Assessment of Flora, Fauna and Habitat at the Blackburn Creeklands and General Recommendations for Conservation Management

Prepared for Whitehorse City Council

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Introduction

Whitehorse City Council is undertaking a Master Planning process for the Blackburn Creeklands. The master planning process requires a review of the environmental values of the reserve and environmental risks and the development of recommendations for maintaining and enhancing those values. This report will fulfill that need.

The process used in this report is generally based on a system recently developed by Melbourne Parks and Waterways (MPW 1996) which is now the system being used across the newer organization of Parks Victoria. It is based on a three step process:

- Environmental Values Assessment,
- Identification of Environmental Risks and Opportunities;
- Management Priorities, Strategies and Actions.

This report will attempt to address the first two steps of this process comprehensively and propose general recommendations for the third step. Assessing environmental values, risks or threats to those values and opportunities to protect and/or enhance them is an inventory of existing information, gathering new information where possible and identifying gaps in the information resource. The aim is to gain a comprehensive picture of the ecological values of the Creeklands and assess the potential future impacts to those values. Getting the values that require protection clearly inventoried and ranking the severity of the risks can then allow the development of realistic management priorities and actions that eliminate or minimise the risks to those values.

Specific objectives of this report include the following:

- the identification of key environmental values, including flora, vegetation communities, fauna and habitat;
- the identification of threats to environmental values and other management issues and opportunities for effective management in the future and
- the development of strategies and prioritised actions to manage for flora, fauna and habitat values.

With the above objectives considered the following components will be included in this report:

- assessment of conditions and existing flora and fauna;
- summary of literature review and research integrated with results of recent survey work;
- review of threats to environmental values and management issues and opportunities scope;
- recommended strategies for management of flora, fauna and habitat at the Creeklands and
- supporting maps (e.g. vegetation quality, local sites of conservation significance, management blocks etc.) and data on flora & fauna.

It can be problematic for someone outside of Council to develop detailed proposals and programs for the management of a Council reserve. It is only the land manager that has all of the information from year-to year to make balanced decisions about its ongoing management and develop annual works programs, both capital projects and ongoing maintenance. The land manager has the difficult job of balancing existing policies, budgets and community expectations while protecting the resource it controls. The overall aim of this background report is to help guide the master planning process and the ongoing management process.

The Study Site

The parkland is along Gardiner's Creek, and extends from Middleborough Road to Blackburn Road, Blackburn. The Creeklands cover an area of approximately 17 hectares. There is a wide variety of conditions in the Creeklands, from open parklands and ovals to large areas of remnant trees and lawn to moderately degraded riparian vegetation and a few areas of drier bushland.

Climate

The climate at Blackburn is cool and wet in the winter with a few frosts each year, and hot dry summers. The mean average rainfall is 833 mm with the wettest months usually being October and

April. The hottest months are January and February with a mean monthly maximum of 26°. The coolest months are June, July and August with a mean monthly minimum of approximately 6°. Major droughts tend to occur in ten-year cycles. (Calder 1976)

Physiography, Geology and Soils

The landforms around Blackburn Creeklands have been carved out of Silurian mudstones and sandstones, i.e. marine sediments that are approximately 450 million years (Geological Survey of Victoria 1969). The land surface, 90-105 m above sea level, is part of a maturely dissected erosion surface, known as the Nillumbik Terrain. Broad shallow valleys dissect the plateau-like surface and flat or gently rounded hills rise only 60 m above the valley floors (Calder 1976).

Since the original deposition of the Silurian sediments they have folded into major anticlines and synclines, i.e. crests and troughs of rock waves. Some alluvial materials, i.e. sediments on the floodplain, were deposited on the valley floors in more recent times, the last million years or so. Most of the Creeklands is floodplain with alluvial soils but there are several outcrops of Silurian sediments on the small escarpments on the north side of the creek and on higher ground to the south.

The soils derived from the Silurian sediments are old, leached and nutrient poor. Soils derived from recent alluvial material, which are distributed across the floodplains, are relatively richer.

Indigenous remnant vegetation still exists on small areas of outcrops of Silurian soils in the Creeklands. The richer alluvial soils, influenced by historical and ongoing disturbance, in the Creeklands actually encourage a low diversity weedscape. Disturbance and nutrient deposition from stormwater runoff causes substantial weed invasion and dominance by exotic plants.

Research and Assessment: Literature Search and Fieldwork

The assessment of natural values within this report is based on a literature search. All reports and information relating to the Creeklands were obtained from the Council. Species lists and other materials were obtained from the Blackburn Creeklands Advisory Committee. The libraries of several institutions and organisations were accessed, including the Field Naturalists Club, Nunawading Historical Society and Birds Australia. Records for flora and fauna were also obtained from the State Government's Flora Information System and the Victorian Wildlife Atlas.

Unfortunately, the literature search did not produce a significant quantity of information about the Creeklands. Records of flora and fauna and past land use were available but much of the information was anecdotal and not necessarily gathered within scientific frameworks.

The largest gap of information was in fauna records. Some specific records were obtained for the Creeklands themselves but other records, particularly from the Victorian Wildlife Atlas, were only from the general area.

Fieldwork was undertaken to assess current conditions and flora but much of the assessment presented below is based on the significant resource of existing records. The methods used to gather data will be explained in more detail in the relevant section below. Much of this current investigation confirmed past records but it was not possible to verify fauna records.

Part 1) Environmental Values Assessment

1.1 Pre-European Ecology, Local History and the Modern Landscape

A general literature review was conducted as background for this report, including two local history books (Brennan 1972 and Sydenham 1990) and historical material gathered by the Advisory Committee. The original environmental conditions in the Creeklands was a key determinant of the history of the area and, despite a history of farming and the present dense urban development in the study area, there are many clues to the local ecological and human history that remain. A combination of a review of historical texts and a visual inspection of the landscape inspire this discussion of the history of the local landscape.

The original vegetation of the area was thick forest and the eastern hills were not the preferred areas of settlement when Melbourne was settled; the first wave of European settlers preferred to move into the open plains to the north and west of Melbourne to graze their sheep. The hills east of Melbourne were not settled at any significant scale before the gold rush. There are still several examples of this original forest in reserves such as Antonio Park and Blackburn Lake Sanctuary.

The gold rushes of the 1850's and the keen desire to settle in Gippsland in the 1870's and '80 drove the next phase of development. This phase was essentially one building through roads, such as Whitehorse Rd., along the ridges of Whitehorse, with periodic pubs, to get up to the upper Yarra gold fields and through Powelltown to Gippsland (because the Kooweerup Swamp was a barrier to the south of the ranges).

These roads also became the focus of another wave of activity when woodcutting was banned close to Melbourne in the 1870's. Many people moved out to the hills to the Whitehorse area to cut wood to make charcoal and ship it to Melbourne. This charcoal manufacture helped many settlers clear bush from their future farms and raise cash so that they could afford to eat at the same time.

After 1880 the Whitehorse was increasingly a landscape of small farms and villages along the major roads. Over time horticulture, particularly fruit and flower production, and grazing became the dominant land uses. The hills were good for orchards while the floodplains were much better suited for flower growing and market gardening. This landscape of small farms continued into the 1960's when the area was urbanised. There were certainly changes in the last part of the farming period with things like battery chicken farming and horse agistment becoming more common as the type of land use that occurred (and still occurs on Melbourne's fringe) immediately before urban subdivision.

The Blackburn Creeklands have been transformed into urban parkland but the various pieces of evidence of the past vegetation and land uses is clear when you look around the landscape. The original bush was probably thick across the entire landscape with many of the same trees along the creek that are still there today. There are still giant Manna Gums (*Eucalyptus viminalis*) on the creek that may have been present as smaller trees when Europeans arrived, with a few of the other original riparian species besides a few hardy indigenous shrubs. Most of the floodplain species and the higher and drier vegetation communities are now absent in the Creeklands but remnants may be seen elsewhere in the city.

It is also easy to imagine the local landscape during the first half of the 20th century. The floodplains of the Creeklands were predominantly cleared with grazing and horticulture and many old remnant trees left along the creek and in various paddocks (and the odd oak). These more diffused agricultural systems didn't require the clearing of every last tree unlike many modern agricultural systems. The landscape was undoubtedly dominated by exotic vegetation; there is still very little indigenous groundstorey anywhere in the local landscape. Similar scenes can easily be seen today on the current urban fringe in the Yarra Valley.

Urbanisation and conversion to public parkland has resulted many changes and additions to the landscape, including:

- a more ordered landscape with fences removed and mowing regime implemented;
- land use changes, such as ovals;
- channeling of Gardiner's Creek and
- waves of regeneration, woody and groundstorey weed invasion and new plantings, from introduced natives in the 1970's to local indigenous species in the 90's.

The current landscape is an amalgam of all of these elements. There are the odd remnant trees that may pre-date European settlement, a groundstorey dominated by exotic grasses (an indicator of extensive clearing) and a great diversity of shrub and tree canopy species. The modern landscape is again bushy and dominated by trees after a period of agriculture, although these trees vary from remnant trees to introduced natives to exotic species. Much of the current tree canopy also consists of invasive weed species, particularly Desert Ash (**Fraxinus angustifolia*), Willows (**Salix* spp.) and Box Elder (**Acer negundo*).

1.2 Flora

All plant names in this report are according to the most recent species list published by DNRE's Flora Information System (Cameron *et al* 1998). Any scientific names, common names and numerical codes used throughout the report are sourced from that document.

A comprehensive flora list for the Blackburn Creeklands was compiled from combining information obtained through literature review and consultation with local people and a flora survey undertaken in August and September 1999. This flora survey included recording all species across the entire study area.

A total of 214 flora taxa were found at the Creeklands. 101 of these species were indigenous and 113 were introduced, both Australian natives and exotic plants. There were no particularly rare plants but all remnant vegetation is uncommon in the Melbourne metropolitan area.

The diversity of indigenous plants was relatively minimal but this is an expected finding considering the disturbed nature of the Creeklands. Most of the Creeklands is only remnant overstorey at most with only a few areas of indigenous groundstorey, where greater diversity would occur.

1.2.1 Existing Vegetation: Condition and Quality

Vegetation condition and quality was assessed through a scale designed to assess the values of the urbanised parkland environment and present the complexity of many different conditions in a graphic way. The four levels of Vegetation Quality Assessment used for much bushland assessment is specifically designed for bushland areas dominated by indigenous vegetation, as presented by Buchanan (1989). However, there are many more conditions within diverse urban parkland that require a more sophisticated and expansive mapping method.

The key and scale used was specifically designed to map the vegetation condition and quality of the vegetation within the Creeklands. The system was designed to graphically document the wide variety of site conditions existing in the Creeklands. The key is presented here and with the maps themselves.

The scale can be used to consider the vegetation of the Creeklands on two levels. The detail provided from A-N identifies a wide variety of conditions. These various categories are then categorised according to more general conditions, as included below. These more general categories help highlight areas that are currently managed as open parkland and the various other types of areas with different opportunities for the re-establishment of indigenous vegetation.

Key to Vegetation Condition and Quality Assessment.

Group 1. Areas actively managed as open parkland and/or dominated by exotic vegetation:

A: Areas cleared of indigenous trees and shrubs or with no indigenous trees and consisting substantially of introduced species in the groundstorey with substantial physical disturbance. Open parkland or ovals without any remnant tree overstorey. Includes small areas of eroded or undercut creek bank.

B: Areas of trees of which less than 50% are indigenous. There is no shrub understorey and a non-indigenous ground layer.

E: Areas containing trees and/or shrubs and groundstorey, with no indigenous species present in any layer. Usually all plants are exotic.

Group 2. Areas with indigenous plants present in the tree or shrub layer but dominated by exotic plants, providing an existing but minimal indigenous framework for recreating indigenous vegetation communities:

C: Areas of trees of which 50% or more are indigenous. There is no shrub understorey and a non-indigenous ground layer.

D: Areas with ground layer, shrub layer and tree layer present, with trees the only indigenous plants, or areas where shrubs are the only indigenous plants, with or without a tree overstorey.

Group 3. Areas with moderate levels of indigenous species and often including moderate to high levels of weed cover:

F: Areas with a young eucalypt overstorey and shrub layer removed, with a moderate cover of both indigenous and introduced species in the ground layer.

G: Overstorey is made up of Acacias or shrubs, but no eucalypts. Groundstorey has a moderate to high cover of introduced species, but also contains bracken or other indigenous species.

H: Areas with tree, shrub and herb/grass layers with an indigenous overstorey. An indigenous shrub layer and/or groundstorey layer are present. There is also a high cover of weeds in the shrub or groundstorey. Indigenous overstorey, rarely with occasional non-indigenous trees or mulch with no ground cover.

Group 4. Areas substantially dominated by indigenous vegetation, whether as remnants or through revegetation works, which consist of a range of different qualities requiring different management approaches:

I: Areas with all layers of indigenous vegetation present, with a moderate cover of weeds in one or more layers of vegetation.

J: Revegetated area, five years old or less, containing no remnant vegetation. May have non-indigenous overstorey.

K: Areas of high quality indigenous revegetation plots, substantially free of introduced plants and weeds. All layers of indigenous vegetation present, tree, shrub, and herb/grass layers are present.

L: Area of indigenous revegetation, five years old or less, with older indigenous overstorey.

M: Areas of high quality indigenous revegetation plots, substantially free of introduced plants and weeds. All layers of indigenous vegetation present, tree, shrub, and herb/grass layers are present, with older indigenous overstorey.

N: Wetlands with open patches of water and rushes, The areas may contain a mixture of indigenous and introduced species.

The Vegetation Condition and Quality maps provide graphic demonstrations of several issues. They highlight the remaining remnants and opportunities to reconnect them as well as degraded areas and areas actively managed as open parkland at the current time.

1.2.2 Past and Present Vegetation Communities

The extent of past vegetation communities has been determined through a comparison of collected flora data, geological information and relevant information from around the region and mapped. A list of character species for these communities and their abundance and distribution is defined below. By comparing the vegetation quality and past vegetation maps a clear picture of existing intact vegetation communities is possible.

Reconstructing the pre-European indigenous vegetation communities within the Creeklands was difficult because of the dramatically altered conditions of the reserve. The topography and remnant vegetation of the site, related to other vegetation studies of the Melbourne region, indicate the existing and past indigenous vegetation communities. The topography of the site is quite diverse and would have possibly supported up to four indigenous vegetation communities. Understanding what these communities may have consisted of previously is a useful tool for designing future plantings.

It appears that there may have been one vegetation community on the few dry areas above the floodplain, although this is hard to determine because of the lack of remnant vegetation as an indicator. This drier community was likely to be:

Yellow Box Open Forest

The Yellow Box trees (*E. melliodora*) in a few areas on drier slopes of the Creeklands indicate a drier community. It would previously have been an open forest or woodland with an open canopy of Yellow Box, Silver-leaf Stringybark (*Eucalyptus cephalocarpa* s.l.) and possibly Candlebark (*E. rubida*). Typical trees and shrubs would have included Black Wattle (*Acacia mearnsii*) and Burgan (*Kunzea ericoides*). The most distinctive feature of this community would have been the previous dominance of Kangaroo Grass, and many other native grasses, in the groundstorey. Other typical plants may have included Small St. John's Wort (*Hypericum gramineum*), Creeping Bossiaea (*Bossiaea prostrata*), Veined Spear Grass (*Austrostipa rudis*), and Yellow Rush Lily (*Tricoryne elatior*).

The intermittently wet and/or flooded areas of the floodplains would have had a mosaic of the following vegetation communities (many remnants and replanted components remain):

Manna Gum Riparian Forest

This forest type occurs on "well drained stream terraces and floodplains" along permanent streams (Bedggood *et al* 1992) and has also been substantially cleared across northeast Melbourne. It is common throughout the Creeklands albeit in a consistently degraded, weed-invaded and species-poor condition. More substantial remnants of this forest still occur along the Mullum Mullum Creek and the middle Yarra.

It would have had a canopy of Manna Gum (*E. viminalis*), sometimes Yellow Box with a lower canopy of Silver Wattle (*Acacia dealbata*) and Christmas Bush (*Prostanthera lasianthos*). Other shrubs and grasses include Sweet Bursaria (*Bursaria spinosa*), Burgan, Common Tussock Grass (*Poa labillardierei*) and Sword Tussock Grass *(P. ensiformis*).

Swamp Paperbark Scrub

Poorly drained soils along creeks and drainage lines in low areas in the eastern suburbs often support, or supported, a thick scrubby forest dominated by Swamp Paperbark (*Melaleuca ericifolia*). Much of this community is made up of resilient indigenous species that easily spread and that is what they have done in wet spots where water accumulates on the floodplain. The shrub layer includes Prickly Moses (*Acacia verticillata*) and Tree Everlasting (*Ozothamnus ferrugineus*). Plants in the some areas include Common Reed (*Phragmites australis*), Spiny-headed Mat Rush (*Lomandra longifolia*), Tall Sedge (*Carex appressa*), Bidgee-widgee (*Acaena novae-zelandiae*), Kidney Weed (*Dichondra repens*) and Forest Clematis (*Clematis aristata*).

Several examples of this community appear to be a relatively recent addition, through revegetation and regeneration, to the Creeklands. Despite its' disturbed status it can be relatively diverse because the indigenous species are selected for by the wet conditions; many of the indigenous species suited to wet conditions dominate in intermittently damp or flooded environments.

Swamp Gum Riparian Forest

This forest type occurred on drainage lines with intermittent streams on Silurian sediments across eastern and northeastern Melbourne (Bedggood *et al* 1992) and has been substantially cleared

and degraded across the region. Swamp Gums (*E. ovata*) were the typical canopy species along with Blackwood (*Acacia melanoxylon*) and sometimes Yellow Box. Shrub species include Sweet Bursaria, Prickly Currant Bush (*Coprosma quadrifida*) and groundstorey species include Spiny Mat Rush and Common Maidenhair (*Adiantum aethiopicum*). This community may have occurred in drainage lines with "winter creeks" in the Creeklands.

There is also an vegetation artificial community in small areas of the Creeklands. These are the wetlands, which support additional plants such as Rushes (*Juncus* spp.), Bulrush (*Typha* spp.), Water Ribbons (*Triglochin procerum spp. agg.*). Natural wetlands are difficult to classify much less artificial sites where best and educated guesses have been made in the choice of plant re-introductions. These wetland areas are a relative recent recreation in the local ecosystem but they can be relatively diverse because the indigenous species are selected for by the wet conditions.

All of these indigenous vegetation communities are mapped (Map 3a, 3b, 3c and 3d) as they would have been distributed prior to European settlement. The existing remnants, topography and soil types were all considered in identifying the areas where these vegetation communities may have formerly occurred. The information presented here and the conservation significance of the first three communities, the ones that actually occur on the site in some form, is summarised in Section 1.2.4.

1.2.3 Determining Conservation Significance or Rarity

Significance is assessed for flora and fauna species and vegetation communities to give land managers a perspective on how common or rare the species or may be. Considering significance is important background for determining management priorities.

Significance in the biological context means very much what it means in common usage, being defined as noteworthy or of considerable importance. Sites of significance are assessed according to defined biological criteria and are independent of any land-use classifications; the status and ownership of land is not relevant. The significance of vegetation communities or particular habitats is an assessment of the qualities of a site in relation to its current distribution, conservation status and integrity.

The scale of significance, for the purposes of this study, is within the following areas:

Local: The City of Whitehorse

Regional: The Melbourne Region as defined within the *Flora of Melbourne* (SGAP Maroondah 1996).

State: Victoria

National: Australia

Several things should be noted in relation to conservation significance. It is not a static condition, the significance of indigenous flora and fauna will change over time according to the evolving condition of the flora and fauna and the ongoing impacts, positive or negative, on it. Conservation significance will be defined for both individual flora species and vegetation communities in the Creeklands according to the criteria listed below.

All remnant vegetation and populations of indigenous flora and fauna in the study area are of local significance. This significance is a given the major depletion and poor condition of indigenous vegetation and habitats in the region as a whole, particularly a substantially cleared and developed area such as the City of Whitehorse and the Melbourne region.

1.2.4 Significant Flora and Vegetation Communities

Indigenous Flora of Conservation Significance

No species of National or State Significance were found in the reserve. 9 species of regional significance were recorded in the reserve.

The regional significance of plant species is based on the following criteria:

- Naturally uncommon or rare in the Melbourne region;
- Formerly widespread in the Melbourne region but now depleted through habitat destruction or degradation;
- Remnant population(s) with important information content for botanical research or the regional vegetation;

- Species which are taxonomically or biogeographically interesting;
- Potentially valuable source of propagation material for revegetation.
- Unique occurrences, large specimens or substantial populations, of common or wide-spread species.

Many of the species in the Creeklands are uncommon in the Melbourne region but they may not necessarily be uncommon in remnant vegetation. A rare plant species is often quite common in remnant vegetation; it is the remnant vegetation or a particular vegetation community that can be very uncommon. These significant species can be indicator species for monitoring in the Creeklands; they are some of the most valuable assets of the Creeklands.

Table 1. Flora of Regional Significance in Blackburn Creeklands [#]

Species	Common Name	Pop. Status	Comments, Management Blocks	References
Acacia myrtifolia	Myrtle Wattle	E	Commonly planted	EM
Alisma plantago-aquatica	Water Plantain	D	Common in artificial wetlands	EM
Austrostipa pubinodis	Spear Grass	C	Black's Walk NW Block	EM
Carex fascicularis	Tassel Sedge	C	Appears to be planted in artificial wetlands	CM
Dianella longifolia	Pale Flax-lily	F	Abundant, commonly planted	EM, MY, WPGG WP
Daviesia latifolia	Hop Bitter Pea	B	Unknown	EM
Eucalyptus cephalocarpa s.l.	Silver-leafed Stringybark	F	Scattered remnant trees	EM
Kennedia prostrata	Running Postman	E	Pakenham Street East - South Creekbank	EM
Tricoryne elatior	Yellow Grass Lily	C	Black's Walk NW Walk	EM, WPGG, WP

Key for Table 1:

[#] Includes flora that is naturally occurring and as a result of revegetation activities.

