



Master Plan

Adopted February 2010 Volume 2 of 2

Background Material





PURPOSE OF THIS DOCUMENT

Background

The City of Greater Bendigo (CoGB) has undertaken a Master Plan for the rejuvenation and extension of the Bendigo Botanic Gardens, White Hills (BBG). This will guide the restoration of the existing culturally significant Gardens and plan for an extension, creating a significant, new, engaging and contemporary facility.

The purpose of this document is to give the reader a thorough understanding of the roles of a botanic gardens, the particular site and its history, its current conditions and its strategic context. In this way Volume 2 provides a background for the Master Plan Volume 1, These two volumes should be considered in association with a number of other documents including;

- The Heritage Significance
 Assessment and Strategy 2005 Lee
 Andrews and Associates
- Interpretation Strategy Bendigo Botanic Gardens White Hills 2009
 - Creative Hat Interpretation
- Bendigo Botanic Gardens Signage Manual - Arterial 2009

Process for Master Plan development

The development of the Master Plan has followed a rigorous and thorough process, including significant public consultation and stakeholder involvement. The Master Plan is the final stage of this lengthy process, which is broadly outlined as follows:

- Formation of a steering committee made up of representatives of various stakeholder groups
- Discussions with various stakeholders to build an understanding of issues, wants and needs
- Release of an Options Paper and undertaking of broad community engagement to seek input on issues such as the future of animal collections, type of aquatic facility and the arrangement of the various elements

- Design of the Draft Landscape Concept Plan and preparation of Master Plan documents for the site based on the feedback from the community
- Review of the draft concept plan by the steering committee and by stakeholder groups
- Public consultation on the Draft Master Plan (including Draft Landscape Concept Plan)
- Finalise the Master Plan, including the Final Landscape Concept Plan based on community feedback to the Draft Master Plan
- Prepare detailed drawings, costings and potential staging
- Budget and programme the works

It is acknowledged that this is a long term project and that the restoration and extension of the Botanic Gardens will happen progressively over many, many years.

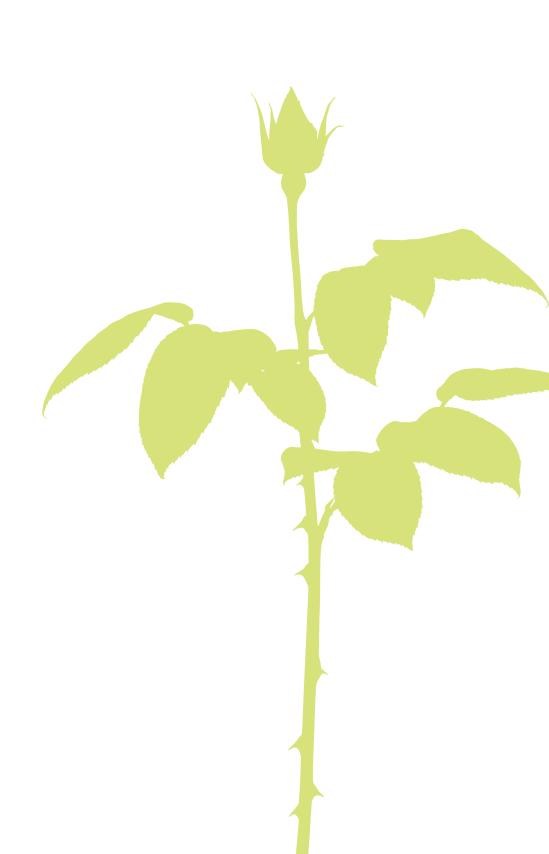


This document is Volume 2 of 2. It contains much of the background and supporting information for the vision and design found in Volume 1



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ACKNOWLEDGEMENTS

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Version

February 2010





I.0 INTRODUCTION

The picnic shelter (constructed circa 1910) is located adjacent to the billabong



The existing billabong is a remnant of the original Bendigo Creek alignment



Existing but incomplete avenue of elms along northern side of Hamelin St, east of Bendigo Creek marking an early path

I.I Introduction

The Bendigo Botanic Gardens at White Hills, is one of the oldest of Victoria's regional Botanic Gardens, and as such is of cultural significance to not only Bendigo, but the State of Victoria. It is on the Victoria Heritage Register, and is covered by the Heritage Act, 1995, providing the highest level of protection for a heritage site available in Victoria. It is the only botanic gardens within the City of Greater Bendigo.

For generations it has been enjoyed as a significant space for passive recreation and family activities, and for its cultural and horticultural heritage. Over many years, numerous attempts have been made to plan, design and implement changes in the Gardens. In some cases these alterations have been beneficial, in others, the changes have produced questionable results.

In 1992 and again in 1998 the City of Bendigo had considerable vision when it purchased the land adjacent to the existing Botanic Gardens. It was intended that this land be developed to extend the Gardens and provide Bendigo with a Botanic Garden that befits the City's reputation as the 'Centrepiece of Victoria'. The purchase of this land has placed Bendigo in the enviable situation of being one of the very few Botanic Gardens in Victoria with the ability to substantially expand their boundaries.

Current and past generations have enjoyed the Gardens that resulted from the vision of those who created it well over 100 years ago. It is intended to not only acknowledge the contributions of those pioneers by restoring the current gardens, but to add to their vision by creating a lasting legacy for future generations to enjoy in 50 and 150 years time.

The proposed new Master Plan addresses the unique opportunity that Bendigo has to rejuvenate a culturally significant 19th and 20th Century Botanic Garden, while creating a new, engaging and contemporary Botanic Garden for the 21st Century and beyond.

The site under discussion is broadly divided into three zones:

- The existing Botanic Gardens at White Hills, including the pool
- The recreation area, including the oval and netball courts
- The undeveloped 'greenfield' site south of these two areas and on either side of Bendigo Creek

The Master Plan will;

- Respond to the needs and desires of the community
- Recognise the tourism potential of a significant Botanic Garden
- Commit to the development of a Garden that meets with internationally and nationally accepted characteristics for a true Botanic Garden
- Use best practice in environmental design, construction and operation.
- Advocate and provide design for sectors of the community that are impaired or differently able
- Meet other strategic plans and objectives set by Council

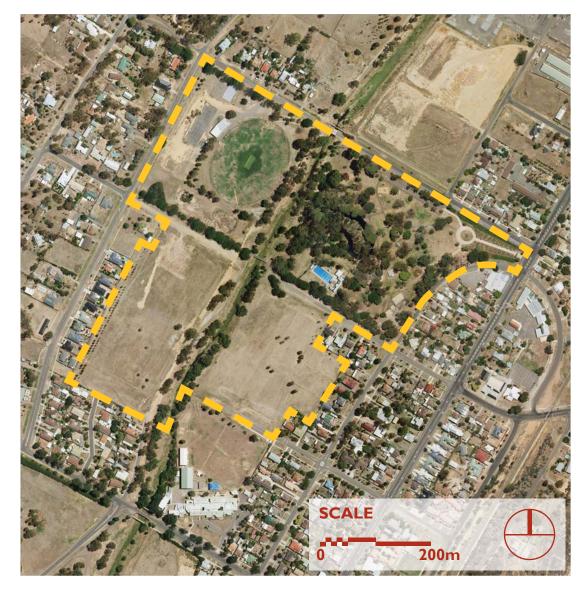


Fig 1.1 Aerial photograph showing extent of area under consideration in the Bendigo Botanic Gardens, White Hills, Master Plan







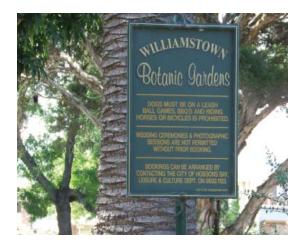




Entry signage for the Ballarat Botanical Gardens



Entry plinth for the Geelong Botanic Gardens



Entry sign at the Williamstown Botanic Gardens

2.1 Defining Characteristics and Roles of Botanic Gardens

A Botanic Gardens differs from an urban park in a range of significant ways. The development, management and operation of a 'Botanic Gardens' must recognise, embrace and celebrate this difference.

