

# **GLENBROOK LAGOON**

**MT SION**

**AND**

**MITCHELL'S PASS**



## **Plan of Management**

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## **PART ONE**

### **1 INTRODUCTION**

#### **1.1 COUNCIL'S VISION AND CORPORATE GOALS**

This plan of Management covers Glenbrook Lagoon, Mt Sion and Mitchell's Pass (from hereon referred to as The Reserve). In setting out the framework for the use and management of The Reserve, it is vital that the Plan of Management fulfils Council's vision and corporate goals.

In its current vision statement, Blue Mountains City Council places considerable emphasis on realising community aspirations relating to its philosophy of a City within a National Park. These aspirations relate to harmony, environment, economy, lifestyle, social justice and culture. To achieve its vision, Council has adopted 8 corporate goals that relate to:

- city planning;
- community and recreation;
- democratic government;
- environmental protection;
- land use management;
- organisational support;
- tourism and enterprise development; and
- transport and public works.

Each of these goals has relevance for The Reserve and are implicit in this Plan of Management.

#### **1.2 BACKGROUND**

Glenbrook Lagoon, Mt Sion and the upper section of Mitchell Pass are all Council lands that form a virtually continuous green corridor in the lower mountains. The Mt Sion Plan of Management (adopted in 1999) proposed incorporating these three areas into a strategic open-space network. This document will address all three areas in one. Glenbrook Lagoon, Mt. Sion and Mitchell's Pass together comprise approximately 38 ha. Glenbrook Lagoon is one of the few areas of naturally occurring lagoon wetland in the eastern escarpment of the Blue Mountains. The area provides an important habitat for lower mountains flora and fauna as well as being an important accessible natural area for recreation and education. The challenge to be addressed by Council and the community is to ensure that these area's environmental values are protected and that the natural values of the Lagoon and its surrounding green corridors are maintained and restored where required.

### **1.3 WHAT IS A PLAN OF MANAGEMENT?**

A Plan of Management is a document available to the community that is to provide clear guidelines for the management of community land. Under the *Local Government Act 1993*, plans of management are the key documents that govern the use and management of sites such as Glenbrook Lagoon, Mt Sion and Mitchell's Pass.

There are various components that must be included in a Plan of Management:

- The identification of the categories applying to the land;
- The objectives and performance targets of the plan with respect to the land;
- The means by which Council proposes to achieve the plan's objectives and performance targets;
- How Council proposes to assess its performance with respect to the plan's objectives and performance targets.

A Plan of Management establishes directions for planning, resource management and maintenance of community land and is intended for use by Council staff and for the information of the public in general.

### **1.4 WHAT DOES THIS PLAN OF MANAGEMENT DO?**

A summary of the management direction proposed in the Plan of Management is outlined below:

- Ensure adequate access for residents and emergency services.
- Support the Rural Fire Service and NSW Fire Brigades in their role of protecting life and property.
- Continue works to reduce sedimentation of waterways and to enhance water quality.
- Preserve landscape character and village ambience.
- Implement measures to provide for attainment of core objectives, particularly those relating to restoration of degraded areas and minimising threats to natural habitats within the site.
- Recommend that those areas categorised as "Natural Areas" within this Plan of Management be zoned "Environmental Protection" within any future LEP that applies to those areas, to ensure that the land is protected from any inappropriate development.
- Protect the recreational resource of Glenbrook Lagoon, Mt Sion and Mitchell's Pass.

Further information on these measures is provided in Section 2 of the Plan of Management.

This Plan of Management is intended to provide an appropriate framework for future planning and management and a sound basis from which further policies and programs can be developed in the future.

## 1.5 COMMUNITY CONSULTATION

Community consultation plays an important role in the formulation of any Plan of Management. It provides Council with a sound understanding of relevant local issues from people who are familiar with and use the sites in question. To a large degree, the direction for the future development of recreational assets is based on the views expressed by the community in general, as well as key stakeholders.

Public involvement and consultation generates an understanding of Council's land management aims, combats misinformation and misunderstanding, and fosters support for Council's programs and policies. Co-operation with and contributions from the users of community land facilitates management and lends weight to the status of the Plan of Management.

This draft Plan of Management endeavours to incorporate the concerns previously raised by the community during previous exhibition of the Mt Sion Park Plan of Management in 1999 (Table 1). The current Plan of Management combines the Mt Sion Plan of Management with the nearby areas of Glenbrook Lagoon and Mitchell's Pass.

**Table 1. Issues raised previously in public consultation in 1999.**

ISSUE	DETAIL
Residential amenity	<ul style="list-style-type: none"> <li>• concern about lack of provision to limit impacts of development on residents</li> </ul>
Bushland values	<ul style="list-style-type: none"> <li>• more integrated approach to bushland management</li> <li>• consideration of impact of works and ongoing active recreational use on bushland (eg weeds, drainage, erosion, sedimentation).</li> </ul>
Water Quality	<ul style="list-style-type: none"> <li>• control of noxious aquatic weed species</li> <li>• identify impacts on water quality</li> <li>• aim for increase in water quality</li> </ul>
Environmental threats	<ul style="list-style-type: none"> <li>• inadequacy of fauna assessment</li> <li>• inadequate bushfire hazard assessment</li> <li>• weed infestations</li> </ul>
Community consultation	<ul style="list-style-type: none"> <li>• need for a more transparent and community-based management approach to the Park</li> <li>• consultation focused on residents.</li> </ul>

An adopted Plan of Management in accordance with the *Local Government Act 1993* provides the most effective and transparent means for Council to ensure the protection and appropriate use of the reserves. Residents input and suggestions for the management of the reserves from residents is actively encouraged.



## **2.0 DESCRIPTION OF GLENBROOK LAGOON, MT SION AND MITCHELLS PASS**

### **2.1 SITE LOCATION AND DESCRIPTION**

Glenbrook Lagoon, Mt Sion and Mitchell's Pass (from hereon referred to as The Reserve) are located in the lower Blue Mountains within the township of Glenbrook (Figure 1- overleaf). These areas are managed by the Blue Mountains City Council as community land and contain many valuable natural heritage features. The Reserve is subject to pressures from adjacent urban areas and their associated impacts.

Glenbrook lagoon is surrounded by residential properties. A small linkage to the east connects the Lagoon with Mt Sion Park, which in turn is connected to Mitchell's Pass effectively creating a green corridor to Lapstone Reserve on the eastern escarpment (Figure 2).

Glenbrook Lagoon (Figure 3) comprises a natural lagoon wetland which varies in depth from two to eight metres. The lagoon and the surrounding reserve of natural bushland is approximately 16 hectares in area.

Mount Sion Park (Figure 4) is located centrally within the developed residential area of Glenbrook, north of the Great Western Highway. The 13.2 hectare reserve is well vegetated and has a central ridge along a south-west to north-east axis, falling in altitude from 235 metres to below 200 metres to the park's northern boundary. The slope down to the south-eastern boundary is of a steeper gradient and is subject to gully erosion. Apart from an existing sealed road, there is no development on Mt Sion. Main roads adjacent to the site are Glenbrook Road, Mitchell's Pass and Olivet Street. While surrounded by development, Mt Sion Park occupies the crown of the mountain, thus urbanisation impacts flow away from the park, leaving it relatively weed free.

Mitchell's Pass (Figure 5) follows Lapstone Creek down to Emu Plains. As with most creeklines flowing from urbanised areas, the top of Mitchell's Pass Creek is heavily infested by weeds. The 9.05 hectare area of Mitchell's Pass that is Council land adjoins Knapsack Reserve which is Crown Land.

#### **2.1.1 Topography, Geology and Soils**

Glenbrook Lagoon is approximately 200 metres above sea level, and is one of several small lakes that have developed between the monocline and the faults, within the Blue Mountains. Water has ponded behind the fault at Lapstone and formed Glenbrook Lagoon. Mountain Lagoon in Hawkesbury LGA is another example where this has occurred.

Triassic Hawkesbury Sandstone underlies Glenbrook Lagoon, Mt Sion and Mitchell's Pass. It is comprised of medium to coarse grained quartz sandstone with minor shale and laminite lenses. The vegetation of Glenbrook Lagoon reflects a more dominant shale component than the adjoining areas.