Population Status in reserve:

A- only one plant recorded

B- less than 10 plants recorded

C- localised, one or few small populations

D- localised, one or several large populations

E - Scattered but not abundant

F - common, population relatively large

References (with description of study area):

CM - Lorimer et al 1997 (Sites of Biological Significance in Maroondah)

EM - Bedggood *et al* 1992 (East of Mullum Mullum Creek)

MY - Thexton *et al* 1988 (Middle Yarra Survey)

WP - Carr *et al* 1993 (Wattle Park)

WPGG - Bedggood and Carr 1994 (Wattle Park Golf Course)

Significance of Vegetation Communities

The conservation significance rating for vegetation communities, including the flora and fauna that depend on specific characteristics or habitat components within the community, is primarily based on its rarity, condition and area protected in conservation reserves in the region. according to the following criteria:

- Distribution and abundance (of the community) in the region, State or nation;
- Level of depletion since European occupation;
- Number and ranking of significant species (of which rarity is an important criterion) occurring in the community.
- The size and extent of vegetation of similar floristic composition and structure, based on ground coverage of the community.
- Level of disturbance, particularly in relation to human-related disturbance.
- The potential vulnerability of the vegetation to weed invasion, one of the most serious threats to the conservation of many plant communities; different vegetation communities differ in susceptibility.
- ♦ The area of the community protected in conservation reserves in the region is potentially nil, poorly or moderately represented, or with substantial areas reserved with conservation management in place.

With all of these factors considered the vegetation communities are ranked, based on other studies, primarily, but also within the context of this study and the authors' knowledge.

Table 2. Indigenous Vegetation Communities within Blackburn Creeklands and their Significance

Vegetation Community	Comments	Signif-icance	References
Yellow Box Open Forest	Only a few small areas remaining	Local at best	Calder and Pike 1976, Yugovic *et al* 1990, Lorimer *et al* 1997, Bedggood *et al* 1992
Manna Gum Riparian Forest	Common but generally degraded	Local	Yugovic *et al* 1990, Lorimer *et al* 1997, Bedggood *et al* 1992, SGAP Maroondah 1996
Swamp Paperbark Scrub	Regenerated and replanted community of limited diversity	Local	Calder and Pike 1976, Yugovic *et al* 1990, Lorimer *et al* 1997, Bedggood *et al* 1992, SGAP Maroondah 1996
Swamp Gum Riparian Forest	Only remnant overstorey remaining	Local	Yugovic *et al* 1990, Lorimer *et al* 1997, Bedggood *et al* 1992, SGAP Maroondah 1996

1.3 Habitat and Indigenous Fauna

The identification of past and present fauna species and their abundance was determined almost exclusively through literature review, consultation with the Blackburn Creeklands Advisory Committee, local people, Field Naturalists Club, Bird Observers Club etc. and a search through the Atlas of Victorian Wildlife. Detailed survey of fauna has not been done as part of this investigation except as incidental observations during general survey efforts.

It is clear that there are many gaps in the fauna records. The most significant is reptiles and amphibians; it is likely that several species may occur in the parklands but were not confirmed in any records. Mammal records were also lacking, in that any recent observations of relatively common species such as Ringtail Possums have not been formally recorded anywhere.

Habitat values were also assessed through the identification of key types or components and their quality. This assessment would also clearly consider and review the habitat contribution of the existing exotic vegetation and weeds compared with the habitat quality of bushland areas.

1.3.1 General Habitat Values

All animals depend on habitat and in an urban area such as the City of Whitehorse a new framework of buildings, roads and exotic vegetation has replaced most of the original indigenous habitat. Only remnants of the original habitat survive; many of the indigenous animals are now extinct across Australia and many others have been extirpated from the local environment. Many indigenous animals have adapted to urban life and still remain. This section will describe the different types of habitat in the reserve and discuss the general groups of indigenous animals they may support. Considering the different habitats provides an overview of how animals are distributed, the range of animals remaining in the reserve and which habitats are the rarest in the region.

These habitat types can be identified through the Vegetation Condition maps described above as well.

Parkland

This habitat type is the typical vision of urban parkland; a groundstorey of mown lawns and a canopy of native or exotic trees. This environment provides habitats for the several exotic birds, such as Indian Mynahs, Starlings etc., and many “weedy” native birds (Green 1986). These native birds are well adapted to the urban habitats created in modern cities. These “weedy” native birds include permanent residents like Willie Wagtails, Red Wattlebirds, and Noisy Miners and migrants such as grass seed eating parrots like Galah and nectar eaters such as Lorikeets, etc. It provides little habitat for many indigenous mammals, reptiles, and amphibians and is common and abundant across the suburbs on private land and many urban parks. Despite this type of habitat’s abundance it is still important for a particular group of native birds and should never be eliminated from a reserve such as the Creeklands even if it was an acceptable idea to eliminate such areas.

Revegetation Areas

There has been much replanting of shrubs and trees in the Creeklands over the last few decades. This is readily apparent on the ground as well as from historic photographs of the Creeklands. This revegetation is of two different groups of species, introduced natives and local indigenous species; an artifact of the change in Council policy over the years. In many ways both types of species provide the same types of habitats. Revegetation areas provide birds with dense cover for shelter and nesting and many nectar-producing plants that feed Honeyeaters and probably possums. They are still of minimal plant diversity being mulched, having leaf litter and/or exotic grass on the groundstorey. These areas certainly provide more habitats for indigenous animals than open parkland but it is still limited.

Wetter Habitats: Creek, Wetlands and Swamp Paperbark Thickets

The wetland communities in the Creeklands have been developed and recreated in the last two decades but indigenous animals have readily reinvaded the habitat. The wetlands attract a wide variety of waterbirds and dense Swamp Paperbark thickets provide roosting and shelter. The dense Swamp Paperbark thickets often provide good spots for Ringtail Possum nests and nesting sites for birds.

There is a notable lack of fringing reed habitat on the creek and wetlands and consequently the types of waterbirds that nest and feed in shallow reed bed habitats are mostly absent from the reserve. This habitat provides important resting areas for migratory birds and may be refuges for many waterbirds when inland wetlands are dry. This habitat doesn’t provide much cover and food for other animals besides birds either; the minimal fringing vegetation doesn’t provide many habitats for frogs, in particular, because of the lack of shallow reedy habitat.

The are also a few remaining willows along Gardiner’s Creeks, although most are quite small. In many places larger willows provide habitat for native species such as Ringtail Possums, although in general willows are very poor habitat for indigenous fauna. Willows can provide roosting space for some native birds and possums as well. The nutrient flush from the autumn leaf fall also contributes to a lack of biodiversity in the water by causing large fluctuations in available oxygen.

Degraded Native Forest

There are large areas of the Creeklands that contain a multi-layered habitat where there are several layers of vegetation, canopy trees, shrubs and an unmown ground layer. Unfortunately, weeds and exotic plants have substantially invaded much of this habitat.

This degraded native forest is still possibly the most diverse habitat within the reserve for the remaining indigenous fauna. It may provide habitat for a range of indigenous animals, from woodland birds to butterflies and ants.

Large Old Remnant Trees

There are many old trees throughout the Creeklands, as documented by Galbraith and Associates (1999) and Treelogic (1999) in their studies, but those studies did not talk about the resources these trees provide for indigenous wildlife. These trees provide a few key habitat components that create some of the greatest and loudest attractions of the Creeklands. The nesting hollows and food resources (flowers, gumnuts, psyllids and lerps etc.) that these trees provide attract large groups of Rainbow and Musk Lorikeets in certain seasons, sometimes creating a raucous environment in the Creeklands. The tree hollows and large flaking pieces of bark will provide nesting habitat and shelter for possums and bats. These tree hollows, in particular, are a disappearing resource across urban areas and beyond; the lack of nesting habitat can limit the general habitat use of hollow-dependent organisms.

This resource of large old trees with hollows and chunks of bark for shelter are in an inevitable decline. The large trees remaining were the only trees left in the Creeklands in its time as a farming landscape, from the 1800's into the 1960's. The last 30 years have seen the establishment of many new indigenous trees in the Creeklands but the natural hollows will still be a long time coming, up to 100 years. The time gap between the current supply of tree hollows and bark and future supply may be substantial and will require action to sustain local indigenous wildlife populations (discussed below)

1.3.2 Fauna Species in the Creeklands

This section will summarise the fauna of the Creeklands. The species found over time in the Creeklands are summarised and discussed, including a detailed section on the rarest fauna.

The data summarised here includes the Victorian Wildlife Atlas records and a few other references found in the literature search. The birds have been surveyed extensively while almost all other groups have had minimal formal survey effort undertaken.

It should also be highlighted that the fauna records in the Victorian Wildlife Atlas are not necessarily reflective of the true diversity and timeframe of occurrence. Many people may see many different animals over time but most people do not submit records to the Atlas. The records in the Atlas reflect the sightings of professional scientists working for the government or as consultants and the local people who are aware they can contribute records and actually take the time to do so.

Birds

A range of bird records were reviewed including the Wildlife Atlas of Victoria and records from a local resident (Humphreys 1986a and 1986b).

These overall list of bird species are presented in Appendix 2.

Overall, the lists highlight some issues with regard to bird species using the Creeklands and the habitats within it:

- Wetland birds are well represented because of the wet habitats in the Creeklands.
- Wetland birds that prefer shallow fringing reed beds are not well represented because of the lack of this type of habitat.
- Woodland birds are reasonably represented because of the thick bushland habitats, albeit somewhat degraded.
- Raptors are poorly represented because of the lack of open paddocks for hunting and large trees for platform nests.
- Birds requiring tree hollows for breeding and nesting are present but poorly represented as well, highlighting the importance of tree hollows in general and lack of hollow-bearing trees in the Creeklands.

These lists demonstrate what the process of urbanisation and fragmentation can do to the biological diversity of a block of remnant vegetation. As the size of a block of habitat decreases the amount of species and individuals that can survive in it inevitably decline. Several of the species, particularly raptors that hunt in open areas, have probably disappeared because of the elimination of certain habitats rather than the lack of habitat corridors.

Mammals

Mammal records in the Creeklands are presented in Appendix 3. There are only formal records of four indigenous mammals and most of these are probably extirpated. The last sighting of an Echidna and Gould's Wattled Bat was in 1973. The lack of recent records of two species is certainly due to a lack of recorded observations rather than their absence; the last Common Brushtail Possum record was in 1996 and the last Common Ringtail Possum record was 1997. Unfortunately, few records have ever gone to the Wildlife Atlas over the years so there is little information on the occurrence of indigenous mammals in the Creeklands.

It is certain that the larger native mammals, such as Koala, Kangaroo, Wallaby and Wombat, are long extirpated. There is occasionally the odd Wallaby that comes down the Mullum Mullum Creek Valley from the Yarra but they would certainly not get as far as the Creeklands at any time.

Amphibians and Reptiles

Two reptiles have been identified in the Creeklands; the Weasel Skink and the Lowland Copperhead were last recorded in 1988 and 1989 respectively. No frog records were found. Again this is probably lack of records and not lack of occurrence.

Invertebrates

One of the few studies of surface active invertebrates in urban parkland has been carried out in the Blackburn Creeklands and Blackburn Lake Sanctuary. Megan Short of Deakin University surveyed a range of habitats at three locations in the Creeklands over 13 months in 1991-1992 using a range of techniques. Sites surveyed were Blacks Walk north and south and Laurel Grove bridge, south side. Her findings included the following:

1. A range of native species was found at all locations even the mown sites, with highest diversity at Blacks Walk north hill sites. Orders common at all locations included springtails, ants, amphipods, flies, mites, beetles, spiders and bugs. Less abundant were snails and slugs, earwigs, flatworms, harvestmen, butterfly and moth larvae, slaters, earthworms, millipedes and grasshoppers. Only very low numbers were found of centipedes, ant-lions, native cockroaches and thrips.

2. Ants were abundant with over 50 native species identified with greatest diversity again on the Hill in Blacks Walk north.

3. The invasive introduced argentine ant was widespread in Blacks Walk but not found elsewhere. It is likely that it arrived in dumped garden waste.

4. Other introduced species were 7 species of gastropods (slugs and snails), 1 species of earwig (Blacks Walk south only) and the Portuguese millipede.

5. Overall the invertebrate fauna in the Blackburn Creeklands was less diverse than at Blackburn Lake Sanctuary. Scorpions, land yabbies, Scolendrid and Scutigerid centipedes and Diplura were all absent from the Creeklands despite their presence at Blackburn Lake.

A survey in 1999 in Blacks walk further investigated the impact of the introduced Argentine ant (*Linepithema humile*) on other surface active invertebrates. Argentine ants were found to be widespread in Blacks Walk and although they appeared to have no impact on the native non-ant invertebrate fauna, they had almost eliminated the native ant species. Fortunately there was no evidence of Argentine ants elsewhere in the Creeklands (Wyndham 1999)

1.3.3 Significant Fauna in the Creeklands

Significance for fauna was assessed according to a similar method and on the same levels that were detailed for flora above.

A note of caution on these and other records of fauna should be highlighted. These records of significant species are often based on the records provided by the Victorian Wildlife Atlas, which

accumulated all records within the square kilometer with Blackburn Creeklands at its centre. This square kilometer appears to include Blackburn Lake Sanctuary as well and many records of significant species are possibly from that well-inventoried and watched habitat. Nonetheless, the Creeklands is an important habitat area and these records may apply directly to the reserve and many of the species highlighted could very easily use habitats in the Creeklands. The Creeklands are part of an important local habitat corridor; records of significant species from the local area are still relevant and included below.

There are several summary points to be made about the significant fauna records:

A) 4 species of International Significance have been recorded in the reserve and local area, being listed on the China-Australia Migratory Bird Agreement and Japan-Australia Migratory Bird Agreement.

B) No species of National Significance (Victorian Wildlife Atlas) were recorded in the reserve and local area.

C) 15 species of State Significance have been recorded in the reserve and local area in the last ten years, including the Great Egret, Swift Parrot and the Regent Honeyeater, all of which are listed under the Flora and Fauna Guarantee Act.

D) Another large group of bird species have been recorded at nearby Blackburn Lake are considered to be of regional significance; many of which may use the Creeklands.

E) None of the other animal species recorded are of anything more than local significance.

Many of the significant species are irregular or vagrant visitors to the Creeklands and/or the local area. The habitat of the area is therefore probably not critical to many of the species' survival. However, it is difficult if not impossible to conclusively determine which piece of habitat of a rare animal or bird that is used in a variable timeframe across a large region is actually its critical habitat. If "non-critical habitat" is steadily destroyed then at some point the last few bits that are left become more critical, if not the last population of a dying species. Therefore, the irregular visitors, as well as the resident species, show the important of retaining and enhancing the habitat values that remain.

The following table is an inventory and reference list with notes of all significant species in the reserve and local area. Species of local significance are not included here but are presented in the appendices.

Table 3. Significant Bird Species Recorded at Blackburn Creeklands

Common Name	Interna-tional Status	State Status	Re-gional Significance	• Notes on ecology and last record
Musk Duck		Vul R/R		• found in terrestrial wetlands, lakes and watercourses • last record in 1978
Australian Shoveler		Vul R/R		• found in terrestrial wetlands, lakes and watercourses • last record in 1978
Pink-eared Duck		Vul R/R		• found in terrestrial wetlands, lakes and watercourses • last record in 1978
Darter		R/R R/C		• found in terrestrial wetlands, lakes and watercourses • last record in 1978
Pied Cormorant		R/C		• irregular visitor • found in terrestrial wetlands, lakes and watercourses • last VWA record in 1991 • recorded by David Ground in 2000
Australian Pelican		R/C		• irregular visitor found on the coast, in terrestrial wetlands, lakes and watercourses • last record in 1978
Great Egret *Ardea alba*	C J	FFG R/C		• found in terrestrial wetlands, watercourses and moist grasslands • feed on aquatic animals by wading through open water. • roost in trees near wetlands • breed in summer, nesting in topmost forks of trees • last record in 1978
Nankeen Night Heron		Vul R/C		• found in terrestrial wetlands, watercourses and moist grasslands • breeds in colonies that can be uncommon and significant • last record in 1978
Australian Hobby *Falco longipennis*			Regional	• last record in 1988 • irregular visitor, preferring more open areas
Peregrine Falcon *F. peregrinus*			Regional	• last record in 1978 • at most, irregular visitor, preferring more open areas
Buff-banded Rail *Rallus phillippensis*			Regional	• Probably a vagrant species; not a resident but an occasional visitor • prefers wet grassland habitats
Australian Spotted Crake *Porzina fluminea*		R/R		• Probably a vagrant species; not a resident but an occasional visitor • prefers wet grassland habitats • last record in 1985
Painted Button-quail *Turnix varia*			Regional	• last record in 1986 • prefers open grassland habitats • very susceptible to predation
Latham's Snipe *Gallinago hardwickii*	C J			• Probably a vagrant species; not a resident but an occasional visitor • prefers wet grassland habitats • last record in 1982
Swift Parrot		End		• nomadic, breeding in Tasmania, overwintering (Mar-

Common Name	Interna -tional Status	State Status	Re- gional Signific ance	• Notes on ecology and last record
Lathamus discolor		Vul FFG R/R		Sept) in the box-ironbark forest of Vic and NSW. • feeds (in Vic) on winter flowering Eucalypts • habitat in the suburbs of Melbourne are rest stops along the migratory route
Australian King-Parrot *Alisterus scapularis*		R/R		• Probably a vagrant species; not a resident but an occasional visitor • last record in 1978
Tawny Frogmouth *Podargus strigoides*			Regional	• last Atlas record in 1986 • however, several pairs are commonly seen in Creeklands
White-throated Needletail *Hirundapus caudacutus*	C J			• last record in 1986
Fork-tailed Swift *Apus pacificus*	C J			• last record in 1978
Sacred Kingfisher *Todiramphus sanctus*			Regional	• last record in 1978 • nests and forages along waterways
Spiny-cheeked Honeyeater *Acanthagenys rufogularis*		R/R		• last record in 1978 • nectar feeder
Regent Honeyeater *Xanthomyza phrygia*		CEn End FFG		• very dependent on nectar, although honeydew, lerps, insects important when nectar is not available • they appear to be migratory, following nectar sources • not often found in narrow corridors or isolated sites, although it does seem to prefer riparian corridors • peak of breeding throughout range in spring and builds nests of bark high in trees on horizontal branches or mistletoe clumps • seen in recent years at Mullum Creek • last local record in 1978
Pink Robin *Petroica rosea*		R/R		• Winter migrant • streamside vegetation is key habitat
White-winged Triller *Lalage suerlii*			Regional	• last record in 1978

Note: All of the significant bird species are labeled in Appendix 2. The key to the significance ratings shown in the above table is also included in Appendix 2.

Assigning different levels of conservation significance to fauna species is a way of highlighting which species and which part of our native ecosystems are under stress and require better management responses. There are some legal requirements for all land managers to maintain and manage habitat of significant species listed under international treaties, the *Commonwealth Environmental Protection and Biodiversity Conservation Act* 1999 and the *Flora and Fauna Guarantee Act 1988*. There are not necessarily any similar legal requirements for land managers to protect regional or locally significant species except within planning laws. This leaves the Council, as land manager, with a mix of legal requirements and possibly moral requirements, i.e. community expectations of formal policy that supports preservation of the remaining local biodiversity, whatever its "significance".

1.3.4 Gaps in Fauna Records and Implications for Management

Gaps in the knowledge of existing animal species are problematic. It may be difficult to determine site or species specific management if you are not sure what is present.

However, a policy of retaining all of the best quality habitats, and implementing a general habitat enhancement program, in the Creeklands is easily justified by the significance of the flora and fauna. With this precautionary approach it could be assumed that the preservation of habitat will ensure survival of the indigenous fauna present. In other words, it may be appropriate to continue on with a relatively uninformed fauna management approach as long as it is conservative, but more information about local fauna would always be useful.

1.4 Management Blocks and Sites of Conservation Significance

During the general flora and fauna survey efforts summarised above, specific sites of conservation interest and/or significance and discrete blocks of similar conditions were identified within the Blackburn Creeklands. These two approaches of describing and assessing the study site is a key framework for identifying management issues across the Creeklands, priority areas for works and targeting management actions.

1.4.1 Management Blocks

Management blocks are part of the information gathering and management framework for the Creeklands. Management blocks can be part of the basis of value assessment, infrastructure design and evaluation, maintenance regime design and implementation and record keeping.

Several criteria are used for defining management blocks that result in areas that require distinct types of management. They include:

- utilising clear physical boundaries such as tracks, creeks, streets, property lines and
- areas where conditions, values and vegetation quality are similar.

Dividing the reserve into management blocks facilitates a clearer focus on areas of common conditions and clear boundaries for different types of management actions. This system of management blocks has also been devised to make planning and communicating about the Creeklands easier. Different management blocks can become part of the language or jargon used to talk about the Creeklands. For example, the Advisory Committee may concentrate their efforts in specific areas and names are proposed here or contractors will need to be given specific directions and the block names will hopefully facilitate tender preparation and smoother information exchange. The names proposed in this report are strictly preliminary and alternative proposals are welcome.

The management blocks are identified on Maps 2a, 2b, 2c and 2d.

Table 4. Management Blocks: Extent, Description and Issues

Management Block	**Location and Extent**	**Description / Values / Quality**	**Management Issues**
Black's Walk Section **Map 2A**			
Middle-borough Rd. Frontage	Area along the road with the creek and crest of hill on eastern edge.	An overstorey of indigenous and introduced natives with weeds in the relatively open understorey.	Key entrance and public front to Creeklands on Middleborough Road.
Black's Walk Northwest Block	Northwest corner of the Black's Walk Reserve; the entire area northwest of the creek and "Blackburn North Drain".	Large area of open grass with remnant trees, area of open grassy woodland above creek and substantial thickets of Hawthorn and Blackberry along creek and drain.	Open native grassy woodland to be protected and enhanced. Substantial weed infestations along the creek and drain.