A Botanic Garden has a number of key defining characteristics. These have been outlined in the Botanic Gardens Conservation Strategy 1989 endorsed by International Union for Conservation of Nature (IUCN), World Wide Fund for Nature (WWF), Food and Agriculture Organization of the United Nations (FAO), United Nations Environment Program (UNEP), and United Nations Educational, Scientific, and Cultural Organization (UNESCO); and the International Agenda for Botanic Gardens in Conservation (2000) and are published on the Australian Botany Pages website (www. anbg.gov.au) and include the following:

- A reasonable degree of permanence
- An underlying scientific basis for the collections
- Proper documentation of the collections, including wild origin
- Monitoring of the plants in the collections
- Adequate labelling of the plants
- Open to the public
- Communication of information to other gardens, institutions and the public
- Exchange of seed or other materials with other Botanic Gardens, arboreta or research institutions
- Undertaking of scientific or technical research on plants in the collections
- Maintenance of research programs in plant taxonomy in associated herbaria.

It should be recognised that there are many institutions that are clearly Botanic Gardens but are only able to meet some of these criteria. Botanic Gardens Conservation International (BGCI) has

produced the following definition of a Botanic Garden which it hopes encompasses the spirit of a true Botanic Garden:

Botanic gardens are institutions holding documented collections of living plants for the purposes of scientific research, conservation, display and education. (Wyse Jackson 2000: 19)

The Master Plan for the Bendigo Botanic Gardens, White Hills aims to achieve the majority of these characteristics, while protecting the significant aspects of cultural heritage.

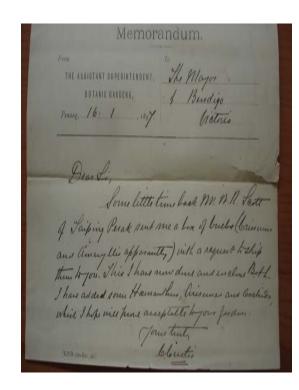
2.1.2 Botanic Gardens in a Time of Climate Change

In more recent times the issue of climate change is being addressed by Botanic Gardens. Anne Duncan, Director of the Australian National Botanic Gardens (ANBG) in Canberra, and Council member of Botanic Gardens Australia New Zealand (BGANZ), said in the March 2008 BGANZ newsletter (www.bganz.org.au) that 'perhaps most importantly all botanic gardens are places where our largely urban populations can connect with the natural world, learn about climate change and what they can do to make our world more sustainable. There are 13.4 million visits to Botanic Gardens and there are over 150 Botanic Gardens, city and regional - this means there is amazing potential to make a difference by increasing awareness of the importance of biodiversity and sustainable living by people all over Australia, not just major cities.... the capital city Botanic Gardens have already started to discuss collaboration in relation to climate change education and it is hoped to also involve regional gardens as this develops through BGANZ' (Duncan 2008: 5).





Passive enjoyment in the Williamstown Botanic Gardens



Copy of letter advising of bulbs and orchids being sent from Penang Botanic Gardens, Malaysia to Bendigo (Bendigo Regional Archives Centre)

2.1.2 Botanic Gardens as a Place of Passive Recreation

Botanic Gardens have traditionally provided the opportunities for passive recreation. Theresa Wyborn says 'While the pursuit of useful, scientific knowledge and selfimprovement was undoubtedly the main idea behind the foundation of Botanic Gardens, it was not the only one. The idea of creating a park setting for the acquisition of useful knowledge immediately introduced the question of health and exercise. Although the Botanic Garden was not conceived of as a public recreation ground but rather as a site for peaceful, reflective instruction, the importance of healthful exercise was not overlooked. The Botanic Garden was to be a place where one could not only cultivate the soul, but refresh it. Along the winding pathways one could promenade in the fresh air whilst pondering the wonders of nature.' (Wyburn 1996: 25). The Master Plan for the Bendigo Botanic Gardens, White Hills will continue the tradition of passive recreation, particularly within the boundaries of the designated 'botanic gardens' area. The recreation zone (including the oval, netball courts, etc) will remain for active recreation.

2.2 Bendigo Botanic Gardens, White Hills History as a 'Botanic' Gardens

A Botanic Gardens is largely about plants, and the Botanic Gardens at White Hills had a range of plants growing from early in its history, some of which had been supplied by Ferdinand Mueller of the Melbourne Botanic Gardens. By 1870 the Bendigo Botanic Gardens contained some 1587 trees shrubs and plants, including 600 Blue Gums, 443 Pine trees of various species and many exotic and native trees (Lee Andrews 2007).

Plants were also received from two other Directors of the Melbourne Botanic Gardens, William Guilfoyle (three lots in 1878) and his successor, John Cronin (Cannas in 1921 and Dahlias earlier) (Lee Andrews 2007). In 1897 a box of bulbs and orchids was received from Charles Curtis, Assistant Superintendent of the Penang Botanic Gardens in Malaysia (BRAC VA2398, Box45).

Seven distinct donations of plants from three different Directors of the Melbourne Botanic Gardens and one international donation support the notion that the Botanic Gardens at White Hills was intended to be - and acted as - a Botanic Garden.

As is evidenced by some of the older and rarer plantings that remain in the Gardens, these plants did, indeed, come from various corners of the globe, as befits a 'botanic' gardens. For example, Kei Apple (Dovyalis caffra) from Africa, Moreton Bay Fig (Ficus macrophylla) from Eastern Australia, Marri (Corymbia calophylla) from south-western Western Australia, Alleppo Pine (Pinus halepensis) and Stone Pine (Pinus pinea) from the Mediterranean, Chir Pine (Pinus roxburghii) from Himalaya and Soledad Pine (Pinus torreyana) from California.

This last plant exemplifies the 'botanic' nature of the Botanic Gardens at Bendigo. The Soledad Pine only occurs in a very limited range in the wild, in a small area of the southwestern section of California near San Diego and on Santa Rosa Island just off the coast. It is the rarest Pine in North America and it is believed there are currently only some 9000 trees in the wild. The source for the tree in the Botanic Gardens at White Hills can only have been the Melbourne Botanic Gardens well over one hundred years ago.

Along with these uncommon trees were a range of trees that were popular and more commonly available at the time, including Blue Gum, Sugar Gum, Oaks, Elms, Poplars, Willows, Monterey Cypress and Radiata Pine.

As well as trees and shrubs, it should be noted that a diverse range of other plants would have been grown. We know from early reports that this included; New Zealand Flax, *Justicia carnea*, Fuchsias,

Petunias, Pansies, Daisies, Pinks, Hydrangeas, Geraniums, Roses, Sultana Grape, Verbena, Yucca and the Sensitive Plant (Mimosa pudica) (Lee Andrews 2007).

2.3 Context with Other Victorian Botanic Gardens

Victoria is unique in Australia - and probably the world - for its collection of well over 20 19th Century Botanic Gardens in regional centres, most of which were developed between 1849 and 1886. A unique confluence of circumstances brought this about, including government policy that allowed crown land to be set aside for Botanic Gardens (as distinct from public parks); a climate of scientific discovery, exchange and education; and the growth, wealth and confidence brought about by the Victorian goldrushes.

