorded within the investigation area since 1990. This is approximately 40 per cent of all vascular plant species recorded in Victoria although the area of the investigation area only represents approximately 2.5 per cent of the area of Victoria. The investigation area also contains 840 bryophyte (mosses and liverworts), lichen and fungi species. A list of flora recorded within the investigation area is published at www.veac.vic.gov.au.

The high plant diversity of the investigation area is largely due to its location at the junction of three major geological formations: fertile clay soils of the basalt plain to the west and north-west; the hillier country of generally poor, strongly weathered soils to the north and east; and the sandy plains to the south-east of the city.⁴⁸ This high recorded diversity is also likely to be due to the intensive plant and animal survey effort undertaken within the metropolitan area.

It is noted that small organisms such as fungi have been poorly surveyed and as a result the number of species recorded is thought to be significantly lower than the number of species present.

Fauna

Native fauna species have responded to the urbanisation of Melbourne in a variety of ways. Many are now restricted to relatively small and often-fragmented patches of habitat while other species survive only in larger parks. Conversely, populations of some native species have remained constant, have adapted to change, or even thrived. While built environments (roads, buildings, paved areas) are often considered unsuitable for fauna, other highly modified environments may, in fact, remain suitable. For example, common brushtail possums *Trichosurus vulpecula* often live in native remnants in Melbourne but also forage in the surrounding residential landscape.⁵³



Box 2.2

The grey-headed flying-fox – an urban adaptor

The grey-headed flying-fox *Pteropus poliocephalus*, the largest member of the fruit bat family, is endemic along the south-eastern coast of Australia including south-west Victoria. It had been an occasional visitor to the Melbourne area since 1884, but it wasn't until 1986 that it settled in the Royal Botanic Gardens Melbourne. The population was subsequently relocated to Yarra Bend Park in 2003 as it was causing serious damage to significant vegetation at the gardens.

Urban areas appear to be becoming increasingly important to the grey-headed flying-fox with flying-fox camps within or near Melbourne, Sydney, Brisbane and Darwin. The movement to Melbourne is probably due to a combination of natural habitat removal, local climate change (Melbourne is now warmer and more humid) and an increased and year-round availability of food resources (for example, 120 plant species native to Queensland and NSW and favoured by the grey-headed flying-fox have been planted in parks and along Melbourne's streets). Melbourne also provides protection from shooting, and street lighting may provide easier night-time navigation.

Source: Yarra Bend Park flying-fox campsite: review of the scientific research.⁵⁴

A total of 495 native vertebrate fauna and 72 native invertebrate species have been recorded within the investigation area. Perhaps surprisingly, given the level of habitat modification, metropolitan Melbourne has a diverse vertebrate fauna with approximately 70 per cent of species currently known in Victoria recorded within the investigation area. A list of fauna recorded within the investigation area is published at www.veac.vic.gov.au.

The investigation area contains 319 species of birds, approximately two-thirds of all fauna species recorded in the investigation area. Mobile species such as birds are well suited to urban areas as they can more easily move between fragmented habitat patches. Species such as rainbow lorikeet *Trichoglossus haematodus* and Australian magpie *Gymnorhina tibicen* are common in a variety of habitats across Melbourne while others, such as eastern yellow robin *Eopsaltria australis*, white-browed scrubwren *Sericornis frontalis* and superb fairy-wren *Malurus cyaneus*, prefer more intact habitat.

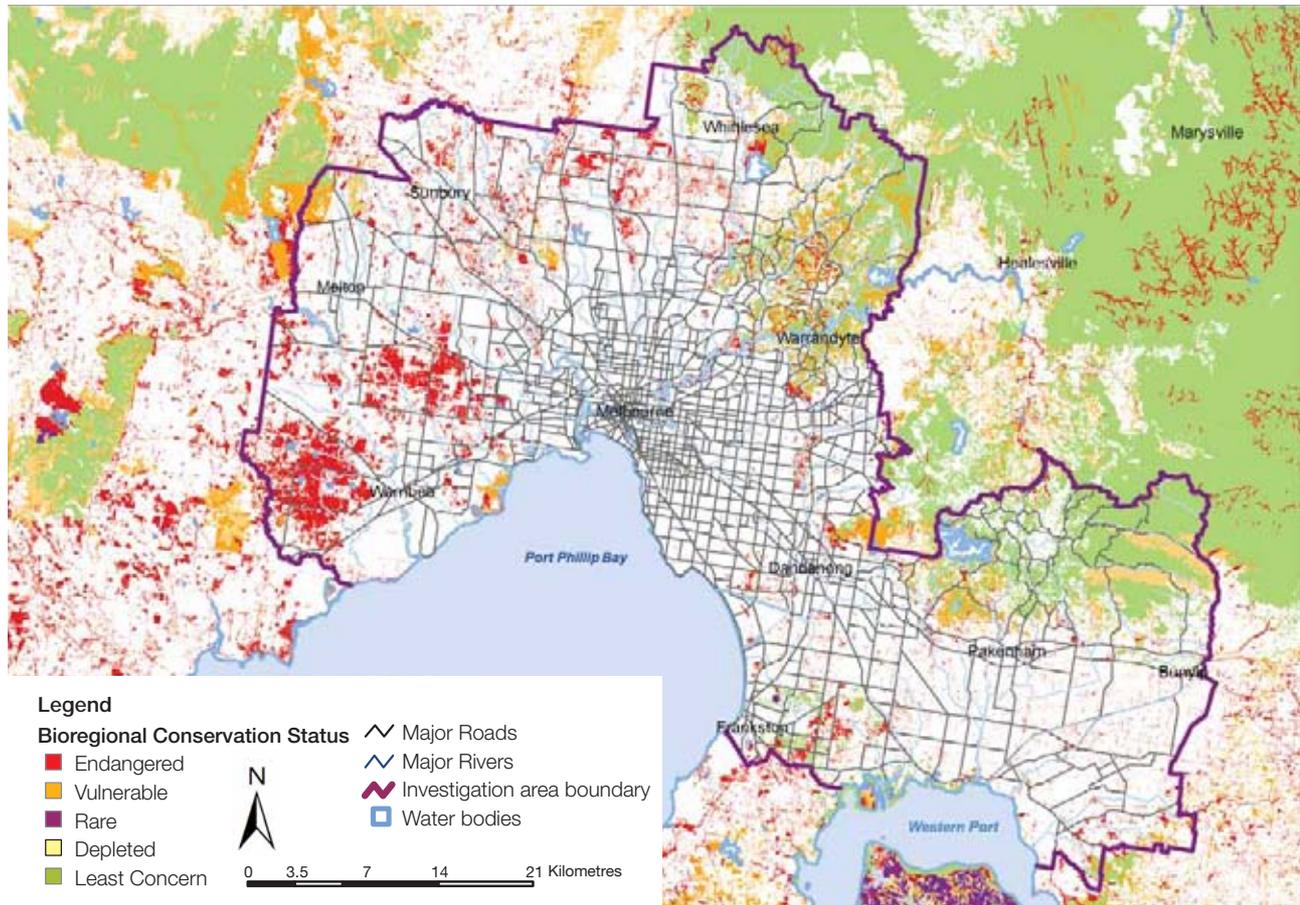
Forty-seven terrestrial and semi-aquatic mammal species have been recorded within the investigation area, largely bats and other arboreal mammal species such as possums and gliders. This may be because urbanised areas such as Melbourne often lack suitable habitat for ground-dwelling mammals.⁵⁶ The common brushtail possum *Trichosurus vulpecula* and common ringtail possum *Pseudocheirus peregrinus* are the two most widespread arboreal native mammal species within inner Melbourne. They have adapted to inner Melbourne for several reasons including an unspecialised diet, their use of man-made structures for shelter and their ability to move across cleared ground and via the tree canopy.⁵⁶ Other arboreal mammal species such as yellow-bellied glider *Petaurus australis*, feathertail glider *Acrobates pygmaeus* and eastern pygmy possum *Cercartetus nanus*, have more specialised diets and are largely restricted to natural areas in outer metropolitan Melbourne. Seven marine mammal species such as dolphins and seals have also been recorded.

Forty-one reptile species have been recorded within the investigation area. These include 29 lizard species with all major groups (geckos, skinks, dragons, goannas and legless lizards) represented. Eight snake species have also been recorded, with common species including eastern brown snake *Pseudonaja textilis*, tiger snake *Notechis scutatus* and common copperhead *Austrelaps superbus*.

Figure 2.9

Bioregional conservation status of Ecological Vegetation Classes in the investigation area

Source: Department of Sustainability and Environment



Nineteen amphibian species have also been recorded within the investigation area (out of a total of 33 species within Victoria). Species such as the southern brown tree frog *Litoria ewingii* and eastern banjo frog *Limnodynastes dumerilii* are common within Melbourne and can often be heard calling from suburban gardens.

Sixty-two species of fish have been recorded within the investigation area. These include freshwater fish such as eels, lampreys, galaxiids, gudgeons, river blackfish *Gadopsis marmoratus*, pigmy perch, smelt and tupong *Pseudaphritis urvillii*.

Seventy-two terrestrial and freshwater invertebrate species have been recorded within the investigation area. These include 59 terrestrial and freshwater insect species (mostly butterfly species) and 13 crustacean species (such as yabbies and crayfish). Many species of invertebrates are yet to be described.

Threatened species and communities

The investigation area contains a large proportion of Victoria's threatened flora and fauna species with 178 plant species, 106 vertebrate fauna and eight invertebrate fauna species listed as threatened in Australia and Victoria.^{57,58}

Habitat for some species such as the grassland earless dragon *Tympanocryptis pinquicollis* and various orchid species occurs almost exclusively within the investigation area. Box 2.3 on the following page provides some background on one of these species, the Eltham copper butterfly *Paralucia pyrodiscus lucida*.



Box 2.3 Eltham copper butterfly

The threatened endemic Eltham copper butterfly is a small butterfly that survives in a highly urbanised environment. The butterfly prefers woodland habitat with an understorey containing the shrub sweet bursaria *Bursaria spinosa* (on which the larvae feed) and a ground layer of native grasses, mosses and leaf litter. It is considered endangered in Victoria and is listed under the *Flora and Fauna Guarantee Act 1988*.

The Eltham copper butterfly was discovered in 1938 in Eltham. It was thought to be extinct in the 1950s, but a population was rediscovered at Eltham in 1986. Since then, the Eltham copper butterfly has decreased in abundance and numbers due to destruction and fragmentation of its habitat through urbanisation, competition for food with introduced wildlife (for example, brown hares and rabbits eat sweet bursaria plants), and altered fire regimes (which can cause understorey vegetation to grow excessively, reducing the area available for flight paths). The main populations currently occur in small patches of bushland surrounded by suburban development (for example, the Eltham Copper Butterfly Reserve, owned by Trust for Nature).

Government agencies, local councils, 'Friends of the Eltham Copper Butterfly' and volunteers have monitored butterfly populations nearly every year since 1988. They have also improved habitat on private land in the Eltham area by planting host plants to help the dispersal of butterflies between reserves, and have protected the butterfly's habitat in a series of reserves where development is strictly controlled.



Many vegetation communities within the investigation area are threatened, with several listed for protection under the *Flora and Fauna Guarantee Act 1988*. This Act is the key piece of Victorian legislation for the conservation of threatened communities and management of potentially threatening processes. These communities are listed in table 2.3.

Table 2.3
Communities within the Metropolitan Melbourne Investigation area listed under the *Flora and Fauna Guarantee Act 1988*

COMMUNITY NAME	DESCRIPTION
Cool Temperate Rainforest	<p>This community is dominated by a dense canopy of non-eucalypt tree species over an understorey of climbers, broad-leafed shrubs, ferns and soft-leafed herbs.</p> <p>Key sites within the investigation area include gullies in the southern section of Kinglake National Park and in the Yarra State Forest.</p>
Rocky Chenopod Open-scrub	<p>This community has an open canopy of eucalypts over a sparse, shrubby understorey dominated by wattles and chenopods.</p> <p>Key sites within the investigation area include above the Plenty River at Janefield, Bundoora and Jacksons Creek between Sunbury and Diggers Rest.⁵⁹</p>
Western (Basalt) Plains Grassland	<p>This community is predominantly open, treeless grassland dominated by tussock grasses, with herbs occurring in the inter-tussock spaces.</p> <p>Key sites within the investigation area include the Craigieburn Grassland Reserve, Merri Creek Grasslands, Derrimut Grassland Reserve and Laverton North Grassland Reserve.</p>

2.3.5 WETLANDS, RIVERS AND STREAMS

Wetlands within the investigation area provide habitat for a range of flora and fauna (including migratory birds from Asia) and act as a drought refuge. Some of Melbourne's larger wetlands such as Edithvale-Seafood Wetlands and wetlands within the Western Treatment Plant at Werribee are considered priority sites for bird conservation within Australia (see box 2.4).⁶⁰ The coastal wetlands of Port Phillip Bay and Western Port provide over-wintering and breeding habitat for migratory species such as sharp-tailed sandpiper *Calidris acuminata*, red-necked stint *Calidris ruficollis* and bar-tailed godwit *Limosa lapponica*, and are internationally and nationally recognised as important bird habitat.

Three of Victoria's 11 Ramsar sites are located within the investigation area, and are predominantly on public land. The Edithvale-Seafood Wetlands are three freshwater wetlands recognised for their high waterbird diversity and numbers and for supporting threatened species. They are located in the southern part of the City of Kingston and the northern part of the City of Frankston. The wetlands are mostly on land owned by Melbourne Water, although parts of the Seafood Wetland are owned by the City of Frankston.

Approximately 7,735 hectares (or 30 per cent) of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site lies within the investigation area (the remainder is located on the Bellarine Peninsula). This Ramsar site contains the Point Cook Coastal Park and Cheetham Wetlands in the Cities of Wyndham and Hobson Bay and the Western Treatment Plant in the City of Wyndham. It is recognised for its high waterbird diversity and numbers.

The Western Port Ramsar site is located in Western Port in Melbourne's south-east. The northern coast of the site lies within the investigation area and contains extensive, narrow areas of saltmarsh and mangroves. The Western Port Ramsar site is recognised for its unusually wide variety of habitat types and for its high waterbird numbers.



Box 2.4

The Western Treatment Plant, Werribee

Melbourne Water's Western Treatment Plant treats 52 per cent of Melbourne's sewage and is located about 35 kilometres south-west of Melbourne, and occupies approximately 11,000 hectares on the western side of Port Phillip Bay. The eastern half of the plant is within the investigation area. The Western Treatment Plant is the largest area of public authority owned land within the investigation area, and parts contain significant biodiversity values.

The Western Treatment Plant supports regular numbers of the critically endangered orange-bellied parrot *Neophema chrysogaster* (including important wintering habitat), and large numbers of international migratory waders. The plant regularly provides habitat for more than 20,000 waterfowl, and has more than one per cent of the population of several species of waders and ducks.

Above: Migratory waders at the Western Treatment Plant

The investigation area contains about 6,400 kilometres of natural rivers and streams, including major waterways such as the Yarra, Maribyrnong and Werribee Rivers. These and smaller waterways provide important habitat for a range of riparian, semi-aquatic and aquatic flora and fauna, and also act as wildlife corridors.

2.3.6 INTRODUCED SPECIES

The environment within the investigation area has been highly modified with a large number of introduced flora and fauna species. Forty-five introduced animal species have been recorded. Common introduced fauna species include birds such as the common blackbird, common myna *Acridotheres tristis*, common starling *Sturnus vulgaris*, spotted turtle-dove *Streptopelia chinensis* and house sparrow *Passer domesticus*, and mammals such as the European rabbit *Oryctolagus cuniculus* and red fox *Vulpes vulpes*.

More than 1,100 introduced plant species (about a third of all plant species recorded in the investigation area) have been recorded within the investigation area. This includes some species which are commonly found in Melbourne's gardens, but which have escaped into more natural areas. Common introduced species include African boxthorn *Lycium ferocissimum*, ragwort *Senecio jacobaea*, gorse *Ulex europaeus* and bridal creeper *Asparagus asparagoides*, grassy weeds such as Chilean needle grass *Nassella neesiana* and serrated tussock *Nassella trichotoma*, riparian weeds such as blackberry *Rubus sp.*, willows *Salix sp.* and phalaris *Phalaris aquatica*, and salvinia and alligator weed *Alternanthera philoxeroides* in waterways and aquatic systems.

A number of these introduced species can invade more natural areas, leading to a decline in biodiversity values. The impacts of invasive species are discussed further in section 8.1.

2.4 Climate

Meteorological measurements have been collected in Melbourne since 1854. These long-term records are important tools used to understand climate averages and ranges, particularly when daily and yearly weather patterns are so highly variable. A description of Melbourne's climate and the impacts of climate change are presented below.

2.4.1 MELBOURNE'S 'NORMAL' CLIMATE

International conventions draw upon the 30 year period from 1961 to 1990 to define normal or current climatic averages or typical conditions. Under these conventions Melbourne's climate is described as temperate with distinctly dry and warm summers using the Köppen classification scheme.⁶¹ During this 30 year period, the region had average maximum summer temperature of around 22 to 24°C near the coast and in the ranges to the east, and 25 to 27°C in Melbourne and inland. Winter average maximum temperatures were mostly around 12 to 14°C with frosts occurring inland, but rarely near the coast and inner urban areas.

Rainfall was highly variable. The average annual rainfall for the Melbourne city gauge was 639 millimetres (mm), but was less than 600mm in Werribee and Laverton west of Melbourne and more than 1300mm north and east at Toolangi and the Dandenong Ranges. Generally, rainfall was greatest in winter and spring.^{62,63,64} Despite a wet and grey weather reputation, Melbourne averaged 98 rainy days a year between 1961 to 1990 when at least 1mm of rain fell (Station: Melbourne regional office).⁶⁵ In comparison, Brisbane averaged 93 rainy days (Station: Brisbane regional office) and Sydney averaged 101 rainy days over the same period (Station: Sydney: Observatory Hill).⁶⁵

2.4.2 MELBOURNE'S CHANGING CLIMATE

Temperatures and rainfall for Melbourne have been atypical for the last decade, even when the natural variability of the climate is taken into account. Since 2001 Melbourne experienced five of the twenty driest years in over 150 years of records (below 472mm in the city gauge), and annual mean temperatures are rising.^{62,66} Climatic modelling suggests that this period is probably not only a 'normal' – albeit longer – drought cycle, but also reflects climate change.⁶⁷

Climate change has significant implications for Australia's environment, economy and society through its effects on the availability and distribution of water, higher average temperatures and increases in the occurrence of droughts, fires and floods.^{67,68,69}

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme. The IPCC Fourth Assessment Report, released in 2007, concluded that *"warming of the climate system is unequivocal"* and *"Most of the observed increase in global average temperatures since the mid-20th century is very likely [greater than 90 per cent probability] due to the observed increase in anthropogenic greenhouse gas concentrations."*^{70,71}

The levels of the three main greenhouse gases (carbon dioxide, methane and nitrous oxide) have grown significantly since 1750. In the past, forest absorption, atmospheric and oceanic processes buffered the earth against short-term natural spikes in greenhouse gases (e.g. from volcanic eruptions). Our increasing use of fossil fuels and land clearing has produced an unprecedented and sustained increase in greenhouse gas emissions, while also undermining the natural absorption processes of the environment.

Carbon dioxide is the most significant of the anthropogenic (human produced) greenhouse gases.⁷² Present day global carbon dioxide concentrations were recently measured as 386 parts per million (ppm).^{73,74} For the 10,000 years before 1750, atmospheric carbon dioxide levels were within the range 280± 20ppm.⁷⁵ Furthermore, the normal or natural range of carbon dioxide during at least the last 800,000 years has been determined by climate scientists as 170 to about 300ppm.^{73,76,71,77,78,79}

There has been a strong correlation between carbon dioxide and temperature over the last 420,000 years. A rapid rise of carbon dioxide levels beyond long term natural variations commenced at the start of the 1800s. But it is not just the increase of the post-industrial greenhouse gas concentrations that is unusual; it is also the rate at which this has occurred. From 1750 to 2005, carbon dioxide increased from 280-379ppm (35 per cent), methane increased from 715-1774ppb (148 per cent) and nitrous oxide from 270-319ppb (18 per cent).⁷⁰ At no stage in the recent geological record has such a rapid and sustained change occurred. Relatively slow atmospheric reaction times and feedback loops will result in climate change continuing in response to greenhouse gases we are emitting today until at least 2030.⁶⁷ There are potentially other long-term changes yet to be fully realised that may be more severe and irreversible from the perspective of human timescales.⁷²

Globally, warming is accelerating.^{80,72} The average rate of increase over the past 50 years is twice that of the 50 previous years.⁷¹ Combined global land and marine surface temperature records from 1850 to 2008 show thirteen of the fourteen warmest years occurred in the fourteen years from 1995 to 2008.^{81,82} Analyses of over 400 proxy climate records (from trees, corals, ice cores and historical information) show 1998 to be the warmest year of the last 1000 years and the 20th century the warmest century.^{62,82}

Global average temperatures have increased by 0.74°C from 1906 to 2005.^{71,72} Over a significant length of time, such changes in climate are what induce ice ages and warm interglacial periods. These changes are a driver for biological change — evolution or adaptation, migration and extinction — even though they may seem inconsequential in relation to Melbourne's variable daily temperatures.

Mean annual temperatures across Australia also reflect this warming trend. The period 2000-2009 was Australia's warmest decade since high-quality data records became available in 1910 and there has been a progression of hotter mean temperatures for each decade since 1940.^{62,73}

Climate change projections forecast warming across south-eastern Australia and also a strong increase in frequency of hot days and warm nights.⁶⁷ In broad terms, CSIRO modelling for south-eastern Australia projects:

- ▶ increases in temperature and sea level, extreme events such as storms, floods and fires
- ▶ uncertainty in rainfall (because of extreme events), rainfall patterns/ distribution, soil moisture, soil erosion, changed hydrological processes.⁶⁷

Temperature increases

From 1950 to 2005 mean annual maximum temperatures increased by 0.71°C (0.13°C per decade) in Victoria and by 0.81°C (0.14°C per decade) in Melbourne. Over the same period annual minimum temperatures increased by 0.44°C (0.08°C per decade) in Victoria but in Melbourne the increase was far greater at 1.79°C (0.32°C per decade).^{63,83}

Projections by CSIRO suggest the future climate of the Port Phillip and Western Port region, including metropolitan Melbourne, will be hotter and drier than it is today.⁶⁷ By 2030, average annual temperatures are projected to be around 0.8°C warmer than 1990 averages. By 2070, a further increase in temperature of 1.3°C is projected, even under a lower emissions growth scenario. Under a higher greenhouse gas emissions growth scenario, these increases double to 2.6°C and

Melbourne's temperatures would resemble present day Echuca, while annual rainfall would be similar to present day Seymour.⁶⁴ At the same time, the annual frequency of hot days above 35 degrees will increase from an average of 9 to 11 by 2030. Under higher emissions scenarios this may rise to 26 days above 35 degrees by 2070.^{67,64} Melbourne recorded 15 days above 35 degrees maximum temperature in 2009.⁶⁶

Increased incidence of extreme weather events

Extreme weather events, such as storms, floods and heatwaves are likely to increase as climate change continues. Heat waves, such as the one experienced in southern Australia during January and February 2009, can be expected to increase in frequency. The effects of this event on metropolitan Melbourne included loss of power supply to some areas and shutting down of many businesses or services due to high power demand, and delays to or cancellations of trains and trams due to infrastructure or equipment failure.

The significance of this prolonged heatwave has been somewhat overshadowed by the devastating bushfires that followed on 7 February (Black Saturday): the hottest day ever recorded in Melbourne with a maximum of 46.4 degrees. This eclipsed the previous record of 45.6 degrees for 13 January 1939, and exceeded the hottest February record by 3.2 degrees (set in 1983). Three of Melbourne's hottest five days were recorded during this heatwave period. Although similar in duration to the 1939 heatwave, the 2009 episode was accompanied by sweltering overnight minimum temperatures. Melbourne's six consecutive nights above 20 degrees equalled records set during 1908.⁸⁴

Climate change is already having an effect on human health and there are concerns that the quality of life for Melburnians will be further impacted in the future. Victoria's Chief Health Officer reported 374 additional deaths across the state, including 248 people aged 75 years or over, during the record-breaking three consecutive days over 43 degrees in Melbourne.⁸⁵

Heat-related mortality rates in Australian cities are expected to increase substantially by 2050, taking into account demographic changes, with heat-related mortality for Melbourne likely to at least double from current averages.⁸⁵

Reduced rainfall

Melbourne has a highly variable annual rainfall but has generally enjoyed a long-term reliable average (figure 2.10).⁶⁶ The long-term average annual rainfall over the last 150 years recorded in the Melbourne city gauge is 647mm, with a range of 967mm (1916) and 332mm (1967).⁶⁶ Annual rainfall has not exceeded the long-term annual average since 1996, and despite some good rainfall in 2010, it is unlikely that this year will see a return to wetter conditions.

Between 1998 and 2007 the average rainfall across this region was 14 per cent below the long-term average. Average inflows to Melbourne’s major dams (Thomson, Upper Yarra, O’Shannassy and Maroondah) from 1997 to 2007 were between 30-40 per cent below average (figure 2.11).^{64,86}

Melbourne has experienced a number of periods with dry conditions or drought generally associated with El Niño Pacific Ocean climatic conditions. In overall terms the current dry period is similar in some ways to the period during World War II, but there are very important differences in seasonal patterns. In particular autumn changes are outside natural variability as well as there being generally drier conditions.⁸⁷ Melbourne may have had a step-change in its annual rainfall and stream flows related to climate change.⁸⁸ The last 13 years since 1997 constitute the longest period of below average annual rainfall recorded.⁶⁶ Perth, at a similar latitude to Melbourne, experienced step changes reducing average annual rainfall on at least two occasions: for the period 1911 to 1974 there are statistically significant reductions over the period 1975 to 1996 and 1997 to 2005.

Figure 2.10
Annual rainfall recorded in central Melbourne from 1856 to 2009⁶⁶

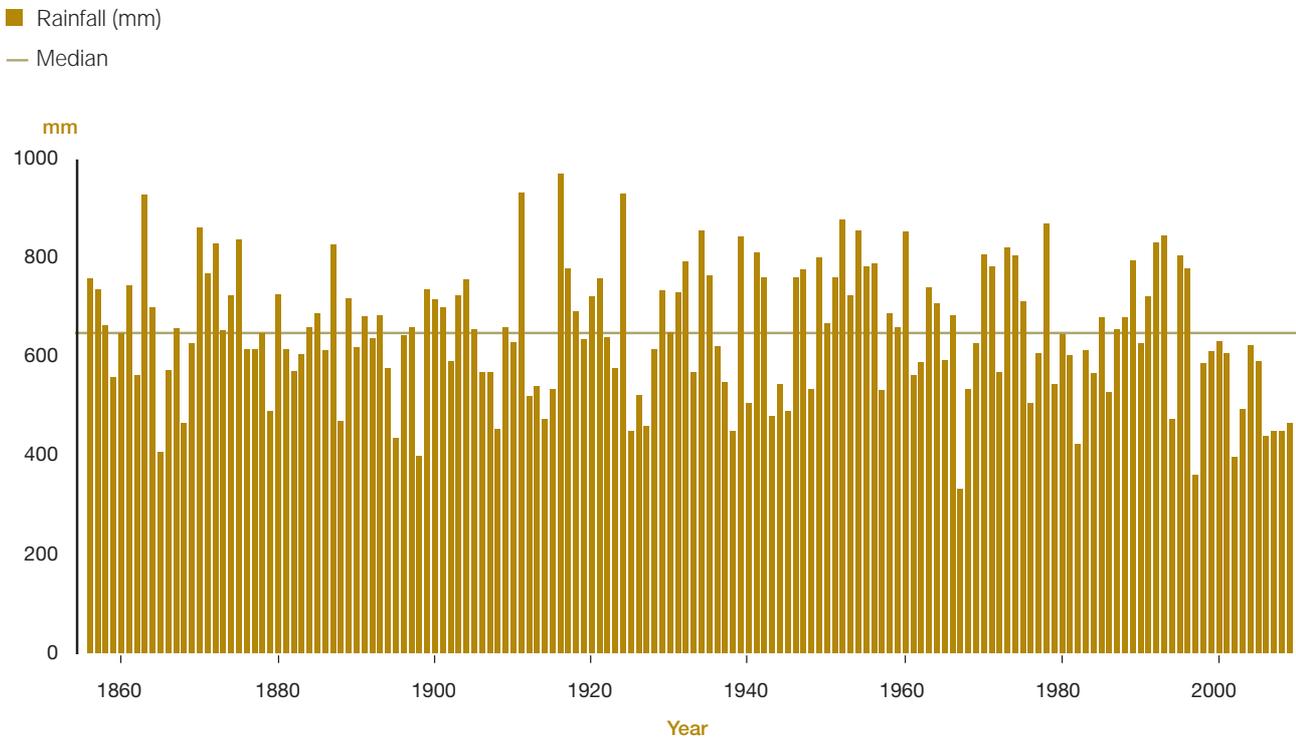
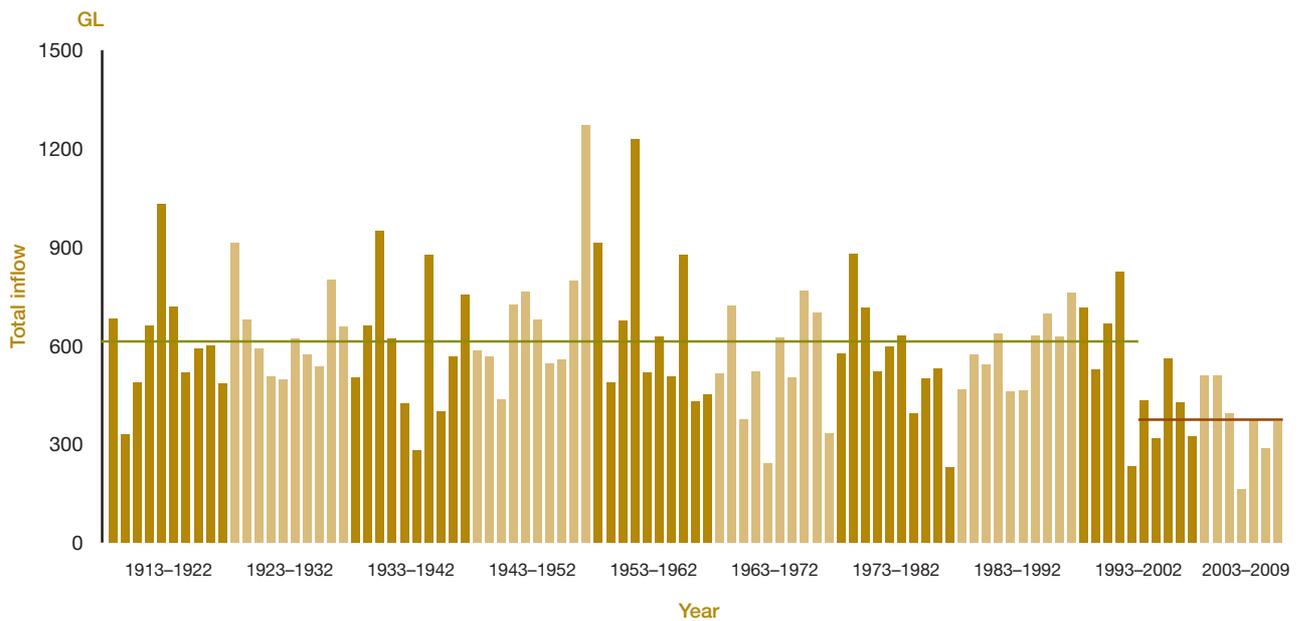


Figure 2.11

Average annual inflows to Melbourne's major dams (Thomson, Upper Yarra, O'Shannassy and Maroondah) from 1913 to 2008

Source: Melbourne Water 2010

- Average inflow 1913-1996 615GL/Year
- Average inflow 1997-2009 376GL/Year



Increasing temperatures alter wind patterns (atmospheric circulation) and humidity. A key atmospheric circulation is the exchange of air from the tropics to mid-latitudes. A predicted change in this pattern will produce more erratic rainfall events.⁶⁷ In south-eastern Australia, average annual rainfall, and the number of rainy days are expected to decrease, however the intensity of rainfall events or heavy rain storms is likely to increase. Combined with increasing air temperatures, there will generally be less surface water and soil moisture.^{67,64}

Changing rainfall patterns, particularly increased time between rainfall events and high intensity storm events, is likely to have negative effects on the natural environment, water quality, and both sewerage and drainage infrastructure. Melbourne Water has identified some of the risks to infrastructure as:

- ▶ flash flooding or damage to sewers and drains, particularly in coastal environments (see section below), due to high rainfall events
- ▶ pipe failure and collapse due to dry soil conditions

- ▶ longer travel times and high concentrations of sewerage due to reduced flow
- ▶ decreased surface water and run-off leading to reduced water quality.⁸⁹

River health is also impacted by reductions in rainfall, with declining river flows potentially causing significant changes in stream conditions and threatening many aquatic or semi-aquatic species.^{88,90}

In Melbourne's catchments, a decrease in inflow of 7-64 per cent from previous long term averages by 2055 is modelled for medium emissions growth scenarios.⁸⁸ At the same time increasing population and temperatures are likely to increase future water demands.

Water conservation and demand management solutions have been implemented in recognition of current falling storage levels. In response to these programs and public campaigns, and despite high temperatures and drought, Melbourne's per capita domestic water consumption has decreased by 34 per cent in 2006/07 compared to averages of the 1990s; industry has also reduced consumption by around 38 per cent.⁹¹



Above: Storms at Ricketts Point Beaumaris have eroded coastal dunes and foreshore areas.

Sea level rise

Global sea level rise is caused by ice sheet melting, particularly land-based glacial ice in Antarctica and Greenland, and the thermal expansion of the ocean. This process has occurred naturally throughout the Earth's history and is linked to glacial and interglacial cycles. While there is some uncertainty about the amount of sea level rise under various future carbon emission scenarios, sea levels are currently rising and will continue to rise during the 21st century and beyond.⁷¹

Climate change is already having significant impacts on coastal environments. Around Australia the sea level rose by about 1.2mm per year during the 20th century. From 1961-2003, the rate was 1.8mm per year and from 1993-2003 it increased to 3mm per year.⁹² This rate of increase is an order of magnitude faster than the average rate of rise over the previous several thousand years.⁶⁷

The IPCC indicated that, relative to 1990 levels, sea levels will rise between 0.18–0.59 metres by 2090–2099 plus an additional ice sheet melt contribution of 0.1–0.2 metres.⁷¹ However, sea level rise may be much greater than these values and recent observations suggest that we are tracking along the upper bounds of earlier IPCC 2001 projections.⁹³ The 2008 Victorian Coastal Strategy established a policy of planning for sea level rise of not less than 0.8 metres by 2100.³⁹ Recent Commonwealth Government coastal planning using a risk based approach has applied 1.1 metres sea level rise as a plausible worst case scenario for this century.⁹⁴

Climate change effects on the Victorian coastline include an increased frequency and severity of storm events leading to greater coastal inundation and erosion.³⁹ The combined effects of sea level rise, the impact of tides, storm surges, wave processes and local conditions such as topography, elevation and geology will determine the areas of greatest damage.

3 METROPOLITAN MELBOURNE – THE PEOPLE

CHAPTER 3 describes the Indigenous and non-Indigenous history of the investigation area and discusses how people lived and continue to live in what is now metropolitan Melbourne.

Material from this section was largely drawn from reports commissioned by VEAC for this investigation.^{7,4,8} These reports are available at www.veac.vic.gov.au

3.1 Early Indigenous history

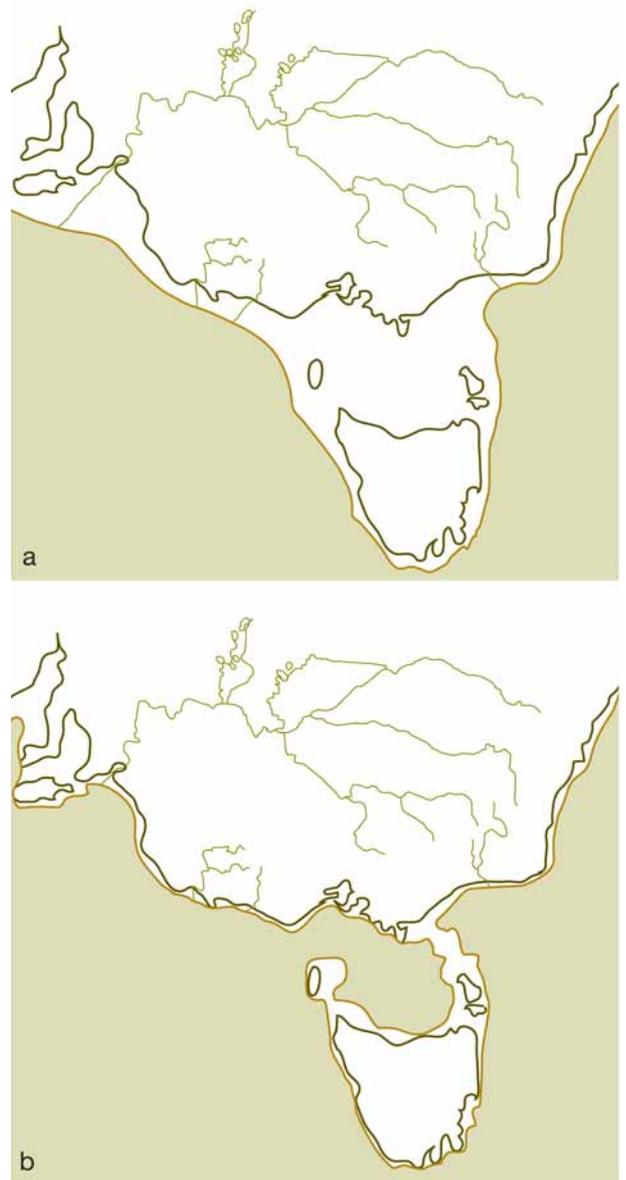
People have observed the changing landscape of Melbourne for up to 40,000 years. Aboriginal inhabitants have adapted over generations to a dramatically changed environment as the climate shifted from warm and wet to cool and dry. By the height of the Last Glacial Maximum 18,000 years ago, Melbourne was cold, dry and largely treeless. The average temperature in winter would rarely have exceeded 10°C. The temperature was on average 5-10°C cooler than today. Rainfall was lower by 30 to 50 per cent and the land was locked in a drought with no foreseeable end. Snow would have fallen on Mount Macedon, and gale-force winds howled across the land.^{95,96} The shallow lakes which had once covered large areas of Victoria were dry and the forests of warmer, wetter years had retracted and disappeared along with the megafauna they once supported.^{97,96} But not everywhere was inhospitable. Small damp pockets of forest survived amidst the tracts of steppe-like grasslands and herbfields.^{97,95,98}

The vast frozen poles had locked up the world's water, dropping sea levels 65 metres below the current coastline and connecting Tasmania to Victoria across the Bassian Plain.⁹⁸ It seems likely that the Aboriginal people inhabited and utilised the Bassian Plain, along with the grassy basin of what was to become Port Phillip Bay (see figure 3.1) but any evidence of their presence has long been reclaimed by the sea.⁹⁹ A smattering of humans left traces across this landscape in shell middens, quarries and fish traps; their scatterings of artefacts, scarred trees and earth mounds testament to thousands of generations of continuous land use.

Figure 3.1

A comparison of the coastline of south-eastern Australia (a) 18,000 years ago and (b) 14,000 years ago (modified after Bird and Frankel 1998)¹⁰⁰

- Major rivers
- Present day coastline
- Past coastline



No Ice Age lasts forever and around 14,000 years ago the ice began to melt and rain began to fall. The sea levels rose and water flooded once more across the Bassian Plain, leaving only the isolated hilltops of the Flinders and King island groups to mark the path of the bridge between Tasmania and Victoria.^{101,102,103} By 6,000 years ago, sea levels had risen rapidly to near present levels, 10-15 metres per thousand years.⁹⁸ At some point the waters had surged through the heads to create Port Phillip Bay, an event reflected in Indigenous oral history.

Mr Robert Russell says that Mr Cobb talks to the blacks in their own language, and that the following is an account, given by them, of the formation of Port Phillip Bay: 'Plenty long ago.....alonga Corio, men could cross, dry-foot from our side of the bay to Geelong.' They described a hurricane – trees bending to and fro – and then the earth sank, and the sea rushed in through the heads, till the void places became broad and deep as they are today.¹⁰⁴

The climate changed to warmer, wetter conditions as erratically and variably as it had swerved away from them, creating pockets and periods of relative stability, before gradually settling into the patterns observed today.^{105,96} The Aboriginal people, the *Woi Wurrung*, *Wada Wurrung* and *Bun Wurrung* moved across the changing landscape, understanding the ecology and seasonal availability of food or other resources.

At the time of first contact, Aboriginal society in southern and central Victoria is believed to have consisted of five major tribal or language groups (see table 3.1).

Each of these major tribes comprised a number of patrilineal clans.^{107,106} The *Wada Wurrung* are thought to have had some 25 clans at the time of European settlement; however, most of these lay outside the investigation area. Within the investigation area, the *Bun Wurrung* tribe of eastern Melbourne is thought to have included five separate clans while the *Woi Wurrung* included six main clans.

These clans were further subdivided into individual family groups, also known as bands.¹⁰⁸ Social, ceremonial, or ritual gatherings between band, clan and tribe were common, sometimes of up to 800 people at a time.^{109,110,111}

These small family groups moved through their territories in response to seasonal abundance of food. They hunted a wide diversity of animals using spears and other weapons, but also trapped birds and fish in nets and traps.^{112,113,114} Eel harvesting using stone traps was widespread in south-eastern Australia.^{112,115} Despite the importance of hunting, plant material probably made up half of the diet of people on the basalt plains.¹¹⁶ The underground tubers of the yam daisy or murnong *Microseris scapigera* were a staple part of the diet, being abundant and available year round.^{117,118,119} Plant material also provided resources for utensils, string, baskets and clothing.

Evidence of trade and exchange between tribes has been preserved by the wide distribution of greenstone artefacts across Victoria. Greenstone, prized for the production of hatchet heads, primarily originates from a quarry at Mount William near Lancefield in central northern Victoria.^{109,120,110,111,121,122} The distribution patterns suggest close affiliation between clans that shared similar languages in central and north-western Victoria, south-western Victoria and south-eastern South Australia, but a paucity of trade with the Kurnai tribes of eastern Victoria.

Table 3.1
The five language groups of southern and central Victoria, encompassing the metropolitan Melbourne area (spelling of each clan or tribe following Clark 1990)¹⁰⁶

NAME	SYNONYMS	TERRITORY
Bun Wurrung	Boon Wurrung, Bunurong	Mornington Peninsula and Western Port, north into the Dandenongs
Woi Wurrung	Wurundjeri	Yarra and Maribyrnong rivers and surrounding tributaries. To Mt Macedon, Mt William, Kilmore. East of the Werribee River
Wada Wurrung	Wathaurung	Bellarine Peninsula, Otway Ranges, west of the Werribee River to Streatham
Djadja Wurrung		Loddon and Avoca river catchments, Bendigo
Daung Wurrung	Taungurung	Kilmore to Euroa, east to Mt Buller, west to Kyneton



Box 3.1
Woodlands Historic Park

Woodlands Historic Park is approximately 20 kilometres north-west of Melbourne, immediately north of Tullamarine Airport. Formerly known as Gellibrand Hill Park, Woodlands Historic Park encompasses over 700 hectares of significant remnant native woodlands and grasslands.¹²⁷ The park is culturally significant as a surviving example of the 1840s agricultural landscape, complete with rare examples of early pioneer buildings.

There are 16 registered Aboriginal places within Woodlands Historic Park (eight artefact scatters, seven scarred trees and one place with multiple types of artefacts), reflecting Aboriginal land usage prior to European settlement. Artefact scatters result from stone tool manufacture, use or curation, often at the location of an ephemeral campsite, while scarred trees result from the removal of bark for housing material, carrying vessels, shields or watercraft. Immediately adjacent to the eastern boundary of the Woodland Historic Park is the Weeroona Aboriginal Cemetery. This contemporary cemetery is the final resting place of a significant number of Melbourne's Aboriginal community and so is of great significance to the community.

As a 'cultural landscape', the Woodlands Historic Park and environs provides tangible evidence of ancestral life prior to European occupation, highly valued natural environmental attributes, and a significant contemporary cemetery demonstrating a continued attachment to place.

Left: Woodlands Historic Park contains one of the greatest concentrations of Aboriginal scarred trees in the Metropolitan Melbourne Investigation area as well as a range of other culturally important sites.

3.2 Post-contact Indigenous history

Patterns of land use differed across the habitats within Indigenous territories. For many tribes, coastal areas offered a rich array of year-round resources. The resulting abundance of calcified remains in shell middens provides evidence of intense occupation along coastlines, in dunes, around lagoons, estuaries and swamps. Similarly, river and creek valleys were favoured occupation areas, providing shelter, firewood, freshwater, food, and materials for tool manufacture as well as travel routes.¹²³ A rich array of archaeological material – artefact scatters, scarred trees, stone quarries, fish traps, human burials and earth mounds – scattered along the corridors of Melbourne's waterways provides evidence of occupation for up to 40,000 years.^{124,125,126}

The open grasslands of the basalt plains also offered a wealth of plant foods, such as yam daisies, as well as good hunting of grazing animals. However, these activities leave little archaeological trace, reflected in the limited artefact locations and small campsites. This patchy evidence of land use may also suggest seasonal use given that the open plains offered little in the way of shelter from the elements or fuel for campfires. Use of the hills areas appears to have been even more sporadic, with the scattered archaeological evidence in hilly areas suggesting at most only periodic use. Both the hills and basalt plains are likely to have been less hospitable at different times over the last 40,000 years due to climatic variation, restricting the abundance of resources present and people's ability to exploit them. For all locations, there is evidence of variable patterns in occupation over time suggesting that local climate variation may have been an important factor in determining land use at particular times and places.¹⁰⁰

There are thousands of archaeological sites and places including human burials, earth mounds, earth 'rings', shell middens, scarred trees, stone artefact scatters, fish traps, stone and historic places within the investigation area. The Victorian Aboriginal Heritage Register (VAHR) records Aboriginal sites and places and currently contains in excess of 30,000 site records from across Victoria. There are approximately 4,500 registered Aboriginal places within the Wurundjeri and Wathaurung Registered Aboriginal Party areas which comprise a large proportion of the investigation area.

Aboriginal people's contact with Europeans in the late eighteenth and early nineteenth century was probably with early whalers and sealers and explorers. A permanent settlement in what was to become 'Melbourne' began in 1835 with John Batman's treaty with the traditional owners.⁷

In 1835, Batman attempted to purchase approximately 600,000 acres of land around Melbourne and Geelong from the traditional Aboriginal owners of the land (figure 3.2).¹²⁸ However, the British Government later claimed the area as Crown land, refusing to ratify Batman's treaties or recognise Aboriginal land ownership. Governor Bourke of the Colony of New South Wales declared the area known as the Port Phillip District open to European settlers in September 1836.¹²⁸

In the settlement period following this first contact, traditional Aboriginal culture and society was severely and irrevocably impacted. Aboriginal people experienced changes and encroachments into their traditional territories which severely altered a way of life that had allowed people to adapt and overcome the challenges of the preceding 40,000 years.⁷

Throughout the early colonisation, various efforts were made by authorities to protect and control, integrate and assimilate local Aboriginal people into European social and political structures. Many of these activities are still evidenced by historic sites around Melbourne. An early mission established on a traditional corroboree ground and meeting place 'Tromgin' is now partially occupied by the Royal Botanic Gardens Melbourne.¹²⁹ Evidence of the Port Phillip Aboriginal Protectorate system can be found at a reserve site at Yerrip Hills just north of Sunbury and at Narre Warren on the site of the old Native Police paddock. The original police barracks and 'headquarters' in Narre Warren were later moved to a paddock on what is now Yarra Park and then to a government reserve at the confluence of Merri Creek and the Yarra River.¹²⁹

Another important site was that of the Merri Creek Aboriginal School, which was used as a makeshift Aboriginal station.¹³⁰ As a result of the activities of the Native Police, a corps of Aboriginal male elders, two Aboriginal men were hung near the Old Melbourne Gaol site in Russell Street for attacks on whalers and settlers.^{131,132,133} These men were the first people buried in an acre of land at the Old Melbourne Cemetery (now the site of the Queen Victoria Market) designated as an Aboriginal burial ground.¹³⁴

Figure 3.2

'Batman's Treaty with the Aborigines at Merri Creek, 6th June 1835'. Painted by John Wesley Burt, 1875, Pictures Collection. State Library of Victoria. H92.196.



Despite the abandonment of the protectorate system in 1849, the three main metropolitan Aboriginal reserves established in this period remained a focus for Aboriginal activities. Aboriginal people were encouraged to relocate to sites outside of Melbourne.^{130,135,136} Regional land was allocated at Coranderrk, Ebenezer, Lake Tyers, Framlingham, Lake Condah, Ramahyuck and Yelta, establishing communities that were either church or government run.¹³⁷ By the late 1880s most of these regional reserves had been closed and sold off. Many remaining residents moved to Lake Tyers in Gippsland or resisted relocation such as at Framlingham.¹³⁷

Aboriginal people were not classified as citizens and could not vote or buy property. Despite these restrictions, between 500 and 800 Aboriginal men served in the Australian Imperial Forces in World War One and 3,000 in World War Two. Those who returned were not eligible for land under the 'Soldier Settlement Schemes' (often on land appropriated from Aboriginal reserves), could not drink in public bars with other servicemen and received no support. This discrimination was pivotal to the growing Aboriginal land rights movement from the 1930s onwards.

By 1955, Victorian legislation was reviewed to promote a policy of assimilation and the abolition of remaining reserves.^{137,138} Despite many Aboriginal people now living in country towns or in suburbs like Collingwood or Fitzroy, connections to the old reserve sites remained strong. Movements to obtain community ownership of reserved lands were successful in Framlingham and Lake Tyers in 1970.

Despite early efforts to remove Indigenous culture from Melbourne's landscape, recent movements have successfully re-established aspects of Melbourne's Indigenous heritage. In 1985, skeletal remains of Aboriginal people from Museum Victoria whose home countries could not be identified, were ceremonially buried at Kings Domain with a commemorative plaque.¹³¹ Many landmarks now carry Woi Wurrung names such as Wurundjeri Way, the new Mullum Mullum Tunnel, Birrarung Marr and the sculptural installation Bunjil at Docklands. William Barak is honoured in the naming of the Bridge of the same name.

There are many historic places within the investigation area that have significance for, and strong links with contemporary Aboriginal people. Some of these are described in appendix 3.

3.3 European settlement history of Melbourne

Lieutenant John Murray was the first European to officially enter and explore Port Phillip Bay, in February 1802. He was followed six weeks later by Matthew Flinders, but it was not until the following year that Charles Grimes, the acting chief surveyor of New South Wales, located fresh water from the Maribyrnong and Yarra Rivers.

In October 1803, Lieutenant Governor David Collins camped at Sullivan Cove outside of the investigation area near Sorrento, with a large party of prospective settlers including 308 convicts. This was the first attempt to settle Europeans in what is now Victoria. But without fresh water the camp was soon abandoned in favour of Van Diemen's Land. Four graves at the camp were reserved in 1875 (VHR H1050).