Management Block	Location and Extent	Description / Values / Quality	Management Issues
Black's Walk Creek Junction	Area in between the two creeks or drains coming together.	An overstorey of indigenous and introduced natives with weeds in the relatively open understorey.	Substantial weed infestations along the creek and drain.
Guide Hall Block	Around the Guide Hall and bordered by Blackburn North Drain and gravel path to south.	Open parkland area with remnant indigenous trees and introduced natives, including a carpark and some revegetated areas.	Lack of habitat.
Black's Walk Playground Block	Around the play ground and bordered by Gardiner's Creek, gravel path to north and private land.	Open parkland area with remnant indigenous trees and introduced natives, including some revegetated areas.	Lack of habitat. Dangerous trees.
Pakenham Street West - North Creekbank	Bordered by creek, private property to the north and Pakenham St.	Open parkland area with remnant indigenous trees and introduced natives.	Substantial weed infestations along the creek.
Scout Hall	Around the Scout Hall and bordered by a gravel path to the north.	Open parkland area with remnant indigenous trees and introduced natives, including a carpark and some revegetated areas.	Dieback around some of the trees around the carpark. Lack of habitat. Dangerous trees.
Pakenham Street West - South Creekbank	This area includes the area inbetween the gravel path and creek, which is channeled in this area.	Open parkland and riparian strip.	Substantial weed infestations along the creek, including Hawthorn, Blackberry, Willows and Desert Ash Erosion and bank protection.
Black's Walk South Block	Southern portion of Black's Walk with primary school to south.	Large area of open grass with remnant trees, area of open grassy woodland.	Dieback around some of the trees around the carpark.
Middle-borough Road East - South Creekbank	This area includes the area inbetween the gravel path and creek.	Open parkland and riparian strip.	Substantial weed infestations along the creek. Dangerous trees.
Kalang Park Section **Maps 2B and 2C**			
Pakenham Street East - North Creekbank	Narrow strip inbetween houses and creek.	Open parkland and riparian strip with substantial revegetated areas and species-rich escarpment on east end.	Wet spots may be opportunities for future wetlands.
Waratah Crescent West	Slope and Floodplain	Floodplain with a few large Manna Gums. Dry slope with many indigenous species on west end.	Dangerous trees.
Waratah	From Laurel Grove	This section is an open	Track erosion.

Management Block	Location and Extent	Description / Values / Quality	Management Issues
Crescent Wetland	to the access track that extends from Waratah Cr. - including the Waratah Rd. reserve still existing.	floodplain with a wetland to filter stormwater and some revegetated areas.	Determining future of Wattle Crescent Road Reserve.
Malcolm St. - Sheehans Rd. Creekbank	From edge of Kalang Oval block to Laurel Grove; from gravel to creek.	Open parkland with strip of riparian vegetation.	Substantial weed infestations along the creek. Dangerous trees.
Malcolm St. - Sheehans Rd. Block	From edge of Kalang Oval to Laurel Grove road reserve.	Open parkland with remnant and introduced trees and some grassy woodland areas.	Remnant trees suffering from dieback. Native grasses to protect. Possibly drainage from adjacent roads to manage and/or take advantage.
Kalang Oval	Large block including oval and extending to bowling club and creek zone.	Open parkland and oval with remnant and introduced trees around fringe.	Remnant trees suffering from dieback. Possibly aesthetic concerns with rough and open edge, view and/or access to park.
Pakenham Street East - South Creekbank	Narrow strip inbetween bowling club and creek.	Open parkland with several large Manna Gums and riparian fringing vegetation.	Substantial weed infestations along the creek. Dangerous trees.
Main Rd. West - North Creekbank Strip	From Main Rd. west to second major bend in creek where conditions change dramatically.	A narrow strip with a path along the channeled creek with an interesting variety of boundaries with private land: ♦ managed lawn with Poplar (**Populus alba*) and Agapanthus (**Agapanthus praecox ssp. orientalis*); ♦ old wire fences with overgrown back gardens with woody weeds and vines and Tree Violets (*Hymenanthera dentata* s.l.) ♦ paling fences with neat boundaries and little habitat.	Boundaries and the extension of vegetation and habitat on private land. Narrow access with little opportunity to enhance habitat corridor values without cooperation with adjacent landowners.
Main Rd. West - South Creekbank Strip	From Main Rd. west to where the narrow strip opens to wider area.	This is a very open area with an overstorey of Pines (**Pinus radiata*) in many areas. The groundstorey is very clear.	There are significant weeds along the edges, creeping over the fences, including Madeira Vine (**Anredera cordifolia*) on the west end. Much variety in edges of private land.

Management Block	Location and Extent	Description / Values / Quality	Management Issues
Laurel Grove East - North Creekbank	From Laurel Grove east to the first major bend in the creek where the reserve narrows even more.	A very neat area with a sterile but tidy border, i.e. a paling fence, and open mown grass and mulched beds with indigenous revegetation.	The tidiness of this area illustrates the question: do we want a neat landscape where habitat is largely eliminated.
Laurel Grove East - South Bank	A large rectangle from Laurel Grove east to where the reserve narrows.	An area full of rough unmown areas separated by access tracks. Indigenous trees and shrubs dominate much of the rough areas but there is much exotic grass in the understorey.	There are significant habitat areas to retain and improve, including the control of weeds and greater use of indigenous groundstorey.
Furness Park Section **Map 2D**			
Furness Park - North Bank	Area to the north of Gardiner's Creek in Furness Park.	This is a very simplified landscape with open lawns, mulched beds with indigenous species and a creek fringe of remnant trees and exotic understorey. There are also substantial areas of erosion along the creek exacerbated by runoff from the streets.	Willows are one of the major weeds along the creek. There is a great variety of edges between private property and parkland in this section. The variety demonstrates different potential treatments that benefit, or do not benefit, the public parkland.
Furness Park Landlocked Areas	Area within the panhandle of Furness Park inbetween Gardiner's Creek and private property to the north.	Most of this area is effectively managed and accessed exclusively by adjacent landowners. The area is dominated by a whole array of various weeds, ornamental plants and some lawn.	Weeds are a major issue in this area but there are a lack of clarity about management and access that is a cause of past planning decisions.
Furness Park Southeast	Within the narrow panhandle of Furness Park with Gardiner's Creek as a north boundary.	This is a narrow strip of mowed lawn along the creek with a fringe of woody weeds and indigenous plants on the street. The open creek fringe has very little remnant vegetation and is dominated by Wandering Jew and Cape Ivy.	There are several patches of remnant trees with their health at risk with Japanese Honeysuckle and Cape Ivy growing into the canopy branches. Woody weeds include Desert Ash on the creek and Hawthorn (**Crataegus monogyna*) on the street fringe
Furness Park Playground Area	Around playground at southwest corner of Furness Park, extending to gravel path and east to gap in vegetation where the reserve narrows.	Playground surrounded by mowed parkland and clumps of indigenous trees and shrubs with exotic grassy understorey	Potentially dangerous trees Exotic groundstorey preventing regeneration of indigenous species in clumps left unmown Major weeds include Cotoneaster (**Cotoneaster pannosus*), Cherry Plum (**Prunus cerasifera*), Kikuyu (**Pennisetum clandestinum*)

Management Block	Location and Extent	Description / Values / Quality	Management Issues
			and Sweet Vernal Grass (**Anthoxanthum odoratum*).
Furness Park - South Bank	Area inbetween the gravel path and Gardiner's Creek.	This area includes open mown parkland with remnant trees and a creek fringe with remnant and exotic trees, mostly exotic grass underneath.	Potential weeds include Wandering Jew (**Tradescantia albiflora*) which is only present in small patches at present. Other significant weeds include Japanese Honeysuckle (**Lonicera japonica*), Cape Ivy (**Delairea odorata*) and Willows (**Salix* spp.)

1.4.2 Local Sites of Conservation Significance

These sites are the areas in the Creeklands reserve where regionally significant indigenous species occurand/or are dominated by good quality indigenous vegetation. These sites would generally not be considered as regionally significant or greater but they stand out as the most intact and diverse areas of flora and habitat within the local context of the Creeklands.

Table 5. Local Sites of Conservation Significance

Site Name	Management Block	Values
Black's Walk Hillside	Black's Walk Northwest Block	Open grassy woodland on dry slope; one of the only examples within the entire Creeklands.
Waratah Crescent Escarpment	Pakenham St. East - North Side and Waratah Crescent West	Sheltered escarpment with remnant vegetation, including ferns, which has been enhanced over several years through planting by the Advisory Committee.
Waratah Crescent Wetland	Waratah Crescent Wetland	An artificial wetland which supports many waterbirds.
Laurel Grove East Woodland	Laurel Grove East - South Bank	Open woodland with clumps of regenerated shrubs and understorey. This is probably the largest contiguous block of such habitats in the Creeklands. It is obvious that several of the neighbours have been managing their land sympathetically.

Part 2) Threats/Risks to Environmental Values and Management Issues

The specific threats to the ecological values and management issues in the Creeklands will be considered as other research and survey is undertaken. It is useful to consider these general issues across the Creeklands because this focus can lead to policy and action for the reserve itself or on a wider level.

It is also inevitable that one of the most significant threats to environmental values will be pest plants considering the disturbed and developed nature of the local environment. The existing weed spectrum is reviewed below but the main focus of the assessment will concentrate on the main problem weeds and their priorities and methods for removal.

Each identified threat and/or management issue and opportunity is detailed and background information gathered has been reviewed.

2.1 Environmental Threats

2.1.1 Weed Invasion

113 species of the 214 plants recorded in the Creeklands, or 53%, are considered introduced, mostly exotic to Australia but including many introduced Australian natives and many species that are direct escapes from gardens, both historically and ongoing. This high proportion of introduced species is to be expected considering the disturbed nature of the reserve and its urban location.

Many of these introduced plants are invasive in native vegetation and are either declared noxious weeds (ie: Regionally Controlled under the *Catchment and Land Protection Act* 1996) or "environmental weeds" (Carr *et al* 1992). The main threats posed by environmental weeds (Lorimer *et al* 1997a) include:

- competition with indigenous plants;
- prevention of the germination and establishment of indigenous plants;
- altering habitat making it less fit for indigenous animals and more fit for introduced animals, including pests which further threaten indigenous plants and
- changing the cycling of nutrients and organic matter.

The introduced species in the Creeklands are listed in Appendix 4. They are classified according to several criteria:

- weed status - declared noxious (NRE 1996) or considered an environmental weed (Carr *et al* 1992);
- life form (adapted from Carr *et al* 1992);
- dispersal mechanisms (adapted from Carr *et al* 1992);
- status within the reserve and priority for control (based on fieldwork and the author's experience);
- risk to indigenous vegetation (based on Carr *et al* 1992 and the author's experience);
- appropriate control methods (based on Carr *et al* 1992 and the author's experience) and
- their availability in nurseries as an indication of the potential of their spread from local gardens.

The list of introduced plants can be quite large and intimidating. However, the classifications in Appendix 4 allow insight into the impact of the various species and what priority they should be given. The impacts of the different weeds vary a great deal. Many of the introduced species are only in disturbed areas.

Many if not most of the introduced plants listed in Appendix 4 are minimal problems within the reserve. However, several plants can be considered high priority for one or several of the following reasons:

- they are invasive in the good quality indigenous vegetation of the Creeklands;
- they spread long distances from existing mature plants;

- they produce long-lived seed which will become a larger problem as seeds accumulate in the soil;
- they completely dominate the groundstorey and spread quickly or
- they impact directly on the rarest flora species in the reserve.

With the above criteria considered high priority weeds are proposed:

Box Elder	** Acer negundo*
Angled Onion	**Allium triquetrum*
Madeira Vine	** Anredera cordifolia*
Bridal Creeper	**Asparagus asparagoides*
Poison Hemlock	**Conium maculatum*
Velvet Cotoneaster	**Cotoneaster pannosus*
Hawthorn	**Crataegus monogyna*
Cape Ivy	**Delairea odorata*
Desert Ash	**Fraxinus angustifolia*
Flax-leaf Broom	**Genista linifolia*
English Ivy	**Hedera helix*
Jerusalem Artichoke	**Helianthus spp.*
St. John's Wort	**Hypericum perforatum*
Japanese Honeysuckle	**Lonicera japonica*
Soursob	**Oxalis pes-caprae*
Cherry Plum	**Prunus cerasifera*
Creeping Buttercup	**Ranunculus repens*
Blackberry	**Rubus fruticosus spp. agg.*
Willows	**Salix spp.*
Tree Tobacco	**Solanum mauritianum*
Jerusalem Cherry	**Solanum pseudocapsicum*
Wandering Creeper	**Tradescantia albiflora*
Blue Periwinkle	**Vinca major*
Bulbil Watsonia	**Watsonia meriana*

These weeds are high priorities for control in most places where they occur in the reserve because they dominate the groundstorey where they occur and can spread long distances.

The Vegetation Condition and Quality Assessment map highlights several issues about the impact of introduced plants. Introduced plants that often spread into remnant bushland dominate the large areas of the reserve that are predominantly exotic; the weed control priority here is the plants that spread long distances. The areas that have significant cover indigenous vegetation have the odd patch of weeds; these are the "spot fires" ahead of invading weed fronts and these are the highest priorities for control. There are of course small quantities of weeds, both groundstorey and above in the indigenous bushland that simply don't register on the Vegetation Quality Assessment map.

Several of the weeds in the reserve are Regionally Controlled weeds declared under the *Catchment and Land Protection Act* (NRE 1996):

Angled Onion	**Allium triquetrum*
Spear Thistle	**Cirsium vulgare*

Hawthorn	**Crataegus monogyna*
Flax-leaf Broom	**Genista linifolia*
St. John's Wort	**Hypericum perforatum*
Soursob	**Oxalis pes-caprae*
Blackberry	**Rubus fruticosus spp. agg.*
Gorse	**Ulex europaeus*

The Council has a legal responsibility under the *Catchment and Land Protection Act* 1994 to control these weeds. Most are already under control and uncommon in the reserve although a few are still common. Angled Onion and Soursob are still common and difficult to eradicate, particularly because of their seasonal nature (they are only up and growing in the winter).

It must also be highlighted that the Council and the Advisory Committee have long had a strong weed control program that has been very successful. The assessment described here is the situation as it is now and management actions for the future will be detailed below.

2.1.2 Predation by Feral and Domestic Predators and Harassment by Domestic Dogs

The impact of introduced carnivores on indigenous animals is likely to be quite substantial but it can be difficult to specifically document both in general and locally. The importance of the issue in general is highlighted by the listing of predation of native animals by foxes (Mansergh and Marks 1993) and cats (FFG-SAC 1991b) as potentially threatening processes under the *Flora and Fauna Guarantee Act* 1988.

Feral cats are probably a significant part of the predation of native animals in general. Their diet in Victoria has been found to include at least 18 species of native birds, 24 mammal species, 3 reptile species (Seebeck *et al* 1991), frogs and numerous invertebrate animals (Anon 1991). Feral cats also carry and transmits infectious diseases, such as toxoplasmosis and sarcosporidiosis, which debilitate and kill native animals, as well as livestock and humans.

Feral dogs are not likely to be significant locally because of their strict regulation.

Foxes are a significant problem in urban areas as well. Their densities are quite high and it has been found that their diet often consists of native birds and small native mammals. The author saw foxes on several occasions in the bushland areas of the Creeklands during this study.

Domestic cats may have a greater impact than feral cats because of their possibly greater abundance. They can travel long distances each night and studies indicate that even well fed cats can eat up to 25 wild creatures per year on average (Lorimer *et al* 1997).

Domestic dogs both on and off leashes may cause problems by harassing wildlife, particularly waterbirds, or just disturbing wildlife with their scents (Brunner *et al* 1991).

A study by Martin Short (1988) using predator scat analysis showed that foxes in the Blackburn area feed on Ringtail and Brushtail Possum, cherry plums, insects and rats. The study by Brunner *et al* (1991) which involved predator scat analysis in Dandenong Valley Park supports this finding. The fox, domestic dog and cat (both feral and domestic they believe) scats contained significant quantities of Ringtail and Brushtail Possum fur, as well as smaller quantities of native birds and Sugar Glider remains.

2.1.3 Competition for Tree Hollows and other Habitat Components

Tree hollows are important for many species of arboreal mammals, such as possums, gliders and bats, and native bird species for shelter in general and nesting in particular (FFG-SAC 1991a). Competition for tree hollows and habitat in general is caused by a range of introduced animals:

- feral honey bees;
- Common Mynas and
- Common Starlings.

This competition occurs just as viciously over artificial hollows, ie. nestboxes.

Some introduced birds, such as Spotted Doves and Blackbirds can exclude native fauna from native nesting sites and be aggressive towards native birds.

Some native birds, predominantly Bell and Noisy Miners, are aggressive colonial breeders that exclude native birds from riparian and open forests or parkland and may contribute to tree dieback by excluding other native birds that eat many of the insects that graze native trees.

2.1.4 Fire and Fire Management

Fire is not usually a threat to the survival of indigenous flora and fauna because most indigenous species are well adapted to fire and may actually need periodic fire to regenerate or thrive. Problems for indigenous flora and fauna may result when fire is too frequent. Plant species are extirpated because they do not get old enough to produce seed before being burnt, or too infrequent or species senesce and die producing seed that has no suitable condition to germinate because they require ash beds or disturbance.

Other problems arise in small reserves such as the Creeklands. When fires do occur, native animals may have little or no room to move to un-burnt habitats after a fire. Many animals do die in fires and as vegetation recovers it is recolonised by species from adjacent areas; this may not occur if there are not enough adjacent habitats.

Fire is not necessarily a threat to the indigenous flora and fauna of the Creeklands if it is used or occurs in patterns and frequencies that encourage greater biodiversity rather than decreasing it. Understanding how to use fire in native vegetation management can be difficult.

However, it is all complicated by the fact that the Council has obligations to ensure that the Creeklands is not a fire hazard to surrounding properties. And fire hazard can be a vastly different concept to different people. Managing fire and fire hazard can have significant impacts on native vegetation through vegetation clearance, slashing and controlled burns that may be too frequent for ecological reasons.

An analysis of the requirements for bushfire management within the City of Whitehorse was undertaken in 1997 (City of Whitehorse). A strategy was then proposed to accommodate both fire hazard management and conservation of biological diversity that involves some sensitive slashing and controlled burns over time. If this strategy is carried out sensitively then fire hazard will not be an environmental risk. The fire management strategy involves the development of a fire management plan that should be complementary to this report and both should be taken into account in the overall management plan.

2.1.5 Tree Decline and Dieback

Dieback describes the condition whereby significant canopy defoliation undermines tree health. If unchecked, trees may eventually die. Causes of dieback are numerous and it is common throughout Australia to find a combination of factors impact to affect tree health. High insect predation, the loss of insectivorous bird species, animal grazing, water stress, wind damage, increased nutrient levels and infections from micro-organisms, such as Cinnamon Fungus have been identified as the major causes of dieback.

Dieback is a particularly significant problem for remnant trees in open areas, where the original ecosystem has been cleared around.

There is a small amount of dieback occurring at the Creeklands. A few trees in both the open and forested portions of the reserve appear to be declining. The trees in decline in relatively intact native vegetation are particularly hard to categorise when it comes to the cause of the dieback; mush of the original ecological processes that may have kept them healthy are still happening.

The abundance of Ringtail Possums, and the grazing pressure on trees, may be part of the problem in some areas. This cause is certainly part of the problem with the dieback of Red Stringybark (*Eucalyptus macrorhyncha*) in Blackburn Lake Sanctuary, where collars to prevent possum grazing are helping trees recover.

2.1.6 Habitat Fragmentation

Habitat fragmentation is a risk that has essentially already occurred. The Creeklands is an isolated area of habitat with few corridors to other areas.

The impacts of fragmentation were reviewed by Saunders *et al* (1991). In essence, less species can survive in smaller 'island' habitats because population levels of many organisms cannot be maintained at high enough levels to be viable. This applies to plants as well as animals. For example, many animal pollinators may not be present in smaller reserves and over time plant species will decline from lack of seed production.

Another factor is the general type of habitat, core versus edge. Different organisms require different structures of habitat. Edge species tend to be more aggressive and adaptable than species that prefer core areas of bushland far from open areas. The smaller a reserve the less core habitat and greater edge habitat there is.

It is often asserted that wildlife habitat corridors will make smaller reserves more viable for more species. However, this can only be true to a limited degree. Habitat corridors are by definition narrow and therefore are likely to be mostly edge habitat. Only a limited range of species is likely to move along such corridors. In addition, many fauna species are so territorial they cannot move through corridors because they would encounter the territory of too many other individuals.

A local ecological study demonstrates the importance of corridors. Baker (1989) found that the Mullum Mullum corridor did support many more birds than the nearby but isolated Blackburn Lake Sanctuary. The study by Baker comparing similar areas of habitat in the Sanctuary and the Mullum Mullum Creek demonstrates how the presence of habitat corridors between larger bushland remnants enhances the biological diversity of a site. Baker found that "of the 100 or so native species birds that visit or reside within the Mullum Mullum There are many gaps in the vegetation corridor along the creek that should be revegetated to develop a greater and more cohesive wildlife corridor. Bushland site, 28 of these were absent or in significantly lower numbers at Blackburn Lake, despite habitat requirements being common to both areas." It was shown that 23 (82%) of the species from this total were migratory or nomadic, clearly indicating the special importance of such corridors for birds that regularly move in and out of areas in accordance to food and general habitat availability."