Amongst Victoria's regional Botanic Gardens, Bendigo's is one of the oldest. Land for Botanic Gardens purposes was set aside as early as 1854. Land for the Botanic Gardens was gazetted in 1857. This makes only five gardens older; Melbourne, Geelong, Portland, Hamilton and Williamstown.

The Bendigo Botanic Gardens, White Hills has retained considerable evidence of its 19th Century landscape design – its central billabong, spacious lawns, shady walks, zoological exhibits and curved paths. The Botanic Gardens shares many of these elements of nineteenth century landscape design with other Victorian Botanic Gardens of the era. It also has some features that are uncommon amongst Victoria's botanic gardens.

For the purposes of the following sections of this report the following regional Botanic Gardens were used for comparison:
Ballarat, Benalla, Buninyong, Camperdown, Castlemaine, Colac, Daylesford, Geelong, Hamilton, Horsham, Kyneton, Malmsbury, Maryborough, Melbourne, Port Fairy, Portland, Sale and Warrnambool.



Like the Bendigo Botanic Gardens at White Hills, the entry to the Ballarat Botanic Gardens is about 4.5 kilometres from the centre of town



Shrubberies and lawn areas, as seen here in the original section of Geelong Botanic Gardens, were also once a feature in Bendigo, but the shrubberies have now all gone



The Kangaroo Flat 'Botanic' Gardens

2.3.1 Key Points of Similarity with Other Regional Botanic Gardens

The Bendigo Botanic Gardens at White Hills, has a large number of similarities with many of the other regional Botanic Gardens in Victoria. These include:

Use or adaptation of existing water course for an ornamental water feature: Benalla, Castlemaine, Colac, Hamilton, Malmsbury, Maryborough, Melbourne, Portland, Sale and Warrnambool.

Zoological, avifaunal or acclimatisation collection: Ballarat, Castlemaine, Colac, Geelong, Hamilton, Horsham, Melbourne, Port Fairy, Sale and Warrnambool. Bendigo's is the last continuous collection.

Curator's residence: Ballarat, Benalla, Buninyong, Camperdown, Castlemaine, Colac, Geelong, Hamilton, Horsham, Kyneton, Melbourne, Port Fairy, Portland, Sale and Warrnambool.

Large picnic shelter/gazebo: Ballarat, Buninyong Castlemaine, Colac, Daylesford, Geelong, Melbourne, Port Fairy and Warrnambool.

Glasshouse and/or conservatory: Ballarat, Buninyong, Camperdown, Castlemaine, Colac, Daylesford, Geelong, Hamilton, Maryborough, Melbourne and Warrnambool.

Located a few kilometres from the centre of town: Ballarat, Benalla, Buninyong, Camperdown, Castlemaine, Colac, Daylesford, Geelong, Hamilton, Kyneton, Maryborough, Melbourne, Port Fairy, Portland, Sale and Warrnambool

Incursion of recreation facilities such as swimming pools, tennis courts, caravan parks, etc: Benalla, Buninyong, Camperdown, Castlemaine, Colac, Hamilton, Horsham, Kyneton, Malmsbury, Maryborough, Port Fairy, Portland, and Sale.

2.3.2 Key Points of Difference with Other Regional Botanic Gardens

The Botanic Gardens at White Hills had - or has - a number of features that are uncommon when compared to the other regional Botanic Gardens in Victoria. These include:

- Avenue of conifers of various Pinus species
- Continuous collection and exhibition of animal collection
- Ornamental memorial gates of post World War One
- History of salinity
- Received plants from John Cronin, Director of Melbourne Botanic Gardens, 1909-1923
- Recent or planned extension into a greenfield site: Melbourne, Geelong

2.3.3 Kangaroo Flat 'Botanic' Gardens

In southern Bendigo is a public open space referred to as the Kangaroo Flat Botanic Gardens. This area is along a seasonal creek just west of the railway, with the Kangaroo Flat railway station to its north-east. Apparently the name was attributed to the site as a proviso of receiving Government funding for the 'development' of the site (Anthony Sheean, pers. comm. 5 May 08). The work was carried out by at least one (possibly more) Commonwealth employment schemes. There is a small ornamental water body and furniture such as a bridge, pergola, seating, etc.

The vast majority of the vegetation is remnant River Redgums (*Eucalyptus camaldulensis*), with some early plantings of Sugar Gum (*E. cladocalyx*). Newer plantings from the period of the employment scheme(s) include mostly Australian natives and some indigenous. There is a small pocket of exotics to the south end of the site near some residential units.



The Canna collection next to the Samual Gadd Centre at the Bendigo Botanic Gardens at White Hills is based on the fact that John Cronin donated Cannas to Bendigo early in the Twentieth Century







A heritage style information stand for visitors to the Albury Botanic Gardens



An interpretive sign at the Royal Botanic Gardens, Melbourne educates visitors about the original nature of the riverside environment



The gardens could host lectures and workshops on horticultural themes for the Bendigo and wider community

The site meets none of the criteria for a Botanic Gardens. It is recommended that a Master Plan be developed for the site, and the attendant links that run south and north of it. A new name should be canvassed for the site and the term 'botanic' should not be used.

2.4 Benefits of a Botanic Gardens

Botanic Gardens have a number of benefits that are both tangible and intangible and work in many dimensions. For example, Botanic Gardens offer opportunities to learn on many educational levels, the health and wellbeing benefits of public open space, and they also provide the economic benefits of increased tourism. It is hard to quantify the benefits of a Botanic Gardens as this research has largely not been done. However, the following outlines some of the benefits.

2.4.1 Educational

One of the principal roles – if not the most important - of a botanic gardens is that of public education. In the 21st Century the emphasis of the educational element has changed slightly. As Michael Maunders (2008: 14) says 'Botanical gardens, as institutions that exhibit and study plants, are undergoing an extraordinary and unprecedented period of growth and creativity. Driven by strong institutional missions they are evolving into venues that promote a public understanding of plants and the fundamental issues of conservation and sustainability. All life on earth depends on plants – they feed us, clothe us and delight us, yet this most fundamental resource is eroding.'

Botanic Gardens at White Hills, Bendigo has the opportunity to be a leading educator of both members of the public and students on a range of plant and landscape based issues. Examples of these include:

- Interpretation of our garden and landscape history
- Conservation of historic plants
- Conservation of rare and threatened plants
- Creating an understanding of local plants and plant communities
- Examples of waterwise gardening and irrigation practices
- Exhibition and trialling of waterwise plants suitable for the local district
- Selection and use of sustainable landscape and building materials
- Examples of sustainable landscape practices, such as composting

2.4.2 Community Health and Wellbeing

Botanic Gardens offer a range of health and wellbeing benefits. These can be as simple as providing a safe and comfortable place for a walk, to the opportunities for social connectedness through family and other social gatherings. The opportunity for simple, quiet respite from the hectic busyness of an advancing urban and technological age is also increasingly important.

While it is early days yet, there is growing empirical evidence of the psychological and physical health benefits of gardens and gardening, as well as contact with nature in its various forms. In 'Healthy Parks, Healthy People' Maller states that 'it has been demonstrated that plants heal via two modes: observational mode and participatory mode. Observational mode occurs when viewing vegetation in a garden or wilderness, but the observer has no responsibility for its care (eg, in a park or wilderness area).







Participatory mode occurs when an individual is responsible for nurturing a plant or garden ... (and) is a more intense experience ... however, both observation and participation produce wellbeing.' (Maller 2002: 38) A botanic garden can provide both modes to improve wellbeing.