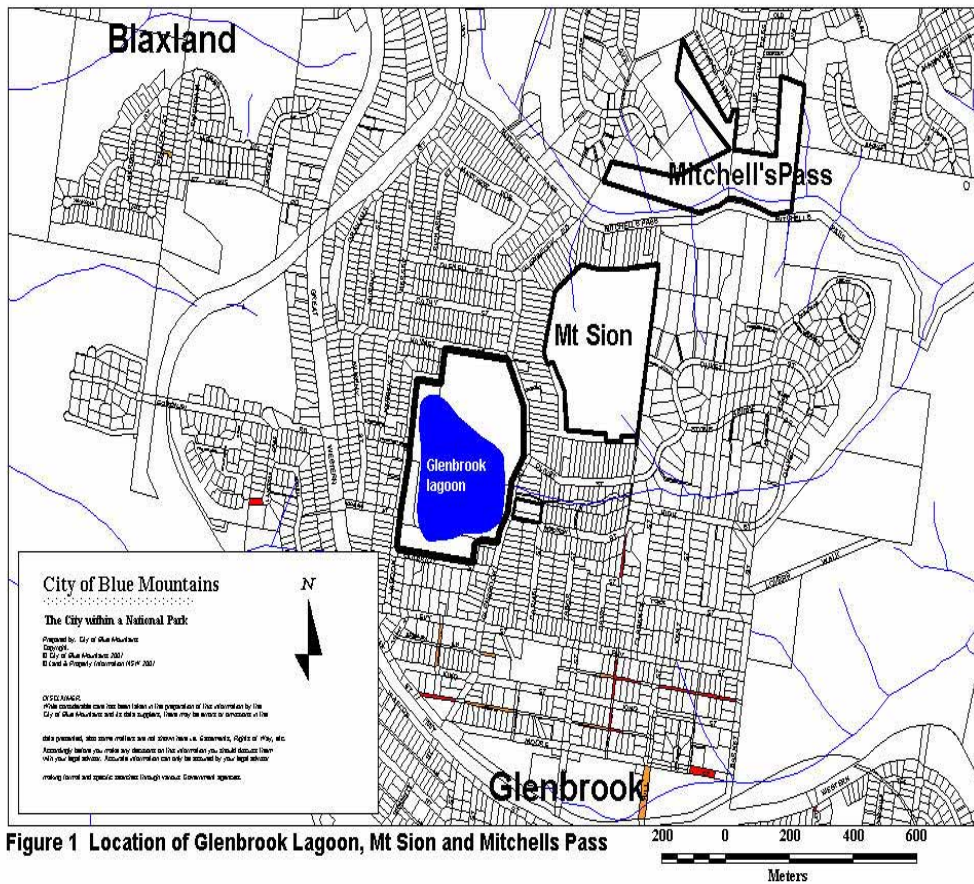


Figure 1 Location of Glenbrook Lagoon, Mt Sion and Mitchell's Pass

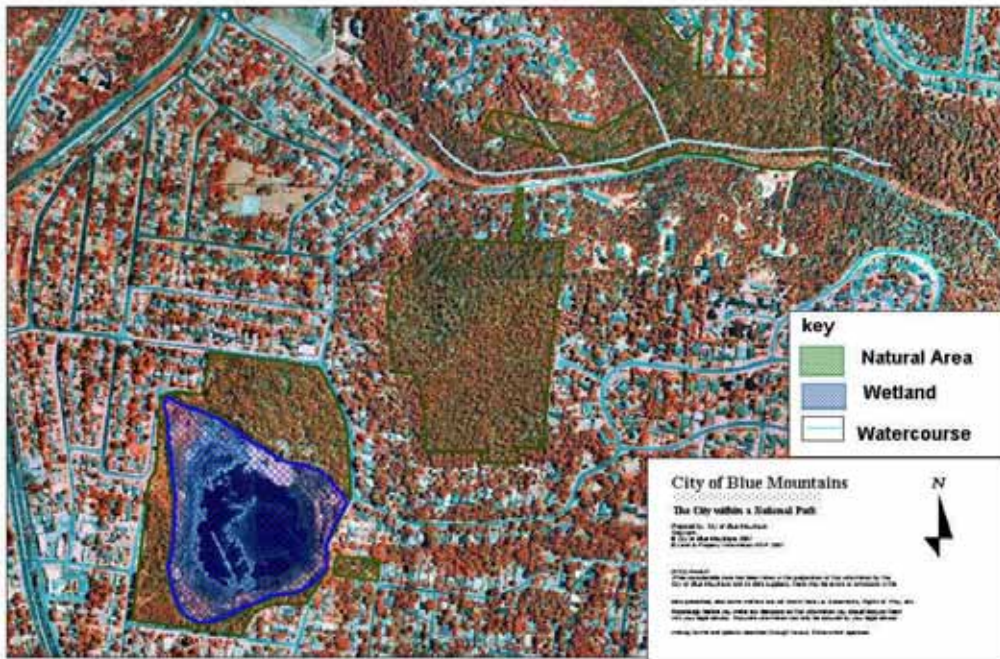


Figure 2 Land Categories - Natural Areas





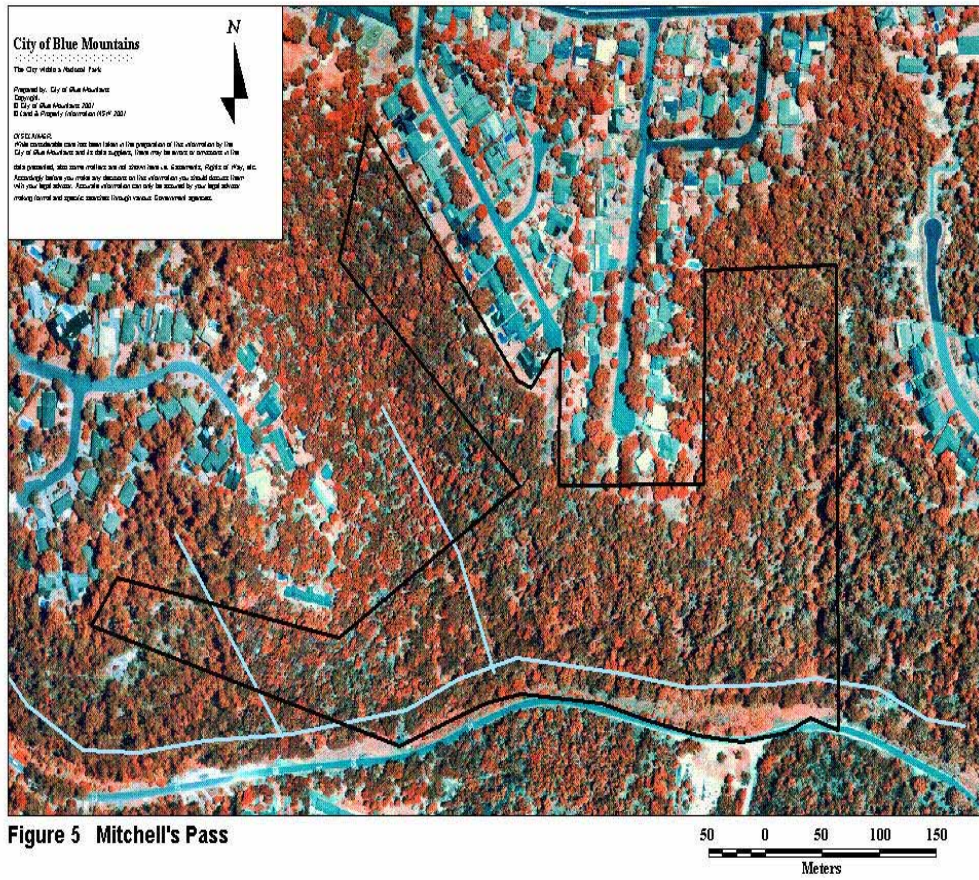
Figure 3 Glenbrook Lagoon

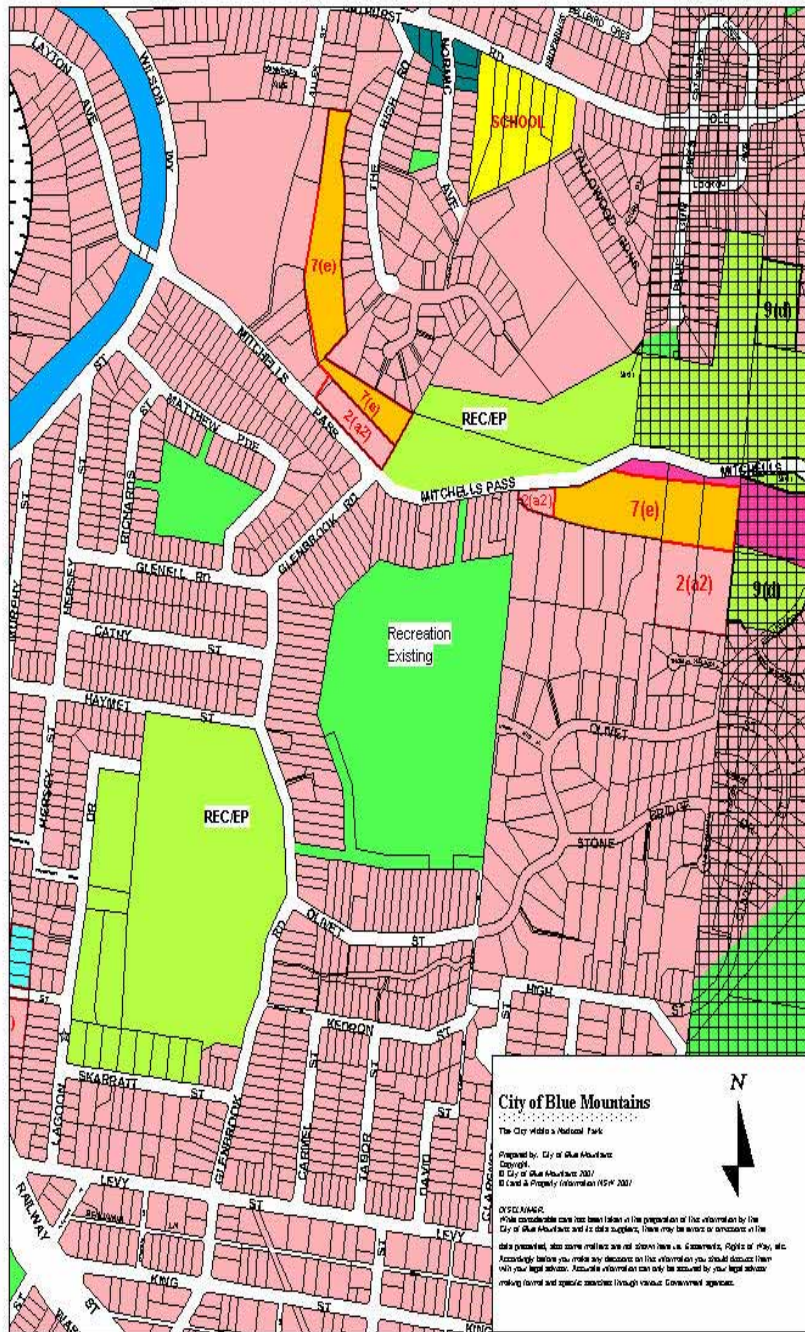




Figure 4 Mt Sion



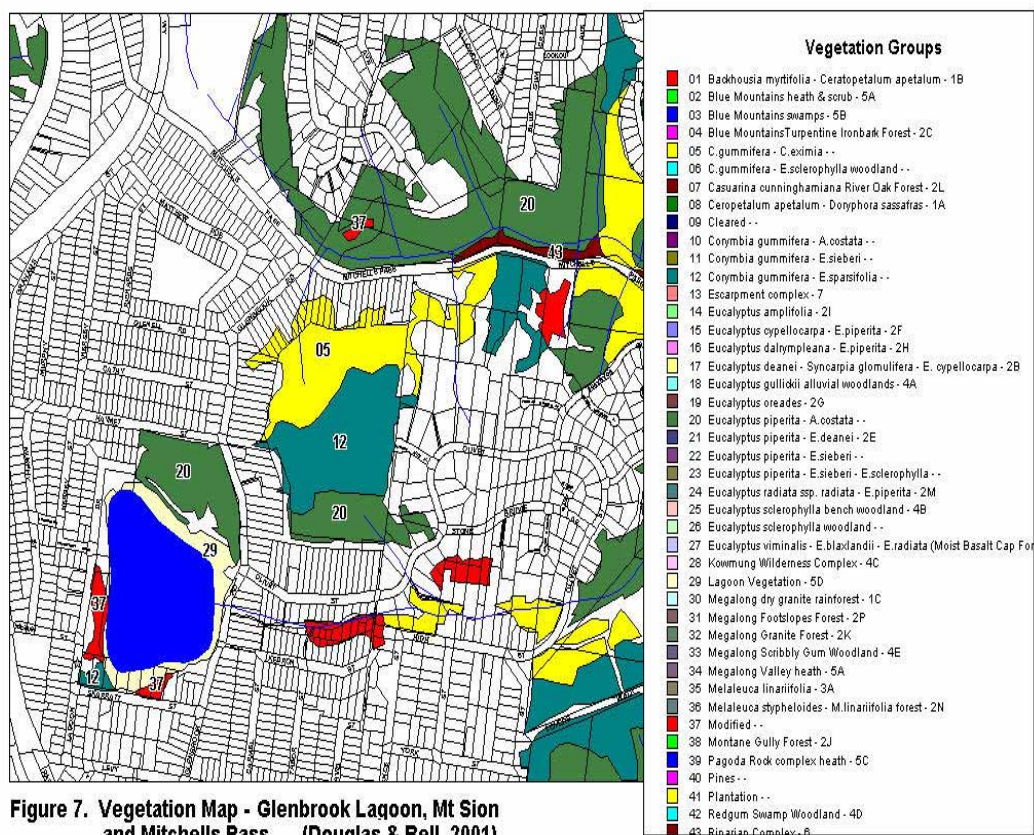




100 0 100 200 300  
Meters



# Glenbrook Lagoon Park Plan of Management



**Figure 7. Vegetation Map - Glenbrook Lagoon, Mt Sion and Mitchells Pass (Douglas & Bell, 2001)**



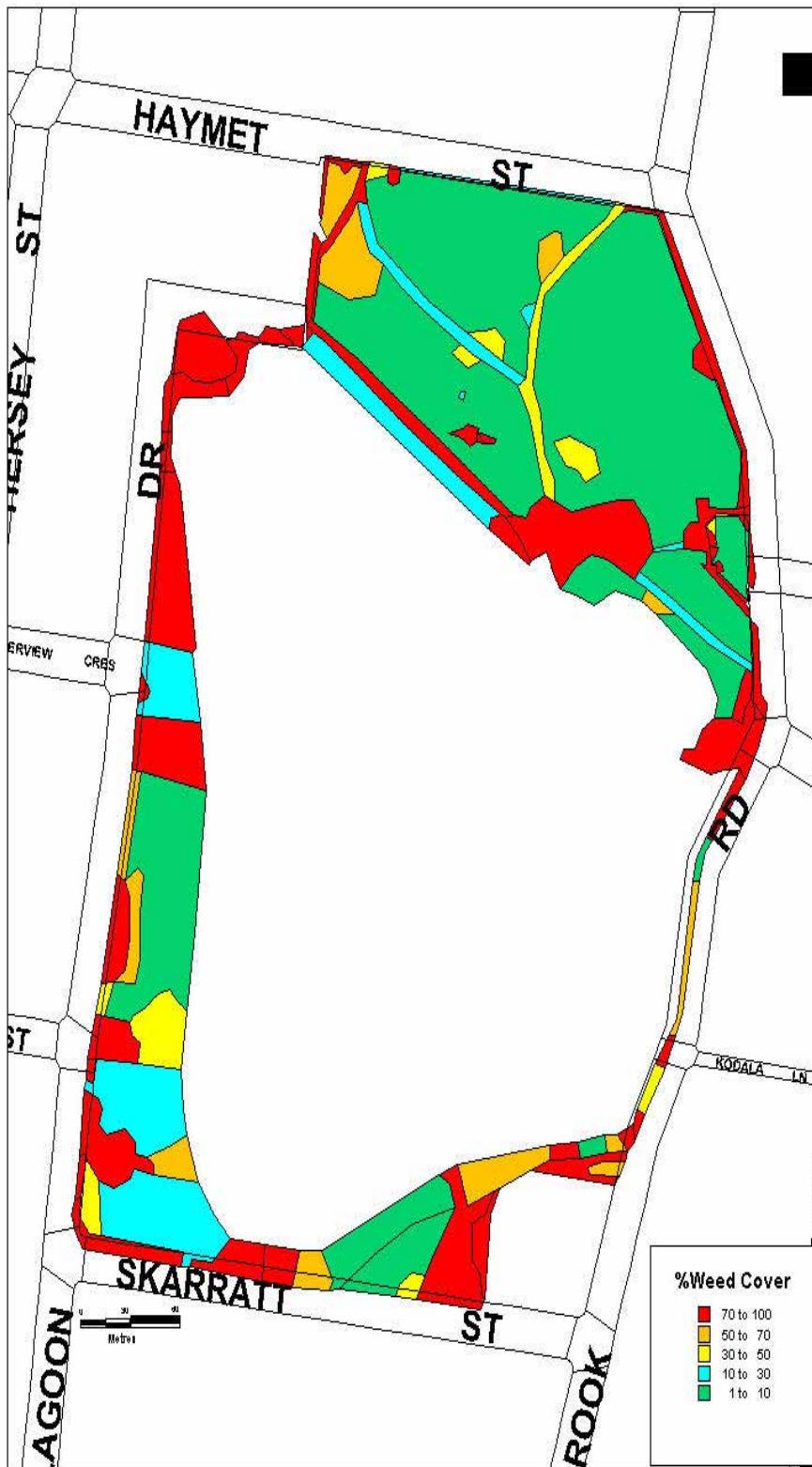


Figure 8 Ratio of % Weed Cover to Native Vegetation Cover for Glenbrook Lagoon

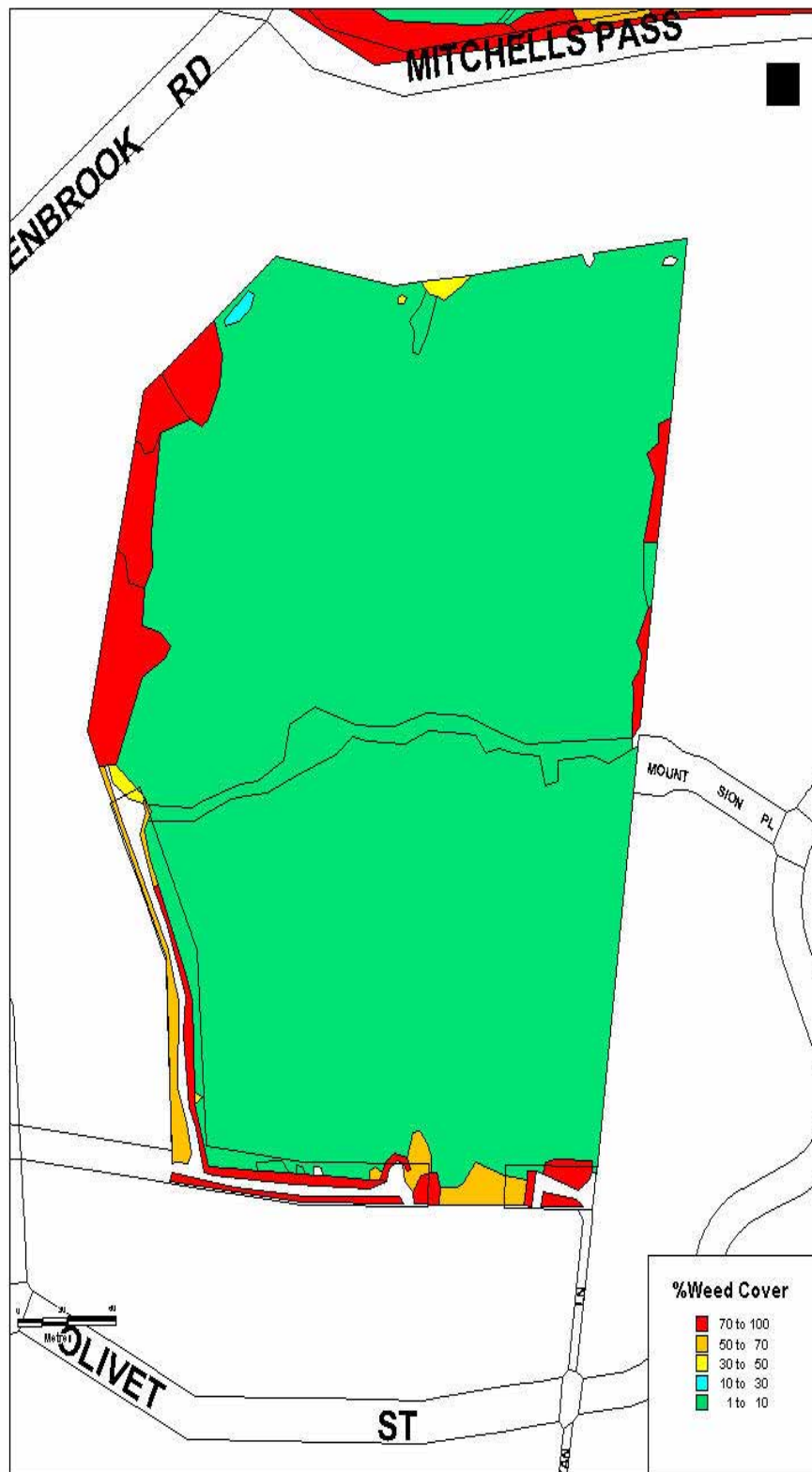


Figure 9 Ratio of % Weed Cover to Native Vegetation Cover for Mt Sion, Glenbrook

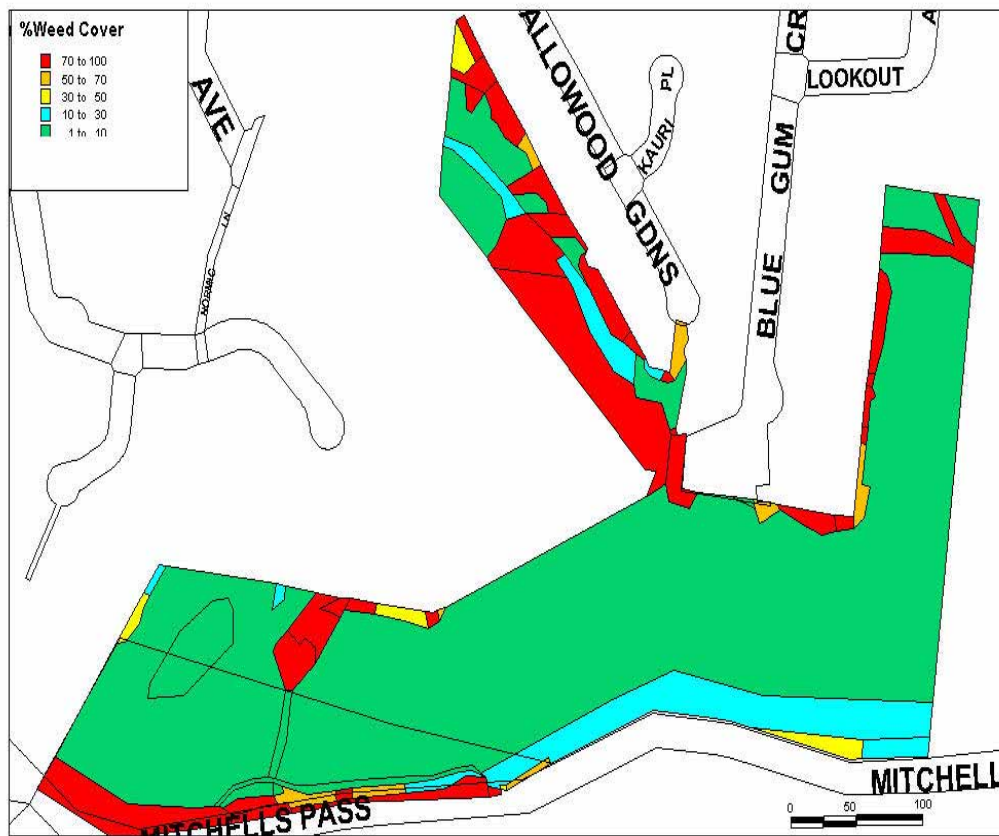


Figure 10 Ratio of % Weed Cover to Native Vegetation Cover for Mitchell's Pass

Soils in the area are generally shallow yellow podzolics, duplex soils with a light textured topsoil overlying clayey subsoils, earthy loams and light sandy clay loams. All soils are highly permeable and very shallow, features which can lead to pollution of the groundwater from urban stormwater.

### **2.1.2 Climate**

The climate in the Blue Mountains differs from warm temperate in the lower altitudes to cool temperate in the upper mountains. Glenbrook at an elevation of 200 metres, is the nearest weather station to The Reserve and it experiences a mild climate, with temperatures ranging from 18-29°C in summer and 4-17°C in winter. Rainfall is variable but normally within the range of 800 – 900 mm per annum.

### **2.1.3 Vegetation Communities**

Glenbrook Lagoon is one of the very few lagoon-type wetlands in the Blue Mountains (Smith and Smith, 1995). This rare wetland provides habitat for flora and fauna species that are otherwise unusual in the area. Two regionally significant plants species, *Lepidosperma longitudinale* and *Gratiola pedunculata* occur here. The dominant reed species found at the lagoon, *Lepironia articulata*, is a beneficial native aquatic reed that is only found at a few localities around Sydney and the Blue Mountains. Other native aquatic plant species occur at Glenbrook Lagoon, include *Utricularia gibba*, *Exoleta* sp, *Utricularia australis* and *Nitella* sp.

Five major vegetation communities are found within the area encompassing The Reserve (Douglas 2001).

**Table 2.****Vegetation Communities recorded in The Reserve (Douglas 2001).**

<b>Vegetation Community</b>	<b>Dominant Species</b>	<b>Location</b>
<i>E. piperita</i> - <i>Angophora costata</i> Open Forest	Sydney Peppermint ( <i>E. piperita</i> ) Sydney Red Gum ( <i>Angophora costata</i> )	Mitchell's Pass, Mt Sion, Glenbrook Lagoon
<i>Corymbia eximia</i> - <i>a. C. gummifera</i> Woodland	Yellow Bloodwood ( <i>C. eximia</i> ) – Red Bloodwood ( <i>Corymbia gummifera</i> )	Mt Sion
<i>Corymbia gummifera</i> - <i>E. sparsifolia</i> Woodland/open forest	Red Bloodwood ( <i>Corymbia gummifera</i> )- Narrow-leaved Stringybark. ( <i>E. sparsifolia</i> )	Mt Sion , Glenbrook Lagoon
Riparian Complex	Coachwood ( <i>Ceratopetalum apetalum</i> ) – Myrtle Leaf ( <i>Backhousia myrtifolia</i> )	Mitchell's Pass
Lagoon Vegetation Reedland	Reed ( <i>Lepironia articulata</i> ) Tall Spike Rush ( <i>Eleocharis sphacelata</i> )	Glenbrook Lagoon

The vegetation community at Mitchell's Pass is characterised by a remnant strip of riparian complex that occurs along the creekline. Dominant species within this community include *Ceratopetalum apetalum* and *Backhousia myrtifolia*. Dry open forest communities characterised by Sydney Peppermint (*Eucalyptus piperita*) and Sydney Redgum (*Angophora costata*) are found on the ridges surrounding the creek.

The ridgetop vegetation at Mt Sion also comprises open woodland\forest dominated by *E. piperita* – *A. costata*, with areas where *Corymbia gummifera* and *E. sparsifolia* form significant canopy components. A small remnant of this latter vegetation community survives at the southeast corner of Glenbrook Lagoon.

#### **2.1.4 Fauna**

Over 70 species of bird have been recorded at Glenbrook Lagoon (Appendix 1). The permanent water is an important asset to the area and attracts a diverse range of birdlife. With the exception of the water birds, many of these species would also be present at Mt Sion and Mitchell's Pass.

Mammals are uncommon on site, however it is expected that small mammals such as Ringtail Possums (*Pseudocheirus peregrinus*) would be present. The small size and urban nature of Glenbrook Lagoon and Mt Sion excludes the presence of a large faunal assemblage, however Mitchells Pass with its dense moist vegetation and steep gullies linking through to Lapstone Reserve would be expected to have a larger fauna

assemblage. Grey-headed Flying Foxes (*Pteropus poliocephalus*) would utilise the area when the eucalypts are in flower and the smaller microchiropteran bats would utilise the bushland surrounding the lagoon for roosting and foraging sites.

Many species of reptiles are present on The Reserve, and Long-necked Tortoise (*Chelodina longicollis*) have been sighted in Glenbrook Lagoon. A feral species of tortoise, the “Red-eared Slider” has recently been reported to be present within Glenbrook Lagoon, this feral species has the potential to out-compete the native Long-necked Tortoise. Glenbrook Lagoon has in the past been regularly stocked with Bass (*Macquaria novemaculeata*) by the Department of Fisheries, this fish species is not known to occur in the area naturally and may have the potential to enter creek systems and threaten endemic fish populations.

### **2.1.5 Water quality and drainage**

Water quality is dependent upon the health of the aquatic ecosystem, whether it is a lagoon or a creek. Bank conditions, accumulated organic matter, riparian vegetation, fish, aquatic macroinvertebrates, waterflows, the presence of weed species and polluted water inflows all contribute to the health of the water body and must be considered.

The landuse within the 47 hectare catchment of Glenbrook Lagoon is now predominantly residential. As a result, the water quality at Glenbrook Lagoon is poor and fluctuates with time between rainfall events. During and after rain events, turbidity, suspended solids and pathogen counts are elevated. The increase of residential development with its associated clearing, paving and gardening greatly increases the amount of sediment and phosphorus in runoff. Large amounts of these sediments and nutrients have flowed into the lagoon over many years, resulting in a large buildup of phosphorus.

Aquatic plants derive essential nutrients from the surface sediment in their root zone. Thus the more nutrients in the system, the more weed growth results. The north west corner of the lagoon receives the water flow from the largest sub-catchment of the lagoon, which is the source of the majority of nutrients flowing into the lagoon.

Previous surveys indicate that there is a large volume of accumulated organic material and peat on the bottom of the lagoon. The presence of this material is a result of natural processes, although is probably exacerbated by increased biomass of decaying aquatic weeds. Its presence traps nutrients leading to increased aquatic weed growth.

Bare soil from unsealed roads and verges is mobilised by rain flowing into waterways. The resulting increase in sedimentation has been an ongoing problem at Glenbrook Lagoon over the years. The Urban Runoff Control Program (URCP) has addressed many of these issues with the construction of detention ponds and gross pollutant traps at all stormwater pipe outlet locations to remove sediment and ameliorate the levels of nutrients entering the lagoon and bushland. The URCP has progressively sealed the road shoulders surrounding the Lagoon and the access road to Mt Sion Reserve.