The areas of habitat in adjacent suburbia, both in people's gardens and in the form of street trees, may be contributing to the survival of native animals in the Creeklands and beyond. This habitat my not be pristine or diverse indigenous vegetation but it does make an important contribution to the local habitat asset. This habitat may be threatened by increasing urban densities.

In summary, the habitat values and the species present in the Creeklands are somewhat dependent on the surrounding habitat in gardens and streets and along the existing vegetation corridors linking the reserve to other areas. This means that conserving the flora and fauna of the Creeklands is partially dependent on maintaining and/or enhancing the adjacent habitats.

A city-wide habitat strategy and program, originally described by Appleby *et al* (1991) for the City of Heidelberg, is being implemented by Banyule City Council through a part-time Habitat Corridor Program Officer. This type of program is the logical extension of considering the importance of habitat corridors to the Creeklands and other areas in the municipality.

2.1.7 Additional Introduced Pests and Impacts

A process that introduced species, such as foxes, blackbirds, starlings etc., contribute to is the spread of weeds. Plants such as English Ivy, Cotoneaster, Hawthorn etc. produce berries that are moved long distances.

Introduced slugs and snails are abundant throughout the Creeklands and may cause decline in populations of plant species such as lilies and orchids. Although significant impacts have not been specifically demonstrated anywhere there are many areas of orchid habitat in northeast Melbourne with declining orchid numbers and large populations of introduced snails and slugs.

2.1.8 Numerous Boundaries with Private Land

Many private land boundaries along the Creeklands are fluid or blurred. It is clear that many adjacent landowners have expanded their use of land to include various size bits of public parkland. Many landowners have taken over public parkland and planted it with the species they have selected and designed the landscapes to make it appear as if the land is for their private use only.

This appropriation of public parkland is not necessarily a negative impact on the environmental values of the Creeklands. However, it is certainly unfair to the wider community for a few landowners to appropriate public land; in other words the use of public parkland without formal Council permission is in principle wrong. There is a bigger environmental with this appropriation of public parkland.

Ironically, it seems that many of the gardens that extend into the Creeklands contain a whole array of environmental and noxious weeds. The planting and maintenance of such species goes against the principles of public land management established for the Creeklands and contributes to the already enormous impact of the environmental weed problem.

2.1.9 Erosion and Erosion Control

Melbourne Water commissioned a comprehensive of the erosion along the creek in 1999 by Ove Arup and partners. Their report documented erosion problems in great detail within the zone of Melbourne Water management responsibility, i.e. bed and banks.

It is certainly apparent in any onsite inspection and within the report by Ove Arup (1999) that erosion of the creekbanks is a threat to significant sections of the Creeklands with vegetation and tracks at risk.

Unfortunately, the required solutions are also somewhat of a threat to the vegetation. Gaining access to stabilize banks with rocks and lay the banks back at lower angles to prevent future problems inevitably results in disturbance, sometimes substantial. However, Melbourne Water has proven in recent years on many Melbourne streams that they can and do minimise to existing vegetation when fixing erosion problems. They also revegetate comprehensively with indigenous vegetation afterwards, often leaving a dramatically improved landscape.

Ove Arup (1999) identified many sites along the creek requiring works and proposed a comprehensive program of works that will take many years to implement. These areas are highlighted in each section of the table proposing specific actions in each management block, which is presented in Part 3.

2.2 Environmental Opportunities

2.2.1 Past Regeneration and Restoration Works

Substantial habitat and vegetation restoration works has already occurred over the last few decades in the Creeklands.

All of the past works provide much inspiration and practical lessons for future works, as well as lessons about what doesn't work well. Some of the successful components of past works will be highlighted below as important characteristics for future works.

2.2.2 Active Community Conservation Group

The Creeklands have an important asset in the Advisory Committee. This is an interested and dedicated group of local people who contribute time, energy and expertise in managing the Creeklands. The contribution comes in several forms:

- significant physical work is done in the form of weed control and other works;
- flora and fauna monitoring work is undertaken by the Advisory Committee, much of the information used in this report was accumulated by interested local residents
- they are the roving eyes for the Council in reporting problems and dealing with other members of the general public and
- they provide input and advice on management issues.

Many bushland reserves do not have such as resource and it is important that the Council continues to work constructively with the Committee to ensure that they are complementary in their efforts.

One of the most productive areas of cooperation could be in developing a formal monitoring program, within the Creeklands and possibly across the municipality, that is partially implemented by the Advisory Committee. The monitoring framework could be defined more clearly. Much of the actual work of counting plants, doing bird counts or spotlighting needs to be carried out. More details on the specific monitoring framework will be discussed below.

2.2.3 Boundaries with Private Land

The environmental risk of numerous boundaries and extended gardens was discussed above. At the moment many of these extended gardens are a threat to the environmental values of the Creeklands.

However, they don't necessarily have to be a threat or a negative influence on public values. It could be suggested that the public open space behind a person's home is a little bit more theirs than the general public's because of the simple fact of proximity and opportunity for increased use. It is also easy to see the effects of the lack of care from local residents in many places across urban Melbourne, from illegal stormwater flows to garden waste and rubbish dumping.

There could be significant benefits for the Creeklands if Council could develop a clear but constructive relationship with adjacent landowners. It would be possible to allow adjacent landowners to do minimal and sensitive landscaping in the Creeklands adjacent to their homes but a few simple rules should probably apply:

- any plants installed should be local indigenous species or non-invasive exotics;
- any landscape furniture should be durable and safe and
- any design should reflect clear boundaries and different regimes between public and private land.

In other words, some land management and landscaping by adjacent owners should be tolerated as long as they respect the objectives and legal requirements of Council as land manager and that any public parkland is always clearly open to all. For example, one resident next to Laurel Grove on the south side of the Creeklands has planted a lemon tree and installed a picnic table but it is clearly not in their garden. If there is a clear boundary between public and private space and the extent of public land is clear this type of situation may be acceptable. In contrast, another resident in the northeast corner of the Furness Park section has constructed a garden extension with several environmental and noxious weeds into public land that doesn't provide any differentiation between public and private land; this situation is probably not acceptable within public parkland.

The ideal relationship between public and private land in the Creeklands would be clear lines between public and private lands but with local residents using and informally and minimally looking after adjacent public land. They might kill weeds, plant indigenous plants, possibly even a fruit tree, in the extension of their garden but always understand that the public land management objectives rule outside their private land.

2.2.4 Cooperating With Melbourne Water

The erosion works that will be undertaken by Melbourne Water over the next 10 years, as identified by Ove Arup (1999) and with some already implemented, are a great opportunity for Council. Melbourne Water will concentrate its work, i.e. erosion control and comprehensive revegetation efforts, in the bed and banks, in the centre of areas that create the most opportunity for Council to complement their efforts. The riparian corridor is the safest and most appropriate area to recreate a corridor of vegetation in the Creeklands. Together, Melbourne Water and Council can achieve this effectively and more quickly with Council complementing the bed and banks works with revegetation in strategic alongside and/or upslope.

This cooperation will take time. Council and Melbourne Water will both need to implement significant works on a staged basis. However, their should be ongoing opportunities to negotiate and work together as budgets and general project objectives are known early in each financial year.

Part 3) Recommended Strategies and Prioritised Actions for Future Management

The recommendations presented later in this section have regard to:

- Council, Advisory Committee and broader community attitudes;
- the Melbourne Water strategy;
- current maintenance practices and maintenance resource considerations;
- existing planting styles;
- practical projects undertaken by the Advisory Committee;
- recreational use of the park and existing facilities / assets, including circulation / access issues and leisure pursuits (mainly walking, jogging, cycling, play, environmental & nature past times and minor sporting activity) in so far as they impact on flora, fauna and habitat;
- opportunities for interpretation;
- historical considerations;
- significance of the surrounding area in contributing to conditions for flora and fauna in the Creeklands;
- management of interface areas with the creek, road frontages, paths and adjoining properties and
- actions / tasks that would be suitable and appropriate for the Advisory Committee to undertake.

A range of different approaches to identifying and presenting management recommendations were determined. They include the following:

- a prioritised list of general management priorities based on the defined environmental threats and management issues;
- priority sites and actions for vegetation and fauna management based on the identified sites of conservation interest and/or significance;
- a general list of specific projects for flora and fauna management across the entire Creeklands and
- general management priorities and actions for each identified management block.

These approaches are designed to and hopefully provide inspiration, direction and details for developing ongoing annual management programs into the future through the lifetime of the Master Plan.

3.1 General Management Priorities

The following prioritised list of management strategies is based on the risk and/or opportunity posed by each of the management issues discussed above. Each strategy is related directly to one or more of the management issues discussed above. The order reflects the extent, severity, probability and/or desirability of each process or opportunity affecting environmental values in the Creeklands.

1. Manage **weed infestations** and **develop a general regeneration/revegetation strategy** to increase the growth and regeneration potential of indigenous flora.
2. Develop a coordinated and integrated approach to **managing fire risk and the ecological use of fire** through the development of a fire management plan for the Creeklands with specific objectives and methods outlined for each management block.
3. Manage feral and domestic predators to reduce **predation** on indigenous fauna.
4. Continue working closely with the Blackburn Creeklands Advisory Committee to **ensure their important contribution continues** and is complementary to Council management and objectives.
5. Develop a program to manage remaining tree hollows and install and monitor nest boxes in the Creeklands to **enhance wildlife habitat**.
6. Develop a **pest control program** concentrating on infestations in tree hollows and nest boxes.

7. Minimise the impacts of **dogs off leads** on indigenous fauna by enforcing bylaws more rigorously in bushland areas and possibly fencing off strategic riparian and wetland areas.
8. **Retain and enhance, through revegetation, habitat corridors** linking Blackburn Creeklands with other reserves by developing a **citywide habitat corridor strategy**.
9. Encourage local residents to **retain and recreate habitat in their gardens** and to their gardens if they abut the reserve to enhance and extend the habitat of the Creeklands.
10. **Develop a strategy to address tree decline** that possibly includes the elimination of mowing underneath tree canopies or developing shallow intermittent wetlands in the floodplain.

3.2 General Management Issues and Biodiversity Enhancement Opportunities

3.2.1 Alternative Models for Revegetation

These alternatives to the current management regimes in the Creeklands are proposed to highlight the greater range of landscape management and habitat enhancement options. Some of the techniques are already occurring on a limited basis and should be expanded.

Remnant Vegetation Communities

These areas are scattered through the park but are concentrated in one key area, the riparian strips. These remnants were often allowed to remain through benign neglect; they are areas that were difficult to manage with machinery so they were left unmown and essentially unmanaged. The indigenous vegetation remained and the weeds were allowed to invade and spread through a narrow approach to parkland management.

These areas are the most economic areas to retain and improve ecological values because they have a framework or skeleton of native vegetation remaining that can be retained, managed and enhanced. The gaps created by weed control over time should be filled with indigenous plants, either through planting with nursery stock or nurturing regeneration. Many species can only be included in these efforts through revegetation works because many appropriate species are currently missing from the park. Some indigenous species may even regenerate too thickly within the context of some management objectives and may have to be managed and controlled as well.

Managing remnant vegetation areas require a unique ecological approach that usually does not involve machinery. Selective weed control is essential; this may involve hand weeding, spot spraying, drilling and filling or cutting and painting or an integrated system. Ongoing weed control works are essential but they must be staged to avoid removing to much habitat at once and to allow gradual replacement by the desired indigenous species.

Planting Beds

The planting beds throughout the park are dominated by trees and shrubs and have been well maintained; there are very few weeds. Ironically, despite the best of intentions these admirable efforts to revegetate the Creeklands may not meet a wide range of ecological management objectives.

Trees and shrubs only provide a narrow range of habitat components. It is even possible that the neat horticultural style of planting eliminates some habitats. Some areas may have begun as unmown areas of woody weeds and rank grass; this type of vegetation provided habitat for a range of native birds, despite the weedy nature of it, that will not find a similar range in the neat revegetation beds.

The current style of planting beds is certainly appropriate in many places because ease of maintenance is essential and several years of weed control under trees and shrubs provide the perfect framework for introducing groundstorey plants. In general, it is proposed that the aim for many planting beds should be the inclusion of the entire range of indigenous plants, from native grasses and herbs to trees and shrubs. Various models for meeting this objective will be detailed below.

There also appears to be indigenous species planted in “ecological situations” where they may not have occurred naturally. The vegetation community lists presented in the Appendices linked with the maps of pre-European vegetation communities will help clarify the appropriate species for different areas in the park.

Lawn Areas and Grass Cutting Regimes

Open lawn areas in the park are clearly important areas for humans and animals. Several open areas were seen as important for human recreation, from exercising dogs to playing with primary school

classes. Several bird species also use such areas, from seedeaters such as Galahs to insect-eaters such as Willie Wagtails and birds of prey that hunt over such areas. However, the current mowing regimes are uniform across all areas and may exclude opportunities for different kinds of management that provide different landscape views and habitats.

It may be possible to refine the management approach in lawn areas to meet a variety of objectives.

There may be small areas of native grass that could be left unmown for part of the year, i.e. in late Spring and early Summer when they set seed. These areas would be relatively open areas with the unique colours and textures of native grass that would enhance the visual landscape opportunities.

Even strategic areas of exotic grass on the edges of the Creeklands and creek may be appropriate to leave unmown, creating long grass that provides a different range of habitats and stabilizing the riparian strip and riverbanks with vegetation at minimal costs. This type of management is done extensively in Yarra Valley Park on the Yarra River. The key elements of this type of management strategy include limiting it to areas distant from main paths and controlling the undesirable high priority weeds that may occur.

Clearly any management regimes that leave long grass in limited areas must integrate fire protection efforts and access. Any riparian areas left unmown probably require periodic pathways to access the creekbank where people will want to look over the water.

A range of grass management efforts might also be integrated with a range of potential alternatives to the current revegetation techniques used.

Alternative Revegetation and Regeneration Techniques

It is a clear priority from community consultation to retain and enhance the indigenous character and vegetation of the park. This will inevitably include extensive revegetation areas.

The limited management approach used to date in the park has already been discussed above. The purpose of this section is to propose a range of options that may fall inbetween the present extremes of management that occur in the park, from the neat horticultural approach to revegetation to open lawns to areas left unmown and unweeded.

The question of where the money and resources to do this revegetation work will come from could and should be asked. It could be suggested that it is not necessarily about accessing more money for revegetation as opposed to looking at different ways to use the money that is already spent on open space management in the Creeklands. This is one key reason to look at a range of revegetation and regeneration options that require different levels of resources. It must also be remembered that a different range of skills and management approach may be required.

Several principles should be kept in mind within a land management framework designed to enhance the indigenous character of the Creeklands landscape:

- high priority weeds should be controlled throughout the park;
- most weeds should be controlled in areas where indigenous vegetation is concentrated;
- efforts should be made to ensure gaps in the ecological landscape created through weed control are filled by indigenous species where possible;
- habitat components, such as tree hollows, can only be created for the long term through long term vision and action and
- indigenous vegetation should be reintroduced on an ongoing staged basis so that the balance of seed production in the landscape, and hopefully indigenous regeneration in the long run, shifts from the present predominantly exotic seed production load to a predominantly indigenous seed production load.

Several specific examples of different approaches for different areas of the park are highlighted:

Stabilizing the Riparian Strip

The narrow fringe of riparian vegetation has already been highlighted in several sections; it is a priority for enhancing habitat and preventing erosion. Several issues and steps in doing this should be considered and could be envisioned, including:

- the defining of larger areas to be left unmown up to 20-30 m from the creekbank where possible;
- the defining of key creek access points through mown paths or simply mown gaps;

- the anticipation of required erosion control works on the creek and the avoidance of intensive revegetation efforts near these sites until such works are completed;
- complementing the revegetation efforts after erosion control works with revegetation works in adjacent floodplain areas;
- ongoing control of high priority weeds across the riparian strip and most weeds in areas of indigenous groundstorey;
- spraying out areas of exotic grass under remnant eucalypts and other plants to encourage regeneration and
- the replanting of uncommon or missing species into gaps created by weed control.

Grassy Open Woodlands

This model could be used in drier areas of the Creeklands and in a cover of native or exotic grass. It would include the following steps:

- cease mowing in strategic areas of the landscape with views and fire management integrated into the design;
- spot spray all exotic grass in native grass areas **or** spot spray the rampant rhizomatous grasses, such as Couch (**Cynodon dactylon*) or Kikuyu (**Pennisetum clandestinum*), in areas of exotic grass leaving a framework of tussock grasses with gaps inbetween;
- fill strategic gaps with native grasses, shrubs or trees, only mulching selectively around new plants and
- conduct ongoing weed control works, particularly the high priority weeds.

This model would result in open grassy woodlands that may be partially exotic tussock grasses, which would possibly meet most people's expectations of what the "bush" should look like.

Preventing Eucalypt Dieback

The large eucalypts in the mown areas on the floodplains of the Creeklands often appear stressed and at risk of dieback. One of the possible reasons for this stress and dieback is the lack of small bird habitats and possibly areas with standing water that can soak into the roots near the trees. Efforts could be made to reduce this dieback through specific efforts highlighted by the following steps:

- scrape or dig small shallow wetlands (not into the root zone) where water can stand and slowly soak in;
- controlling weeds and exotic grass elsewhere within the driplines of the trees;
- planting rushes and other intermittent wetland plants in the shallow wetlands or existing wet spots and
- planting native grass, wildflowers and shrubs in other areas creating an open grassy character.

A good example of this technique can be seen in front of the Victorian Indigenous Nurseries at Yarra Bend Park. The contrast between the health of the Red Gums in the wetland/revegetation area and the adjacent open lawn is dramatic and clearly shows the benefit of such an approach.

3.2.2 Managing Interfaces with Private Property

As highlighted above the interfaces between the Creeklands and private property are significant threatening processes. Many areas of public parkland have been effectively taken over as private garden, many of these areas contain some of the most invasive environmental weeds in the Creeklands. The Council also has an ongoing policy of clarifying property issues in the parkland.

There are several issues that arise on the boundaries of the Creeklands:

- Many areas adjacent to the Creeklands are extensions of the habitat on public land;
- Many environmental weeds invade the Creeklands from private land along the Creeklands; and
- Fences and other boundary structures can help define boundaries so that management rights and obligations are clear but can also often create harsh or blunt edges.

Managing boundaries with private land has to achieve the clarity necessary to ensure appropriate land management responsibilities are clear. It would also be very desirable to ensure indigenous fauna can easily cross boundaries and to ensure that the edges of the Creeklands are aesthetically pleasing, however, subjective this value can be. Paling fences are a key example of a "harsh" edge effect.

There are some examples of attractive edges. The southeastern corner of the Laurel Grove East _ South Bank Management Block has a back garden bordering the public with a minimal wire fence and bollards and indigenous vegetation extending into the private land. The homeowners have a low maintenance backyard, a firm edge to their property and animals can easily flow back and forth.

General recommendations for managing private land boundaries include:

- the areas of public land being used in ways that appear exclusive to adjacent homes should be "re-landscaped" with firm boundaries and indigenous species to make it clear that it is public land;
- private land owners with existing indigenous plants and/or extensive back gardens on the edge of the Creeklands should be encouraged to manage that vegetation or plant indigenous vegetation, possibly through cooperative projects across the public and private land or "community conservation grants";
- private land owners with extensive back gardens on the edge of the Creeklands should be encouraged to control environmental weeds in their gardens, again possibly through cooperative projects or "community conservation grants";
- private landowners should be encouraged to build fences of bollards or wire (either strands or netting depending on security concerns of landowners) in areas where indigenous vegetation occurs; and
- adjacent land owners should be encouraged to have clear boundary fences and have indigenous vegetation within their gardens on the Creeklands' edge.

Working with private landowners can be done through educational programs, grant schemes or the planning scheme as appropriate. The above recommendations could certainly be part of the "wildlife corridor program" discussed in the next section.

3.2.3 Habitat Corridor Development

The conservation and enhancement of habitat corridors within the Creeklands and throughout the city is essential if indigenous fauna species are to survive and potentially thrive. Habitat corridors are essential in ensuring that the various areas of habitat in the City of Whitehorse achieve the maximum habitat potential; a patch of habitat with links to other patches will support more species and individuals.

Better corridors can be created within the Creeklands themselves. The Vegetation Condition mapping presented in maps attached to this report show where breaks occur in the vegetation within the Creeklands themselves. There are many areas that could effectively link up areas of existing habitat. These can be readily identified and are priority areas for revegetation and regeneration.

It is also important to ensure that the long corridor of the Creeklands is linked to other areas of indigenous vegetation in the city. Although Council will find it easiest to implement the recreation of habitat corridors on its own land working with private landowners will be essential in some areas. Private landowners will need to be asked to retain existing remnant native vegetation and hopefully add to it over time.

A citywide habitat corridor program should also be initiated; the City of Banyule (Brown 2000) has developed strategy and program that could provide inspiration of what can be achieved. The City of Banyule's program uses the provision of free indigenous plants as an educational tool and as a key influence on landscaping projects in schools and private land. The program is "spruiked" by a Program Coordinator who speaks to any group or school about the local wildlife and how to support it. Vouchers for indigenous plants from local indigenous nurseries are provided to landowners and schools with educational packages describing the local fauna, existing corridors, vegetation corridors and information on environmental weeds. For a relatively low outlay, much indigenous habitat is recreated and landowners are connected with the local indigenous nursery and their gardens are given an indigenous character.

3.2.4 Nestbox Provision and Hollow Management Program

The ongoing loss of tree hollows was identified as a threat to indigenous fauna. The ongoing decline and death of an older generation of trees will intensify this process.

Several of the old trees with hollows in the Creeklands have been identified as dangerous and may have to be removed if no other solutions are found to protect the trees and keep people away from the danger zone. Unfortunately, many of these trees would probably fall in the next decade or two even if they weren't a risk to park visitors; they would be valuable habitat for the types of organisms that like fallen logs, but not be available for nesting hollows.