The benefits of having a 'green oasis' in an urban setting, while hard to quantify, are widely acknowledged. In an era of smaller block sizes with larger houses, the value of such public open space is even more greatly valued. Add to this the impact that drought and water restrictions are having on people's own gardens and the results are increased use of public open space. In the case of the Royal Botanic Gardens, Melbourne an increase in visitation of 61% was noted over the two seasons of serious water restrictions for home gardeners (summers of 2006-2007 and 2007-2008). (Richard Barley, pers. comm. September 2008)

2.4.3 Tourism

Botanic Gardens are one of the most popular of tourist destinations. According to the BGANZ website, 'data from the Australian Bureau of Statistics show that people visit botanic gardens more than any other cultural venue apart from cinemas' (www.bganz.org.au).

This is supported by David Aldous, who states 'the most popular activities for both international and domestic tourists include nature-based and ecotourism activities with 40 percent of international visitors and 12 percent of Australians visiting our nation's national and state parks, wildlife parks and zoological gardens, botanic gardens, municipal gardens and green spaces' (Aldous 2008: 8).

The benefits are obvious as 'both the international and domestic visitor injects money in the community by paying for activities, products, services and experiences largely through food, accommodation, travel and entertainment' (Aldous 2008: 8).

Furthermore, Aldous predicts that the future is bright. 'Horticultural tourism will continue to grow in Australia provided it is founded on the principles of minimal impact on the environment, promote health and active living, and is supportive of local culture and economy' (Aldous 2008: 12).

At Geelong, the experience from their extension to the Geelong Botanic Gardens supports their investment in the Gardens. Annual visitation rose from around 70,000 to well over 210,000 a year after the completion of the extension. (John Arnott, pers. comm. October 2008)

In Bendigo's case it is interesting to note that some 48% of visitors come to visit family and friends (Kathryn Mackenzie, pers. comm. 9 January 2008). Providing a restored heritage botanic gardens along with a contemporary extension which houses family and visitor friendly facilities will encourage more tourism and is likely to increase the length of stay of those visitors.

Within Bendigo, the Botanic Gardens, Lake Weeroona and Rosalind Park are the feature elements of a horticultural 'string of pearls'. Visiting these key attractions enable visitors to experience a variety of landscapes within the city and an appreciation of the city's culture and horticultural history.

The rejuvenation and extension of the Botanic Gardens at White Hills is also – as it was at its creation 150 years ago – a physical manifestation of civic pride. This sort of place-making reinforces a positive message of Bendigo's confidence in its community and its future.







A collection of Cannas is an important feature of the Bendigo Botanic Gardens



Signage providing information to visitors about the New Caledonia Collection at the Royal Botanic Gardens, Melbourne

2.5 Botanic Gardens Australia New Zealand (BGANZ)

Botanic Gardens Australia New Zealand (BGANZ) is an incorporated association which has published on its website its aims as:

- Providing a forum for information exchange and coordinated planning;
- Fostering best-practice standards amongst Australian and New Zealand Botanic Gardens and other Botanic Gardens internationally;
- Being an advocate for the interests of Australian and New Zealand Botanic Gardens;
- Providing policy and legislative advice affecting Botanic Gardens;
- Advocating plant conservation and fostering the plant sciences and social and cultural heritage programs;
- Building and maintaining links with relevant national and international bodies. (www.bganz.org.au)

BGANZ membership offers an important network, particularly at this critical phase in the Bendigo Botanic Gardens' history. The CoGB has been a member of BGANZ for some time and has participated at various levels. The CoGB currently has a staff member on the executive of BGANZ Victoria.

2.6 Garden Plant Conservation Association of Australia (Inc) (GPC)

The Garden Plant Conservation Association of Australia (Inc) (GPC) is an organisation dedicated to the establishment, development and maintenance of collections of cultivated garden plants, usually based on a particular genus. Most collections aim to hold examples of forms of plants that have fallen out of circulation, as well as examples of rarer forms worthy of trialling. The collection becomes a resource for conservation and education and thus, holding a GPC collection(s) meets many of the aims of a botanic gardens. Regional botanic gardens, such as Bendigo, should be keepers of such plant collections. For example, the Geelong Botanic Gardens holds a collection of Pelargoniums and Salvias. GPC is the new name of the Ornamental Plants Conservation Association of Australia (Inc) (OPCAA).

2.7 Living Plant Collections

At the very core of any botanic gardens is its collections of living plants. It is essential that these collections are derived from clear policies and visions. The Bendigo Botanic Gardens Master Plan is using, with permission, the Living Plant Collections Plan of the Royal Botanic Gardens, Melbourne, as its guide to developing its own policies for Bendigo.

2.7.1 Definition and Roles of Living Plant Collections

As stated by the RBGM 'a collection is defined as a managed group of plants demonstrating a particular theme(s). It serves one or more of the general goals of research, conservation, education or ornamental display. It is an essential feature of botanic gardens that they contain accurately identified, documented and labelled collections of plants for the purposes of conservation, reference, research, interpretation, education or pleasure. This is one of the features of botanic gardens which distinguishes them from other public gardens and parks, and highlights their role as a valuable scientific and cultural resource' (RBGM 2008: 54)

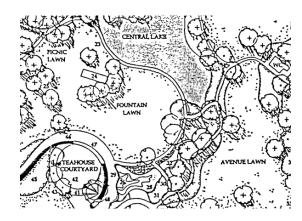
A Living Plant Collections Plan for the Botanic Gardens at White Hills, Bendigo, and a statement of the possible living plant collections, has been drafted and is included in the Master Plan document. Policies regarding plant sourcing, record management and collection management have also be devised. A policy for assessment of weed potential will also need be developed in line with BGANZ Weed Risk Assessment Procedure.



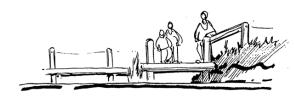




3.0 EXISTING MATERIAL REVIEW & SUMMATION



An extract of the Bendigo Regional Botanic Gardens Study, Volume 2: Design & Implementation Report (Gerner Consulting Group Pty Ltd., Dec 1993)



A sketch from the White Hills Botanic Gardens Concept Plan Report for Discussion Purposes (David McCubbin & Susan Milton Landscape Architecture, Oct 1997)

3.1 Introduction

There are a number of documents dealing with the Botanic Gardens that have been produced in the last two decades. Two of these (Gerner and TBA) produced Master Plans for the development and extension of the Gardens. A third (McCubbin & Milton) produced a concept plan for the existing Botanic Gardens site. While well intentioned, all these reports were done without the benefit of Conservation Management Plan (CMP) having been completed. A CMP is completed to accepted international guidelines and practice. It gives historical context to the site and provides analysis and assessment of the cultural significance of the site. Conservation policy, guidelines and actions are also provided along with a statement of cultural significance. A CMP was completed for the current Botanic Gardens site at White Hills (as Heritage Significance Assessment and Strategy) in 2007. Sections One, Two and Three of the Executive Summary of this report were adopted by council in September 2007. (See Appendix D)

Earlier reports and Master Plans were completed with only cursory assessment of the physical nature of the site. Only Gerner (1993) includes a soil test, and this appears to be of only one sample and it does not indicate from which part of the site it was taken. No study of the hydrology of the area appears to have been undertaken before any of the above plans were produced, despite the fact that Bendigo Creek runs through the site. Additionally, two of the Master Plans (Gerner and TBA) feature new water bodies, and in the case of TBA, one that is very sizeable. The context of the CoGB's own strategies and policies in a number of relevant areas also seems to have been ignored or given cursory treatment only.

These points should not be perceived as criticisms as it must be understood that the consultants who undertook these plans did so with a particular brief and budget given to them. It should not be implied that they did not meet the requirements set for them.

The current Master Plan follows a more rigourous process and more thorough backgrounding, assessment, analysis and consultation before the Master Plan is complete. A brief summary of these previous reports follows.