3.3.1 EARLY SETTLEMENT

In 1835, John Batman and John Pascoe Fawkner arrived as separate parties to establish private pastoral runs. They both settled on the Yarra, initiating the formation of a village, the rudimentary origin of the city of Melbourne. The settlement expanded rapidly and spread north and west along the Werribee and Moorabool Rivers. Within a year, nearly 200 settlers lived here along with 25,000 sheep. The Port Phillip District was belatedly opened for settlement by the New South Wales government in September 1836 and William Lonsdale was appointed Police Magistrate in charge of the district. All previous claims to land ownership – indigenous and settlers alike – were swept away and the entire region was proclaimed Crown land.

The new settlement was planned by Robert Hoddle, who formulated the grid bordered by Flinders, Spencer, Lonsdale and Spring Streets, characterised by wide streets and gardens. The grid paid as little heed to geography as it had to cultural history,¹³⁹ imposing its structure over hills, swamps and tributaries in a model for future suburban expansion.¹³⁹ Nature was confined within reserves for public purposes. This resulted in substantial parks including a block of land on 'Western Hill', a 50 acre (20 hectare) botanic gardens reserve on Batman's Hill and large reserves east of the earliest river crossing site (now Princes Bridge).¹⁴⁰

The 1842 Act for the sale of 'Waste Lands' allowed authorities to set land aside specifically for recreation and public health.¹⁴¹ Applications, primarily from the Town of Melbourne, included sporting grounds, parks, gardens and acclimatisation grounds (the forerunner of zoological gardens). These reserves incorporated modern ideas about the need for breathing spaces in industrial cities and resulted in four square miles (1035 hectares) being set aside north of the town in 1845 (Royal Park); a new botanic garden site in South Yarra in 1846; Fitzroy Square in 1848 (Fitzroy Gardens); and the substantial Domain park in South Yarra.

Land use outside of the township was dominated by pastoral leases. Between 1834 and 1837 these extended north and south of the Yarra River settlement across the grassy flat coastal and volcanic plains. Only a few homesteads survive as evidence of this early activity including Woodlands Homestead (1840s), the Altona Homestead (1842) and Point Cook Homestead (1850s) (figure 3.3). At Werribee Park several farm buildings from 1861-2 also survive. Many of these historic locations are listed on the Victorian Heritage Register. The Yan Yean Reservoir Reserve includes Bear's Castle constructed around 1844 (VHR H1420) while the remains of Viewbank Homestead (VHR J1396) are contained within the Yarra Valley Parklands. But the continuing expansion of the townships over the surrounding agricultural land has left only patchy remains of the original settlement land use of these areas.⁴⁸

Figure 3.3
Woolshed of the former Chirnside property,
constructed in 1860s (Point Cook Coastal Park).



3.3.2 THE GROWTH AND URBANISATION OF MELBOURNE

By 1847 Melbourne was officially proclaimed a city and by 1850 its population exceeded 20,000 people.⁴⁸ The suburban villages of Carlton, Fitzroy, Collingwood and Richmond, Hotham (North Melbourne) and Sandridge (Port Melbourne) surrounded central Melbourne. St Kilda already thrived as a holiday destination, while Williamstown grew on the back of its deepwater port in Hobsons Bay. Across the Maribyrnong River, a new settlement of Saltwater (Footscray) had grown around the punt crossing.

Further afield, villages formed at the transport hubs of the pastoral hinterland. Pentridge (Coburg) was surveyed in 1837-8. Land sales extended east from Warrigul/Heidelberg and across the Plenty River.¹⁴² The foundations of Eltham village were planned in 1840 with the extension of the Heidelberg Road reaching the site in 1846 to further promote lands sales through the district.¹⁴² To the south east, small timber camps formed the basis of later developments in the foothills of the Dandenong Ranges.

Victoria achieved independence from New South Wales on 1 July 1851, an event which coincided with discoveries of gold across the state at Ballarat, Clunes, Warrandyte and Buninyong and official sanctioning of gold mining. Evidence of mining activity still survives across the state including in Melbourne, such as within Warrandyte State Park which also contains the diversion of the Yarra River at Pound Bend through a 300 metre tunnel (VHR H1260). Victoria's population boomed, fuelling a rapid growth in government civic and urban infrastructure as well as unprecedented programs of land settlement and reservation.

It soon became clear to the government that Melbourne's growing population needed an improved water supply. A large water store was constructed based on the Plenty River north of Melbourne at Yan Yean. To avoid the spread of infectious disease, clean water was piped from the reservoir to individual properties and households. Yan Yean Reservoir was completed in 1857 and, at the time of construction, was one of the largest reservoirs in the world.

By 1861, Melbourne's population had increased to 140,000 comprising some 23 per cent of Victoria's population.⁴⁸ The central city saw much expansion with the development of port infrastructure, manufacturing and especially financial activity, as Melbourne effectively became the financial capital of Australia. Based largely on the production of gold and the growth of finance and banking industries, Melbourne was considered one of the great cities in the world and famously described

as 'Marvellous Melbourne'.¹⁴³ The construction of the Exhibition Building between 1879 and 1880 (now World Heritage-listed), was designed to accommodate the International Exhibition of 1880, reflected the confidence and aspirations of the metropolis.

The period between 1861 and 1881 saw much suburban consolidation, mostly within a three mile arc around central Melbourne. While the population had swelled to 268,000, most of the population still lived within the most densely settled suburbs of Melbourne. From the west, these included Flemington, Kensington, North Melbourne, Fitzroy, Collingwood and Richmond. They extended east to Prahran, and south to St Kilda, Port Melbourne and South Melbourne. Williamstown and Footscray to the west, had developed as largely self contained suburbs, based on industry.¹⁴⁴

Melbourne's famous land boom, which occurred during the 1880s, was driven in part by the significant expansion of the rail system across the suburbs. During this decade, more than sixty lines were constructed in Melbourne, in a radial pattern extending out to the suburbs and villages. Construction of the lines encouraged land speculation built on the increasingly flimsy foundations of building societies and land banks. The sale of many land estates was closely associated with construction of the lines and they were clustered around the new railway stations.

Much of this expansion occurred north and east of the city – including Hawthorn, Camberwell, and Malvern – and south east along Port Phillip Bay. Expansion in the east reflected a desire to avoid industrial areas and the flat 'treeless' plains that typified land to the west. Instead there was a preference for land seen as more fertile and able to provide opportunities for gardening and outdoor recreation and better situated for pleasant views. It is from this time that Melbourne's characteristic sprawl of low density, single dwelling suburbs has developed.

Many railway stations remain as evidence of the significant expansion of the system around Melbourne during the 1880s. Brighton Railway Station reflected the progress of a rail line along the coast of Port Phillip Bay leading to not only residential and commercial expansion but the establishment of holiday resorts and coastal recreation opportunities. Many other railway stations demonstrate fine architecture and the immense wealth generated by gold and commercial development in Melbourne.

While the creation of parks and maintenance of open space was seen as one means of providing for the wellbeing of the community, wider health issues remained for Melbourne. With the land boom of the 1880s and rapidly expanding population, the spread of contagious

disease escalated as a serious health threat due to lack of proper drainage and sewerage. The Sydney Bulletin coined a new term 'Marvellous Smellboom' to describe the increasing filth of Melbourne's streets and waterways.^{143,145}

Some measures had already been undertaken to improve the city's sanitation – relocation of noxious industries to the western suburbs, closure of the city's cesspits and 'night soil' removal – but the disease and stench remained. Eventually the government was forced to take action and the Melbourne and Metropolitan Board of Works (MMBW) was established in 1891.

The MMBW comprised representatives from all of the municipalities in Melbourne and was given responsibility for the progressive construction of sewerage of Melbourne. In addition, the Board became responsible for the management of Melbourne's water supply. In time, the MMBW would also take on planning responsibilities in the absence of an overall planning agency for greater Melbourne.

A number of engineering structures remain as evidence of the major engineering works undertaken by the MMBW to improve drainage and sewerage across Melbourne. Construction of the Spotswood Pumping Station, a key component of the new sewerage and draining system, was completed in 1896. The pumping station received water from Melbourne's underground sewers, which was then pumped to Brooklyn and on to the Metropolitan Sewerage Farm at Werribee via the Main Outfall Sewer or channel constructed between 1892 and 1894 (VHR H1932).

Inevitably, the land boom of the 1880s collapsed, to be followed by severe depression in 1893. Many Melburnians left for rural areas or to try their luck on the recently discovered Western Australian goldfields. However, despite government concerns about depopulation, Melbourne's population stabilised at 494,000 and future population growth remained steady over the next few decades.

By 1900, the worst of the depression was over and a period of slow recovery was underway. Federation in 1901 provided a boost to Melbourne's confidence, with the new Commonwealth Government and its offices accommodated in Melbourne. Victoria's parliament building housed the new federal parliamentarians while the Royal Exhibition Building operated as a temporary parliament until transfer of the Commonwealth Government to Canberra during the 1920s.

While the 1890s depression had set back the growth of Melbourne, most of the fledgling suburbs revived if they had good transport links – trains and/or trams – and possessed the features considered necessary for pleasant residential living, that is, opportunities for gardening and preferably higher land commanding views. More land in the south and eastern part of Melbourne met these conditions, resulting in the continuing lopsided growth of Melbourne. By contrast, suburban growth in the western suburbs was to flag for several decades.¹⁴⁴

Growth was slow up until the 1920s but increased after the return of World War One veterans seeking respite in the suburbs. Suburban development was also supported by the State Savings Bank with package deals for home ownership. The suburbs that expanded at this time are now regarded as Melbourne's middle suburbs.

Suburbanisation during these years was accompanied by improvements to local infrastructure and the extension of some government services, including education. From the turn of the century, it was increasingly recognised that government education should extend beyond primary schools. Initially, several 'Continuation Schools' and Agricultural High Schools were set up to provide an extended state education, the first Continuation School being housed at the former Model School in Spring Street, Melbourne, in 1905. High Schools were established under the *Education Act 1910* and the Melbourne Continuation School became known as Melbourne High School in 1912 and continued to educate students in Spring Street until its relocation to South Yarra in 1927 (VHR H1636).

The former Essendon High School was the first suburban high school established in Melbourne (1914) (VHR H1294), but the *Education Act 1910* restricted building high schools near existing (private) secondary schools. Consequently, most government high schools were built in rural areas at first and in Melbourne's northern and western suburbs, such as Essendon, Williamstown and Coburg.

After the turn of the century, monuments and memorials also became a greater feature of the cultural landscape, with most monuments erected on public land, either in existing parks or within road reserves. The Shrine of Remembrance, Victoria's main war memorial near the Domain reserve, was completed in 1934 (VHR H0848). MacRobertson Girls High School (VHR H1641), MacRobertson Bridge, and the Herbarium at the Royal Botanic Gardens (VHR H1459), were constructed with funds provided by the prominent confectioner and philanthropist, Sir MacPherson Robertson, to celebrate Victoria's centenary celebrations in 1934.

A list of Victorian Heritage Register sites and places on public land in the investigation area is contained in appendix 4.

3.3.3 MELBOURNE'S PLANNING HISTORY

As Melbourne slowly expanded in the first decades of the twentieth century, concerns about planning and conservation emerged. To some extent, management of natural resources – including forests and water – had improved. Policies for closed catchments had been introduced and a new forest management agency established. However, protection of the natural environment on public land through reservation remained ad hoc.^{146,147} The development of tourism, along with a growing interest in outdoor recreation contributed to a new appreciation of nature conservation. There remained a pragmatic view that only land considered unsuitable for settlement should be reserved for conservation. Significantly, land reservation for conservation purposes tended to result from the efforts of concerned groups and individuals rather than a strategic approach by government agencies.

At the same time, urban planning in Melbourne was no more strategic. Greater Melbourne was administered by a multiplicity of local councils, and lacked a central planning agency. A pattern of 'organic' growth had predominated, based on a *laissez-faire* process of land speculation, given direction by public transport development and social and amenity aspirations.

Progress on planning reform was slow. In 1922, the Metropolitan Town Planning Commission was established with a charter to investigate Melbourne's urban form and provide guidelines for development and planning improvement. A Plan of General Development was published in 1929 but was never to be implemented. It was not until 1944 that a new *Town and Country Planning Act* established a basic framework for planning in Melbourne.

In 1949, responsibility for a metropolitan wide planning scheme was given to the MMBW. With a massive increase in Government sponsored immigration, and a baby boom following World War Two, again Melbourne was faced with a wave of strong population growth and suburban expansion. The population doubled from around 1.1 million in 1946 to 2.2 million in 1966.

The drift of suburbia eastward towards the Dandenong Ranges during the 1940s and 50s raised further concerns about Melbourne's planning strategies and resulted in a 'Save the Dandenongs' campaign. This led to the purchase and reservation of land to protect nature conservation values and recreational opportunities.^{146,148}

The MMBW planning scheme (1954) was designed to deal with Melbourne's characteristic low density urban sprawl, traffic congestion, industrial development, and land use zoning. A chief feature of the plan was the identification of growth corridors and maintenance of 'green wedges' of agricultural land and open space in the form of parkland. This approach has been consolidated in various planning strategies and policies over the years since then, notably in the 1971 *Planning policies for the Melbourne Metropolitan Region*.

The 20th century saw continued expansion of Melbourne which, at the end of the Second World War had a population of around 1.2 million. The post war "populate or perish" slogan saw a rapid expansion in immigration to Australia and a significant wave of refugees from Europe. Melbourne has one of the largest Jewish populations of any Australian city as a result of this period. In the 1960s, migration from Yugoslavia, Turkey and Lebanon became more common, bringing Melbourne out of a period of recession and slow growth and creating a resurgence in public infrastructure projects. In the 1970s, changes to immigration policy saw an increase in Asian migration particularly from Vietnam, Cambodia and China. By 1976, the population had grown to 2.7 million.

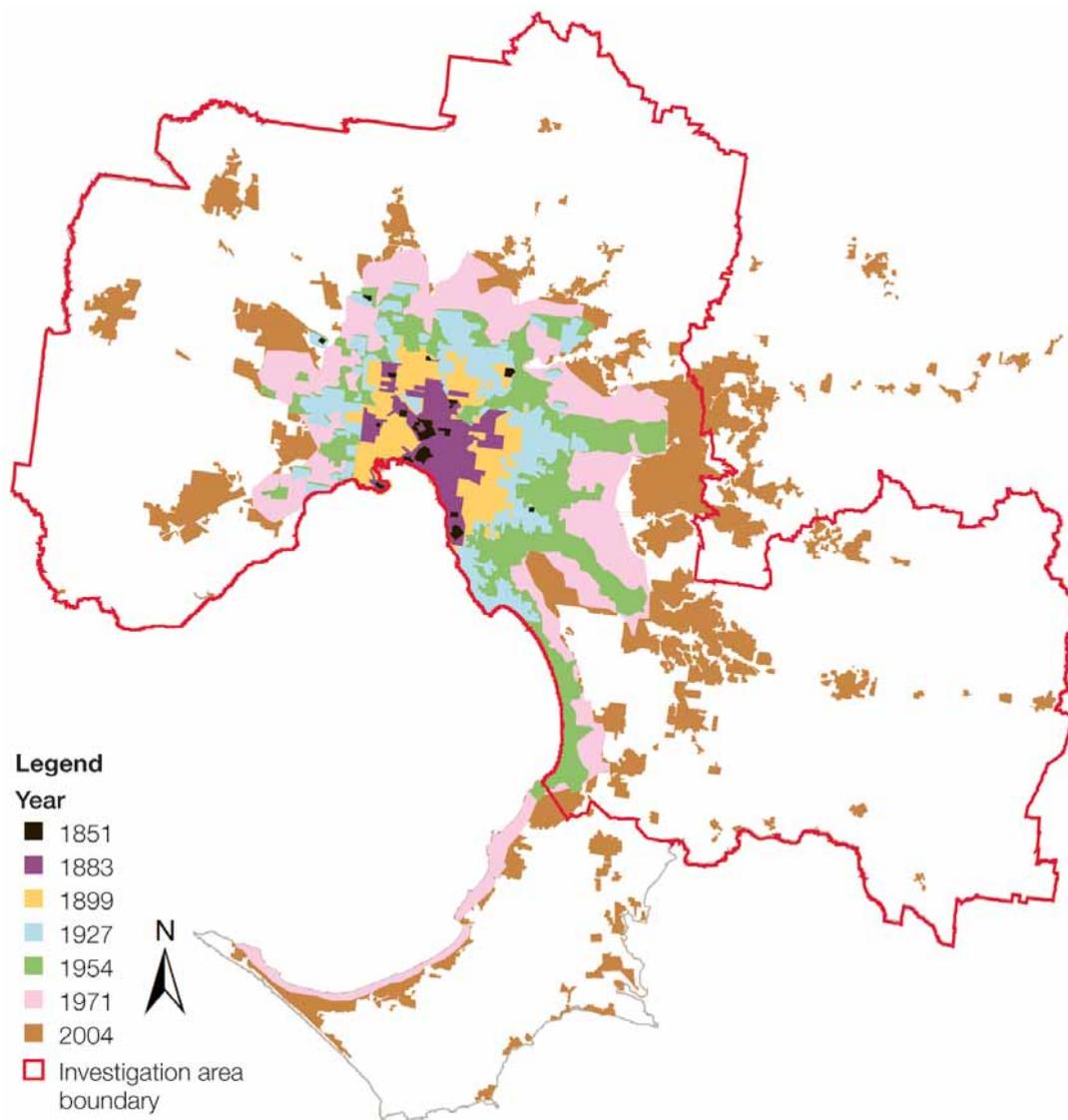
During the 1970s, a wider public conservation movement developed amid continuing expansion of the suburbs. There was strong community support for green wedge policies and progressive development of a system of metropolitan parks designed to provide 'breathing space' in Melbourne's urban area.¹⁴⁹ These included the Yarra Valley Parklands, Horseshoe Bend on the Maribyrnong River at Brimbank (Maribyrnong Valley Parklands), Jells Park and parks at Lysterfield, Braeside and Point Cook.

By 1996, metropolitan Melbourne's population had reached 3.3 million and its physical breadth was around 90 kilometres from Werribee to Pakenham (see figure 3.4). The beginning of the new century saw concerns being raised about this ongoing expansion of the city and its suburbs. In 2002, the Victorian Government implemented the urban growth boundary (UGB) 'to set clear limits to Melbourne's outward development'.¹ This boundary was extended in 2005 and again in July 2010 due to unexpectedly rapid population growth.

Figure 3.4

Melbourne's urban development (1851 to 2004)

Source: Department of Planning and Community Development.⁴



3.4 The people of metropolitan Melbourne today and in the future

The previous sections of this chapter described cultural heritage and history of the people of metropolitan Melbourne. This section completes the story with an overview of Melbourne's population today and projections for 2026.

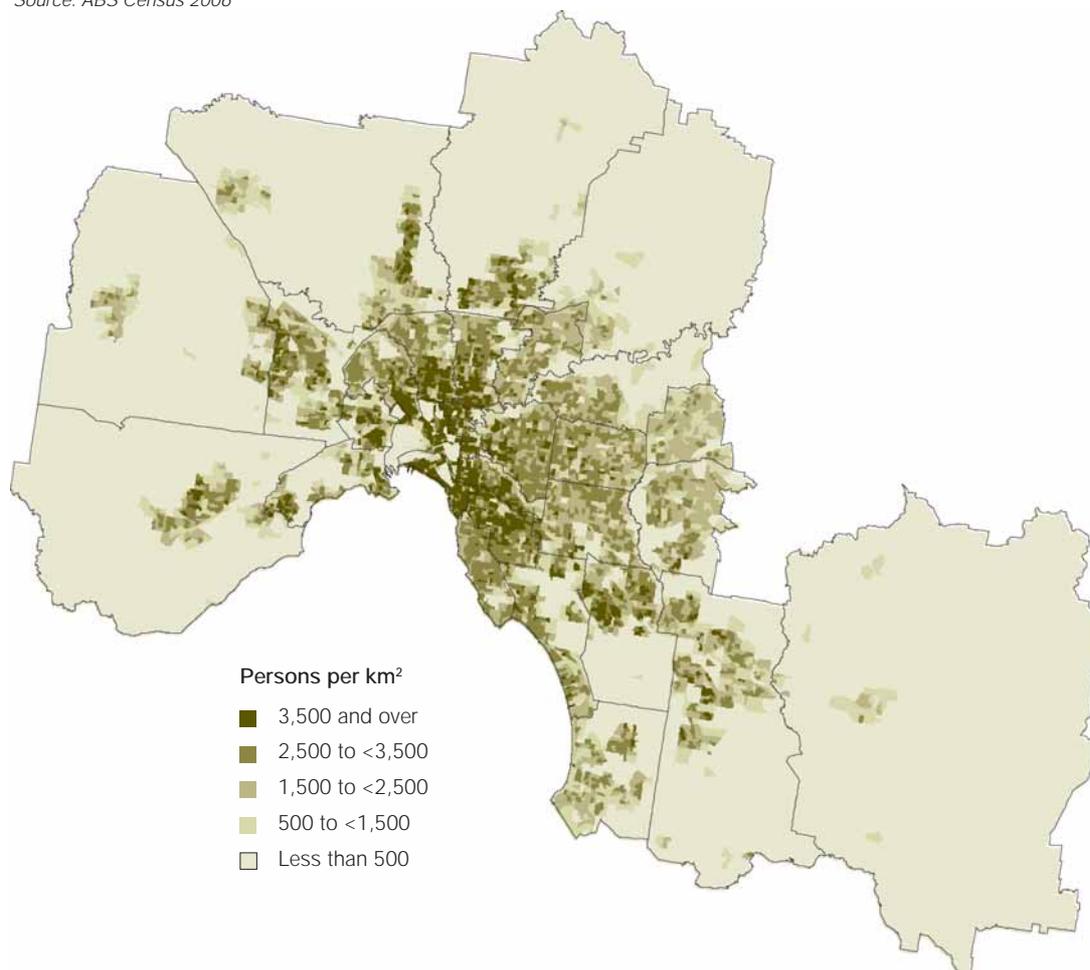
3.4.1 MELBOURNE'S CURRENT POPULATION

Metropolitan Melbourne's* population reached 3.7 million people by 2006, with two in three Victorians living in Melbourne. Melbourne's population density is highest in the inner and middle residential suburbs, which have been settled the longest, and areas along areas of Melbourne's rail and tram network (see figure 3.5).

Municipalities with the greatest proportion (compared to density) of population are Casey, Monash, Boroondara and Brimbank (see figure 3.6). Melton in the west, Nillumbik in Melbourne's north-east and Cardinia in the south-east are larger municipalities that are less densely settled. More central municipalities such as Melbourne, Yarra, Maribyrnong and Hobsons Bay have a smaller proportion of the population, partly due to their smaller size, but also as commercial and industrial land uses reduce the land available for residential development.

Figure 3.5
Population density in metropolitan Melbourne in 2006

Source: ABS Census 2006

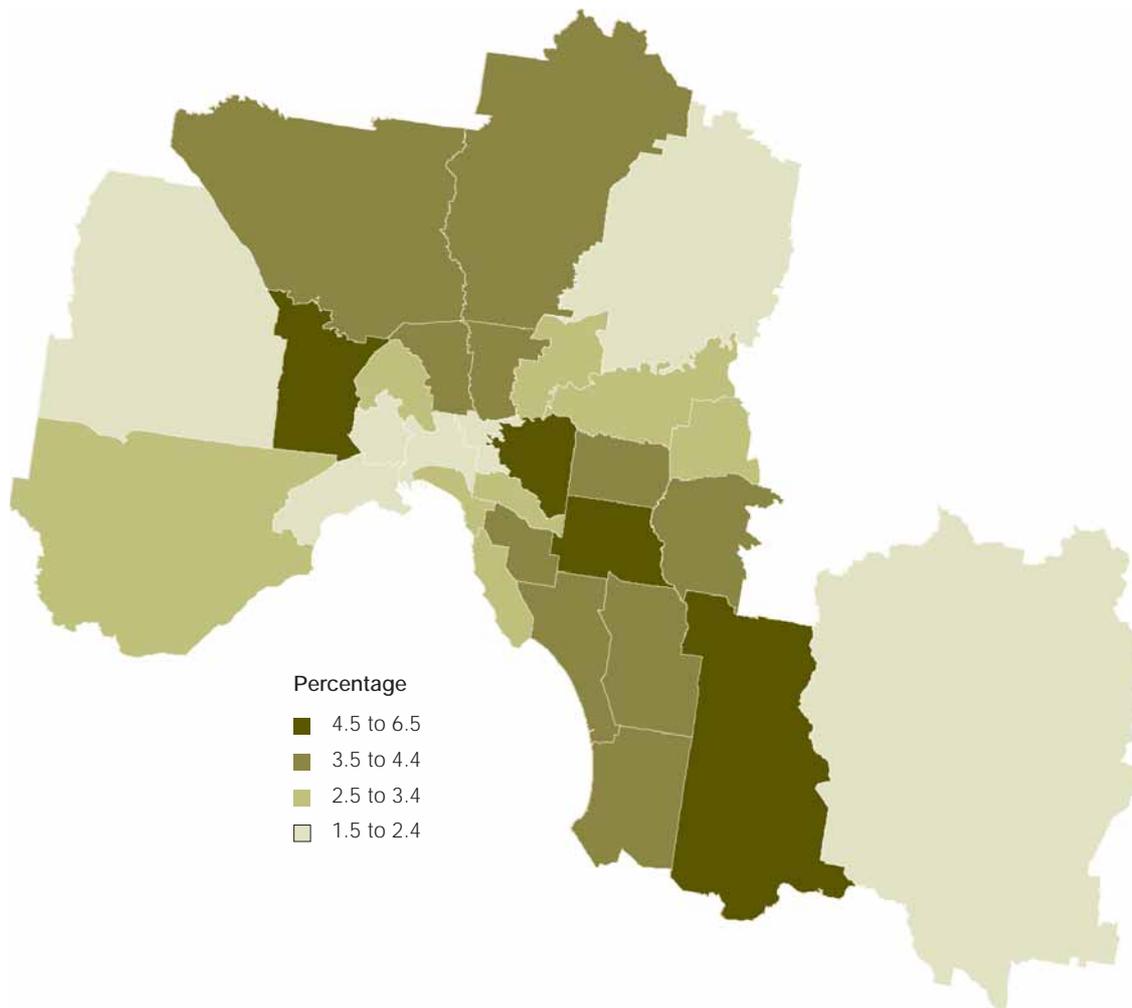


* These population figures are for all of metropolitan Melbourne including the Shires of Mornington Peninsula and Yarra Ranges. The investigation area had an estimated population of 3,459,140 in 2006.

Figure 3.6

Municipal population as a percentage of the total investigation area population in 2006

Source: ABS Estimated Residential population



The population of the investigation area has increased by about 430,000 people in the past ten years. Much of the growth over this period has been in the outer suburbs from new housing estates and in central Melbourne from inner urban gentrification and apartment development. Some parts of Melbourne have experienced local population declines such as in the outer suburbs in the north-west, west and east. This is largely due to young adults leaving the family home to move to other parts of the city.

Melbourne's age structure varies greatly across the investigation area. Inner urban areas such as the City of Melbourne are dominated by young adults, reflecting the employment and entertainment options in these areas. Outer and growth areas, by contrast, are dominated by

young families. Melbourne's "middle ring" of established suburbs has a range of age groups, although they tend to contain a higher proportion of older residents than other parts of Melbourne.

Metropolitan Melbourne is recognised for its cultural diversity with one in three Melburnians born overseas. The highest proportion of overseas born are found around Footscray-Maribyrnong in the west, Preston-Coburg in the north, and Dandenong-Springvale in the south-east. These patterns reflect various waves of post-World War Two migration. More recent arrivals to Melbourne (since 2001) have tended to settle in inner Melbourne (often overseas students and skilled migrants) and around Werribee in the west and Dandenong in the south-east.

3.4.2 MELBOURNE'S FUTURE POPULATION

Metropolitan Melbourne's population* is predicted to grow to about five million people by 2026.¹⁵⁰ Population projections indicate that all municipalities within the investigation area will experience growth between 2006 and 2026 (see figure 3.7). The pattern of strong growth in central Melbourne and in growth areas designated for future urban development is projected to continue. The population density of the City of Melbourne, for example, is projected to double in the 20-year period to 2026. Slower rates of growth are anticipated for Melbourne's middle and outer suburbs and north-east although the population in these areas will still continue to increase overall.

Figure 3.7

Projected population growth between 2006 and 2026 in metropolitan Melbourne

Source: DPCD Victoria in Future 2008 First Release



* These population figures include the Shires of Mornington Peninsula and Yarra Ranges.

PART C



PUBLIC LAND IN METROPOLITAN MELBOURNE

This part describes the public land within the investigation area and its uses, resources, values and management. This is the first time that ownership and use of public land has been identified for the inner and middle municipalities of metropolitan Melbourne.

4

PUBLIC LAND

The *Victorian Environmental Assessment Council Act 2001* defines public land broadly as Crown land and freehold land owned by public authorities (i.e. State government departments, agencies and bodies). It does not include local government owned freehold or Commonwealth land.

Public land offers a range of community uses and values. Nature conservation and appreciation is provided for in national, state and other parks, nature conservation reserves and some natural features reserves. Recreation occurs across most public land but is specifically provided for in regional and metropolitan parks, and smaller recreation reserves of various kinds such as sports fields. Public land also provides for government services or administration in public buildings including court houses, schools, government offices, hospitals, cemeteries, fire stations and police stations; and for community use in public halls, libraries, and public memorials. In addition, government infrastructure and utilities are located on public land including roads and railways, gas and electricity, piers, jetties, water supply and storage reservoirs, as well as sewage treatment plants. Detailed descriptions of current public land use are provided below in section 4.4 and shown on map A.

The public land estate across the investigation area is around 163,000 hectares (1,630 square kilometres) of a total 562,740 hectares (5,627.4 square kilometres). Approximately 131,000 hectares is Crown land and 32,000 hectares is public authority freehold land. The Crown land consists of 58,000 hectares identified by VEAC from detailed GIS mapping and a further 73,000 hectares of 'unparcellised' Crown road reserves. The area for unparcellised Crown road reserves is a broad estimate only. Subdivision roads owned by local councils are not included in this estimate. All public authority land was identified by VEAC using property details provided by public authorities and detailed GIS mapping.

For the first time, VEAC has brought together details of all land held by the Crown and more than 22 government departments and public authorities to provide a detailed picture of its use and its ownership across metropolitan Melbourne.

4.1 Public land distribution across Melbourne

Metropolitan Melbourne extends disproportionately to the east of the central business district or the original settlement. West of Melbourne, the relatively flat, treeless volcanic plains tended to discourage early residential development in favour of industry and transport infrastructure, such as ports, airports, river side and maritime industrial use, public infrastructure and defence industries, sewerage systems, and pastoral uses. To the east, development followed the fertile catchments of the Yarra River and Dandenong Creek and throughout these settlements — now suburbs — public land supported a range of community uses.

Inner suburbs tend to reflect the boom years of suburban growth, with many substantial public buildings, including schools, public infrastructure such as railways, court houses and town halls as well as notable public parks and recreational areas.

Early and systematic protection of Crown land coastal foreshore and river banks occurred in 1881 with survey and permanent reservation of unalienated areas. Metropolitan Melbourne's river and stream sides and beaches, along with other important public places, reflect a strong community focus on both passive and active outdoor activities and recreation, particularly on public land.

Successive governments have supported educational, cultural, sporting and scientific institutions. Some important sites on public land in the Metropolitan Melbourne Investigation area are the Royal Exhibition Building, Melbourne Museum, National Gallery of Victoria, State Library, Parliament House, Royal Botanic Gardens, Immigration Museum (Old Customs House), and the Shrine of Remembrance.

In much of the outer suburban areas, the pastoral and agricultural land use is evident, including early settlements and farm complexes, along with bridges, quarries and other industrial sites. Public land is mostly related to water management and infrastructure in these regions. The exception is in townships where public land was generally set aside for recreation reserves, local community halls or mechanics' institutes, schools and parkland.

4.2 Public land ownership



Around Port Phillip Bay, public land reflects an emphasis on maritime activities and coastal recreation, particularly to the east of the city. There are numerous piers, jetties, marinas and coastal buildings associated with use of the bay and sandy foreshore for boating, fishing, and relaxing by the sea. Sea baths and coastal promenades, now including bike paths, are key features that have long attracted visitors to the seaside. Coastal Crown land along Western Port is less developed for recreation and provides a different experience. Shallow, often mangrove-lined, foreshores are less inviting for seaside leisure, but are important for nature conservation and provide habitat for many species of plants and animals.

National and state parks occur largely in the outer fringing ranges in the north and east of the investigation area. These places were not closely settled or cleared during early colonisation due to distance and the steep terrain.

In the Metropolitan Melbourne Investigation area the majority (approximately 65 per cent) of public land is Crown land. There are, however, large areas of public authority freehold land, particularly services and utilities areas, compared to other areas of Victoria.

The public land estate is highly fragmented in this investigation area with more than 75 per cent of all land blocks or parcels less than one hectare. At a detailed level, the public land estate is also relatively dynamic. Map B depicts public land ownership across the investigation area. However, there may be ongoing changes that are accounted for by the dynamic nature of land ownership particularly around large infrastructure projects in growth corridors and the inner city.

After the Crown, the largest public landholder in the investigation area is Melbourne Water with around 17,721 hectares or 20 per cent of the total public land estate. Its landholdings include sewage treatment plants (Western and Eastern), bulk water storage reservoirs and catchments, water supply, drainage and flood mitigation areas, and semi-natural wetlands such as Edithvale-Seafood Wetlands and Truganina Swamp, and streams.

Other major public landholdings in the investigation area are:

- ▶ VicRoads' extensive road infrastructure network
- ▶ VicTrack's extensive infrastructure network for delivery of rail services
- ▶ the Department of Education and Early Childhood Development's hundreds of schools and educational facilities across Melbourne.

Other public authorities own land to provide a range of community services. Many operate from both freehold land and Crown land reserved or allocated for a specific purpose.

- ▶ The Department of Human Services administers hospitals and related health care facilities on both Crown and freehold public land.
- ▶ The Metropolitan Fire and Emergency Services Board, Country Fire Authority and Ambulance Victoria deliver emergency response, community education and safety awareness, as well as providing advice to State and local government on emergency response and management on both Crown and freehold public land.
- ▶ The Victorian Government owns three retail water businesses in metropolitan Melbourne: South East Water, Yarra Valley Water and City West Water. These agencies provide water and sewerage services to residents of Melbourne. In addition Western Water and Southern Rural Water provide domestic water, irrigation and stock services, and some bulk water supply services.

- Other government departments own small areas of public land (including land held in title by the relevant minister) to deliver specific services.

A summary of public land holdings is provided below in table 4.1 and shown on map B.

Table 4.1
Public land ownership in the Metropolitan Melbourne Investigation area

PUBLIC LAND OWNER	AREA (HA)
Crown	58,137
Crown road reserve (estimated)	73,000
Melbourne Water	17,721
VicRoads	5,462
Department of Education and Early Childhood Development	2,363
VicTrack	2,322
Western Water	997
Port of Melbourne Corporation	494
South East Water	470
Southern Rural Water	250
Department of Health	195
Skills Victoria and other adult education services	153
Yarra Valley Water	151
Department of Planning and Community Development	142
Department Industry, Innovation and Regional Development	134
Trust for Nature	112
Department of Human Services	60
City West Water	30
Department of Transport	26
Metropolitan Fire and Emergency Services Board	25
Department of Treasury and Finance	21
Country Fire Authority	16
Ambulance Victoria	6
Department of Justice	6
Total extent of public land in the investigation area excluding estimated Crown road reserves	89,293
Total extent of public land in the investigation area including estimated Crown road reserves	162,293

Notes:

1. Public land owner includes land owned by the Minister for the relevant portfolio and other bodies that are directly administered by the relevant department or Minister such as boards of TAFE.
2. VicUrban and Department of Human Services Office of Housing owned developments (with the exception of Office of Housing high-rise apartment buildings) are not included in public land calculations.
3. Areas of Crown land administered by the Department of Treasury and Finance (DTF) are included in the table as DTF land.

4.3 Previous public land investigations of the Melbourne area

Since 1970, the Land Conservation Council (LCC) and successor bodies, the Environment Conservation Council (ECC) and now VEAC, have conducted systematic public land use investigations across the State. These earlier studies addressed many of the same issues of balanced use of public land that are relevant today. The recommendations of these studies and investigations, once approved by Government, provide the framework for public land use and management in Victoria.

Outer portions of the Metropolitan Melbourne Investigation area were covered in one of the first LCC studies of the Melbourne Area completed in 1977.¹⁵¹ Two regions have subsequently also been reviewed as part of the strategic approach adopted by the LCC to revise recommendations in response to changing and evolving community uses of public land.^{152,153} The Melbourne Area District One Review covered areas of western and north-western Melbourne now part of the Wyndham, Melton, Hume and Whittlesea municipalities.¹⁵² Melbourne Area District Two Review included areas of Nillumbik and Cardinia with small areas in the Banyule, Maroondah and Knox municipalities.¹⁵³

In addition to the broad-based public land use investigations, two thematic special investigations have also been conducted within the investigation area. The statewide LCC Rivers and Streams Special Investigation focused on major watercourses with special values.¹⁵⁴ Areas bordering the Yarra River were recommended and approved by Government as a Victorian Heritage River, and general recommendations were made regarding the use and management of public land stream frontages.¹⁵⁴

The Environment Conservation Council (ECC) completed the Marine Coastal and Estuarine Investigation.¹⁵⁵ The ECC investigation area overlaps with the current investigation area along the intertidal zone between low and high water mark, and in places where municipal boundaries have been expanded to encompass coastal infrastructure (e.g. marinas, piers and jetties).

The boundaries of LCC and ECC investigations relevant to the Metropolitan Melbourne Investigation area are shown in figure 4.1. Inner and municipal city areas were excluded from earlier systematic investigations of public land use under the *Land Conservation Council Act 1970*. This current VEAC investigation is the first of this type encompassing most of the metropolitan area.

Figure 4.1
Previous Land Conservation Council (LCC) public land use investigation areas and the Metropolitan Melbourne Investigation area



4.4 Public land use categories

An evolving suite of public land use categories has been developed by VEAC and its predecessors in order to describe and recommend public land use across the state (see below). Each public land use category defines the primary purpose of the land and the range of permitted uses. This may be reflected in the reservation purpose and legislation for Crown land (e.g. national parks are established under the *National Parks Act 1975*). Public authority freehold land is held for a primary purpose undertaken by that agency. Many public authorities manage a mixture of Crown land and freehold land.

VEAC has classified public land into the following major land use categories:

- ▶ parks primarily set aside for nature conservation — national and state parks, wilderness parks, marine national parks and marine sanctuaries, and some other parks
- ▶ nature conservation reserves — flora, flora and fauna, and non-hunting wildlife reserves
- ▶ private protected areas — Trust for Nature conservation properties
- ▶ historic and cultural feature reserves — historic reserves
- ▶ regional parks including, in Melbourne, metropolitan and coastal parks
- ▶ natural features reserves — bushland areas, stream frontages, wildlife areas and wetlands, streamside areas and scenic reserves, lakes, mineral springs and caves
- ▶ state forest — including areas allocated as hardwood production areas
- ▶ coastal reserves and offshore coastal waters reserve
- ▶ community use areas — recreation reserves, parklands and gardens, and community buildings such as schools, libraries and public halls
- ▶ water production areas — water storage reservoirs and bulk distribution facilities
- ▶ services and utilities areas — roads, railways, sewerage services, pipelines, cemeteries, police stations, court houses, public offices, hospitals, public housing, municipal buildings and depots
- ▶ uncategorised public land — no committed use, but subject to investigation, a future public use may be determined
- ▶ other categories — those not in this investigation area including alpine resorts, national heritage park, forest park, softwood and hardwood plantations, earth resource areas.

In addition to public land use categories, there are three types of overlay that may be applied to public land. These are heritage rivers, reference areas and declared or proclaimed water supply catchments. Each is described in section 4.6.

4.5 Current public land use

Current public land use across the investigation area is shown on map A and described below. Table 4.2 opposite shows the extent of land within each of the major public land use categories in the investigation area. In some places these land uses are formalised through legislation, by existing Crown land reservation or previous government approved public land use recommendations of one of the LCC or ECC investigations referred to in section 4.3. In other cases, there may not be a legal or formal mechanism in place which reflects the accepted current use for particular sites. For this reason VEAC has provided in Part E general recommendations for the relevant land use categories that confirm existing public land use across the investigation area as depicted on map A. There are also a small number of sites for which changes to public land use are proposed and these are outlined in Part E of this discussion paper, together with the general recommendations for the relevant public land use category.

Table 4.2
Extent of major public land use categories in the investigation area

CATEGORY	AREA (HA)
National park	10,515
State park	14,400
Marine national park and marine sanctuary	95
Nature conservation reserve	3,540
Private protected area - Trust for Nature	110
Regional park	8,700
Regional and metropolitan park	7,690
Coastal park	1,010
Natural features reserve	4,755
Natural features reserve (general)	10
Natural and scenic features area	5
Bushland area	865
Streamside area	160
Stream frontage (including stream beds and banks)	3,135
Wildlife areas and wetland	580
Coastal reserve and coastal waters reserve	1,175
Water production area	8,710
Historic and cultural features reserve	60
Community use area	7,595
Recreation area	2,180
Parklands and garden	2,110
Recreation trail	115
Rifle and shooting range	5
Reservoir park	380
Buildings in public use	2,805
State forest	4,045
Services and utilities area excluding Crown road reserves	24,435
Services and utilities area including Crown road reserves	97,435
Road	6,225
Crown road reserve (estimated)	73,000
Railway	2,905
Hospitals, public offices, justice	845
Cemeteries	1,070
Water and sewerage service	11,940
Other services and utilities area	1,450
Uncategorised public land	1,160
Total extent of public land in the investigation area excluding Crown road reserves	89,295
Total extent of public land in the investigation area including Crown road reserves	162,295
Total extent of investigation area (all freehold and public land)	562,740
Overlays (areas included in the totals above)	
Reference area (in various categories above)	2,045
Heritage river (in various categories above)	205

Notes:

1. Areas are rounded to the nearest five hectares and are mostly derived from GIS analysis.
2. Only portions of a number of larger parks are within the investigation area (e.g. Dandenong Ranges National Park, Kurth Kiln Regional Park, Lerderderg State Park, Kinglake National Park).
3. Historically, Government roads were not ascribed allotments or parcels. The estimate of public land allocated to Services and utilities areas – road transport purposes described here is defined in two ways – an accurate description of public land parcels allocated to road use and secondly the less accurate unparcellised Crown road reserves estimated to be around 73,000 hectares using GIS methods.

National and state parks

Victoria's national and state parks comprise the vast majority of the state's protected area system. They are set aside primarily to conserve and protect natural ecosystems and provide for public enjoyment, education and inspiration in natural environments. National and state parks are managed for the same objectives under provisions of the *National Parks Act 1975*.

These parks have multiple objectives and provide for nature conservation, recreation, water supply and other uses. While some parks include small relatively undisturbed areas, they almost all include areas with past disturbance, mostly from timber harvesting and grazing.

National and state parks currently comprise approximately 25,000 hectares or about 27 per cent of public land in the investigation area. Parks wholly or partly within the investigation area are listed in table 4.3.

VEAC is recommending several small additions to Kinglake National Park and Bunyip State Park (see chapter 10).

Table 4.3
National and state parks in the investigation area

NAME	AREA (HA) WITHIN INVESTIGATION AREA
Organ Pipes National Park	153
Kinglake National Park	10,026 (total 22,430)
Churchill National Park	272 ha
Dandenong Ranges National Park	17 (total 3,540)
Lerderderg State Park	646 (total 20,180)
Warrandyte State Park	681
Bunyip State Park	13,075 (total 16,655)



Above: The Yarra River flows through Warrandyte State Park in Melbourne's outer east.

Marine national parks and marine sanctuaries

In 2002, 5.3 per cent of Victoria's marine environments were set aside under the *National Parks Act* in a system of highly protected marine national parks and marine sanctuaries. These areas are designated for protection of natural values with no fishing, resource use or damaging activities permitted.

Only the areas of marine national parks and sanctuaries between high and low water mark are included within the investigation area boundary. Yaringa Marine National Park (90 hectares of 980 hectares total) in Western Port and Jawbone Marine Sanctuary (4 hectares of 30 hectares) near Williamstown are partly included in the Metropolitan Melbourne Investigation area. Point Cooke Marine Sanctuary and Ricketts Point Marine Sanctuary abut the investigation area boundary along the high water mark, but are not included.

Both Yaringa Marine National Park and Jawbone Marine Sanctuary adjoin onshore nature conservation reserves comprising saltmarsh, wetlands, sheltered intertidal soft sediments and mangrove complexes. Yaringa

Marine National Park together with Quail Island Nature Conservation Reserve and Northern Western Port Nature Conservation Reserve, constitute an important portion of the Westernport Ramsar wetland, and protect one of the least disturbed intertidal mudflats in the region. Jawbone Marine Sanctuary contains one of the largest mangrove community remnants in Port Phillip Bay, and includes a range of unusual geomorphological features and values.

Other parks

Several areas across Victoria are set aside under Schedule Three of the *National Parks Act* as other parks. Where the park was established primarily for protection of natural or biodiversity values, these areas are included in the protected areas system. Some of these areas also provide for an intensity of recreational use and similar activities (e.g. dog walking) that may not be compatible with national or state parks.

There are three places in this investigation area that are other parks under Schedule Three of the *National Parks Act*: Lysterfield (Lake) Park set aside for recreational values in a natural landscape and Woodlands Historic Park established for cultural heritage values are considered regional parks based on current public land use objectives and values; and Langwarrin Flora and Fauna Reserve is considered a nature conservation reserve.

Nature conservation reserves

Nature conservation reserves are protected areas like national and state parks. These areas are set aside to conserve rare or threatened species and/or plant associations or communities that are of particular conservation significance or valuable faunal habitat. The primary land use objective is nature conservation, with compatible educational and scientific study and some passive recreation where compatible with the values of the particular reserve.

There are 41 nature conservation reserves in the investigation area (see appendix 5). Twelve existing nature conservation reserves specifically protect native grasslands and grassy woodlands in the Victorian Volcanic Plain bioregion. This is one of the most cleared ecosystems in Victoria having been subjected to intensive agriculture and domestic stock grazing. These threatening processes continue and there is additional pressure from expanding residential development in Melbourne's west. Very little of this bioregion remains in public ownership across the investigation area.

Five nature conservation reserves are greater than 200 hectares in size. Of these Craigieburn Grasslands (344 hectares), The Pines (216 hectares) and Langwarrin (215 hectares) flora and fauna reserves are located in corridors of expanding residential development. The other large areas — Warrandyte-Kinglake Nature Conservation Link (646 hectares) and Northern Western Port Nature Conservation Reserve (680 hectares) — are located in the outer areas, the latter extending beyond the investigation area boundary. Many are small remnants of the pre-colonisation landscape; fifteen are less than 20 hectares. Small nature conservation reserves are particularly sensitive to disturbance, both from within or from adjoining land use, and maintaining their natural values can be problematic.

Private protected areas

Trust for Nature (TFN) conservation land is the only freehold public land in the investigation area currently included in a protected area category. A total of around 155 hectares of TFN owned public land at 10 sites meet the standards of protected areas on Crown land. The largest sites are Willis Nature Park at Smiths Gully (82 hectares) and Harbury near Gembrook (22 hectares). These areas are managed in a manner consistent with nature conservation reserves.

Natural features reserves

Natural features reserve is a public land use grouping that includes several categories of land that have broadly similar land use objectives. They include:

- ▶ scenic and natural features areas
- ▶ bushland areas
- ▶ wildlife areas (hunting permitted)
- ▶ lakes
- ▶ geological and geomorphological features areas
- ▶ streamside areas
- ▶ stream frontages, stream beds and banks
- ▶ wetlands.

While the conservation values of such areas are not generally as significant as those of national parks and nature conservation reserves, these areas nonetheless have an important role in the protection of remnant vegetation and habitat, and of natural and scenic features and landscape character. They also provide opportunities for education and passive recreation. Bushland, scenic and streamside areas are considered to be protected areas, as they are managed primarily for protection and enhancement of natural values.

Other natural features reserves such as wildlife areas and wetlands, stream frontages and lakes may have permitted uses that are incompatible with nature conservation objectives including grazing, timber harvesting and duck hunting and may be more intensively developed for recreation.

Many of these areas are relatively small parcels of vegetated public land or linear strips along waterways. Some form important habitat links or corridors across the now fragmented landscape. Streamside areas and stream frontages are particularly important for the movement of plants and animals, and will be of increasing importance during changing climatic conditions. Edithvale-Seafood and the Point Cook to Little River coastal wetlands and the northern coastal area of Western Port have also been recognised as wetlands of international importance under the Ramsar Convention (see chapter 2).

This category also includes areas of natural and semi-natural wetlands, sometimes utilised as retarding basins, that are owned by water management agencies, notably Melbourne Water. This includes areas such as Edithvale – Seafood Wetlands and Centre Swamp, Truganina Swamp and Cherry Lake (as part of the floodplain for Kororoit Creek).

Historic and cultural features reserves

Throughout the investigation area there are many sites associated with human history. Aboriginal history extends over thousands of years and evidence of occupation is ubiquitous across the landscape. More recent history also records many sites associated with exploration, settlement, agriculture and mining, as well as government institutions and services. These sites and values are an important cultural connection to the past for current and future generations.

Historic and cultural features reserves are established to primarily protect highly significant historical or archaeological values, including features such as buildings, structures, relics or other artefacts. Throughout the investigation area there are a range of sites and places associated with Aboriginal history and European exploration, settlement, agriculture, timber production and gold exploration and mining. There are fourteen historic and cultural features reserves within the investigation area including notable sites such as Old Melbourne Gaol, Emerald (Puffing Billy) Railway, Greenvale Aboriginal Cemetery and Bullum Bullum Reserve in Deer Park (table 4.4).

Historic and cultural heritage places on public land often contribute to overall values of areas (e.g. Royal Exhibition Building, Melbourne Cricket Ground, Flemington Racecourse, Woodlands Historic Park, Point Cook Coastal Park, Kurth Kiln Regional Park). In some places a particular feature may be a key visitor attraction. Although the underlying land use category does not specifically reflect historic or cultural values, a range of other mechanisms, such as management zoning, listing on heritage registers or planning scheme heritage overlays, identify these sites as significant.

Table 4.4
Historic and cultural features reserves in the investigation area

NAME	AREA (HA)
Bullum Bullum Reserve, Burnside	7.80
RipponLea (part), Elsternwick*	0.28
Royal Historical Society, Melbourne*	0.15
Emerald (Puffing Billy) Railway	37.70
Essendon Historical Museum	0.06
Greenvale Aboriginal Cemetery	9.45
Warrandyte Miners Residence	0.03
Lynchs Bridge Historic Precinct Reserve	0.94
North Base Stone Historic Reserve, Tarneit	<0.01
Old Heidelberg Court House	0.11
Old Melbourne Gaol	0.08
Old Sunbury Court House	0.24
South Base Stone Historic Reserve, Werribee	0.08
Tasma Terrace, East Melbourne	0.14

* Public authority land

Regional parks

Across the state, regional parks provide for intensive visitor use by those seeking informal recreation in natural or semi-natural surroundings. They are typically located near major regional or urban centres, often along tourist routes, and offer opportunities for activities such as picnicking and walking in a natural environment as well as other more intensive uses such as trail bike riding. Minor resource use may be permitted in some regional parks.

This land use category is more difficult to apply within metropolitan Melbourne, and a wide range of permitted uses and values are found in the areas categorised and mapped as regional parks. There are a number of apparently dissimilar areas included in the 'regional park' category, arising from the spectrum of development in the investigation area from highly urbanised areas to rural fringe. For example, Kurth Kiln Regional Park (1,247 hectares) and Lysterfield Park (655 hectares) are substantial areas with natural and semi-natural landscapes providing for day visitors engaged in non-organised recreation. Wattle Park also provides for a large number of visitors, but offers a more structured and less natural landscape experience in an urban setting. While detailed management planning guides land use for each park, a strategic framework encompassing all types of public parklands in metropolitan Melbourne is lacking. This investigation is the first to include such a broad range of parklands and open space in a public land use framework.