The possible solution to this threat is the implementation of a Nesting Box and Hollow Management Program. Such a program might have two major components (Grant 1997 and de Souza-Daw 2000):

1) Nesting boxes would be placed in appropriate places in trees and an ongoing monitoring program would evict introduced organisms to give indigenous birds a chance.

2) Existing hollows would be inventoried and monitored with exotic bird eggs being removed in some circumstances and other animals like feral bees removed or poisoned as an ongoing priority.

This program could be an effort to provide habitat and to measure and document fauna occurring in the Creeklands, as was done by Homan (1999) and Weston (1998) on the Diamond Creek in Eltham. It would ensure that artificial hollows replace hollows that are disappearing with old trees while a younger generation of trees is developing hollows.

For example, the Friends of Organ Pipes has set up Sugar Glider and Bat roost boxes and has not only increased the amount of breeding and roosting sites but conduct ongoing monitoring efforts to ensure the nest boxes are effective. The Friends of Organ Pipes collect incredibly useful scientific information while enjoying contact with animals.

A Council employee or contractor could run such a program that could effectively work with Advisory Committees, community groups and/or schools on the different activities that would be required. This could also easily be part of a "wildlife corridor program". This general program could be guided with help from the Bird Observers Club, Birds Australia, universities and DNRE but Council would probably have to sponsor someone or contract a professional to the actual work of the program over time.

It should be emphasized that any nestbox provision must include a monitoring and management program. There are many examples of nestbox programs across Victoria that have simply encouraged exotic birds because no efforts are made to discourage exotic birds and ensure design changes are researched and adopted over time to ensure that indigenous species are encouraged.

3.3 Management Recommendations for Local Sites of Conservation Significance

Sites of significant vegetation were highlighted in the first section of this report. Some of the most important conservation assets and diverse vegetation occur in these areas. They are strategic and important areas for targeting weed control and management efforts; these areas are where the most effective and efficient work can be achieved for biodiversity conservation. They are more interesting for people, Council workers, contractors and members of the community, to work in because of their diversity. With this opportunity considered specific actions for the local sites of conservation significance are proposed in the table below:

Site Name	Management Block	Management Recommendations
Black's Walk Hillside	Black's Walk Northwest Block	Maintain current open grassland area by spot spraying weeds over time. Enrich species diversity by planting indigenous wildflowers and shrubs in gaps between tussocks or created by weed control. Control weeds, and revegetate where necessary, along slope to east and creek to south and west to expand indigenous vegetation. Attempt to expand this area of significant indigenous vegetation to the edge of the creek. Melbourne Water is already helping in this endeavor. Continue the community's good work at the top of the hill.

Waratah Crescent Escarpment	Pakenham St. East - North Side and Waratah Crescent West	Continue enhancing this area by introducing and/or planting more species and/or individuals; past weed control efforts have been very effective creating many ecological gaps to fill with indigenous species. Continue expanding the site along the escarpment on both ends. Consider this as a useful site for environmental interpretation; many uncommon plants are very close to the paths.
Waratah Crescent Wetland	Waratah Crescent Wetland	Monitor birds in the wetlands. Determine if rare waterbirds use the site. Measure water quality changes through wetlands. Enhance the habitat of the site by creating shrubby habitat adjacent to the wetland and/or expanding it to the east.
Laurel Grove East Woodland	Laurel Grove East - South Bank	Concentrate weed control and planting works across this area. Consider a program of controlled burns and spot spraying afterwards to manage fuel loads, weeds and indigenous plant regeneration. Control exotic grasses in the groundstorey. Plant more eucalypts to ensure a fuller future canopy. Expand revegetation efforts into adjacent management blocks. Ensure that appropriate firebreaks are retained in this area.

3.4 Management Recommendations for Management Blocks

This section reviews each management block of the Creeklands and proposes general recommendations for each one. The list of possible actions is potentially endless but this table will simply highlight many opportunities for future management of the Creeklands.

Management Block	Management Recommendations
Black's Walk Section **Map 2A**	
Middleborough Road Frontage	This frontage is what thousands of motorists see everyday and this is an opportunity to presented key images of the reserve to this large audience. In contrast, the traffic is a significant impact on the experience of park users. It should be possible to reach a compromise between the opportunity and negative impact. Strategic revegetation efforts could create attractive buffers and retain views into the Creeklands. Much weed control has occurred over the last few years along the creek bank in this area. This work should be built on with additional revegetation efforts including dense plantings of groundstorey plants, particularly tussock grasses (potentially cells), to ensure the bank is well stabilised over time to resist erosion and weed invasion. Anticipate proposed erosion control works to be implemented by Melbourne; avoid revegetation around these sites and plan complementary works in the future.
Black's Walk Northwest Block	This area has a local site of significance that has been discussed above; please refer to the above section. This area provides the opportunity to create over time the largest node of indigenous habitat within the

Management Block	Management Recommendations
	Creeklands corridor; it is an excellent opportunity because of the size of the area and the clear boundaries around it that provide good fire safety options. The current path in the east end of this area is a liability risk because of difficult circumstances on the site. An acceptable and safe route should be designed and implemented as a priority for public safety. A reasonable solution may involve the selection of a route that would go through weed-infested areas providing an opportunity to achieve several objectives at once: safer path, weed control and high profile revegetation efforts.
Black's Walk Creek Junction	Anticipate proposed erosion control works to be implemented by Melbourne; avoid revegetation around these sites and plan complementary works in the future. This area currently has a canopy that prevents substantial weed invasion in the groundstorey although that layer is currently dominated by exotic grasses. This area is very stable and probably suggests typical images of the Australian bush despite much of the canopy trees being introduced natives and much of the groundstorey being exotic grasses. It provides the opportunity to slowly shift the area to indigenous by removing the introduced natives over time and introducing groundstorey plants.
Guide Hall Block	Most of this area is open with an overstorey of introduced natives and remnant trees and a closely mowed groundstorey around the Guide Hall and carpark. It provides the opportunity to create a quiet entrance to the Creeklands with more clumps of indigenous vegetation scattered around. There may be opportunity to collaborate with the groups using the hall to improve the area.
Black's Walk Playground Block	Anticipate proposed erosion control works to be implemented by Melbourne Water; avoid revegetation around these sites and plan complementary works in the future. The margin of the creek certainly requires weed control and revegetation efforts to ensure it can act as part of the linking habitat corridor through the Creeklands. Consider the future of the playground and its immediate environment. It clearly requires some upgrading and its location is difficult because of the existence of potentially unsafe trees and the lack of shade. The area around the playground should continue to be kept mown and open but strategic revegetation efforts around the larger potentially dangerous (yet still safe enough to retain) could be used create more shade, improve tree health and discourage access around the trees for public safety objectives.
Pakenham Street West – North Creekbank	The current layout, i.e. mowed in the north part with a fringe of vegetation along the creek, is probably the most appropriate. . The walking access on the west end is certainly essential to retain. However, the creek fringe is the part of the habitat corridor through the Creeklands and should be slowly enhanced to be dominated by indigenous species and widened where possible.
Scout Hall	This area is currently used as a driveway and carpark for school kids and Scouts although there are large, significant trees that are suffering from dieback. These large trees require management and protection from soil compaction within the canopy and strategic plantings of shrubby clumps to encourage insectivorous birds. The area also has a significant problem with dust. A new layout to alleviate access problems has been anticipated by Council. It is recommended that any new access solutions do not have significant impacts on the large trees; room should be left around the trees to allow revegetation potentially and discourage access for public safety objectives. Any pressure to expand parking areas or driveways should be

Management Block	Management Recommendations
	expanded to adjacent lawn areas rather into the driplines of the large trees.
Pakenham Street West - South Creekbank	Anticipate proposed erosion control works to be implemented by Melbourne; avoid revegetation around these sites and plan complementary works in the future. The current layout is probably the most appropriate. . The walking access is certainly essential to retain. However, the creek fringe is the part of the habitat corridor through the Creeklands and should be slowly shifted to be dominated by indigenous species and widened where possible. There are several dangerous trees near the footbridge and the futures of these trees need to be determined. If removal is the only option then revegetation efforts should be implemented in direct proximity to make it clear that mitigation for negative impacts of public safety management efforts is undertaken whenever possible. Woody weeds, such as Hawthorn, Blackberry, Willows and Desert Ash will need ongoing control efforts.
Black's Walk South Block	This area has several areas of indigenous grass. Some areas already have been left unmown for some years with good effect, including the appearance of orchid species. Any areas left unmown should be monitored and any emerging weeds should be controlled. This strategy could be expanded to other areas, but the appropriate areas must be selected well and a different layout for the area must be well considered. It is probably important to retain a large central area as open for the use of the school classes from next door. However, the edge to the south is problematic because of the condition of the schoolyard; open grassy woodland regeneration should be done in a narrow band along the fence line, with appropriate access breaks, to create a more attractive buffer along the school fence. Other areas of open grassy woodland regeneration around the fringe of the area, particularly around large trees should be undertaken.
Middleborough Road East - South Creekbank	Anticipate proposed erosion control works to be implemented by Melbourne; avoid revegetation around these sites and plan complementary works in the future. The creek fringe is another important part of the habitat corridor through the Creeklands and should be slowly shifted to indigenous species on all layers and widened where possible. The unmown habitat could be expanded to the existing path if appropriate breaks are retained on the other side for public safety objectives.
Kalang Park Section Maps 2B and 2C	
Pakenham Street East – North Creekbank	Consider artificial wetlands in wet areas that occur on the floodplain, where stormwater accumulates on the floodplain. It appears that the Council has tried to level this area in the past, creating large wet areas of lawn that are difficult to mow through winter and spring. Simply digging out some areas and moving soil to raise other areas is one way to create these wetlands. The low areas would be intermittent wetlands that could be planted with Rushes (*Juncus* spp.) and other semi-aquatics that are adapted to drying out in summer. The higher areas would then dry out more quickly and would be more easily maintained. Areas of the steeper banks above the floodplains have also been planted with indigenous species. This is a strategy that should continue with due consideration for fire safety. Clear breaks should always be maintained around revegetation areas.

Management Block	Management Recommendations
	However, planting and wetlands should probably not be implemented so intensively that the open walking corridor is closed. The future should include more habitats but an open area long the walking path should be maintained.
Waratah Crescent West	This management block has several large and outstanding Manna Gum trees that are quite dangerous and the area around the largest most magnificent specimen is so narrow that it provides few options for trail relocation away from the tree. It is important to determine a solution for this area that resolves the public safety issues and retains the significant trees. One of the potential and most viable solutions is using the old track across the creek (formerly to a chicken farm apparently) as a place to build a bridge across. ***Note: Since production of this report, one of the trees has needed to be removed and another has had arboricultural work to remove some limbs to enable it to be retained.*** This block also has a small area of escarpment with several significant indigenous species; it is possibly the most diverse site in the Creeklands. This area should be maintained and expanded through groundstorey revegetation efforts on either end of the site of conservation significance. The Creeklands Advisory Committee has been implementing a constructive and useful project in the eastern end of this block. They have installed an area of indigenous groundstorey plants with little mulching. Unfortunately, several groundstorey weeds have invaded the area around the larger Common Tussock Grass. More intensive weeding and sensitive herbicide use in the first few years of this type of planting will ensure greater success. It is a good model of planting that is extensively undertaken by Melbourne Water as well but it must be remembered that success is dependent on effective maintenance in the first few years. In addition, a few smaller exotic plants may have to be accepted in the long-term once indigenous groundstorey plants dominate the specific sites. Anticipate proposed erosion control works to be implemented by Melbourne; avoid revegetation around these sites and plan complementary works in the future once works are done along the creek.
Waratah Crescent Wetland	This site contains one of the most significant constructed wetlands of the Creeklands. It could potentially use some enhancement and upgrading in the form of enrichment aquatic planting, control of Cumbungi and replacement by more desirable species, deepening and the strategic planting of shrubby thickets on each fringe. In addition, there are wet areas extending to the east from the wetland that could be deepened into intermittent wetlands, planted with indigenous species and other adjacent areas would then dry out more effectively. Some of the tracks in this block are eroding and require work to stabilise them for the long-term. The Waratah Crescent road reserve is still legally available for use, requiring Council to keep it mowed and accessible for vehicles. Eliminating the road reserve creates opportunities for enhancing the entire, particularly in regards to the potential expansion of the wetland. Anticipate proposed erosion control works to be implemented by Melbourne; avoid revegetation around these sites and plan complementary works in the future once Melbourne does some work.
Malcolm St. - Sheehans Rd. Creekbank	There are significant weed infestations along the creek that will require attention over time. There are three intersecting issues that will potentially influence a new layout around the track through several trees and around a Swamp Paperbark thicket (an area partly shared by the block below). Several small but hazardous trees are located in this area around the track. There

Management Block	Management Recommendations
	is also a small wetland that hasn't achieved its purpose very well, in that no water accumulates in it and weeds dominate it. It is also where a bridge might come over the creek to avoid large trees on the other bank. It may also be possible to use stormwater from Malcolm Street to fill a reconstructed wetland that would improve water quality. Anticipate proposed erosion control works to be implemented by Melbourne; avoid revegetation around these sites and plan complementary works in the future once works are completed. These works will also influence the future layout of the area mentioned above.
Malcolm St. - Sheehans Rd. Block	There are several areas of native grasses, predominantly Wallaby grasses (*Austrodanthonia* spp.), and remnant eucalypts and wattles. These areas provide opportunities to create open grassy woodland areas that are mowed less frequently or not mown with weeds spot sprayed immediately after ceasing mowing and replacing the indigenous shrub layer. When creating areas of grassy open woodland the issues of personal safety and fire management must be integrated into plans for new landscape layouts. There are three intersecting issues that will potentially influence a new layout around the track through several trees and around a Swamp Paperbark thicket (an area partly shared by the block above). Several small but hazardous trees are located in this area around the track. There is also a small wetland that hasn't achieved its purpose very well, in that no water accumulates in it and weeds dominate it. It is also where a bridge might come over the creek to avoid large trees on the other bank. It may also be possible to use stormwater from Malcolm Street to fill a reconstructed wetland that would improve water quality.
Kalang Oval	This block is dominated by the sporting facilities, as will undoubtedly and appropriately continue, but the few remnant trees around the fringes could be used to enhance the landscape for conservation and recreation. Planting clumps of indigenous shrubs or planting beds of indigenous groundstorey would complement the existing indigenous and native trees and create an oval that could feel more like an "opening in the bush". Any planting must be designed to prevent fire management problems as well.
Pakenham Street East – South Creekbank	This narrow strip along the creek is adjacent to the oval and a channeled section. It is a section where the habitat along the creek is quite narrow with few but important opportunities for enhancing the vegetation corridor. It may also be desirable to develop a visual barrier between the path and the open area of the Kalang Oval with stands of indigenous vegetation being installed around the north end of the oval area and the large Oak tree.
Main Rd. West – North Creekbank Strip	This long narrow strip is a management issue in itself, including several specific issues. However, there is little room to anything in this section but maintain the path. There eastern end of the block on Main Street is wider than most of the strip but it is a block of land owned by Melbourne Water and dominated by the neighbor's ornamental planting of environmental weeds (Poplars and Agapanthus). This area could be a much more inviting entrance into the Creeklands. Efforts should be made to formalize use of the Melbourne Water land as parkland and aim to replace the ornamental environmental weeds with indigenous vegetation. There is interesting and important habitat on private land along this block in the form of wire fences and stands of Tree Violet. It may be worthwhile to communicate with adjacent landowners to ensure that they retain these assets for the public and develop an agreement about integrating their use and habitat conservation. The narrow bank provides limited opportunities for revegetation that

Management Block	Management Recommendations
	should be taken advantage in cooperation with Melbourne Water. Anticipate proposed erosion control works, i.e. bank laybacks, to be implemented by Melbourne Water; avoid revegetation around these sites and plan complementary works in the future.
Main Rd. West – South Creekbank Strip	Anticipate proposed erosion control works, i.e. bank laybacks, to be implemented by Melbourne; avoid revegetation around these sites and plan complementary works in the future. Remove the major invasive weeds as a priority, including Madeira Vine and Pines on a long term staged basis, continuing the process of installing indigenous vegetation. Fire management objectives must be integrated as well into any planting strategies, with appropriate gaps in the vegetation where necessary.
Laurel Grove East - North Creekbank	This long narrow stretch is partially dominated by the neighboring paling fences and is open lawn inside the Creeklands boundary. There are clear opportunities for a line of specimen trees and enhancement of the narrow creekbank with indigenous vegetation, although Melbourne Water may do this over time.
Laurel Grove East - South Bank	This block contains one of the largest patches of habitat in the Creeklands and requires ongoing ecological management. Current firebreaks should be maintained. The network of mowed paths should be reduced with a clear access plan developed and implemented. Using controlled burns, followed by appropriate weed control efforts, will be a useful tool for managing fuel loads and indigenous plants over time. The path should be maintained with a similar area mowed around it as it is currently. However, the creekbank provides opportunities for indigenous revegetation and habitat improvement. Anticipate proposed erosion control works, i.e. bank laybacks, to be implemented by Melbourne Water; avoid revegetation around these sites and plan complementary works in the future.
Furness Park Section **Map 2D**	
Furness Park - North Bank	There are many gaps in the vegetation corridor along the creek that should be revegetated to develop a greater and more cohesive wildlife corridor. Consider constructing a wetland in eastern half of block where stormwater accumulates on the floodplain to prevent tree dieback, fix the erosion problem. Investigate and redesign paths in the block. Consider reconstructing the path into the Creeklands from Furness Street to make it safer and plant indigenous vegetation around it after reconstruction. Consider the path on the north side of the creek to the east; it is informal but often used and is dangerous. Anticipate proposed erosion control works to be implemented by Melbourne; avoid revegetation around these sites and plan complementary works in the future.
Furness Park Landlocked Areas	Liaise with adjacent landowners to ensure that all public land is clearly open to any potential visitors. Several environmental weeds are also a significant problem; they require removal and replacement with indigenous species over time. Investigate and redesign paths in the block. Paths to the west should be allowed to safely connect and travel through this area.

Management Block	Management Recommendations
Furness Park Southeast	The woody weeds on the street fringe should be replaced with appropriate species to drier areas to replace the cover and boundary to the Creeklands that the current weedy hedge-like vegetation creates. Japanese Honeysuckle and other creepers are swamping several islands of remnant trees in this section; these islands should be focuses for weed control and revegetation efforts. There are many gaps in the vegetation corridor along the creek that should be revegetated to develop a greater and more cohesive wildlife corridor.
Furness Park Playground Area	Kikuyu, preventing regeneration, is swamping several islands of remnant vegetation in this section. These islands should be focuses for weed control and revegetation efforts. These islands could be selectively burnt and spot sprayed in the summer time to create a more indigenous grassy groundstorey. Trees on the edge of Main St. are suffering from dieback. Restricting mowing and planting a grassy understorey around these trees may help reverse this decline, improve the appearance the entrance to the park and create a more serene experience in the parklands.
Furness Park - South Bank	There are many gaps in the vegetation corridor along the creek that should be revegetated to develop a greater and more cohesive wildlife corridor. Anticipate proposed erosion control works to be implemented by Melbourne Water; avoid revegetation around these sites and plan complementary works in the future.

Summary and Conclusion

This report is to be used as guide to incorporating flora and fauna conservation issues into a master plan for the Blackburn Creeklands. It provided several different resources to achieve this aim.

The conservation values of the Creeklands have been reviewed and documented. This information has clearly shown that the reserve has significant conservation values. Admittedly, the indigenous vegetation and ecosystem is significantly modified and degraded but many important values remain. These remaining values highlight the effective opportunities for enhancing habitat values and the experience for visitors who enjoy an indigenous environment.

The processes that threaten the documented conservation values are then reviewed. These issues are a general inspiration for management activities and they allow the targeting of those activities to the most important actions that are required over time within the Creeklands.

The last section reviews and presents different management recommendations in a variety of structures. As an outside consultant it is difficult to determine the most appropriate actions for Council as land manager. However, this section is an attempt to provide as much insight and inspiration for management to Council as possible.

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Appendix 1. Vascular Plants Recorded at Blackburn Creeklands

References:

A Blackburn Creek Conservation Group 1981

B Brandenburg 1990

C DNRE Flora Information System

D This study (Flora survey undertaken on 6 and 7 August 1999 and 13 September 1999).

Recorded by Treelogic 1999 and/or Galbraith and Associates 1999

► Exotic species

Significance Ratings are based on Botanicus Australia 1998 and City of Whitehorse 1998, and only regionally significant species were found.