3.2 Bendigo Regional Botanic Gardens Study 1993

Volume 1: Background, Principles and Themes. (Gerner Consulting Group Pty Ltd)

Use of Gardens as a significant tourist attraction, particularly after enhancement and expansion; Themes are listed as a basis for defining the site and its role. These include: botanic science; horticulture; education; conservation; aesthetic; recreation and tourism. Along with this were offered a set of major principles, including; access and parking; land use; water; market niche and themes; financial and management.

3.3 Bendigo Regional Botanic Gardens Study 1993

Volume 2: Design and Implementation Report (Gerner Consulting Group Pty Ltd)

This gives the major design and functional elements. These include: Memorial Garden; Photographic Garden; Main Lawn; Playground; Conifer Lawn; Billabong; Central Lake; Picnic Lawn; Avenue Lawn; Gardens Bridge; Teahouse Courtyard; Riverine environment; Conservatory; Conservation Lawn; Fauna display; Open Forest Garden; Goldfields Garden; Wild Flower Garden; Southern Lawn; Shade house; Shade garden; Koori Garden; Endangered Species garden; Gully lawn; Australian Lawn; Western Lawn; Playground — associated with Western lawn; Amphitheatre; Stage Lake; Entry Plaza.

Many of these themes and elements were reconsidered in the current Master Planning process for possible inclusion in the new Master Plan.

3.4 White Hills Botanic Gardens Concept Plan Report for Discussion Purposes 1997

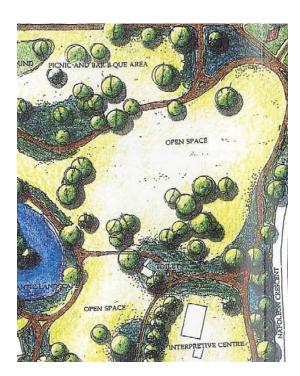
(David McCubbin & Susan Milton Landscape Architecture)

This discusses their idea that the 'quirky' nature of the Botanic Gardens at White Hills is the essence of the character and identity. Discusses access, and supports vehicular access and parking within the Gardens. Suggests upgrade of fencing and Scott St streetscape. Recommends the relocation and expansion of animal enclosures. Suggests the walk-through aviary needs additional planting and interpretive material and the cockatoos deserve something better than the current cage. Improve edges and access to the billabong and link physically and visually with its source. The swimming pool is an intrusion. Enhance its entry and differentiate its boundary with the Gardens. Provide a kiosk/interpretive centre/meeting room, with viewing area up to three storeys high, which incorporates the avifauna. Incorporate massed plantings. Strengthen avenues in adjoining Hamelin Street and Scott Avenue. Opportunity to reinvent the Shelter with more planting, BBQ's and seating. Incorporate the creek into the Gardens, by manipulating the fence edges and topography. Provide a varied fencing style and height to allow views beyond gardens. Develop vistas to anchor gardens to surrounding country.





3.0 EXISTING MATERIAL REVIEW & SUMMATION



Part of the landscape plan from Bendigo Botanical Gardens at White Hills (TBA Planners, 1998)



1896 photograph of girls enjoying the billabong at the Bendigo Botanic Gardens, White Hills (Elaine Harrington, private collection)

14

3.5 Bendigo Botanical Gardens at White Hills 1998

(TBA Planners)

This is much more ambitious than previous plans and sets to re-establish the Gardens as a major botanic feature. It also set out to establish new themes and attractions. The Concept Plan provides for 4 main areas: Heritage – focused on existing gardens area; Indigenous - new area to be developed with references to Dia Dia Wrung, local indigenous flora and fauna (south of the existing Botanic Gardens, east of creek); Native – area of vegetation and landscapes compatible with the Bendigo environment. Included a large open area and lake (south of White Hills oval, west of creek); Recreation - including area of White Hills Oval. The concept includes using Bendigo Creek and creek side (riparian) environment as connecting feature within the Gardens and includes the idea of a treatment wetland.

The plan goes on to outline some priorities and lists the various elements of the Gardens as 'asset' or 'liability', and makes recommendations for these. Themes for each of the garden zones are also outlined in some detail.

Proposed overall Landscape Features are also described and include: Creek Environment, including use of wetland; Footpath System: Pedestrian Entrances: Open Space Network; Furniture and Lighting; Indigenous Plants Buffer; Develop a Friends of Gardens group; Rename 'Bendigo Botanic Gardens at White Hills.

Significant issues exist with many of the suggestions within this report as to whether they can be practically or sustainably achieved. Those that can were reconsidered in the current Master Planning process.

3.6 Wetlands Site Evaluation, Botanical Gardens at Bendigo Creek, White Hills 2001

(Fisher Stewart)

This report was prepared to evaluate siting options and identify a preferred concept option for a proposed constructed wetlands at Bendigo Creek in the vicinity of the Botanic Gardens at White Hills. Preliminary cost estimates were also provided. Three options were included, with the consultants preferred option being Option Two.

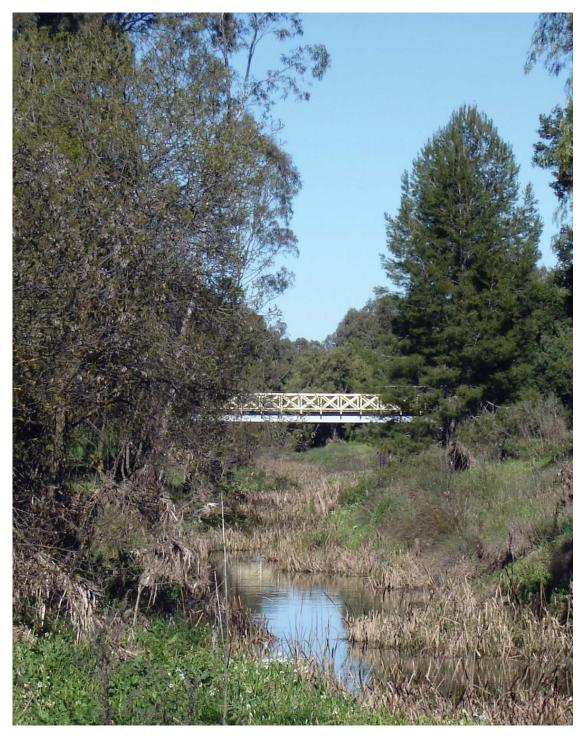
Thorough site investigation needs to be carried out before further development of the water body concept takes place as it is generally believed that it would not be sustainable.

3.7 Bendigo Wetland Project at Bendigo Creek, White Hills 2003

(Central Highlands Environmental Consultancy)

This report appears to be a follow up to the previous report, with an emphasis on assessment of existing flora and fauna conditions along with a range of attendant strategies and recommendations. The area covered is along Bendigo Creek from around Lake Weeroona up to Buckland and Saade Roads.

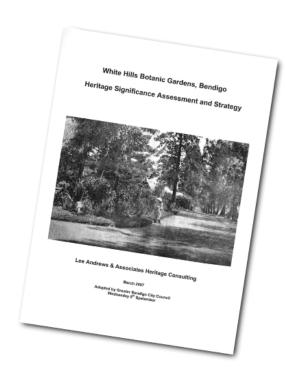
All sections of this report assess the Bendigo Creek as being a degraded site of poor vegetation and faunal value. However, this report will be very useful on a number of levels, should the concept of creek side improvement and/ or constructed wetlands be pursued in the Botanic Gardens Master Plan.