Larger less structured passive recreation areas with semi-natural landscapes are more similar to the regional parks in the rest of Victoria. These are Kurth Kiln Regional Park, Lysterfield Park, Police Paddocks and Woodlands Historic Park. Other regional parks are described below in sub-categories reflecting their different character in metropolitan Melbourne.

The reservation purpose for Crown land is utilised as an approximation for management objectives where approved LCC recommendations are not in place.¹⁵⁶

All regional parks within the investigation area are listed in table 4.5.

Metropolitan parks

Places that are located within the urban area or nearby, have a largely modified landscape, or provide for more intensive or more organised recreation use are described here as a sub-category of regional parks – metropolitan parks – reflecting similar overall land-use objectives in an urban context e.g. Yarra Bend Park reserved for a 'public park and recreation' in 1935. Many of these are areas established by the former Melbourne Parks and Waterways during the late 1990s (e.g. Karkarook Park, Braeside Park, Lower Maribyrnong Valley Parklands, and Dandenong Valley Parklands) and are reserved for 'conservation, recreation, leisure and tourism' and managed by Parks Victoria. Provision of open space for non-organised and informal activities recreation has a long history aligned with the development of broader planning for Melbourne. Planning for public open space is discussed further in chapter 6.

Some metropolitan parks may be similar to sites included in the community use area land use category which includes parklands and gardens, reservoir parks, and recreation reserves. For example Westgate Park and Werribee Park Mansion are reserved for 'public recreation' and 'public park' respectively and are allocated to the public land use category 'community use area- parklands and gardens' reflecting a more landscaped and modified environment. Karkarook Park, Braeside Park and Wattle Park are all reserved for 'conservation, recreation, leisure and tourism' and are categorised here and described as metropolitan parks.

Coastal parks

Across the state, coastal parks are often established under Schedule Three of the *National Parks Act 1975* (e.g. Discovery Bay, Cape Liptrap and Cape Conran coastal parks). In the Metropolitan Melbourne Investigation area there are three coastal parks: Point Cook Coastal Park including Cheetham Wetlands, Altona Coastal Park and unreserved Crown land of Truganina Coastal Park (north of Cheetham Wetlands and informally managed as part of the wetlands by Parks Victoria).

These coastal parks typically have objectives of metropolitan parks in a coastal setting.

Table 4.5
Regional parks in the investigation area

NAME	AREA (HA)	RESERVATION TYPE OR PURPOSE OR ACCEPTED LCC RECOMMENDATION
Regional park		
Kurth Kiln Regional Park	1247.2	Public purposes LCC 1994- Regional Park
Lysterfield Park	655.4	National Parks Act- Schedule 3 LCC 1994- Regional Park
Woodlands Historic Park	820.8	National Parks Act- Schedule 3 LCC 1987- Regional Park
Police Paddocks	418.4	Public purposes (1930)
Regional park – metropolitan park		
Braeside Park	293.2	Conservation, recreation, leisure and tourism
Cardinia Creek Parklands	230.6	Conservation, recreation, leisure and tourism
Dandenong Valley Parklands	848.3	Conservation, recreation, leisure and tourism
Karkarook Park	37.8	Conservation, recreation, leisure and tourism
Footscray Park	14.5	Public park and recreation
Lower Maribyrnong Parklands	160.6	Conservation, recreation, leisure and tourism
Maribyrnong Valley Parklands	349.8	Conservation, recreation, leisure and tourism
Merri Creek Parklands (Galada Tamboore)^	106.9	Areas of freehold PL will remain unreserved
Plenty Gorge Parklands (including Plenty Gorge Metropolitan Park)^	1148.1	Conservation, recreation, leisure and tourism, (Conservation of an area of Natural Interest) LCC 1994- Regional Park (part)
Wattle Park	55.0	Conservation, recreation, leisure and tourism
Werribee River Regional Park	228.6	To be reserved
Yarra Bend Park	245.3	Public park and recreation (1935)
Yarra Valley Parklands (including Yarra Valley Metropolitan Park, Yarra Flats area, Pridmore Park)^	830.6	Conservation, recreation, leisure and tourism (public park and recreation, public park)
Regional park – coastal park		
Point Cook Coastal Park	847.7	Conservation, recreation, leisure and tourism
Altona Coastal Park	67.3	Recreation and conservation
Truganina Coastal Park	94.2	To be reserved

[^] Parks consisting of multiple land units and/ or public land ownership.

State forest

State forests are mostly extensive areas of Crown land supporting native forests and other vegetation. These areas are set aside to produce hardwood timber; conserve native plants and animals; supply water, and protect catchments and streams; provide opportunities for recreation and education; and protect historic and Aboriginal cultural sites and places. State forests are also available for the production of minerals, honey, gravel, sand, road-making materials, and other forest products.

Timber harvesting in state forests occurs in the General Management Zone (GMZ), and the Special Management Zone (SMZ) where compatible with identified values. While timber production is the highest priority for areas zoned GMZ there is also a range of other uses such as recreation and nature appreciation. Unproductive forest (less than 28 metres mean stand height) is also included in the GMZ. In addition the *Code of Practice for Timber Production 2007* as the regulatory instrument for commercial timber production provides management prescriptions for buffers around some other values such as streams, historic places, recreation facilities, threatened flora and fauna species, or specific habitats in which harvesting is not undertaken.

The 4,050 hectares of state forest in the investigation area is part of the extensive Yarra State Forest (total area 17,650 hectares). There are two geographically separate blocks: Mt Disappointment Block abutting Kinglake National Park and Upper Bunyip Block abutting Bunyip State Park and Kurth Kiln Regional Park. The former is some 1,600 hectares consisting of roughly half this area in SMZ for recreation values and about 35 hectares in Special Protection Zone (SPZ) for old growth forest protection. In the Upper Bunyip Block (around 2,340 hectares) SMZ for landscape values includes most of the area south of Dodd Creek and Bunyip River (approx 340 hectares) and SPZ protects areas of cool temperate rainforest, Leadbeaters possum, *Gymnobelideus leadbeateri* and tall astelia *Astelia australiana* habitat, mostly along the Bunyip River corridor.

These areas include a range of vegetation types and natural features or cultural features as well as many roads and visitor facilities for sightseeing, walking, picnicking or camping. Most of this area was burnt during the devastating 2009 bushfires.

Community use areas

Community use areas are primarily used for recreation, education, parklands or other specific community purposes. Community use areas in metropolitan Melbourne encompass some 7,600 hectares, and include some highly significant sites. Notable community use areas include the Melbourne Cricket Ground, Royal Park, the National Gallery of Victoria, Melbourne Museum, the Royal Exhibition Buildings, Melbourne Zoological Gardens, Fitzroy Gardens, Westgate Park, Albert Park, Bundoora Park, Fawkner Park, Yarra Park, Royal Botanic Gardens Melbourne and Cranbourne, Melbourne Aquarium, Cardinia Reservoir Park and Yan Yean Reservoir Park. In metropolitan Melbourne, as observed earlier, some sites in the parklands and gardens sub-category of community use area are similar to the more structured and modified metropolitan parks (see regional parks above), and vice versa, and could be assigned to either category.

Buildings in this category are distinguished from public offices, justice and health related sites that are categorised as services and utilities areas. The difference is based on typically broader community access or focus on the areas described here. Buildings such as libraries, halls, schools and community centres provide for multiple uses. By comparison buildings classed as service and utilities areas are used almost exclusively to deliver a service to the public and provide a workplace for government employees.

There are numerous schools and other public community buildings distributed across the investigation area. Management of these areas is often delegated to locally based committees of management, particularly local government. Some of these are recreation reserves, also containing small areas of remnant vegetation contributing to local habitat and landscape values. Often parks and sports grounds are important focal points for outdoor activities including both active and passive use. Public land is in high demand to provide for these types of uses, particularly in urban areas where there may be limited access to larger coastal foreshores, national, state or regional parks.

The types of community use also differ in requirements for land; both the size of area and site location. Some community uses require built infrastructure and facilities, while others can occur in less structured environments. The level of usage may sometimes cause conflict between different user groups or other values. In other cases a broader range of uses may be able to be made available than is currently provided, but there are additional management responsibilities and resources required to provide for this additional access. Conflicts

and tensions between user groups are some of the most difficult aspects of public land management, together with providing for changing or evolving needs of different communities over time. Each of the sub-categories of community use areas is described in more detail below. Note that land and buildings owned by local government are not included in VEAC's definition of public land.

Buildings in public use — kindergartens, schools, and other educational institutions, institutes of TAFE and adult education services, public halls, community centres, galleries, museums, exhibition centres, libraries, infant welfare and child care centres. 'Buildings in public use' account for over one third of public land categorised as community use areas. The multiple uses of these sites distinguishes them from buildings that provide services and utilities functions, that typically are only accessed by the wider community attending for provision of health or justice services.

Recreation areas — reserves with facilities for organised sports, non-organised and informal recreation, e.g. sports grounds, swimming pools, tennis courts, bowling greens. Some of the most notable examples in Melbourne are major sports and recreation complexes and include sites with other values such as heritage or biodiversity values. These include Albert Park and the Melbourne Tennis Centre. Recreation areas account for over one quarter of public land categorised as community use areas.

Recreation trails — linear trails for cycling and walking, many of which are located along the coast or streams, as well as along infrastructure corridors such as railway lines or roads. Some of the most popular trails include the coastal Bay Trail, Merri and Darebin creeks trails, Federation Trail, Capital City Trail, Anniversary Trail and Maribyrnong River Trail.

Parklands and gardens — often small intensively used local community parklands, playgrounds and ornamental gardens, civic areas and promenades, zoological and botanical gardens. Inner Melbourne has some particularly large and significant areas set aside during initial settlement planning. Many others occur throughout the investigation area, embedded within residential areas, and readily accessible within a short walking distance.

Reservoir parks — parklands associated with water storage areas often containing recreation facilities for picnicking and walking trails. Popular areas for day visits, these places are Cardinia, Yan Yean, Greenvale, Sugarloaf and Toorourrong reservoir parks.

Rifle and shooting ranges — three rifle ranges operate on public land in the investigation area: Springvale, Lang Lang and Frankston.



Above: In the Metropolitan Melbourne Investigation area, considerable numbers of community use areas are buildings in public use such as primary and secondary schools.

Coastal reserve and coastal waters reserve

Coastal reserve consists of a narrow and often discontinuous strip of Crown land. Coastal waters reserve occurs in river estuaries and around infrastructure associated with piers, jetties and wharfs where the investigation area boundary extends beyond low water mark.

The coastal reserve is an area of public land set aside on the coast primarily for public recreation, education and conservation of natural environments. Some coastal Crown land is specifically set aside or reserved for a purpose such as coastal park (regional park), parklands, recreation areas, or nature conservation reserves, and these areas are included in other appropriate public land use categories. Navigational aids and markers are included in the services and utilities areas category.

Gellibrand Coastal Heritage Park is included in this public land use reflecting the values associated with maritime industry on this site and the coastal landscape.

In Victoria we are fortunate that unalienated Crown coastline was set aside in 1881 for public purposes, ensuring that this important resource remains largely accessible to the public. Coastal reserves fringing Port Phillip Bay and Western Port are a primary recreational resource servicing a catchment of almost four million residents as well as many overseas visitors.

A coastal waters reserve was recommended in ECC's Marine Coastal and Estuarine Investigation Final Report and accepted by Government to encompass territorial waters (including the seabed) outside parks or other reserves extending from the shoreline to 5.5 kilometres offshore. This reserve is yet to be formally implemented and has a wide range of objectives including conservation of natural and cultural features, provision for recreation, education and tourism, sustainable harvesting of natural resources, and provision for shipping and pipelines.

The terms of reference for the Metropolitan Melbourne Investigation define the investigation area as the cities of metropolitan Melbourne and Cardinia Shire. Nine local government areas are defined at least in part by coastal boundaries: two in Western Port and seven in Port Phillip Bay. West to east these are: Wyndham, Hobsons Bay, Melbourne (including Melbourne Docklands), Port Phillip, Bayside, Kingston, Frankston, Casey, and Cardinia. The *Local Government Act 1989* defines coastal municipal boundaries as a line being the low water mark on the sea coast, except where amendments have been made by Order in Council.

Amendments to the boundary occur largely to encompass coastal infrastructure, such as piers, jetties, wharfs and harbours or marinas. In such cases coastal waters are included within the municipal district and therefore within the investigation area. In addition, the physical location of low water mark is changeable, particularly in areas where coastal sandy sediments move on a seasonal basis. Where beach renourishment has occurred — the artificial addition of sand to a beach — the position of the current average low water mark may not be the municipal boundary.

The high water mark is the landward boundary for marine protected areas in the investigation area. The area of intertidal zone between high water and low water is therefore included in municipal districts at these marine national parks and sanctuaries. For practical mapping purposes only portions of Jawbone Marine Sanctuary and Yaringa Marine National Park are included in this investigation as these two locations have a significant intertidal zones — 4 and 90 hectares respectively, and both abut onshore protected areas (i.e. nature conservation reserves).

The issue of boundary definition between stream frontages and coastal waters is important in the estuary of rivers and streams. Coastal waters reserve is shown for estuary areas where tidal influences are likely to play a major role in river function. The Yarra River is a somewhat atypical case. The mouth of the Yarra River is largely artificial, the original channel having been straightened, widened and new paths known as the Fishermans Bend channel excavated from the delta in the Coode Scheme of the 1880s forming Coode Island. Nearby West Melbourne swamps and minor channels were reclaimed with the spoil from excavation of Victoria docks and the area developed as industrial land. For the Yarra River, the boundary between the coastal waters reserve and natural features stream frontage (beds and banks) is taken to be Wurundjeri Way at Charles Grimes Bridge.

Water production areas

The water production land use category includes bulk water storage areas (reservoirs, large water holding basins), diversion weirs, pump intakes and associated buffer areas that obtain their supply from catchment flows, and comprises some 8,500 hectares of public land in the investigation area. This area includes a large number of water reserves, storage tanks, bores, off-takes and water storages on public land which are reserved for water production purposes. Supply and distribution infrastructure is allocated to the services and utilities area land use category.

The largest water production areas are reservoirs and water catchments at Cardinia, Melton, Djerrivarrh, Yan Yean, Sugarloaf, Toorourrong and Greenvale, with an additional area allocated for potential future reservoir use at Watsons Creek, near Christmas Hills.

Drainage basins for flood protection or diversion for flood waters are allocated to the services and utilities areas category. Some flood or drainage water storage areas utilise pre-existing wetlands or swamps, e.g. Edithvale-Seaford Wetlands, Truganina Swamp, and these are shown as natural features reserves.

Services and utilities areas

Services and utilities areas is a broad public land use grouping for purposes such as transport (roads, railway), ports, cemeteries, government buildings, hospitals, nursing homes, public housing, justice services such as courts, police stations and jails, fire stations, depots, piers and jetties, water treatment and delivery infrastructure, easements for water, electricity and gas, survey and navigation, and sewage treatment facilities. In this investigation area there is a greater proportion of services

and utilities areas than elsewhere in the state. This is unsurprising given the broad range of government services provided on public land and Melbourne's large population.

As described above, there is a distinction between buildings used for community purposes and those for government services. Included here are those public offices and buildings that deliver a government service, and are not generally available for other wider community access. Community use buildings include schools, libraries and public halls that provide for a range of compatible uses or focus for activities. Court houses, police stations, hospitals and health care facilities provide only for people accessing or employed to deliver those services. Some of these buildings may also have significant historic values and may also provide for broader community use when the site is no longer required for the original purpose.



Roads and railways

Transport is an important use and occupies a substantial proportion of public land across the investigation area. There is a total estimated area of 79,225 hectares of roads. The total extent of roads has been calculated by VEAC to include 6,225 hectares of parcellised roads and an estimated 73,000 hectares of unparcellised government roads. This does not include private freehold roads or local government owned subdivision roads, but does include unused government roads that may have a license issued. VicRoads manages more than 3000 kilometres of major arterial roads in Melbourne. There is a total area of 2885 hectares of railways consisting of both parcels of Crown land and public authority (VicTrack) land.

The primary purpose of road and railway reserves is to provide for communication, transport and access. Transport corridors can also have high conservation, recreation and landscape values, especially in urban landscapes where native vegetation has been largely cleared. Recreation trails are an important secondary use factored into the design of many of the new freeways constructed in Melbourne. Often monuments and historic markers are also located within road reserves.

Left: Melbourne's wide road reserves were set aside in the early planning of the city and remain an important part of the transport network. Historic road verge tree plantings form an important visual element of the city landscape, and also mitigate the urban heat island effect.

Water and sewerage services

These areas comprise water or sewage pipes, channels and infrastructure etc used to convey water or sewage; storages that are part of the reticulation system; storages of water not used for domestic consumption; drainage or flood-protection channels or structures; and sewage treatment or disposal infrastructure. Drainage basins that are diversions for flood waters are also allocated to this services and utilities land use category.

One of the largest areas of public land in the investigation area outside of national and state parks is Melbourne Water's Western Treatment Plant (WTP) comprising some 6,685 hectares (out of a total area of 11,000 hectares). A substantial portion of the site is not directly utilised for sewage treatment but is required as a buffer to ensure odours are not discharged beyond the WTP boundary in accordance with a permit issued by the Environment Protection Agency. The WTP forms part of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site (i.e. it is internationally recognised and considered a Wetland of International Importance). It supports critically endangered orange-bellied parrot, and a large number of international migratory waders. Complementary

4.6 Public land use overlays

conservation management continues to enhance the protection of shorebird habitat at this site, recognising its listing as a Ramsar site and the presence of threatened species at this site (see chapter 2.3). Some areas contain significant native grasslands remnants; for example, an area of natural temperate grassland located north of the Princes Freeway. Melbourne Water leases the majority of the odour buffer area for grazing of stock (15,000 cattle and 45,000 sheep).

Plantations

Public land is used for both softwood (pine) and hardwood (eucalypt) plantations. The investigation area includes a small area (0.8 hectares) allocated as a school plantation located near Whittlesea.

Uncategorised public land

Some public land has been identified by VEAC as 'uncategorised public land'. Uncategorised public land is a broad category used for sites for which no specific use is recommended, as well as for many smaller blocks, particularly in and around infrastructure projects such as road corridors, that are now considered surplus. Public land in this category has no clear primary use and, subject to assessment of any public land attributes present on the site, may be either assigned to an appropriate land manager or disposed of through sale. The treatment of surplus public land is discussed further in chapter 9. The Department of Sustainability and Environment carries out these assessments of Crown land parcels. Public land attributes are the resources (or natural, recreational, heritage or scenic values) present on a site that would generally require its retention as Crown land. Crown land that has minimal or no such values or resources is considered surplus to government needs and may be disposed of. In certain circumstances, and after Native Title assessments have been made, disposal may be undertaken as a land exchange for nearby freehold land with high values.

An example of an area mapped as uncategorised land is an area of Melbourne Water land at Werribee, which is to become the 'River Walk' residential development. This site will become private residential land and therefore is uncategorised in terms of VEAC's public land use categories.

Other land use categories

There are several other public land use categories used throughout the state that are not represented in the Metropolitan Melbourne Investigation area. These include forest parks, alpine resorts, earth resources, wilderness areas and national heritage parks.

Three categories of land use overlay are defined by legislation. These are reference areas, heritage rivers and declared water supply catchments. Five reference areas and one heritage river have been declared in the Metropolitan Melbourne Investigation area. There are several water supply catchments, both proclaimed and as land use determinations. These are described below.

Reference areas

Reference areas are relatively small areas of public land containing viable samples of one or more land types that are relatively undisturbed. Such areas are set aside in perpetuity under the *Reference Areas Act 1978* to maintain natural systems as a scientific reference to enable comparative study of modified and unmodified lands. A management plan for each reference area typically also defines a buffer area in which restrictions are placed on land uses that may have a detrimental effect on the reference area.

Within reference areas, only activities associated with protecting the natural processes of the area, emergency operations or approved research are permitted. Grazing, mineral exploration, mining, harvesting of forest produce, apiculture, quarrying, educational activities and recreational activities are specifically prohibited in reference areas. Access is restricted to authorised researchers and people undertaking management tasks or emergency operations, as well as those with Ministerial approval.

There are five reference areas in the Metropolitan Melbourne Investigation area established following government approval of the LCC Melbourne Study Final Recommendations.¹⁵¹ Of these five areas, two reference areas at Yan Yean overlay public land outside national or state parks (table 4.6).

Table 4.6
Reference areas

NAME	AREA (HA)	UNDERLYING PUBLIC LAND USE	VALUES
Disappointment	1,090	Kinglake National Park	Open mountain ash forest of moderate elevation on Devonian granite plateaus and slopes.
Joey Creek	250	Kinglake National Park	Open messmate stringybark and narrow-leaf peppermint forest of low elevation on Devonian granite plateaus and slopes.
Yan Yean north	100	Yan Yean water supply catchment	Open candlebark and red stringybark forest of low elevation on Silurian sedimentary rocks forming moderate slopes.
Yan Yean south	300	Yan Yean water supply catchment	Open forest of grassy woodlands with white sallee and swamp gums on flat Quaternary sediments at low elevations.
Diamond Creek	330	Bunyip State Park	Heathy woodlands of silver-leaf stringybark and broad-leaf peppermint forest of moderate elevation on moderately sloping Devonian granite.

Table 4.7
Heritage river

NAME	AREA (HA)	LENGTH (KM)	UNDERLYING PUBLIC LAND USE	SPECIAL VALUES TO BE PROTECTED (LCC 1991)
Yarra	285 in state park 60 in other public land (total 1,065 ha)	total 103	Warrandyte State Park, stream frontage, streamside area	Scenic landscapes, threatened fauna and flora communities, fish habitat and diversity, recreational opportunities. No impoundments, artificial barriers or structures to be constructed, new water diversions not to significantly impair attributes.

Heritage rivers

Victoria's heritage rivers highlight those rivers with outstanding values for current and future generations, and are protected under the *Heritage Rivers Act 1992*. The LCC's Rivers and Streams Special Investigation systematically studied the biodiversity, recreational, cultural heritage and scenic values of Victorian rivers.¹⁵⁴ Seventeen heritage rivers were nominated by the LCC as those rivers, or river reaches, that had at least four values of state or greater significance. Some heritage rivers are to retain their free-flowing condition to protect native fish habitat, recreational canoeing or scenic values.

The Yarra River Heritage River was declared in 1992 and extends some 103 kilometres from Warburton to Blue Tongue Bend at Warrandyte, and includes a total of around 1,065 hectares: 345 hectares is included in the investigation area. For around 14 kilometres, the heritage river corridor overlays Warrandyte State Park, expanding to 200 metres wide and encompassing some 285 hectares; the remaining 60 hectares of heritage river overlays other public land, mostly stream frontage (table 4.7).

The Yarra River Heritage River winds through a series of floodplains and gorges. The river valley is an important feature in the landscape and processes associated with incision and floodplain deposition have been studied in detail.¹⁵⁷ Remnant and restored vegetation along the stream frontage provides a wildlife corridor, linking the forested hills around Warburton to patches in central Melbourne, such as at Studley Park. The Yarra River corridor, with its diverse habitats and highly varied native fauna, including in-stream fauna, provides critical breeding sites and habitat for numerous birds, mammals, reptiles, and amphibians.

4.7 Resources and uses of public land

Declared water supply catchments

Important drinking water production areas are often defined in detailed plans called special area plans (or pre-existing 'land use determinations') following the declaration of 'special water supply catchment areas' under the *Catchment and Land Protection Act 1994*. Domestic water supply catchments are also proclaimed under the *Soil Conservation and Land Utilization Act 1958* in conjunction with the *Land Conservation Act 1970*.

In the investigation area declared water supply catchments and land use determinations currently exist on all major water production sites (Djerriwarrah, Greenvale, Yan Yean, Sugarloaf and Cardinia reservoirs) as well as areas of Lerderderg State Park, Kinglake National Park, Bunyip State Park and Yarra State Forest. Many of these areas were proclaimed in late 1800s as a part of the early works undertaken to establish both a clean drinking water supply and drainage or sewerage system for the expanding population of Melbourne. The area of water supply overlays now encompasses some 15,320 hectares across the investigation area (see map A).

Access to domestic water supply storages for recreation and resource use is generally restricted to protect and retain high water quality and yield.

As the preceding section demonstrates, public land has a wide range of uses and contains many types of community values. Some of the key uses and resources are described below.

4.7.1 NATURE CONSERVATION

In Victoria the protected area system (also referred to as the conservation reserve system) is a public land network set aside primarily for biodiversity protection providing the highest possible level of legal protection. To be considered a protected area, public land must be securely set aside and managed primarily for biodiversity conservation such as in parks under the *National Parks Act 1975* and permanent nature conservation reserves.

Public land use categories within the protected area system include national, state and some other parks under the *National Parks Act*, marine national parks and sanctuaries, nature conservation reserves, and certain natural features reserves (streamside areas, bushland areas, scenic areas, wildlife areas without hunting).

Victoria's protected areas form part of the National Reserve System which is discussed in more detail in chapter 8.

Protected areas within the investigation area comprise around 30,000 hectares of public land – or about 5.3 per cent of the entire investigation area (public and private land). Of this, nearly 25,000 hectares is in national and state parks. National, state and other parks and reserves considered to be protected areas are listed in appendix 5. Being close to Melbourne, these parks are exposed to higher visitor pressures than some other parks across Victoria and they are important educational and recreational resources for the community.

Biodiversity values on public land in the investigation area are described in greater detail in chapters 2 and 8.

4.7.2 RECREATION

Public land provides a broad range of recreation opportunities including national parks to small neighbourhood pocket parks, beaches, golf courses, tennis courts and sports grounds. Urban parks and sports grounds provide opportunities for organised and casual sport and exercise, while more natural areas allow for activities such as bushwalking, mountain biking and canoeing. Across the region, public land and land owned by local councils (not considered public land under the VEAC Act) together provide for an active and engaged community.



A summary of popular sport and recreation activities across the state is shown in table 4.8. Community based sport is supported by a network of enthusiastic volunteers and spectators. These activities can provide important social and community networks.

Table 4.8
Participation rates in most popular recreation and sport activities in Victoria in 2009¹⁵⁸

ACTIVITY	ESTIMATED NUMBER OF PARTICIPANTS	ESTIMATED PARTICIPATION RATE (%)
Walking	1,543,800	35.9
Aerobics/ fitness	1,008,500	23.5
Swimming	596,600	13.9
Cycling	551,400	12.8
Running	501,900	11.7
Tennis	294,400	6.9
Golf	278,100	6.5
Basketball	230,500	5.4
Netball	220,400	5.1
Australian rules football	220,300	5.1

Above: The Melbourne Cricket Ground (MCG) is one of the cities most iconic sites and is recognised on the National heritage list. Managed by a government appointed Trust since 1862, the 'G' regularly draws large attendances at sporting events. The main venue of the 1956 Olympic Games, the MCG's value to the community reaches beyond individual events to an experience of the place itself.

Non-organised recreation

Non-organised activities are popular on public land within the investigation area. The *Victorian Trails Strategy* indicates that the most popular activities within metropolitan parks between 2002 and 2004 were short walks (less than one hour), followed by cycling, walking the dog, and jogging/ running.¹⁵⁹ All of these recreational activities can be undertaken in urban areas.

Other popular forms of non-organised recreation that typically occur in more natural environments include horse riding, fishing, trail-bike riding, four wheel driving and canoeing and kayaking.

Organised recreation

Melbourne's public land provides a range of opportunities for organised recreation. Public sports grounds and courts, swimming pools, bowling greens and golf clubs enable golf, tennis, Australian rules football, cricket, soccer, hockey, netball and basketball. These facilities are provided on both public land and on land owned by local councils. Participation in organised sport at a community level is very popular, particularly with school-aged children.

Leisure activities

Parks Victoria information indicates that attending a special event, socialising with friends and family and picnicking are likely to be the most popular activities in urban parks in metropolitan Melbourne.¹⁶⁰ Community use of public open space* supports this finding, with popular activities including relaxing, being in nature, picnicking and barbeques and socialising with family and friends.

Melbourne is also well known for cultural and sporting events enjoyed by residents and visitors alike. Iconic sites such as the Melbourne Cricket Ground provide a venue for a range of major sporting events. AFL match attracts around three million visitors per year and the popular five-day Boxing Day test match cricket was attended by around 156,000 spectators in 2009.¹⁶¹

Community sports grounds are a hub of activity on weekends and provide an important place for social interaction as well as delivering the health benefits of physical activity.

4.7.3 WATER AND SEWERAGE

The provision of clean high quality water from catchments to Melbourne's water supply reservoirs is an important public health issue but also contributes to prosperity and liveability of the city. From very early in the planning of this settlement, delivery of a high quality domestic water supply and drainage or sewerage systems was considered of great importance. Water supplied from Yan Yean Reservoir was first provided to the city of Melbourne on 31 December 1857.¹⁶² Many of Melbourne's existing water supply reservoirs were created in the nineteenth and early twentieth century (see table 4.9). The Melbourne Metropolitan Board of Works was established in 1891 to provide water and sewerage services to the rapidly growing city.

Population growth combined with an extended dry period, mostly during the post World War Two years, were the main reasons for construction of new water supply reservoirs. The Upper Yarra Reservoir (located outside the investigation area) was completed in 1957, tripling Melbourne's total water storage to nearly 300,000 megalitres (ML). Other significant water supplies for Melbourne were added with the construction of the Cardinia (1973) and Thomson reservoirs (1984) (located outside the investigation area).

Table 4.9
Water supply areas including catchments in the investigation area

RESERVOIR	AREA OF PUBLIC LAND (HA)**	YEAR ESTABLISHED	TOTAL CAPACITY (ML)
Cardinia	2,515	1973	287,000
Sugarloaf (Winneke Dam)	455	1981	96,000
Yan Yean	2,800	1857	30,000
Greenvale	280	1971	27,000
Melton (Exford Weir)	250	1916	14,340
Djerriwarrh	250	1964	983
Toorourrong Reservoir	135	1885	273
Total			455,323

* The use of open space by the Melbourne community has largely been determined from municipal household surveys and on-site surveys of park users. This information is often used by local governments to inform municipal open space strategies.

** Area of public land occupied by water supply reservoir and associated area dedicated to water production. Some water reservoirs have other compatible public land uses in catchment areas (e.g. national parks, state forest).

Recycled water

Melburnians use about 500,000 million litres of potable (drinking) water each year. Some of these uses can be readily substituted with recycled water. Water recycling is a socially, environmentally and economically viable solution to help preserve our drinking water supplies.¹⁶³ Recycled water is a term used to describe stormwater, greywater, rainwater and treated effluent produced from sewage treatment plants. The long dry period experienced in Melbourne over the last decade has led to greater exploration of recycled water and its use for a range of purposes including agriculture, horticulture, industrial processing, residential dual pipe schemes, and to keep our parks and recreational grounds green. This contributes to conservation of higher quality drinking water and reduces the amount of treated effluent discharged into the sea.

The main source of recycled water is Melbourne's two main sewage treatment facilities — the Eastern Treatment Plant at Bangholme and the Western Treatment Plant at Werribee — and to a lesser extent some local treatment plants. In addition, flows from the Western Treatment Plant are used to maintain a complex range of wetland habitats identified as a wetland site of international significance under the Ramsar Convention (see chapter 8).

There are a number of new residential developments in Melbourne, which will have dual pipe facilities enabling the use of recycled water for non-drinking applications such as toilet flushing and garden watering. The availability of water under future climate change scenarios is explored in greater detail in chapter 2.

4.7.4 OTHER GOVERNMENT AND COMMUNITY SERVICES

As a large capital city, Melbourne provides for a wide range of community services and utilities. Within the investigation area, a significant proportion of public land is used for roads and railways and other infrastructure such as ports. Indeed the total area occupied by roads is estimated to be in the order of 80,000 hectares across the entire investigation area. In addition, other government services such as hospitals, public schools, kindergartens, cemeteries, fire and emergency services, police stations and courts are all located on public land.

Provision of these services is an important component of government planning and each agency or department responsible for these functions undertakes detailed planning and forecasting of future needs. Some of these processes include designation of land required for future projected population, and implementation through the use of public land acquisition overlays under the planning scheme. Other ways in which public land is acquired or disposed of are discussed in greater detail in chapter 9. As the population of Melbourne continues to grow, demand for these services continues to increase.

Cultural and educational institutions

The provision of education from early childhood to adult training is an important component of government services and community wellbeing. Since the establishment of Melbourne as a city in the 1850s significant areas of public land have been set aside as part of civic development. Land was allocated for public and scientific organisations as early as 1857 (Royal Society of Victoria building, Melbourne), and mechanics institutes were established to provide for self-education and intellectual opportunities. Land was granted to churches to provide schools from the 1850s but by the 1870s a new education department was established to deliver compulsory, free and secular education. Today the total area of schools and education facilities on public land across metropolitan Melbourne exceeds 2400 hectares. An important part of community health, well-being and prosperity is based on the delivery of government funded education opportunities, particularly for children. School buildings also provide a venue for various associated 'after-hours' activities by a wider cross-section of the community.

The Royal Exhibition Building and Carlton Gardens is a feature of the Melbourne landscape, now recognised as a UNESCO World Heritage site. Constructed in 1880 to house the International Exhibition, this remarkable building is testament to the prosperity and aspirations of post-industrial revolution Melbourne. The site provides a venue for the Melbourne Museum, housing the state's scientific and cultural collections and hosting permanent and visiting exhibitions. Other large institutions, such as the State Library of Victoria, National Gallery of Victoria and the Victorian Arts Centre, are responsible for other parts of the state's cultural collections and, along with smaller local community centres, provide venues for artistic and cultural activities. Meeting spaces in outdoor environments and venues for cultural activities or festivals are important community assets in the city. These include Federation Square, Sidney Myer Music Bowl and large parklands in the city centre. Additionally, the wide streets of the central city often host parades and political demonstrations.

Health and emergency services

While education services were provided by the early colonial government, much of the health sector was left to private organisations for many years. In line with common practice in Britain at that time, charity and religious organisations were relied upon to provide health services. Crown grants of land were the main government contributions with the exception of facilities for the mentally ill (asylums) such as those at Yarra Bend and Kew (Willsmere) in the 1840s to 50s. Health service delivery is complex and interlinked with university and charitable organisations. Today government provides health care at major hospitals, early childhood centres, aged care facilities through various partnerships with private providers, charitable organisations and local government. Emergency medical response and pre-hospital services are operated by Ambulance Victoria (a statewide body), often from sites co-located with other emergency services or hospitals.

Police, justice and legal institutions have always been seen as important services provided by Government. Modelled on civil policing in Britain, by the late 1840s the number of Melbourne Police was a meagre 40. Soon overwhelmed by the influx of migrants seeking their fortune on the goldfields, the *Police Regulations Act 1853* brought together the disparate forces across the colony and substantially increased numbers. Today Victoria Police as an organisation has more than 13,800 staff members located throughout the investigation area and the state.

The Metropolitan Fire and Emergency Services Board (MFB) is one of the Melbourne's oldest organisations.

The first known volunteer fire brigade operated in Melbourne from around 1845, but not until 1890 were these organisations amalgamated under the badge of the Melbourne Fire Brigade Board and the Country Fire Brigade Board in regional centres. In 1893, the Eastern Hill fire station opened and today there are around 50 MFB stations across Melbourne. The Country Fire Brigade initially operated in towns outside of 16 kilometres from the city centre. Following devastating fires in 1939 and 1944, the Country Fire Authority (CFA) was established, uniting the regional Country Fire brigade with the independent rural bush fire brigades. Today the CFA is one of the world's largest volunteer based emergency management organisations and operates from around 80 stations in outer areas of the Metropolitan Melbourne Investigation area, often in shared service centres.

Transport infrastructure

Across metropolitan Melbourne transportation services including roads, railway, and the Port of Melbourne comprise the single greatest use of public land. VEAC has for the first time undertaken an assessment of the area occupied by the Crown road reserves; including both used and unused roads. The total area of Crown reserves is estimated to be 73,000 hectares with an additional 6,225 hectares of mostly VicRoads land. This total of around 80,000 hectares is significantly greater than any other public land uses across this investigation area, although this is unsurprising given the urbanisation associated with a capital city.

Provision of transport infrastructure plays a critical role for economic and social development. Expansion of road and railway corridors has been accompanied by residential development, particularly around railway stations. Road and railway corridors are also used for other services such as electricity and pipelines. Notably, the Hoddle early grid plan set out in 1837 for straight, wide streets was repeated with survey of roads reserves laid out across the suburbs and villages of Melbourne. The wide and treed boulevards are one of the key characteristics of the city of Melbourne. Many of these corridors provide important linkages for natural values and may also contain cultural sites.

Port of Melbourne Corporation (PoMC) owns approximately 494 hectares at the Yarra River mouth comprising shipping docks and related transport infrastructure. PoMC provides an important strategic asset and economic service for all of Victoria, and the Port of Melbourne is the largest container and general cargo port in Australia with over 3,400 commercial ship visits per year. PoMC enters into commercial lease and licence arrangement with shipping operations companies across the majority of the land described above.

4.7.5 COMMERCIAL RESOURCE USES

Across Victoria, public land is an important source of natural resources particularly timber, grazing, apiculture, earth resources and water. In the Metropolitan Melbourne Investigation area, public land has also provided these resources in the past, but currently water supply remains the only significant use of this kind.

Earth resources

Victoria and the Melbourne region are historically known for gold production. Alluvial gold was first officially recorded in Victoria at Warrandyte, along the Yarra River, in 1851. This area and Kangaroo Ground, Diamond Creek, St Andrews and Kinglake were all worked in diggings of shallow alluvial deposits, deep leads and quartz reefs. Although eclipsed by the rich gold fields of Ballarat and Bendigo areas, this region north-east of Melbourne was worked intermittently for many years; the main reefs largely abandoned by the mid 1870s.

Minerals and petroleum continue to provide a major economic contribution to Victoria generating some \$5.4 billion per annum for the economy. The availability of good quality building and construction materials has played an important role in the development of a prosperous city. Materials such as basalt (bluestone and blue metal), sand, gravel and clay minerals have been readily obtained from both within and nearby to the investigation area. The close proximity of building and construction materials to Melbourne has been of substantial economic benefit. In 2006/07, the industry's State wide production had a sales value of some \$654 million and directly employed over 3,500 people.¹⁶⁴

There are few tenements (exploration and production licences or permits) on public land in the metropolitan Melbourne investigation area. The majority of earth resource interest is exploration for geothermal energy and construction materials.

Timber resources

State forests are a major source of timbers and firewood across Victoria, as well as supporting biodiversity and providing for recreational activities. Management planning of these forests establishes three zones based on the values and uses available. These are Special Protection Zone (SPZ), Special Management Zone (SMZ) and General Management Zone (GMZ). In addition the *Code of Practice for Timber Production 2007* as the regulatory instrument for commercial timber production provides management prescriptions for buffers around some other values such as streams, historic places, recreation facilities, threatened flora and fauna species or specific habitats in which harvesting is not undertaken.¹⁶⁵

Two forest blocks of the extensive Yarra State Forest overlap with in the investigation area: Mt Disappointment Block (Kinglake) and Upper Bunyip Block (Bunyip) within the Central and Dandenong Forest Management Areas respectively (see discussion of state forests). Both state forest blocks are within either a land use determination or proclaimed water supply catchment limiting forestry activities that may impact on water supply.

The 2009 fires encompassed the entire Mt Disappointment block and roughly three quarters of the Upper Bunyip block. It is likely that the availability of timber in these areas will need to be reviewed based on post-fire recovery.

Stock grazing

Domestic stock grazing is undertaken on public land under licence or permit. Grazing may also be undertaken as a land management tool; in particular, short term or intermittent grazing at low stocking rates has been demonstrated to maintain grassland habitats and to control weeds by reducing overall biomass.^{166,167}

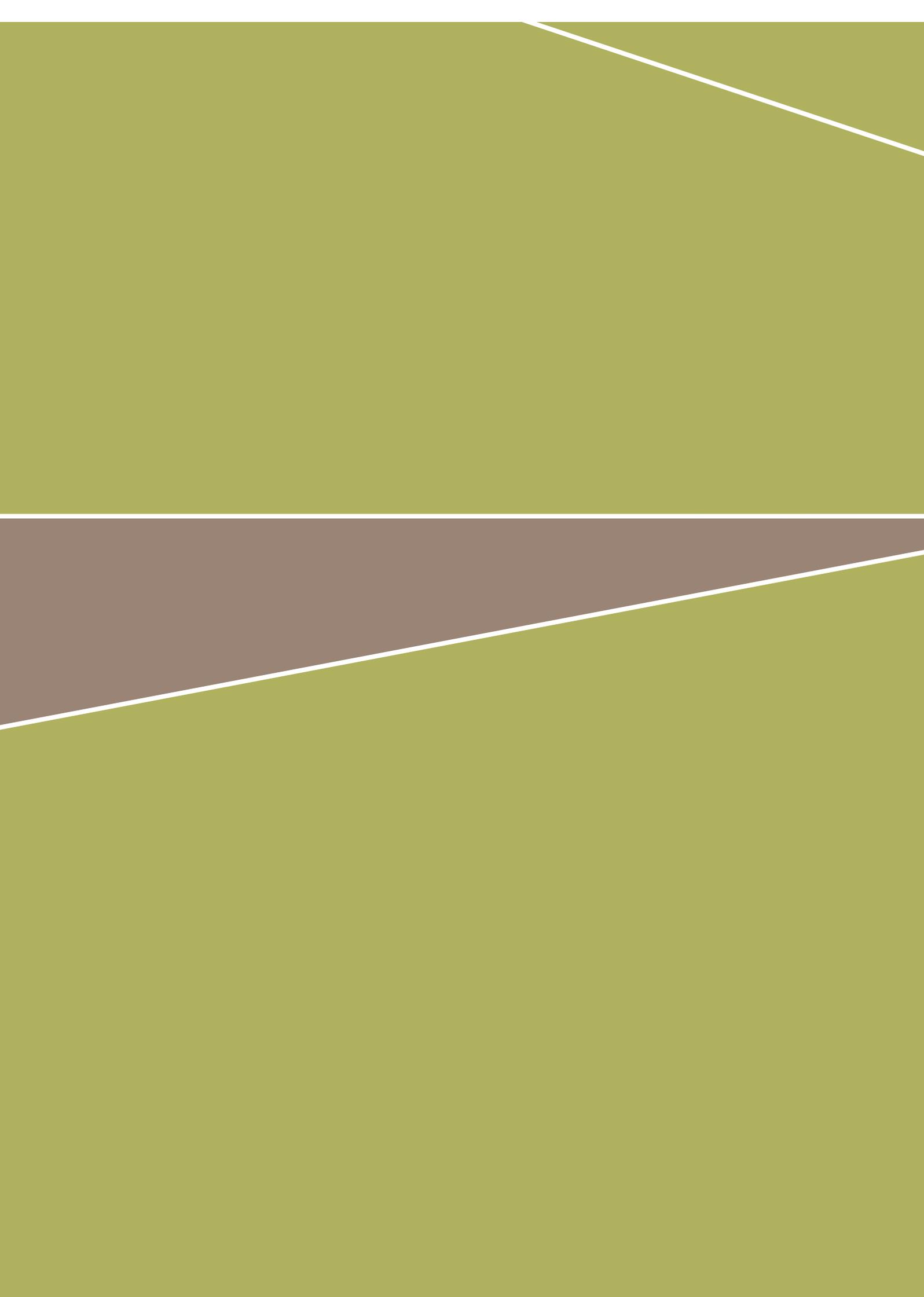
There is some 1,065 hectares held under about 677 grazing licences across Crown land in the investigation area (table 4.10). Of this area, about 28 per cent is public land water frontage and 60 per cent unused government roads, although not all of this area is necessarily grazed. Most of these areas are licensed to adjoining land owners and in some instances may not be readily distinguished from the freehold land. The remaining licensed area is for broad acre grazing — a term used to describe grazing licences issued over Crown land that is not a water frontage or unused road and typically consists of state forest, unreserved Crown land, streamside and other natural features reserves.

Table 4.10**Stock grazing licences on Crown land in the investigation area***Source: data supplied by Department of Sustainability and Environment (2008)*

GRAZING LICENCE TYPE	NO. LICENCES	LICENCE AREA (HA)	AVERAGE AREA (HA)
Unused government road licence	477	629	1.3
Crown land water frontage	175	298	1.7
Broad acre	25	138	5.5
Total	677	1,065	

Grazing licences do not confer exclusive use of public land to the licence holder. Certain types of recreation are permitted on the licensed area such as walking, fishing and nature appreciation. Licence conditions for Crown land stream frontages typically specify that stiles or gates are required in fences that cross the licensed land in order to provide for continued recreation access. However, members of the public are not permitted to camp, light fires or carry firearms on the licensed land.

Public authorities may also undertake commercial arrangements for grazing. These are not documented in detail here and are subject to change and contract arrangements entered into by government authorities. Of these the most notable grazing enterprise is that operated by Melbourne Water at the Western Treatment Plant. Initially this compatible use was established in the early 1900s where stock grazed on irrigated paddocks. Currently there are up to 15,000 cattle and 40,000 sheep on over 8,500 hectares (including areas of public land outside the investigation area) making this a major commercial use of public land. As sewage treatment processes have modernised, flood irrigation has been replaced with settling ponds and production of high quality re-cycled water — a by-product in high demand for agricultural and horticultural use in the Werribee district (see section 4.7.3).





PART D

THE CONTRIBUTION OF PUBLIC LAND TO LIVEABILITY AND NATURAL VALUES

This part of the discussion paper defines liveability and describes the contribution of public land to liveability. Public land's contribution to public open space and the protection of biodiversity, and its role in aiding communities adapt to and mitigate climate change are explored, along with opportunities for enhancing this contribution. Also discussed are the values and scope of public land 'not committed to a specific use' and opportunities for future uses relevant to Melbourne's liveability and natural values.

5

THE CONTRIBUTION OF PUBLIC LAND TO MELBOURNE'S LIVEABILITY

5.1 What is liveability?

*Liveability reflects the wellbeing of a community and comprises the many characteristics that make a location a place where people want to live now and in the future.*¹⁶⁸

Melbourne is often discussed as a liveable city but there is neither a universal definition of liveability nor agreement as to what makes a location liveable. These references to Melbourne as a liveable city are often taken from assessments made for particular purposes, such as rankings for determining remuneration for expatriate executives. Mercer's *Quality of living index* is an example of such rankings.¹⁶⁹

Two relatively recent Victorian government reports provide insights into some factors considered to contribute to liveability for Victorian communities. *A strategic framework for creating liveable new communities* focuses on the social, economic and environmental conditions necessary for creating liveable new communities in Melbourne's growth areas.¹⁷⁰ It identifies the following four liveability goals:

- ▶ high quality job opportunities
- ▶ healthy, safe and socially connected communities
- ▶ affordable living
- ▶ sustainable natural and built environments.

*A state of liveability: an investigation into enhancing Victoria's liveability** examines the links between liveability and the competitiveness of Victoria.¹⁶⁸ It identifies three drivers of liveability:

- ▶ economic strength and markets
- ▶ governments and decision making
- ▶ communities and human rights.

VEAC's focus for this investigation is the contribution of public land to the liveability of communities in metropolitan Melbourne. The material used in this chapter is largely drawn from a report commissioned by VEAC. *The contribution of public land to Melbourne's liveability*³ was developed from a review of liveability and environmental literature relevant to public land use within Melbourne.

5.2 Community wellbeing

The Victorian Competition and Efficiency Commission's definition of liveability was used in *The contribution of public land to Melbourne's liveability*. It has been adopted by VEAC for this discussion paper as it identifies community wellbeing as the core component of liveability and acknowledges that there are many contributors to liveability (i.e. "the many characteristics that make a location a place where people want to live").

Liveability relates to positive social, economic, environmental, cultural and governance outcomes in communities. It can be described in terms of the following five domains:

- ▶ healthy, safe and inclusive communities
- ▶ dynamic resilient local economies
- ▶ sustainable built and natural environments
- ▶ culturally rich and vibrant communities
- ▶ democratic and engaged communities³.

These domains can be considered as goals which governments work towards in order to maintain or enhance liveability, with public land being one of the contributors to achieving these goals.

* In this report the Victorian Competition and Efficiency Commission (VCEC) describes competitiveness as the ability to attract and retain capital and develop and use resources efficiently. The VCEC identified a number of features of strong communities including engagement and wellbeing, cultural diversity, local amenity, access to services and housing affordability.¹⁶⁸

5.3 The contribution of public land to Melbourne's liveability

Since the early days of the European settlement of Victoria, successive governments have provided community services on public land in order to enhance Melbourne's liveability. As early as 1839 substantial areas of Crown land were allocated for parks and gardens as "settlers from Europe introduced emerging ideas about the need for open public land, to provide 'breathing space' for rapidly expanding industrial cities."⁸ By 1857 Yan Yean Reservoir was providing the water supply necessary to support and expand the colonial settlement. Many of greater Melbourne's major roads were built during the 1850s, along with the early development of Melbourne's railways providing for the transportation of people and goods. From the early 1850s, substantial public buildings and offices were built by the Government, initially focusing on court houses and police stations to support law and order, but very quickly including other major educational and cultural buildings including the University of Melbourne and the State Library.⁸

The contribution of public land to liveability has continued with the ongoing provision of roads, hospitals, schools, open space and other community services on public land. Although it seems self-evident that public land makes this contribution, it does not appear to have been articulated and documented; potentially giving rise to its importance being underestimated by policy and decision makers.

Table 5.1 documents the contribution of public land to Melbourne's liveability in a summary form against the five liveability goals. Natural environments feature frequently in this table as contributors to physical, mental and social wellbeing. Biodiversity on public land has its own intrinsic value and ecosystem services values as well as this 'liveability value'. These are discussed further in chapter 8.

The literature review supporting the material in table 5.1 is documented in *The contribution of public land to Melbourne's liveability*.³ The report notes that some literature does not distinguish between land owned by the State and land owned by local councils or, in some cases, between open space on public and private land.

Land owned by local councils makes significant contributions to the liveability of communities through community facilities and services and open space. This land often adjoins and is indistinguishable from public land, and even when this is not the case, is generally considered by members of the community to be part of the public land estate.



Table 5.1
Contributions of public land to liveability

LIVEABILITY GOAL: Healthy, safe and inclusive communities
<p>Public land contributes to physical health as:</p> <p>Parks, walking and cycling tracks, beaches and sports grounds enable organised and non-organised high intensity physical exercise in outdoor spaces.</p> <p>Parks, sports centres, swimming pools and schools enable children to play sport and have free play contributing to physical and mental health.</p> <p>Public hospitals, maternal and child health services provide health services and parks, tracks, beaches, sports grounds and other public land facilitate preventative health measures.</p> <p>Vegetated parks, coastal reserves and rivers provide exposure to nature which contributes to physical and mental wellbeing.</p> <p>Water catchments and treed parks enhance air and water quality.</p>
<p>Public land contributes to mental health as:</p> <p>Natural environments alleviate mental fatigue and exposure to these environments is linked to mental wellbeing.</p> <p>Some parks provide the opportunity to participate in environmental programs which are associated with improvements to mental health.</p>
<p>Public land contributes to social capital as:</p> <p>Community hubs, shopping strips, parks, schools and other public spaces are used for socialising and community activities.</p> <p>Parks, nature strips, coastal foreshores and riverbanks provide green spaces in urban settings. There is a positive correlation between the greenness of spaces and social participation.</p> <p>Accessible public spaces contribute to the independence and social connection of young people.</p> <p>Public transport infrastructure and walking and bicycle paths facilitate social, economic and health outcomes in communities.</p> <p>Public housing provides affordable accommodation which facilitates physical and emotional wellbeing and results in improved community wellbeing and social cohesiveness.*</p>
<p>Public land contributes to community safety as:</p> <p>Police and emergency services facilities are located on public land.</p>
<p>Public land contributes to a sense of pride and attachment to place as:</p> <p>Well designed and maintained public spaces, such as streets, shopping strips and parks, engender a positive neighbourhood identity.</p> <p>National parks and other biodiversity conservation areas provide reassurance to people that natural environments are being protected.</p> <p>Public facilities, such as schools, museums, galleries and libraries, provide educational programs and community activities across age groups, ethnicities and education levels.</p>
<p>Public land contributes to early childhood development and lifelong learning as:</p> <p>Most schools, museums, galleries, public libraries, zoos and other facilities that provide education programs are on public land.</p> <p>Children learn from experiencing natural environments, many of which are protected in conservation reserves on public land.</p>

* Public housing was not documented as contributing to liveability in The contribution of public land to Melbourne's liveability.