			References/Flora Lists				Sig.
FIS No.	Scientific Name	Common Name	A	B	C	D	Rat -ing
	FERNS AND FERN ALLIES						
	ADIANTACEAE						
0129	*Adiantum aethiopicum*	Common Maidenhair				*	
	AZOLLACEAE						
0347	*Azolla filiculoides*	Pacific Azolla				*	
	DENNSTAEDTIACEAE						
2777	*Pteridium esculentum*	Austral Bracken				*	
	CONIFERS						
	PINACEAE	Pine Family					
2539	► *Pinus radiata*	Monterey Pine				*	
	MONOCOTS						
	AGAVACEAE						
4393	► *Cordyline australis*	New Zealand Cabbage Tree				*	
	ALISMATACEAE						
0174	*Alisma plantago-aquatica*	Water Plantain				*	Reg
	ALLIACEAE	Lily Family					
3638	► *Agapanthus praecox ssp. orientalis*	Agapanthus				*	
0179	► *Allium triquetrum*	Angled Onion	*			*	
	ASPARAGACEAE						
0274	► *Asparagus asparagoides*	Bridal Creeper				*	
	COMMELINACEAE						
3416	► *Tradescantia albiflora*	Wandering Jew				*	
	CYPERACEAE	Sedge Family					

			References/Flora Lists				Sig.
FIS No.	Scientific Name	Common Name	A	B	C	D	Rat -ing
0623	*Carex appressa*	Tall Sedge				*	
0638	*Carex fascicularis*	Tassel Sedge				*	
0918	► *Cyperus eragrostis*	Drain Flat-sedge				*	
1394	*Gahnia radula*	Thatch Saw Sedge		*			
	IRIDACEAE						
2942	► *Romulea rosea*	Onion Grass				*	
3562	► *Watsonia meriana*	Bulbil Watsonia				*	
	JUNCACEAE						
1830	*Juncus pallidus*	Pale Rush				*	
1833	*Juncus planifolius*	Broad-leaf Rush					
	JUNCAGINACEAE						
3448	*Triglochin procerum spp. agg.*	Water Ribbons				*	
	ORCHIDACEAE	Orchid Family					
8739	*Microtis spp.*	Onion Orchid					
	PHORMIACEAE						
1030	*Dianella tasmanica*	Tasman Flax-lily				*	
1028	*Dianella longifolia*	Pale Flax-lily				*	Reg
3421	*Tricoryne elatior*	Yellow Rush Lily				*	
	POACEAE	Grass Family					
0151	*Agrostis avenacea*	Common Blown Grass				*	
0153	► *Agrostis capillaris*	Brown-top Bent Grass				*	
0236	► *Anthoxanthum odoratum*	Sweet Vernal Grass				*	
0961	*Austrodanthonia caespitosa*	Common Wallaby Grass				*	
0965	*Austrodanthonia geniculata*	Kneed Wallaby Grass				*	
0977	*Austrodanthonia racemosa var. racemosa*	Striped Wallaby Grass				*	
8361	*Austrodanthonia spp.*	Wallaby Grass	*				
3288	*Austrostipa pubinodis*	Tall Spear Grass				*	
3289	*Austrostipa rudis*	Veined Spear Grass	*			*	
0495	► *Briza maxima*	Large Quaking Grass				*	
0498	► *Bromus catharticus*	Prairie Grass				*	
0500	► *Bromus diandrus*	Great Brome				*	
4554	► *Cynodon dactylon var. dactylon*	Couch Grass				*	
0948	► *Dactylis glomerata*	Cocksfoot				*	
8313	*Danthonia s.l. spp.*	Wallaby Grass	*	*			

			References/Flora Lists				Sig.
FIS No.	Scientific Name	Common Name	A	B	C	D	Rat -ing
1128	► *Ehrharta erecta*	Panic Veldt Grass				*	
1129	► *Ehrharta longiflora*	Annual Veldt Grass				*	
1692	► *Holcus lanatus*	Yorkshire Fog				*	
2179	*Microlaena stipoides var. stipoides*	Weeping grass				*	
2430	► *Paspalum dilatatum*	Paspalum				*	
2451	► *Pennisetum clandestinum*	Kikuyu				*	
2476	► *Phalaris aquatica*	Toowoomba Canary-grass				*	
2497	*Phragmites australis*	Common Reed	*	*		*	
	► *Poa annua*	Winter Grass				*	*
2590	*Poa ensiformis*	Sword Tussock Grass				*	
2600	*Poa labillardierei*	Common Tussock-grass				*	
2602	*Poa morrisii*	Soft Tussock Grass				*	
3133	► *Setaria gracilis*	Slender Pigeon Grass				*	
3387	*Themeda triandra*	Kangaroo Grass	*	*		*	
	TYPHACEAE						
3470	*Typha orientalis*	Cumbungi				*	
	XANTHORRHOEACEAE	Grass Tree Family					
2042	*Lomandra filiformis*	Wattle Mat Rush				*	
2046	*Lomandra longifolia*	Spike Mat Rush	*	*		*	
	DICOTYLEDONS						
	ACANTHACEAE						
	► *Acanthus mollis*	Acanthus				*	
	ACERACEAE						
4389	► *Acer negundo*	Box Elder				*	
0108	► *Acer pseudoplatanus*	Sycamore Maple				*	
	AMARANTHACEAE						
0184	*Alternanthera dentata s.l.*	Lesser Joyweed				*	
	APIACEAE						
0803	► *Conium maculatum*	Hemlock				*	
1370	► *Foeniculum vulgare*	Fennel				*	
	APOCYNACEAE						
3524	► *Vinca major*	Blue Periwinkle				*	
	ARALIACEAE						
1599	► *Hedera helix*	Ivy				*	
	ASTERACEAE	Daisy Family					

			References/Flora Lists				Sig.
FIS No.	Scientific Name	Common Name	A	B	C	D	Rat -ing
0255	► *Arctotheca calendula*	Cape Weed				*	
0384	► *Bellis perennis*	English Daisy				*	
0666	*Cassinia aculeata*	Dogwood		*		*	
0667	*Cassinia arcuata*	Drooping Cassinia				*	
0668	*Cassinia longifolia*	Shiny Cassinia	*				
0782	► *Cirsium vulgare*	Spear Thistle				*	
3118	► *Delairea odorata*	Cape Ivy				*	
8561	► *Helianthus spp. ?*	Sunflower / Jerusalem Artichoke ?				*	
2511	► *Helminthotheca echioides*	Ox-tongue				*	
1748	► *Hypochoeris radicata*	Cat's Ear				*	
2312	*Olearia lirata*	Showy Daisy Bush				*	
1616	*Ozothamnus ferrugineus*	Tree Everlasting		*		*	
2762	*Pseudognaphalium luteoalbum*	Jersey Cudweed				*	
3203	► *Sonchus asper s.l.*	Rough Sow-thistle				*	
3204	► *Sonchus oleraceus*	Common Sow-thistle				*	
3336	► *Taraxacum Sect. Ruderalia*	Garden Dandelion				*	
	BASELLACEAE						
3632	► *Anredera cordifolia*	Madeira Vine				*	
	BORAGINACEAE						
2247	► *Myosotis sylvatica*	Wood Forget-me-not				*	
	BRASSICACEAE						
0614	► *Cardamine hirsuta s.l.*	Common Bitter-cress				*	
3162	► *Sisymbrium orientale*	Indian Hedge-mustard				*	
	CAPRIFOLIACEAE						
2053	► *Lonicera japonica*	Japanese Honeysuckle				*	
	CARYOPHYLLACEAE						
0719	► *Cerastium glomeratum s.l.*	Common Mouse-ear Chickweed				*	
3251	► *Stellaria media*	Chickweed				*	
	CASUARINACEAE						
0677	*Allocasuarina littoralis*	Black She-oak				*	
	CHENOPODIACEAE						
0318	► *Atriplex prostrata*	Hastate Orache				*	
	CLUSIACEAE						

			References/Flora Lists				Sig.
FIS No.	Scientific Name	Common Name	A	B	C	D	Rat -ing
1744	► *Hypericum perforatum*	St. John's Wort				*	
	CRASSULACEAE						
0862	*Crassula helmsii*	Swamp Crassula				*	
5186	► *Crassula multicava ssp. multicava*	Shade Crassula				*	
	EPACRIDACEAE						
1165	*Epacris impressa*	Common Heath				*	
	EUPHORBIACEAE						
2683	*Poranthera microphylla*	Small Poranthera				*	
	FABACEAE	Pea Family					
0996	*Daviesia latifolia*	Hop Bitter Pea	*				Reg
1050	*Dillwynia cinerascens*	Grey Parrot Pea				*	
8336	*Dillwynia spp.*	Parrot-Pea	*				
1422	► *Genista linifolia*	Montpellier Broom				*	
1596	*Hardenbergia violacea*	Purple Coral Pea				*	
1705	*Hovea linearis*	Common Hovea		*			
1761	*Indigofera australis*	Austral Indigo	*				
1847	*Kennedia prostrata*	Running Postman				*	
2850	*Pultenaea gunnii*	Golden Bush Pea				*	
8949	*Pultenaea spp.*	Bush Pea				*	
3435	► *Trifolium repens var. repens*	White clover				*	
3440	► *Trifolium subterraneum*	Subterranean Clover				*	
3471	► *Ulex europaeus*	Gorse				*	
3523	*Viminaria juncea*	Golden Spray				*	
	FAGACEAE	Oak Family					
2884	► *Quercus robur*	English Oak				*	
	► *Quercus palustris*	Pin Oak				*	
	FUMARIACEAE						
1382	► *Fumaria muralis ssp. muralis*	Wall Fumitory				*	
	GENTIANACEAE						
0705	► *Centaurium tenuiflorum*	Branched Centaury				*	
	GERANIACEAE						
1434	*Geranium solanderi s.l.*	Austral Cranes-bill				*	
	GOODENIACEAE						
1507	*Goodenia ovata*	Hop Goodenia	*	*		*	

			References/Flora Lists				Sig.
FIS No.	Scientific Name	Common Name	A	B	C	D	Rat -ing
	HALORAGACEAE						
3867	*Myriophyllum crispatum*	Upright Water-milfoil				*	
	LAMIACEAE	Mint Family					
5196	► *Plectranthus ?ecklonii*	Blue Spur Flower				*	
2743	*Prostanthera lasianthos*	Victorian Christmas Bush	*	*		*	
2757	► *Prunella vulgaris*	Self-heal		*		*	
	LAURACEAE						
8201	*Cassytha spp.*	Dodder Laurel				*	
	LYTHRACEAE						
2092	*Lythrum hyssopifolia*	Small Loosestrife				*	
	MALVACEAE						
1557	*Gynatrix pulchella s.l.*	Hemp Bush				*	
8536	► *Hibiscus spp.*	Hibiscus				*	
2120	► *Malva neglecta*	Dwarf Mallow				*	
2213	► *Modiola caroliniana*	Carolina Mallow				*	
	MIMOSACEAE	Wattle Family					
0014	► *Acacia baileyana*	Cootamundra Wattle				*	
0025	*Acacia dealbata #*	Silver Wattle	*	*		*	
0028	► *Acacia decurrens*	Early Black Wattle				*	
0031	► *Acacia elata*	Cedar Wattle				*	
0045	*Acacia implexa*	Lightwood				*	
0053	► *Acacia longifolia var. longifolia*	Sallow Wattle				*	
0056	*Acacia mearnsii #*	Black Wattle	*	*		*	
0057	*Acacia melanoxylon #*	Blackwood	*	*		*	
0063	*Acacia myrtifolia*	Myrtle Wattle		*			Reg
0072	*Acacia paradoxa*	Hedge Wattle		*		*	
3649	► *Acacia prominens*	Gosford Wattle				*	
0078	*Acacia pycnantha*	Golden Wattle				*	
0083	► *Acacia saligna*	Golden Wreath Wattle				*	
0100	*Acacia verticillata*	Prickly Moses		*		*	
	MYRTACEAE						
	► *Agonis flexuosa #*	Honey Myrtle				*	
1250	*Eucalyptus baxteri s.l. #*	Brown Stringybark				*	
1254	► *Eucalyptus botryoides #*	Southern Mahogany				*	
1260	*Eucalyptus cephalocarpa s.l. #*	Silverleaf Stringybark		*		*	Reg

			References/Flora Lists				Sig.
FIS No.	Scientific Name	Common Name	A	B	C	D	Rat -ing
	► *Eucalyptus citriodora*	Lemon-scented Gum				*	
	Eucalyptus camaldulensis #	River Red Gum (Planted?)					
1265	► *Eucalyptus crenulata*	Buxton Gum				*	
1272	*Eucalyptus dives*	Broad-leaved Peppermint				*	
	► *Eucalyptus globulus* #	Blue Gum					
1286	*Eucalyptus goniocalyx s.l.*	Long-leaf Box		*			
1294	*Eucalyptus macrorhyncha*	Red Stringybark	*	*			
	► *Eucalyptus mannifera* #						
1297	*Eucalyptus melliodora* #	Yellow Box	*	*		*	
	► *Eucalyptus nicholii* #						
1304	*Eucalyptus obliqua*	Messmate		*			
1307	*Eucalyptus ovata* #	Swamp Gum	*	*		*	
1313	*Eucalyptus radiata s.l.* #	Narrow-leaf Peppermint	*	*		*	
1315	*Eucalyptus rubida*	Candlebark				*	
	► *Eucalyptus tricarpa*	Ironbark				*	
1323	*Eucalyptus viminalis* #	Manna Gum	*	*		*	
4487	*Eucalyptus viminalis ssp. pryoriana (?)* #	Coast Manna Gum					
1956	*Leptospermum continentale*	Prickly Tea Tree	*	*		*	
2144	► *Melaleuca armillaris ssp. armillaris*	Giant Honey Myrtle				*	
2147	*Melaleuca ericifolia*	Swamp Paperbark	*	*		*	
	► *Melaleuca stypheloides*	Paperbark				*	
	OLEACEAE						
8451	► *Fraxinus angustifolia*	Desert Ash				*	
2002	► *Ligustrum lucidum*	Tree Privet				*	
5268	► *Ligustrum ovalifolium*	Hedge Privet				*	
	ONAGRACEAE						
1174	*Epilobium billardierianum*	Variable Willow Herb				*	
	OXALIDACEAE						
2383	► *Oxalis incarnata*	Pale Wood-sorrel				*	
2386	*Oxalis perennans*	Grassland Wood-sorrel				*	
2387	► *Oxalis pes-caprae*	Soursob				*	
	PITTOSPORACEAE						
0515	*Bursaria spinosa*	Sweet Bursaria	*	*		*	
2543	*Pittosporum undulatum*	Sweet Pittosporum				*	
	PLANTAGINACEAE						

			References/Flora Lists				Sig.
FIS No.	Scientific Name	Common Name	A	B	C	D	Rat -ing
2553	► *Plantago coronopus*	Buck's-horn Plantain				*	
2561	► *Plantago lanceolata*	Ribwort				*	
2562	► *Plantago major*	Whiteman's Foot				*	
	POLYGONACEAE						
2628	*Persicaria hydropiper*	Water-pepper				*	
2626	► *Polygonum aviculare s.l.*	Prostrate Knotweed				*	
2969	► *Rumex conglomeratus*	Clustered Dock				*	
2970	► *Rumex crispus*	Curled Dock				*	
2974	► *Rumex pulcher ssp. pulcher*	Fiddle Dock				*	
	PORTULACACEAE						
2684	*Portulaca oleracea*	Common Purslane				*	
	PRIMULACEAE						
0223	► *Anagallis arvensis*	Pimpernal				*	
	PROTEACEAE						
	► *Grevillea robusta*					*	
4066	► *Grevillea rosmarinifolia s.s.*	Rosemary Grevillea (Planted)				*	
	► *Hakea salicifolia*	Willow Hakea				*	
	RANUNCULACEAE	Buttercup Family					
0788	*Clematis aristata*	Forest Clematis		*		*	
0790	*Clematis microphylla*	Small-leafed Clematis				*	
1036	*Dichondra repens*	Kidney Weed				*	
2906	► *Ranunculus repens*	Creeping Buttercup				*	
	RHAMNACEAE						
3235	*Spyridium parvifolium*	Dusty Miller				*	
	ROSACEAE	Rose Family					
0105	*Acaena novae-zelandiae*	Bidgee-widgee				*	
0106	*Acaena echinata*	Sheep's Burr				*	
0844	► *Cotoneaster pannosus*	Velvet Cotoneaster				*	
0867	► *Crataegus monogyna*	Hawthorn				*	
1113	► *Duchesnea indica*	Indian Strawberry				*	
2758	► *Prunus cerasifera*	Cherry Plum	*			*	
2952	► *Rubus fruticosus spp. agg.*	Blackberry				*	
2956	*Rubus parvifolius*	Small-leaf Bramble				*	
	RUBIACEAE						

			References/Flora Lists				Sig.
FIS No.	Scientific Name	Common Name	A	B	C	D	Rat -ing
0822	*Coprosma quadrifida*	Prickly Current Bush		*		*	
0823	► *Coprosma repens*	Mirror-bush				*	
1402	► *Galium aparine*	Cleavers				*	
	RUTACEAE						
0832	*Correa reflexa*	Common Correa					
	SALICAEAE	Willow Family					
2679	► *Populus alba*	White Poplar				*	
2989	► *Salix babylonica s.l.*	Weeping Willow				*	
2990	► *Salix cinerea*	Grey Sallow				*	
2991	► *Salix fragilis #*	Crack Willow					
5119	► *Salix X reichardtii*	Pussy Willow				*	
	SANTALACEAE	Sandalwood Family					
1350	*Exocarpus cupressiformis*	Cherry Ballart	*	*			
	SCROPHULARIACEAE						
3502	► *Veronica arvensis*	Wall Speedwell				*	
	SOLANACEAE	Nightshade Family					
3995	► *Solanum mauritianum*	Wild Tobacco Tree				*	
3179	*Solanum laciniatum*	Large Kangaroo Apple				*	
5321	*Solanum nigrum s.l.*	Black Nightshade				*	
3187	► *Solanum pseudocapsicum*	Jerusalem Cherry					
	VIOLACEAE						
1731	*Hymenanthera dentata s.l.*	Tree Violet	*	*		*	

Appendix 2. Bird Species Recorded at Blackburn Creeklands

Sources of Records:

- **A** Humphreys 1986 (a) (poster)
- **B** Humphreys 1986 (b)
- **C** Atlas of Victorian Wildlife
- **D** D. Grounds & R. Gardiner (2001 revision)

Key for Significance Rating:

Listed on International Treaties	
C	Listed under CAMBA
J	Listed under JAMBA
Designations of State Significance (according to Victorian Wildlife Atlas records)	
CEn	Critically Endangered
End	Endangered
Vul	Vulnerable
FFG	Listed under the Flora and Fauna Guarantee Act (1988)
R/R	Rare
R/C	Rare/colonial
^	Alien Conservation Status in Victoria
Regional Significance	
Regional	Fauna of regional significance
References for significance ratings	
Beardsell (1997)	
Hollow Dependency	
T	Totally Dependent
P	Partially Dependent

Common Name	A	B	C	D	Hollow Dependency	Significance Rating
SWANS, GEESE, DUCKS, GREBES						
Musk Duck			*			Vul, R/R, Regional
Black Swan		*	*	*		
Australian Shelduck			*		T	
Australian Wood Duck			*	*	T	
Mallard			*			^
Pacific Black Duck	*	*	*	*		
Australasian Shoveler			*			Vul, R/R, Regional
Pink Eared Duck			*		P	R/R, Regional
Australasian Grebe			*			
Chestnut Teal				*	P	

Common Name	A	B	C	D	Hollow Dependency	Significance Rating
GANNETS, CORMORANTS						
Darter			*			R/R, R/C, Regional
Pied Cormorant			*			R/C, Regional
Little Pied Cormorant				*		
Little Black Cormorant			*			
Great Cormorant			*	*		
Australian Pelican			*			R/C
HERONS, IBIS, SPOONBILLS						
White-faced Heron	*	*	*	*		
White-necked Heron		*	*	*		
Great Egret	*		*			CJ, End, R/C, FFG
Nankeen Night Heron			*	*		Vul, R/C
Sacred Ibis	*					
Australian White Ibis	*		*	*		
Straw-necked Ibis			*			
Yellow-billed Spoonbill			*			
BIRDS OF PREY						
Black-shouldered Kite			*			
Brown Goshawk	*	*	*	*		
Brown Falcon		*	*	*		
Australian Hobby	*	*	*	*		Regional
Peregrine Falcon			*	*	P	Regional
BROLGA, CRAKES, RAILS						
Buff-banded Rail			*			Regional
Australian Spotted Crake			*			R/R
Purple Swamphen			*			
Dusky Moorhen			*			
Black-tailed Native-hen			*			Regional
Eurasian Coot			*			
BUSTARD, BUTTON QUAILS						
Painted Button-quail			*			Regional
Stubble Quail				*		Regional
WADERS						
Latham's Snipe			*			CJ, Regional
Masked Lapwing	*	*	*	*		
GULLS, TERNS						
Silver Gull	*	*	*	*		

Common Name	A	B	C	D	Hollow Dependency	Significance Rating
PIGEONS, DOVES						
Feral Pigeon	*	*		*		^
Spotted Turtle-Dove	*	*	*	*		^
Common Bronzewing			*	*		
COCKATOOS, PARROTS						
Gang-gang Cockatoo	*		*	*	T	
Galah	*	*	*	*	T	
Long Billed Corella		*		*		Regional
Little Corella	*					Regional
Sulphur-crested Cockatoo	*	*	*	*	T	
Rainbow Lorikeet	*	*	*	*	T	
Scaly-breasted Lorikeet	*	*	*	*	T	
Musk Lorikeet	*	*	*	*	T	
Little Lorikeet	*	*		*		Regional
Purple-crowned Lorikeet	*	*	*	*	T	
Swift Parrot		*	*	*	T	End, Vul, FFG, R/R
Australian King-Parrot		*	*	*	T	R/R, Regional
Crimson Rosella	*	*	*	*	T	
Eastern Rosella		*	*	*	T	
Pale-headed Rosella	*					
Australian Ringneck	*	*	*			
Blue Bonnet		*		*		
Red-rumped Parrot		*	*	*	T	
CUCKOOS						
Pallid Cuckoo	*		*			
Fan-tailed Cuckoo			*			
Horsfield's Bronze-Cuckoo			*			
NIGHT BIRDS						
Southern Boobook		*	*	*	T	
Tawny Frogmouth	*	*	*	*		Regional
Powerful Owl				*	T	FFG
SWIFTS, KINGFISHERS						
White-throated Needletail	*	*	*	*		CJ
Fork-tailed Swift			*			CJ, Regional
Laughing Kookaburra	*	*	*	*	T	
Sacred Kingfisher	*	*	*	*	P	Regional
AUSTRALIAN WRENS, PARDALOTES						