### 2.1.6 Role in the Landscape

The Reserve provides an important 'green corridor' amidst the surrounding urban areas (Smith and Smith, 1995). Green corridors contribute to landscape quality and character while acting as buffer zones between urban and native bushland areas.

Wildlife corridors are those areas of remnant bushland in urban areas that provide a link or corridor to intact bushland. These areas play an essential role in facilitating fauna movement from area to area and to connect isolated fauna communities. This is extremely important as urbanisation and transport corridors have fragmented natural habitat on the plateau. Much of the lower mountains bushland on the plateau has been removed, making the preservation of these remaining areas more critical. In areas where native bush has been removed, corridors can also include areas of semi-cleared or degraded 'weedy' areas. Areas such as The Reserve fulfil these roles and should be enhanced where possible by the planting of endemic species and allowing regeneration to occur.

Buffer zones of native vegetation can act as a 'filter' for adverse impacts associated with urban development, and should be located around any areas of significant habitat, such as swamps. The optimum width of buffer zones for different habitats is unknown, however Smith and Smith (1995) recommend a buffer zone of a minimum of 50 meters increasing to a minimum of 100m along major streams. These corridors also assist in maintaining the integrity of water courses and catchments.

### 2.1.7 Weeds

Weeds invade areas where the soil has been disturbed, and where urban development contributes to increased moisture and nutrients. Weed infestations have been identified at Glenbrook Lagoon, Mitchell's Pass primarily at reserve boundaries, tracks, and along drainage lines. Common weeds in the area include Small-leaved Privet (*Ligustrum sinense*), Large-leaved Privet (*Ligustrum lucidum*), Blackberry (*Rubus fruticosus*), Japanese honeysuckle (*Lonicera japonica*), Lantana (*Lantana camara*), Wandering Jew (*Tradescantia albiflora*) and Montbretia (*Crocasmia x crocosmiiflora*).

Two noxious aquatic weeds are of major concern on Glenbrook Lagoon, they are *Salvinia molesta* and *Cabomba caroliniana*. *Salvinia*, a surface growing plant which interferes with active/passive recreational activities and aquatic fauna, this species occupies 44 per cent of the lagoon surface. *Cabomba*, a sub-surface species, is present in substantial densities throughout the Lagoon. The breakdown of these plants causes deoxygenation of the water and contributes to the black organic material found along parts of the lagoon edge. To have major success in the control of these aquatic weed species, nitrogen levels in the lagoon must be controlled.

Major weed infestations are present along the creekline at Mitchell's Pass. Due to its elevated position, Mt Sion remains relatively weed free away from the road edges.

The Urban Runoff Control Program is tackling these weed issues by addressing their cause in a combined program of drainage works, road sealing and bush regeneration. The presence of weed species has been mapped during the URCP Bluespace mapping project, the results are shown in Figures 8, 9 and 10. Blue Mountains City Council's Bushcare team support community Bushcare sites throughout the mountains, a group currently exists at Glenbrook Lagoon. Blue Mountains Council also have full-time noxious weeds and environmental weeds teams working on weed infestations throughout the mountains.

## **2.2 EXISTING USES**

There is currently little formal development within this Reserve. Mt Sion and Mitchell's Pass have a network of informal walking tracks that are used primarily by residents. Glenbrook Lagoon has a small carpark, walking tracks and fencing. The existing uses comprise bushwalking, cycling, dog-walking, picnicking and boating. The beach area at Glenbrook Lagoon is predominantly bare soil due to foot traffic and use by waterfowl, and is susceptible to erosion.

## **2.3 HISTORICAL SIGNIFICANCE**

### **2.3.1 Aboriginal Heritage**

Aboriginal people have occupied the Blue Mountains since at least 15,000 to 20,000 years ago (Brennan 1999). Occupation of the lower, climatically milder areas of the mountains was most likely year-round, whereas occupation of the upper mountains may have been limited to warmer seasons and when passing through to the western plains.

There are several major language groups of Aboriginal people in the Blue Mountains and Cumberland Plain area : The Darug, Dharawal, Kuringgai, Gundungurra and Darkinjung (Stockton and Holland 1974, cited in Brennan 1999).

Although no formal heritage or archaeological study has been undertaken for the area, it is highly likely that there would be evidence of Aboriginal occupation on the site, particularly given the nature of the site, which would have provided permanent fresh water and significant fauna habitats. As the Plan of Management proposes no works that could potentially impact on any sites of Aboriginal significance and protects these areas through a "Natural Area" categorisation, there is no requirement for a formal study to be undertaken. In the event that a future Plan of Management proposes works or alteration to these natural areas, full archaeological studies in association with the Deerubbin Local Aboriginal Land Council would be required.

No Aboriginal sites have been formally identified within Glenbrook Lagoon Reserve, however numerous art sites, shelters and archaeological deposits have been found elsewhere in Glenbrook (NPWS). No rock shelters are present within Glenbrook Lagoon Reserve and wood, bone and plant materials would not have survived long in the open, wet environment at the site. Stone implements may be present, but are likely to have been covered by sediment and/or vegetation.



There is no evidence of Aboriginal occupation at Mt Sion however, due to its high elevation, the site was probably used to look over the country and for hunting.

Mitchell's Pass has many rock overhangs and caves. These overhangs would have been in constant use by Aboriginal people, and many artefacts would be expected within this area. A post-European occupation site is also within Mitchell's Pass (W. Brennan. Pers. Comm).

It is important to recognise that Aboriginal sites continue to hold a great deal of importance to Aboriginal people still living in the Blue Mountains. Places that are recognised as cultural landmarks such as shelters, food gathering sites, lookouts, tracks etc may also have cultural significance for Aboriginal people.

### **2.3.2 European Heritage**

Glenbrook Lagoon was first described during the historical crossing of the Blue Mountains by Blaxland, Wentworth and Lawson. Blaxland described it as "a large lagoon of good water full of very coarse rushes" (Mackaness, 1965).

In 1815, Major Henry Antill described the lagoon while accompanying Governor Macquarie on his journey over the mountains. "Wednesday, April 26, came to the first depot established by Mr Cox, when making the road, as a place of safety for his provisions for his working party. A small guard of soldiers are stationed here in a good log hut with two rooms, one of which answers as a store. It is placed about 100 yards on the right of the road, near a small lagoon of fresh water. The soldiers have enclosed a small piece of ground for a garden, and one of them had displayed some taste in laying it out in little arbours and seats formed from the surrounding shrubbery, which gave the place an appearance of comfort and simplicity" (Mackaness, 1965).

The Lagoon was situated on lands granted to Barnett Levy in 1825. Levy owned approximately 950 acres in the area and it was on this land that the historic Pilgrim Inn was built. The inn was first licensed in 1830 and was destroyed by bushfires in 1968.