LIVEABILITY GOAL: Dynamic resilient local economies

Public land contributes to stimulated and sustainable economies as:

Commercial and community activities at art galleries, zoos, botanic gardens, beaches, parks, sporting venues and other public places draw residents and tourists and generate significant employment.

Roads and railways facilitate commerce and trade.

Physical activity on public land provides health benefits, which reduces health care costs.

LIVEABILITY GOAL: Sustainable built and natural environments

Public land contributes to water and air quality as:

Forested water catchments protect Melbourne's water quality.

National parks, state forests and other vegetated public land absorb carbon and offset greenhouse gas emissions.

Public land contributes to biodiversity conservation as:

Conservation reserves contribute to the protection of Australia's biodiversity, including threatened flora and fauna.

Parkland corridors provide habitat links across landscapes.

Public land contributes to environmentally sustainable urban areas as:

Walking and cycling paths can reduce travel in vehicles, thereby reducing greenhouse gas emissions.

Urban parks and street trees reduce the 'urban heat island effect', increasing the comfort of the community and reducing the need for mechanical cooling.

LIVEABILITY GOAL: Culturally rich and vibrant communities

Public land contributes to artistic expression and cultural diversity as:

Large art institutions, such as the National Gallery of Victoria and the Victorian Arts Centre, and smaller local community centres provide venues for artistic and cultural activities.

Public land contributes to local, metropolitan and international sporting events and activities as:

Public sports grounds, swimming pools, beaches and streets enable participation in sports clubs which contribute to building cultural identity.

Major and local sporting events at these sites contribute to the cultural fabric of communities.

Public land contributes to Melbourne's heritage as:

The remaining intact Indigenous cultural heritage sites in metropolitan Melbourne are largely on public land and are an important part of Melbourne's heritage.

Iconic post contact sites, such as the Exhibition Building and State Library, contribute to the heritage of Melbourne.

LIVEABILITY GOAL: Democratic and engaged communities

Public land contributes to consultation and engagement as:

Community management of public land through committees or boards enhances democracy.

Public land provides opportunities for conservation and other groups to be involved in land management and related activities.

Public land contributes to community action as:

Public demonstrations on public land, such as Spring and Collins Streets and the steps of Parliament House, enable political expression within the broader community.

Community centres and neighbourhood houses provide places to facilitate community decision making and consultation.

The added value of public land

The contributions documented in table 5.1 demonstrate that public land contributes to the range of liveability goals in many different ways. Some of these contributions could also be made on private land. For example, private art galleries and music venues contribute to artistic expression and privately owned heritage buildings contribute to our understanding of Melbourne's heritage.

However, unlike private land, public land provides governments with opportunities to utilise land for the purposes it sees fit. In the context of this discussion, this is to improve social, economic, environmental, cultural and governance (or liveability) outcomes. These are generally 'public good' or utilitarian purposes such as conservation of the natural environment, providing opportunities for recreation and relaxation, the delivery of public services and utilities, and securing land for use by future generations.

Public land provides benefits to members of the community, often without being required to pay for access to private services and/or land holdings and generally without being excluded based on ownership or club membership. Most importantly, stability or permanence is generally associated with public land, but not with private land.

However, although public ownership of land may provide more access to, and permanency of benefits it does not provide a guarantee that the 'public good' will be realised. Liveability benefits are most likely to be realised when there is adequate and effective:

- ▶ supply of public land, taking into account its location, size (i.e. appropriate to the catchment it is serving) and connectivity;
- ▶ management of public land and the amenity provided;
- ▶ governance arrangements such as community engagement and partnerships with local government.³

If we accept that public land contributes to liveability, a failure to secure an adequate supply of public land means that governments and community members have reduced capacity to affect liveability for current and future generations. Equally, where the land is, what happens on the land and how it's managed makes a difference to liveability outcomes.³

Assessing whether these public land contributions are sufficient

Although many of the contributions of public land to Melbourne's liveability have now been documented, the extent of these contributions has not been measured. Further, there are no or few accepted standards* for providing services or achieving outcomes on public land to meet the liveability goals across metropolitan Melbourne. This makes it difficult to determine whether this contribution, or the breadth of public land contributions, is sufficient.

* The Draft Precinct Structure Plans developed by the Growth Areas Authority can be considered as a form of liveability standards for Melbourne's growth areas. However, these cover a broader range of contributions to liveability than those provided by public land.

5.4 Opportunities for enhancing the contribution of public land to Melbourne's liveability

Metropolitan Melbourne is a heavily populated urban environment and its population is rapidly growing. It is estimated that around 4.7 million people will live in the investigation area by 2026.⁴ As Melbourne grows, more people will use its public land – its open space, roads, railways, paths and trails, hospitals, schools and utilities.

Melbourne has a diverse community. Although Australia generally has an ageing population, the age profile of residents varies across municipalities. Melbourne is also a very multicultural community. Different age groups, and potentially different cultural groups, have different needs and want different benefits from public land – for example schools, playgrounds, sports ovals, walking paths, parks, places to meet and socialise, health services and hospitals, public housing and public transport.

Melbourne will need to accommodate an expanding, ageing and culturally diverse population and ideally provide for this population to have access to public land and the services and utilities on it. There will be pressure on natural environments in the face of changing weather patterns and urbanisation. There will be pressure on services and utilities due to increasing demand and diverse needs.

All of these factors impact on current and future liveability. Chapters 6, 7 and 8 include discussions on the ways public land contributes to Melbourne's liveability. Also discussed in chapter 6 is the complementary or shared use of public land to achieve multiple liveability outcomes. Chapter 9 includes a discussion of the opportunities for surplus public land to further enhance these contributions to Melbourne's liveability.



6 PUBLIC OPEN SPACE IN METROPOLITAN MELBOURNE

CHAPTER 6 discusses the contribution of public open space to Melbourne's liveability and provides some background to open space planning in the metropolitan area. It describes the extent and ownership of public open space across the investigation area, and discusses some of the major issues associated with, and future options for, providing public open space.

Comments are invited on a number of specific issues throughout this chapter.

6.1 What is public open space?

6.1.1 A DEFINITION

Any discussion of public open space requires an accepted meaning of the term. The definition below was developed by VEAC for this purpose.

Public open space is public land and local council land that has an accepted and ongoing community use for outdoor recreation and informal activities, and that is freely accessible to the public.

The following matters were taken into account when developing this definition:

- ▶ Open space on public land and local council land is generally more permanent than open space on private land, such as privately-owned bushland, farmland and golf courses.
- ▶ Public open space is largely unbuilt and available for outdoor recreation (both organised sports and non-organised recreation, such as jogging, walking and cycling) and informal activities (such as picnicking, nature appreciation and reading).
- ▶ Public open space is freely accessible: that is, access does not require exclusive club membership, and entry is not prevented by physical barriers such as permanently locked gates.

6.1.2 OWNERSHIP OF PUBLIC OPEN SPACE

Public open space within metropolitan Melbourne is owned by the Crown, public authorities and local councils. Open space is described at several levels, according to the community (or catchment) it services: state, regional, district and local. State-level open space, such as national and State parks, is Crown land. Regional open space is generally Crown land, although some proposed new regional parks will be formed from a combination Crown land, secondary use of public authority land and local council land. Local and district open space is generally owned by local councils.

Land owned by local councils is included in this discussion of public open space as, although VEAC's role is to conduct investigations of public land, it considers that the role of municipal land in the public open space network must be acknowledged.

6.1.3 CATEGORIES OF PUBLIC OPEN SPACE

Open space differs according to its form, its uses and the size of the community that it services. It can be land with intact native vegetation, planted gardens, playgrounds, running tracks or paved squares and promenades. Its use for recreation can be secondary to other uses, such as floodplain management, and it can be primarily used by local neighbourhoods or by people from across the State and beyond. Table 6.1 describes the different categories of public open space in metropolitan Melbourne and the catchments they service.

Table 6.1
Open space categories

CATEGORY	DESCRIPTION	CATCHMENT
<p>Protected area</p> <p>National and state parks, nature conservation reserves, natural features reserves that are part of the protected area system (bushland areas, streamside areas and scenic reserves)</p>	<p>These areas are set aside for the conservation and protection of natural ecosystems, landscape character and/or historical and scenic features. All are part of Victoria's protected areas system (see chapter 4).</p> <p>They can be used for non-organised recreation and informal activities, provided this does not damage any natural or heritage values.</p>	State
<p>Multiple-purpose area</p> <p>Wetlands, stream frontages, state forests</p>	<p>These natural and semi-natural or historic areas have a resource, service and utility use or natural drainage function. They are managed for the protection of their nature conservation values, along with these other uses. Recreational uses vary, depending on how compatible they are with the conservation values and other uses of the areas.</p>	Regional/district
<p>Nature-based recreation area</p> <p>Regional or metropolitan parks, coastal parks, coastal reserves</p>	<p>Areas with natural and semi-natural values primarily used for non-organised recreation and informal activities. These areas are generally vegetated, but this can range from remnants of native vegetation through to revegetated and semi-landscaped areas. They are generally larger and have more nature conservation values than parkland and gardens.</p>	Regional/district
<p>Parkland and garden</p> <p>Formal public gardens, pocket parks and playgrounds</p>	<p>Generally intensively landscaped areas that provide for a range of non-organised recreation and informal activities.</p>	District/local
<p>Organised recreation area</p> <p>Sports fields, bowling greens, public golf courses and driving ranges, tennis courts, netball and basketball courts and public swimming pools</p>	<p>Areas used for playing organised (often club-based) sport in an outdoor setting.</p>	District/local
<p>Services and utilities area</p> <p>Pipe tracks, retarding basins, aqueducts and some power line easements</p>	<p>Areas used primarily for service delivery purposes that have a secondary recreational use.</p>	District/local
<p>Civic square and promenade</p> <p>Areas such as Federation Square and Southbank promenade.</p>	<p>Major hard-surfaced open areas and long, open areas (often adjacent to rivers) used for non-organised recreation and informal activities (such as community gatherings).</p>	District/local
<p>Recreation trail</p> <p>Trails such as the metropolitan trail network and rail trails</p>	<p>Off-road pathways used for walking and cycling that link areas of public open space.</p>	Regional/local

6.2 Contribution of public open space to liveability

Public open space was the most common theme raised in submissions to the investigation and by the Community Reference Group. Many submissions commented on the mental and physical health benefits of recreating out of doors; the benefits to the environment from the conservation or re-planting of native vegetation, and the opportunities provided by linear open space for creating habitat links and corridors; and the benefits in counteracting the loss of private open space in a time of increased housing density. Many submissions also raised concerns about the loss of open space in particular municipalities, the need to protect open space from further loss and the need for additional open space to meet increasing population levels. Some submissions were concerned about the disposal of public land that is currently used or could be used for open space.

Public open space is a key contributor to Melbourne's liveability.³ It contributes to a range of liveability goals including healthy, safe and inclusive communities, dynamic resilient local economies, sustainable built and natural environments and culturally rich and vibrant communities.

Some examples of the contribution of public open space to Melbourne's liveability are provided below. These are drawn from the literature review undertaken in *The contribution of public land to Melbourne's liveability*³ and from information collected through municipal household and on-site surveys.^{171,172,173,174,175}

Physical health

Public open space provides for a broad range of organised and non-organised recreational uses which may increase physical activity levels. Parks, walking and cycling tracks, beaches and sports grounds enable organised and non-organised high intensity physical exercise in outdoor spaces, as well as play opportunities for children. This is particularly important within the context of rising obesity levels amongst children and adults (approximately 17 per cent of Victorian adults are classified as obese) and the reduction in size or loss of private backyards.¹⁷⁶

Open space, especially at the local level, is valued by the community for its importance in maintaining a healthy lifestyle and for the recreational opportunities it provides. For example, walking paths and playgrounds are considered as very important facilities in open space areas by residents of many municipalities including Kingston, Yarra, Darebin and Moreland.

Mental health

Public open space is increasingly the only natural or semi-natural environment available in densely populated urban areas. Exposure to natural environments has intrinsic health benefits, whilst a lack of nature has been linked to trends such as attention deficit disorders and depression in children. It also provides opportunities to undertake informal activities such as relaxing and being in nature, which can benefit mental health.

Social capital

Public open space contributes to social capital as it provides opportunities for group gatherings (such as picnics and barbecues) and to socialise and meet new people. It can also encourage social connections and can help new arrivals to integrate into a community. Opportunities for gathering in groups for activities such as picnicking and barbecues provided by open space are highly valued by residents of municipalities such as Kingston, Yarra, Darebin and Moreland.^{171,172,173,174,175}

6.3 A history of Melbourne's public open space planning

Stimulated and sustainable economies

Public open space offers a variety of activities which draw residents and tourists to city squares and promenades, beaches and parks, which in turn generate employment and contribute to economic growth. Commercial and community activities (such as private fitness coaching/ classes and weekend markets) occur within public open space, and communities and the private sector benefits from this free, or low cost, facilitation.

Environmentally sustainable urban areas

The greening and cooling effect of public open space on residential and commercial areas helps people cope with increased temperatures. Urban residents are provided with a direct link to the natural heritage of an area, providing opportunities to experience natural values.

Local communities place a high value on open space containing natural values.⁴⁶ For example, when surveyed by their councils, residents in the Darebin, Kingston, Moreland and Yarra municipalities identified natural values as the key value of open space. Open space is also seen as offering opportunities to be "in touch with nature". Residents also increasingly considered the retention of remnant vegetation and revegetation of public open space to aid the preservation of threatened species and local habitats as being of high importance.

Artistic expression and cultural diversity

Public open space provides venues for local community activities and cultural festivals, displays and programs which contribute to the vitality, diversity and liveliness of urban areas. It also contributes to local, metropolitan and international sporting events and activities. Large scale sporting events contribute to the cultural fabric of a community and draw civic engagement, and membership of sports and other recreation clubs contributes to building cultural identity at a local, regional and metropolitan level.

Melbourne has a long history of reserving public land for open space, dating back to the 1830s and 1840s. Pressure to set aside public land for recreation was, however, often overshadowed by the need to provide land for the developing colony.

The history of open space planning in Melbourne is also long, but somewhat sporadic. A ring of large parklands was established around Melbourne during the 1840s, including the Royal Botanic Gardens Melbourne and Kings Domain, Royal Park and Princes Park and Fitzroy Gardens. Other parks such as Albert Park, Carlton (Exhibition) Gardens, Treasury Gardens and Fawkner Park were established soon after.

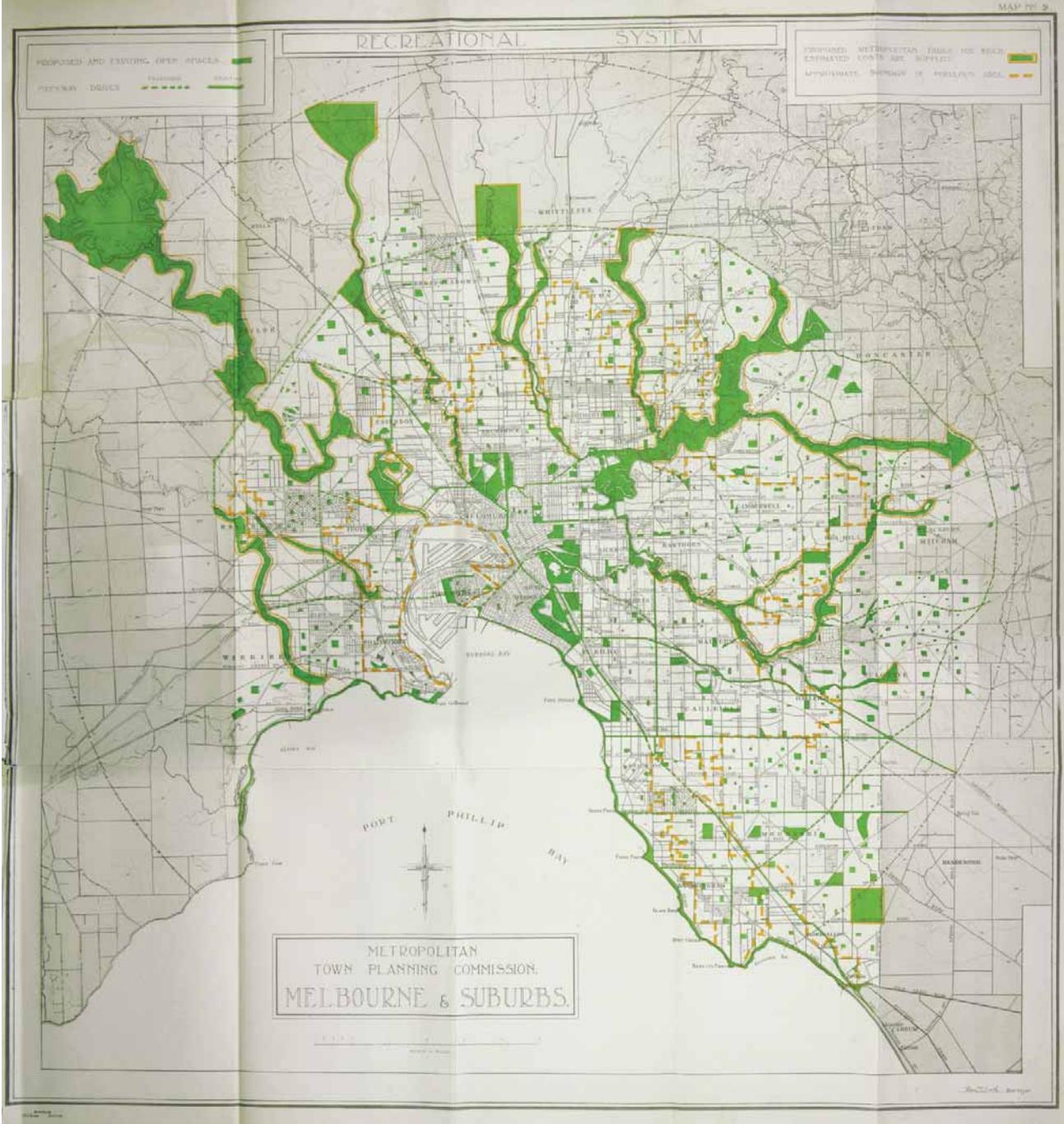
As the population increased, new suburbs were developed from subdivision of rural holdings. The absence of an ordered planning framework often meant that public open space was made available only because small areas were not suitable for housing.

In 1929, the Metropolitan Town Planning Commission undertook a major examination of public open space in Melbourne. The Commission reported that there were insufficient parks and that new parks were not being systematically created to meet the needs of the expanding metropolis. The Commission recommended minimum guidelines for provision of recreation space, and published a plan for a system of parks along Melbourne's major waterways. The vision was not implemented at the time, largely due to the Great Depression and the Second World War. Figure 6.1 shows the Commission's 1929 plan for existing and proposed open space in Melbourne.

This 1929 vision was reinvigorated by the Melbourne and Metropolitan Board of Works (MMBW) in a 1971 corridor wedge plan. This plan set the scene for metropolitan growth: it provided for green wedge corridors between growth corridors, and reserved land for parkland along the river corridors. Over the next 20 years the MMBW acquired large areas of land and commenced the establishment of many of the metropolitan parks along the major river corridors, including Yarra Valley, Dandenong Valley and Maribyrnong Metropolitan Parklands.

A new Metropolitan Open Space Plan was published in 1988, with a focus on conservation, provision and distribution of public open space. The plan committed to the development of a linear network of public open space along the major river systems and Port Phillip Bay foreshore, and new parks and reserves such as Plenty Gorge Regional Park, Braeside Metropolitan Park, Royal Botanic Gardens Cranbourne and Point Gellibrand Coastal Heritage Park.

Figure 6.1
Plan of general development, Melbourne: existing and proposed recreational system
Source: Report of the Metropolitan Town Planning Commission 1929



6.4 Open space strategies for metropolitan Melbourne

Strategic planning for open space has continued to the present day with the development of *Linking People and Spaces* and its integration into *Melbourne 2030*.^{1,13} The strategy plans for the further development and enhancement of the 'metropolitan open space network' by the Victorian government. This network covers regional level metropolitan parks on public land (most commonly managed by Parks Victoria), the metropolitan trail network and the major waterways and coastal foreshores of Port Phillip Bay and Western Port. Six new parks are to be established to meet the regional open space needs of Melbourne's new growth areas (Werribee River Regional Park, Werribee Township Regional Park, Kororoit Creek Regional Park, Merri Creek Regional Park, Melton Township Regional Park and Cranbourne Regional Park), as well as an expansion of the metropolitan trail network. Parks Victoria is currently updating *Linking People and Spaces*, for proposed release in 2010.

As well as planning for regional open space, almost all municipalities have prepared municipal open space strategies which provide comprehensive planning for community access to all types of metropolitan open space (regional, district and local), including both Crown and local council owned open space. However, these plans have been developed without the benefit of a Melbourne-wide strategic open space framework and in the absence of metropolitan-wide policies and guidelines for the provision of open space opportunities. As a result, open space provision requirements can vary between municipalities and, as there is no requirement for local councils to develop such open space strategies, not all have done so.

There appears to be little coordination within state government or between local and state governments for strategic open space planning. For example, strategies such as *Linking People and Spaces* and *Melbourne 2030* address regional open space planning and issues, while local council strategies generally focus on local and district open space.^{1,13} Further, the open space guidelines for Melbourne's growth areas provide for local and district active open space, but not regional active open space.

The implications of the absence of a strategic open space plan for Melbourne potentially include an ad-hoc approach to public open space planning and funding in some areas and a lack of consistency in public open space provision and management across municipal boundaries.

COMMENTS INVITED

A metropolitan wide public open space strategy should be developed for metropolitan Melbourne addressing public open space elements such as the provision, accessibility and type of public open space. This would provide a consistent framework for individual municipal open space strategies, which all councils should be required to prepare.

Metropolitan wide and local council strategies should be maintained and updated at regular intervals (for example, every five to ten years).

6.5 Open space standards

The *Planning and Environment Act 1987* provides for the Minister for Planning to prepare a set of standard provisions for planning schemes called the Victoria Planning Provisions (VPP). Open space standards for local, district and linear open space are described in Clause 56-05 of these provisions and in the Growth Areas Authority's Precinct Structure Planning Guidelines.

These standards are largely applied in greenfield development sites in outer municipalities and growth areas. There are no dedicated guidelines to guide middle and inner municipalities that are faced with providing open space as part of the redevelopment of urban sites.

Three generic types of standards are discussed below: proportion of open space in an area, open space per capita and access to open space.

Proportion of open space

In the growth areas of metropolitan Melbourne, the Growth Area Precinct Structure Planning Guidelines (PSPG) set open space standards of 10 per cent of net developable area (i.e. land available for development) in residential areas. Approximately six per cent of this land is for active open space i.e. for sporting use (as active open space in the guidelines is defined as sporting space).¹⁷⁰ This net developable area excludes encumbered land, arterial roads, railway corridors, government schools and facilities and public open space.¹⁷⁰

In established areas, the most applicable 'standard' is the five per cent contribution from subdivision proponents under the *Subdivision Act 1988*. While this has the

6.6 Public open space inventory

potential to support an area-percentage standard, the contribution may be taken as land or value of the land or a combination of both (and it only applies to parts of a municipality where there may be a subdivision). Section 6.9.1 discusses contributions under the *Subdivision Act 1988* in more detail.

Open space per capita

Open space per capita standards are useful in guiding broad land use planning, particularly within developing areas. An open space per capita standard used in Victoria is 3.03 hectares per thousand people, of which 1.5 hectares is for organised recreation. One example of the use of this standard is Bayside City Council's *Community Neighbourhood and Audit Tool* which specifies that the public open space provision should be at least three hectares per thousand residents.¹⁷⁷ This standard was originally developed by the Melbourne and Metropolitan Board of Works in 1954. It is similar to the New South Wales standard of 2.83 hectares per thousand, although somewhat lower than the generally accepted standard of 4 to 5 hectares per thousand used in Queensland. The major limitation of these standards is that they don't take into account the function, quality and accessibility of open space, or the specific needs of a community.¹⁷⁸ Accessibility is discussed below.

Accessibility

Access to open space by the local and wider community is another important standard. A benchmark for community access to open space is the walkable distance for every resident, without significant barriers such as freeways or railways.

With this in mind, Clause 56-05 of the Victoria Planning Provisions (VPP) and the guidelines for open space in Melbourne's growth areas indicate that local parks should be within 400 metres walking distance of at least 95 per cent of all dwellings, and active open space within one kilometre of 95 per cent of all dwellings.¹⁷⁹ Many local council open space strategies also specify benchmarks for accessibility. Internationally, the *United National Environmental Accord Green Cities Declaration* states that there should be an accessible public park or recreational open space within 500 metres (a 'walkable' distance) of every city resident by 2015.¹⁷⁹ Best practice standards in the United Kingdom indicate that there should be an accessible green space no more than 300 metres (or five minutes walk) from home.¹⁸⁰

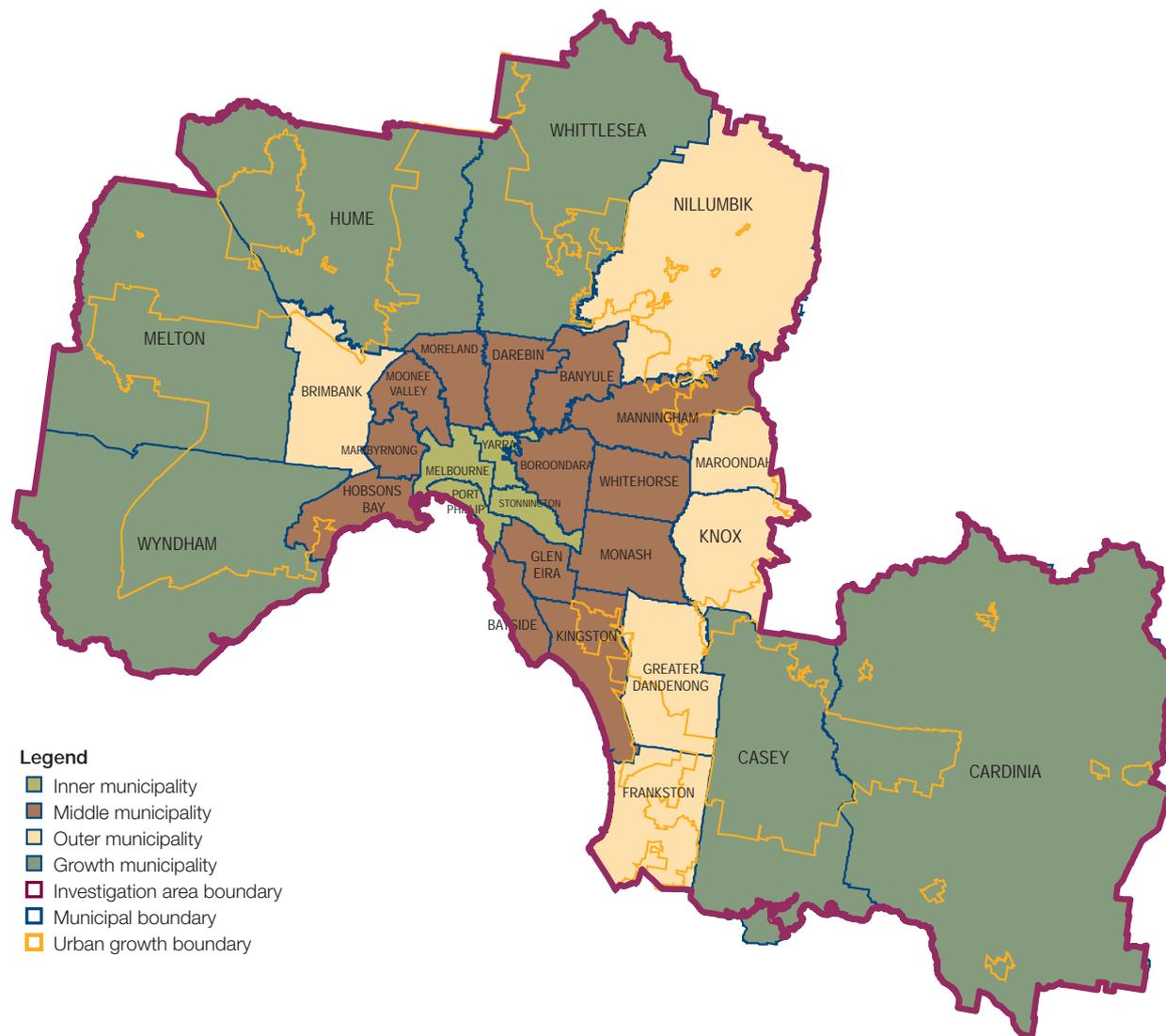
The data that informs the discussion throughout much of the remainder of this chapter is drawn from an inventory of public open space compiled by VEAC (with the assistance of public authorities and local councils). This inventory has been created as a spatial database and contains information on the amount, type, location and ownership of public open space across the investigation area. This is the first time that information about open space on Crown, public authority and municipal land across the investigation area has been compiled in one place.

The following sections use analyses of the inventory data to describe and compare public open space across municipalities in the investigation area. In some cases two sets of analyses have been undertaken – one for the entire investigation area and another for those areas of municipalities that are within the urban growth boundary. The rationale for undertaking this second set of analyses is that residential areas in some municipalities are primarily inside the urban growth boundary, with large rural areas or large national and state parks outside the urban growth boundary. The inclusion of areas containing low populations and/or large areas of public open space outside the urban growth boundary may skew the results of the data analysis. Figure 6.2 shows the urban growth boundary in the investigation area. Comparisons have also been made between the inner, middle, outer and growth municipalities of metropolitan Melbourne (also shown in figure 6.2).

Maps C and D show one of the outcomes of this inventory: public open space across the investigation area by function and ownership. Appendix 6 shows the data used in the analysis.

Figure 6.2
Urban growth boundary and inner, middle, outer and growth municipalities in the investigation area

Source: DPCD 2009; DPCD 2010



- Legend**
- Inner municipality
 - Middle municipality
 - Outer municipality
 - Growth municipality
 - Investigation area boundary
 - Municipal boundary
 - Urban growth boundary

It is expected that VEAC's inventory of public open space will produce a baseline for future investigations of Melbourne's public open space, and will aid in strategic public open space planning at a local and state government level. It may also support strategic planning and policy development for state and local governments. As such, it should be made available to a wide range of stakeholders, including state government departments, local councils and the community.

The inventory should be updated at regular intervals to maximise its value and its currency. This will allow trends in public open space provision to be monitored over time. It will also provide a record of additions and losses in public open space across metropolitan Melbourne.

COMMENTS INVITED

The public open space inventory developed by VEAC should be maintained and updated at regular intervals (for example, every five to ten years).

6.7 Melbourne's public open space network

6.7.1 EXTENT OF PUBLIC OPEN SPACE

The Metropolitan Melbourne Investigation area contains approximately 67,150 hectares of public open space, while the investigation area within the urban growth boundary contains approximately 22,130 hectares of open space. This difference is largely due to the presence of several large parks, such as Kinglake National Park and Bunyip State Park, on Melbourne's fringes.

6.7.2. OWNERSHIP OF PUBLIC OPEN SPACE

Map D shows the ownership of public open space across the investigation area. Most public open space in the investigation area is located on Crown land (48,245 hectares or 72 per cent). This large area is also a reflection of the large parks on the fringes. Approximately four per cent (2,880 hectares) is located on public authority land, primarily as a secondary use of land providing other public services and utilities. The remainder (16,025 hectares or 24 per cent) is located on local council land.

Inner municipalities generally contain a higher proportion of public open space located on Crown land than on municipal land. The amount of public open space on Crown land within inner municipalities reflects historic patterns of public open space provision and acquisition. A number of parks were set aside on Crown land in the municipalities of Melbourne, Port Phillip and Yarra shortly after European settlement (for example, Royal Botanic Gardens and Domain, Royal Park, Princes Park, Fitzroy Gardens, Albert Park, Carlton (Exhibition) Gardens, Treasury Gardens and Fawkner Park). However, this is not uniform across all inner municipalities. The rapid pace of settlement meant that some inner municipalities were required to purchase public open space. For example, Prahran Council (now Stonnington City Council, which has the lowest amount of Crown land in inner Melbourne) purchased land to establish Victoria Gardens, Toorak Park and Greville Street Gardens.¹⁸¹

The reverse is generally true for middle municipalities, with a higher proportion of public open space located on municipal land rather than Crown land. Municipal public open space within these areas is often smaller and more fragmented than areas of public open space on Crown land. Municipalities with few river and streams within their boundaries (for example, Stonnington and Glen Eira) were unable to supplement their open space needs from the Crown land streamside reserves that were established in 1888.

When considering the entire investigation areas, outer and growth municipalities generally contain a higher proportion of Crown land than middle municipalities, with large areas of public open space on Crown land in regional, state and national parks and along waterways such as the Yarra and Plenty Rivers. However, within the urban growth boundary, open space in outer and growth municipalities is generally located on municipal land. Councils in outer and growth municipalities have obtained much of their open space land through the Precinct Structure Plans in growth areas and through land subdivision negotiations with land developers that designate part of new subdivisions as public open space. The proportion of public open space in each municipality is discussed later in this chapter.

Although VEAC's definition of public open space specifies that public open space has an ongoing use, public authorities generally reserve the right to dispose of land that they no longer require to deliver their services. The open space inventory includes a small number of VicTrack sites. VicTrack has advised that any of its freehold land used as public open space may be sold or utilised for transport purposes in the longer term, and that parts of the land may be required to be used from time to time as access to rail infrastructure, subject to any existing third party leases.

6.7.3 CATEGORIES OF OPEN SPACE

Figure 6.3 shows the proportion of each type of public open space across the investigation area and within the urban growth boundary.

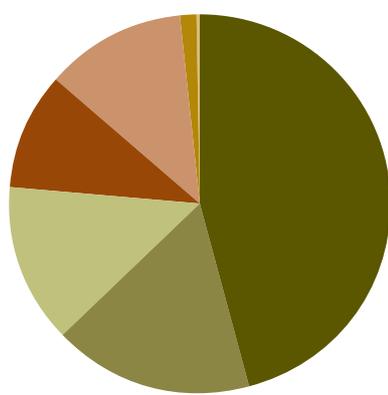
Approximately two-thirds of public open space within the investigation area is in protected areas and nature-based recreational areas. More than half of the public open space within these categories occurs within outer metropolitan Melbourne in two parks, Kinglake National Park and Bunyip State Park.

The proportion of each type of public open space changes substantially when only land within the urban growth boundary is considered. The most common type of public open space inside the urban growth boundary is organised recreation areas (approximately one-third of all open space) and parklands and gardens (approximately one-quarter of all open space). Less than ten per cent of public open space falls within protected areas, as Kinglake National Park and Bunyip State Park lie outside the urban growth boundary.

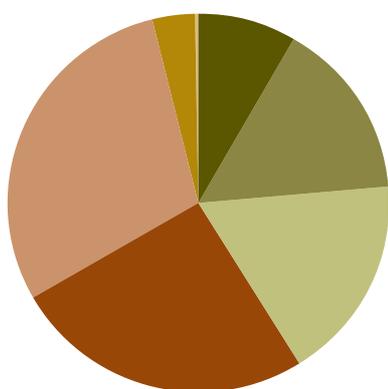
Small amounts of public open space are located within civic areas and promenades and service and utilities areas for both the entire investigation areas and within the urban growth boundary.

Trails are an important component of the public open space network. Only some trails are recorded in VEAC's open space inventory due to the difficulties of accurately mapping such an extensive network, and they are not included in the open space analysis. However, the metropolitan trail network is shown as an overlay on maps C and D in this discussion paper.

Figure 6.3
Public open space by category in the investigation area (top) and within the urban growth boundary (bottom)



- Protected area 46%
- Nature-based recreation area 17%
- Multiple-purpose area 13%
- Parkland and garden 10%
- Organised recreation area 12%
- Services and utilities area 2%
- Civic square and promenade <1%



- Protected area 9%
- Nature-based recreation area 15%
- Multiple-purpose area 17%
- Parkland and garden 26%
- Organised recreation area 30%
- Services and utilities area 4%
- Civic square and promenade <1%

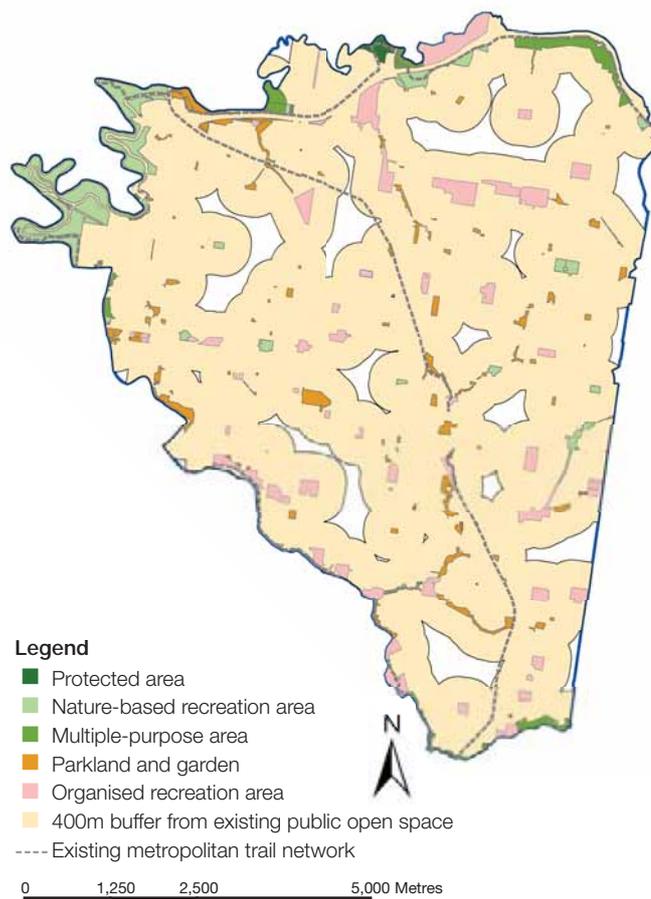
6.7.4 DISTRIBUTION OF PUBLIC OPEN SPACE

There are a number of ways of describing the distribution of open space across the investigation area. The proportion of municipal area and area per capita ratios are discussed below. These have also been discussed in section 6.5 in relation to public open space standards.

When considering these comparisons, it needs to be kept in mind that these two measures do not take into account accessibility or "quality" of open space within municipalities. Some municipalities within the investigation area with comparatively low per capita levels or low proportions of open space may have high quality open space that is well dispersed throughout the municipality.

An example of this is the City of Boroondara, which has a comparatively low level of open space area per thousand people within the investigation area. However, as shown in figure 6.4 below, most residents have access to open space within a walkable distance (in this case, 400 metres). Areas in white indicate where residents do not have access to open space within 400 metres, or where there are 'gaps' in the open space network.

Figure 6.4
Accessibility of public open space in Boroondara



Proportion of municipality area

Approximately 12 per cent of all land within the investigation area is public open space and this increases to 18 per cent if industrial, green wedge and agricultural areas are excluded. Similarly, while approximately four per cent of all land within the urban growth boundary is public open space, this increases to 11 per cent if industrial, green wedge and agricultural areas are excluded.

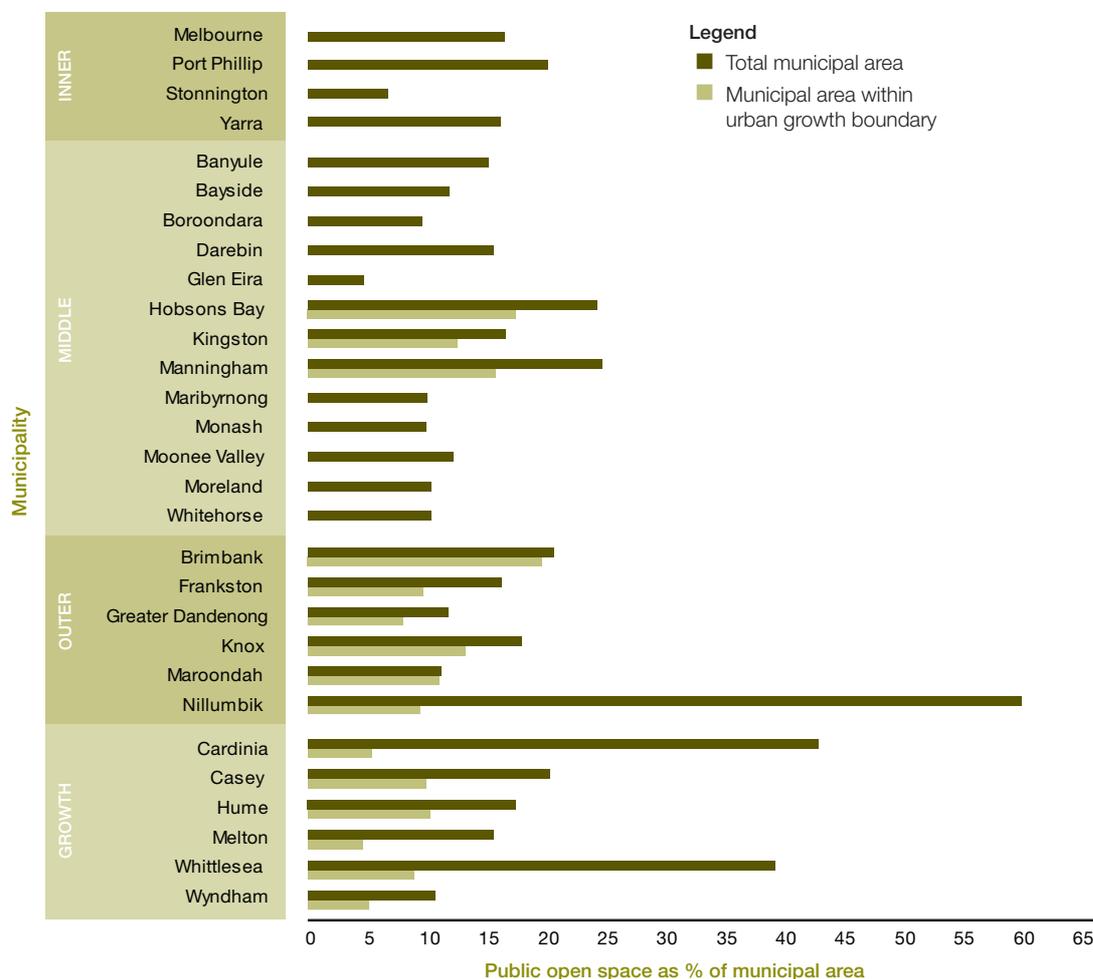
These measures of the proportion of open space are not directly comparable with the 10 per cent guidelines contained in the Precinct Structure Planning Guidelines (PSPG) as the guidelines apply to net developable area, i.e. land suitable for housing (see section 6.5).¹⁷⁰

Figure 6.5 shows public open space as a proportion of the total area of each municipality (excluding industrial, green wedge and agricultural areas) for the entire investigation area and within the urban growth boundary.

Municipalities with the lowest amount of public open space as a proportion of their municipality area include Glen Eira (4.7 per cent), Stonnington (6.7 per cent), Boroondara (9.6 per cent) and Monash (9.9 per cent). By contrast, Nillumbik (60.1 per cent), Cardinia (42.9 per cent) and Whittlesea (39.3 per cent) contain the highest amount of public open space as a proportion of the entire municipality, which is unsurprising given the relatively large land area and small population centres in these municipalities.

The picture changes when the amount of public open space is considered as a proportion of municipality within the urban growth boundary. The greatest difference can be observed in the outer and growth municipalities (where only part of the municipality lies within the urban growth boundary). For example, less than ten per cent of Melton, Cardinia and Nillumbik contain public open space when only considering areas inside the urban growth boundary. There is no clear pattern across municipalities, with comparatively low proportions observed in both established and growth municipalities.

Figure 6.5
Proportion of public open space in each municipality



Public open space per capita

Public open space per capita varies widely within the investigation area, from one hectare/1000 people in Glen Eira to 343 hectares/1000 people in Cardinia. Public open space within Cardinia is substantially higher than any other municipality, a reflection of this municipality's low population and large size.

The median public open space per capita across metropolitan Melbourne is 7 hectares/1000 people. Most inner and middle municipalities contain less than this median. Although the City of Melbourne contains the median level of open space, it has many non-resident open space users, such as city workers, students and tourists.

Public open space per capita is generally higher in the growth municipalities than in inner, middle and outer municipalities, and is generally lowest in the inner municipalities. Municipalities with the lowest public open space per capita include Glen Eira, Stonnington, Boroondara and Moreland. These municipalities also contain low levels of public open space as a proportion of municipal area (see previous section). Similarly, municipalities such as Cardinia, Nillumbik and Whittlesea with the highest proportion of public open space per capita also contain the highest amount of public open space as a proportion of municipal area.

Figure 6.6 shows public open space per thousand people for each municipality within metropolitan Melbourne. This highlights the generally low levels of public open space per capita in inner and middle municipalities when compared to the outer and growth municipalities.

6.7.5 THE IMPLICATIONS OF PROJECTED POPULATION GROWTH FOR PUBLIC OPEN SPACE

Population projections prepared by the Victorian Government indicate continued strong population growth in metropolitan Melbourne.¹² No municipality within the investigation area is projected to experience population decline over the coming two decades (see section 3.4 for more detail).

An additional 600,000 new homes will need to be accommodated in Melbourne within the next 20 years.¹² It is projected that 47 per cent of new homes will be accommodated in growth areas, with the remaining 53 per cent to be built in established areas.¹²

The public open space inventory developed by VEAC provides a 'snapshot' of public open space at a single point in time. Some idea of future per capita provision can be gained by applying population projections for metropolitan Melbourne to the current area of public open space and land subject to Public Acquisition Overlays (PAOs) (that is, land that proposed to be acquired by an authority) for additions to regional parks. It is recognised that PAOs will not be the only source of future public open space but other sources, such as development contributions, are too difficult to project. This analysis is limited, but it provides some preliminary observations on future public open space per capita within metropolitan Melbourne if no additional open space is provided outside of that already committed under existing PAOs.

Figure 6.6 shows public open space per capita (hectares per thousand people) for each municipality in the investigation area in 2006 (the date of Australia's most recent population census), 2016 and 2026.

When considering the entire investigation area, the potential decrease in public open space per capita between 2006 and 2026 is generally greatest for growth municipalities. This is to be expected given the projected increases in population density in these areas. However, growth municipalities have, and are projected to retain, higher per capita levels of open space than most other municipalities. Further, it is anticipated that new open space will be provided in these areas through the planning process and, in some cases, new regional parks will cater for the projected population increases.

Public open space per capita in the City of Melbourne will also decrease significantly given its anticipated strong population growth in areas like Docklands. Municipalities like Glen Eira and Stonnington, with low per capita provision, will in all likelihood have decreased per capita levels of open space. While there are potential opportunities for increasing the amount of public open space in growth municipalities, there is less available land in the City of Melbourne and other established municipalities.

Figure 6.7 shows public open space per capita in 2006, 2016 and 2026 for areas within the urban growth boundary. The analysis uses overall population figures from Victoria in the Future 2008 for each municipality.¹⁵⁰ That is, it does not differentiate between population inside and outside of the urban growth boundary in the investigation area. It is assumed that a low proportion of the population currently resides outside the urban growth boundary in the investigation area.

Figure 6.6

Public open space per capita for current (2006) and predicted (2016 and 2026) population in the investigation area

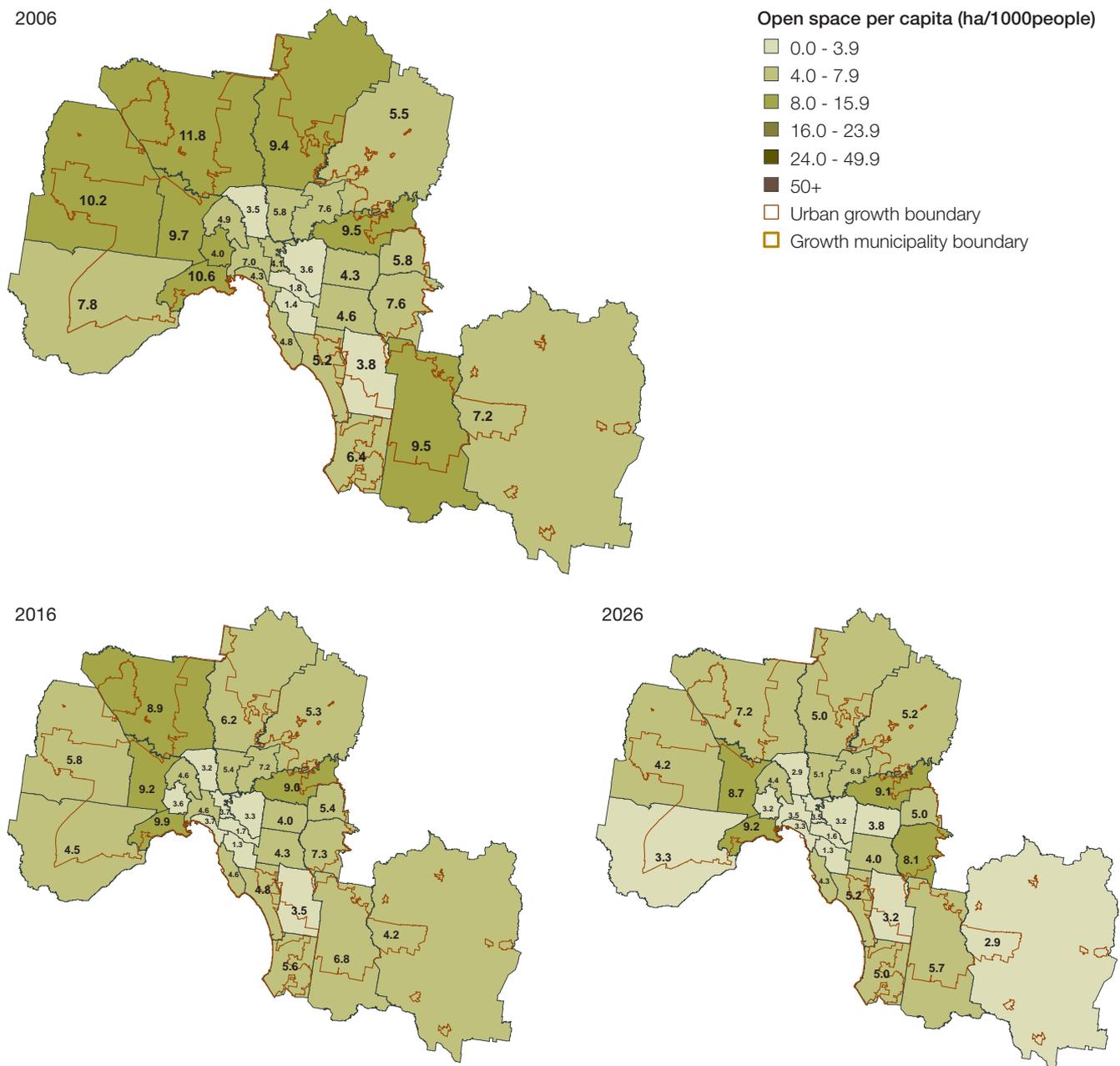


As shown, public open space per capita could decrease over time for all municipalities except Knox. Growth municipalities, such as Cardinia, will be relying upon the planning process and possibly the creation of new regional parks to offset these potential decreases. Otherwise, levels of open space per capita in outer municipalities may decrease to lower levels than some inner municipalities. Increasing population and limited opportunities for the creation of new public open space are likely to mean that public open space per capita within inner and middle municipalities remains low.