Common Name	A	B	C	D	Hollow Dependency	Significance Rating
Superb Fairy-wren	*	*	*	*		
Spotted Pardalote	*		*	*		
Striated Pardalote	*		*	*	P	
SCRUBWRENS, ALLIES						
White-browed Scrubwren	*	*	*	*		
Western Gerygone			*			Regional
Brown Thornbill	*	*	*	*		
Yellow-rumped Thornbill			*			
Striated Thornbill	*	*		*		
HONEYEATERS						
Red Wattlebird	*	*	*	*		
Little Wattlebird	*		*			
Spiny-cheeked Honeyeater			*			R/R, Regional
Regent Honeyeater			*			CEn, End, FFG, Regional
Bell Miner		*	*	*		
Noisy Miner	*	*	*	*		
White-plumed Honeyeater	*		*	*		
White-naped Honeyeater	*					
New Holland Honeyeater			*			
Eastern Spinebill	*		*	*		
CHATS, ROBINS						
Scarlet Robin			*			
Flame Robin			*			
Pink Robin		*		*		R/R, Regional
Eastern Yellow Robin			*			
QUAIL-THRUSHES & ALLIES						
Varied Sittella		*		*		
WHISTLERS, SHRIKE-THRUSHES						
Crested Shrike-tit			*			
Golden Whistler	*	*	*	*		
Rufous Whistler			*			
Grey Shrike-thrush			*	*	P	
MAGPIE-LARK, FLYCATCHERS						
Magpie-Lark	*		*	*		
Rufous Fantail			*			
Grey Fantail	*	*	*	*		

Common Name	A	B	C	D	Hollow Dependency	Significance Rating
Willie Wagtail	*	*	*	*		
Restless Flycatcher				*		
CUCKOO-SHRIKES, ORIOLES						
Black-faced Cuckoo-shrike	*	*	*	*		
White-winged Triller			*			Regional
Olive-backed Oriole			*	*		
WOODSWALLOWS						
Dusky Woodswallow	*		*		P	
MAGPIE, BUTCHERBIRDS						
Grey Butcherbird	*		*	*		
Australian Magpie	*		*	*		
Pied Currawong	*		*	*		
Grey Currawong	*		*	*		
RAVENS, MUD-NESTERS						
Corvid			*			
Australian Raven	*		*	*		
Little Raven			*	*		
SPARROWS, FINCHES						
House Sparrow	*		*	*		^
Tree Sparrow	*		*	*		^
Red-browed Finch			*			
European Greenfinch	*		*	*		^
European Goldfinch			*			^
SUNBIRD, MISTLETOEBIRD						
Mistletoebird			*	*		
SWALLOWS, BULBUL						
Welcome Swallow	*	*	*	*	P	
Tree Martin		*	*	*	T	
Fairy Martin			*		P	
OLD WORLD WARBLERS, THRUSHES						
Clamorous Reed-Warbler			*			
Rufous Songlark			*			Regional
Silvereye	*		*	*		
Common Blackbird	*	*	*	*		^
Song Thrush	*	*	*	*		^
MYNA, STARLING						
Common Starling	*		*	*	P	^

Common Name	A	B	C	D	Hollow Dependency	Significance Rating
Common Myna	*		*	*		^

Appendix 3. Mammals, Reptiles and Amphibians Observed at Blackburn Creeklands

No *	Common Name	Scientific Name	Hollow Dependency	Observations by author and/or Notes
1003	Short-beaked Echidna	*Tachyglossus aculeatus*		Last record in 1973 and probably extirpated
1113	Common Brushtail Possum	*Pseudocheiris vulpecula*	Totally	Last record in 1996 but this is probably lack of records submitted. Commonly sighted on an ongoing basis
1129	Common Ringtail Possum	*Pseudocheiris peregrinus*	Partially	Last record in 1997 but this is probably lack of records submitted Commonly sighted on an ongoing basis
1349	Gould's Wattled Bat	*Chalinolobus gouldii*	Totally	Last record in 1973 - specific trapping techniques are necessary to find this species and no efforts may have been made since that time.
1408	Black Rat	**Rattus rattus*		Last record in 1989 but this is probably lack of records submitted Commonly sighted on an ongoing basis
1532	Fox	**Vulpes vulpes*		Last record in 1997 but this is probably lack of records submitted Commonly sighted on an ongoing basis
2452	Weasel Skink	*Saproscincus mustelinus*		Last record in 1988 but this is probably lack of records submitted Commonly sighted on an ongoing basis
2973	Lowland Copperhead	*Austrelaps superbus*		Last record in 1989 but this is probably lack of records submitted

**** Notes:*** ***All records are from the Victorian Wildlife Atlas***

Information from the local community indicates that many of these species are commonly sighted despite dated records with the Victorian Wildlife Atlas. e.g. Brushtail Ringtail Possums, Weasel Skink, Foxes and others.

It is understood that the community has also sighted the Flying Fox, Sugar Glider and other unidentified bat and marsupial species.

Appendix 4. Introduced Flora in the Blackburn Creeklands: A Summary of their Status and Control

Species	Common Name	Nox	Env	Life Form	Disper-sal	Priority	Risk	Control	Av.
**Acacia baileyana*	Cootamundra Wattle		*	Ls/T	A, W	S	1	4, 6	A
**Acacia decurrens*	Early Black Wattle		*	T	A, W	S	1	2, 7	A
**Acacia elata*	Cedar Wattle		*	T	A, W	S		2,7	
**Acacia longifolia var. longifolia*	Sallow Wattle		*	Ls/T	B, A	U	1	3, 4, 6	A
**Acacia prominens*	Gosford Wattle			T	B, A	N	1	?2, ?3, ?4	A
**Acacia saligna*	Golden Wreath Wattle		*	Ls/T	?B, A	S	1	2, 6, 7	A
**Acanthus mollis*	Acanthus			Gt	W, V	U	2	1, 6	A
**Acer negundo*	Box Elder		*	Ls/T	H, W	H		2, 6, 7	A
**Acer pseudoplatanus*	Sycamore Maple		*	Ls/T	H, W	S		2, 6, 7	A
**Agapanthus praecox ssp. orientalis*	Agapanthus		*	Gb	H, W	S	2	1, 6	A
**Agonis flexuosa*	Honey Myrtle		*	Ls/T		N		2, 7	A
**Agrostis capillaris*	Brown-top Bent Grass		*	P	V, W	U		1, 10,	A
**Allium triquetrum*	Angled Onion	*	*	Gb	V, H	H	1	1, 6	A
**Anagallis arvensis*	Scarlet Pimpernel		*	A	?	U	2	1, 6	
**Anredera cordifolia*	Madeira Vine		*	V-X	V, W	H-S		1, 6	
**Anthoxanthum odoratum*	Sweet Vernal Grass		*	P	E, H, W	H-U		1, 10, 6	A
**Arctotheca calendula*	Cape Weed		*	A	W	U	2	1, 6	
**Asparagus asparagoides*	Bridal Creeper		*	Gt	B, V	H	1	1, 6	
**Atriplex prostrata*	Hastate Orache		*	A	W, H	U	2	1, 6	
**Bellis perennis*	English Daisy		*	P	H, W	U	2	1, 6	
**Briza maxima*	Large Quaking Grass		*	A	H, I, W	U	2	1, 5, 6	
**Bromus catharticus*	Prairie Grass		*	A	E, ?I, W	U	3	1, 5, 6, 8	
**Bromus diandrus*	Great Brome		*	A	H, W	U		1, 5, 6	
**Cardamine hirsuta s.l.*	Common Bitter-cress		*	A	H, W	U	2	1, 6	
**Centaurium tenuiflorum*	Branched Centaury		*	A/B	?E, ?H	U	2	1, 6	
**Cerastium glomeratum s.l.*	Common Mouse-ear Chickweed		*	A	?E, ?H, I	U	2	1, 6	
**Cirsium vulgare*	Spear Thistle	*	*	B	E, H, W	S - U	2	1, 6	
**Conium maculatum*	Poison Hemlock	?		B	H	S-V		1, 6	
**Coprosma repens*	Mirror Bush		*	Ls	B, I	S	1	2, 6, 7	A

Species	Common Name	Nox	Env	Life Form	Disper -sal	Priority	Risk	Control	Av.
**Cordyline australis*	New Zealand Cabbage Tree		*	Ls	Un	U		2	A
**Cotoneaster pannosus*	Velvet Cotoneaster		*	Ls	B, I	S	1	2, 6, 7	A
**Crassula multicava ssp. multicava*	Crassula		*	X	V	S	1	1, 6	
**Crataegus monogyna*	Hawthorn	*	*	Ls/T	B, E, I	S	1	1, 2, 7	
**Cynodon var. dactylon*	Couch Grass		*	P	E, H, V	H - U	1	1, 10, 11	A
**Cyperus eragrostis*	Drain Sedge		*	P	E, H, ?W	S	2	1, 6	
**Dactylis glomerata*	Cocksfoot Grass		*	P	E, H, ?W	U	2	1	A
**Delairea odorata*	Cape Ivy		*	V	?A	H	1	2, 7	A
**Duchesnea indica*	Indian Strawberry		*	p	I, B	V		1, 6	
**Ehrharta erecta*	Panic Veldt Grass		*	P	E, ?I, W	U, S	1	1, 6	
**Ehrharta longiflora*	Annual Veldt Grass		*	A	E?, I, W	U	1	5	
**Eucalyptus botryoides*	Southern Mahogany		*	T	H, W	N	3	2, 7	A
**Eucalyptus citriodora*	Lemon-scented Gum			T	H, W	N		2, 7	A
**Eucalyptus crenulata*	Buxton Gum			T	H, W	N		2, 7	A
**Eucalyptus globulus*	Tasmanian Blue Gum		*	T	H, W	N	3	2, 7	A
**Eucalyptus mannifera*				T	H, W	N		2, 7	A
**Eucalyptus nicholii*				T	H, W	N		2, 7	A
**Foeniculum vulgare*	Fennel			P	H	H		1, 6, 8	A
**Fraxinus angustifolia*	Desert Ash		*	T	H, W	H, E	1	2, 7	
**Fumaria muralis ssp muralis*	Wall Fumitory		*	A	W, H	U	2	1, 6	
**Galium aparine*	Bedstraw		*	A	W, H	U	2	1, 6	
**Genista linifolia*	Flax-leaf Broom	*	*	S	?E, H	S	1	2, 6	A
Grevillea robusta				T		N		2, 7	
**Hakea salicifolia*	Willow Hakea		*	Ls	W	S	3	2, 7	A
**Hedera helix*	English Ivy		*	V	B, W	H	1	1, 2, 6	A?
**Helminthotheca echioides*	Ox-tongue		*	A	W	U	2	1, 6	
Helianthus spp.	Jerusalem Artichoke		*	P	H, V	H		1, 7	
**Hibiscus spp.*	Hibiscus			S	?	U		2, 6	
**Holcus lanatus*	Yorkshire Fog Grass		*	P	E, H, I, W	U	2	1, 6	
**Hypochoeris radicata*	Cat's Ears		*	P	E, W	U - H	2	1, 6	

Species	Common Name	Nox	Env	Life Form	Disper-sal	Priority	Risk	Control	Av.
**Hypericum perforatum*	St. John's Wort	*	*	P	H	H-S		1, 6	
**Ligustrum lucidum*	Tree Privet			Ls	I, B	S		1, 2, 7	
**Ligustrum ovalifolium*	Hedge Privet			S	I, B	S		1, 2, 8	
**Lonicera japonica*	Japanese Honeysuckle		*	V	?A	H	1	2, 7	A
**Malva neglecta*	Dwarf Mallow		*	P	H	U	2	1, 6	
**Melaleuca armillaris spp. armillaris*	Giant Honey Myrtle		*	T	?	N		1, 2, 7	A
**Melaleuca stypheloides*	Paperbark			Ls/T	H, W	N	3	2, 7	A
**Modiola caroliniana*	Carolina Mallow		*	P	H	U	2	1, 6	
**Myosotis sylvatica*	Wood Forget-me-not		*	P	E, ?H	U	2	1, 6	
**Oxalis incarnata*	Pale Wood-sorrel		*	Gb	V	S	1	1, 9	
**Oxalis pes-caprae*	Soursob	*	*	Gb	V	U	1	1, 9	
**Paspalum dilatatum*	Paspalum		*	P	E, H, I, W	S	1	1, 8, 11	
**Pennisetum clandestinum*	Kikuyu		*	P	?E, H, W	H -S	1	1, 8, 11	
**Phalaris aquatica*	Toowoomba Canary-grass		*	P	H, W	H-S		1, 8, 11	A
**Pinus radiata*	Monterey Pine		*	T	H, W	S	1	2, 3, 4, 7	A
**Plantago coronopus.*	Buck's-horn Plantains		*	P	E, H, I	U	2	1, 6	
**Plantago lanceolata*	Ribwort		*	P	H, W	U		1, 6	
** Plantago major*	Whiteman's foot		*	P	H, W	U		1, 6	
**Plectranthus ?ecklonii*	Blue Spur Flower			S		U		1, 2	
**Poa annua*	Winter Grass		*	A	I, W	U	2	1, 6	
**Polygonum aviculare*	Prostrate Knotweed		*	A	H	U	2	1, 6	
**Populus alba*	White Popular		*	T	H	S	3	2, 7	A
**Prunella vulgaris*	Self-Heal		*	A	H	U	2	1, 6	
**Prunus cerasifera*	Cherry Plum		*	T	B, H, I	S	2	1, 2, 6, 7	A
**Quercus robur*	English Oak			T	NA	U		NA	
**Quercus palustris*	Pin Oak			T	NA	U		NA	
**Ranunculus repens*	Creeping Buttercup		*	V	H	S-H	1	1, 6	
**Romulea rosea*	Onion-grass		*	P	H	U	2	1, 6	
**Rubus fruticosus spp. agg.*	Blackberry	*	*	Ls	B, I, V	H	1	1, 2, 8, 9	
**Rumex crispus*	Curled Dock		*	P	E, H, I, W	U	2	1, 6	
**Rumex pulcher spp. pulcher*	Fiddle Dock		*	P	E, H, I, W	U		1, 6	
**Salix spp.*	Willows		*	T	H, W	H-S	1	2, 7	

Species	Common Name	Nox	Env	Life Form	Disper -sal	Priority	Risk	Control	Av.
**Setaria gracilis*	Slender Pigeon Grass		*	P	H	U		1, 8, 11	
**Sisymbrium orientale*	Indian Hedge Mustard		*	B	H	U		1, 6	
**Solanum mauritianum*	Tree Tobacco		*	T	I, B	H, S		1, 2	
**Solanum pseudocapsicum*	Jerusalem Cherry		*	S	I, B	H, S		1, 2	
**Sonchus asper s.l.*	Rough Sow Thistle		*	A	E, H, W	U	2	1, 6	
**Sonchus oleraceus*	Common Sow Thistle		*	A	E, H, W	U	2	1, 6	
**Stellaria media*	Chickweed		*	A	E	U	2	1, 6	
**Taraxacum Sect. Ruderalia*	Dandelion		*	P	E, H, W	U	2	1, 6	
**Tradescantia albiflora*	Wandering Jew		*	P	V / H	H	1	1, 6, 8	
**Trifolium spp.*	Clover		*	P	E, H, I	U	2	1, 6	A
**Ulex europaeus*	Gorse	*	*	Ls	B, H	S	1	1, 6	
**Veronica arvensis*	Wall Speedwell		*	P	H	U		1, 6	
**Vinca major*	Blue Periwinkle		*	P	V, W	S - H	1	1, 6, 8	A?
**Watsonia meriana*	Bulbil Watsonia		*	Gc	H, V	H	1	1, 6, 9	A?

Legend

Nox * RC = Regionally Controlled weed in Victoria under *Catchment and Land Protection Act* 1994

Env. * recorded environmental weed (Carr *et al* 1992)

Risk: (Level of risk to indigenous vegetation in reserve.)

1 - Capable of invading plant communities and dominating vegetation.

2 - Generally restricted to disturbed areas or common but not usually dominating native vegetation.

3 - No regeneration of these species were observed.

Life Form

A	Annual
P	Perennial Herb
B	Biennial
S	Small-Medium Shrub
Gb	Bulbous Geophyte
Ss	Subshrub
Gc	Cormous Geophyte
T	Tree
Ls	Large Shrub
Gr	Rhizomatous Geophyte
V	Vine or Creeper
Gt	Tuberous Geophyte
X	Succulent

Control:

1. Foliar spray of herbicide.
2. Cut and Paint.
3. Ringbarking.
4. Cut off near ground level.
5. Mown, cut down or burnt with a flame thrower before seed ripens and followed by an Autumn or Spring burn.
6. Handweeding of small populations.
7. Drill and fill with herbicide.
8. Plants burnt or cut back to ground level and young regrowth sprayed with herbicide.
9. Smother with underfelt or carpet.
10. Scraping ..
11. Selective mowing, particularly before seed set, for suppression of perennial weeds.

Dispersal Mechanisms

E	Animal, external
H	Water
I	Animal (not birds), internal
W	Wind
B	Bird, internal
V	Vegetative
A	Ants

Status and/or Priority

H	High priority weed in need of constant and ongoing control across the reserve or in significant areas.
S	Species that occur as small populations or isolated individuals and may be potentially serious and advisable to attempt eradication.
U	Widespread ubiquitous species or low priority or difficult to eliminate but should be controlled in selected areas.
N	Native Australian species planted for ornamental purposes that do not pose a danger to indigenous vegetation and usually do not warrant control efforts.
E	Possibly eliminated from the Blackburn Creeklands because it has not been recorded for some time.

Availability:

Sold commercially in the region.

Appendix 5. Species Lists for Revegetation in Blackburn Creeklands

The following list includes the most common plants that currently or formerly occurred in the local native vegetation along the Blackburn Creeklands. They have been selected as being suitable for use in amenity horticulture, for revegetation works or for adding species diversity to remnant vegetation. This can also be used as a guide to what plants occur in the various plant communities found in the City. All plant names are based on the latest census of vascular plants from the Royal Botanic Gardens (Ross 2000).

Four basic vegetation communities may have occurred along the Creeklands. Some floristically similar vegetation communities have been grouped into major communities. It should be remembered that each community would have different species occurring in different microclimates; any revegetation project can have a variety of the species listed below but each site must be individually assessed to ensure suitable species are selected.

The list of species and descriptions of vegetation communities are summaries of information gathered from a wide variety of published and unpublished ecological reports. The numbered columns to the right of the plant names correspond to the numbers of the vegetation communities. The three vegetation community groupings are described below:

1. Yellow Box Open Forest

This community is characterised by its stunted overstorey of wattles with a sparse cover of herbs on dry rock ledges or Silurian rocky outcrops. The sub-canopy cover is composed of Lightwood (*Acacia implexa*), Black Wattle (*A. mearnsii*), Golden Wattle (*A. pycnantha*), Sweet Bursaria (*Bursaria spinosa*), Hazel Pomaderris (*Pomaderris aspera*), Burgan (*Kunzea ericoides*), Cherry Ballart (*Exocarpos cupressiformis*), and Small-leafed Clematis (*Clematis microphylla*). The understorey also features a range of tussock grasses such as Common Tussock-grass (*Poa labillardierei*) and Weeping Grass (*Microlaena stipoides*) and Mat-rushes (*Lomandra spp.*).

This community occupies the steep, exposed escarpments that overlook the floodplains of the Creeklands. Exposed Silurian rocky outcrops are common on these slopes.

2. Manna Gum Riparian Forest

This community is characterised by an open canopy of Manna Gum (*Eucalyptus viminalis*) and Yellow Box (*Eucalyptus melliodora*), over a dense, medium to tall shrub layer of Silver Wattle (*Acacia dealbata*), Tree Violet (*Hymenanthera dentata*), River Bottlebrush (*Callistemon sieberi*), Burgan (*Kunzea ericoides*), Swamp Paperbark (*Melaleuca ericifolia*), and River Tea-tree (*Leptospermum obovatum*). The groundstorey features Kangaroo Grass (*Themeda triandra*), Sword Tussock-grass (*Poa ensiformis*) and Common Tussock-grass (*Poa labillardierei*) on the drier, elevated banks, grading into the moist, sheltered riparian margins of club-sedges (*Isolepis spp.*), rushes (*Juncus spp.*), Common Reed (*Phragmites australis*), and Water-ribbons (*Triglochin procerum spp. agg.*) at the water's edge (LCC 1991 and Beardsell 2000).

This community can be found on floodplains along permanent streams. It is regionally significant given the extensive modification of riparian environments.

3. Swamp Paperbark Scrub and Swamp Gum Riparian Forest

Areas where these communities would occur may either be almost permanent billabongs, wet, shallow depressions on the floodplains that act as intermittent water-storage facilities. Swamp Gum Riparian Forest typically occurs in gullies with intermittent streams that often contain small, intermittent wetlands or more permanent wetlands.

These wet communities typically include a range of different species and structures depending on the specific site conditions. They include dense canopy species such as Swamp Paperbark (*Melaleuca ericifolia*) and Swamp Gum (*Eucalyptus ovata*). There is also an emergent reed-bed component from seasonal wetlands which consists of Tall Spike-sedge (*Eleocharis sphacelata*), Finger Rush (*Juncus subsecundus*), Milfoil (*Myriophyllum* spp.), Water Ribbons (*Triglochin procerum spp. agg.*), Cumbungi (*Typha spp.*), Common Reed (*Phragmites australis*) and various sedges (*Bolboschoenus* spp. *& Carex* spp.).