In the late 1860's the lands were resumed from Levy by the railways and the storage capacity of the lagoon was increased with the construction of a low dam to provide water during the construction of the railway across the Blue Mountains. During the 1870's this water was used for steam trains travelling on the line across the mountains.

Mt Sion, a large property, was subdivided in 1926 and was heavily promoted as one of the prestige sites in the mountains. Blocks in the estate could be bought for twenty pounds or paid off for four pence a day. The owner, Charles R. Staples generously set aside approximately 40 acres of the top of the hill for recreational purposes. The result was Mt Sion Park which was transferred to the Shire of the Blue Mountains for the purposes of providing "Public Gardens and Recreation Space" on 28 May 1928. Council has retained the park in its entirety since that time, with current boundaries coinciding with the original subdivision plans for the Mt Sion Estate.

Major Mitchell was instrumental in the building of Mitchell's Pass. The search for a new road route was required as the first road leading up the mountains was steep and difficult to negotiate in wet weather. The second road also wound up the hill very steeply, and is still in existence as the old Bathurst Rd (formerly called the Zig Zag Rd). Mitchell finally found the pass for the new road in a gully between the two existing roads, this was named Mitchell's Pass in his honour.

Lennox bridge on Mitchell's Pass at Glenbrook is the oldest stone arch bridge on the mainland. It was completed in 1833 and built by David Lennox from sandstone quarried 450 metres further upstream.

The many caves and overhangs in Mitchell's Pass provided shelter for swaggies, itinerants and railway workers up to the 1940's.

## **2.4 BUSHFIRE RISK**

Fire is a natural component of the Blue Mountains environment, however fire in urban areas must be strictly controlled for the protection of life and property. At times hazard reduction may be required in these areas through either fire or manual fuel removal. Smith and Smith (1995) recommend that intensive hazard reduction burning be avoided in significant flora and fauna habitats and that a fire-free interval of at least 10 years should be maintained where possible to prevent loss of biodiversity.

The majority of the site is subject to a Moderate bushfire risk based on the criteria identified in the Blue Mountains Bushfire Risk Management Plan. The lagoon itself is considered a minor risk, however the potential for ignition rises with high visitation levels. Mt Sion and Mitchell's Pass are subject to Moderate fire risk.

## **3 THE BASIS FOR MANAGEMENT**

The protection and management of The Reserve must be based on a philosophical and legal foundation. Aspects of this are discussed below and guide the plan's formulation. It sets the management style which generates the proposed actions in response to the issues raised in Section 4.

### **3.1 OPEN SPACE PROVISION AND RECREATION DEMAND**

In comparison with other areas of the Blue Mountains, Glenbrook appears to be generally well provided for in terms of open space suitable for intensive recreation, with numerous parks, Glenbrook Oval, swimming pool and a few smaller reserves.

Demands for new/improved facilities can be accommodated in existing settings which are far more appropriate for those activities than Glenbrook Lagoon, Mount Sion and Mitchell's Pass.

It is recommended that Glenbrook Lagoon be maintained to provide a pleasant area for picnics, walking etc, while maintaining the integrity of the bushland and lagoon. Mount Sion and Mitchell's Pass are unsuitable for activities beyond those already carried out in the area. It is not recommended that extra parking and constructed tracks be installed, as this would lead to increased levels of activity and subsequent degradation of the bushland areas. These areas should be retained as part of the "community land bank", and valued as integral components of the strategic open space network.

### **3.2 VALUES OF THE RESERVE**

Based on previous community consultation in this area, it is clear that there are some key values which contribute to The Reserve's importance to the community and which should underpin the Plan of Management. These are:

- The quality of the area's natural resources located within an urbanised area. The Reserve represents a largely intact example of dry sclerophyll sandstone based vegetation and associated habitats. Its location between the urban areas of Glenbrook and the larger bushland areas of Knapsack Reserve to the east make it an important "green corridor" as identified by Smith and Smith (1995).
- Glenbrook Lagoon, as the only upland natural lagoon in the eastern Blue Mountains, represents an important natural wetland environment, with defining features including open water, swamps and natural bushland areas. The lagoon provides habitat for a large range of bird species not found elsewhere in the city. Many of the nearby residential properties have extensive views over the lagoon.
- Mitchell's Pass contains a rainforest remnant that has remained comparatively intact apart from weed invasion on edges and along the watercourse.
- Value as a passive recreation setting – the open water body making it rare in the Mountains
- Cultural significance; Aboriginal and European heritage values as outlined in Section 2
- Visual backdrop as important component of local landscape character.

The natural values of this area should continue to be conserved in the short to medium term. This does not mean "do nothing" management. It will require a monitoring and maintenance programme and a level of intervention to address matters such as weed control, poor water quality, fire hazard reduction, sedimentation and encroachment from neighbouring properties. It is a function of this Plan of Management to ensure that appropriate management strategies are put in place to protect the natural values of this area.

### 3.3 LEGAL FRAMEWORK

As a central requirement for Plan of Managements, the Local Government Act (1993) stipulates that all community land must be assigned to one or more categories as nominated in Section 36, and guidelines are provided for the categorisation. The guidelines result in four land categories being applied within The Reserve as shown in Figure 2 – Land Categories. The categories are;

- Natural Area - Bushland
- Natural Area – Watercourse
- Natural Area - Wetland
- General Community Use - Park

The management objectives for each category have been established in accordance with the core objectives of the *Local Government Act 1993* and Council's vision and corporate goals for the future directions of the Blue Mountains. They are outlined in Section 5 and provide significant management direction.

There are also objectives set out in the Local Environmental Plan via the zoning. Glenbrook Lagoon and the majority of Mitchell's Pass are zoned Recreation-Environmental Protection (Rec-EP) under Local Environmental Plan 1991. A section fronting Tallowood Gardens is zoned 2(a1) Residential under Local Environmental Plan No. 4 (LEP4). Mt Sion Park is currently zoned 6(a) Recreation Existing under LEP4.

Uses permissible with Council consent on land zoned Rec-EP under LEP 1991 include: recreation, bushfire hazard reduction, utilities, walking tracks and visitor facilities. Objectives for a Rec-EP zone are:

- *To ensure protection of environmentally sensitive land and areas of high scenic value in the City.*
- *To provide a buffer around areas of natural ecological significance.*
- *To restrict development on land that is inappropriate by reason of physical characteristics or high bushfire hazard.*
- *To encourage the restoration of disturbed bushland areas.*
- *To provide for passive recreational activities that are compatible with the land's environmental characteristics.*

Uses permissible with development consent from Council within the 6(a) Recreation Existing zone include: camping areas, childrens' playgrounds, gardens, picnic grounds and buildings associated with the management of the land by Council.

The provisions in this draft Plan of Management are consistent with the provisions under the relevant environmental planning instruments subject to *Environmental Planning and Assessment Act 1979*.

Until such time as this Plan of Management is adopted, the land associated with Glenbrook Lagoon and Mitchell's Pass are managed as designated areas of community

land within Council's city-wide or generic *Community Lands Plan of Management*. Mt Sion has an individual Plan of Management adopted by Council in April 1999. In the interest of ensuring that the management of these community land parcels recognises the interrelationship between these different land uses, the Plan of Management will maintain this arrangement.

### **3.4 COUNCIL'S VISION**

Council's overall vision for Glenbrook Lagoon is to provide, in partnership with the community, a safe, attractive and appealing park that provides informal recreation opportunities for the local community, and to protect and enhance The Reserve's bushland for the enjoyment of present and future generations. Council envisages that in time, while ensuring consistency with this Plan of Management, that the local community can contribute to managing the Reserve.

## **4 ISSUES AND PROPOSED ACTIONS**

This section examines the range of issues raised by the Community and Council affecting the use and management of The Reserve. These issues are:

- Reserve Management
- Access
- Bushland Management
- Water Quality
- Drainage and Sedimentation Control
- Preservation of Landscape Character
- Recreational Use and Education
- Bushfire management
- Monitoring and Maintenance
- Funding

The issues and their resolution (desired outcomes) are elaborated below

#### **4.1 RESERVE MANAGEMENT**

As a result of community feedback following the exhibition of the Draft Plan of Management for Mt Sion in 1999 it was recommended that: In the short to medium term, any form of development should not be contemplated because the site has:

- recognised natural values which need to be conserved;
- there is no demand or need for additional formal recreation facilities;
- the wider community's current aspirations (as expressed in the open space and recreation surveys) are for nature based recreation experiences; and
- the local community has strong feelings that no intensive forms of recreational development should take place, and believe that the natural qualities of the site should be enjoyed now and safeguarded for the enjoyment of future generations.

This recommendation has been carried through to this Plan of Management of which Mt Sion Reserve is a part.

##### **Desired Outcome**

The desired outcome recommended for consideration is:

- To maintain and enhance appropriate planning and environmental controls and management under the relevant legislation to ensure the achievement of the core objectives of the Plan of Management

##### **Recommended Actions**

- Identify future resources to enable the ongoing management, monitoring, and maintenance of the Reserve and control of use within it.
- Annually assess environmental status and use of The Reserve (as part of the monitoring programme) as these relate to the implementation of the Plan of Management.

Given the above, it is recommended that Council adopt the following strategy for the management of The Reserve.

##### **\* Short Term (next 5 years)**

Remediation oriented management targeted at controlling weeds, sedimentation and nutrient flows. Maintain current levels of use.

##### **\* Medium Term (5-15 years)**

Remediation oriented management continues - assess if demand exists for low key interpretative facilities such as signs.

✱ **Long Term (15 years plus)**

Continue remediation oriented management, periodically review community demands/needs and determine management response.

## **4.2 ACCESS**

Three types of access are relevant to this Plan of Management:

- access for public recreation
- access for adjoining residents
- access for maintenance and fire services

### **4.2.1 Public Recreation Access**

Mount Sion Park is encircled by residential development, and opportunities for community access are presently limited to four entry points as follows:

1. The entry to the access road (formally a fire trail) from Glenbrook Road which was sealed with URCP funding in 1999.
2. The extension of a trail from Bunyan Lane to the south-east of the park presents few opportunities for recreational pedestrian access and is not linked to open space systems;
3. Mount Sion Place, a cul-de-sac head to the east of the Park.
4. The parcel of land fronting Mitchell's Pass to the north is zoned 6(a) Recreation Existing under LEP 4. Presently the land is used for the parking of vehicles belonging to neighbouring residents and is degraded.

As such, current opportunities for access to Mt Sion park by the community are limited. Indeed, the relatively undisturbed nature of this reserve could be attributed in part to the limited access provided to the wider community.

Access to Glenbrook Lagoon is via the carpark off Glenbrook Rd, or numerous pedestrian access points from Glenbrook Rd, Skarrat St, Lagoon Drive and Haymet Streets. A track system within the Reserve links all these access points, with the exception of small sections on Lagoon Drive and Glenbrook Rd, where it is necessary to walk along the road before linking back up to tracks.

Access to Mitchell's Pass is via informal tracks; no formal track system exists.

#### **4.2.2 Access for Residents**

This applies solely to residents who require rear access to their properties on Mt. Sion via sealed shared access way. The main use of this access way at Mt. Sion is to enable adjacent residents to gain access to the rear of their property. Council records indicates that some 22 of the 61 residential properties, backing onto the park, use or have available for use access to the rear of their properties from this access way. This use has occurred for over twenty years and has now been formalised with sealing and gazettal of this road.

#### **4.2.3 Service Access**

For the purposes of access in The Reserve, the current fire trails and vehicle access routes should be retained and maintained at a level to ensure that Category 1 bushfire tankers can manoeuvre without hindrance with adequate turning circles to enable ease of escape if required. All gates on access routes should be fitted with BF3 or BF4 keys.

Access for servicing purposes (fire hazard management, emergencies and general park maintenance) in The Reserve is generally good, however the main access points need to remain clear. To this end, the modification and construction of access ways is only to be undertaken in consultation with emergency service providers. This development should be kept to the minimum necessary, commensurate with the desire to minimise impacts on the natural qualities of the Reserve.

### **Desired Outcomes**

The desired outcomes recommended for consideration are as follows:

#### **Public Recreation Access**

- To maintain current access points to Glenbrook Lagoon, Mt Sion and Mitchell's Pass.
- To maintain the track system within Glenbrook Lagoon Reserve
- Pedestrian access to Mt Sion to be improved by restoring the Mitchell's Pass access parcel and limiting the encroachments into this part of the park by parked vehicles.
- To investigate the formalisation of a track system within Mitchell's Pass Reserve.

#### **Access for residents**

- To maintain the shared access way at Mt Sion for adjoining residents who enjoy rear of property access.
- To discourage the use of the Mt Sion shared access way as a primary vehicular access to adjoining residential properties, except in the case of those properties which have no alternative means of vehicular access.

#### **Service Access**

- To be upgraded to the minimum standard necessary to facilitate park monitoring, maintenance and bushfire prevention and control activities.



- To be improved by restoring that part of the Mt Sion park fronting Mitchell's Pass and limiting the encroachment into this area by vehicles. It is essential that this area remains accessible to permit fire crews access to the top of Mt Sion as required.

### **Recommended Actions**

- Confine vehicular movement within the area of Mt Sion to the sealed access ways by appropriate alignment and barriers.
- Monitor demand for public recreation use.
- Monitor the need to formalise additional entry to Mt Sion via Mitchell's Pass.
- Erect park signs and "conditions of use" signs at Glenbrook Road, Olivet Street and Mitchell's Pass entries to Mt Sion.
- Ensure Mt Sion land parcel fronting Mitchell's Pass is kept clear and free from encroachment by neighbours with appropriate signage.
- Assess demand for formalisation of tracks in Mitchell's Pass.

## **4.3 BUSHLAND MANAGEMENT**

The bushland in Glenbrook Lagoon, Mt Sion and Mitchell's Pass is of high conservation significance and adds immeasurably to the aesthetics of the residential area. The bushland directly connects with natural areas on the eastern escarpment and provides an important green corridor (Figure 2).

The core objectives for the management and restoration of the "Natural Area" and "Bushland" and "Watercourse" are prescribed in Sections 36(e)-36(n) of the *Local Government Act 1993* outlined above. For these core objectives to be met it is important that existing areas of healthy bushland are maintained, and degraded areas are regenerated. The protection and restoration of bushland involves addressing past and current land use practices that have degraded bushland and water courses as well as planning for future land use to minimise impacts wherever possible.

Work has begun with Urban Runoff Control Program funding to protect and restore the integrity of Glenbrook Lagoon and its surrounding bushland. Work has included stormwater management structures, bush regeneration in weed infested bushland and weed control and revegetation works in badly degraded watercourses. Blue Mountains City Council's Bushcare program also runs a monthly Bushcare group at Glenbrook Lagoon.

It is essential that bushland management and restoration works be carried out with consideration for and in conjunction with any other works within The Reserve or adjacent properties. A clear example of the importance of this is in carrying out bush regeneration works. Bush regeneration programs have limited value when surrounding properties containing weed infestations are a continuous source of seed or drainage lines carry nutrient rich water into bushland or wetlands.

### **4.3.1 Bush Regeneration**

Bush regeneration involves specialised weed control within bushland that encourages the bushland's natural ability to regenerate. Bush regeneration is an important management practice, and will be used to assist natural regeneration of the site in areas where this is possible. Regeneration is possible in areas where there is native seed source in the soil or on surrounding vegetation, where there is no current soil disturbance and urban runoff is controlled.