While the analysis does not include all sources of future public open space provision, it provides insights and may identify pressures from existing and increasing population densities on public open space across metropolitan Melbourne. It highlights the importance of taking opportunities to create areas of new public open space in areas of high and increasing ratios of population to public open space.

Figure 6.7

Public open space per capita for current (2006) and predicted (2016 and 2026) population within the urban growth boundary



6.8 Protecting Melbourne's public open space network

There are many historic examples where a reduction in parkland area has not been replaced (see box 6.1). Today, open space is generally protected through legal mechanisms. For example, clause 12.05 of the State Planning Policy Framework of the Victoria Planning Provisions and the Parklands Code^{1,13} outline measures to protect open space within metropolitan Melbourne from being depleted through encroachment or excision for other projects.

The State Planning Policy Framework and the Parklands Code apply to open space on public land. Both state that there should be no long-term reduction in open space area, and where a reduction in open space must take place, it should be replaced with land of equal or greater size and quality. This aims to ensure that public open space cannot be diminished without a proper public process, and replacement with land of equal or greater quality. An example of the application of clause 12.05 and the code is the Royal Children's Hospital. A new hospital is being constructed in Royal Park adjacent to the existing facility. The existing hospital is to be demolished and its site is to become part of the park to replace land used for the new hospital.

Despite this protection, some specific legislation (such as legislation establishing freeway construction entities) overrides the general planning principles in the State Planning Policy Framework of the Victoria Planning Provisions. Open space can also be reduced in area by new building works. A common instance is where an addition is required to an existing public building in a local park. This may not be seen as a significant loss, although in municipalities with a low level of open space, incremental losses of this nature can have an impact. Also, significant areas of reserved Crown open space have been lost to public access by the construction of enclosed and gated sporting stadiums (e.g. Yarra Park, Royal Park, Princes Park and Albert Park).

Some smaller areas of open space are not zoned as open space, e.g. They may, for example, be zoned as residential and have no protection under the planning scheme.

Protection of the land can be further enhanced by ensuring all open space areas are appropriately permanently reserved (in the case of Crown land) and/or zoned for open space use under the Planning Scheme (in the case of municipal land).

COMMENTS INVITED

Open space should be protected by ensuring appropriate legal status is given to the land. Crown land areas should be permanently reserved under the *Crown Land (Reserves) Act 1978* for public parks, public recreation or other more specific purposes. Municipal land should be correctly zoned as Public Park and Recreation Reserve or Public Conservation and Resource.

Open space should also be protected from incremental loss of area. If open space must be reduced in area then this should be based on consideration of the costs and benefits to the community and on the basis that replacement land be sought. It is important that a public process to review the losses and gains be undertaken. This may require strengthening of relevant planning provisions.

6.9 Providing new open space

Box 6.1

Loss of open space – three inner Melbourne case studies

Royal Park

While still a large area of open space, Royal Park has lost a significant area of open space for arterial roads, rail and tram lines, Melbourne Zoo and the Hockey and Netball Centre and the 1953 Royal Children's Hospital (amongst others). As a result, Royal Park has been reduced in size by approximately a third since its establishment in 1854, from 283 hectares to 170 hectares.¹⁸¹

Yarra Park

Yarra Park in East Melbourne was established in 1850 with an area of 40 hectares, but has become fragmented and reduced over time. Parts of the park were used for buildings, railway lines and sporting ovals such as the Melbourne Cricket Club (MCG) and Richmond Cricket Club (3.6 hectares and 2.4 hectares respectively). The park's area was reduced in 1875 by the extension of Swan Street across the Park to the Yarra River. Brunton Avenue and the railway tracks running from Flinders Street Railway Station to Richmond station effectively cut Yarra Park in two. The 1956 Olympic Games in Melbourne resulted in the construction of the Olympic Swimming Pool and cycling velodrome in Yarra Park.

Albert Park

Albert Park was reserved in 1862, but an area was sold on the eastern side of the park for housing in 1875. Smaller sections of the park were also excised for schools and an army signals depot, and an aquatic and indoor sports was constructed in the Park in 1997.

Open space additions

Despite these historic encroachments, there have been additions within inner Melbourne such as Birrarung Marr (about eight hectares, created to partly replace open space lost during the construction of the Melbourne Park sports precinct) and new areas of open space in Docklands (approximately 17 hectares, most of which is hard-paved water frontage).

VEAC's open space inventory indicates that public open space per capita is generally higher in the growth and outer municipalities than in inner and middle municipalities. Similarly, inner and middle municipalities contain low levels of public open space as a proportion of municipal area. Projected increases in population are likely to place more pressure on existing open space in municipalities across the investigation area. New public open space will need to be provided to enable current levels of open space provision to be maintained as Melbourne's population increases. While it is envisaged that the Precinct Structure Planning Guidelines will facilitate creation of new open space in growth municipalities, it will be much more difficult to apply similar standards in established municipalities.

A number of different mechanisms for creating public open space are discussed below.

6.9.1 PLANNING MECHANISMS

The creation of public open space commonly occurs through contributions from developers required under the *Subdivision Act 1988* or alternatively, the Victoria Planning Provisions.

Subdivision Act 1988

Contributions under the *Subdivision Act 1988* are the most common mechanism used to provide open space contributions in established municipalities. Local councils can require a contribution for public open space from subdivision proponents under the Act. This requirement may be met through a land or cash contribution (up to five per cent), or a combination of both. Any payments must be used to purchase new, or improve existing, open space. There is some evidence to suggest that the contribution is generally accepted as a cash contribution, particularly in established areas with higher rates of infill.¹⁶⁸

Open space contributions received as cash, rather than as land contributions, are required to be used to acquire land elsewhere, upgrade existing open space facilities or undertake capital works on undeveloped open space. Improvements in quality and access to open space is the method employed by most inner and middle ring municipalities, as the alternative of land acquisition is seen to be cost prohibitive.

Improvements in quality, such as the ability to accommodate larger numbers of users and uses on the same space, environmentally sustainable design, improvements in safety, increased accessibility, particularly for an ageing population, and public knowledge of where open space is located, are very important uses of cash contributions.

Some municipalities have identified neighbourhoods that require additional open space in their open space strategy documents and have taken steps to identify funding and acquire land. In the future, more inner and middle municipalities may need to consider using developer contributions for acquisition of land as their populations increase and adequate improvements to open space quality have been made.

Some types of subdivisions are exempt from an open space contribution from developers (for example, two lot subdivisions that are unlikely to be further subdivided, and land and buildings that have made the contribution previously). Local councils also have discretion to exempt any new types of land use or development from the payment of open space contributions (for example, private schools and hospitals or churches on the basis that they provide a community service).

Further, local councils can only require an open space contribution if there is a requirement for more open space as a result of the subdivision. The contribution may be challenged by the subdivision proponent if they consider that there is adequate open space nearby or that it is provided as part of the development.

The effectiveness of the Act as a mechanism for open space contribution depends on whether it is applied to greenfield or outer urban developments as opposed to infill developments.¹⁶⁸ The contribution is calculated as a percentage of the area of the land or land value. It does not take into account the number of potential residents of the new subdivision, even if it is a medium or high density development. Conversely, growth municipalities commonly receive more than the maximum of five per cent public open space specified under the Subdivision Act – often up to 15 per cent (although, as explained below, Development Contributions Plans and schedules to Clause 52.01 are more commonly used in the growth areas).

The provisions of the Subdivision Act relating to open space contributions do not appear to be responsive to the changing needs of municipalities, particularly:

- ▶ the rationale for the maximum five per cent contribution rate is not strategic as it relates to the area under subdivision, not the increase in population resulting from the subdivision
- ▶ the provisions are applied in an inconsistent way across municipalities
- ▶ the provisions are not linked to municipal open space policies and strategic plans that identify the open space needs of growing populations in inner and middle municipalities.

Victoria Planning Provisions

The Victoria Planning Provisions are state-wide provisions that form a template from which the planning schemes of all municipalities are sourced and constructed. Through the State Planning Policy Framework (clauses 12 and 15) and particular provisions (clause 56.05 and 52.01), they provide guidance and tools to municipalities for acquiring public open space through the land development process. Clause 52.01 enables local councils to specify their own contribution rate, in place of the maximum five per cent specified in the Subdivision Act, for public open space, provided this can be justified via a planning scheme amendment. If no contribution rate is specified, a contribution of up to five per cent may still be required under the Subdivision Act.

Schedules to Clause 52.01 essentially enable local councils to set their own contribution rates that reflect local circumstances. Approximately 15 of the 29 municipalities within the investigation have established their own contribution rates and the remaining municipalities rely on the five per cent maximum contribution available under the Subdivision Act. There is considerable variation in the contribution rates levied across metropolitan Melbourne. Many municipalities have settled on a five per cent contribution with higher contribution levels required in specific precincts. For example, while Maroondah requires an eight per cent contribution in a specific precinct, Greater Dandenong requires 20 per cent contribution in a specific precinct. Others have a sliding scale with lower contributions required for smaller subdivisions. In Glen Eira the contribution is a minimum of two per cent for a three-lot subdivision and 3.55 per cent for a six-lot subdivision.

COMMENTS INVITED

The open space contribution provisions of the *Subdivision Act 1988* and Victoria Planning Provisions should be reviewed with the aim of facilitating appropriate levels of open space contributions, particularly in inner and middle municipalities.

The Development Contributions Plan Overlay (Clause 45.06) in the Victoria Planning Provisions facilitates payment of development contributions, one-off payments or in-kind provision of works, services or facilities, by developers. Development contributions to planned infrastructure (such as public open space) are required to meet the needs of communities resulting from new developments.

Development Contributions Plan Overlays are commonly used for planning greenfield sites in the outer and growth municipalities. Development Contributions Plans (strategic plans for infrastructure projects required for an area), allow local councils to specify local requirements, including variations to open space provision to reflect local needs, or specifying what type of land may be included.

Thirteen of the municipalities within the investigation area have Development Contribution Overlays that specify open space contributions

6.9.2 PUBLIC ACQUISITION OVERLAYS

The Government maintains a long term land acquisition program, primarily for securing open space land for metropolitan parks or regional level parks. These areas are defined by Public Acquisition Overlays (PAO) in planning schemes. In some instances, the PAO land is situated in middle municipalities that have a low level complement of open space and have been listed in planning schemes for scores of years. Many of these sites are located along Melbourne's major river systems and are gaps in public access to the river. The purchase of this land has been constrained by limited available financial resources.

6.9.3 MULTIPLE USE AND USERS

Public land, particularly public open space, within the metropolitan area often fulfils multiple functions and meets a range of community expectations. Approximately 2,880 hectares, or four per cent, of public open space is located on public authority land. This percentage increases to nine per cent if only open space within the urban growth boundary is considered.

Most of this land (more than 90 per cent) belongs to Melbourne Water (generally along stream frontages, wetlands, retarding basins and pipe tracks). Melbourne Water has recently launched the '84Hundred campaign' which encourages the recreational use of waterways. The campaign aims to raise public awareness of the natural, social and recreational values of waterways within the Port Phillip and Western Port catchment, and encourages people to enjoy, value and protect rivers and creeks in Melbourne. Another example of the multiple use of Melbourne Water land is the incorporation of a retarding basin into the Merri Creek Regional Park.

Other councils and public authorities have entered into agreements with VicRoads or VicTrack to use land adjacent to freeways and railways as bicycle paths. Shared use agreements also allow local councils and schools to enter into arrangements for community use of school sportsgrounds in areas deficient in public open space.

Multiple uses of this land are often viewed as a pressure on public land and one that is increasing as Melbourne's population increases. However, the multiple use of public authority land can maximise access for the greatest number of people and, in some situations can provide 'new' public open space for communities.

COMMENTS INVITED

Multiple uses of public authority land should be encouraged as a means of providing additional public open space in metropolitan Melbourne.

7 CLIMATE CHANGE AND PUBLIC LAND

Section 2.4 discussed Melbourne's changing climate. **CHAPTER 7** discusses the predicted impacts on public land, with an emphasis on how climate change will affect Melbourne's liveability and natural values on public land. It also discusses the role public land can play in adapting to the impacts of climate change.

7.1 The impacts on public land

Melbourne has experienced higher than average temperatures and lower rainfall for the last decade, even when the natural variability of the climate is taken into account. Altered weather patterns are most likely to be related to climate change and are projected to increase in frequency and/or severity.⁶⁷ Some of the implications for public land are discussed below.

Rainfall variability

Severe rainfall shortages have been experienced in Melbourne over recent years. Although there has been a return to wetter conditions this year, it is unlikely that this reflects a long-term shift back to above average rainfall – Melbourne city last registered annual rainfall above the long-term average of 647mm in 1996.⁶⁶

Water shortages have had a significant effect on the natural environment and many metropolitan parks and gardens have suffered significant stress. There is ongoing concern that the reduction in rainfall is a step-down from the previous long-term average, and that this may have significant consequences for the future management of parks, reserves and recreation areas on public land.

Parks, recreation reserves and treed streets are important visual elements of the Melbourne metropolitan area. These areas of public land provide important contributions to Melbourne's liveability as well as providing habitat and corridors for some native species.

Many public land managers are adapting their management practices to the changing weather conditions. Some examples are presented in box 7.1.

Box 7.1

Adapting to the effects of reduced rainfall on public land

The predicted impacts of climate change include drier conditions and hotter average temperatures. Throughout the investigation area, hotter and drier conditions have significantly affected public parks and recreation areas. Public land managers have adapted to the changing climate by undertaking a range of measures including those discussed below.



Parklands and gardens

The City of Melbourne alone has over 50,000 trees of which 18,000 are located on roadsides and boulevards. These trees are important contributors to Melbourne's liveability. Alternative water supplies and mulch beds have been used to support significant trees and parks through extended dry periods. The selection of species more tolerant of dry conditions for future plantings is also a way of reducing water needs.

Sports grounds

The Sustainable Sports Grounds Program is a fund provided by the Department of Planning and Community Development to support local councils in implementing sustainable water management practices for sport and recreation facilities. The aim of the program is to 'weather proof' sports facilities through the installation of synthetic turf, developing fields with drought resistant turf species and water harvesting or water efficiency projects. Many sporting groups have been asked to adjust their patterns of use – particularly training use – on sports fields to help maintain good playing conditions throughout the season.

Urban water conservation

The Victorian Government's Stormwater and Urban Water Conservation fund promotes the reduction in use of drinking water through demonstration projects. One such example is the diversion and treatment of stormwater from three large drains into Albert Park Lake. Stormwater collected from surrounding suburbs is stored in the lake and treated for irrigation of the 19 sports grounds at this park. This reuse of stormwater also reduces runoff and pollution into Port Phillip Bay.

Left: During the recent extended dry conditions and summer heatwaves, many public land managers used slow-feed watering to maintain trees. The picture shows traffic management barriers being used for this purpose and mulch beds to maintain soil moisture around tree roots.

Increased bushfire risk

Many Melburnians live on the urban fringes in areas at risk of bushfire. In 2009, there were bushfires at Kilmore East–Murrindindi, Bunyip State Park, Narre Warren North, Endeavour Hills and Plenty Gorge. This affected around 24,440 hectares of land, including some 17,250 hectares of public land in the municipalities of Nillumbik, Whittlesea, Casey and Cardinia in the Metropolitan Melbourne Investigation area.

Climate change is predicted to increase bushfire risk. In Melbourne, the number of 'extreme' fire danger days is expected to increase by between 12 and 38 per cent by 2020, and by between 20 and 135 per cent by 2050.^{64,182}

The Victorian government recently accepted the Victorian Bushfires Royal Commission's recommendations to substantially increase fuel reduction by prescribed burning and other measures on public land, while also undertaking to eliminate the source of some fires.² Enhanced research and monitoring will be undertaken to inform adaptive management and the impact on natural values of increased prescribed burning.

Impacts on biodiversity

Major land use change in Australia over last 200 years has greatly altered many ecosystems and species compositions. Climate change will compound this existing stress for many plants and animals and reduce the capacity of natural adaptive processes.¹⁸³ Indeed, many species that are not currently threatened may become so. The pressures on biodiversity from climate change are discussed in chapter 8.

The orange-bellied parrot *Neophema chrysogaster* is an example of a threatened species that could be subject to further pressures from the effects of climate change. A case study on the orange-bellied parrot, which overwinters in coastal saltmarsh on public land within the investigation area, is presented in box 7.2.



Box 7.2
Potential implications of climate change for the orange-bellied parrot

A coastal species, the critically endangered orange-bellied parrot – a small grass parrot of coastal south-eastern Australia – may be particularly susceptible to the effects of climate change. The orange-bellied parrot breeds in Tasmania, before migrating across Bass Strait to Victoria and over-wintering in Victorian and South Australian coastal saltmarsh habitats. Approximately 50 mature birds remain in the wild and the captive breeding program for the species comprises around 160 birds.^{184,185} Up to 70 per cent of the entire Victorian population is concentrated at three wintering sites around western Port Phillip Bay and the Bellarine Peninsula.¹⁸⁶

On the mainland the orange-bellied parrot depends on coastal saltmarsh vegetation communities for food and habitat. These environments are threatened by rising sea levels. Adding to these existing threats, climate change impacts may lead to a further overall reduction in saltmarsh habitat through permanent inundation and greater frequency of major storms increasing coastal erosion. A significant decrease in food and habitat resources would have disastrous consequences for the wild population of orange-bellied parrots which are highly dependent on high-quality saltmarsh.¹⁸⁵ Increased storm frequency may also affect the seasonal Bass Strait migration of the species.

Above: Each winter the critically endangered orange-bellied parrot migrates to Victoria’s coastal saltmarshes. Climate change may pose a further threat to this species.

Flooding and erosion

Climate change is predicted to increase the occurrence of extreme weather events such as flash floods and storms. The risks include erosion, damage and loss of infrastructure or property, and flooding or inundation. There are significant risks for tourism and recreation as well as economic costs associated with asset maintenance and repair – for example, flooding of drainage systems or erosion of coastal roads. Many areas of public land across the investigation area perform a function of flood retention or detention and storm water drainage. Many of these areas are also semi-natural wetland environments and recreation areas (e.g. Truganina Swamp, Edithvale-Seafood Wetlands and Galada Tamboore in Merri Creek Parklands).

The results of changing rainfall patterns, particularly increased time between rainfall events and high intensity storm events, are also likely to have negative effects on both sewerage and drainage infrastructure.⁸⁹



Above: A severe storm in April 2009 caused extensive damage to the coastal foreshore and promenade at Black Rock. In general, the effects of sea level rise are most pronounced during storm events.

7.2 Public land's role in mitigating and adapting to climate change

Coastal impacts

Sea-level rise in future decades will affect the coastlines of Port Phillip Bay and the Western Port region with erosion in many locations, particularly during storm events. For example, storm surge inundation simulations for the Western Port region suggest that a current one in 100 year storm surge could become a one in one to one in four year storm surge by 2070.¹⁸⁷

Many natural systems, including estuaries, coastal vegetation, wetlands and reefs are likely to become increasingly vulnerable. For metropolitan Melbourne some of the most significant impacts will include erosion of beaches and loss of coastal landscapes, damage and loss of infrastructure or property, and flooding or permanent inundation.^{64,188}

Most of Melbourne's Port Phillip Bay coast is fringed by Crown land reserves (about 92 per cent). Communities and assets along the Victorian coastline will increasingly come under threat from coastal flooding due to rising mean sea levels and possible changes in weather patterns that drive sea level extremes such as storm tides.¹⁸⁹ Rising sea levels will generally reduce access to public land beaches and foreshores impacting on a popular open spaces and community assets. Planning processes will need to take into account the lifetime of coastal assets – often 100 years or more – in those areas vulnerable to sea level rise.³⁹ In addition, areas where sea level rise and flooding will have a combined effect may present significant engineering problems, for example with bridges over the lower Yarra and Maribyrnong Rivers.

The Future Coasts Program is undertaking extensive data collection and modelling of the physical vulnerability of Victoria's coast to climate change.¹⁹⁰ Strategies for managing risks include: development of set-backs for locations susceptible to flooding and erosion, increased beach renourishment; and protection measures such as sea walls.

As described above, some of the most significant risks for public land in metropolitan Melbourne and its associated infrastructure are from extreme weather events. These include heat waves, long-term drought, thunderstorm or heavy rainfall events, flooding, erosion, and coastal inundation from storm surge combined with sea level rise.^{67,64,68} The role of public land in mitigating and adapting to the negative impacts of climate change is discussed below.

Countering urban heat islands

In built-up city areas like urban Melbourne, hard impermeable surfaces such as infrastructure, roads, pavement and building roofs heat above air temperature on hot and sunny days, and slowly release heat during the night. This is the heat island effect caused by urbanisation.⁶³ Figure 7.1 shows how urban temperatures are typically lower at the urban-rural border than in densely urbanised areas.¹⁹¹

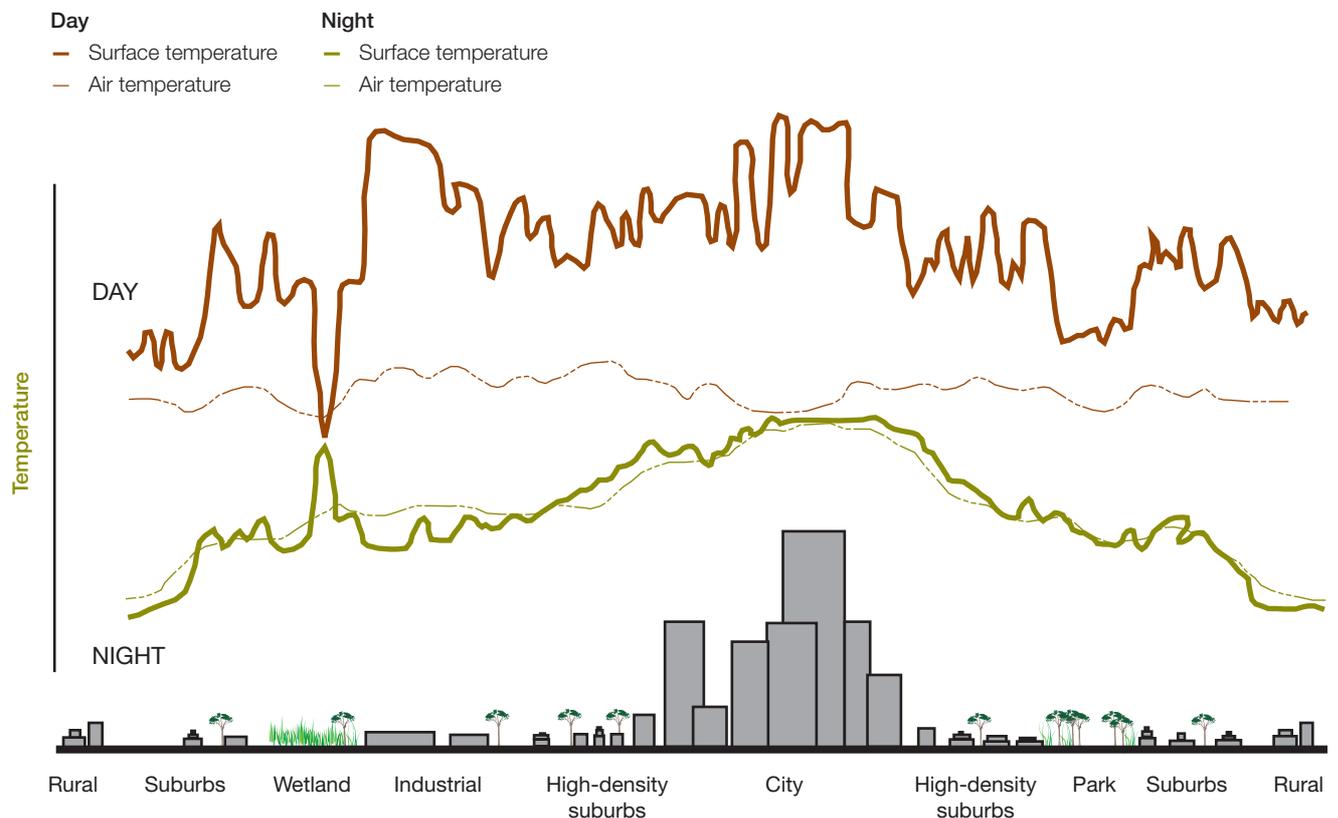
Elevated temperatures from urban heat islands, particularly during summer, can increase the energy used for cooling, and compromise health and comfort.

Parks and other treed areas and bodies of water can create cooler areas within a city by providing shading and evaporative cooling. In metropolitan Melbourne, public land containing treed nature strips and parks can reduce the impacts of urban heat islands and protect Melbourne's liveability. For example street trees provide:

- ▶ shade for homes and buildings, reducing interior temperatures and the costs of cooling
- ▶ shaded paths encouraging walking and cycling
- ▶ habitat for some native animals.

However, the ability of 'park cool islands' to provide thermal cooling is highly dependent on soil moisture and water supply. Trees respond to the stress of drought and heat by reducing surface area through dropping leaves. The reduced tree canopy then provides less shade and the surrounding soil loses more moisture through evaporation. Until recently, the extended dry period across Melbourne and the region affected the ability of vegetation to provide cooling by both lowering moisture levels and reducing tree canopy or shaded areas. Many trees died due to this drought and temperature stress.

Figure 7.1
Air and surface temperatures of differing urban forms¹⁹¹



Providing ecological connectivity

Land that links areas of habitat has been identified as being critical to maintaining biodiversity in the long term under the threat of climate change, and many existing biodiversity links across Melbourne are on public land. Existing natural areas of public land, such as parks and reserves, and smaller public land areas such as Crown river frontages, are the building blocks of landscape-scale connectivity strategies. There is, however, growing evidence that public land, and in particular national parks and conservation reserves, may not be effective alone in mitigating the effects of climate change on Australia's biodiversity.^{192,183} Private freehold land will be required to play a role in restoring important connections.

Across the state many parks and reserves are large enough to enable native plants and animals to "move", recolonise and reconfigure in response to climate change.¹⁹³ However, in a highly urbanised area like Melbourne, scope to improve ecological connectivity may be limited (see chapter 8).

There are also ecological networks at a global scale that are threatened by climate change. Several species of migratory wading birds annually visit wetlands across the investigation area from as far away as Siberia. These birds are protected under international conventions (JAMBA, CAMBA, ROKAMBA and Bonn). Wetland sites of International significance, identified under the Ramsar convention, found in the investigation area include the western shoreline of Port Phillip Bay (including the Western Treatment Plant), Edithvale-Seafood Wetlands and Western Port (see chapter 2.3).

COMMENTS INVITED

Vegetated public land plays an important role in adapting to climate change. Street trees and urban parks help counter urban heat islands, while more natural areas of public land provide the linkages that are critical for flora and fauna under threat from the impacts of climate change.

8

ENHANCING BIODIVERSITY IN METROPOLITAN MELBOURNE

Section 2.3 describes the natural values of the investigation area. **CHAPTER 8** discusses the pressures on biodiversity and opportunities to maintain and enhance its protection within the investigation area.

8.1 Pressures on biodiversity

Many of the pressures on biodiversity within the investigation area are the result of past and current land uses such as agriculture and urban development. These include habitat loss and fragmentation, invasive species, altered fire regimes and recreation and tourism pressures. Additional pressures include processes such as climate change. VEAC's recently released *Remnant Native Vegetation Investigation Discussion Paper* provides a discussion of threats to biodiversity at a statewide level.¹⁹⁴

Most of suburban Melbourne has been irreversibly changed. It is the most altered landscape in Victoria from a biodiversity perspective, not only in terms of the amount of direct habitat loss but also because the land and associated land uses between remaining fragments of habitat are so inhospitable to native biodiversity. For example, hard-surfaced built environments, gardens dominated by exotic plants, and high densities of domestic pets (particularly cats and dogs), are all potential barriers to the successful dispersal of native species.

8.1.1 HABITAT LOSS

Habitat loss is a major cause of species decline in Australia. Within metropolitan Melbourne this has occurred as a result of land use changes such as clearance for urban development, agriculture, extractive industries and infrastructure. Impacts on native flora and fauna are often immediate and permanent.

During Melbourne's settlement phase, broad-scale vegetation clearance for development and agriculture was widespread and systematic. Native vegetation retention controls introduced in the late 1980s halted broad-scale habitat clearance within the investigation area. However, incremental habitat removal continues for residential

housing, infrastructure projects such as road widening, land subdivisions, fire protection and agricultural activities. Land-use decisions are often made on a case-by-case basis and generally don't take into consideration the cumulative effect of incremental habitat loss.¹⁹⁵

Local extinction of species may also occur with a substantial delay following habitat loss (known as an "extinction debt"). Modelling of plant species data and remnant habitat for Melbourne suggests that there may be a significant flora extinction debt – up to 55 per cent of (pre-European) plant species may be lost in the future as a consequence of historical vegetation clearance and land management (even with no further habitat loss or modification).¹⁹⁶ Focussed management actions can enhance the long-term persistence of species and reduce the likelihood of extinction debt.

8.1.2 HABITAT FRAGMENTATION

Most of the investigation area is a fragmented landscape, although parts of the north-east remain relatively intact. Fragmented native ecosystems can experience altered community and landscape dynamics such as increased flora and fauna mortality rates, decreased plant recruitment rates (the process by which seedlings establish themselves) and fluctuations in population size.¹⁹⁷

Small, isolated patches are generally less likely to support viable flora and fauna populations and communities than networks of larger, well-connected habitat patches. There are a number of findings that demonstrate the reduced ecological viability of small patches. For example, bird species richness (the number of different species in a given area) was shown to be lower in smaller habitat patches than larger patches in southern-eastern Melbourne.¹⁹⁸ Smaller grassland patches in western Melbourne had a higher probability of being degraded than larger patches over a fifteen year period.¹⁹⁹

Despite this, sometimes, smaller habitat areas can play an important role in the protection of biodiversity.²⁰⁰ For example, important populations of the threatened Eltham copper butterfly *Paralucia pyrodiscus lucida* occur in small, relatively isolated remnant patches in Eltham.

Vegetated habitat corridors are considered one means of restoring structural connectivity in a fragmented landscape. For example, the Port Phillip and Westernport Catchment Management Authority's *Living Links* program aims to create biolinks within the Dandenong creek catchment in the south-east of the investigation area. The recently released Land and Biodiversity White Paper and VEAC's *Remnant Native Vegetation Investigation Discussion Paper* also stress the importance of functional connectivity, with the White Paper identifying regional-scale biolinks for Victoria.^{14,194}

8.1.3 HABITAT DEGRADATION

The continued degradation of remaining native vegetation is currently the major threat to Victoria's biodiversity. Remaining areas of native vegetation face potential loss of habitat condition through a range of pressures including physical fragmentation, invasions of introduced species, changes to fire regimes and climate change. The interaction between these various pressures is often complex and unpredictable. The pressures are discussed in more detail below.

Invasive species

Australia has had a long period of geographic isolation resulting in high levels of endemism in our native flora and fauna. As a result, the introduction of plants and animals has dramatically affected many of our natural ecosystems, and directly led to species extinctions in most bioregions in Australia.

Melbourne contains an abundance of introduced species (for example, planted non-native gardens), leading to significant opportunities for the more invasive of these species to move into more natural areas. Introduced species threaten native biodiversity in multiple ways, including direct competition for resources, alteration of habitat conditions, hybridisation with native species and predation.²⁰¹ It is expected that some invasive species will be favoured by predicted global climate change, leading to greater impacts on native ecosystems within Melbourne.⁵

Altered fire regimes

Fire in urban and semi-urban areas can have devastating impacts, as occurred in the Victorian bushfires on 7 February 2009. Parts of the investigation area were also affected by the 1939 Black Friday and 1983 Ash Wednesday fires.

Bushfires occur naturally throughout many Victorian landscapes. The response of flora and fauna species and communities to fire is complex. In some cases, fire can provide appropriate conditions for the regeneration of many of Melbourne's native flora species and communities. Different vegetation communities such as grasslands, heathlands and woodlands all have their own tolerances to fire and require different fire regimes (factors such as the intensity, frequency, seasonality and scale of fire) to ensure their long-term viability.

The management of fire regimes in metropolitan areas can be complex given the close proximity of people to vegetated areas. The impact of bushfires and public concern about potential fire hazard has resulted in the use of fuel management techniques such as prescribed burns.²⁰² The impacts of prescribed burns on individual species are often poorly understood. However, frequent prescribed burns can negatively impact on some plant species if they are unable to reach maturity and produce sufficient seed before the next fire episode.

Fire suppression can also have a detrimental effect on some vegetation communities. For example, grassland and heathland communities rely on fire to stimulate seed release and create open spaces for seedling germination, and a lack of fire can impede successful regeneration within these communities.^{203,204} An accumulation of heavy fuel loads can also result in large, very intense and ecologically damaging bushfires.

Climate change

Human-induced climate change is likely to compound existing stresses on flora and fauna and reduce the capacity of natural adaptive processes.¹⁸³ It is difficult to predict the exact impacts of climate change on flora and fauna due to uncertainty about how ecological processes will interact with one another. However, impacts may include changes in the distribution and abundance of flora and fauna species. Factors contributing to the vulnerability of Melbourne's biodiversity to climate change include:

- ▶ generally low relief of the metropolitan area and hence limited scope for altitudinal migration of species
- ▶ low and variable rainfall and considerable between-year variation in climate
- ▶ extensive and ongoing habitat degradation, loss and fragmentation
- ▶ a high proportion of species with narrow geographic or climatic ranges.²⁰⁵

Climate change may also affect ecosystems through sea level rise, increased frequency and intensity of fires and invasive species. Indeed, many species that are not currently threatened may become so, particularly those that depend on environments at risk such as coastal shorelines and wetlands, or those vegetation communities that are sensitive to more frequent and intense fires.

Marine environments are not the specific focus of this investigation, but it is noted that marine species will be affected directly and indirectly by climate change, particularly in temperate and coastal areas. Impacts include ocean acidification, changes in temperature, currents, winds, nutrient supply and rainfall. This will affect groups such as phytoplankton and zooplankton resulting in cascading effects in food webs.^{182,206}

Flora and fauna species within the investigation area most at risk from the effects of climate change include those with one or more of the following ecological attributes:

- ▶ genetically impoverished and/ or localised populations (e.g. helmeted honeyeater *Lichenostomus melanops cassidix*, Eltham copper butterfly);
- ▶ species/ communities with specialised habitat requirements, a narrow range of physiological tolerance, or limited adaptive capacity (e.g. Leadbeater's possum *Gymnobelideus leadbeateri* and little penguin *Eudyptula minor*);
- ▶ narrow geographic ranges or disjunct populations (e.g. southern brown bandicoot *Isodon obesulus obesulus*); or
- ▶ species that depend on other species or habitats that may be restricted (e.g. orange-bellied parrot).

Chapter 7 includes a case study on the implications of climate change for one of these species, the orange-bellied parrot.

Recreation and tourism

Areas of public land with natural values in metropolitan Melbourne are often subject to multiple land uses in addition to conservation. For example, larger parks serve conservation, recreation and tourism functions. Land managers in urban areas often face the challenge of protecting natural areas while also providing sustainable recreational and tourism opportunities.

Most visitor activity in parks and reserves with biodiversity values is concentrated at serviced areas or along access roads and tracks, with impacts associated with recreational activities generally confined to small

sections of a park or reserve.¹⁶⁰ Similarly, many parks in Melbourne are suited to high concentrations of visitors due to their lower natural values and developed facilities. However, impacts on natural values can occur when inappropriate and unsustainable behaviour occurs in natural areas. For example, inappropriate access by vehicles and pedestrians can cause erosion, degraded habitat and displacement of native fauna.¹⁷ The impacts of inappropriate uses in areas containing natural values are often incremental, with some impacts becoming self-sustaining over time (for example, weeds can continue to spread even if there is no further use of an area).

The high value placed on recreational and visitor use of public open space in Melbourne also means that opportunities for restoring structural habitat connectivity through revegetation are more limited than in rural areas of Victoria.

Box 8.1

Contribution of biodiversity to liveability

The terms of reference for the Metropolitan Melbourne Investigation require VEAC to report on the contribution of public land to Melbourne's liveability and opportunities for enhancing this contribution.

Biodiversity is essential for human existence – it contributes to the healthy environments, clean air and water that support human life. These services to humanity are termed “ecosystem services” and include temperature amelioration (e.g. reduction of the “urban heat island” effect), reduction of greenhouse gas emissions through carbon capture, air purification, water filtration and drainage and waste decomposition.²⁰⁷ (Exotic vegetation can also provide these benefits.)

Areas with native biodiversity can provide local residents and other urban dwellers with a direct link to the natural heritage of an area and contribute to a sense of place in urban environments.⁴⁶ The contribution of biodiversity to liveability is reflected in community attitudes towards nature. Remnants of habitat within urban areas are usually highly valued by the local community.⁴⁶ Similarly, having nature in close proximity (e.g. in urban or national parks), or just knowing it exists, is important to people regardless of whether they are regular ‘users’ of it.²⁰⁸

A key opportunity to enhance biodiversity, and therefore liveability, in the investigation area is to protect natural habitats on public land.

8.2 Protecting biodiversity in metropolitan Melbourne

A key response to the pressures facing biodiversity in the investigation area is to enhance the protection of natural habitats on public land. Globally, protected areas are the cornerstone of efforts to protect biodiversity. The protected areas system is discussed below, along with other mechanisms for protecting biodiversity on both private and public land in metropolitan Melbourne (and in Victoria more generally).

Protected areas in urban environments face a number of pressures such as fragmentation and human disturbance which are common to all natural areas (see section 8.1). However, being surrounded by people can also be an advantage, making it easier for protected areas to gain public support.²⁰⁹ This is evidenced by the public interest generated by campaigns such as ‘Save the Dandenongs’ campaign in the 1940s and 1950s, and the large number of environmental community groups operating in metropolitan Melbourne today (see box 8.2, right).

Urban and peri-urban areas contribute to wider efforts to conserve biodiversity, a contribution that is recognised internationally. For example, approximately 20 per cent of the Greater London Area is assessed as valuable wildlife habitat, and both remnant and ‘designed’ natural areas (such as artificial or reclaimed wetlands) in London are considered important in efforts to conserve biodiversity.²¹⁰ The International Union for the Conservation of Nature’s (IUCN) World Commission on Protected Areas has established a specialist group on cities and protected areas to, amongst other things, advance a broader IUCN urban initiative, which has a goal of improving lives of city dwellers while strengthening protection of nature.

8.2.1 VICTORIA’S PROTECTED AREA SYSTEM

In past VEAC investigations, protection of biodiversity has been achieved through additions to Victoria’s protected areas (or conservation reserve) system, which forms part of the National Reserve System (NRS). The goals and requirements of the National Reserve System are summarised in box 8.3. In the following discussion, ‘protected areas system’ and ‘conservation reserve system’ are used interchangeably. Protected areas within the investigation area are listed in appendix 5.

Box 8.2

Community groups - working to improve Melbourne’s biodiversity

Community groups make a vital contribution to the protection and maintenance of natural areas in metropolitan Melbourne. Friends groups, committees of management and advisory committees, Coast Action/Coastcare groups, Waterwatch groups and others work to restore the natural values of public land through activities such as revegetation, pest plant and animal control, and erosion and salinity control.

The Port Phillip and Western Port region has more than 380 community groups (this figure excludes Landcare groups, which typically operate on private land) that contribute directly to managing public land with natural values.⁴⁵ These groups also receive support from public land managers such as local government, Parks Victoria and Melbourne Water. Two examples of the important work undertaken by Melbourne’s community groups are provided below.

Reducing salinity at Braeside Park

Braeside Park is a 293 hectare conservation reserve located in Braeside in Melbourne’s south-east. The park contains river red gum *Eucalyptus camaldulensis* woodlands and wetlands. A number of red gums contain hollows (often a limiting resource within urban environments), providing resources for hollow-dependent mammals and birds. The wetlands, although mostly dry in recent years, also provide important habitat for waterbirds and migratory waders.

The health of the red gum woodlands throughout Braeside Park was declining due to salinity in the late 1990s. Friends of Braeside Park and Parks Victoria planted thousands of trees, shrubs and grasses over a four year period in areas affected by salinity with the aim of reducing salinity and establishing new habitat areas. Volunteers also monitored the watertable levels and salinity concentrations within the park.



Restoring the Ngarri-djarrang (Central Creek) grassland

The Ngarri-djarrang Grassland Reserve is a nine hectare reserve located at Central Creek in Reservoir, in Melbourne's north. It contains areas of threatened plains grassland and grassy wetland ecosystems. The site has a long and diverse land use history, which resulted in a long-term decline in vegetation quality.

The Merri Creek Management Committee has carried out habitat restoration and maintenance at the reserve since 1993. Activities include intensive weed control, revegetation and ecological burning.

Above: Many community groups and volunteers take part in land management activities in Melbourne's parks and reserves. The photo above shows volunteers helping with revegetation works on National Tree Day 2010.

Box 8.3

The National Reserve System

The National Reserve System is largely made up of the protected areas established and managed by the states and territories over land and inland freshwater, but it also includes Indigenous and private protected areas. The goal of the National Reserve System is to develop and effectively manage a comprehensive, adequate and representative (CAR) national system of protected areas. **Comprehensiveness** relates to the need to include the full range of ecosystems within the reserve system. **Adequacy** relates to the need to ensure ecological viability, resilience and integrity of each ecosystem in the reserve system.

Representativeness relates to the need to ensure that the examples of those ecosystems represented in the reserve system reasonably reflect the biotic diversity of those ecosystems.

To be part of the National Reserve System, areas must fall within the IUCN definition of protected areas. That is, they must be clearly defined geographical spaces, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

*Australia's Strategy for the National Reserve System 2009–2030*¹⁰ includes the following national targets for the reserve system:

- ▶ examples of at least 80 per cent of all regional ecosystems in each bioregion by 2015
- ▶ examples of at least 80 per cent of all regional ecosystems in each subregion by 2025
- ▶ core areas for the long-term survival of threatened ecosystems and threatened species habitats in each of Australia's bioregions by 2030
- ▶ critical areas for climate change resilience, such as refugia, to act as core lands of broader whole of landscape scale approaches to biodiversity conservation by 2030.

Within Victoria, Ecological Vegetation Classes (EVCs) are the principal unit for vegetation mapping for land-use planning and management in Victoria, and are used as ecosystem surrogates to measure progress against these targets.

In 1997, nationally agreed criteria were established for CAR reserve systems in forests in Australia (commonly known as the JANIS criteria). The JANIS criteria set targets for the amount of each forest ecosystem that should be reserved in each bioregion (namely 15 per cent of the pre-1750 extent, 60 per cent of the current extent for vulnerable ecosystems, and 100 per cent of the current extent for rare and endangered ecosystems). The criteria allow for both “dedicated” reserves and “informal” “reserves which do not all fall within the National Reserve System, but the criteria nevertheless provide additional guidance for establishing Victoria’s conservation reserve system.

The protection of natural habitats in metropolitan Melbourne is underpinned by the protected areas system which, as discussed in box 8.3, aims to include representative examples of all ecosystems. Many ecosystems in metropolitan Melbourne are poorly represented in the protected areas system. As well as providing permanent habitat protection, a strategic, well planned and managed network of protected areas is probably the most important strategy for reducing the negative impacts of climate change on biodiversity.¹⁰

Private protected areas contribute to the National Reserve System, and can be useful when options for public reserves are limited. They are achieved by the covenanting of properties or establishing other legal instruments and agreements to meet reserve system standards by individual landholders, non-government organisations or corporate bodies. Private protected areas may also be located on public authority freehold land.

8.2.2 OTHER MECHANISMS FOR BIODIVERSITY PROTECTION

Many important ecological processes and threats operate at scales larger than individual protected areas, and some of these threats are best addressed at multiple scales: local, regional and landscape. There is a range of other mechanisms for biodiversity protection outside of the protected areas system for both public and private land. Some of these are discussed below.

Other parks and public land

Some public land with high biodiversity values is reserved primarily for other purposes (such as some natural features reserves, state forest and regional parks). Many of these areas have management objectives or management plans that aim to protect their biodiversity values.

Some public authority land also contains significant biodiversity values and is managed to protect those values. Significant sites owned by Melbourne Water (for example, the Edithvale-Seafood Wetlands) are discussed in chapter 10.

Waterways

Melbourne’s waterways network makes a major contribution to biodiversity protection through the linkages it provides between inner urban areas and larger protected areas in outer Melbourne. Melbourne’s rivers and creeks are some of our most valuable natural assets, and provide immense community benefits. They face a number of challenges including poor water quality, reduced flows, and the need for protection and enhancement of streamside vegetation and habitats.

Covenants and agreements

As mentioned in the previous discussion of private protected areas, mechanisms such as covenants and agreements can be used to protect natural values on private land outside the public protected areas system. The covenant or agreement provides on-title and permanent protection. For example, Trust for Nature is a statutory body that enters into voluntary conservation covenants with private landholders on their land, permanently protecting significant areas of natural habitat. Trust for Nature also manages a revolving fund to purchase properties of high conservation value, which it then on-sells with a conservation covenant.

Legislation and policy

Biodiversity is also protected and managed through legislation and policies. Some of the more commonly used tools are discussed below.

Victoria Planning Provisions

The Victoria Planning Provisions provide the framework, standard provisions and State planning policy for all Victorian planning schemes. These planning provisions state that a planning permit is required to remove, destroy or lop native vegetation, with some exemptions for fire-prone areas. They also allow local councils to apply a Vegetation Protection Overlay or an Environmental Significance Overlay to particular areas with environmental values (for example, private land along the Yarra River frontage). Additional planning controls are applied to areas with planning overlays, providing special protection for vegetation and other environmental assets.

Victoria's Native Vegetation Management: A Framework for Action

This state-wide policy framework for the protection and management of native vegetation in Victoria.¹⁶ The primary goal of the framework is 'a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a net gain'. Three steps are applied to decisions on the protection or removal of native vegetation: (1) *avoid* the removal of native vegetation, (2) *minimise* the removal of native vegetation through appropriate planning and design, and (3) appropriately *offset* the loss of native vegetation. Native vegetation that is removed must be "offset" through the protection and management of similar vegetation types. For example, if an area of native grassland is removed, another area of native grassland should be protected and/or managed to offset the loss. Losses can also be offset through revegetation in some circumstances.

Threatened species legislation

Flora and fauna communities and species considered threatened in Victoria are protected by federal and state legislation. For example, the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* seeks to protect nationally threatened species, while Victoria's *Flora and Fauna Guarantee Act 1988* protects threatened species and communities within Victoria. Any direct or indirect impacts from development on threatened species listed under these Acts must be assessed. The other primary piece of Victorian legislation providing for the protection, conservation and management of Victoria's biodiversity is the *Wildlife Act 1975*.

Threatened species advisory lists

The Department of Sustainability and Environment's threatened species advisory lists contain flora and fauna considered critically endangered, endangered, vulnerable, poorly known, near threatened or extinct in Victoria. The advisory lists are not the same as the threatened list under the *Flora and Fauna Guarantee Act 1988*. There are no legal requirements that flow from inclusion of a species in the advisory lists.

COMMENTS INVITED

There are pressures on biodiversity in metropolitan Melbourne. The protection of areas with natural values is a key mechanism for enhancing Melbourne's biodiversity. Readers are invited to comment on recommendations in Chapter 10 to enhance biodiversity values on public land in the investigation area.

9 VALUES AND FUTURE USES OF SURPLUS PUBLIC LAND

One of the terms of reference for this investigation requires VEAC to assess the values of Crown land and public authority land for areas not committed to a specific use, and report on appropriate future uses relevant to Melbourne's liveability and natural values.

CHAPTER 9 addresses this term of reference by:

- ▶ defining 'public land not committed to specific use'
- ▶ describing the values and scope of this land
- ▶ discussing the policies and processes for determining appropriate future uses of this land
- ▶ reporting on appropriate future uses of this land relevant to Melbourne's liveability and natural values.

At the end of this chapter, comments are invited on a number of topics.

9.1 : What is public land 'not committed to a specific use'?

Since the early days of colonisation, successive Victorian governments have allocated public land for public purposes and disposed of other public land. A short history of public land allocation and disposal in Victoria is provided in box 9.1, right. In current times, public land no longer required for its original purpose is assessed by the owning authority to determine if it is required for an alternative use. If there is no alternative use, the land is usually identified as surplus and disposed of.

For the purposes of this investigation, VEAC will refer to Crown land and public authority land not committed to a specific use as surplus public land, defined as:

- a** land for which there is no current or planned use
- b** land that has a current use which will cease in the foreseeable future
- c** land that has no current use, but may be required in the long-term future.

Land in categories a) and b) is frequently considered by public authorities to be surplus land that can then be reallocated to another use, leased or sold. Land in category c) also may be considered to be surplus by public authorities because of the difficulties involved in projecting long-term demographic changes and the subsequent future demand for land for public purposes. School sites are an example of land that may become surplus as local communities age or change, but could conceivably be needed in the future if young families were to return to the locality.

9.2 : Values of surplus public land

The public land estate is dynamic; land is regularly bought, sold and transferred. This makes it difficult to assess the values and scope of surplus public land sites across the investigation area. A broad understanding of the values of surplus public land in general (rather than of particular sites) can be gained from considering its value to its owners and/or managers and users – public authorities and the Melbourne community.

Box 9.1

A short history of public land allocation and disposal in Victoria

Prior to European settlement, much of southern and central Victoria was the traditional estate of five tribal or language groups: the Bun Wurrung, Woi Wurrung, Wada Wurrung, Djadja Wurrung and Daung Wurrung.⁷

With the colonisation of Victoria in the 1830s all land was considered to be the property of the Crown. Since that time, Crown land has been allocated for public purposes, sold or leased. The sale or granting of Crown land in freehold title provided for the settlement and future of Victoria through the establishment of cities and townships, private dwellings, infrastructure and agriculture.

In 1837, Senior Crown Surveyor Robert Hoddle was instructed to survey parishes, locate roads and village sites and to 'reserve all tracts or pieces of land that may appear to be required for public purposes...'. Other instructions required land to be reserved for government purposes, for public buildings, church, parsonage, school, market place, gaol, Court House, watchhouses, burial places, and places for the recreation or amusement of the inhabitants.¹⁴¹ An Act to authorise the first sales of 'waste land belonging to the Crown' was passed in 1842. The proceeds of sale were to be applied to the public service of the Colony among other purposes.¹⁴⁰

Many early municipalities had smaller Crown reserves set aside for public purposes in keeping with their then status as small villages. As the population expanded, new suburbs were developed from subdivision of rural holdings. Government departments acquired land to provide services, such as schools.