LIST **Vegetation Community:**

Scientific Name	Common Name	1	2	3
TREES				
Acacia dealbata	Silver Wattle		X	X
Acacia implexa	Lightwood	X	*X*	
Acacia mearnsii	Black Wattle	*X*	X	
Acacia melanoxylon	Blackwood		*X*	
Acacia pycnantha	Golden Wattle	X	*X*	
Allocasuarina littoralis	Black She-oak	*X*		
Allocasuarina verticillata	Drooping She-oak	*X*		
Banksia marginata	Silver Banksia		*X*	
Eucalyptus camaldulensis	River Red Gum		X	*X*
Eucalyptus goniocalyx	Long-leaf Box	X		
Eucalyptus melliodora	Yellow Box		X	
Eucalyptus obliqua	Messmate		X	
Eucalyptus ovata	Swamp Gum		*X*	
Eucalyptus radiata	Narrow-leafed Peppermint		X	
Eucalyptus viminalis	Manna Gum		X	
Exocarpos cupressiformis	Cherry Ballart	X	X	
SHRUBS		X		
Acacia acinacea	Gold-dust Wattle	*X*		
Acacia paradoxa	Hedge Wattle	*X*		
Acacia verticillata	Prickly Moses	X	X	*X*
Bursaria spinosa ssp. spinosa	Sweet Bursaria	X	X	*X*
Callistemon sieberi	River Bottlebrush		*X*	*X*
Cassinia aculeata	Common Cassinia	X	X	
Cassinia arcuata	Drooping Cassinia	*X*	*X*	
Cassinia longifolia	Shiny Cassinia		*X*	
Coprosma quadrifida	Prickly Coprosma		*X*	*X*
Correa glabra	Rock Correa	*X*		
Daviesia leptophylla	Narrow-leaf Bitter-pea	*X*		
Dodonaea viscosa ssp. cuneata	Wedge-leafed Hop-bush	X	X	
Goodenia ovata	Hop Goodenia		X	
Gynatrix pulchella	Hemp Bush	X	X	*X*
Hakea nodosa	Yellow Hakea	*X*		
Hymenanthera dentata	Tree violet		X	*X*
Indigofera australis	Austral Indigo	X		
Kunzea ericoides	Burgan	*X*	X	X
Leptospermum continentale	Prickly Tea-tree	X	X	

Scientific Name	Common Name	1	2	3
Leptospermum lanigerum	Woolly Tea-tree	X		*X*
Melaleuca ericifolia	Swamp Paperbark		*X*	*X*
Myoporum viscosum	Sticky Boobialla	X		
Olearia lirata	Snow Daisy-bush		X	X
Olearia ramulosa	Twiggy Daisy Bush	X		
Ozothamnus ferrugineus	Tree Everlasting		X	*X*
Pomaderris aspera	Hazel Pomaderris		X	*X*
Pomaderris prunifolia	Prunus Pomaderris	*X*		
Prostanthera lasianthos	Victorian Christmas-bush	*X*	*X*	
Pultenea gunnii	Golden Bush-pea	*X*		
Rapanea howittiana	Muttonwood		X	X
Sambucus gaudichaudiana	White Elderberry		X	
Solanum aviculare	Kangaroo Apple			*X*
Solanum laciniatum	Large Kangaroo Apple		X	X
Spyridium parvifolium	Dusty Miller	X	X	
Viminaria juncea	Golden Spray		X	X
GRASSES, SEDGES & RUSHES				
Agrostis aemula	Purplish Blown-grass			*X*
Agrostis avenacea	Common Blown-grass		*X*	X
Amphibromus fluitans	River Swamp Wallaby-grass			X
Amphibromus nervosus	Veined Swamp Wallaby-grass			X
Austrodanthonia caespitosa	Common wallaby-grass	*X*	*X*	
Austrodanthonia carphoides	Short Wallaby-grass	X	*X*	
Austrodanthonia duttoniana	Brown-black Wallaby-grass			*X*
Austrodanthonia eriantha	Reddish Wallaby-grass	*X*		
Austrodanthonia geniculata	Kneed Wallaby-grass		*X*	
Austrodanthonia laevis	Smooth Wallaby-grass	*X*		
Austrodanthonia penicillata	Slender Wallaby-grass	X		
Austrodanthonia pilosa	Velvet Wallaby-grass		*X*	
Austrodanthonia procera	Tall Wallaby-grass	*X*		
Austrodanthonia racemosa var. racemosa	Branched Wallaby-grass	*X*	X	
Austrodanthonia setacea	Bristly Wallaby-grass	*X*		
Austrodanthonia tenuior	Long-leaf Wallaby-grass	*X*		
Austrofestuca hookeriana	Hooker Fescue		X	
Austrostipa densiflora	Dense Spear-grass	*X*		
Austrostipa mollis	Spear-grass		X	
Austrostipa pubinodis	Tall Spear-grass	X		
Austrostipa rudis	Veined Spear-grass		X	

Scientific Name	Common Name	1	2	3
Austrostipa rudis ssp. nervosa	Veined Spear-grass	X		
Austrostipa scabra ssp. falcata	Slender Spear-grass	X		
Austrostipa semibarbata	Fibrous Spear-grass	X		
Baumea juncea	Bare Twig-sedge	X		X
Bolboschoenus caldwellii	Salt Club-rush			X
Bolboschoenus medianus	Marsh Club-sedge			X
Carex appressa	Tall Sedge		X	X
Carex breviculmis	Short-stem Sedge	X		
Carex fascicularis	Tassel Sedge		X	X
Carex gaudichaudiana	Fen Sedge		X	X
Carex incomitata	Hillside Sedge		X	X
Carex inversa	Common Sedge	X		
Carex iynx	Tussock Sedge	X		
Carex tereticaulis	Rush Sedge		X	X
Chamaescilla corymbosa var. corymbosa	Blue Squill	X		
Cyperus lucidus	Leafy Flat-sedge			X
Deyeuxia quadriseta	Reed Bent-grass			
Dichelachne crinita	Long-hair Plume-grass	X		
Dichelachne micrantha	Short-hair Plume-grass	X		
Echinopogon ovatus	Common Hedgehog-grass	X	X	
Eleocharis acuta	Common Spike-sedge			X
Eleocharis gracilis	Slender Spike-sedge			X
Eleocharis sphacelata	Tall Spike-sedge			X
Elymus scabrus	Common Wheat-grass	X		
Eragrostis brownii	Common Love-grass			X
Gahnia radula	Thatch Saw-sedge	X	X	
Glyceria australis	Australian Sweet-grass			X
Hemarthria uncinata	Mat Grass		X	X
Isolepis cernua	Nodding Club-Sedge		X	
Isolepis hookeriana	Grassy Club-sedge			X
Isolepis fluitans	Floating Club-sedge			X
Isolepis inundata	Swamp Club-sedge		X	X
Isolepis nodosa	Knobby Club-rush			X
Isolepis platycarpa	Club-rush			X
Juncus amabilis	Hollow Rush		X	X
Juncus australis	Austral Rush			X
Juncus bufonius	Toad Rush			X
Juncus flavidus	Rush			X

Scientific Name	Common Name	1	2	3
Juncus gregiflorus	Green Rush		X	X
Juncus pallidus	Pale Rush		*X*	
Juncus pauciflorus	Loose-flower Rush		*X*	*X*
Juncus sarophorous	Rush		X	X
Juncus subsecundus	Finger Rush			X
Lepidosperma laterale	Variable Sword-sedge	*X*	X	
Lomandra filiformis ssp. coriacea	Wattle Mat-lily	X		
Lomandra filiformis ssp. filiformis	Wattle Mat-lily	X		
Lomandra longifolia	Spiny-headed Mat-lily	X	X	
Lomandra micrantha	Small-flower Mat-lily	*X*		
Lomandra nana	Dwarf Mat-lily	X		
Luzula ovata	Woodrush	*X*		
Microlaena stipoides	Weeping Grass	*X*	X	X
Notodanthonia semiannularis	Wetland Wallaby-grass			*X*
Phragmites australis	Common Reed		X	X
Poa ensiformis	Sword Tussock-grass		X	X
Poa labillardierei	Common Tussock-grass		X	X
Poa morrisii	Soft Tussock-grass	*X*		
Poa sieberiana	Grey Tussock-grass			
Poa tenera	Slender Tussock		X	X
Schoenus apogon	Common Bog-sedge	*X*	*X*	
Schoenoplectus validus	River Club-sedge			X
Themeda triandra	Kangaroo Grass		X	
Triglochin procerum spp. agg.	Water Ribbons			X
Typha domingensis	Cumbungi			X
Typha orientalis	Cumbungi			X
Xanthorrhoera minor	Small Grass Tree	*X*		
VINES & CREEPERS				
Billardiera scandens	Common Apple-berry	*X*		
Calystegia sepium	Large Bindweed			X
Clematis aristata	Mountain Clematis		X	
Clematis microphylla	Small-leafed Clematis	X	X	
Hardenbergia violacea	Purple Coral-pea	X		
Rubus parvifolius	Native Bramble	X	X	X
LILIES, DAISIES & OTHERS				
Acaena agnipila	Hairy Sheep's Burr	X		
Acaena echinata	Sheep's Burr	*X*		
Acaena ovina	Australian Sheep's Burr	*X*		

Scientific Name	Common Name	1	2	3
Acaena novae-zelandiae	Bidgee-widgee		X	X
Ajuga australis	Austral Bugle		X	
Alisma plantago-aquatica	Water Plantain			X
Alternanthera denticulata	Lesser Joyweed			X
Amyema pendulum	Drooping Mistletoe		X	
Apium prostratum	Sea Celery			*X*
Arthropodium minus	Small Vanilla-lily	X		
Arthropodium strictum	Chocolate-lily	*X*		
Asperula conferta	Common Woodruff	X		
Astroloma humifusum	Cranberry Heath	X		
Atriplex semibaccata	Berry Saltbush	*X*		
Bossiaea prostrata	Creeping Bossiaea	*X*		
Brachyscome multifida	Cut-leaf Daisy	X		
Brunonia australis	Blue Pincushion	*X*		
Bulbine bulbosa	Yellow Bulbine-lily	X		
Burchardia umbellata	Milkmaids	X		
Caesia calliantha	Blue Grass-lily	*X*		
Callitriche muelleri	Round Water Star-wort			*X*
Calystegia sepium	Large Bindweed		X	X
Carpobrotus modestus	Inland Pigface	X		
Centella cordifolia	Centella		X	X
Centipeda cunninghamii	Common Sneezeweed			X
Centipeda minima	Spreading Sneezeweed			X
Chrysocephalum apiculatum	Common Everlasting	*X*		
Chrysocephalum semipapposum	Clustered Everlasting	*X*		
Comesperma volubile	Love Creeper	*X*		
Convolvulus erubescens	Pink Bindweed	X		
Convolvulus remotus	Grassy Bindweed	*X*		
Crassula helmsii	Swamp Crassula			*X*
Crassula sieberiana	Sieber Crassula	*X*		
Cymbonotus preissianus	Austral Bear's Ear	*X*		
Cynoglossum suaveolens	Sweet Hound's-tongue	X		
Daucus glochidiatus	Austral Carrot	X		
Dianella longifolia	Pale Flax-lily	*X*	X	
Dianella revoluta	Black-anther Flax-lily	X		
Dichondra repens	Kidney-weed	*X*	*X*	
Dillwynia cinerascens	Grey Parrot-pea	*X*		
Drosera peltata ssp. auriculata	Tall Sundew	*X*	X	

Scientific Name	Common Name	1	2	3
Drosera peltata ssp. peltata	Pale Sundew	*X*		
Drosera whittakeri	Scented Sundew	X		
Einadia nutans	Nodding Saltbush	X		
Elatine gratioloides	Waterwort	X		X
Enchylaena tomentosa	Ruby Saltbush	X		
Epilobium billardierianum	Robust Willow-herb			*X*
Epilobium hirtigerum	Hairy Willow-herb	X		*X*
Euchiton involucratus	Star Cudweed			X
Eutaxia microphylla	Common Eutaxia	*X*		
Galium gaudichaudii	Rough Bedstraw	*X*		
Geranium inundatum	Naked Crane's-bill			*X*
Geranium retrorsum	Grassland Crane's-bill	X		
Geranium solanderi	Austral Crane's-bill	*X*		
Glycine latrobeana	Clover Glycine	*X*		
Glycine microphylla	Small-leaf Glycine	*X*	X	
Glycine tabacina s.l.	Variable Glycine	X		
Gonocarpus humilis	Shade Raspwort		X	
Gonocarpus tetragynus	Common Raspwort		X	
Goodenia geniculata	Bent Goodenia		X	X
Goodenia pinnatifida	Cut-leaf Goodenia	X		
Gratiola peruviana	Brooklime			X
Haloragis heterophylla	Varied Raspwort			X
Helichrysum scorpioides	Button Everlasting	*X*		
Hibbertia riparia	Upright Guinea Flower	X		
Hovea heterophylla	Common Hovea	X		
Hydrocotyle hirta	Hairy Pennywort	X	*X*	*X*
Hydrocotyle laxiflora	Stinking Pennywort	X	X	X
Hypericum gramineum	Small St. John's Wort	X		
Hypericum japonicum	Matted St John's Wort			*X*
Hypoxis glabella	Yellow Star	X		
Hypoxis hygrometrica	Golden Weatherglass	*X*		
Isotoma fluviatilis ssp. australis	Swamp Isotome			*X*
Kennedia prostrata	Running postman	*X*		
Lagenophora stipitata	Blue Bottle-daisy	*X*		
Lemna disperma	Water-duckweed			X
Leptorhynchos squamatus	Scaly Buttons	X		
Leptorhynchos tenuifolius	Wiry Buttons	*X*		
Leucopogon virgatus	Common Beard-heath	*X*		

Scientific Name	Common Name	1	2	3
Linum marginale	Native Flax	X		
Lobelia anceps	Angled Lobelia			X
Lobelia pratioides	Poison lobelia			*X*
Lycopus australis	Australian Gypsywort		X	X
Lythrum hyssopifolia	Small Loosestrife			*X*
Lythrum salicaria	Purple Loosestrife			X
Mentha australis	River Mint			X
Microseris scapigera	Yam-daisy	X		
Muellerina eucalyptoides	Creeping Mistletoe		*X*	
Myriophyllum crispatum	Upright Milfoil			X
Neopaxia australasica	White Purslane			X
Nymphoides crenata	Wavy Marshwort			X
Opercularia ovata	Broad-leaf Stinkweed	X		
Opercularia varia	Variable Stinkweed	*X*		
Oxalis exilis	Wood-sorrel	*X*		
Oxalis perennans	Wood-sorrel	*X*		
Pelargonium australe	Austral Stork's Bill	*X*	X	
Persicaria decipiens	Slender Knotweed		X	X
Persicaria hydropiper	Water-pepper			X
Pimelea humilis	Common Rice-flower	*X*		
Pimelea linifolia	Slender Rice-flower	*X*		
Plantago varia	Variable Plantain	X		
Platylobium obtusangulum	Common Flat-pea	X		
Poranthera microphylla	Small Poranthera	X		
Potamogeton ochreatus	Blunt Pondweed			X
Potamogeton tricarinatus	Floating Pondweed		X	
Prunella vulgaris	Self-heal		X	*X*
Pseudognaphalium luteoalbum	Jersey Cudweed			*X*
Ranunculus inundatus	River Buttercup			*X*
Rumex bidens	Mud Dock			X
Rumex brownii	Slender Dock	X		
Samolus repens	Creeping Brookweed			X
Sebaea ovata	Yellow Sebaea			
Selliera radicans	Shiny Swamp-mat			*X*
Senecio biserratus	Jagged Fireweed	X		
Senecio glomeratus	Annual Fireweed	*X*		
Senecio minimus	Shrubby Fireweed	X	X	X
Senecio quadridentatus	Cotton Fireweed	*X*		X

Scientific Name	Common Name	1	2	3
Senecio tenuiflorus	Narrow Groundsel	*X*		
Solenogyne dominii	Solenogyne	X		
Stackhousia monogyna	Creamy Candles	*X*		
Stellaria caesposita	Matted Starwort			X
Stellaria flaccida	Forest Starwort			X
Stellaria pungens	Prickly Starwort		X	
Stylidium graminifolium	Grass Trigger-plant	X		
Thysanotus patersonii	Twining Fringe Lily	X		
Tricoryne elatior	Yellow-Rush-lily		X	
Urtica incisa	Scrub-Nettle			*X*
Veronica calycina	Hairy Speedwell	*X*		
Veronica gracilis	Slender Speedwell	X		
Veronica plebeia	Trailing Speedwell	*X*	X	
Vittadinia muelleri	Narrow Leaf New-Holland Daisy	*X*		
Wahlenbergia communis	Tufted Bluebell	*X*		
Wahlenbergia gracilis	Sprawling Bluebell		X	
Wahlenbergia stricta	Tall Bluebell	*X*		
Wurmbea dioica	Common Early Nancy	X		
FERNS AND FERN ALLIES				
Azolla filiculoides	Pacific Azolla			*X*
Azolla pinnata	Ferny Azolla			*X*
Calochlaena dubia	Common Ground Fern			*X*
Pteridium esculentum	Austral Bracken	*X*	X	

Map 1a. Vegetation Quality and Condition Assessment: Middleborough Rd. to Pakenham St.

Map 1b. Vegetation Quality and Condition Assessment: Pakenham St. to Waratah Cr.

Map 1c. Vegetation Quality and Condition Assessment: Waratah Cr. To Main St.

Map 1d. Vegetation Quality and Condition Assessment: Main St. to Blackburn Rd.

Key to Vegetation Quality and Condition Assessment.

Group 1. Areas actively managed as open parkland and/or dominated by exotic vegetation:

A: Areas cleared of indigenous trees and shrubs or with no indigenous trees and consisting substantially of introduced species in the groundstorey with substantial physical disturbance. Includes open parkland or ovals without any remnant tree overstorey. Includes small areas of eroded or undercut creek bank.

B: Areas of trees of which less than 50% are indigenous. There is no shrub understorey. Non-indigenous ground layer.

E: Areas containing trees and/or shrubs and groundstorey, with no indigenous species present in any layer. Usually, all plants are exotic.

Group 2. Areas with indigenous plants present in the tree or shrub layer but dominated by exotic plants, providing an existing but minimal indigenous framework for recreating indigenous vegetation communities:

C: Areas of trees of which 50% or more are indigenous, with no shrub understorey and a non-indigenous ground layer.

D: Areas with ground layer, shrub layer and tree layer present, with trees the only indigenous plants, or areas where shrubs are the only indigenous plants, with or without a tree overstorey.

Group 3. Areas with moderate levels of indigenous species and often including moderate to high levels of weed cover:

F: Areas with a young eucalypt overstorey and shrub layer removed, with a moderate cover of both indigenous and introduced species in the ground layer.

G: Overstorey is made up of Acacias or shrubs, but no eucalypts. Groundstorey has a moderate to high cover of introduced species, but also contains bracken or other indigenous species.

H: Areas with tree, shrub and herb/grass layers with an indigenous overstorey. An indigenous shrub layer and/or groundstorey layer are present. There is also a high cover of weeds in the shrub or groundstorey. Indigenous overstorey, rarely with occasional non-indigenous trees or mulch with no ground cover.

Group 4. Areas substantially dominated by indigenous vegetation, whether as remnants or through revegetation works, which consist of a range of different qualities requiring different management approaches:

I: Areas with all layers of indigenous vegetation present, with a moderate cover of weeds in one or more layers of vegetation.

J: Revegetated area, five years old or less, containing no remnant vegetation. May have non-indigenous overstorey.

K: Areas of high quality indigenous revegetation plots, substantially free of introduced plants and weeds. All layers of indigenous vegetation present, tree, shrub, and herb/grass layers are present.

L: Area of vegetation, five years old or less, with older indigenous overstorey.

M: Areas of high quality indigenous revegetation plots, substantially free of introduced plants and weeds. All layers of indigenous vegetation present, tree, shrub, and herb/grass layers are present, with older indigenous overstorey.

N: Wetlands with open patches of water and rushes, The areas may contain a mixture of indigenous and introduced species.

BOXES ON MAPS (blue pen lines)

1. Black's Walk Reserve. The creek, including the creek junction, is incorrectly shown on the map, making accurate vegetation assessment impossible to draw. Vegetation classes shown are those that are prevalent in the area. Vegetation classes to the north of the creeks have been expanded to fit the map.
2. Kalang Recreation Reserve and Laurel Grove maps. There is a flat area of up to approximately fifteen metres, between the path and the top of the creek bank, which is not shown on the map.

Vegetation classes have been shrunk to fit the map. The area shown as creek bank on the map, includes vegetation classes that belong on the flat area above the bank. Generally, classes A and E belong on the bank, and classes D and H on the flat area.

3. Kalang Recreation Reserve and Laurel Grove maps. The area between the steeply contoured creek bank and the path is approximately five metres wide or less. It is shown much wider than this on the map. Vegetation classes have been lengthened to fit the map
4. Laurel Grove map. A moderately large bend in the creek is not shown on the map. Vegetation classes to the south of the creek have been shrunk, and those in the north expanded, to fit the map.
5. Furness Park map. Numerous bends in the creek are not shown, making mapping of the vegetation classes less accurate. The large area of vegetation class H between Main St. and the first bend shown on the map, is much smaller in reality.

NOTES

The area on the Furness Park map, to the north of the creek, between Blackburn Rd. and the back of 8 Furness St. is inaccessible.

Wandering Jew is common, especially along the creek at the western end of the Kalang Recreation Reserve map, where it is particularly thick.

On the Black's Walk Reserve map, the large area of vegetation class D on the west of the map, has hawthorn growing thickly in it, making access difficult.

+ Black's Walk Reserve map: A small area of vegetation class B, one third of the way down the western side of the map, labeled +, has a ground cover layer with a moderate cover of both indigenous and non-indigenous species.

Map 2a. Management Blocks and Sites of Significance: Middleborough Rd. to Pakenham St.

Map 2b. Management Blocks and Sites of Significance: Pakenham St. to Waratah Cr.

Map 2c. Management Blocks and Sites of Significance: Waratah Cr. To Main St.

Map 2d. Management Blocks and Sites of Significance: Main St. to Blackburn Rd.

Map 3a. Pre-European Vegetation Communities: Middleborough Rd. to Pakenham St.

Map 3b. Pre-European Vegetation Communities: Pakenham St. to Waratah Cr.

Map 3c. Pre-European Vegetation Communities: Waratah Cr. To Main St.

Map 3d. Pre-European Vegetation Communities: Main St. to Blackburn Rd.