### **4.3.2 Revegetation**

Revegetation involves planting native species in an area not capable of natural regeneration. Revegetation will be required in areas where there is minimal or no native seed source and where soil conditions have changed so greatly that local natives cannot tolerate the conditions. Revegetation areas are distinct management zones within the site.

For either bush regeneration or revegetation initiatives to be effective, existing degrading factors such as urban runoff and soil disturbance must first be managed or controlled.

### **4.3.3 Weed control**

All weed control undertaken in bush regeneration areas is carried out following the guidelines set out in the *Bush Regenerators Handbook* published by the National Trust of Australia (NSW). Weed control in revegetation areas may utilise other control methods such as slashing and spraying herbicide as well as use of methods described in the Handbook.

Although weeds are one of the significant factors associated with bushland degradation, they can often play an important role in native ecosystems. Weeds play a critical role in soil stabilisation, provision of food and habitat for native fauna, and can also be very effective in minimising the erosive effect of stormwater on natural drainage channels. For these reasons any weed control carried out as part of bush regeneration or revegetation works should be done as part of a long-term plan to restore the native plant community.

In carrying out weed control priority should be given to:

- Weeds listed on the *Noxious Weeds Act 1993*
- Minor infestations of potentially invasive weeds
- Vines or climbers threatening significant trees
- Areas containing rare or threatened flora and fauna
- Sensitive ecosystems such as hanging swamps and creek lines.

Weeds colonise disturbed areas rapidly. Weed infestations occur primarily on the edges at Mt Sion and Mitchell's Pass Parks, although the creekline flowing down Mitchell's Pass is also susceptible to weed growth. Weeds have been a major problem at Glenbrook Lagoon due to nutrient-laden water and garden weeds flowing into the lagoon and its

surrounding bushland. The lagoon also has a long history of disturbance, through track construction, recreational use or adjacent building activities.

Glenbrook Lagoon has received large-scale bush regeneration works over several years under several grant programs including the Urban Runoff Control Program. These works have been very successful with large areas of weeds being removed. It is essential that follow-up bush regeneration works be carried out to prevent weed re-infestations.

Aquatic Weeds found in Glenbrook Lagoon include *Cabomba caroliniana* and *Salvinia molesta*. *Salvinia molesta* is a declared noxious weed (W1) under the *Noxious Weeds Act 1993* and is required to be “fully and continuously suppressed and destroyed”. Alligator Weed, a highly invasive weed species, has previously been detected downstream of the lagoon. This infestation was quickly controlled, however monitoring for potential reinfestations of this species is critical.

Mitchell’s Pass includes a main creekline with many steep tributaries flowing into it. The western and northern side of Mitchell’s Pass is highly developed and therefore a major source of both weeds and urban runoff. There are abundant weeds along the road verges with the main problem weeds being : Privet, Lantana, Jasmine, Honeysuckle, Fishbone Fern, Blackberry, Coreopsis and weed grasses such as African Love Grass, Whisky Grass, Carpet Grass and Buffalo Grass.

### **Desired Outcomes**

The desired outcomes recommended for consideration are as follows:

- Conserve and improve the bushland habitat and landscape character of the park consistent with green corridor and recreational objectives and in accordance with Council’s broader conservation policies.
- To restore degraded Shale Woodland, as well as other native plant communities within The Reserve.
- To reduce the impact of untreated stormwater on bushland and Glenbrook Lagoon.
- To reduce weeds entering The Reserve from surrounding residences.
- To raise awareness of contributing factors to degradation of bushland among reserve neighbours.
- To otherwise comply with the core-objectives applying to Natural Areas, Bushland, Wetland and Watercourse categories.

### **Recommended Actions**

- Continue URCP works furthering the bush regeneration and revegetation program at Glenbrook Lagoon.
- Investigate Bush Regeneration works at Mitchell’s Pass.
- Investigate appropriateness and effectiveness of existing stormwater management structures.
- Blue Mountains City Council to incorporate within its existing environmental education programme information for residents on about threats posed to the integrity of Council’s Reserves and their flora and fauna by exotic plant and animal species.

- Investigate residential interest in forming bushcare groups for Mt. Sion and Mitchell's Pass.
- Initiate long-term maintenance bush regeneration works in these bushland areas.
- Introduce native local waterplant species such as Bladderwort, Nitella, Nardoo, while gradually minimising aquatic weed species through weed management practices.

#### 4.4 WATER QUALITY

The water from Glenbrook Lagoon flows into Lapstone Ck at Lennox Bridge in Mitchell's Pass, then down to Emu Plains. Due to the urban nature of the catchment the water quality of the Lagoon is poor and fluctuates with time between rainfall events.

Recreational water quality in the lagoon has been sampled regularly since 1996. Critical recreational water quality attributes assessed are : Bacteriological quality (counts of faecal coliform and enterococci bacteria); water pH; presence of blue-green algae; water temperature; presence of surface films and water clarity.

Faecal coliform counts carried out weekly over a 10 week period (BMCC Recreational Water Quality Program 2001) showed that faecal coliform counts varied between 140 to 9800 CFU/100ml , the ANZECC guidelines indicate an acceptable count of 150/100ml for primary contact and 1000/100ml for secondary contact.

The results in Table 3 show that Glenbrook Lagoon remains unsuitable for primary recreation such as swimming. Suitability for secondary recreational activities such as boating fluctuates, however the latest figures show that the lagoon is unsuitable for these activities at present. Due to the poor water quality, fishing and the consumption of fish caught in the lagoon is not advised.

Recreational Water Quality Results of Glenbrook Lagoon			Rating	Compliance with ANZECC criteria
Year	Primary Contact	Secondary Contact		
1996/97	Very Poor	Good	Good	75 – 100 %
1997/98	Very Poor	Fair	Fair	50 – 74%
1998/99	Very Poor	Good	Poor	25 – 49%
1999/00	Poor	Good	Very Poor	0 – 24%
2000/01	Very Poor	Poor		

**Table 3. Water Quality Results – Glenbrook Lagoon ( BMCC Recreational Water Quality Program 2001)**

Aquatic weed infestations are a major contributor to poor water quality, as they produce excess quantities of decaying matter and reduce the quantity of sunlight reaching the water. The numerous ducks and geese on the lagoon also contribute significantly to the excessive presence of faecal coliforms in the lagoon which in turn contributes to nutrient buildup.

#### Desired Outcomes

- Conserve and improve the water quality of Glenbrook Lagoon and Lapstone Creek consistent with ANZECC water quality guidelines and in accordance with Council's broader conservation policies.

### **Recommended Actions**

- Implementation of BMCC's Stormwater Management Plan.
- Liaison with Sydney Catchment Authority.
- Control of priority terrestrial noxious weeds in and surrounding Lagoon.
- Investigate cost effective methods of control for aquatic weeds in Glenbrook Lagoon.
- Investigate control of introduced ducks and geese.
- Maintain and expand URCP's existing drainage strategies to encompass Mt Sion and Mitchell's Pass.

## **4.5 DRAINAGE AND SEDIMENTATION CONTROL**

Glenbrook Lagoon, is surrounded by residential development and thus experiences inflows of suspended solids and nutrient-enriched sediments. A study undertaken in 1995 (Keogh and Simmons 1995) identified the unsealed road ways of Mount Sion Park as the most probable source area for suspended solid concentration in run-off within that sub-catchment of Glenbrook Lagoon. Substrate stabilisation was recommended within the high priority region of the sub-catchment as a source control measure and it was recommended that the roads were bitumen sealed. In addition, the study recommended that exposed road verges along the surface drainage pathway should be grassed, further reducing suspended solid concentration of run-off waters and act to slow run-off, aiding particle settlement (Keogh and Simmons 1995: 201). These recommendations were addressed by the Urban Run-off Control Program. Further works are required to ensure that access points at residential driveways are sealed or otherwise appropriately treated to limit erosion.

Sedimentation ponds were installed at three inflow points in 1997 with funding from the Environmental Trust. Under the Urban Runoff Control Program, four gross pollutant traps have also been installed at Glenbrook Lagoon. Installation of curbing and guttering in nearby streets has reduced the amount of sedimentation, however the hard surfaces from ongoing development within the catchment has increased the amount of runoff now entering the lagoon. In normal weather conditions all runoff into the lagoon is controlled and receives primary treatment as it flows through the trash racks and sedimentation ponds. However, significant removal of suspended nutrients is unlikely to occur fostering increased growth of weed species in the lagoon (Willing and Partners, 1997).

### **Desired Outcome**

- To limit the transport of sediment and nutrients into Glenbrook Lagoon.
- To minimise stormwater runoff and sedimentation from entering the creek system.

### **Recommended Action**

- Identify those residential driveways that provide access from the sealed access way, which require sealing or other appropriate treatment to prevent erosion.
- Investigate options for stabilisation of beach area at Glenbrook Lagoon and implement remediation works.
- Conduct regular monitoring of water quality.
- Maintain and clean out Gross Pollutant Traps and sedimentation ponds regularly as required.

## **4.6 PRESERVATION OF LANDSCAPE CHARACTER**

Council is investigating the appropriate zoning for this area as part of the review of planning controls for the Draft Local Environmental Plan 2002. Any rezoning would need to ensure adequate protection of this fragile environment.

Consideration is to be given to the provision of an Environmental Protection zoning under any future Draft Local Environment Plan, which will have a similar effect as the Recreation – Environmental Protection zoning under Local Environment Plan 1991. This will achieve two outcomes:

- to provide a zoning that recognises the environmental constraints that effect each of the reserves in a consistent manner, in order to allow appropriate land use planning protections.
- to provide for land use management consistency between the planning provisions of the Local Environment Plan under the *Environmental Planning and Assessment Act 1979* and the provisions of this Plan of Management.

As with all provisions in a local environmental plan, this proposal will be subject to a separate public exhibition process to ensure that the community is given the opportunity to provide feedback to Council on this proposal.

### **Desired Outcome**

- Pro-active monitoring and maintenance of the park to achieve Plan of Management objectives.
- Ensure planning controls guarantee the continued integrity of these areas as a strategic open-space network.

### **Recommended Action**

- Council to regularly review Environmental quality of The Reserve to ensure compliance with the Plan of Management.
- Encourage local residents to take a greater role in the monitoring and maintenance of the resource quality.

#### **4.7 RECREATIONAL USE AND EDUCATION**

Recreational use of the Reserve revolves primarily around informal recreation, such as bushwalking, walking of dogs and bird watching. The area has a high degree of neighbour usage with many residents enjoying the natural bush and landscape values of the area.

Glenbrook Lagoon experiences the highest visitation rates in The Reserve, with walking and picnicking being common activities. To this end the provision of seating facilities to enhance the recreational amenity of the Lagoon needs to be investigated. Litter within the carpark has been an ongoing problem at Glenbrook Lagoon. To reduce this impact, investigation needs to be undertaken into providing litter bins at the track entrances to the carpark.

The Reserve currently offers a high quality nature-based recreation experience to local residents. There appear to be no current demands for additional facilities to be located on the site to satisfy short falls in community needs which are compatible with the bushland setting of the site.

Following a submission from residents, Bass have been released into Glenbrook Lagoon by NSW Dept. Fisheries for recreational fishing. However, 'No Fishing' signs have been erected at the lagoon by Blue Mountains City Council, due to the poor water quality, presence of noxious aquatic weeds and bank instability. At this stage, recreational fishing and the consumption of fish caught within Glenbrook lagoon will continue to be discouraged.

Further development of these areas would be deleterious to the bushland environment although interpretive signage could be considered if thought to be advantageous.

##### **Desired Outcome**

- To maintain the level and range of facilities for informal nature-based recreational pursuits in response to community desires. Ensure that the habitat and visual landscape integrity of the park is maintained.
- To reduce litter within carpark area of Glenbrook Lagoon.
- To enhance the recreational amenity of the Lagoon.

##### **Recommended Actions**

- Investigate installation of two garbage bins within carpark at Glenbrook Lagoon at entrance to walking tracks.
- Investigate erection of low level metal seating at strategic points at Glenbrook Lagoon.
- Periodically assess the need for the development of additional facilities such as car parking and pedestrian access to be located off Mitchell's Pass

- Develop a long term monitoring program to determine changes in community use, needs and levels of satisfaction with facilities.

## **4.8 BUSHFIRE MANAGEMENT**

### **4.8.1 Fire Management.**

The protection of life, property and the environment is required under the *Rural Fires Act 1997*. Council and the fire fighting authorities are required to balance protection of life and property with management of the bushland ecology. The responsible land manager in accordance with the Bushfire Risk Management Plan will undertake Bushfire risk management works.

Any prescribed burning cycle is proposed to be in accordance with appropriate fire regimes to ensure that plant species do not become extinct in natural areas due to high fire frequency. The responsible land manager, will determine the type, location and frequency of the bushfire risk management works within the designated area. Management zones will be identified in accordance with the Blue Mountains Bushfire Risk Management Plan.

The maintenance of protection to property and life is paramount in the Blue Mountains area. Council and the Rural Fire Service are aware of the need to maintain the ecology of the bushland within the Lower Blue Mountains. The fuel reduction burning cycle may be extended to at least 15 years to ensure that plant species do not become extinct in areas such as Glenbrook Lagoon, Mount Sion Park and Mitchell's Pass due to high fire frequency. Sensitive rainforest vegetation such as that growing along Mitchell's Pass will not tolerate frequent fires. The responsible land manager will determine the type, location and frequency of the bushfire risk management works within the designated area. Management zones will be identified in accordance with the Blue Mountains Bushfire Risk Management Plan.

Glenbrook Lagoon may be required to be used as an emergency source of water for helicopter operations during a bushfire event. The use of the lagoon during a bushfire event will be controlled by the conditions stated in the "Bushfire Management Plan – OPERATIONS" prepared by the Blue Mountains Management Committee.

### **4.8.2 Fire History**

The last fire at Glenbrook Lagoon was a prescribed burn carried out in 1998. The area is not considered a high risk area, as it is fully contained by sealed roads. Historically Mt Sion Park has been subjected to fuel reduction burns on an approximate 10 year cycle. The last total site burn was in 1982. Since this time the park has been burnt in two sections. The southern section of the park was subject to a fuel reduction burn in April 1991 and the northern section was burnt in August 1992. A 30 metre asset protection zone is required for properties adjacent to Mt Sion Park.



Lookouts along Mitchell's Pass tend to be a source of ignitions in the area due to the dumping and burning of motor vehicles. Mitchell's Pass was subject to a wildfire in December 2001

#### **Desired Outcome**

- The maintenance of the required standard of protection to properties and life consistent with Council's broader policies and the desire to conserve the bushland habitat and landscape qualities of The Reserve.
- To maintain fuel loadings in the areas to the required standard to ensure adequate protection to life and properties consistent with Council's broader policies and taking into account the need to conserve the bushland habitat and landscape qualities of the park.
- Encourage fire management practices that enhance and conserve the biodiversity of the area.