Reserved land was frequently disposed of as a result of pressure from landholders for access to more land, and based on colonial policies to make land available for selection. Many timber reserves, town commons and racecourses were terminated in this way.¹⁴¹ The large parks in and around the City of Melbourne were established under Governor Latrobe as early as 1846. Many parks, however, have been reduced in size by incremental excisions – for example Royal Park has been reduced in area from 283 hectares at its establishment in 1854, to its current extent of around 170 hectares.¹⁴⁰

The broad-scale sale of Crown land effectively ceased in the late 1960s when a major public controversy arose over the government's proposed disposal of 80,000 hectares of vegetated Crown land in the Wimmera region of Victoria for agricultural use. The 'Little Desert controversy' as the issue was known, galvanised the public and conservation groups into opposition to the proposal with the result that no land was made available for agriculture in the Little Desert. It also ushered in a radically new system of public land decision-making, including the creation of the Land Conservation Council, a predecessor of VEAC.²¹¹

Although disposal of Crown land no longer occurs on a large scale, smaller areas of Crown land deemed to be surplus have always been disposed of by government. Public authorities also continue to dispose of their surplus freehold land. Crown land and public authority freehold land (together termed 'public land') may become surplus for a range of reasons, such as the closure of a school or hospital, or they may be the residual area of land acquired for a freeway, or an unused road.

In 1983, the identification and sale of surplus Crown land properties became more systematic and was specifically aimed at the generation of funds for government works. In 1986, the Victorian Auditor-General, reporting on the disposal of surplus court buildings recommended that consistent policies be applied across the public sector to the disposal of government properties that are surplus to requirements.²¹² Around the same time, the then Department of Property and Services introduced new measures for classifying Crown land into public (heritage) land that was to be retained in public ownership and government (transactional) land that could be disposed of by sale or lease. The *Crown Land Assessment Guidelines*²¹³ outline the classification process that is in current use. These guidelines are discussed further in appendix 7.

9.2.1 THE VALUE OF SURPLUS LAND TO PUBLIC AUTHORITIES

VEAC's discussions with several land-owning public authorities indicate that they value their freehold land and the Crown land they manage as a means of fulfilling their legislated functions and charters, which includes the most effective management of their assets. In this context, the value of any land that is surplus to current and future requirements tends to be its financial value to be realised on sale and/or the reduction in management costs achieved on disposal.

In some cases public authorities rely on revenue from land sales to fund purchases of new land to deliver services. For example, the Department of Education and Early Childhood Development (DEECD) uses funds from the sales of school sites that are no longer needed to assist with the purchase of new school sites in areas of increasing demand.

An example of the value of land to public authorities is provided in section 16 of the *Transport Act 1983*. This requires the Roads Corporation (trading as VicRoads) to consider the achievement of objects set out in the Act including:

to manage its assets effectively, including real estate, to protect future options and to provide for the planning, design, construction and management of new infrastructure and facilities as required.

There is an expectation within the Victorian government that government business enterprises will operate efficiently and in a commercial manner and provide an appropriate return to government. The *Water Act 1989*, the *Rail Corporations Act 1996*, and the *State Owned Enterprise Act 1992* respectively provide for water and rail corporations to pay the state a dividend as determined by the Treasurer after consultation with the relevant board and Minister. For example, the *State Owned Enterprise Act 1992*, which applies to VicTrack and VLine, states:

The principal objective of each state business corporation is to perform its functions for the public benefit by:

- a** operating its business or pursuing its undertaking as efficiently as possible consistent with prudent commercial practice; and
- b** maximising its contribution to the economy and wellbeing of the state.

The above legislated requirements do not, however, preclude government businesses from delivering whole of Victorian government priorities which may impact on their dividends. This is generally done in consultation with the Treasurer and/or relevant Minister.

9.2.2 THE VALUE OF SURPLUS PUBLIC LAND TO THE MELBOURNE COMMUNITY

The counterpoint to the value of surplus public land to public authorities is the value that the community places on it.

VEAC's consultations with the Community Reference Group for this investigation revealed a number of strongly held perspectives that provide some insights into the community value of surplus public land. These perspectives were also very clear in some submissions made to the investigation.

The first perspective is that public land is highly valued and is viewed as a finite, and possibly scarce, community resource. Community consultations indicated that Melbourne communities particularly value surplus public land that is, or has the potential to be, public open space. The grounds of former schools and natural or semi-natural spaces were often used as examples of such land.

One of the reasons that surplus land appears to be highly valued is a perception that public open space is diminishing in some neighbourhoods as a result of the sale and development of surplus public authority land and the subsequent conversion of open space to built space. For example, the development of former school sites was mentioned by the Community Reference Group and in several submissions. The view was put forward that when disposing of former school sites, vegetated areas or sports fields should be retained as public open space.

The Community Reference Group argued strongly that public land contributing to open space and land with natural and semi-natural values should not be sold. Some considered that any public land sales should be justified against liveability criteria or offset with land purchases.

Meeting the needs of future generations was also a concern of the Community Reference Group. It commented that Melbourne's increasing population and urban density were putting pressure on existing, and creating a need for more, open space and community facilities and services. It considered that some surplus land should be retained because government may be unable to repurchase suitable land due to either reduced availability or high land prices.

9.3 Scope of surplus public land



Above: DSE undertakes assessments of Crown land values using the Crown Land Assessment Guidelines (see appendix 7)

The second perspective is that the wider community does not recognise different ownerships of public land. Community consultations indicated that all land owned by the state (and to some extent local councils) tends to be viewed as public land, not as Crown land, VicTrack land, Melbourne Water land, and so on. As a consequence, there is a view that public land that is no longer needed for one public purpose should be automatically considered for another public purpose.

Underpinning this is a third perspective that public land is paid for and owned by the community to meet community needs. Community views indicated opposition to the sale of land which has a clear potential for meeting other community needs.

Disposal of public land was a theme raised in approximately 40 per cent of submissions. Recurring issues included requests to allocate adjacent surplus public land to an existing open space reserve; dissatisfaction with the disposal process (regarding lack of transparency, process and notification of decisions to dispose of surplus land); local councils' inability to afford to purchase surplus land; and strong views that public land should be available for the best public use at no further cost to the public.

Public authorities would each be aware of their own surplus land, but there is no central listing of this land. This, and the dynamic nature of surplus public land, makes it difficult to determine its scope.

9.3.1 AMOUNT OF SURPLUS PUBLIC LAND

Some surplus public land sites can be identified from the Government Land Monitor's sales bulletin board. (This internal state government electronic bulletin board is maintained by the Land Monitoring Unit of the Department of Planning and Community Development). However, listing of surplus land on the bulletin board is currently not mandatory and sites are only listed for 30 days.

Some understanding of the scope of surplus public land can be gained from VEAC's public land database for the investigation. As explained in chapter 4, VEAC has categorised public land according to its use. Some areas of land remain uncategorised because they have no clear public land use. Their future use may be under consideration, they may be surplus to requirements, or they may have an identified future use as private land, such as land that is to be developed and sold for private housing.

VEAC has identified hundreds of sites amounting to 1,161 hectares (0.7 per cent of all public land) as 'uncategorised public land'. At the time of compiling this database, many of these sites would have fitted within VEAC's definition of 'land not committed to a specific use'. However, it is likely that some of these sites will now be allocated to another use or disposed of. It is also likely that some sites that VEAC has identified as having a current public land use have since become surplus.

Assuming that most surplus public land will eventually be transferred or sold, some further understanding of its scope and significance can be gained from examining the land transactions of several of the largest public land owners and managers in the investigation area. Other than the Crown, which owns an estimated 80 per cent of public land within the investigation area, Melbourne Water, VicRoads, the Department of Education and Early Childhood Development (DEECD) and VicTrack are the largest public land owners (see chapter 4 for more detail). Collectively these public authorities own approximately 17 per cent of public land, and manage substantial areas of Crown land, within the investigation area.

Table 9.1 summarises public land sales and transfers for Melbourne Water, DEECD, VicRoads and VicTrack over the previous three years. Land acquisitions are also summarised so that these land disposals can be understood within the broader context of changes to the public land estate.

Table 9.1

Land disposals and acquisitions in the investigation area by four public authorities*

FINANCIAL YEAR	PUBLIC AUTHORITY	AREA SOLD (HA)	AREA TRANSFERRED AT NO COST (HA)	AREA ACQUIRED (HA)
2006-07	Melbourne Water	50.88	21.91	52.27
	DEECD	11.65	nil	58.28
	VicRoads	16.73	nil	127.80
	VicTrack	1.20	5.82	2.26
Total		80.47	27.73	240.61
2007-08	Melbourne Water	40.39	93.96	42.09
	DEECD	1.02	nil	52.54
	VicRoads	36.74	nil	255.42
	VicTrack	2.27	nil	15.82
Total		80.42	93.96	365.87
2008-09	Melbourne Water	25.17	39.85	61.70
	DEECD	2.12	nil	34.95
	VicRoads	111.61	20.58	29.73
	VicTrack	1.72	0.46	nil
Total		140.62	60.89	126.38
Grand total		301.50	182.58	732.86

*The data provided by the public authorities varied. Some may have combined land transfers, and relinquished Crown land with land sales. Some may have combined land acquired through transfer with land purchases.

As this table shows, approximately 302 hectares of public land was sold during this three year period and a further 183 hectares was transferred. This indicates that around 484 hectares (or 4.84 square kilometres) of public land was considered to be surplus by these four land owners and managers.

Clearly, not all surplus public land leaves the public land estate. Some land is sold or transferred in accordance with the applicable legislation to other public authorities for other public uses. For example, in 2007-08, Melbourne Water transferred approximately 90 hectares of freehold land at Frankston Reservoir to the Crown to establish a natural features reserve. In 2008-09, VicRoads transferred 20.58 hectares of land to the Crown for the creation of the Mullum Mullum Creek Parklands and sold 0.29 hectares to VicTrack for the redevelopment of the Coolaroo railway station. In the same year (2008-09) Melbourne Water transferred 21.56 hectares to other water authorities for service provision, 17.7 hectares to VicRoads for the Dandenong Bypass and 0.59 hectares to the City of Melbourne for public open space.

As table 9.1 also shows, the area of land acquisitions was more than double the area of land sales and one and a half times the area of sales and transfers combined. This shows that the combined landholdings of these public authorities increased over this three year period. This is not surprising given that land is needed for the new schools, roads, and other services that are being developed to accommodate Melbourne's population growth.

There have also been other additions to the public land estate in this period. Since 2006-07 Department of Sustainability and Environment (DSE) has acquired more than 440 hectares (4.4 square kilometres) of freehold land across approximately 30 sites. The majority of acquisitions were purchases of private land subject to long-term public acquisition overlays for additions to regional parks. The acquisitions also included a small number of blocks that were transferred at no cost from other public authorities, including land transferred as native vegetation offsets.

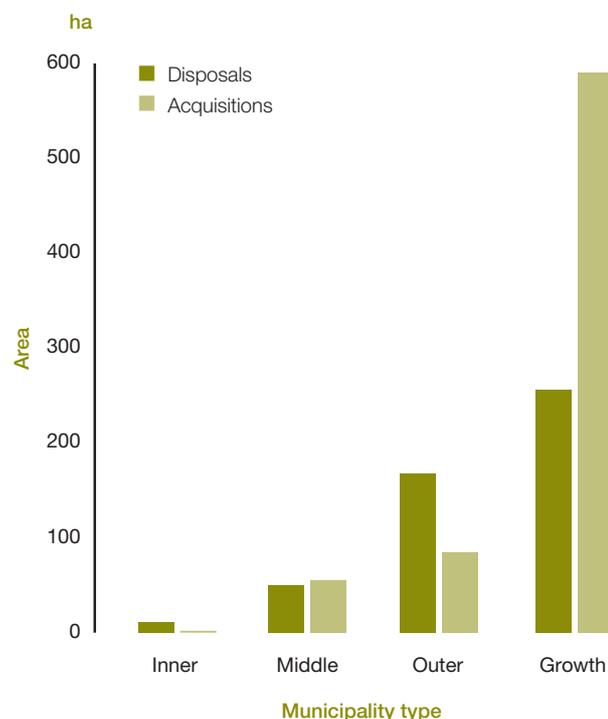
9.3.2 CHARACTERISTICS OF SURPLUS PUBLIC LAND

Overall, the information provided by the four public authorities indicates that there is great variation in the characteristics of surplus public land. The blocks that were sold or transferred ranged in size from around 0.01 hectares to more than 90 hectares. There were many very small parcels – the majority of VicTrack’s, VicRoads’ and Melbourne Water’s land disposals were less than one hectare. There were, however, others that were more significant – for example, Melbourne Water disposed of nine sites of between eight and 93 hectares in area and VicRoads disposed of five sites of between 10 and 60 hectares in area. While many sites were either sold or transferred for alternative public purposes, others were sold for private uses such as private residential and industrial developments.

A possible explanation for the community perception that the public land estate is diminishing might be that land purchases are primarily occurring in outer and growth municipalities, while land sales are occurring in established municipalities. DEECD land transactions during the period could support this perception. It sold ten sites across the metropolitan area and purchased land for 26 new schools in the outer and growth municipalities and one school site extension in a middle municipality. Figure 9.1 shows the land disposals and acquisitions by Melbourne Water, the DEECD, VicRoads and VicTrack in inner, middle, outer and growth municipalities over the three year period. It partially supports this explanation by showing that most public land acquisitions were in growth municipalities. However, most public land sales were also in the growth municipalities and, although disposals exceeded purchases in inner and outer municipalities, the amount of land was much smaller.

A further explanation of the community perception that the public land estate is diminishing may be that communities value small or particular areas of surplus public land. It is feasible, for example, that small areas of surplus public land in inner municipalities are valued because they provide recreational or green spaces (possibly incidentally to their primary purpose) which are not in abundance and are difficult to replace. A small number of submissions mentioned the closure and sale of specific schools sites in relation to the loss of open space. These closures had occurred over the last 20 years and were largely in established suburbs.

Figure 9.1
Land disposals and acquisitions by type of municipality for four public authorities in the investigation area



9.4 Policies and processes for determining appropriate future uses of surplus public land

9.4.1 GOVERNMENT POLICY

The *Policy and instructions for the purchase, compulsory acquisition and sale of land*²⁰ are administered by the Government Land Monitor. The document, which is known as the Government Land Monitor's Policy, was developed to ensure accountability and integrity in land transactions. It outlines a best practice approach that must be implemented by all public authorities when selling land and includes the following major components:

- ▶ Public land is not to be sold at less than the market value determined by the Valuer-General.
- ▶ First right of refusal to purchase surplus public land must be offered to other public authorities.
- ▶ The price paid for public land by public authorities is the value determined by the Valuer-General.
- ▶ Public land that is not purchased by public authorities must be:
 - ▷ rezoned prior to sale to maximise its valuation and sale price
 - ▷ marketed appropriately to achieve adequate exposure to the market and maximise the sale price
 - ▷ sold by public auction or public tender, unless sale by private treaty has been approved by the Minister for Finance in relation to Crown land or the Minister for Planning in relation to freehold public land.

As indicated previously, the policy does not require that all public land to be disposed of is listed on the Government Land Monitor's sales bulletin board. Local council submissions to this investigation and submissions to the 2008 *Legislative Council Select Committee on Public Land Development* highlighted a general dissatisfaction with the consultation on the disposal of public land.¹⁷⁷ The main concerns were that the land disposal process is not transparent, and there is insufficient time after being notified of a future land sale for local councils to assess the land and arrange funds to acquire land, or make representations to manage the land as a committee of management.

The policy applies to all sales of public land. There are, however, land transfer mechanisms other than sale. Public authority freehold land that is no longer required for its

original use can be transferred to the Crown at nil cost for another public use. This can be done in accordance with existing statutory procedures, such as those possible under the *Land Act 1958* and the *Crown Land (Reserves) Act 1978*. Mullum Mullum Park, Warrandyte-Kinglake Nature Conservation Reserve, Werribee River Regional Park and part of Merri Creek Regional Park, for example, were created with land transferred to the Crown from public authorities. Public authorities consulted by VEAC considered transfers at no cost to be exceptions, rather than general practice.

9.4.2 PROCESSES RELATING TO THE ASSESSMENT AND SALE OF SURPLUS PUBLIC LAND

Crown land

There are different processes for assessing whether surplus Crown land and public authorities' freehold land should be retained or disposed of. These are summarised and a more detailed account is provided in appendix 7.

DSE is required to assess whether surplus Crown land, including land relinquished by other public authorities, has 'public land values' and should be retained. The role stems from the role of the Minister for Environment and Climate Change in relation to land reserved under the *Crown Land (Reserves) Act 1978* and the *Land Act 1958*. This assessment is undertaken against criteria grouped into six main categories: environment/conservation; cultural/historical; social/community/Aboriginal; recreation/tourism; resource production/utilisation; strategic/other including government policies.²¹³ Box 9.3 (right) summarises assessment outcomes from July 2006 to March 2010.

Crown land assessed as having no identified public values, or land identified with lesser public land values that can be adequately protected by covenant or other instrument, may be sold. The Minister for Finance is responsible for selling Crown land and therefore land determined to be suitable for sale is sold by the Department of Treasury and Finance (DTF).

Land assessed as having important public land values and potential alternative uses is retained in Crown ownership for reallocation to another public use, in consultation with potential land managers. This could result, for example, in the addition of land to an existing park, the reuse of former government buildings by local communities, or allocation of land to another public authority for another public purpose. The land may be managed by another public authority, a local council or a committee of management, or managed under lease or licence.

Box 9.3

Summary of Crown land assessment outcomes

Between July 2006 and March 2010 DSE assessed 62 sites or approximately 180 hectares of surplus Crown public land within the investigation area. The sites varied significantly in size. These assessments resulted in approximately:

- ▶ 13 sites[^] totalling 48 hectares assessed as suitable for retention as Crown land
- ▶ 36 sites[^] totalling 90 hectares assessed as suitable for sale
- ▶ 16 sites totalling 42 hectares assessed as suitable for sale with protective instruments, such as overlays or covenants.

Some of these sites were relinquished to the Crown by public authorities and may be included in the land disposals of the selected public authorities as shown in table 9.1. Some sites were transferred or sold to these authorities and may be included as acquisitions in table 9.1.

[^] Three sites were assessed as being suitable for part retention and part sale.

Source: Derived from information provided by Department of Sustainability and Environment

The *Crown Land Assessment Guidelines* provide for surplus Crown land that is assessed as having a local community use to be retained in Crown ownership and subsequently reserved for a public purpose. There is no payment required of the new public land manager – usually the relevant local council or committee of management – as the land is retained by the Crown for a new public purpose.

VEAC received some submissions from local councils requesting that surplus Crown land sites be allocated for a range of public purposes. This indicates that there may have been a shift from providing this land under committee of management arrangements, and that there is now an expectation within the Victorian government that local councils will purchase Crown land for local community uses.

The community use of former courthouses provides an example of this policy shift. In past decades disused courthouses were retained as Crown land and allocated to local councils for use by service clubs.²¹² However, several years ago Kew courthouse was sold to City of Boroondara for use as a community facility. The alternative would have been to retain the courthouse as Crown land and appoint the local council or another body as committee of management.

Public authority land

Freehold land owned by public authorities may be considered for sale in keeping with the commercial or operational objectives of the authority. Public authorities are not obliged to assess whether their surplus land is suitable for an alternative public purpose, nor are they obliged to retain land with public land values, unless the land is subject to a government-approved LCC recommendation. Land with potential alternative public uses may be offered for purchase for public purposes on a first right of refusal basis to other public authorities and then to the relevant local council (although this is not currently mandatory) at market value as determined by the Valuer-General. Land having significant values, such as biodiversity or heritage values, may be sold subject to protective covenants or other planning instruments.

9.5 Revenue generation from land sales

The Department of Treasury and Finance has annual revenue targets for the sale of surplus land, with a target of \$40 million in 2009-10.²¹⁴ These revenue targets are one of the main drivers of Crown land (and some public authority freehold land) sales. Targets and revenue generated for the years 1998-99 to 2009-10 are summarised in table 9.2.

Public land sales have realised \$600 million over the past eleven years. It is noted that the value of actual sales has decreased since 1999-2000. Some public authorities indicated to VEAC that the supply of surplus land is decreasing and is becoming limited to smaller parcels as the larger and more valuable areas were disposed of some time ago.

Table 9.2
Annual land sales for the Department of Treasury and Finance

FINANCIAL YEAR	LAND SALES (\$MILLION)	
	Actual	Target
2008-09	\$33.0	\$30.0
2007-08	\$38.0	\$70.0
2006-07	\$49.9	\$40.0
2005-06	\$30.0	\$30.0
2004-05	\$31.7	\$30.0
2003-04	\$50.0	\$30.0
2002-03	\$41.0	\$50.0
2001-02	\$54.4	\$50.0
2000-01	\$87.0	\$50.0
1999-00	\$105.0	\$60.0
1998-99	\$80.0	\$50.0
Totals	\$600.0	\$490.0

Source: Victorian Budget Papers 1998-99 to 2010-11

9.6 Enhancing the contribution of surplus public land to liveability

Surplus public land has two avenues by which it can contribute to Melbourne's liveability. It can be retained in public ownership and allocated to other public purposes such as those described in chapter 5. As discussed in that chapter, public ownership of land may provide more access to, and permanency of, community benefits.

Alternatively, surplus public land can be sold to private landholders for other purposes that benefit Melbourne communities. Affordable housing is an example of a liveability outcome that could be provided both by public land (i.e. as public housing) and by surplus public land that is sold for private housing developments. Aged care facilities are an example of a liveability outcome that could be achieved on surplus public land that is sold to a private or local council operator.

Despite the potentially small amounts of land involved, VEAC's consultations with the community reveal a concern that not enough surplus public land is being retained and reallocated for public purposes. This is possibly because relatively small areas of land in urban areas, such as former school sites and courthouses and land remaining after construction of roads, are rare and highly attractive for open space and community facilities. It is also possibly due to a view that all surplus public land should be available for other community uses, regardless of its ownership. Several means of maximising the contribution of surplus public land to the liveability of metropolitan Melbourne are discussed below.

9.6.1 CENTRAL LISTING OF ALL SURPLUS FREEHOLD PUBLIC LAND

Crown land is only identified as surplus after it has been assessed to determine its public land values. Public authority land, however, is generally not assessed for its values beyond the service delivery requirements of the authority. Mandatory listing on an accessible register, such as the Government Land Monitor's sales bulletin board, would result in a single reference point for all public authorities and local councils wishing to identify surplus public land that is available for public purposes and would increase the opportunities for surplus land to contribute to Melbourne's liveability.

Notification of forthcoming sales of surplus freehold public land is dependent upon public authorities voluntarily listing land on the bulletin board for thirty days and/or advising relevant local councils. Notification on the sales bulletin board for a longer time period, possibly in excess of 60 days, would provide potential Victorian and local

government purchasers with sufficient time to consider and arrange for land purchases. It may also be beneficial to maintain the listing on the bulletin board until the land is reallocated or sold to provide a current register of all public land that is available for sale.

COMMENTS INVITED

All surplus Crown land and public authority freehold land should be listed on the Government Land Monitor's sales bulletin board. The bulletin board should be accessible to all public authorities and local councils. Listings on the bulletin board should be for at least 60 days and should be maintained until the land is allocated to another use or sold.

9.6.2 PRICING PUBLIC LAND TO BE USED FOR PUBLIC PURPOSES

In general, Crown land is sold if it is assessed as having no public land values, or if the values can be protected through legal instruments such as covenants. However, sales of Crown land may also be driven by revenue targets, management costs or the inability to find a suitable manager.

While it is common practice for local councils to provide land for local community services, there is also a history of Crown land being for retained public purposes but with management delegated to local councils. There may be occasional opportunities to provide land for these purposes when suitable Crown land becomes available.

COMMENTS INVITED

Crown land that is assessed as suitable for another public use should be retained by the Crown and made available at no cost to a new manager, either under assignment or committee of management arrangements.

Sales of most public authority freehold land are generally associated with requirements for cost effective delivery of services and to return a dividend to the State, or the need to generate funds for other land purchases. These requirements may or may not be consistent with maximising the contribution of public land to Melbourne's liveability.

Public authorities and local councils wishing to *acquire* surplus Crown and freehold public land are required to meet the Valuer-General's valuation. Due to the high cost of land in Melbourne, this price could be prohibitive for many authorities and municipalities.

One way of managing the price of land to be purchased by other public authorities or local councils for public purposes land is to zone it to reflect its intended community use.

COMMENTS INVITED

Public authority freehold land that is assessed as suitable for another public use could be (re) zoned to reflect its intended public use and sold at a price that reflects this use. This would require an amendment to the Government Land Monitor's Policy and the funding implications for the public authorities selling land would need to be considered.

9.6.3 FUNDING FOR MANAGEMENT OF CROWN LAND

In some cases local councils and other land managers may be unwilling to take on the management of some Crown land due to the associated costs. Although DSE is the default manager of Crown land, it is often not in a position to manage additional land. Attempts to shift the cost of land management onto other land managers has the potential to compromise assessments by creating a driver for selling land, despite it having significant values.

COMMENTS INVITED

Clarifying responsibilities and/or additional resourcing for the management of Crown land should be considered.

9.7 : Appropriate future uses of land not committed to a specific use relevant to Melbourne's liveability and natural values

The provision of public open space and conservation of biodiversity were two of the most common themes raised during the community consultation for this investigation. Public open space and land with natural values also featured strongly in the literature review commissioned by VEAC on the contribution of public land to Melbourne's liveability (see chapter 5). This section discusses the opportunities provided by surplus public land sites to contribute to public open space and biodiversity conservation within the investigation area.

Open space

Chapter 6 identifies public open space as a key contributor to Melbourne's liveability. It also notes that public open space per capita is projected to decline for almost all municipalities in the investigation area, and particularly in established areas.

There is generally limited scope to create additional public open space in established areas due to the low availability of suitable land. Surplus public land could be seen as one means of providing new open space in municipalities with lower levels of open space per capita.

Surplus public land in fifteen municipalities with less than the median level of public open space per capita (current or future) was investigated by VEAC for public open space opportunities. Sites were assessed on the basis of location and general accessibility only. Quality was not taken into account.

VEAC found limited public open space opportunities on surplus public land, particularly within established municipalities. Six sites totalling 13.6 hectares (or 0.14 square kilometres) were initially identified as having some potential to provide public open space within five municipalities. One site, VicRoads land along Edgars Creek, accounted for 10.5 hectares. The Victorian Government recently announced that this site will become Crown land and be permanently reserved as parkland (see box 9.4).

The remaining five sites were largely unbuilt, semi-natural areas located on public authority-owned land. The sites ranged in size from 0.3 to 1.4 hectares. They were generally located in residential areas adjacent or near to existing areas of public open space. Given the small number and size of these remaining sites, VEAC has decided that it is better to focus its attention on the

processes for the identification and disposal of surplus public land, rather than on the potential future uses for individual surplus land sites.

Although this exercise reveals the limited opportunities available at this time, it also indicates that these opportunities may need to be taken when they arise. The Edgars Creek land is an example of such an opportunity.



Box 9.4

Case study: Edgars Creek Parkland

Edgars Creek Parkland is located in the City of Moreland. Much of the site is currently VicRoads freehold land. The land was purchased for construction of a road, but is no longer required. It is part flood zone, part residential zone and part industrial zone.

Within the investigation area, the City of Moreland has the third lowest amount of public open space per capita and a below average area of open space as a proportion of the municipality. The VicRoads land has been used by the community for recreation for the past thirty years. It adjoins City of Moreland freehold land and Melbourne Water freehold land providing a contiguous area of open space.

The Victorian Government recently decided to transfer the VicRoads land to the Crown and assign it to the City of Moreland as a committee of management. Transfer to the Crown and reservation as parkland will secure the site as public open space.

Above: VicRoads freehold land at Edgars Creek is to be transferred to the Crown and become permanent parkland.

Biodiversity conservation

Chapter 8 discusses the contribution of biodiversity on public land to Melbourne's liveability and natural values. It outlines the pressures on biodiversity within the investigation area and mechanisms for protecting biodiversity.

Chapter 10 includes draft recommendations to include a small number of public land sites with important natural in Victoria's protected areas system. Two of these sites are on surplus public land and these are described in box 9.5 below.

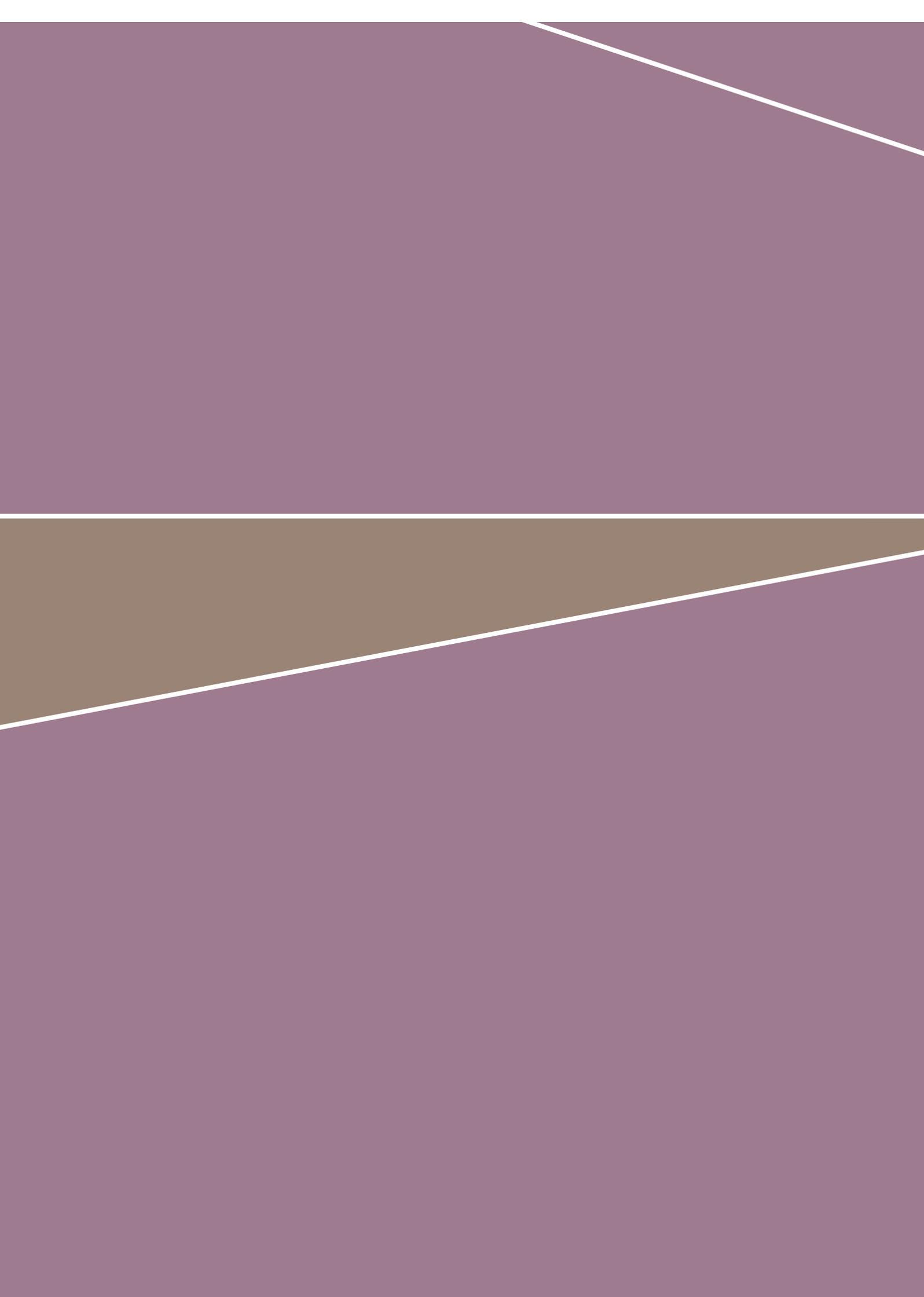
Box 9.5

Case study: Sherwin Ranges southern and northern buffers

The Sherwin Ranges southern buffer is located directly north of Yan Yean reservoir in the City of Whittlesea and is approximately 81 hectares in area. It contains remnant native vegetation including one threatened Ecological Vegetation Class (EVC) – Valley Grassy Forest. A number of threatened flora and fauna species have been recorded in the immediate vicinity of the site, including brush-tailed phascogale *Phascogale tapoatafa*, barking owl *Ninox strenua*, southern toadlet *Pseudophryne semimarmorata* and clover glycine *Glycine latrobeana*.

The northern buffer was reserved for water supply purposes in 1872 as part the Yan Yean reservoir catchment. It is approximately 136 hectares in area and is contiguous with Kinglake National Park.

Both the northern and southern buffer area sites are located on Crown land. They are no longer required by Melbourne Water for water supply purposes. Chapter 10 includes draft recommendations to add these two areas to Kinglake National Park.





PART E

DRAFT PUBLIC LAND USE RECOMMENDATIONS

One of the usual outcomes of VEAC investigations is recommendations for public land use within the investigation area. While not the major focus of the investigation, this part contains a small number of draft public land use recommendations for the Metropolitan Melbourne Investigation area.

10

DRAFT RECOMMENDATIONS

Public land within the investigation area is described in chapter 4. Section 4.5, in particular, describes the current uses and extent of public land within each of the major public land use categories developed by VEAC and its predecessors.

As discussed in chapter 4, some public land may not have a legal or formal reservation in place which reflects the accepted current use for particular sites. This chapter includes general recommendations that, if approved by government, will formally confirm existing public land uses across the investigation area as depicted on map A, and provide a framework for the management of land for which changes to land use are recommended.

This chapter also includes specific recommendations for changes to land use categories for a small number of sites to enhance the protection of biodiversity, and a further small number of specific recommendations relating to the continued management by Melbourne Water of freehold land with biodiversity values.

Comment is invited on all draft recommendations outlined below.

10.1 General recommendations

This section contains draft general recommendations for relevant land use categories to confirm existing public land use across the investigation area. General recommendations are only included where it is probable that there is land in this category not covered by approved Land Conservation Council (LCC) recommendations from the previous Melbourne investigations (see section 4.3). General recommendations are included in this chapter for the following land use categories:

- ▶ nature conservation reserves and private protected areas
- ▶ regional parks, including metropolitan parks
- ▶ natural features reserves
- ▶ coastal reserves
- ▶ water production areas
- ▶ historic and cultural features reserves
- ▶ community use areas
- ▶ services and utilities areas.

The general recommendations for the coastal park land use category are included later in the chapter as they relate only to the area recommended to be established as the Point Cook Coastal Park.

These recommendations will provide a consistent set of management objectives and provisions that can be applied to guide future management for the land assigned to the category. They will also provide a legal or formal mechanism which reflects the accepted current public land use for particular sites. This mechanism is appropriate, for instance, where obsolete historic reservations are in place (such as 19th century stock watering reserves or church reserves), or where the land is no longer required for its original purpose.

Nature conservation reserve and private protected area

In the investigation area, nature conservation reserves are mostly small areas set aside to conserve rare or threatened species, significant plant associations or communities, or valuable habitat for populations of significant fauna.

Trust for Nature conservation land is the only freehold public land in the investigation area currently included in a protected area category (see appendix 5). Freehold properties in the National Reserve System are generally categorised as private protected areas, and VEAC has adopted this term for Trust for Nature's freehold land. Trust for Nature owned private protected areas are generally managed in a manner consistent with nature conservation reserves, although public access may not be as readily available as it is for most Crown land nature conservation reserves.

DRAFT RECOMMENDATION

General recommendations for nature conservation reserves and Trust for Nature private protected areas

B That nature conservation reserves, and private protected areas according to their specific values, as shown on map A and listed in appendix 5 be used to:

- (a) conserve and protect species, communities or habitats of indigenous animals and plants
- (b) provide for educational and scientific study if consistent with (a) above; and
- (c) provide for recreation by small numbers of people, if consistent with (a) above;

and:

(d) the following activities generally be permitted:

- (i) bushwalking, nature observation, heritage appreciation, picnicking
- (ii) car touring, including four wheel driving, on formed roads and tracks
- (iii) for Crown land, apiculture on existing licensed sites, subject to the outcome of scientific research into the ecological impacts of this industry, and management requirements
- (iv) for Crown land, exploration and mining for minerals and searching for and extraction of stone resources subject to the consent of the Crown land Minister under the relevant legislation;

and:

(e) the following activities not be permitted:

- (i) grazing of domestic stock (see note 2 below)
- (ii) harvesting of forest products
- (iii) hunting and use of firearms (see note 3 below)
- (iv) solid fuel fires at any time of year
- (v) dogwalking
- (vi) horseriding;

and:

- (f) for Crown land, if not already appropriately reserved, these areas be permanently reserved under the *Crown Land (Reserves) Act 1978* (see note 4); or
- (g) Trust for Nature properties continue to be managed in accordance with the above and, should these areas no longer be required by Trust For Nature, that the areas be transferred to the Crown and reserved for conservation purposes under the *Crown Land (Reserves) Act 1978*.

Notes:

1. The above management objectives and land use recommendations are those that generally apply for the land use category. Exceptions to these may apply to specific reserves in special circumstances.
2. Grazing may be contracted for ecological or management purposes such as targeted weed control.
3. Hunting and the use of firearms may be authorised as part of a pest animal control program.
4. Langwarrin Flora and Fauna Reserve is to remain on Schedule Three of the *National Parks Act 1975*.

Regional park

Regional parks are set aside primarily to provide informal recreation for large numbers of people in natural or semi-natural surroundings. Across metropolitan Melbourne this category also includes areas identified as metropolitan parks (see table 4.5) and encompass areas with a broad range of landscape types and recreational uses. For example, camping and horseriding is generally permitted

in those regional parks outside the residential area, such as Kurth Kiln and Lysterfield regional parks. In some inner metropolitan parks, visitor centres may include picnic facilities with electric barbeques and children's playgrounds, and landscapes may be highly modified to provide for more intensive recreation activities including sporting fields.

DRAFT RECOMMENDATION

General recommendations for regional parks, including metropolitan parks

C That regional parks and metropolitan parks as shown on map A be used to:

- (a) provide for informal recreation associated with enjoyment of natural or semi-natural surroundings by large numbers of people
- (b) conserve and protect natural landscapes and scenic values
- (c) conserve and protect biodiversity to the extent that is consistent with (a) above; and
- (d) protect significant cultural and historic sites and places, including Aboriginal cultural sites and places;

and:

- (e) the following activities generally be permitted:
 - (i) bushwalking, nature observation, heritage appreciation, picnicking, recreational fishing
 - (ii) camping
 - (iii) dogwalking and camping with dogs (see note 1, right)
 - (iv) car touring, including four wheel driving, on formed roads and tracks
 - (v) mountain bike and trailbike riding on formed roads and tracks
 - (vi) horseriding on formed roads and tracks and overnight camping with horses
 - (vii) apiculture
 - (viii) metal detecting, prospecting, and
 - (ix) research, subject to permit;

and:

- (f) the following activities not be permitted:
 - (i) harvesting of forest products (see notes 2 and 3)
 - (ii) grazing by domestic stock (see note 4)
 - (iii) hunting and use of firearms (see note 5 below), and
- (g) subject to clearly defined, transparent and scientifically supported ecological objectives, park managers may undertake adaptive management to restore ecosystems or to return them to a condition more closely resembling their natural condition;
- (h) unused road reserves be added to adjoining parks where appropriate;
- (i) a management plan be prepared for each park in partnership with key user groups, local authorities and the community;

and:

- (j) if not already appropriately reserved, these areas be permanently reserved under the *Crown Land (Reserves) Act 1978* for the purpose of regional park (see note 7 below).

Notes:

1. Dogs must be on a leash in some areas as zoned in management plans.
2. Collection of firewood for campfires is permitted as zoned in management plans.
3. Ecological thinning may be permitted where required for ecological management purposes.
4. Grazing may be contracted for ecological or management purposes such as targeted weed control.
5. Hunting and the use of firearms may be authorised as part of a pest animal control program.
6. Implementation of recommendations and land management should allow flexibility for minor boundary adjustments.
7. Lysterfield Park and Woodlands Historic Park are to remain on Schedule Three of the *National Parks Act 1975*.

Natural features reserve

Natural features reserves are areas with a variety of natural values worthy of protection, including scenic areas, bushland, lakes, rivers and streams, geological and geomorphological features. Those natural features reserves considered protected areas are listed in appendix 5. This public land use category includes areas of public authority land, particularly along stream frontages and wetlands.

DRAFT RECOMMENDATION

General recommendations for natural features reserves

E That the natural features reserves as shown on map A, according to their specific characteristics:

(a) be used to:

- (i) protect natural features and values
- (ii) protect and restore areas with remnant vegetation or habitat value and conserve native flora and fauna
- (iii) protect water quality where appropriate
- (iv) provide protection for historic and Aboriginal cultural heritage features, values and sites
- (v) provide opportunities for education and recreation, including hunting where specified below, at levels consistent with (i) to (iv) above
- (vi) maintain scenic features and the character and quality of the local landscapes
- (vii) preserve features of geological or geomorphological interest;

and:

- (b) timber harvesting not be permitted
- (c) exploration for minerals be permitted, and mining, subject to decisions on particular cases
- (d) prospecting and apiculture generally be permitted
- (e) domestic stock grazing not be permitted in bushland, scenic and streamside areas (see note 1)
- (f) unused road reserves adjoining natural features reserves be added to those reserves where appropriate ecological or recreational values are identified; and
- (g) for Crown land, if not already appropriately reserved, these areas be permanently reserved under the *Crown Land (Reserves) Act 1978*; or
- (h) public authority land be managed in accordance with the above.

Notes:

1. Grazing may be contracted for ecological or management purposes such as targeted weed control.
2. Existing wildlife areas continue to be used in accordance with the natural features reserve general recommendations, and for public recreation (including hunting in season as specified by the land manager) and education, where this does not conflict with the primary objective.

Coastal reserve

Coastal reserves are areas of public land set aside on the coast primarily for public recreation, education and conservation of natural environments.

DRAFT RECOMMENDATION

General recommendations for coastal reserves

F That coastal reserves shown on map A be used to:

- (a) provide opportunities for informal recreation for large numbers of people, and also for recreation related to enjoying and understanding nature;
- (b) protect and conserve natural coastal landscapes, ecosystems and significant geomorphological, archaeological and historical features for public enjoyment and inspiration and for education and scientific study;
- (c) ensure the protection and conservation of important aquatic and terrestrial fauna and flora;
- (d) provide opportunities for fishing and facilities for boating, together with the necessary navigation aids; and:
- (e) these areas, if not already appropriately reserved, be permanently reserved under the *Crown Land (Reserves) Act 1978*.

Note:

The above management objectives are those that generally apply to most coastal reserves. Exceptions may apply to specific reserves in special circumstances.

Water production areas

Water production areas provide for both the collection of water and the storage of water derived from a catchment, and include distribution and holding facilities such as storage tanks and channels. This public land use category includes substantial areas of public authority land such as Cardinia, Sugarloaf, Greenvale, Melton, and Djerriwarrh water supply reservoirs.

DRAFT RECOMMENDATION

General recommendations for water production areas

G That water production areas; storage areas, diversion works and associated facilities; protective buffer zones around diversion works and storages where defined in a special area plan; and any other public land considered necessary, as shown on map A be:

- (a) used for water supply purposes;
 - (b) other activities be permitted by the water supply authority after consultation with the Department of Sustainability and Environment, and other relevant agencies, and where consistent with (a) including:
 - (i) recreation, nature observation, heritage appreciation, picnicking, bushwalking (see note 1)
 - (ii) apiculture;
- and:
- (c) the following activities generally not be permitted:
 - (i) grazing by domestic stock (see note 3 below)
 - (ii) harvesting of forest products
 - (iii) hunting and use of firearms (see note 4 below)
 - (iv) dogwalking
 - (v) horseriding;

and:

- (d) natural and cultural heritage values be protected; and
- (e) for Crown land, if not already appropriately reserved, these areas be permanently reserved under the *Crown Land (Reserves) Act 1978* for water supply purposes and be managed by the appropriate water supply authority; or
- (f) public authority land be managed in accordance with the above.

Notes:

1. Some large water storage areas not primarily used for domestic water supply are also used for water-based recreation. This may continue except where it results in deteriorating water quality.
2. The above management objectives are those that generally apply. Exceptions may apply to specific reserves in special circumstances.
3. Grazing may be contracted for ecological or management purposes such as targeted weed control.
4. Hunting and use of firearms may be allowed as part of a pest animal control program.

Historic and cultural features reserves

Historic and cultural features reserves are established primarily to protect places with highly significant historical or cultural values. Two small areas of public authority land comprising less than 0.5 hectares in total are included here (see table 4.4).

DRAFT RECOMMENDATION

General recommendations for historic and cultural features reserves

H That historic and cultural features reserves as shown on map A, according to their specific characteristics, be used to:

- (a) protect historic and cultural heritage values, features and sites (Aboriginal and non-Indigenous)
- (b) provide opportunities for:
 - (i) education and passive recreation such as picnicking, walking and, where relevant, fishing
 - (ii) more intensive recreation such as camping where specified by the land manager and compatible with (a); and
- (c) protect areas with remnant natural vegetation or habitat value;

and that:

- (d) timber harvesting not be permitted
- (e) low impact exploration for minerals be permitted, and mining, subject to consideration of the impact on values in (a) for each application or case
- (f) prospecting and apiculture generally be permitted
- (g) grazing not be permitted (see note 2); and
- (h) for Crown land, if not already appropriately reserved, these areas be permanently reserved under the *Crown Land (Reserves) Act 1978*; or
- (i) public authority land be managed in accordance with the above.

Notes:

1. Where appropriate, a committee of management may be appointed or continue to manage community use areas in accordance with the general recommendations H.
2. Grazing may be contracted for ecological or management purposes such as targeted weed control.

Community use areas

Community use areas are mainly used for education, recreation or other specific community purposes. They include recreation areas, parklands and gardens, reservoir parks and buildings in public use, such as schools, libraries and halls. Some of these areas also contain significant natural values.

DRAFT RECOMMENDATION

General recommendations for community use areas

I That community use areas as shown on map A, according to their specific characteristics, be used for recreation, parklands and gardens, reservoir parks, buildings for community purposes and education; and

- (a) appropriate facilities be provided
- (b) schools, public halls, kindergartens, libraries, museums and other similar areas be used for education, recreation where appropriate, and public enjoyment
- (c) parklands and gardens be used as botanic and other gardens, community parkland or ornamental plantations
- (d) where relevant, and where compatible with the above, features of cultural significance, natural surroundings and the local character and quality of the landscape be maintained or restored
- (e) harvesting of forest products, hunting, and 'stone' extraction as defined in the *Extractive Industries Development Act 1995*, not be permitted; and
- (f) Crown land, not already appropriately reserved, be reserved under the *Crown Land (Reserves) Act 1978*; or
- (g) public authority land be managed in accordance with the above.

Note:

Where appropriate, a committee of management may be appointed or continue to manage community use areas in accordance with the general recommendation I.

Services and utilities areas

This category includes utilities located on public land such as transport, communications, hospitals, cemeteries, water, sewerage, waste disposal, electricity and gas and other services. There are substantial areas of public authority land and unparcellised Government road reserves included in this public land use category.

DRAFT RECOMMENDATION

General recommendations for services and utilities areas

J That reserves and easements for public services and utilities such as transport, electricity and gas, communications, cemeteries, water and sewerage be used for those purposes; and that

- (a) new services, or utility sites and easements or lines, not be sited in or across reference areas, and wherever possible not be sited in or across national, state or other parks or nature conservation reserves
- (b) railway lines, roadsides and other service and utility sites be managed to protect natural values including remnant vegetation and habitat, as far as practical
- (c) organisations responsible for services and utilities management conserve and protect indigenous flora and fauna communities and habitat, as part of management plans/ planning; and
- (d) should a public land area or building and site used for service or utility purposes no longer be required for its primary designated use, it be assessed for its natural, recreational and cultural heritage values, and capability for other public uses.

Notes:

1. While DSE, VicRoads and municipalities are commonly responsible for road reserve management, many unused roads are licensed to adjoining landholders. Roads and unused road reserves may not be distinguishable on map A.
2. There are numerous cemeteries across the investigation area that contain remnant natural vegetation. These should be managed to protect this vegetation where it does not interfere with the primary objective of the cemetery.

Uncategorised public land

Uncategorised public land is a broad category for which no specific public use is recommended. Land in this category has no clear primary use and, subject to assessment of any public land attributes present on the site, may be either assigned to an appropriate land manager or disposed of through sale.

Uncategorised public land is discussed in detail in chapter 9.

10.2 Recommendations to enhance the protection of biodiversity on public land

The draft recommendations below were developed by considering those areas of native vegetation containing threatened Ecological Vegetation Classes (EVCs or native vegetation communities used as surrogates for ecosystems) and records of threatened species of flora and fauna on Crown and public authority land outside existing protected areas (see chapter 8 for a discussion of protected areas). Particular attention was given to vegetation communities present in the investigation area that are under-represented in protected areas across each bioregion*. In practical terms, national representation targets cannot be achieved for some EVCs, even with the inclusion of all remaining examples in protected areas – there may simply be too little land available for acquisition. The ability of public land to provide for a broad range of community uses and services was also considered important in the highly urbanised areas of metropolitan Melbourne; this reduces the number of sites available for reclassification to a protected area category with biodiversity protection as the primary objective.

VEAC also considered the following factors:

- ▶ the representation of EVCs in protected areas across the bioregion (not only within the investigation area)
- ▶ the occurrences of EVCs in the investigation area (some EVCs had only minor occurrences within the investigation area)
- ▶ the presence of rare or threatened species and/ or communities, or whether an area provides critical habitat for large numbers of a particular species (for example, migratory birds)
- ▶ site condition, with a focus on areas in natural or near-natural condition with a low level of disturbance
- ▶ well-connected areas of high quality habitat and smaller areas connecting larger habitat patches (for example, road reserves)
- ▶ the presence of a high diversity of species or communities
- ▶ the 'significance' of an area (for example, areas of national importance such as wetlands).

*The Highlands-Northern Fall bioregion is not included because of the small area within the investigation area and because the relevant EVCs are well represented.

10.2.1 ADDITIONS TO PROTECTED AREAS

This section contains a small number of draft recommendations for the addition of Crown land to Victoria's protected areas system.

A summary of these draft land use recommendation is provided below.

Additions to Kinglake National Park

- ▶ Yan Yean Reservoir and surrounds
- ▶ reserved Crown land adjoining the park.

The proposed additions to Kinglake National Park are described in draft recommendations A1 and shown in figure 10.1.

Additions to Bunyip State Park

- ▶ four Crown allotments adjacent to the park
- ▶ an adjacent unused road reserve.

The proposed additions to Bunyip State Park are described in draft recommendation A2 and shown in figure 10.2.

Creation of Point Cook Coastal Park

- ▶ existing Point Cook Coastal Park and Cheetham Wetlands
- ▶ Truganina Wetland and the adjoining section of Altona Coastal Foreshore Reserve.

The proposed creation of Point Cook Coastal Park is described in draft recommendation A3 and shown in figure 10.3.

Creation of the Bandicoot Corner Bushland Area

- ▶ reserving the unreserved Crown land parcel containing the area known locally as 'Bandicoot Corner'.

The proposed creation of the Bandicoot Corner Bushland Area is described in draft recommendation E1, and shown in figure 10.4.

More detailed descriptions of the location, biodiversity values and current uses of these areas are provided below.

COMMENTS INVITED

The addition of these four areas to the protected areas system would result in only minor changes to their use and management. It would, however, increase the recognition of the biodiversity values of these sites and ensure the management of these values into the future.

A1 Proposed additions to Kinglake National Park

Yan Yean Reservoir and surrounds

The Yan Yean Reservoir and surrounds are located on 2,791 hectares of Crown land near Yan Yean in Melbourne's north-east. The area includes the 81 hectare Sherwin Ranges southern buffer, which is permanently reserved for water supply, but is no longer required by Melbourne Water for water supply purposes. Note that the existing Yan Yean Reservoir Park and water treatment infrastructure and related areas are not included in the proposed addition to Kinglake National Park.