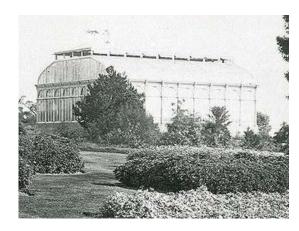
The proposed treatment to the adjacent section of the Bendigo Creek was considered by several reports, as it is currently of low environmental and recreational value



3.0 EXISTING MATERIAL REVIEW & SUMMATION



The Heritage Significance Assessment and Strategy (Lee Andrews & Associates Heritage Consulting, March 2007) will provide the basis for master plan decisions relating to the historic area of the Bendigo Botanic Gardens, White Hills



Cast iron conservatory or Palm House from the Royal Botanic Gardens - Melbourne (National Library of Australia Collection)

3.8 Heritage Significance Assessment and Strategy 2007

(Lee Andrews & Associates Heritage Consulting)

This document is the most significant and influential of those so far produced in relation to the Bendigo Botanic Gardens and is carried out in accordance with national and international best practice.

It outlines the history of the Botanic Gardens and gives guidelines for the conservation of the existing site.

The document includes a history of the development of the Botanic Gardens at White Hills and its features, including some that are no longer present. Provides a listing of elements by ranking of cultural significance. Gives an analysis and assessment of cultural significance, which includes: Historic; Aesthetic; Social; and Scientific significance.

Gives conservation policies for the conservation of culturally significant fabric, use, interpretation and management. Also discusses new developments. Discusses the principles of tree and plant maintenance, replacement, propagation and substitution. Suggests establishing a protocol for assessing the weed potential of plants within the Gardens. Recommends the re-establishment of the Botanic Gardens at White Hills as botanic gardens. Gives guidelines for interpretation of the Gardens. Makes various recommendations regarding management of the Botanic Gardens at White Hills, staffing levels and skills, funding and instigation of a garden maintenance plan. Outlines some suggested new works within the existing historic boundaries of the Botanic Gardens at White Hills and discusses some possible new works within the proposed extension. Outlines a range of conservation actions that should be undertaken and sets a priority to each. Includes a Tree Survey 2006 and copies of historic photos, plans and documents.

It should be noted that Priority One, Two and Three of this report were adopted by Greater Bendigo City Council on 5 September 2007. The final priority, Priority Four, was not adopted. The current Master Plan will incorporate the relevant recommendations from Priorities 1, 2 and 3 and also address and attempt to resolve the issues associated with Priority 4 through the consultation and design process.

3.9 Cast Iron Conservatory

In 2001 the CoGB was successful when it put in an Expression of Interest to the National Trust of Australia to be the holder of the Victorian Cast Iron Collection. Amongst the pieces in the collection is a cast iron conservatory that was part of the RBGM for almost one hundred years. This building is currently in pieces and after further research and restoration it could be reconstructed in the heritage section of the Bendigo Botanic Gardens.

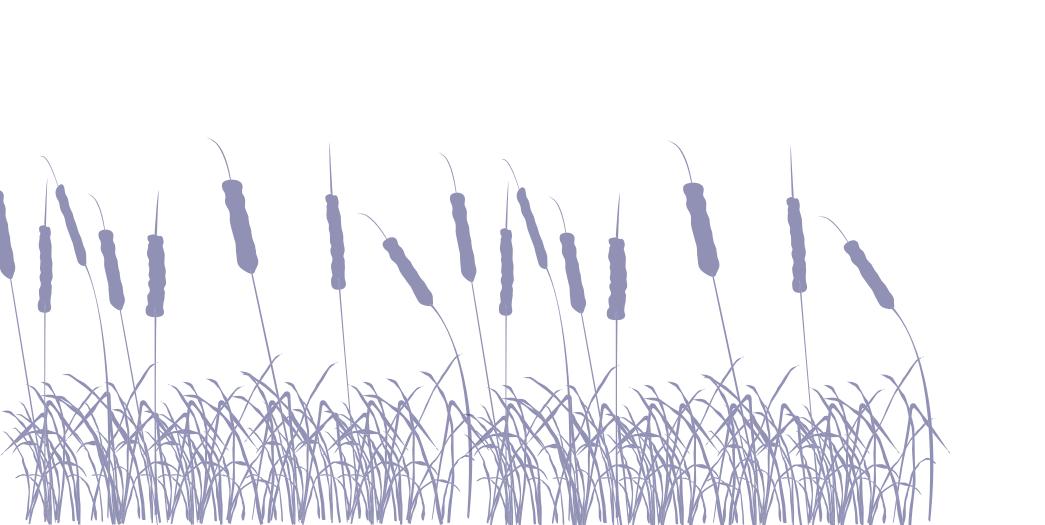
A 1994 report on the Cast Iron Conservatory (also known as the Palm House) is included here as an appendix. This report comes from the period when the Cast Iron Conservatory was at the Melbourne Zoo and beign deconstructed and moved to be housedat Werribee Park.

The Heritage Significance Assessment and Strategy (HSAS) recommends as Priority 4 to 'construct a display conservatory' (Lee Andrews 2008: 13). It may also be appropriate to house other elements of the cast iron collection, such as drinking fountains, in the Gardens.



Elements of historic significance have been discussed in the Heritage Significance Assessment and Strategy (Lee Andrews & Associates Heritage Consulting, March 2007)



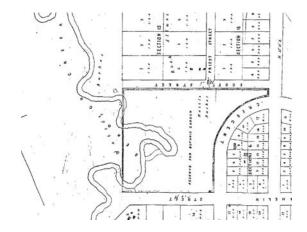




4.0 SITE HISTORY



A typical image of box-ironbark vegetation of the Bendigo region



1854 plan of the Bendigo Botanic Gardens, White Hills extent, and the arrangement of the billabong as a part of the Bendigo Creek prior to its realignment west of the site

4.1 Pre-White Settlement History

The White Hills area is part of Jaara Country, the traditional land of the people of the Dja Dja Wrung language. The Dja Dja Wrung language group is one of the five distinct but closely related communities comprising the Kulin Nation in south central Victoria. Various explorers passed through the area in the early 19th Century, and some settlement occurred before the goldrush with sheep runs.

The Ecological Vegetation Class (EVC) of the original vegetation of the vast majority of the site would be classified as Creekline Grassy Woodland. This is described as having a eucalypt overstorey with occasional scattered shrub layer over a mostly grassy/ sedgy to herbaceous ground layer. Canopy species would typically be River Redgum (Eucalyptus camaldulensis), Grey Box (Eucalyptus microcarpa) and Yellow Box (Eucalyptus melliodora). Shrubs would have included Golden Wattle (Acacia pycnantha), Common Rice-flower (Pimelea humilis) and Gorse Bitter-pea (Daviesia ulicifolia). Grasses and herbaceous plants would have included Shiny Everlasting (Xerochrysum viscosum), Common Tussock-grass (Poa labillardieri), Bristly Wallaby-grass (Austrodanthonia setacea), Tall Sedge (Carex appressa) and Diffuse Rush (Juncus remotiflorus). (DSE: EVC 68)

As the land rises from the creek flat on the eastern and western edge of the site, it is likely that the vegetation changed. The EVC for these areas is listed as Low Rises Grassy Woodland. This is described as a variable open eucalypt woodland to 15m tall over a diverse ground layer of grasses and herbs. The shrub component is usually diverse but sparse in cover. Canopy species would typically be Grey Box (Eucalyptus microcarpa) and Yellow Gum (Eucalyptus leucoxylon). Shrubs would have included Golden Wattle (Acacia pycnantha), Gold-dust Wattle (Acacia acinacea), Wedge-leaf Hop-bush (Dodonaea viscosa ssp. cuneata), Common Rice-flower

(Pimelea humilis) and Common Eutaxia (Eutaxia microphylla var. microphylla). Grasses and herbaceous plants would have included Shiny Everlasting (Xerochrysum viscosum), Grey Tussock-grass (Poa sieberiana), Bristly Wallaby-grass (Austrodanthonia setacea) and Feather Spear-grass (Austrostipa elegantissima). (DSE: EVC 175-61)

Remnant original vegetation is extremely rare on the site. Some River Redgums within the existing Botanic Gardens at White Hills probably date from pre-white settlement times. Some Rushes, Sedges and Cumbungi occur and these are indigenous to the site. However, comparison of the current creek course to its pre-1854 alignment (see plan) indicate that the creek (apart from within the existing Botanic Gardens) has been realigned. Existing plants, therefore — with the exception of the above - are either weed species or deliberate plantings.