#### **Recommended Action**

- Maintain emergency service access along the ridge between the existing track running behind the houses fronting Glenbrook Road and Mount Sion Place.
- Maintain a radiation buffer zone around property boundaries. This would involve regularly slashing the understorey to a distance of 30 metres from the properties boundaries.
- Carry out fuel reduction burns in accordance with Blue Mountains Bushfire Risk Management Plan where required, ensuring that the natural values of these areas are not compromised by too frequent burning regimes.
- Ensure adequate policing of the Mitchell's Pass area by Environmental Rangers to reduce the incidence of car dumping and ignition.

### **4.9 MONITORING AND MAINTENANCE**

To date Council maintenance of the area has been on an "as needs basis". This has generally been in response to periodic complaints by residents about matters such as the condition of fire trails, reports of unacceptable use etc. To ensure that the integrity of the bushland setting is maintained and enhanced it would be necessary for Council to embark upon a pro-active monitoring and periodic maintenance program. This would involve regular inspections of the bushland and activities undertaken within it.

Vandalism has occurred at Glenbrook Lagoon with the destruction of seats, fences and plants. Cars are regularly dumped at certain locations along Mitchell's Pass. Litter is a continuing problem in the carpark at the lagoon. Mowing is required at regular intervals during the summer months at Glenbrook Lagoon, in particular the corner of Lagoon Drive adjacent to the sediment pond and the picnic area near the 'beach'. Mowing of all the sediment pond banks is also required on a regular basis, as is mowing of the access strip in Mitchells Pass. Regular Council ranger patrols will assist in discouraging vandalism, in The Reserve.

The maintenance of all stormwater structures and sediment ponds is a high priority, without maintenance these structures do not operate efficiently.

### **Desired Outcome**

- Monitoring and maintenance of the park to achieve Plan of Management objectives, incorporating a pro-active role by the local community.
- That Council Parks technical officers and rangers inspect the park each three months to identify any works which may need to be done, monitor encroachments and unacceptable use of the park.
- To ensure that drainage structures are maintained on a frequent and regular basis, so as not to compromise the effectiveness of these structures.

### **Recommended Actions**

- Specialist Council staff to review and monitor aspects of the resource quality of Mount Sion Park to ensure compliance with the Plan of Management.
- All drainage and sediment control structures to be maintained as required.
- Grassed areas to be regularly mown.

## **4.10 FUNDING**

The ongoing maintenance of The Reserve relies on funding from BMCC. At present there is no cost recovery from the use of the area. The level of recreational use likely to be sustained in the park in the foreseeable future is unlikely to generate any revenue.

While increased demands on the limited budgetary resources of Council can be offset to a degree by the introduction of new and more efficient maintenance practices, funding for capital works to improve the existing facilities or establish new ones will require a wide range of sources to be considered. These include corporate sponsorship, State Government programmes, Commonwealth Government cultural/recreation facilities and environmental programs, local community clubs such as Rotary. Enhanced use of the Bushcare program by establishing more groups and actively promoting the program will provide continuous small scale maintenance bush regeneration at minimal cost.

With the exception of the works covered by the URCP funding, the proposed works and management activities identified for the park in this Plan of Management will be dependent on the allocation of funding on a two yearly basis as part of Council's overall corporate management plan (Section 2).

### **Desired Outcome**

- Ensure that adequate levels of funding are available to enable Council to meet its management objectives for Glenbrook Lagoon, Mt Sion and Mitchell's Pass.

### **Recommended Actions**

- Identify and pursue financial grant opportunities consistent with Council policy. Examine opportunities for collaborative projects with local user groups eg. local residents, bushland enhancement groups or the orienteering club and other community based organisations.

## 5 MANAGEMENT CATEGORIES AND OBJECTIVES

Plan of Management in brief		
Site Name	Glenbrook Lagoon (5-026A), Mt Sion (5-026) and Mitchell's Pass (5-021)	
Address	Glenbrook	
Key Components	Lot 6 DP 201228 DP 29605 Lot 39 DP 29605 Lot 11&12 DP 249003 Lots 10-17 DP37391 Lots 132-134 DP 14954	Lots 1 DP 882039 Road reserve portion 2 DP 882039 Lot 52 DP 622139 Lot 44 DP 220434 Lot 28 DP 261135
Ownership	Blue Mountains City Council	
Care, Control, Management	Blue Mountains City Council	
Area	Glenbrook Lagoon 16 ha, Mt Sion 13.2ha and Mitchell's Pass 9.0ha	
Zoning	Recreation, Environmental Protection	
Community land categorisation - natural areas core objectives	Natural areas Natural area -bushland Natural area - water course Natural area - wetland General community use - parkland	
Uses	<b>Current Uses</b> habitat maintenance bushwalking, cycling, dog walking picnicking boating and fishing	<b>Proposed Uses</b> habitat maintenance bushwalking, cycling, dog walking picnicking boating fishing is to be discouraged until water quality improves
Leases/Licenses	Leases and Licenses for the purposes of management and/or maintenance of the site, or any element of the site in accordance with this plan are permissible.	
Assets	Walking tracks - in fair condition	

The objectives which guide the management of the reserve are shown in tables over leaf. They are repeated in part two with the actions which flow on from them. The categorisation maps follow.

## Reserve Objectives

Community land categorisation - natural areas core objectives	<ul style="list-style-type: none"> <li>· to conserve biodiversity and maintain ecosystem function in respect of the land, or the feature or habitat in respect of which the land is categorised as a natural area, and</li> <li>· to maintain the land, or that feature or habitat, in its natural state and setting, and</li> <li>· to provide for the restoration and regeneration of the land, and</li> <li>· to provide for community use of and access to the land in such a manner as will minimise and mitigate any disturbance caused by human intrusion, and</li> <li>· to assist in and facilitate the implementation of any provisions restricting the use and management of the land that are set out in a recovery plan or threat abatement plan prepared under the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994.</li> </ul>
Community land categorisation - natural area bushland core objectives	<ul style="list-style-type: none"> <li>· to ensure the ongoing ecological viability of the land by protecting the ecological biodiversity and habitat values of the land, the flora and fauna (including invertebrates, fungi and micro-organisms) of the land and other ecological values of the land, and</li> <li>· to protect the aesthetic, heritage, recreational, educational and scientific values of the land, and</li> <li>· to promote the management of the land in a manner that protects and enhances the values and quality of the land and facilitates public enjoyment of the land, and to implement measures directed to minimising or mitigating any disturbance caused by human intrusion, and</li> <li>· to restore degraded bushland, and</li> <li>· to protect existing landforms such as natural drainage lines, watercourses and foreshores, and</li> <li>· to retain bushland in parcels of a size and configuration that will enable the existing plant and animal communities to survive in the long term, and</li> <li>· to protect bushland as a natural stabiliser of the soil surface.</li> </ul>
Community land categorisation- natural area Watercourse - Core Objectives	<ul style="list-style-type: none"> <li>· to manage watercourses so as to protect the biodiversity and ecological values of the instream environment, particularly in relation to water quality and water flow, and</li> <li>· to manage watercourses so as to protect the riparian environment, particularly in relation to riparian vegetation and habitats and bank stability, and</li> <li>· to restore degraded watercourses, and</li> <li>· to promote community education, and community access to and use of the watercourse, without compromising the other core objectives of the category.</li> </ul>
Community land categorisation natural area Wetland - Core Objectives	<ul style="list-style-type: none"> <li>· to protect the biodiversity and ecological values of wetlands, with particular reference to their</li> </ul>

Glenbrook Lagoon Park Plan of Management

	<p>hydrological environment (including water quality and water flow), and to the flora, fauna and habitat values of the wetlands, and</p> <ul style="list-style-type: none"> <li>· to restore and regenerate degraded wetlands, and</li> <li>· to facilitate community education in relation to wetlands, and the community use of wetlands, without compromising the ecological values of wetlands.</li> </ul>
Community land categorisation General community use, Park - Core Objectives	<ul style="list-style-type: none"> <li>· to protect the biodiversity and ecological values of wetlands, with particular reference to their hydrological environment (including water quality and water flow), and to the flora, fauna and habitat values of the wetlands, and</li> <li>· to restore and regenerate degraded wetlands, and</li> <li>· to facilitate community education in relation to wetlands, and the community use of wetlands, without compromising the ecological values of wetlands.</li> </ul>
All reserve	<p>To maintain and enhance appropriate planning and environmental controls and management under the relevant legislation to ensure the achievement of the objectives of the Plan of Management</p> <p>Public Recreation Access To maintain current access points to Glenbrook Lagoon, Mt Sion and Mitchell's Pass. To maintain track system within Glenbrook Lagoon Reserve. Pedestrian access to Mt Sion improved by restoring the Mitchell's Pass access parcel and limiting the encroachments into this part of the park by vehicles. To investigate the formalisation of track system within Mitchell's Pass Reserve.</p> <p>To maintain the shared access way at Mt Sion for adjoining residents who enjoy rear of property access. To discourage the use of the shared access way as a primary vehicular access to residential properties, except in the case of those properties which have no alternative means of vehicular access.</p> <p>Conserve and improve the bushland habitat and landscape character of the park consistent with green corridor and recreational objectives and in accordance with Council's broader conservation policies. To restore degraded shale woodland as well as other native plant communities within The Reserve. To reduce the impact of untreated stormwater on bushland and Glenbrook Lagoon. To reduce weeds entering The Reserve from surrounding residences. To raise awareness of contributing factors to degradation of bushland among reserve neighbours.</p> <p>Conserve and improve the water quality of Glenbrook Lagoon and Lapstone Creek consistent with water quality guidelines and in accordance</p>

	<p>with Council's broader conservation policies.</p> <p>To limit the transport of sediment and nutrients into Glenbrook Lagoon.To minimise stormwater runoff and sedimentation from entering the creek system.</p> <p>Pro-active monitoring and maintenance of the park to achieve Plan of Management objectives.Ensure planning controls guarantee the continued integrity of these areas as a strategic open-space network</p> <p>To maintain level and range of facilities for informal nature based recreational pursuits in response to community desires.</p> <p>Ensure that the habitat and visual landscape integrity of the park is maintained.To reduce litter within carpark area of Glenbrook Lagoon.</p> <p>To enhance the recreational amenity of the Lagoon.</p>
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## **6 IMPLEMENTATION AND PERFORMANCE PROGRAM**

### **6.1 BACKGROUND**

Section 36(3) of the Local Government Act, 1993, requires Councils to identify:

- the objectives (desired outcomes) and performance targets of the Plan of Management;
- the means by which Council proposes to achieve the plan's objectives and performance targets; and
- how Council will assess its performance.

This is necessary to ensure that progress on the implementation of the Plan of Management can be assessed.

### **6.2 PURPOSE**

The principal purpose of the Implementation and Performance Program is to provide managers with guidance on what needs to be done to achieve the objectives of the Plan of Management. The information in this section is tabulated for each issue under the following headings.

#### **Objective**

There are eight issues which have been identified for which objectives for management have been identified.

#### **Policy**

The policy response to the objectives is documented.

#### **Actions**

Actions required to implement the policies are nominated.

#### **Priority**

This identifies the priorities to be given to the achievement of the action. The codes used are as follows:

ST (Short Term)	-	to be completed within 1-2 years.
MT (Medium Term)	-	to be completed within 2-4 years.
LT (Long Term)	-	action to be commenced after 4 years.
O (Ongoing)	-	to be carried out on a regular basis for the life of this plan.

This Plan of Management will be reviewed annually and updated each 5 years. Long term actions/projects are those scheduled for commencement but not completion within

the initial 5 year period. This includes formal reviews. The review process would commence before the end of the 5 year period but would be incorporated into any adjustments made to the Plan of Management for the next five year period.

### **Indicative Costs**

An indicative cost using current (2001) commercial construction rates is provided for guidance purposes. This does not include Council on-costs for administration or design fees.

### **Implementation**

The Plan provides strategic direction for the management and conservation of the Glenbrook Lagoon, Mt Sion and Mitchell's Pass open space network. The plan aims to provide focus and a framework for routine maintenance and existing and future projects. Many of these are listed in the Action Plan as "ongoing" and are funded through existing programs. Some of the work Council has recently undertaken and continues to maintain and fund including:

- A Bushcare group has been operating in the area of Glenbrook lagoon since 1993 focusing on bush regeneration around the perimeter of the lagoon.
- There has been the installation of stormwater controls to help protect the lagoon as well as a recent environmental education initiative carried out by Department of Land and Water Conservation.
- Blue Mountains Urban Runoff Control Program has conducted bush regeneration works around Glenbrook Lagoon since 1997. These works will be maintained by Council from June 2003.
- Hazard reduction burning has occurred in the Mt Sion Park area in the past. Council's current focus is to establish a slash break around the perimeter of the park immediately joining properties. This break is planned to be maintained on regular basis every 3-4 years.
- Council annually undertakes control programs for noxious weeds in these areas. Council monitors closely the aquatic weeds in the lagoon to prevent escape. The water quality in Glenbrook Lagoon is regularly monitored.

The Draft Plan categorises land as "Natural Areas Wetland", "Bushland", General Community Use "Park" and "Watercourse". The principal objectives proposed in the Plan of Management are aimed at achieving the core objectives of these categories as well as providing for additional objectives relevant to particular land parcels. The principal objectives are to:

- Ensure adequate access for residents and emergency services.
- Support the Rural Fire Service and NSW Fire Brigades in their role of protecting life and property.



- Management of access to public recreation, adjoining residents, maintenance and fire services.
- Continue works to reduce sedimentation of waterways and to enhance water quality.
- Preserve landscape character and village ambience.
  - Implement measures to provide for attainment of core objectives, particularly those relating to restoration of degraded areas and minimising threats to natural habitats within the site.
  - Recommend that those areas categorised as “Natural Areas” within this Plan of Management be zoned “Environmental Protection” within any future LEP that applies to those areas, to ensure that the land is protected from any inappropriate development.
- Protect the recreational resource of Glenbrook Lagoon, Mt Sion and Mitchell’s Pass.

### **Performance Indicators**

This states how progress on the achievement of the plan will be assessed.

## **6.3 RESPONSIBILITIES**

The responsibility for the achievement of the Plan of Management objectives lies primarily with the Group Manager, City Solutions. The day to day administration of the plan will be undertaken by the Program and Project Development Branch. The Group Manager may involve staff from other divisions of Council in certain aspects of the plan eg. Works and Technical Services for construction of shared access way.

## PART TWO

## GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM

## ISSUE NO. 1: RESERVE MANAGEMENT

ST (Short Term)	-	to be completed within 1-2 years.
MT (Medium Term)-		to be completed within 2-4 years.
LT (Long Term)	-	action to be commenced after 4 years.
O (Ongoing)	-	to be carried out on a regular basis for the life of this plan.

Objectives	Policies	Actions	Priority	Indicative Costs	Performance Indicators
To maintain and enhance appropriate planning and environmental controls and management under the relevant legislation to ensure the achievement of the objectives of the Plan of Management	The planning controls and environmental management of Glenbrook Lagoon, Mount Sion and Mitchell's pass will be consistent with the adopted Plan of Management. and policy decisions of the advisory management committee and Council based upon the principles of open government and accountability to the community.	Identify future resources to enable the ongoing management, monitoring, and maintenance of The Reserve and control of use within it.	ST	\$1-5,000.	Adoption of a Plan of Management for Glenbrook Lagoon, Mount Sion and Mitchell's pass.
		Annually assess environmental status and use of the park (as part of the monitoring programme) as these relate to the implementation of the Plan of Management.	O	≥\$1,000	Achievement of park management objectives as contained in the Plan of Management.  Continued designation of a land use zoning for Glenbrook Lagoon, Mount Sion and Mitchell's Pass within future city-wide planning instruments that protect the site's environmental values.

## GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM

### ISSUE NO. 2: ACCESS

Objectives	Policies	Actions	Priority	Indicative Costs	Performance Indicators
<p><b>Public Recreation Access</b></p> <p>To maintain current access points to Glenbrook Lagoon, Mt Sion and Mitchell's Pass.</p> <p>To maintain track system within Glenbrook Lagoon Reserve.</p> <p>Pedestrian access to Mt Sion improved by restoring the Mitchell's Pass access parcel and limiting the encroachments into this part of the park by vehicles.</p> <p>To investigate the formalisation of track system within Mitchell's Pass Reserve.</p>	<p>Public vehicular access within the areas to be confined to sealed access ways.</p> <p>Maintain existing walking tracks in fair to good condition</p> <p>Access to Mount Sion Park by the community for nature based recreation and educational purposes is to be incrementally developed from Mitchell's Pass, subject to demand.</p>	<p>Confine vehicular movement within the area to the sealed access ways by appropriate alignment and barriers.</p> <p>Document existing walking tracks and their condition and include in service level agreement</p> <p>Monitor demand for public recreation use of the park and formalise additional entry to Mt Sion via Mitchell's Pass.</p> <p>Erect park signs and "Conditions of use" signs at Glenbrook Road, Olivet Street and Mitchell's Pass entries to Mt Sion..</p> <p>Assess demand for formalisation of tracks in Mitchell's Pass.</p>	<p>ST/O</p> <p>ST</p> <p>ST</p> <p>ST</p> <p>MT</p>	<p>≥\$1,000</p> <p>≥\$1,000</p> <p>≥\$1,000</p> <p>≥\$1,000</p>	<p>Percentage decrease in the area of park damaged or effected by vehicle access.</p> <p>No degradation of the parks natural bushland character and habitat quality.</p> <p>Walking tracks on asset register and noted in service level agreement</p> <p>The number of park users expressing satisfaction with the standard of access related infrastructure.</p>

## GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM

### ISSUE NO.2 : ACCESS – Cont'd....

Objectives	Policies	Actions	Priority	Indicative Costs	Performance Indicators
<p><b>Access to Rear of Properties</b></p> <p>To maintain the shared access way at Mt Sion for adjoining residents who enjoy rear of property access.</p> <p>To discourage the use of the shared access way as a primary vehicular access to residential properties, except in the case of those properties which have no alternative means of vehicular access.</p>	<p>Periodic use of the shared access way by residents as a secondary access to rear of properties.</p> <p>Use of shared access way as a primary access to rear of properties for those properties which do not currently enjoy access from Glenbrook Road or Olivet Street</p>	Monitor use of accessway	ST	≥\$1,000	<p>Increase in the number of property owners expressing satisfaction with the standard of access related infrastructure.</p> <p>No degradation of the parks natural bushland character and habitat quality.</p>
<p><b>Service Access</b></p> <p>To be upgraded to the minimum standard necessary to facilitate park monitoring, maintenance and bushfire prevention and control activities.</p> <p>To be improved by restoring that part of the park fronting Mitchell's Pass and limiting the encroachment into this area by fire vehicles to permit fire crews access to the top of Mt Sion as required.</p>	<p>Service access to be provided to the minimum standard necessary to ensure effective maintenance and control.</p> <p>Ensure that obstructions to service vehicles are removed and the site be maintained as an access point.</p>	Ensure land parcel fronting Mitchell's Pass is kept clear and free from encroachment by neighbours with appropriate signage.	ST	≥\$1,000	<p>Refer above</p> <p>Compliance with the requirements of Council's Emergency Services Team for a fire services road.</p>

## GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM

### ISSUE NO. 3: BUSHLAND MANAGEMENT

Objectives	Policies	Actions	Priority	Indicative annual Costs	Performance Indicators
<p>Conserve and improve the bushland habitat and landscape character of the park consistent with green corridor and recreational objectives and in accordance with Council's broader conservation policies.</p> <p>To restore degraded shale woodland as well as other native plant communities within The Reserve.</p> <p>To reduce the impact of untreated stormwater on bushland and Glenbrook Lagoon.</p> <p>To reduce weeds entering The Reserve from surrounding residences.</p> <p>To raise awareness of contributing factors to degradation of bushland among reserve neighbours.</p>	<p>Management of the park's bushland habitat and landscape including the development of facilities that is consistent with objectives for the Plan of Management.</p>	<p>Continue URCP works furthering the bush regeneration and revegetation program at Glenbrook Lagoon.</p> <p>Investigate Bush Regeneration works at Mitchell's Pass.</p> <p>Investigate appropriateness and effectiveness of existing stormwater management structures.</p> <p>Blue Mountains City Council to incorporate within its existing environmental education programme about threats posed to the integrity of Councils Reserves and their flora and fauna by exotic plant and animal species.</p> <p>Initiate long-term maintenance bush regeneration works in these bushland areas.</p>	<p>MT</p> <p>MT</p> <p>O</p> <p>MT</p> <p>LT</p>	<p>≅\$10,000</p> <p>≥\$30,000</p> <p>≥\$1,000</p> <p>≥\$1,000</p> <p>≅\$10,000</p>	<p>Removal of exotic plant species from the park and rehabilitation of degraded areas of bushland.</p> <p>Conservation of indigenous canopy trees to maintain the green corridor.</p> <p>Level of satisfaction of park users.</p> <p>Increased numbers and diversity of native animals present within the park.</p> <p>Nutrient levels within Glenbrook Lagoon decreasing.</p>

To otherwise comply with the core objectives applying to Natural Areas, Bushland and Watercourse categories.					
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## GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM

### ISSUE NO. 4: WATER QUALITY

Objectives	Policies	Actions	Priority	Indicative Costs	Performance Indicators
Conserve and improve the water quality of Glenbrook Lagoon and Lapstone Creek consistent with water quality guidelines and in accordance with Council's broader conservation policies.		Implementation of BMCC's Stormwater Management Plan.	MT	\$5-10,000	Water quality to improve.
		Liaison with Sydney Catchment Authority.	MT	ongoing	
		Control of priority terrestrial Noxious weeds In the Reserve. Investigate cost effective methods of control for aquatic weeds in Glenbrook Lagoon.	O	\$20,000 2 years	
		Investigate control of introduced ducks and geese.	ST	≥\$1-2,000	
		Maintain and expand URCP's existing drainage strategies to encompass Mt Sion and Mitchell's Pass.	MT	variable	



## GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM

### ISSUE NO. 5: DRAINAGE AND SEDIMENTATION CONTROL

Objectives	Policies	Actions	Priority	Indicative Costs	Performance Indicators
<p>To limit the transport of sediment and nutrients into Glenbrook Lagoon.</p> <p>To minimise stormwater runoff and sedimentation from entering the creek system.</p>	<p>The control of erosion and sediment transport will be consistent with the park management objectives to sustain the integrity of the natural bushland and adjacent lagoon.</p>	<p>Identify those residential driveways that provide access from the sealed access way, which require sealing or other appropriate treatment to prevent erosion.</p> <p>Investigate options for stabilisation of beach area and implement remediation works.</p> <p>Conduct regular monitoring of water quality.</p> <p>Maintain and clean out Gross Pollutant traps and sedimentation ponds regularly as required.</p>	<p>ST</p> <p>O</p> <p>O</p> <p>O</p>	<p>≥\$1-5,000</p> <p>≥\$-5,000</p> <p>ongoing</p> <p>variable</p>	<p>Identification of all areas within Mount Sion Park which are subject to sheet and gully erosion.</p> <p>Measurable reduction in erosion and sediment transport as determined by visual inspections and assessments made under Glenbrook Lagoon monitoring initiatives.</p>

## **GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM**

### **ISSUE NO. 6: PRESERVATION OF LANDSCAPE CHARACTER**

<b>Objectives</b>	<b>Policies</b>	<b>Actions</b>	<b>Priority</b>	<b>Indicative Costs</b>	<b>Performance Indicators</b>
Pro-active monitoring and maintenance of the park to achieve Plan of Management objectives.	Monitoring and maintenance operations by Council staff on a three monthly basis or in response to concerns raised by the local community to ensure that natural resource quality is maintained.	Council to regularly review Environmental quality of The Reserve to ensure compliance with the Plan of Management.	ST	\$1-5,000	Percentage of park users and residents surveyed expressing satisfaction with monitoring and maintenance standards.  Better condition of facilities and natural resources.
Ensure planning controls guarantee the continued integrity of these areas as a strategic open-space network.		Encourage local residents to take a greater role in the monitoring and maintenance of the resource quality.	O	≥\$1,000	

## GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM

### ISSUE NO. 7: RECREATIONAL USE AND EDUCATION

Objectives	Policies	Actions	Priority	Indicative Costs	Performance Indicators
<p>To maintain level and range of facilities for informal nature based recreational pursuits in response to community desires.</p> <p>Ensure that the habitat and visual landscape integrity of the park is maintained.</p> <p>To reduce litter within carpark area of Glenbrook Lagoon.</p> <p>To enhance the recreational amenity of the Lagoon.</p>	<p>Provision of recreational facilities and opportunities for community use will be consistent with the overall agreed management objectives for Mt Sion Park relating to the conservation of natural values.</p>	<p>Investigate installation of two garbage bins within carpark at Glenbrook Lagoon at entrance to walking tracks.</p> <p>Investigate erection of low level metal seating at strategic points at Glenbrook Lagoon.</p> <p>Periodically assess the need for the development of additional facilities such as car parking and pedestrian access to be located off Mitchell's Pass</p> <p>Develop a long term monitoring program to determine changes in community use, needs and levels of satisfaction with facilities.</p>	<p>MT</p> <p>ST</p> <p>LT</p> <p>MT</p>	<p>≥\$1,000</p> <p>≥\$1,000</p> <p>Ongoing</p> <p>\$1-5,000</p>	<p>Enhancement of natural areas</p> <p>Increase in level of satisfaction of park users</p>

## GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM

### ISSUE NO. 8: BUSHFIRE MANAGEMENT

Objectives	Policies	Actions	Priority	Indicative Costs	Performance Indicators
<p>The maintenance of the required standard of protection to properties and life consistent with Council's broader policies and the desire to conserve the bushland habitat and landscape qualities of The Reserve.</p> <p>To maintain fuel loadings in the areas to the required standard to ensure adequate protection to life and properties consistent with Council's broader policies and taking into account the need to conserve the bushland habitat and landscape qualities of the park.</p> <p>Encourage fire management practices that enhance the biodiversity of the area.</p>	<p>The provision of an acceptable level of protection and access for fire control and emergency situations response.</p>	<p>Maintain emergency service access along the ridge between the existing track running behind the houses fronting Glenbrook Road and Mount Sion Place.</p> <p>Maintain a radiation buffer zone around property boundaries. This would involve regularly slashing the understorey to a distance of 30 metres from the properties boundaries.</p> <p>Carry out hazard reduction burns in accordance with Blue Mountains Bushfire Risk Management Plan where required ensuring that the natural values of these areas are not compromised by too frequent burning regimes.</p> <p>Ensure adequate policing of the Mitchell's Pass area by Environmental Rangers to reduce the incidence of car dumping and ignition.</p>	<p>O</p> <p>O</p> <p>O</p> <p>O</p>	<p>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p>	<p>Achievement of objectives for bushfire management.</p> <p>No increase in the number of incidents relating to public safety.</p>

## GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM

### ISSUE NO. 9: MONITORING AND MAINTENANCE

Objectives	Policies	Actions	Priority	Indicative Costs	Performance Indicators
<p>Monitoring and maintenance of the park to achieve Plan of Management objectives, incorporating a pro-active role by the local community.</p> <p>That Council Parks technical officers and rangers inspect the park each three months to identify any works which may need to be done, monitor encroachments and unacceptable use of the park.</p> <p>To ensure that drainage structures are maintained on a frequent and regular basis, so as not to compromise the effectiveness of these structures.</p>	<p>Monitoring and maintenance operations by Council staff on a three monthly basis or in response to concerns raised by the local community to ensure that natural resource quality is maintained.</p>	<p>Specialist Council staff to review and monitor aspects of the resource quality of Mount Sion Park to ensure compliance with the Plan of Management.</p> <p>All drainage and sediment control structures to be maintained as required.</p> <p>Grassed areas to be regularly mown.</p>	<p>O</p> <p>O</p> <p>O</p>	<p>\$1-5,000</p> <p>Ongoing</p> <p>Ongoing</p>	<p>Percentage of park users and residents surveyed expressing satisfaction with monitoring and maintenance standards.</p> <p>Better condition of facilities and natural resources.</p>

## GLENBROOK LAGOON, MT SION AND MITCHELLS PASS PLAN OF MANAGEMENT IMPLEMENTATION AND PERFORMANCE PROGRAM

### ISSUE NO. 10: FUNDING

Objectives	Policies	Actions	Priority	Indicative Costs	Performance Indicators
Ensure that adequate levels of funding and cost recovery enable Council to meet its management objectives for Glenbrook Lagoon, Mount Sion and Mitchell's Pass.	Integration of the management of Mount Sion and Mitchell's Pass with the current Urban Run-off Control Program initiatives for Glenbrook Lagoon.	Identify and pursue financial grant opportunities consistent with Council policy.	ST	Variable	Percentage increase in revenue from opportunities other than Council funds.
	Expenditure and revenue related to the management of the park will be made available to the public as part of Council's annual report.	Examine opportunities for collaborative projects with local user groups eg. local residents, bushland enhancement groups or the orienteering club and other community based organisations.	O	ongoing	Targets achieved for capital works, park improvements and maintenance programs.  Operating costs adequately recognised in allocations by Council in its overall management plan.

## **Maps/Illustrations**

Figure 1	<b>Location</b>
Figure 2	<b>Land Categories</b>
Figure 3	<b>Glenbrook Lagoon</b>
Figure 4	<b>Mt Sion Park</b>
Figure 5	<b>Mitchell's Pass</b>
Figure 6	<b>Zoning</b>
Figure 7	<b>Vegetation</b>
Figure 8	<b>Weed Map – Glenbrook Lagoon</b>
Figure 9	<b>Weed Map – Mt Sion</b>
Figure 10	<b>Weed Map – Mitchells Pass</b>



**APPENDIX 1****BIRD LIST FOR GLENBROOK LAGOON**

University NSW Study/Cumberland Bird Observers.