The Yan Yean Reservoir is used by Melbourne Water to supply water to parts of Melbourne. The reservoir and surrounds are a 'closed catchment' and public access is restricted. VEAC considers that current controls on access to the catchment area should continue for the purposes of protecting water quality.

In addition to protecting water quality, the closed nature of the catchment has protected its biodiversity values. The catchment contains two reference areas.

The Yan Yean Reservoir and surrounds fall within two bioregions – the Victorian Volcanic Plain bioregion in the south and Highlands-Southern Fall in the north. The area contains a large area of high quality remnant vegetation, with forest communities occurring at higher elevations and woodland communities at lower elevations to the south. Large areas of threatened plains grassy woodland (endangered) and valley grassy forest (vulnerable) are present. The remainder contains non-threatened grassy dry forest and shrubby foothill forest, riparian forest and grassy woodland communities.

Threatened flora recorded within the reservoir surrounds include the large-fruited groundsel *Senecio macrocarpus* (nationally vulnerable, considered endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*), matted flax lily *Dianella amoena* (endangered nationally, considered endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*), purple diuris *Diuris punctata* var. *punctata* (considered vulnerable in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*) and clover glycine (vulnerable nationally, considered vulnerable in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*). Threatened fauna such as powerful owl *Ninox strenua* and brush-tailed phascogale *Phascogale tapoatafa* (both considered vulnerable in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*) are also present.

Council considers that a management agreement between DSE and Melbourne Water can be established, similar to those that have been successfully employed in other water supply catchments within national parks (for example, in the Yarra Ranges and Great Otway national parks). This agreement would ensure that the land is managed to maintain water quality and protect water resources, as well as to conserve biodiversity.

Sherwin Ranges northern buffer

The 136 hectare Sherwin Ranges northern buffer is a long, narrow site that lies adjacent to the southern boundary of the Wallaby Creek designated water supply catchment area in the Kinglake National Park, near Kinglake West. This area is Crown land permanently reserved for water supply. As with the Sherwin Ranges southern buffer, Melbourne Water no longer requires the buffer for water supply purposes.

The vegetation at this site was burnt during the 2009 Victorian bushfires. The site contained heathy dry forest and herb-rich foothill forest communities (both non-threatened). Threatened fauna species such as barking owl *Ninox connivens* (considered endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*), powerful owl and brush-tailed phascogale have been recorded in the vicinity.

The Sherwin Ranges northern buffer is contiguous with Kinglake National Park. The inclusion of this area in Kinglake National Park will provide an opportunity to protect an area of high natural values and provide a consistent management approach for public land contiguous with the park.

DRAFT RECOMMENDATION

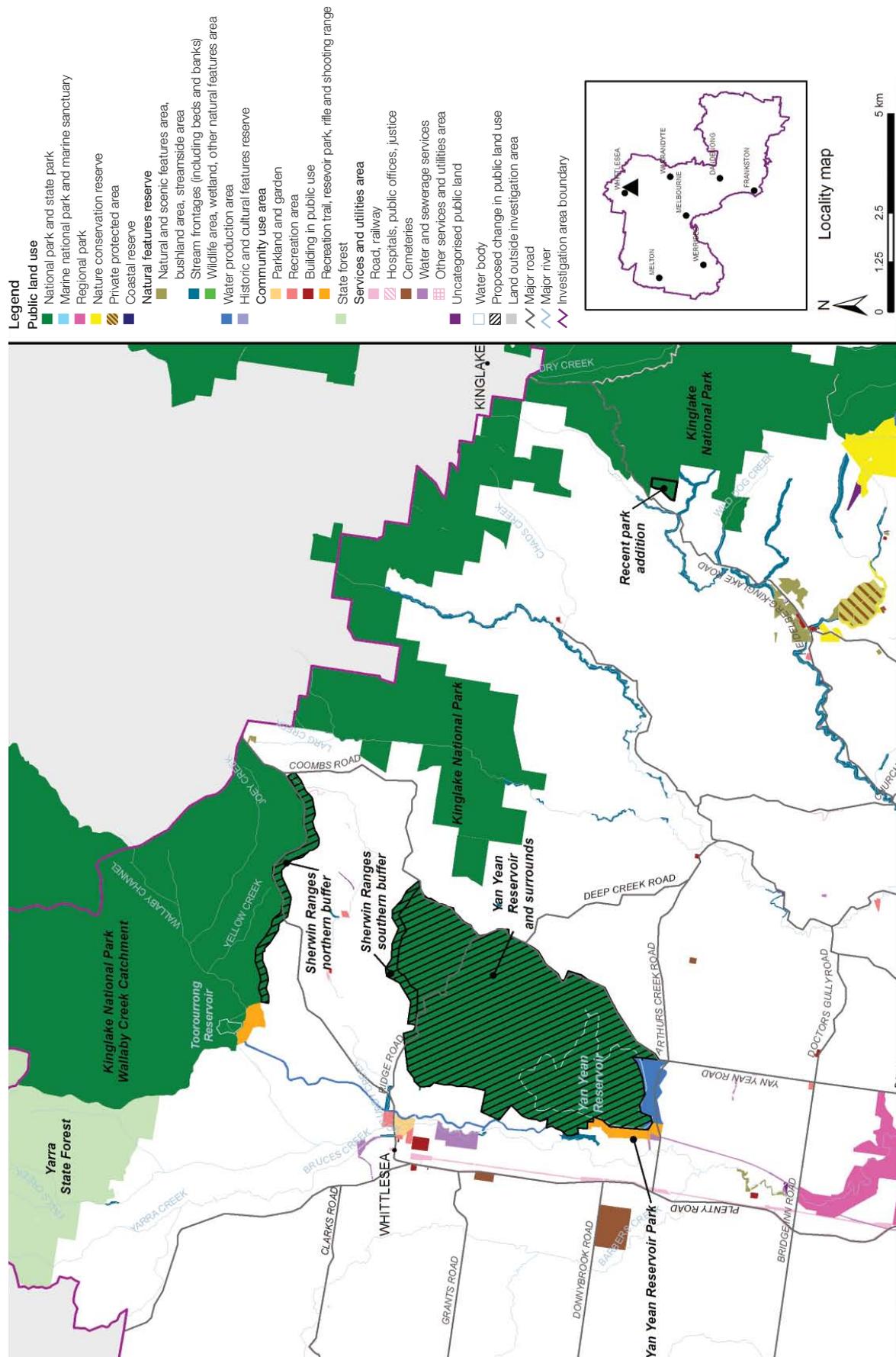
A1 Additions to Kinglake National Park

- (a) The area of 2,927 hectares, shown hatched on figure 10.1, be added to Kinglake National Park under the *National Parks Act 1975*; and
- (b) a management agreement be established under section 321 of the *National Parks Act 1975* for the area shown on figure 10.1 as Yan Yean Reservoir and surrounds; and
- (c) Melbourne Water continues to manage all infrastructure associated with the Yan Yean Reservoir and water treatment facilities.

Note:

Implementation should allow flexibility for boundary adjustments. VEAC notes that Ridge Road and Coombs Road are to be excluded from the national park.

Figure 10.1
Proposed additions to Kinglake National Park



A2 Proposed additions to Bunyip State Park

Crown land - Tonimbuk

These proposed additions consist of four unreserved Crown land allotments that vary in size from one to 24 hectares and total approximately 50 hectares. The site is located adjacent to the southern boundary of Bunyip State Park, near the township of Tonimbuk in Melbourne's outer east. The blocks are currently managed by the Department of Sustainability and Environment.

These areas contain vegetation communities such as damp heathy woodland and lowland forest. Threatened fauna such as sooty owl *Tyto tenebricosa* (considered vulnerable in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*) have also been recorded in the vicinity.

These sites are contiguous with Bunyip State Park, providing good connectivity for flora and fauna. The eastern sections are located close to the re-establishment program aviaries for the threatened helmeted honeyeater *Lichenostomus melanops cassidix* (nationally endangered, considered critically endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*), while the western section of the site provides a link with helmeted honeyeater habitat.

The addition of these areas to Bunyip State Park will help to secure protection of the adjoining helmeted honeyeater habitat, and allow for a consistent management approach for public land contiguous with Bunyip State Park.

Annual grazing licences are issued on two of the Crown allotments. Council considers that these licences may continue with special conditions consistent with the one remaining grazing licence in a nearby area of the existing Bunyip State Park.

Unused road

This roughly three hectare unused Government road is located west of the township of Tonimbuk. It is a long, narrow site contiguous with the park.

The road easement contains high quality remnant shrubby foothill forest and damp forest vegetation community. Threatened fauna such as sooty owl have been recorded directly south of this site.

DRAFT RECOMMENDATION

A2 Additions to Bunyip State Park

- (a) The area of 52.5 hectares, shown hatched in figure 10.2, be added to Bunyip State Park under the *National Parks Act 1975*; and
- (b) grazing licences on the proposed additions may only be reissued to the current licensees in accordance with special conditions applied to the grazing licence in the existing Bunyip State Park.

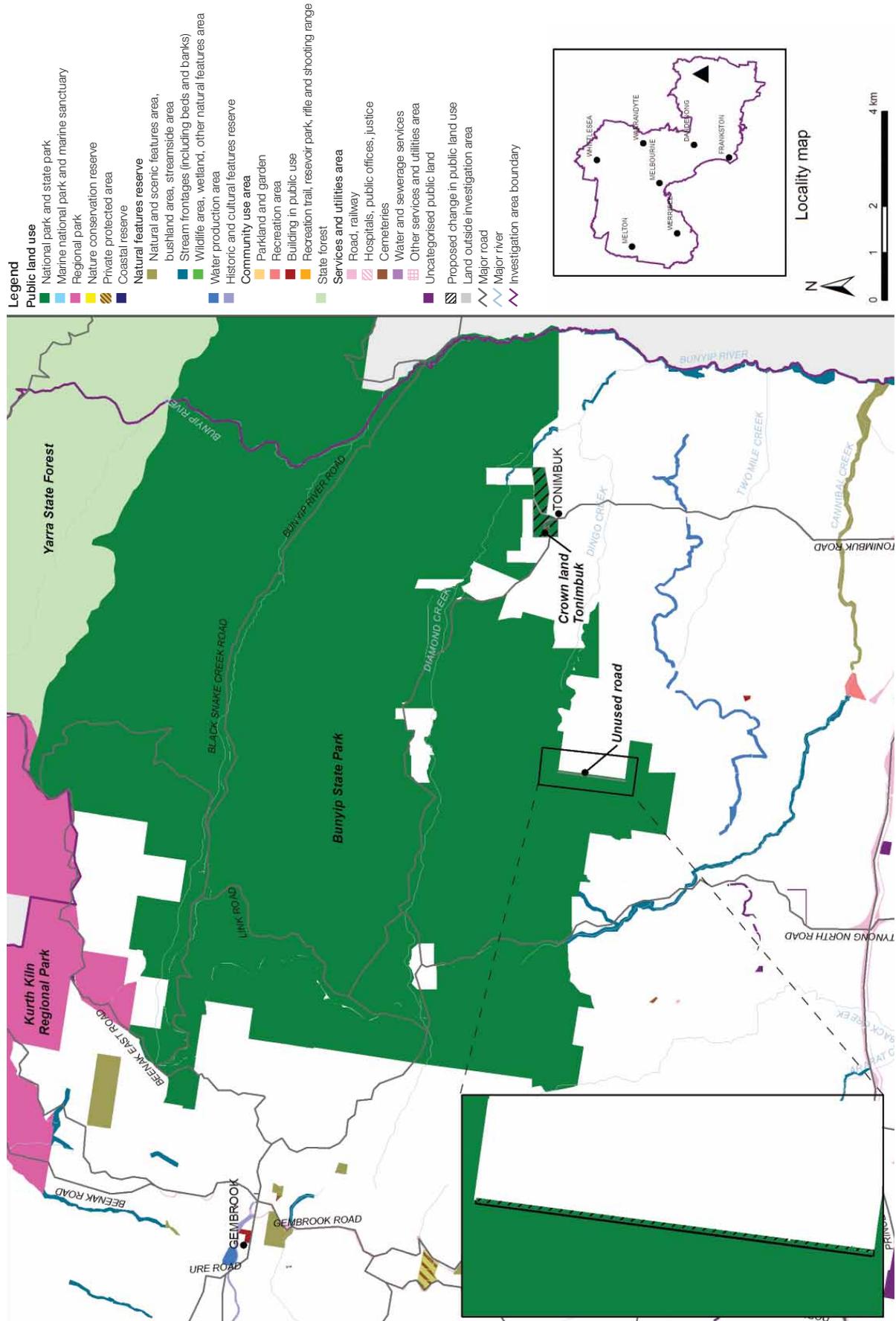
A3 Proposed Point Cook Coastal Park

The existing Point Cook Coastal Park, Cheetham Wetlands, Truganina Wetland and the adjoining section of the Altona Foreshore Reserve are located on Crown land near Point Cook, west of Melbourne. They are contiguous areas, forming a large block of 955 hectares along the coast. Point Cook Coastal Park and Cheetham Wetlands abut the Point Cooke Marine Sanctuary. Truganina Wetland was formerly part of the Cheetham saltworks.

The sites contain a range of threatened vegetation communities such as coastal saltmarsh, plains grassland, aquatic herbland and coastal alkaline scrub. It provides habitat for threatened flora such as tough scurf-pea *Cullen tenax* (considered endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*), button wrinklewort *Rutidosis leptorhynchoides* (nationally endangered, considered endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*) and orchids such as small golden moth *Diuris basaltica* (nationally endangered, considered vulnerable in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*), fragrant leek-orchid *Prasophyllum suaveolens* (nationally endangered, considered endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*) and swamp diuris *Diuris palustris* (considered vulnerable in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*).

The sites support numerous shorebirds and migratory wading birds of international and national importance, with more than 200 bird species recorded. Cheetham Wetlands provides one of the remaining wintering sites for the critically endangered orange-bellied parrot *Neophema chrysogaster*. It also provides habitat for the threatened striped legless lizard *Delma impar* (nationally vulnerable, considered endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*) and yellow sedge-skipper butterfly *Hesperilla flavescens flavescens* (also known as Altona skipper butterfly considered vulnerable in

Figure 10.2
Proposed additions to Bunyip State Park



Victoria and listed under the *Flora and Fauna Guarantee Act 1988*). A section of Cheetham Wetlands forms part of the Port Phillip Bay (western shoreline) and Bellarine Peninsula Ramsar site. It is listed under the Ramsar convention in recognition of its high value as habitat for waterbirds.

The existing Point Cook Coastal Park, Cheetham Wetland and the adjoining section of the Altona Foreshore Reserve are currently temporarily reserved under the *Crown Land (Reserves) Act 1978*, while Truganina Wetland is located on unreserved Crown land. Establishing these

areas as one coastal park under Schedule Three of the *National Parks Act 1975* acknowledges the important natural values of each site and protects them for future generations. Council considers that there will be no changes to current recreational and community uses of these areas.

'Point Cooke' was named after First Mate John M Cooke. The geographic feature of the point, marine reserve and subsequent marine sanctuary retain this original spelling. 'Point Cook' is used for the coastal park and township.

DRAFT RECOMMENDATION

A3 Point Cook Coastal Park

The area of 955.3 hectares, shown hatched in figure 10.3 (i.e. Point Cook Coastal Park, Cheetham Wetlands, Truganina Wetland and adjoining section of Altona Foreshore Reserve):

(a) be used to:

- (i) conserve, protect and re-establish indigenous flora, fauna and natural ecosystems in the park
- (ii) preserve and protect features in the park of archaeological, historical, ecological, scenic, geological or other scientific interest
- (iii) provide opportunities for recreation and education associated with the enjoyment and understanding of natural environments;

and:

(b) features listed below be specifically protected:

- (i) the diverse flora and fauna associated with the threatened grasslands, saltmarsh and wetlands throughout the park, notably migratory wader bird species
- (ii) saltmarsh and lagoons comprising Truganina wetlands and Cheetham wetlands between Laverton Creek and Point Cooke (locality)
- (iii) fauna associated with the beach and intertidal environments adjoining Point Cooke Marine Sanctuary

and:

(c) the following activities be generally permitted:

- (i) bushwalking, nature observation, heritage appreciation, picnicking, recreational fishing (see note 1)
- (ii) bike riding on formed roads and tracks
- (iii) research, subject to permit;

(d) the following activities not be permitted:

- (i) harvesting of forest products, including firewood collection
- (ii) grazing by domestic stock
- (iii) hunting and use of firearms
- (iv) burning solid fuel fires during the high fire danger period;

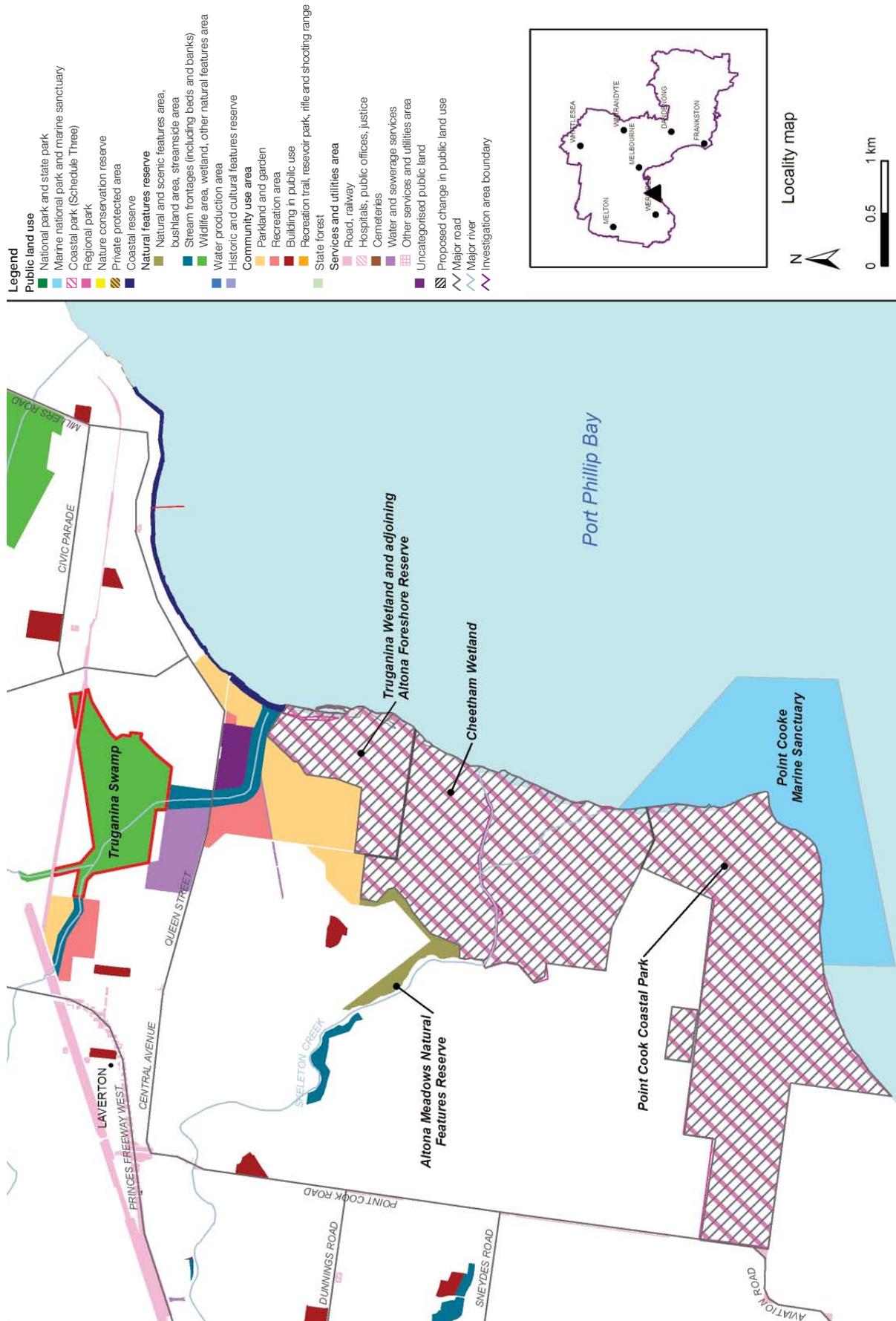
and:

(e) the area be established under Schedule Three of the *National Parks Act 1975*.

Notes:

1. On-leash dog walking is to be managed to ensure that the environmental values of the park are not compromised and is to be limited to areas specified in the management plan for the park.
2. The seaward boundaries of the Crown land reserves are not aligned with the current coastline and should be redefined when establishing the coastal park.

Figure 10.3
Proposed Point Cook Coastal Park and Truganina Swamp, Altona



E1 Proposed Bandicoot Corner Bushland Area

This 12.5 hectare site of unreserved Crown land contains the area known locally as 'Bandicoot Corner' because of the presence of the nationally vulnerable southern brown bandicoot *Isodon obesulus obesulus*. It adjoins the undeveloped Bayles Recreation Reserve on the Koo-wee-rup-Longwarry Road and the Yallock Outfall Drain (figure 10.4).

This proposed bushland area contains remnants of once more extensive vegetation including threatened riparian woodland and swamp scrub vegetation communities of the former Koo-wee-rup Swamp in the Gippsland Plain bioregion. The growling grass frog *Litoria raniformis* (nationally vulnerable, considered endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*) has been recorded in nearby Yallock Creek.

The Cardinia Environment Coalition currently manages approximately 2.5 hectares of the proposed Bandicoot Corner Bushland Area under licence for conservation purposes and informally manages some adjoining areas. About 5.5 hectares comprising the eastern part of the proposed bushland area is largely cleared and licensed annually for grazing.

DRAFT RECOMMENDATION

E1 Bandicoot Corner Bushland Area

- (a) The area of 12.5 hectares, shown hatched in figure 10.4, be reserved as a natural features reserve – bushland area under the *Crown Land (Reserves) Act 1978* and used in accordance with the natural features reserves general recommendation E; and
- (b) Cardinia Environment Coalition be appointed as committee of management for the reserve.

10.2.2 MANAGING PUBLIC AUTHORITY LAND FOR THE PROTECTION OF BIODIVERSITY VALUES

Melbourne Water manages a number of significant wetlands for flood management and other purposes. The three areas of public land discussed below have high biodiversity values and are currently managed by Melbourne Water to protect and enhance these values. Most of the areas are owned by Melbourne Water as freehold land.

It is proposed that Melbourne Water continue to manage Ryans Swamp, Truganina Swamp and the Edithvale-Seafood Wetlands. Consideration should be given to establishing formal agreements (such as those made under section 69 of the *Conservation, Forests and Lands Act 1987*) for their management, use, development and conservation in order to secure the biodiversity values of the sites for future generations.

In the event that Melbourne Water no longer requires these areas, they should be transferred to the Crown and appropriately reserved under the *Crown Land (Reserves) Act 1978* for conservation purposes.

Edithvale-Seafood Wetlands also contain small areas of Crown land. Draft recommendations for these areas of Crown land are included below.

*Sites of Biological Significance, or 'BioSites', and their register, were developed by DSE in 2000 to categorise significance of flora and fauna (or their habitats) at a landscape scale.

Figure 10.4
Proposed Bandicoot Corner Bushland Area



Ryans Swamp and surrounds, Western Treatment Plant

Ryans Swamp is an intermittent shallow freshwater marsh located in the northern part of the Western Treatment Plant at Werribee, which is owned and managed by Melbourne Water. Ryans Swamp and the surrounding grasslands are covered by a BioSite of approximately 59 hectares, within a larger block of about 191 hectares. This larger block is bound by the Princes Freeway to the north, Little River to the west and south. An internal access track (Murtcaim Road) traverses the southern section of the site.

The swamp contains, and is surrounded by, patches of threatened vegetation communities such as plains sedge wetland, plains grassy woodland and plains grassland.

Ryans Swamp supports a large population and diversity of waterbird species when flooded, including many rare or threatened species. This area provides habitat for threatened species growling grass frog and striped legless lizard.

Ryans Swamp is located within the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.

DRAFT RECOMMENDATION

Ryans Swamp and surrounds

- (a) Melbourne Water continues to manage the 191 hectare block containing Ryans Swamp and surrounds, as shown within the red boundary on figure 10.5, to protect and enhance its biodiversity values; and
- (b) Melbourne Water considers the establishment of an agreement, such as those provided for under section 69 of the *Conservation, Forests and Lands Act 1987*, for the management, use, and conservation of the area; and
- (c) should Melbourne Water no longer require Ryans Swamp and surrounds, the area be transferred to the Crown and reserved for conservation purposes under the *Crown Land (Reserves) Act 1978*.

Truganina Swamp, Altona

Truganina Swamp is a 100 hectare semi-natural wetland located on land owned by Melbourne Water near Altona.

The swamp contains areas of the threatened coastal saltmarsh vegetation community, and provides important habitat for a range of migratory waders and water birds. Tidal sections of Laverton Creek are frequented by a number of migratory waders and terns and larger wading birds (such as the threatened great egret *Ardea alba*, considered vulnerable in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*) and little egret *Egretta garzetta* (considered endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*). Concentrations of migratory waders such as sharp-tailed sandpiper *Calidris acuminata* are found on the edge of the ponds during the annual summer residence. The threatened Lewin's rail *Lewinia pectoralis* (considered vulnerable in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*) has been recorded breeding at this site.

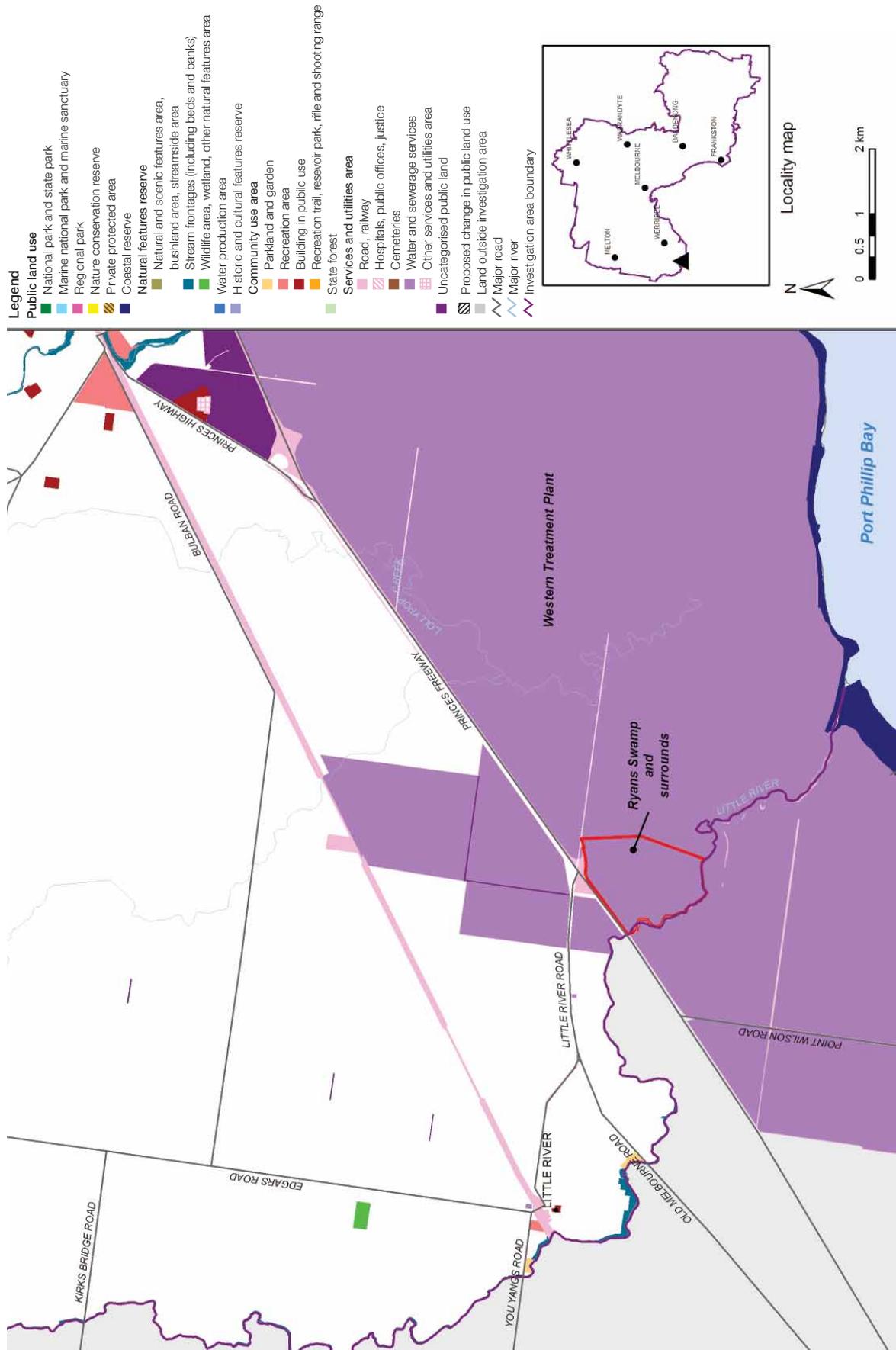
Vegetation adjacent to the swamp provides habitat for the yellow sedge-skipper butterfly (Altona skipper butterfly). Sites at Altona such as Truganina Swamp are considered key conservation sites for this species within the investigation area.

DRAFT RECOMMENDATION

Truganina Swamp

- (a) Melbourne Water continues to manage the 100 hectares comprising Truganina Swamp, as shown within the red boundary on figure 10.3, to protect and enhance biodiversity values; and
- (b) Melbourne Water considers the establishment of an agreement, such as those provided for under section 69 of the *Conservation, Forests and Lands Act 1987*, for the management, use, and conservation of the area; and
- (c) should Melbourne Water no longer require Truganina Swamp, the area be transferred to the Crown and reserved for conservation purposes under the *Crown Land (Reserves) Act 1978*.

Figure 10.5
 Ryans Swamp and surrounds, Western Treatment Plant



Edithvale-Seafood Wetlands

The Edithvale and Seafood Wetlands are two freshwater wetlands located in Melbourne's south-east.

Edithvale Wetlands is located on 107 hectares of Melbourne Water freehold land and a small area of 5.2 hectares of Crown land.

Seafood Wetlands is located mostly on 78 hectares of Melbourne Water freehold land. Approximately 21 hectares is located on reserved Crown land (Seafood Wetlands Reserve) and four hectares of other Crown land. City of Frankston owned land (not considered public land under the VEAC Act) makes up the remainder of the wetland.

Combined, the Edithvale-Seafood Wetlands are recognised for their high waterbird diversity and numbers and for supporting threatened species. While these wetlands contain limited remnant vegetation, shallow freshwater marshes and reed beds continue to provide important habitat with over 190 bird species and 25 migratory bird species recorded. Importantly, these sites also regularly support populations of the Australasian bittern *Botaurus poiciloptilus* (considered endangered in Victoria and listed under the *Flora and Fauna Guarantee Act 1988*) and more than one per cent of the East Asian-Australian flyway population of the migratory sharp-tailed sandpiper.

Edithvale-Seafood Wetlands are internationally recognised as a wetland of importance under the Ramsar convention. The two wetlands, along with Melbourne Water freehold land at Centre Swamp in Chelsea, are the last remains of Carrum Carrum Swamp; a shallow freshwater marsh that was largely drained following European settlement. The draft recommendations describe both Melbourne Water and Crown land within the Ramsar wetland boundary. They do not apply to Centre Swamp at Chelsea.

DRAFT RECOMMENDATIONS

Edithvale-Seafood Wetlands

- (a) That Melbourne Water continues to manage Edithvale-Seafood Wetlands to protect and enhance their biodiversity values; and
- (b) Melbourne Water considers the establishment of an agreement, such as those provided for under section 69 of the *Conservation, Forests and Lands Act 1987*, for the management, use, and conservation of the area; and
- (c) should Melbourne Water no longer require the areas within the red boundaries on figures 10.6 and 10.7, that these areas be transferred to the Crown and reserved for conservation purposes under the *Crown Land (Reserves) Act 1978*.

DRAFT RECOMMENDATION

Edithvale Wetland

E2

The area of 5.2 hectares of Crown land, shown hatched on figure 10.6, be reserved for conservation purposes under the *Crown Land (Reserves) Act 1978* and used in accordance with natural features reserves general recommendation E.

Seafood Wetland

E3

The area of 4 hectares of Crown land at Seafood Wetland, shown hatched on figure 10.7 be added to the existing natural features reserve-bushland area (Seafood Wetland Reserve) under the *Crown Land (Reserves) Act 1978*.

Figure 10.6
Edithvale Wetland



ABBREVIATIONS AND ACRONYMS

ABS	Australian Bureau of Statistics
BP	years before present time
CAR	Comprehensive, Adequate and Representative
CRG	Community Reference Group for VEAC's Metropolitan Melbourne Investigation
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEECD	Department of Education and Early Childhood Development, Victoria
DPCD	Department of Planning and Community Development, Victoria
DSE	Department of Sustainability and Environment, Victoria
DTF	Department of Treasury and Finance, Victoria
ECC	Environment Conservation Council, Victoria
EVC	Ecological Vegetation Class
FFG	Flora and Fauna Guarantee
GIS	Geographic Information System
GL	Gigalitre (1 billion litres)
GMZ	General Management Zone in state forest
ha	Hectare (1 ha = 2.47 acres; 100 ha = 1 square kilometre)
IBRA	Interim Biogeographic Regionalisation for Australia
IPCC	Intergovernmental Panel on Climate Change
IUCN	World Conservation Union, previously known as the International Union for the Conservation of Nature and Natural Resources
JANIS	Joint ANZECC / MCFFA National Forest Policy Statement Implementation Sub-committee
LCC	Land Conservation Council, Victoria
Ma	millions of years
ML	Megalitre (1 million litres)
MMBW	Melbourne and Metropolitan Board of Works
NRS	National Reserve System
PAO	Public Acquisition Overlays
SMZ	Special Management Zone in state forest
SPZ	Special Protection Zone in state forest
TFN	Trust for Nature
VEAC	Victorian Environmental Assessment Council
VHR	Victorian Heritage Register
VPP	Victoria Planning Provisions
UGB	Urban Growth Boundary
WTP	Western Treatment Plant

GLOSSARY

Bioregion

Large, geographically distinct areas of land characterised by landscape-scale natural features and environmental processes that influence the function of entire ecosystems. Bioregions are delineated by physical characteristics such as geology, landforms and climate.

CAR reserve system

A system of forest reserves established by agreement between commonwealth, state and territory governments to provide for biodiversity protection. The system is based on the principles of comprehensiveness, adequacy and representativeness.

Climate change

Climate change in IPCC usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity.

Connectivity

Structural connectivity

The physical relationship between different types of landscape elements such as habitat patches and corridors.

Functional or ecological connectivity

The degree to which landscapes aid or impede the movement of individuals, species or ecological processes, and their behavioural response to this structure.

Conservation reserve system

See "protected areas system".

Crown land

Crown land means land held by the State of Victoria, that has not been made freehold by the issue of land titles. It includes unreserved land, land temporarily and permanently reserved under the *Crown land (Reserves) Act 1978*, state forest under the *Forests Act 1958* and park under the *National Parks Act 1975*. It is managed by the government for the benefit of the Victorian community. Crown land does not include freehold land owned by a public authority, or private freehold land.

Declared water supply catchment

Under the *Catchment and Land Protection Act 1994*, water catchments can be declared as 'special water supply catchment areas' to identify areas for water supply. 'Special area plans' can be prepared for such areas to guide land use.

Ecological Vegetation Class (EVC)

A type of native vegetation classification that is described through a combination of floristic, life form and ecological characteristics.

Ecosystem

A system functioning together as a unit that includes all living organisms, the physical components of the environment and their relationships.

Forest management area plan

A plan developed to address the full range of values and uses in state forest, including nature conservation and timber production.

Geographic information system (GIS)

A system which holds spatially referenced data which can be classified, overlaid, analysed and presented in map, tabular or graphic form.

General Management Zone (GMZ)

State forest area managed for the broad range of forest values available in the area.

Heritage River

Rivers or reaches of rivers designated under the *Heritage Rivers Act 1992*, and managed primarily to protect their significant nature conservation, recreation, scenic or cultural heritage values.

JANIS criteria

Criteria set by the Joint ANZECC/MCFFA National Forest Policy Statement Implementation Sub-committee for the establishment of the CAR system of forest reserves.

Protected areas system

A public land network set aside primarily for biodiversity protection. To be considered a protected area, public land must be securely set aside and managed primarily for biodiversity conservation such as in parks under the *National Parks Act 1975* and permanent nature conservation reserves.

Public land within the protected areas system include national, state and some other parks under the *National Parks Act*, marine national parks and sanctuaries, nature conservation reserves, and certain natural features reserves (streamside areas, bushland areas, scenic areas, wildlife areas without hunting).

Public land

Under the *Victorian Environmental Assessment Council Act 2001*, public land refers to any unalienated Crown land, including land temporarily or permanently reserved under the *Crown Land (Reserves) Act 1978*; state forest within the meaning of the *Forests Act 1958*; park, within the meaning of the *National Parks Act 1975*; land vested in any public authority, other than (i) a municipal council; or (ii) an authority under the *Water Act 1989*, to the extent that the land vested in the authority is within a sewerage district."

Public land use categories

A classification of public lands into major land use categories such as national and state parks, nature conservation reserves, state forest, community use areas and services and utilities areas. Each land use category specifies the primary land use objectives, and appropriate uses of the land. Land within each category is generally subject to particular legislation and management arrangements.

Regional Forest Agreement

An agreement between the commonwealth and a state or territory government, for the long-term management and use of forests in a particular region.

Special Management Zone (SMZ)

Delineates an area that is managed to maintain specified values, such as flora and fauna habitat or catchment values, while catering for timber production under certain conditions.

Special Protection Zone (SPZ)

Delineates an area that is managed for the conservation of natural or cultural values and where timber harvesting is excluded. It forms part of a network designed to link and complement conservation reserves.

Threatened species

Threatened species is a generic term for a plant or animal generally considered as vulnerable or endangered under various threatened species conservation laws. It is used to indicate that there is some level of threat as to the species viability in the wild.

Urban Growth Boundary (UGB)

The Urban Growth Boundary is a planning tool implemented by the Victorian Government to manage the growth of metropolitan Melbourne. It contains urban development within a legislated urban growth boundary.

Wetlands

Areas featuring permanent or temporary shallow open water including billabongs, marshes, swamps and lakes.

Wildlife corridor

Components of the landscape that facilitate the movement of a given species between areas of intact habitat.

World Conservation Union (IUCN)

The World Conservation Union (formerly the International Union for Conservation of Nature) is the world's largest conservation-related organisation. It supports the conservation of natural heritage – for instance, the work of the IUCN World Commission on Protected Areas aims to promote the establishment and effective management of a worldwide, representative network of terrestrial and marine

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APPENDIX 1

COMMUNITY REFERENCE GROUP

VEAC is required to establish a Community Reference Group to provide advice in respect of each investigation. The Council may also appoint any committees that it considers necessary to assist with conduct of investigations.

The Metropolitan Melbourne Investigation Community Reference Group was established in September 2009. It is independently chaired by Ms Jan Macpherson.

Membership consists of:

Cr Sam Alessi

Municipal Association of Victoria

Dr Bob Birrell

Director, Centre for Population and Urban Research,
Monash University

Mr Garry Brennan

Bicycle Victoria

Dr Phillip Brotchie

Bushwalking Victoria

Mr Pat Corr

Member, Arthurs Creek Landcare Group and
WACMAC Landcare

Mr Maelor Himbury

Victorian Environment Friends Network

Aunty Diane Kerr

Wurundjeri Tribe Land and
Compensation Heritage Council Inc

Ms Anne McGregor

Victorian National Parks Association

Assoc Prof Mardie Townsend

Associate Dean, School of Health and Social Development,
Deakin University

APPENDIX 2

SITES OF INTERNATIONAL, NATIONAL AND STATE GEOLOGICAL SIGNIFICANCE ON PUBLIC LAND IN THE INVESTIGATION AREA

International

- ML 310 Beaumaris Cliffs Tertiary fossil site No. 1 (Keepers)
- ML 311 Beaumaris Cliffs Tertiary fossil site No. 2 (Yacht Squadron)

National

- ML 011 Dry Creek-Maribyrnong River junction Quaternary fossil site
- ML 190 Taylors Creek silcrete cave
- QN 152 Yallock Creek Swamp Sediments

State

- ML 012 Green Gully (Taylors Creek)
- ML 016 The Organ Pipes
- ML 249 Altona Meadows active sand spits
- ML 308 Williamstown lava blister
- ML 375 Werribee River cliffs-floodplain sediments (Provisional)
- QN 019.2 Lyall Inlet to Bunyip River
- QN 023 Quail Island and Watson Inlet Area
- WL 088 Athlone-Lang Lang River Knickpoint

Source: Sites of geological and geomorphological significance on public land. VEAC Metropolitan Melbourne Study 2008/9. Final Report May 2009.⁶

Notes:

1. Sites are identified using an alpha-numeric code based on the 1:250 000 mapsheet areas issued by the Geological Society of Australia (Victoria Division) Heritage sub-committee (e.g. White et al. 2003).²¹⁴
2. Significance assessments are undertaken by a reference panel of geological experts for GSA (Vic) Heritage Sub-committee. Assessment criteria include the rarity, representation and replication of features as well as site accessibility and management conditions.

APPENDIX 3

HISTORIC PLACES IN METROPOLITAN MELBOURNE WITH STRONG LINKS TO CONTEMPORARY ABORIGINAL PEOPLE

Batman Treaty Site, Merri Creek – The signing of two treaties in 1835 by John Batman with traditional owners for 500,000 acres around Melbourne and Corio Bay and 100,000 acres around Geelong and Indented Hill, probably took place on the Merri Creek, although the exact location is debatable and some have also suggested Edgars Creek and Darebin Creek.^{130,128}

Langhorne's Government Mission, Melbourne – In 1837 the first government sponsored Aboriginal mission in Victoria was established on 895 acres south of the Yarra River under the management of George Langhorne. After the mission's closure, the buildings were briefly used by Assistant Protector William Thomas and Chief Protector George Robinson.^{130,217} Four Aboriginal people were buried at the mission including 'Toollermaene' (1839) and Peter (1839).²¹⁷ The site, or 'Tromgin' as it was known to Aboriginal people, is now part of the Royal Botanic Gardens Melbourne near the ornamental lake and Anderson Street.

Bolin Bolin Billabong, Bulleen Park – Assistant Protector William Thomas observed that this was a popular meeting place for Woi Wurrung groups. The Bolin Swamp comprised a series of smaller lagoons used for seasonal eel catching.²¹⁸ Thomas observed that the area was of great significance to Aboriginal people and that they regularly camped on both the north and south sides of the curve in the Yarra River.¹³⁰

Merri Creek Protectorate 'Station', Yarra Bend Park – The confluence of the Merri Creek and the Yarra River was a popular campsite for Aboriginal people. The area bounded by Heidelberg Rd, Merri Creek and the Yarra River was a government reserve from the late 1830s and used as barracks by the Native Police Corps from 1842. The Corps included many Aboriginal leaders whose family often camped nearby. In September 1842 around 500 people were camped at the unofficial 'station'.¹³⁰ Influenza dramatically reduced the population in 1847 and the remaining Woi Wurrung abandoned the site. Thomas moved to Moonee Ponds the same year and the 'station' closed.¹³⁰

Western District Protectorate Station, Dandenong Police Paddock Reserve, Narre Narre Warren – The original headquarters for the Native Police Corps formed in October 1837 until they disbanded briefly in January 1838. The site was then used in 1840 by Assistant Protector William Thomas for his central Aboriginal Station as suitable for both the Woi Wurrung and Bun wurrung

groups.¹³⁰ Thomas and the residents huts, cleared, fenced and ploughed the land for crops. Thomas remained here 1842, when he moved to Merri Creek.

Mt Macedon Protectorate Station, Yerrip Hills near Sunbury – Yerrip Hills was the location of Assistant Protector Edward Stone Parker's first Protectorate station for Aboriginal people in the Mt Macedon District. Parker built a wattle and daub hut for his family at Yerrip Hills and ran sheep before moving further out into his district, near Daylesford. The site is north of Sunbury, adjacent to Jackson's Creek.²¹⁹

Home of George Augustus Robinson, South Yarra – In 1840 Chief Protector Robinson bought 8 hectares of land along the south side of the Yarra River at the northern end of Chapel Street. Local Aboriginal people referred to the area as Ternee and often visited Robinson at his home. The Van Diemen's Land Aboriginal people he had brought with him from Flinders Island helped Robinson build his brick and stone house, and farm the surrounding land. At least two are thought to be buried on the site including Peter Brune (1843) and Rebecca (1841).²¹⁷

Old Melbourne Cemetery, Melbourne – The earliest burials in Melbourne took place at Flagstaff Hill but the Old Melbourne cemetery was opened in 1837 on 10 acres bordered by Franklin, Peel, Queen and Fulton Streets. The cemetery was divided into Christian denominations with an area for Aboriginal burials. It is estimated that up to 10,000 people were buried there before the Melbourne General Cemetery opened in 1853. In 1878 the Queen Victoria Market took over part of the site and in the twentieth century nearly 1,000 bodies were exhumed and removed to Fawkner Crematorium and Memorial Park or the Melbourne General Cemetery.²²⁰ The Aboriginal section of the cemetery is located near sheds F-J of the market close to Queen Street.¹³¹

Gallows Hill, Melbourne – In January 1842 two Van Diemen's Land Aboriginal men were executed at Gallows Hill near the Old Melbourne Goal in Russell Street.¹³¹ The original gaol building was on the corner of Russell and La Trobe Streets and was built over between 1841-1844. Convicted of murdering two whalers in Western Port, Bob and Jack were captured by the Native Police Corps and Border Police.¹³² Bob and Jack were the first people publicly hung in Melbourne and Chief Protector Robinson carried their bodies in his cart to be buried in the Old Melbourne Cemetery.¹³⁴

Pentridge Stockade, Coburg – In 1850 Superintendent La Trobe constructed a stockade for the detainment of prisoners doing hard labour in anticipation of the newly separated Colony of Victoria taking responsibility for its own prisoners. The Native Police Corps performed undertake sentry duty around the stockade and supervised road gangs for eight months until August 1851.^{131,132} The original wooden stockade buildings was transformed into the enclosed bluestone Pentridge Prison between 1857-1864 closed in 1997.

Police Magistrate's Paddock, Yarra Park – The Police Magistrate's paddock was bounded by Wellington Parade, Punt Road and the River, near the office of Police Magistrate William Lonsdale. After accusations of impropriety, Lonsdale moved the Native Police Corps headquarters to the Police Magistrate's paddock where he could monitor their activities more closely.¹³² The Native Police barracks were near the corner of Punt Road and Wellington Parade.¹³¹ Chief Protector George Augustus Robinson also had an office on this site in 1839 and Aboriginal groups continued to camp in the area until the 1850s.

Old Supreme Court House, Melbourne – The Chief Protector, George Augustus Robinson, ran the Chief Protector's Department from the Old Supreme Court House on the corner of Bourke and Kings Streets from 27 July 1843 until 1848.^{217,221}

Mordialloc Aboriginal Reserve, Attenborough Park – The Mordialloc depot opened in 1852 encompassing 832 acres alongside the Mordialloc Creek and Port Phillip Bay at a popular Bun wurrung camping spot, to distribute supplies and food.²²² The site had been an Aboriginal burial ground since 1839.²²² The government eventually divided the area into smaller blocks of land offering them for sale in 1863.²²² Some Aboriginal people remained on part of the site until 1878 but when the reserve was revoked they were removed to Coranderrk Aboriginal Reserve.²²³

Pound Bend Aboriginal Reserve, Warrandyte State Park – The government created this reserve in 1841 and allocated 1,908 acres for Aboriginal people on the Yarra River at Pound Bend. The government revoked the area as an Aboriginal reserve in 1861.²²³

Bayswater Boys' Home, The Basin – Run by the Salvation Army, the Boys' Home opened in 1893 as a care facility for children. The Boys' home included 200 hectares of farmed land where children were trained 'to make them upright and intelligent members of the community.'¹³⁷ Under the Aboriginal protection legislation of 1886 and 1890, the government could remove 'neglected'

Aboriginal children from their parents and placed them in care. In practice the Board for the Protection of Aborigines could remove any child from their family without evidence of neglect.²²⁴ In the late nineteenth century a small number of Aboriginal children were taken and placed with the Salvation Army's Bayswater Boys' Home on Basin-Olinda Rd or Albion Training School for Girls.¹³⁷

Menzies Boys' Home, Frankston – 'The Ragged School Mission' was established on the corner of La Trobe and Exhibition Streets in 1865 (later moving to Frankston). Initially called the Minton Home for Boys, it was later named the Menzies Boy's Home.²²⁵ The Menzies Boys' Home was a care facility in which the government placed some Aboriginal children after separating them from their families in the 1940s.²²⁴

Bethesda Aboriginal Mission, Fitzroy – In 1938 Sister Maude Ellis started a mission to Aboriginal people at 406 Fitzroy Street. A deaconess in the Methodist Church, Ellis ran church services and ministered to the poor offering assistance where possible. She also ran a kindergarten for Aboriginal children. The mission continued into the 1950s, although at some stage was moved to the Independence Hall on the corner of Fitzroy Street and Brunswick Place.¹³⁷

George Street Primary School, Fitzroy – When Aboriginal people began to settle in areas such as Fitzroy, they sent their children to the local schools. In the early 1940s there were around 100 Aboriginal children attending the George Street Primary School.¹³⁷

Aboriginal Chapel, Fitzroy – In 1943 Pastor Doug Nicholls began preaching on a Sunday to the local Aboriginal community of Fitzroy from the old Church of Christ Sunday school building at 258 Gore Street. Nicholls sought support from the Victorian Aborigines Committee of the Federal Aborigines Mission Board of the Church of Christ. The chapel became known as the Church of Christ Aborigines Mission and ran for the next 27 years.^{137,226}

Aboriginal Girls' Hostel, Northcote – In 1958 Pastor Doug Nicholls opened a hostel for Aboriginal girls at an old Church of England vicarage at 56 Cunningham Street, Northcote. The hostel was run by the Girls' Hostel Committee, later the auxiliary committee of the Aborigines Advancement League. The hostel opened with twelve girls cared for by Henry and Amy Charles.²²⁶

Aborigines Advancement League Offices, Northcote – established in the same vicarage building as described at the Aboriginal Girls' Hostel, Northcote.

Kings Domain Resting Place, Melbourne – In 1985 the Koorie Community buried the skeletal remains of 38 Aboriginal people at a site in the Kings Domain near the Royal Botanical Gardens. The remains, previously held by the Melbourne Museum, were returned to the Koorie Community after legal action and ceremonially buried near the corner of Linlithgow Avenue and St Kilda Rd in the Kings Domain, under a large granite bolder. A memorial plaque acknowledges the tribal groups thought to be represented among the remains.¹³¹

Aborigines Advancement League, Thornbury – Under the Aboriginal Land (Aborigines Advancement League) (Watt Street, Northcote) Act (1982) the Aborigines Advancement League was given two acres of land in Watt Street for their headquarters. This was the first time freehold land had been given back to Aboriginal Victorians. In 1989 the League also took ownership of the adjacent Sir Douglas Nicholls recreational reserve.²²³

Melbourne Museum, Carlton – Under the Aboriginal Heritage Act (2006), the Victorian government gave Museum Victoria responsibility for looking after Aboriginal ancestral remains before they are returned to their communities.²²⁷ Since the nineteenth century the Museum has held a significant collection of manuscripts, photographs and artefacts relating to south-eastern Aboriginal people. In July 2000 the Melbourne Museum opened Bunjilaka, an Aboriginal cultural centre and keeping place designed for the exhibition of these collections.