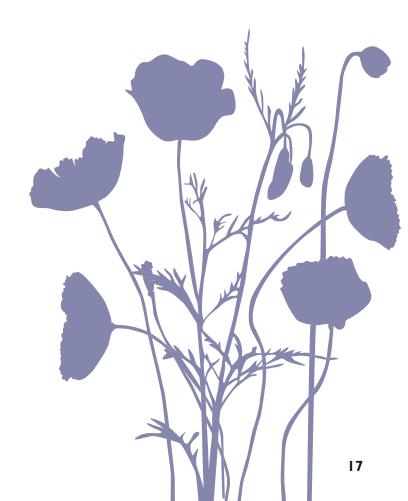
4.2 History of the Botanic Gardens at White Hills

After the discovery of gold in 1851 the area of Bendigo expanded rapidly. By 1854 land had been set aside for botanic gardens purposes and was officially gazetted in 1857. Work began directly after reservation and by 1862 it was a flourishing site. By this stage a 'stockade' had been prepared in readiness for animals to be sent for acclimatisation and it was later reported there was 'a small but varied collection of native animals'. By 1865 it was noted that there was a monkey family present.

By 1877 an intricate network and hierarchy of paths had been installed (see plan on page 24), covering a total of 3,450 yards. There were four circular beds 12 feet wide and 24 of eight feet wide. There were also 20 rectangular garden beds and a border of 220 yards by five feet wide. As well, about half an acre of area had been cleared and sown with grass.



Fig 4.1 Plan showing estimated Ecological Vegetation Class divisions and extents in 1750 for the Bendigo Botanic Gardens Master Plan Project extent. (Source DSE)





The state of the s

1877 plan of the path layout within the Bendigo Botanic Gardens, White Hills (Bendigo Regional Archives Collection)



Photograph of animals in the Botanic Gardens around the 1910s or 1920s (Bendigo Regional Archive Centre collection)

4.0 SITE HISTORY

By this stage, too, the creek had been turned into a billabong, there was as a greenhouse (sometimes referred to as a hothouse), a grape arbour and numerous plants were established, including a bed of dahlias and over one hundred standard roses. There was a Curator's house and the 'zoo' held monkeys, cockatoos and kookaburras. Plans were underway for reticulating water in the Botanic Gardens. In 1878 three lots of plants were received from William Guilfoyle, Director of the Melbourne Botanic Gardens.

By the late 1880s a salt problem was evident in the Gardens and many plants and trees had succumbed. Drainage was installed and the problem was largely overcome. Samuel Gadd, when asked by the Council's Parks and Gardens Committee in 1898 whether we 'have made a Botanical Gardens instructive to the public?' was able to answer 'yes'. (Lee Andrews 2008:33)

By the end of the Nineteenth Century the Acclimatisation Grounds (ie current site of White Hills Recreation Reserve) was largely unused, with botanical and acclimatisation efforts having been consolidated onto the site east of Bendigo Creek some years earlier. There is no date for the planting of the rows of Oaks that mark the northern and southern boundaries of the acclimitisation grounds, however, it is estimated that they are well over 100 years old and possibly date from the 1860s or 1870s.

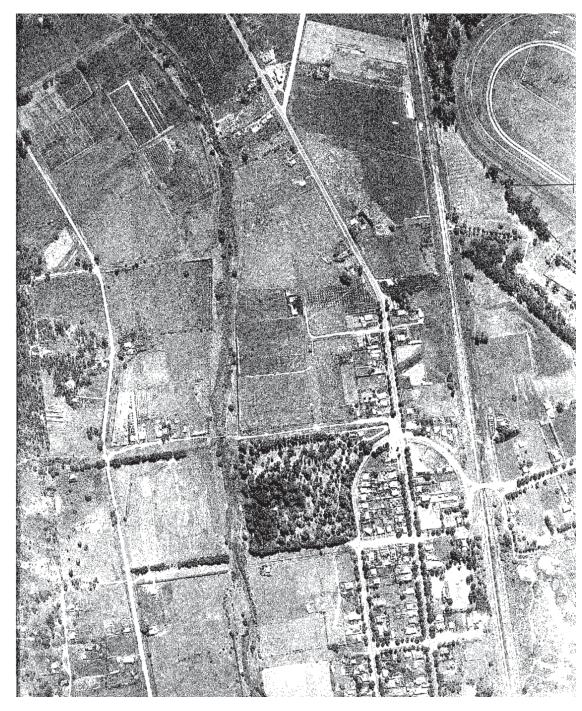
The Bendigo Botanic Gardens, White Hills continued its popularity into the Twentieth Century. A shelter shed was built on the island on the site of an earlier aviary, and a bridge to the island was raised, both early in the Twentieth Century.

After World War One efforts were made by a local committee to raise the funds to construct a memorial arch to honour those who had participated in the war. The Arch of Triumph was finally completed in 1925. In 1921, 19 varieties of Canna Lilies were received from John Cronin, then Director of the Botanic Gardens, Melbourne. He had also donated Dahlias sometime earlier.

In 1929 the Council voted to allow the north-west section of the Gardens to be used as a camping ground, in particular for 'camping motorists', as caravanners were then called.

Little change or development happened within the Botanic Gardens until the late 1940s and early 1950s, when lobbying took place to construct a swimming pool on the site. This was opposed by the Returned Services League and the Bendigo Trades Hall Council and was not supported by the Department of Lands on several grounds, including that the land was reserved for 'Botanic Gardens' and as such could not be used for any other purpose. After further lobbying and negotiation a site in the southwest corner of the Gardens was chosen and approved by the relevant Government Minister in 1955. This site involved using a depression that was part of the original Bendigo Creek, with much of the fill going into the south-west corner of the site, thus changing the topography, including changing the island into a promontory. The original path network also had to be altered. The swimming pool was completed around 1960 and within a year the caravan section of the Gardens was closed and the area tidied up.

In 1973 M J Beaumont, Superintendent of Parks and Recreation, designed a plan for major changes to the Gardens to be staged over a seven year period. While the plan was adopted by Council, not all aspects were instigated. A survey plan of existing features produced in 1975 showed the Gardens contained three bird cages, a cockatoo cage, two shelter sheds, parking areas, an open drainage channel crossed with a vehicle bridge and a shrubbery at the eastern end of the billabong. This plan also indicated, but did not identify, a large number of the plants growing on the site.



1957 aerial photograph of the site showing the established tree growth, the lack of residential development to the west and the distinct oak tree border to the former acclimatisation paddock



4.0 SITE HISTORY



The walk-through aviary is a recent development, being built in 1987



The entrance area behind the Arch of Triumph was radically redesigned and constructed in 2000

By 1977 the following aspects of the seven year plan had been completed: perimeter fencing on two boundaries; new central toilet block; planting of a shrub border along Scott Street; construction of two electric barbecues; and construction of a small adventure playground.

In 1980 another set of plans for proposed redevelopment were available for public inspection. It is likely that these mostly contained elements of Beaumont's 1973 plan. The new curator's residence (the current Samuel Gadd Centre) was constructed in late 1980, and it is assumed that the original house was demolished at this time. Work on the billabong in 1982 created the current island. As part of the celebrations of Victoria's 150th in 1984, tree identification was undertaken, along with labelling and tree surgery. A number of trees were also donated and planted.