**Native Bird Species**

Australian Pelican ( <i>Pelecanus conspicillatus</i> )	Galah ( <i>Cacatua roseicapilla</i> )
Darter ( <i>Anhinga melanogaster</i> )	Sulphur-crested Cockatoo ( <i>Cacatua galerita</i> )
Little Pied Cormorant ( <i>Phalacrocorax melanoleucos</i> )	Fan-tailed Cuckoo ( <i>Cuculus pyrrhophanus</i> )
Black Cormorant ( <i>Phalacrocorax carbo</i> )	Laughing Kookaburra ( <i>Dacelo gigas</i> )
Little Black Cormorant ( <i>Phalacrocorax sulcirostris</i> )	Welcome Swallow ( <i>Hirundo neoxena</i> )
White-necked Heron ( <i>Ardea pacifica</i> )	Tree Martin ( <i>Cecropis nigricans</i> )
White-faced Heron ( <i>Ardea novaehollandiae</i> )	Black-faced Cuckoo-shrike ( <i>Coracina novaehollandiae</i> )
Large Egret ( <i>Egretta alba</i> )	Little Cuckoo-shrike ( <i>Coracina papuensis</i> )
Black Swan ( <i>Cygnus atratus</i> )	Rose Robin ( <i>Petroica rosea</i> )
Black Duck ( <i>Anas superciliosa</i> )	Golden Whistler ( <i>Pachycephala pectoralis</i> )
Grey Teal ( <i>Anas gibberifrons</i> )	Rufous Whistler ( <i>Pachycephala rufiventris</i> )
Chestnut Teal ( <i>Anas castanea</i> )	Grey Shrike-thrush ( <i>Colluricincla harmonica</i> )
Wood Duck ( <i>Chenonetta jubata</i> )	Leaden Flycatcher ( <i>Myiagra rubecula</i> )
White-eyed Duck ( <i>Aythya australis</i> )	Satin Flycatcher ( <i>Myiagra cyanoleuca</i> )
Dusky Moorhen ( <i>Gallinula tenebrosa</i> )	Rufous Fantail ( <i>Rhipidura rufifrons</i> )
Swamphen ( <i>Porphyrio porphyrio</i> )	Grey Fantail ( <i>Rhipidura fuliginosa</i> )
Coot ( <i>Fulica atra</i> )	Willy Wagtail ( <i>Rhipidura leucophrys</i> )
Pied Stilt ( <i>Himantopus himantopus</i> )	Eastern Whipbird ( <i>Psophodes olivaceus</i> )
	Clamorous Reed-warbler ( <i>Acrocephalus stentoreus</i> )
Spotted Turtledove ( <i>Streptopelia chinensis</i> )	Superb Blue Wren ( <i>Malurus cyaneus</i> )
Yellow-tailed Black Cockatoo ( <i>Calyptorhynchus funereus</i> )	Weebill ( <i>Smicrornis brevirostris</i> )
King Parrot ( <i>Alisterus scapularis</i> )	Little Grassbird ( <i>Megalurus gramineus</i> )
Crimson Rosella ( <i>Platycercus elegans</i> )	White-throated Warbler ( <i>Gerygone olivacea</i> )
Brown Thornbill ( <i>Acanthiza pusilla</i> )	Brown-headed Honeyeater ( <i>Melithreptus brevirostris</i> )
Yellow Thornbill ( <i>Acanthiza nana</i> )	Eastern Spinebill ( <i>Acanthorhynchus tenuirostris</i> )
Striated Thornbill ( <i>Acanthiza lineata</i> )	Spotted Pardalote ( <i>Pardalotus punctatus</i> )
Varied Sitella ( <i>Daphoenositta chrysoptera</i> )	Striated Pardalote ( <i>Pardalotus striatus</i> )
White-throated Treecreeper ( <i>Climacteris leucophaea</i> )	Silvereye ( <i>Zosterops lateralis</i> )
Noisy Friarbird ( <i>Philemon corniculatus</i> )	Magpie-lark ( <i>Grallina cyanoleuca</i> )
Noisy Miner ( <i>Manorina melanocephala</i> )	Pied Currawong ( <i>Strepera graculina</i> )
Lewin Honeyeater ( <i>Meliphaga lewinii</i> )	Grey Butcherbird ( <i>Cracticus torquatus</i> )
Yellow-faced Honeyeater ( <i>Lichenostomus chrysops</i> )	Black-backed Magpie ( <i>Gymnorhina tibicen</i> )
	Australian Raven ( <i>Corvus coronoides</i> )

**Feral Bird Species**

Red-whiskered Bulbul ( <i>Pycnonotus jocosus</i> )
House Sparrow ( <i>Passer domesticus</i> )
Indian Myna ( <i>Acridotheres tristis</i> )
Common Starling ( <i>Sturnus vulgaris</i> )

**Plant Species list For Glenbrook Lagoon**

**Compiled by the National Trust (1992)**

**FERNS**

DENNSTAEDTIACEAE

*Pteridium esculentum*

Bracken fern

DICKSONIACEAE

*Culcita dubia*

Soft Bracken Fern

LINDSAEACEAE

*Lindsaea linearis*

MARSILEACEAE

*Marsilea sp*

nardoo

SALVINIACEAE

*Salvinia molesta*

\*

SINOPTERIDACEAE

*Cheilanthes sieberi*

Rock fern

**GYMNOSPERMS**

ZAMIACEAE

*Macrozamia comunis*

Burrawang

**ANGIOSPERMS**

**Dicotyledons**

APIACEAE

*Centella asiatica*

*Hydrocotyle sp.*

*Platysace linearifolia*

Carrot tops

ASTERACEAE

*Aster subulatus*

\*

*Bidens pilosa*

Cobblers peg

\*

*Conyza bonariensis*

Fleabane

\*

*Coreopsis lanceolata*

Coreopsis

\*

*Gnaphalium americanum*

\*

*Helichrysum diosmifolium*

*Hyperchoeris radicata*

Catsear

\*

*Solidago canadensis*

Golden rod

\*

<i>Sonchus oleraceus</i>	Common sow thistle	*
<i>Taraxacum officinale</i>	Dandelion	*
<b>CAMPANULACEAE</b>		
<i>Wahlenbergia gracilis</i>	Slender bluebell	
<b>CAPRIFOLIACEAE</b>		
<i>Lonicera japonica</i>	Honeysuckle	*
<b>CARYOPHYLLACEAE</b>		
<i>Stellaria media</i>	Chick weed	*
<b>CASUARINACEAE</b>		
<i>Allocasuarina littoralis</i>	Black she-oak	
<i>Allocasuarina torulosa</i>	Forest she-oak	
<b>DILLENIACEAE</b>		
<i>Hibbertia acicularis</i>		
<i>Hibbertia aspera</i>		
<i>Hibbertia linearis</i>		
<b>DROSERACEAE</b>		
<i>Drosera auriculata</i>	Sundew	*
<b>ELAEOCARPACEAE</b>		
<i>Elaeocarpus reticulatus</i>	Blueberry ash	
<b>EPACRIDACEAE</b>		
<i>Lisanthe strigose</i>		
<i>Monotoca scoparia</i>	Broom heath	*
<b>FABACEAE</b>		
<i>Acacia baileyana</i>	Cootamundra wattle	P
<i>Acacia binerva</i>	Coast myall	P
<i>Acacia decurrens</i>	Green wattle	
<i>Acacia falcata</i>		
<i>Acacia floribunda</i>		P
<i>Acacia longifolia</i>	Sydney golden wattle	
<i>Acacia rubida</i>		
<i>Acacia terminalis</i>	Sunshine wattle	
<i>Acacia ulicifolia</i>	Prickly moses	
<i>Bossiaea obcordata</i>		
<i>Cassia coluteoides</i>	Cassia	*
<i>Genista monspessulana</i>		*
<i>Glycine clandestina</i>		
<i>Hardenbergia violaceae</i>	False sarsparilla	
<i>Kennedia rubicunda</i>	Dusky coral pea	P
<i>Medicago polymorpha</i>	Burr medic	*

*Oxylobium ilicifolia*  
*Phyllota phylicoides*  
*Pultanaea daphnoides*  
*Pultanaea villosa*  
*Trifolium repens*  
*Vicia tetrasperma*  
*Viminaria juncea*

Clover \*  
 Slender vetch \*  
 Native broom

#### GOODENIACEAE

*Goodenia sp.*

#### HALORAGACEAE

*Gonocarpus tetragynus*  
*Myriophyllum propinquum*

#### HYPERICACEAE

*Hypericum gramineum*

#### LAURACEAE

*Cinnamomum camphora* Camphor laurel \*

#### LOBELIACEAE

*Pratia purpurascens*

#### MALVACEAE

*Pavonia hastate* \*  
*Sida rhombifolia* Paddy's lucerne \*

#### MELIACEAE

*Melia azedarach* White cedar \*

#### NENYANTHACEAE

*Nymphoides geminata*

#### MYRTACEAE

*Angophora costata* Sydney red gum  
*Eucalyptus citriodora* Lemon scented gum P  
*Eucalyptus elata* River peppermint P  
*Eucalyptus eximia* Yellow bloodwood P  
*Eucalyptus globoidea* White stringybark  
*Eucalyptus gummifera* Red bloodwood  
*Eucalyptus maculata* Spotted gum P  
*Eucalyptus notabilis* Blue Mountains mahogany  
*Eucalyptus piperita* Sydney peppermint  
*Eucalyptus punctata* Grey gum

<i>Eucalyptus sclerophylla</i>	Scribbly gum	
<i>Kunzea ambigua</i>	Tick bush	
<i>Leptospermum attenuatum</i>	Flaky-barked tea tree	
<i>Leptospermum flavescens</i>	Yellow tea tree	
<i>Melaleuca linariifolia</i>		
<i>Melaleuca quinquinervia</i>	Paperbark	P
<i>Melaleuca thymifolia</i>		
<i>Syncarpia glomulifera</i>	Turpentine	
<i>Syzygium paniculatum</i>	Brush cherry	*
<b>OCHNACEAE</b>		
<i>Ochna serrulata</i>	Ochna	*
<b>OLEACEAE</b>		
<i>Ligustrum lucidum</i>	Large leaf privet	*
<i>Ligustrum sinense</i>	Small leaf privet	*
<b>OXALIDACEAE</b>		
<i>Oxalis corniculata</i>	Yellow wood sorrel	
<i>Oxalis purpurea</i>	Large flowered wood sorrel	*
<b>PITTOSPORACEAE</b>		
<i>Billardiera scandens</i>		
<i>Pittosporum undulatum</i>	Sweet pittosporum	
<b>PLANTAGINACEAE</b>		
<i>Plantago lanceolata</i>	Ribwort	
<b>POLYGONACEAE</b>		
<i>Persicaria capitata</i>	Japanese knot weed	*
<i>Persicaria decipiens</i>		
<i>Persicaria sp A</i>		
<i>Rumex brownii</i>		
<i>Rumex crispus</i>		*
<b>PROTEACEAE</b>		
<i>Banksia robur</i>		P
<i>Banksia spinulosa</i>	Hairpin banksia	
<i>Grevillea mucronulata</i>		
<i>Hakea salicifolia</i>		P
<i>Hakea sericea</i>	Needlebush	
<i>Isopogon anemonifolius</i>	Drumsticks	
<i>Lambertia formosa</i>	Mountain devil	
<i>Lomatia silaifolia</i>	Crinkle bush	
<i>Persoonia laurina</i>		

<i>Persoonia levis</i>	Broad-leaf geebung	
<i>Persoonia linearis</i>		
<i>Persoonia oblongata</i>		
<i>Petrophile pedunculata</i>	Conesticks	
<i>Xylomelum pyriforme</i>	Woody pear	
<b>RANUNCULACEAE</b>		
<i>Ranunculus repens</i>	Creeping buttercup	*
<b>ROSACEAE</b>		
<i>Rubus ulmifolius</i>	Blackberry	*
<b>RUBIACEAE</b>		
<i>Opercularia varia</i>		
<i>Pomax umbellata</i>		
<b>RUTACEAE</b>		
<i>Eriostemon hispidulus</i>		
<i>Eriostemon myoporoides</i>	Native daphne	P
<b>SALICACEAE</b>		
<i>Salix babylonica</i>	Weeping willow	*
<b>SAPINDACEAE</b>		
<i>Cardiospermum grandiflorum</i>	Balloon vine	*
<i>Dodonea triquetra</i>	Hop bush	
<b>SCROPHULARIACEAE</b>		
<i>Gratiola latifolia</i>		
<i>Veronica sp.</i>		
<b>SOLANACEAE</b>		
<i>Solanum mauritum</i>	Wild tobacco	*
<b>STYLIDIACEAE</b>		
<i>Stylidium graminifolium</i>	Trigger plant	
<b>THYMELIACEAE</b>		
<i>Pimelia linifolia</i>	Slender riceflower	
<b>ULMACEAE</b>		
<i>Trema aspera</i>	Native peach	
<b>VERBENACEAE</b>		
<i>Lantana camara</i>	Lantana	*
<i>Verbena bonariensis</i>	Purple top	*

Monocotyledons

CANNACEAE

<i>Canna indica</i>	Canna lily	*
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COMMELINACEAE

<i>Commelina cyanea</i>		
<i>Tradescantia albiflora</i>	Wandering jew	*

CYPERACEAE

<i>Cyperus brevifolius</i>	Mullumbimby couch	*
<i>Cyperus eragrostis</i>	Umbrella sedge	
<i>Eleocharis sphacelata</i>	Tall spike-rush	
<i>Fimbristylis dichotoma</i>		
<i>Isolepis sp.</i>	Club rush	
<i>Lepidosperma laterale</i>		
<i>Lepironia articulata</i>		

IRIDACEAE

<i>Gladiolus sp.</i>	Gladiolus	*
<i>Watsonia angusta</i>	Watsonia	*

JUNCACEAE

<i>Juncus cognatus</i>		
<i>Juncus holoschoenus</i>		*

LILLIACEAE

<i>Asparagus asparagoides</i>	Asparagus fern	*
<i>Caesia vittate</i>	Caesia	
<i>Dianella caerulea</i>	Paroo lily	
<i>Laxmannia gracilis</i>		
<i>Lilium formosum</i>	Formosan lily	*

LOMANDRACEAE

<i>Lomandra longifolia</i>	Spiny headed mat-rush	
<i>Lomandra multiflora</i>		
<i>Lomandra obliqua</i>		

ORCHIDACEAE

<i>Acianthus fornicatus</i>		
<i>Cryptostylus erecta</i>		

Poaceae

<i>Andropogon virginicus</i>	Whisky grass	*
<i>Aristida sp.</i>		
<i>Axonopus affinis</i>	Carpet grass	*
<i>Bromus unioloides</i>		*



<i>Cynodon dactylon</i>	Common couch	
<i>Dichlachne micrantha</i>	Short-hair plume-grass	
<i>Digitaria parviflora</i>		
<i>Echinochloa crus-galli</i>	Barnyard grass	*
<i>Echinopogon caespitosus</i>	Tufted hedgehog grass	
<i>Echinopogon ovatus</i>	Forest hedghog grass	
<i>Entolasia marginata</i>		
<i>Entolasia stricta</i>	Panic grass	
<i>Eragrostis curvula</i>	African love-grass	*
<i>Eragrostis sp.</i>	Love grass	
<i>Imperata cylindrica</i>	Blady grass	
<i>Isachne globosa</i>		
<i>Microlaena stipoides</i>	Weeping grass	
<i>Paspalum dilatatum</i>	Paspalum	*
<i>Paspalum paspalodes</i>	Water couch	
<i>Paspalum urvillei</i>	Vasey grass	*
<i>Pennisetum clandestinum</i>	Kikuyu	*
<i>Setaria geniculata</i>	Slender pigeon grass	*
<i>Sporobolus africanus</i>	Parramatta grass	*
<i>Themeda triandra</i>	Kangaroo grass	
<b>TYPHACEAE</b>		
<i>Typha domingensis</i>	Cumbungi, Bull rush	
<b>XANTHORRHOEACEAE</b>		
<i>Xanthorrhoea media</i>	Grass tree	

- \* Introduced sp. or native sp. not indigenous to area.  
P Plantings

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