Koorie Heritage Trust, Melbourne – Originally housed in the Melbourne Museum, the Trust operated from a temporary home in Flinders Lane in 1999 before moving permanently to a new building at 295 King St in 2003.²²⁸ The Trust originated in the 1980s from legal proceedings for the return of skeletal remains. Since then the Trust has gradually developed its own collection of Koorie cultural artefacts.

Weeroona Aboriginal Cemetery, Greenvale – The Weeroona Aboriginal cemetery reserve is adjacent to the Woodlands Historic Park in Greenvale. An Aboriginal Committee of Management maintains the cemetery. The site is significant to the Woi Wurrung people as an historic camping area and to the Gunung willam bulug, in particular, whose elder, Uncle Norm 'Wonga' Hunter, is buried there. The first burials took place on the site in 1993 and in 2003 the area encompassed 33 burials. Aboriginal skeletal remains are also sometimes interned in the Weeroona cemetery following repatriation.²²⁹

Merri Creek Wurundjeri Trail, East Brunswick – A walking track along the Merri Creek, the Wurundjeri Wander or Bunjil Discovery Trail includes part of the Community Environmental Park in Lee St, East Brunswick. The trail can be self-guided or directed through a representative of the Wurundjeri people and includes Kulin Nation Lookout, contemporary rock art and the Weroona Garden.¹³¹

Brimbank Park, Keilor – In the 1960s archaeologists found significant Aboriginal remains in what is now Brimbank Park on the Maribyrnong River. The Kulin Wetlands are protected and recognised through an Aboriginal cultural display at the park. The site also includes a native plant/indigenous food walking trail.¹³¹

The Keelbundoora Scarred Tree and Heritage Trail, Bundoora – This trail opened in May 2008 as a self-guided walk created to recognise and preserve the ecological and cultural significance of remaining vegetation on RMIT's Bundoora campus.²³⁰ The creation of the trail was a joint project between RMIT's Ngarara Willim Indigenous Centre, Property Services, School of Art and School of Education, and the Wurundjeri Land Council and the City of Whittlesea, highlighting a rare stand of river red gums estimated to be around 800 years old including six scarred trees and three canoe trees.²³⁰

Birrarung Marr, Melbourne – The most recent public park established in Melbourne, Birrarung Marr is located on the north bank of the Yarra River adjacent to Federation Square. The 6.9 hectares park in central Melbourne has been extensively landscaped with over 200 native trees. The name derives from the Woi Wurrung 'Birrarung' or 'river of mists' and 'Marr' or 'side of the river.'²³¹ The park opened on Australia Day, 26 January, 2002 and is connected to Yarra Park and the Melbourne Cricket Ground via the William Barak Bridge.

Source: Indigenous Cultural Heritage and History within the Metropolitan Melbourne Investigation Area.⁷

APPENDIX 4

CULTURAL HERITAGE SITES AND PLACES OF INTERNATIONAL, NATIONAL AND STATE SIGNIFICANCE ON PUBLIC LAND IN THE INVESTIGATION AREA

ID	SITE NAME	PLACE TYPE
World Heritage List		
1131	Royal Exhibition Buildings and Carlton Gardens	Building and gardens
National Heritage List		
105708	Royal Exhibition Buildings and Carlton Gardens	Building and gardens
105885	Melbourne Cricket Ground	Sporting venue, grandstand
105922	Flemington Racecourse	Sporting venue
105743	Sidney Myer Music Bowl	Park, gardens, outdoor venue
Victorian Heritage Register		
Banyule		
H0617	Napier Waller House	House
H1396	Viewbank Homestead	Homestead
H1617	Former Head Teachers Residence Heidelberg Primary School	Staff housing
Bayside		
H0269	Railway Gates New Street Brighton	Railway gate/fence/wall
H1077	Brighton Beach Railway Station	Railway platform/station
H1561	Middle Brighton Railway Station Complex	Railway platform/station
H2023	Sir Thomas Bent Statue	Statue/memorial
H2206	Former Old Melbourne Gaol Burial Markers	Cemetery/graveyard/burial sites
Boroondara		
H0049	Boroondara General Cemetery	Cemetery/graveyard/burial sites
H0055	Kew East Baby Health Centre	Infant welfare centre
H0173	Tram Shelter Cotham Road	Tramway station/waiting shed
H0380	Wallen Road Bridge Hawthorn	Road bridge
H0517	Former Invergowrie Lodge	House
H0522	Springthorpe Memorial – Boroondara General Cemetery	Memorial/monument
H0876	Former Hawthorn Tramways Trust Depot	Tramway – urban
H0890	Glenferrie Oval Grandstand	Grandstand
H1194	Camberwell Court House & Police Station	Court house
H1327	Former Hawthorn Fire Station	Fire station
H1559	Auburn Railway Station Complex	Railway platform/station
H1566	Hawthorn Railway Station Complex	Railway platform/station
H1630	Glenferrie Primary School	School – state (public)
H1671	Glenferrie Railway Station Complex	Railway platform/station
H1707	Auburn Primary School	School – State (public)
H2036	Cussen Memorial Boroondara Cemetery	Cemetery/graveyard/burial sites
H0374	Victoria Bridge	Road bridge
H1522	Dights Mill Site	Mill (grain)
H2035	Kew War Memorial	War memorial
H0050	Hawthorn Bridge	Road bridge

ID	SITE NAME	PLACE TYPE
Brimbank		
H0667	Massey Ferguson Complex (Part)	Factory/plant
H1427	Bridge over Maribyrnong River, near Calder Highway, Keilor	Road bridge
H1953	HV Mckay Memorial Gardens and Footbridge – Sunshine	Parks, gardens
H1952	Trestle Bridge Arundel Road - Keilor	Road bridge
H1197	Railway Bridge (Albion Viaduct) over Maribyrnong River between Jacana and Albion Stations – Keilor East	Railway bridge/viaduct
Cardinia		
H1852	Bayles Bridge No.1 & 2	Road bridge
H2012	Kurth Kiln (Cardinia)	Forestry and timber industry
H2025	Bunyip Railway Sub Station	Railway platform/station
Darebin		
H1872	Former Mont Park Hospital and Avenue Of Honour	Hospital
H2031	Tramway Workshops Miller Street – Preston	Tramway – urban
Glen Eira		
H0174	Tram Shelter Balaclava Road	Tramway station/waiting shed
H0227	Grand Union Tramway Junction	Tramway – urban
H0230	Tram Shelter Dandenong Road	Tramway station/waiting shed
H0614	Rippon Lea (Part)	Mansion
H1665	Caufield Railway Station Complex	Railway platform/station
H1708	Caufield South Primary School	School – State (public)
Hobsons Bay		
H0927	Dressing Pavilion – Williamstown	Pavilion
H1000	Former Newport Railway Workshops	Tramway – urban
H1088	Gellibrand & Breakwater Piers	Pier/jetty
H1512	Former Morgue – Ann St Williamstown	Morgue/mortuary
H1513	Tide Gauge House	Tide gauge house
H1555	Spotswood Sewerage Pumping Station	Sewerage pump house/pumping station
H1599	Williamstown Railway Station Complex	Railway platform/station
H1639	Williamstown Primary School	School – State (public)
H1649	Time Ball Tower – Williamstown	Lighthouse
H1733	Wilkinson Memorial Drinking Fountain	Drinking fountain
H1790	Melbourne Harbour Trust Stores & Workshops	Port facility
H1803	Williamstown Botanical Gardens	Parks, gardens
H1811	Fort Gellibrand	Defence battery
H1837	Williamstown Cemetery	Cemetery/graveyard/burial ground
H1885	Blunts Boatyard & Slipway	Boat building
Hume		
H0275	Rupertswood	Mansion
H0937	Caloola	Asylum, industrial school
H1426	Bluestone Road Bridge Over Jackson Creek	Road bridge
H1441	Kismet Creek Rail Bridge	Railway platform/station
H1455	Fawkner St Bridge over Moonee Ponds Creek	Road bridge
H1612	Woodlands Homestead	Homestead complex
H1673	Water Tower – Sunbury	Railway water tower

ID	SITE NAME	PLACE TYPE
H1692	Jacksons Creek Rail Bridge	Railway bridge/viaduct
H1694	Riddell Rd Bridge over Railway	Road bridge
H1964	Railway Bridge Sunbury Hill	Railway bridge/viaduct
	Kingston	
H0928	Market Gardeners Tram Plateway – Mentone	Equipment and objects
H2099	Mentone Railway Station And Gardens	Railway platform/station
Manningham		
H1260	Pound Bend	Water diversion tunnel
H1395	Pontville	Homestead complex
H1494	Heide II	Art gallery/museum; parks, gardens
Maribyrnong		
H0183	Henderson House – Footscray	House
H1028	Interlocked Railway Crossing Gates	Railway platform/station
H1213	Rail Bridge Over Maribyrnong River	Railway platform/station
H1218	Maribyrnong Town Hall	Hall – Town Hall
H1220	Footscray Park	Parks, gardens; monuments/memorials
H1343	Kariwara District Scout Headquarters	Hall – girl guide/scout
H1397	Saltwater River Crossing & Footscray Wharves Precinct	Boat shed
H1503	Pipe Makers Park Complex	Factory/plant
H1563	Footscray Railway Station Complex	Railway platform/station
H1713	Footscray Primary School	School – State (public)
Maroondah		
H0054	Croydon Baby Health Centre	Infant welfare centre
H1587	Ringwood Railway Station	Railway platform/station
Melbourne		
H0021	Newman College	Tertiary college
H0042	Former Melbourne Meat Market	Market
H0047	Gordon Reserve - Melbourne	Parks, gardens; statue
H0194	Womens Christian Temperance Union Drinking Fountain	Memorial/monument
H0366	Marquis Of Linlithgow Statue	Memorial/monument
H0369	Queen Victoria Memorial	Memorial/monument
H0373	Royal Society Of Victoria	Community facilities – hall/friendly society
H0382	Boer War Monument	Memorial/monument
H0466	City Baths	Swimming, baths
H0520	Horticultural Hall	Social club/meeting place
H0526	Robur Tea Building 28 Clarendon Street	Warehouse
H0634	Victorian Artists Society	Social club/meeting place
H0646	Princes Walk Vaults	Retaining wall, shop
H0663	Trades Hall	Hall trades
H0682	Melbourne University Boat Club Shed	Boat shed
H0717	Former Royal Australian Army Medical Corps Training Depot	Defence
H0770	Former Royal Mint	Mint
H0848	Shrine of Remembrance	War memorial
H0849	Former Grand Rank Cabmans Shelter	Cabman's shelter
H0891	Cargo Sheds & Wharves	Coastal warehouse
H0912	Police Garage, Melbourne	Other – law enforcement

ID	SITE NAME	PLACE TYPE
H0932	Retaining Wall Flinders Street	Railway/gate/fence/wall
H0945	Old Mens Shelter	Meeting place
H0956	Former Queen Victoria Hospital Tower Etc	Hospital
H0970	Former Queensberry Street Primary School	School
H0988	Former Cable Tram Engine House North Melbourne	Engine house
H0994	Sandridge Railway Line Bridge	Railway bridge/viaduct
H1002	Royal Victorian Institute For The Blind	Deaf, dumb and blind institute
H1025	Tasma Terrace	Residential
H1042	Eastern Hill Fire Station	Fire station
H1045	Beaurepaire Centre	Swimming pool/baths
H1047	Former Customs House – Melbourne	Customs house
H1064	Carousel	Carousel; tourist attraction
H1074	Royal Melbourne Zoological Gardens	Zoo
H1076	La Trobes Cottage	Residential
H1083	Flinders Street Railway Station Complex	Railway platform/station
H1087	Former Observatory Site	Observatory
H1096	Duke & Orrs Dry Dock	Dock/dry dock/graving dock
H1211	Queens Warehouse	Warehouse/storage area
H1317	Federal Oak, Parliament House Gardens	Tree
H1329	Royal Agricultural Showgrounds	Showground
H1363	Yarra Bank	Meeting place
H1430	Former Newmarket Saleyards & Abattoirs	Stock/saleyard
H1440	Morrell Bridge	Road bridge
H1447	Princes Bridge	Road bridge
H1448	Queens Bridge	Road bridge
H1459	Royal Botanic Gardens	Parks, gardens
H1467	Carlton Court House	Court house
H1476	Federal Court Of Australia	Law court
H1477	Library Of The Supreme Court	Other – law enforcement
H1478	Supreme Court Annexe	Law court
H1496	Missions To Seamen	Welfare/hall
H1497	State Library Of Victoria	Library
H1499	National Gallery Of Victoria	Art gallery/museum
H1500	Victorian Arts Centre	Entertainment centre
H1501	Royal Exhibition Buildings And Carlton Gardens	Exhibition
H1506	RMIT Building No. 9, La Trobe Street	Education – training college
H1507	William Angliss College	School – technical
H1514	Law Courts	Law court
H1526	Treasury Reserve Precinct	Government administration
H1541	Former Victorian Police Depot	Other – law enforcement
H1545	Former Police Station Complex – Parkville	Police station
H1553	Old Melbourne Gaol	Gaol/lock up, art gallery/museum
H1582	North Melbourne Railway Station Complex	Railway platform/station
H1585	Womens Sports Dressing Pavilion	Pavilion
H1619	Airlie, Former Police College, South Yarra	Mansion
H1620	Government House Complex	Government administration

ID	SITE NAME	PLACE TYPE
H1624	Carlton Primary School No. 2605	School – State (public)
H1625	Kathleen Syme Education Centre	School – State (public)
H1633	Melbourne College of Printing & Graphic Arts	School – technical
H1646	Emily Mcpherson College	School – technical
H1686	Tramway Signal Cabin, Waiting Shelter And Conveniences	Tramway station/waiting shed
H1720	Victoria Dock	Dock/dry dock/graving dock
H1722	Parliament House (including grounds, works and fences)	Government administration
H1724	Royal Eye & Ear Hospital Aubrey Bowen Wing	Hospital
H1725	North West Hospital Parkville Campus	Orphanage
H1747	Anzac Hall	Hall RSL
H1772	Sidney Myer Music Bowl	Theatre, stage
H1788	Melbourne General Cemetery	Cemetery/graveyard/burial sites
H1798	Berth No. 5 North Wharf	Goods shed/crane
H1834	Fitzroy Gardens	Parks, gardens; Monuments and memorials
H1868	Tram Shelter	Tramway station/waiting shed
H1870	Tram Shelter	Tramway station/waiting shed
H1887	Treasury Gardens	Parks, gardens
H1920	Northern Market Reserve Wall	Market
H1928	Melbourne Cricket Ground	Grandstand
H1946	Walmsley House - Royal Park Rangers Cottage	Government/administration
H1977	Former Olympic Pool	Swimming pool/baths
H2002	Ola Cohn House	Private studio/outbuilding
H2041	Flagstaff Gardens	Parks, gardens; Monuments and memorials
H2062	Former Royal Park Psychiatric Hospital	Psychiatric hospital/mental institute/asylum
H2108	Underground Toilets Russell Street	Public lavatory
H2109	Underground Toilets Queen Street	Public lavatory
H2110	Underground Toilets GPO Elizabeth Street	Public lavatory
H2111	Underground Toilets Elizabeth Street/Victoria Market	Public lavatory
H2116	Polly Woodside	Vessel – seagoing
H2122	Former Victorian Deaf & Dumb Institution	Deaf, dumb and blind institute
H2133	Underground Public Toilets King Street	Public lavatory
H2134	Underground Public Toilet Faraday Street	Public lavatory
H2137	Cast Iron Urinal Queensberry Street 1	Public lavatory
H2138	Cast Iron Urinal Queensberry Street 2	Public lavatory
H2139	Cast Iron Urinal Queensberry Street 3	Public lavatory
H2140	Cast Iron Urinal Latrobe Street	Public lavatory
H2148	Underground Public Toilet Flinders Street	Public lavatory
H2149	Cast Iron Urinal Nicholson Street	Public lavatory
H2183	University High School	School – State (public)
H2198	Royal Parade	Road
Monash		
H1084	Clayton North Primary School	School – State (public)
H1667	Clayton Railway Station	Railway platform/station
Moonee Valley		
H0844	Flemington Police Station and Lock-Up	Police station

ID	SITE NAME	PLACE TYPE
H1051	Former Moonee Ponds Court House	Court house
H1078	Former Curators Cottage	Parks, gardens
H1199	Railway Sub Station	Railway platform/station
H1200	Canary Island Date Palm Avenue	Tree groups – avenue
H1215	Essendon Tramway Depot	Tramway depot – urban
H1294	Former Essendon High School	School – State (public)
H1295	Former Essendon Technical School	School – State (public)
H1321	Infant Building Moonee Ponds West Primary School	School – State (public)
H1562	Essendon Railway Complex	Railway platform/station
Moreland		
H0916	Brunswick Fire Station & Flats	Fire station
H0952	Upfield Railway Line	Railway platform/station
H1198	Bridge Over Merri Creek	Road bridge
H1446	Newlands Road Bridge Over Merri Creek	Road bridge
H1551	Pentridge Prison (Part)	Cemetery gates/fences
H1709	Infant Building & Shelter Shed – Coburg Primary School	School – State (public)
Nillumbik		
H0784	Eltham Court House	Court house
H1539	Former Police Quarters – Eltham	Staff accommodation
Port Phillip		
H0217	Jubilee Memorial Drinking Fountain At South Melbourne Town Hall	Memorial/monument
H0938	Luna Park – St Kilda	Amusement centre/arcade
H0947	Palais Theatre	Theatre
H0981	Princes Pier	Pier/jetty
H0982	Leading Lights, Hobsons Bay & Port Melbourne	Leading lights
H0983	Port Melbourne Railway Station	Railway platform/station
H0984	Station Pier Northern Section	Pier/jetty
H0985	Station Pier Southern Section	Pier/jetty
H1081	St Kilda Cemetery	Cemetery/graveyard/burial ground
H1291	St Vincent Place Precinct	Other – urban area
H1364	All Saints Church Hall & Former Vicarage	Church hall
H1374	South African Soldiers Memorial	War memorial
H1375	South African War Memorial	War memorial
H1378	Naval Drill & Former Post Office	Defence and post office
H1486	South Melbourne Court House & Police Station	Court house
H1531	Former St Vincent De Pauls Girls Orphanage	Orphanage
H1533	St Kilda Pavilion	Pavilion
H1534	Kerferd Road Pier	Pier/jetty
H1558	Albert Park Railway Station Complex	Railway platform/station
H1588	Ripponlea Railway Station Complex	Railway platform/station
H1593	South Melbourne Railway Station Complex	Railway platform/station
H1629	Albert Park Primary School	School – State (public)
H1637	St Kilda Primary School No. 2460	School – State (public)
H1641	MacRobertson Girls High School	School – State (public)
H1711	Middle Park Primary School	School – State (public)

ID	SITE NAME	PLACE TYPE
H1712	St Kilda Primary School	School – State (public)
H1719	Former St Kilda Railway Station Complex	Railway platform/station
H1735	Port Melbourne Band Rotunda	Memorial/monument
H1804	St Kilda Botanical Gardens	Parks, gardens
H1805	Catani Gardens – St Kilda	Parks, gardens
H1867	St Kilda Road Tram Shelter 2	Tramway station/waiting shed
H1869	St Kilda Road Tram Shelter 1	Tramway station/waiting shed
H1913	St Kilda Bowling Club	Bowling green
H2170	St Vincent De Paul's Boys' Orphanage	Orphanage
H2080	St Kilda Street Bridge Over Elwood Canal	Road bridge
H1023	Ornamental Tramway Overhead Poles	Railway machinery and objects
Stonnington		
H0175	Tram Shelter Toorak Station	Tramway station/waiting shed
H0203	Prahran Town Hall	Town hall
H0519	Prahran Fire Station	Fire station
H0542	Former Police Station & Court House	Court house
H0910	Malvern Tram Depot	Tramway depot
H1068	Former South Yarra Railway Station	Railway platform/station
H1575	Malvern Railway Station	Railway platform/station
H1600	Windsor Railway Station Complex	Railway platform/station
H1636	Melbourne High School	School – State (public)
H1640	Armadale Primary School	School – State (public)
H1710	Malvern Primary School	School – State (public)
H1917	Church Street Bridge	Road bridge
Whitehorse		
H0904	Wattle Park	Picnic ground/recreation reserve
H0975	Former Burwood Primary School No. 461	School – State (public)
H2045	Box Hill Cemetery Columbarium & Myer Memorial	Cemetery/graveyard/burial sites
Whittlesea		
H0958	Summerhill Complex	Homestead complex
H1417	Yan Yean Caretakers Cottage	Cottage
H1418	Flume Over Plenty River – Mernda	Water flume
H1420	Bears Castle	Folly/parks, gardens
H1717	Whittlesea Primary School	School – State (public)
Wyndham		
H1309	Werribee Railway Station	Railway platform/station
H1416	Water Tank – Western Treatment Plant	Water tank
H1509	Point Cook Homestead & Stables	Homestead complex
H1572	Little River Railway Station & Goods Yard	Railway platform/station
H1613	Werribee Park	Homestead complex
H1884	Werribee Satellite Aerodrome	Defence base airforce
H1957	Geodetic Survey Baseline – South Base Stone – Hoppers Crossing, and North Base Stone	Exploration, survey and events
H1961	State Research Farm	School – agricultural
H1932	Main Outfall Sewer	Sewage aqueduct
Yarra		
H0584	Former Cable Tram Engine House	Engine house

ID	SITE NAME	PLACE TYPE
H0718	North Carlton Cable Tram Engine House And Car Shed	Engine house
H0751	Fitzroy Cricket Ground Grandstand	Grandstand
H0954	Dolls House – Collingwood	Cottage
H1552	Former Fairlea Womens Prison	Prison
H1610	Former Gas Inspectors Residence	House; other – utilities (gas)
H1621	Clifton Hill Primary School	School – State (public)
H1626	Carlton Stockade Primary School	School – State (public)
H1634	Richmond Primary School (Cremorne Street)	School – State (public)
H1635	Richmond Primary School (Buckingham Street)	School – State (public)
H1668	Clifton Hill Railway Station Complex	Railway platform/station
H1878	Former Fairfield Hospital	Hospital
H2052	Burnley Gardens	Parks, gardens; gardens – institutional, research; school – agricultural
H2055	Keith Haring Mural	Mural

Source: *Non-Indigenous cultural heritage and historic places on public land in VEAC's Metropolitan Melbourne Investigation Area September 2009.*⁸

Note:

1. ID refers to identification number of the heritage site as provided by relevant heritage council or body.

APPENDIX 5

PROTECTED AREAS IN THE METROPOLITAN MELBOURNE INVESTIGATION AREA

PROTECTED AREA	MUNICIPALITY	AREA (HA) ^a
National park		
Churchill National Park	Casey	272.0
Dandenong Ranges National Park (part)	Knox	17.0 (total 3,540)
Kinglake National Park	Nillumbik, Whittlesea	10,026.0 (total 22,430)
Organ Pipes National Park	Brimbank, Hume	153.0
State park		
Bunyip State Park (part)	Cardinia	13,075.0 (total 16,655)
Lerderderg State Park (part)	Melton	646.0 (total 20,180)
Warrandyte State Park	Manningham, Nillumbik	681
Marine national park and sanctuary		
Jawbone Marine Sanctuary (part)	Hobsons Bay	4.0 (total 30)
Yaringa Marine National Park (part)	Casey	89.5 (total 980)
Private protected area (Trust for Nature)		
Bungalook Conservation Reserve	Maroondah	2.1
Dexter's Bush	Maroondah	0.9
Eltham Copper Butterfly Reserve	Nillumbik	0.7
Harbury	Cardinia	22.4
Uambi	Maroondah	3.7
Willis Nature Park	Nillumbik	81.7
Nature conservation reserve		
Adams Creek Nature Conservation Reserve	Cardinia	57.5
Altona Nature Conservation Reserve	Hobsons Bay	5.4
Angliss Native Grasslands	Wyndham	22.4
Banchory Grove Nature Conservation Reserve	Melton	21.9
Beaconsfield Nature Conservation Reserve	Cardinia	171.8
Boomers Nature Conservation Reserve (C28)*	Nillumbik	27.8
Cairnlea Estate Grassland Reserve	Brimbank	37.5
Cardinia Creek Nature Conservation Reserve	Cardinia	34.3
Central Creek Grasslands Reserve	Darebin	7.0
Cherry Street Grasslands	Darebin	13.6
Cooper Street Grasslands	Darebin, Hume, Whittlesea	117.1
Craigieburn Grassland	Hume, Whittlesea	343.9
Cranbourne Wetlands	Casey	25.1
Deer Park Grasslands	Melton	95.2
Derrimut Grasslands	Brimbank	164.9
Gilbertson Grassland	Brimbank	10.2

PROTECTED AREA	MUNICIPALITY	AREA (HA)^
Gresswell Forest Wildlife Reserve	Darebin	46.1
Gresswell Habitat Link	Darebin	17.1
Gresswell Hill Reserve	Darebin	8.9
Hochkins Ridge Flora Reserve	Maroondah	18.7
Holden Flora Reserve	Hume	90.7
Jawbone Flora and Fauna Reserve	Hobsons Bay	20.7
Langwarrin Flora and Fauna Reserve	Frankston	215.5
Laverton North Grasslands	Hobsons Bay	48.5
Long Forest Flora and Fauna Reserve (part)	Melton	31.2 (total 510)
Melton Gilgai Woodlands	Melton	33.2
Mount Cottrell Nature Conservation Reserve	Melton	44.3
Mount Derrimut Nature Conservation Reserve	Brimbank	30.0
Mount Ridley Grasslands	Hume	132.4
Nillumbik Native Flora Reserve (G139)*	Nillumbik	1.1
North Western Port Nature Conservation Reserve (part) (C14)*	Casey, Cardinia	680.4 (total 715)
Pauline Toner Butterfly Reserve	Nillumbik	2.1
Queenstown Native Flora Reserve	Nillumbik	1.6
Smiths Gully and Peter Franke Nature Conservation Reserve	Nillumbik	15.4
St Andrews Nature Conservation Reserve	Nillumbik	11.1
Sweetwater Creek Reserve (Yuille and Foot Streets)	Frankston	0.15
The Pines Flora and Fauna Reserve	Frankston	247.7
Upper Beaconsfield (Critchley Parker Junior) Reserve	Cardinia	34.6
Warrandyte Wildflower Reserve	Manningham	0.9
Warrandyte-Kinglake Nature Conservation Link	Nillumbik	655.9
Yellingbo State Nature Reserve (part)	Cardinia	1.9 (total 290)
Natural features reserve – Natural and scenic features area		
Bulla Landscape Preservation Reserve	Hume	5.0
Natural features reserve – Streamside area		
Altona Meadows Natural Features Reserve	Hobsons Bay	20.5
Bulla Bulla Streamside Reserve (K52)*	Hume	0.94
Bunyip Streamside Reserve	Cardinia	4.7
Cannibal Creek Streamside Reserve (G25)*	Cardinia	63.0
Cobbledicks Ford Streamside Reserve	Wyndham	25.2
Jacksons Creek Streamside Reserve (K39)*	Hume	10.1
Kororoit Creek (Clarke Road) Streamside Reserve (K35)**	Melton	7.7
Kororoit Creek (Holden Road) Streamside Reserve	Melton	12.8
Kororoit Creek (Melton Highway) Streamside Reserve	Melton	1.9
Mernda Streamside Reserve	Whittlesea	5.5
Werribee River Streamside Reserve	Melton	5.5

PROTECTED AREA	MUNICIPALITY	AREA (HA)^
Natural features reserve – Bushland area		
Baxter Park (Baxters Flat) Bushland Area	Frankston	21.1
Bradshaw Reserve (Parkdale)	Kingston	1.7
Bunarong Park (Frankston)	Frankston	9.6
Bunyip Bushland Reserve (G212)*	Cardinia	0.4
Burke Road Billabong	Boroondara	8.0
Chapmans Road Reserve (Toolern Vale)	Melton	3.5
Clematis Park (Emerald)	Cardinia	1.5
Cockatoo Natural Interest Reserve	Cardinia	2.3
Eltham Water Supply Reserve (G143)*	Nillumbik	1.6
Hogan Park Bushland Reserve (Emerald)	Cardinia	2.1
Forensic Drive Reserve (Macleod)	Darebin	2.4
Frankston Reservoir Natural Features Reserve	Frankston	90.6
Garden Estate (Cockatoo)	Cardinia	8.3
Garfield Bushland Reserve	Cardinia	0.8
Gembrook (Bessie Creek Rd) Bushland Reserve	Cardinia	11.4
Gembrook (Blackwood Lane) Bushland Reserve (G205)*	Cardinia	3.8
Gembrook (Boyd Rd) Bushland Reserve	Cardinia	4.0
Gembrook (Mann Rd) Bushland Reserve	Cardinia	20.5
Gembrook (Shepherd Creek West) Bushland Reserve (G203)*	Cardinia	1.6
Gembrook Park Bushland Reserve (G204)*	Cardinia	24.7
Gilwell Park Bushland Reserve (G179)*	Cardinia	73.5
Haileybury College Camp Site (Wright Forest, Cockatoo) (G202)*	Cardinia	3.5
Heath Hill Conservation Reserve	Cardinia	10.1
Kalinda Urban Forest (Ringwood)	Maroondah	4.4
Kangaroo Ground South Bushland Reserve (Henley) (G151)*	Nillumbik	0.7
Kinglake West Bushland Reserve	Whittlesea	2.1
Koolunga Native Reserve (part)	Knox	0.4
Lang Lang Bushland Reserve (I96)*	Cardinia	11.4
Langwarrin Bushland Reserve	Frankston	1.7
Long Gully Bushland Reserve (G146)*	Nillumbik	7.5
Long Hollow Heathland (Beaumaris)	Bayside	2.4
Lower Eltham Park Flora Reserve (G136)*	Nillumbik	4.9
Mount Majestic Bushland Reserve	Cardinia	3.4
Nar Nar Goon Bushland Reserve	Cardinia	18.2
Neil Douglas Reserve	Nillumbik	9.5
Pakenham Bushland Reserve	Cardinia	11.2
Panton Hill (Bakehouse Rd) Bushland Reserve (G145)*	Nillumbik	2.2
Panton Hill (Merritts Rd) Bushland Reserve (G144)*	Nillumbik	0.8
Plenty Gorge Bushland Reserve (South Morang)	Whittlesea	8.5
Queenstown Bushland Reserve	Nillumbik	40.2
Research (Reynolds Rd) Bushland Reserve (G138)*	Nillumbik	0.8

PROTECTED AREA	MUNICIPALITY	AREA (HA) [^]
RJ Chambers 'Flora and Fauna' Reserve	Cardinia	112.0
Seaford Wetlands (Crown land only)	Frankston	21.0
Smiths Gully Bushland Reserve (G147)*	Nilumbik	0.8
Smiths Gully (Joyces Rd) Bushland Reserve	Nilumbik	0.5
St Andrews Bushland Reserve	Nilumbik	4.7
St Andrews Protected Forest	Nilumbik	20.9
Stoney Creek Bushland Reserve (Beaconsfield Upper)	Cardinia	5.9
Symonds Road Bushland Reserve (Avonsleigh)	Cardinia	2.0
Temple Ridge Reserve (Wattle Glen) (G141)*	Nilumbik	7.1
Warneet (Balaka St) Bushland Reserve	Casey	2.5
Warneet (Iluka St) Bushland Reserve	Casey	1.4
Warneet Nature Reserve	Casey	3.7
Wattle Creek Bushland Reserve (Avonsleigh)	Cardinia	1.7
Weeroona Aboriginal Cemetery bushland buffer	Hume	12.4
Wright Forest (Avonsleigh) (G202)*	Cardinia	111.1
Yangardook Bushland Reserve (I108)*	Melton	50.0
Yering Gorge Bushland Reserve (G60)*	Nilumbik	70.1
Reference area		
Diamond Creek Reference Area (Bunyip State Park)	Cardinia	330.0
Disappointment Reference Area (Kingleake National Park)	Whittlesea	1,090.0
Joey Creek Reference Area (Kingleake National Park)	Whittlesea	250.0
Yan Yean (north) Reference Area (Yan Yean water production area)	Whittlesea	100.0
Yan Yean (south) Reference Area (Yan Yean water production area)	Whittlesea	300.0
Heritage river		
Yarra River Heritage River (part overlays Warrandyte State Park)	Nilumbik, Manningham	285.0 (total 335.0)
Yarra River Heritage River (part overlays other public land, mostly water frontages)	Nilumbik, Manningham	50.0 (total 335.0)

[^] Total area for protected area is shown in brackets where it extends beyond the investigation area.

* These sites are not formally reserved, but are managed in accordance with the government approved Land Conservation Council recommendation. The bracketed letter/number (e.g. G60) refers to the relevant LCC recommendation.¹⁵¹⁻¹⁵³

** The beds and banks of Kororoit Creek (Clarke Road) are not reserved.

APPENDIX 6

PUBLIC OPEN SPACE INVENTORY DATA

Public open space categories in metropolitan Melbourne

INVESTIGATION AREA		
CATEGORY	AREA (HA)	PROPORTION OF TOTAL PUBLIC OPEN SPACE (%)
Protected area	30,814.6	45.9
Nature-based recreation area	11,454.7	17.1
Multiple-purpose area	9,017.0	13.4
Parkland and garden	6,858.9	10.2
Organised recreation area	8,019.9	11.9
Service and utilities area	978.6	1.5
Civic square and promenade	6.1	0.01
Total	67,149.8	100
WITHIN URBAN GROWTH BOUNDARY		
CATEGORY	AREA (HA)	PROPORTION OF TOTAL PUBLIC OPEN SPACE (%)
Protected area	1,898.2	8.6
Nature-based recreation area	3,355.1	15.2
Multiple-purpose area	3,839.3	17.4
Parkland and garden	5,678.7	25.7
Organised recreation area	6,557.9	29.6
Service and utilities area	792.5	3.6
Civic square and promenade	5.7	0.03
Total	22,127.3	100

Notes:

1. Table 6.1 in chapter 6 provides a definition of each category of public open space in the investigation area.
2. I – inner; M – middle; O – outer; G – growth municipality
3. 'Within urban growth boundary' refers to those areas within the urban growth boundary that are also in the investigation area.

Proportion of public open space in each municipality

MUNICIPALITY	INVESTIGATION AREA		WITHIN URBAN GROWTH BOUNDARY	
	AREA (HA)	PROPORTION OF MUNICIPAL AREA (%)	AREA (HA)	PROPORTION OF MUNICIPAL AREA (%)
Banyule (M)	905.0	15.2	905.0	15.2
Bayside (M)	443.7	11.9	443.7	11.9
Boroondara (M)	580.1	9.6	580.1	9.6
Brimbank (O)	1,871.9	20.8	1,702.9	19.7
Cardinia (G)	20,031.9	42.9	419.8	5.4
Casey (G)	4,055.4	20.4	2,112.8	9.9
Darebin (M)	781.7	15.6	781.7	15.6
Frankston (O)	1,618.8	16.3	776.0	9.7
Glen Eira (M)	180.5	4.7	180.5	4.7
Greater Dandenong (O)	918.1	11.7	500.7	8.0
Hobsons Bay (M)	1,402.2	24.4	900.9	17.5
Hume (G)	3,159.9	17.5	1,809.5	10.2
Kingston (M)	1,243.3	16.6	731.8	12.5
Knox (O)	1,804.9	18.0	1,164.8	13.2
Manningham (M)	2,040.0	24.8	1,096.8	15.8
Maribyrnong (M)	262.7	10.1	262.7	10.1
Maroondah (O)	616.6	11.3	596.8	11.0
Melbourne (I)	569.4	16.6	569.4	16.6
Melton (G)	2,171.6	15.7	829.1	4.6
Monash (M)	776.2	9.9	776.2	9.9
Moonee Valley (M)	518.8	12.2	518.8	12.2
Moreland (M)	495.2	10.3	495.2	10.3
Nillumbik (O)	8,488.6	60.1	343.2	9.5
Port Phillip (I)	390.6	20.2	390.6	20.2
Stonnington (I)	172.3	6.7	172.3	6.7
Whitehorse (M)	644.6	10.4	644.6	10.4
Whittlesea (G)	8,175.4	39.3	1,214.1	8.9
Wyndham (G)	2,527.6	10.7	904.5	5.1
Yarra (I)	302.8	16.2	302.8	16.2
Total	67,149.8	17.9	22,127.3	11.4

Notes:

1. I – inner; M – middle; O – outer; G – growth municipality
2. 'Within urban growth boundary' refers to those areas within the urban growth boundary that are also in the investigation area.
3. 'Municipal area' excludes industrial, agricultural and green wedge areas.

Public open space ownership in the investigation area

MUNICIPALITY	AREA (HA)			
	Crown	Public authority	Municipal	Total
Banyule (M)	306.8	9.2	589.0	905.0
Bayside (M)	179.2	1.2	263.3	443.7
Boroondara (M)	157.1	11.7	411.4	580.1
Brimbank (O)	781.6	68.5	1,021.7	1,871.9
Cardinia (G)	18,786.2	263.4	982.3	20,031.9
Casey (G)	2,310.8	487.2	1,257.4	4,055.4
Darebin (M)	317.6	42.2	421.9	781.7
Frankston (O)	941.5	149.9	527.4	1,618.8
Glen Eira (M)	63.7	0.1	116.7	180.5
Greater Dandenong (O)	121.7	344.4	451.9	918.1
Hobsons Bay (M)	783.6	271.4	347.1	1,402.2
Hume (G)	1,416.9	201.1	1,541.8	3,159.9
Kingston (M)	514.4	252.8	476.0	1,243.3
Knox (O)	852.3	174.9	777.7	1,804.9
Manningham (M)	1,271.9	38.1	730.0	2,040.0
Maribyrnong (M)	118.4	1.7	142.6	262.7
Maroondah (O)	60.8	53.9	502.0	616.6
Melbourne (I)	539.2	1.2	28.9	569.4
Melton (G)	1,007.3	11.4	1,152.9	2,171.6
Monash (M)	256.6	55.1	464.5	776.2
Moonee Valley (M)	160.2	17.1	341.5	518.8
Moreland (M)	39.5	51.4	404.4	495.2
Nillumbik (O)	7,718.2	59.2	711.3	8,488.6
Port Phillip (I)	380.1	0.1	10.5	390.6
Stonnington (I)	25.2	4.9	142.2	172.3
Whitehorse (M)	89.4	47.1	508.0	644.6
Whittlesea (G)	7,081.0	218.9	875.5	8,175.4
Wyndham (G)	1,697.3	41.0	789.4	2,527.6
Yarra (I)	268.1	1.6	33.1	302.8
Total	48,246.7	2,880.5	16,022.6	67,149.8

Notes:

I - inner; M - middle; O - outer; G - growth municipality

Public open space ownership within the urban growth boundary

MUNICIPALITY	AREA (HA)			Total
	Crown	Public authority	Municipal	
Banyule (M)	306.8	9.2	589.0	905.0
Bayside (M)	179.2	1.2	263.3	443.7
Boroondara (M)	157.1	11.7	411.4	580.1
Brimbank (O)	674.4	67.9	960.7	1,702.9
Cardinia (G)	97.4	44.4	278.0	419.8
Casey (G)	621.3	473.0	1,018.4	2,112.8
Darebin (M)	317.6	42.2	421.9	781.7
Frankston (O)	322.0	69.6	384.4	776.0
Glen Eira (M)	63.7	0.1	116.7	180.5
Greater Dandenong (O)	83.0	85.7	332.0	500.7
Hobsons Bay (M)	380.2	174.1	346.6	900.9
Hume (G)	372.6	167.2	1,269.7	1,809.5
Kingston (M)	166.4	246.7	318.7	731.8
Knox (O)	241.7	158.9	764.2	1,164.8
Manningham (M)	467.3	31.7	597.8	1,096.8
Maribyrnong (M)	118.4	1.7	142.6	262.7
Maroondah (O)	60.7	43.3	492.7	596.8
Melbourne (I)	539.2	1.2	28.9	569.4
Melton (G)	176.0	0.6	652.6	829.1
Monash (M)	256.6	54.9	464.7	776.2
Moonee Valley (M)	160.2	17.1	341.5	518.8
Moreland (M)	39.5	51.4	404.4	495.2
Nillumbik (O)	87.8	7.3	248.2	343.2
Port Phillip (I)	380.1	0.1	10.5	390.6
Stonnington (I)	25.2	4.9	142.2	172.3
Whitehorse (M)	89.4	47.1	508.0	644.6
Whittlesea (G)	447.8	147.2	619.2	1,214.1
Wyndham (G)	169.8	41.0	693.7	904.5
Yarra (I)	268.1	1.6	33.1	302.8
Total	7,269.5	2,002.7	12,855.1	22,127.3

Notes:

1. I – inner; M – middle; O – outer; G – growth municipality

2. 'Within urban growth boundary' refers to those areas within the urban growth boundary that are also in the investigation area.

Public open space per capita (2006, 2016, 2026) in the investigation area

MUNICIPALITY	AREA (ha)	PUBLIC OPEN SPACE (HA) PER THOUSAND PEOPLE		
		2006	2016	2026
Banyule (M)	905.0	7.6	7.2	6.9
Bayside (M)	443.7	4.8	4.6	4.3
Boroondara (M)	580.1	3.6	3.3	3.2
Brimbank (O)	1,871.9	10.7	10.1	9.6
Cardinia (G)	20,031.9	342.1	200.2	135.4
Casey (G)	4,055.4	18.2	13.0	11.0
Darebin (M)	781.7	5.8	5.4	5.1
Frankston (O)	1,618.8	13.3	11.6	10.4
Glen Eira (M)	180.5	1.4	1.3	1.3
Greater Dandenong (O)	918.1	7.0	6.5	5.9
Hobsons Bay (M)	1,402.2	16.5	15.4	14.3
Hume (G)	3,159.9	20.6	15.5	12.6
Kingston (M)	1,243.3	8.9	8.2	8.3
Knox (O)	1,804.9	11.8	11.3	11.9
Manningham (M)	2,040.0	17.6	16.7	16.4
Maribyrnong (M)	262.7	4.0	3.6	3.2
Maroondah (O)	616.6	6.0	5.6	5.1
Melbourne (I)	569.4	7.0	4.6	3.5
Melton (G)	2,171.6	26.8	15.1	19.5
Monash (M)	776.2	4.6	4.3	4.0
Moonee Valley (M)	518.8	4.9	4.6	4.4
Moreland (M)	495.2	3.5	3.2	2.9
Nillumbik (O)	8,488.6	136.9	129.9	123.3
Port Phillip (I)	390.6	4.3	3.7	3.3
Stonnington (I)	172.3	1.8	1.7	1.5
Whitehorse (M)	644.6	4.3	4.0	3.8
Whittlesea (G)	8,175.4	63.1	41.7	33.1
Wyndham (G)	2,527.6	21.8	12.5	52.3
Yarra (I)	302.8	4.1	3.7	3.5
Total	67,149.8	-	-	-
Median	-	7.0	6.5	5.9

Notes:

1. I – inner; M – middle; O – outer; G – growth municipality

2. The population projections are sourced from the document Victoria in the Future 2008 and focus on two points in time, 2016 and 2026.¹⁵⁰ The analysis assumes that public open space provision would remain fairly static, with the exception of additions of Public Acquisition Overlays (PAOs). It also assumes that existing PAOs will be purchased by 2026. While it is recognised that PAOs will not be the only method for additions to the public open space network, other sources of future public open space provision such as development contributions are considered too difficult to project.

Similarly, it is recognised that the Victorian Government has committed to six new regional parks in future growth areas (Werribee River Regional Park, Werribee Township Regional Park, Kororoit Creek Regional Park, Merri Creek Regional Park, Melton Township Regional Park and Cranbourne Regional Park).¹ One of these, Werribee River Regional Park, has been included in the analysis as it has known boundaries. The other parks have not been included as their extent is currently unknown.

Public open space per capita (2006, 2016, 2026) within the urban growth boundary

MUNICIPALITY	AREA (ha)	PUBLIC OPEN SPACE (HA) PER THOUSAND PEOPLE		
		2006	2016	2026
Banyule (M)	905.0	7.6	7.2	6.9
Bayside (M)	443.7	4.8	4.6	4.3
Boroondara (M)	580.1	3.6	3.3	3.2
Brimbank (O)	1,702.9	9.7	9.2	8.7
Cardinia (G)	419.8	7.2	4.2	2.9
Casey (G)	2,112.8	9.5	6.8	5.7
Darebin (M)	781.7	5.8	5.4	5.1
Frankston (O)	776.0	6.4	5.6	5.0
Glen Eira (M)	180.5	1.4	1.3	1.3
Greater Dandenong (O)	500.7	3.8	3.5	3.2
Hobsons Bay (M)	900.9	10.6	9.9	9.2
Hume (G)	1,809.5	11.8	8.9	7.2
Kingston (M)	731.8	5.2	4.8	5.2
Knox (O)	1,164.8	7.6	7.3	8.1
Manningham (M)	1,096.8	9.5	9.0	9.1
Maribyrnong (M)	262.7	4.0	3.6	3.2
Maroondah (O)	596.8	5.8	5.4	5.0
Melbourne (I)	569.4	7.0	4.6	3.5
Melton (G)	829.1	10.2	5.8	4.2
Monash (M)	776.2	4.6	4.3	4.0
Moonee Valley (M)	518.8	4.9	4.6	4.4
Moreland (M)	495.2	3.5	3.2	2.9
Nillumbik (O)	343.2	5.5	5.3	5.7
Port Phillip (I)	390.6	4.3	3.7	3.3
Stonnington (I)	172.3	1.8	1.7	1.5
Whitehorse (M)	644.6	4.3	4.0	3.8
Whittlesea (G)	1,214.1	9.4	6.2	5.0
Wyndham (G)	904.5	7.8	4.5	3.3
Yarra (I)	302.8	4.1	3.7	3.5
Total	22,127.3	-	-	-
Median	-	5.8	4.6	4.3

Notes:

1. I – inner; M – middle; O – outer; G – growth municipality

2. 'Within urban growth boundary' refers to those areas within the urban growth boundary that are also in the investigation area.

The population projections are sourced from the document Victoria in the Future 2008 and focus on two points in time, 2016 and 2026.¹⁵⁰ The analysis assumes that public open space provision would remain fairly static, with the exception of additions of Public Acquisition Overlays (PAOs). It also assumes that existing PAOs will be purchased by 2026. While it is recognised that PAOs will not be the only method for additions to the public open space network, other sources of future public open space provision such as development contributions are considered too difficult to project.

Similarly, it is recognised that the Victorian Government has committed to six new regional parks in future growth areas (Werribee River Regional Park, Werribee Township Regional Park, Kororoit Creek Regional Park, Merri Creek Regional Park, Melton Township Regional Park and Cranbourne Regional Park).¹ One of these, Werribee River Regional Park, has been included in the analysis as it has known boundaries. The other parks have not been included as their extent is currently unknown.

APPENDIX 7

PROCEDURES USED IN THE DISPOSAL OF CROWN LAND AND PUBLIC AUTHORITY LAND

Crown land

Crown land is managed by a range of public authorities and other organisations in accordance with its public land use category or reservation. For example, land reserved for a school, water supply or police station is managed by the government agency responsible for that function. Many areas of Crown land are managed by committees of management (committees are often incorporated community groups or local councils). The Minister for Environment and Climate Change and the Department of Sustainability and Environment (DSE) have a role to reserve land for the required purposes, and to establish committees of management. These responsibilities stem from the *Land Act 1958* and *Crown Land (Reserves) Act 1978*.

Assessment

DSE has a program to audit Crown land parcels that fall under its direct management responsibility, with one of the aims being to divest parcels that are surplus to requirements. If land is not required it is assessed to determine whether it has public land values, in accordance with the 1998 'Crown Land Assessment Guidelines' – known as the GL/PL (i.e. government land/public land) assessment.²¹³

The Minister for Environment and Climate Change is responsible for the *Crown Land (Reserves) Act 1978* and for land reserved under this Act. Consequently, when public authorities identify that Crown land is no longer required (for example, a disused police station), they notify DSE which conducts a GL/PL assessment of the land.

Land is assessed against the criteria listed below (DSE is currently revising these criteria). If the land meets one or more of the criteria, it is categorised as *public land* – to be withheld from sale and reallocated to another use compatible with the existing values of the land. This could result in its addition to an existing reserve, or creation of a new park or other Crown land reserve, or the reuse of former government buildings by local communities. The criteria are:

- ▶ natural values or conservation significance for present and future generations
- ▶ historical significance that it should be retained as part of the public estate for current and future generations
- ▶ recreation or tourism significance for current and future generations

- ▶ natural resource production/utilisation significance for present or future generations
- ▶ social or cultural significance (including special significance for the Aboriginal community) for present or future generations
- ▶ other special values relevant to meeting present and future land uses
- ▶ intrinsic value for any of the above purposes outweighs any potential benefits to be gained by reclassifying the land.

If the land meets none of the above criteria, it is categorised as *government land*, and may be sold. In some cases *government land* is sold with a covenant or other restriction on title designed to protect public land values. This can occur when it is determined that the restriction can adequately protect the identified public land values on the land. The land must also be assessed to determine if Native Title has been extinguished as Crown land cannot be sold unless it can be shown that this is the case.

Disposal of land

The details of Crown land assessed as *government land* are forwarded to the Department of Treasury and Finance to manage the sale process. Areas of Crown land do not have land titles, so this includes carrying out the formal steps leading to the issuing of a title.

The sale of land must adhere to the Government Land Monitor's (GLM) Policy and will require approval of the GLM for transactions greater than \$250,000. Often the land has an existing zoning for a public purpose in the planning scheme, and a rezoning is required prior to sale to achieve the best financial outcome. Government departments and the relevant local government must be offered the opportunity to purchase the land (at market value as assessed by the Valuer-General).

If the land is permanently reserved Crown land, a specific amendment to an Act of Parliament is required to revoke its reservation status. Temporary reservations of Crown land can be revoked by Orders of the Governor in Council (GIC) to remove its reservation status. Vested land must be divested, using a parliamentary or GIC process. These are important checks in the accountability process as they allow for public scrutiny. The administration of both steps is carried out by DSE.

Public consultation

Land is generally offered to other public authorities and then to the relevant local council for purchase. If it is not purchased at these stages, it is generally sold by public auction. Public consultation occurs as part of the rezoning process and advertising of a public auction.

Public authority freehold land

Assessment

Public authorities use internal business processes to determine whether their freehold land is surplus to operational requirements. If land is considered to be surplus, it can be considered for sale and a financial return obtained in keeping with the commercial or operational objectives of the authority.

Public authorities are not required to determine whether the land is suitable for an alternative public purpose, so no equivalent GL/PL assessment process is undertaken. However, occasionally some public authority land is referred to DSE for this assessment.

Disposal

Public authority land is sold in accordance with the Government Land Monitor's Policy, as for Crown land. Thus the land may be offered for sale firstly to public authorities or and then relevant local councils.

If the land has recognised significance for biodiversity, heritage or other values, it may be protected by use of statutory tools. For example a public authority may use one or more of the following tools to protect biodiversity values:

- ▶ application of an Vegetation Protection Overlay or Environmental Significance Overlay in Victoria's planning scheme
- ▶ protective covenant under the *Victoria Conservation Trust Act 1972*
- ▶ section 173 agreement under the *Planning and Environment Act 1987* (for example to designate a building envelope to minimise impacts on remaining native vegetation).

Public consultation

As for the disposal of Crown land, public consultation occurs as part of the rezoning process and public auction and through advertising of a public auction.