The walk through bird aviary was constructed in 1987.

In 1993 a Landscape Master Plan for the Gardens was completed by the Gerner Consulting Group. The Concept Plan Report by McCubbin and Milton Landscape Architects was completed in Oct 1997. This was followed in 1998 by the TBA Master Plan, which included simplified elements of the Gerner plan. The entrance area behind the Arch of Triumph was redesigned and the construction completed in 2000. This completely altered the area, which had remained largely unchanged for 140 years. The Heritage Significance Assessment and Strategy was completed, and subsequently adopted by Council, in 2007.

4.3 White Hills Recreation Reserve History

The area west of Bendigo Creek and north of Hamelin Street was set aside as an Acclimitisation Reserve in the 1860s. It is unclear if birds and animals were

housed there, and if they were it would have been for a short period of the site's history. Certainly by the mid 1880s the site was described as 'unimproved'. Originally the acclimitisation reserve went further west but this land was cut off when Kennewell Street was constructed through the original reservation. Oak trees that currently line the Scott Street part of the reserve are also evident west of Kennewell Street indicating the original extent.

A plan in the Crown Land Reserve File (Rs 3156) indicates a concrete and asphalt cricket pitch on the land in 1930. However, subsequent correspondence in the file shows that the pitch was used in 1934 for the first time in about five years. The land was officially gazetted for Public Recreation in 1933.

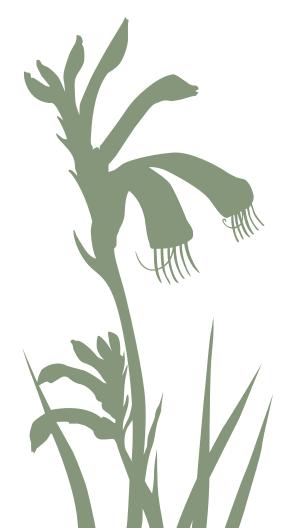
An oval is evident in aerial photos of the site taken in 1957 and again in 1966. Council records also show that this was facility was upgraded in 1975. Anecdotal evidence suggests that a scout hall has on site in the north-east corner in the first half of the 20th century.

4.4 Botanic Gardens Greenfield Site History

The greenfield section of the site has remained largely undeveloped throughout its history. The 1934 aerial photo shows market gardens on the site east of the creek. There looks to be a dwelling in the north-west corner of this area (where an old Mulberry tree currently exists) and a house toward the middle of this land. An aerial photo of 1966 shows the market gardens gone and replaced by paddocks, although the two houses are still present. The greenfield area west of the creek was most likely grazed by stock and/ or horses. The site of the White Hills Primary School was also used as market gardens.



The greenfield site south-west of the existing Bendigo Botanic Gardens showing the bordering residential development and the tree ridgeline







5.0 STRATEGIC CONTEXT



Restoring, maintaining and enhancing Bendigo's historic parks and gardens are an important component of the Bendigo +25 Community Plan



Responsible development of heritage places is an important component of the Bendigo +25 Community Plan

The rejuvenation and extension of the Bendigo Botanic Gardens, White Hills must be seen in a broader context of the City of Greater Bendigo's stated plans, strategies and policies. The planning and development of the site will take into account these existing plans, strategies and policies. Significant and directly relevant strategies are covered here individually, with other strategies listed in Table 1.

5.1 Bendigo + 25 Community Plan

This document illustrates a shared vision of what Greater Bendigo should be like in 25 years time.

The rejuvenation and extension of the Bendigo Botanic Gardens meets many of the commitments and actions of the Bendigo + 25 Community Plan. Key actions relevant to the Botanic Gardens Master Plan that meet the commitments include:

- Restoring, maintaining and enhancing
 ... historic parks and gardens
- Enhancing existing walking and cycling access and infrastructure
- Educating and informing the community about better water management practices
- Investigating and realising opportunities for use of reclaimed water
- Supporting initiatives that improve the liveability of Greater Bendigo
- Supporting the development of significant tourism infrastructure
- Conserving and interpreting heritage places
- Planning responsible development of heritage places
- Ensuring recreation and leisure activities are accessible to everyone
- Supporting the development of a diverse range of recreational activities

5.2 Council Plan 2009-2013

The Council Plan is a document prepared to identify the key issues to be pursued over the following four years to address the community's needs and aspirations.

The City of Greater Bendigo has identified the completion of the Master Plan for the Bendigo Botanic Gardens as a key project in the current Council Plan.

In addition, the rejuvenation and extension of the Botanic Gardens is supported by a number of the stated strategies in the Council Plan. These include to:

- Support community and cultural development
- Be responsible stewards of community resources and assets
- Develop and enhance public places, open spaces and active and passive recreation facilities to meet community needs
- Support arts and culture in the community
- Plan for and support the municipality's children and their families
- Adopt and promote environmentally sustainable practices
- Be a leader in water management practices
- Adopt and promote practices that are environmentally sustainable by protecting, maintaining and restoring the natural environment
- Address the impacts of climate change and reduce greenhose gas emissions
- Help maintain and grow jobs in the community
- Promote Greater Bendigo as a place to ... visit

5.3 Open Space Strategy 2005

The Open Space Strategy was developed in order to give council a clear strategic approach to open space planning and management.

The rejuvenation and extension of the Bendigo Botanic Gardens, White Hills also meets many of the objectives of the council's Open Space Strategy. Some strategies relevant to the Botanic Gardens redevelopment that contribute to meeting the objectives include:

- Protecting, rehabilitating, improving, reinforcing and promoting the natural and cultural values of open space.
- Protecting areas with high scientific and natural values and of heritage and cultural significance.
- Providing education and awareness on environmental issues and values to the general community.
- Providing a diversity of opportunities for quality experiences, enjoyment and beneficial outcomes
- Managing, providing appropriate accessible facilities on, and programming the use of open space so that it encourages ... social recreational, cultural and educational uses which contribute to a cohesive and creative community and to community health and wellbeing
- Interpreting open space settings for their natural, cultural and social values
- Protecting open spaces that can be used for educational, scientific, research and tourism purposes
- Undertaking activities which use and promote the recreational, heritage, cultural and environmental values of open space.
- Promoting the use of open space for regional, state, national and international leisure, recreation, environment and other events.
- Siting open spaces that are major users of water in such a way they can make use of on-site storage, stormwater run-off, waste water and recycled water.



5.0 STRATEGIC CONTEXT

Consulting with and encouraging individuals and community groups, and the regional indigenous community, to take an active role in open space decision making, especially when major changes to park management and use are contemplated.

5.4 Northern Corridor & **Huntly Local Structure Plan** (2005)

This report gives guidelines for the future development of the White Hills, Epsom-Ascot and Huntly areas.

The rejuvenation and extension of the Botanic Gardens is supported in this plan which states:

'the ultimate development involving expansion ... should be progressed and delivered. Resources applied to the future management of the completed resource should be commensurate with a major regional facility.' 'Council should continue to support local recreation clubs/reserve users at White Hills ... through the

preparation of development plans'

5.5 Community Access and Inclusion Plan 2006-2009

This plan demonstrates the CoGB's continued commitment to the principles of universal access and social inclusion. It is intended that the Bendigo Botanic Gardens, be developed as a 'whole of life, whole of community' cultural facility.

Amongst the recommendations of this Plan that relate to the Bendigo Botanic Gardens Master Plan are:

- Undertake a Universal Access Audit of major projects
- Undertake the development of a fully accessible regional play space



This strategy provides a framework for council to make strategic decisions relating to development and provison of play opportunities. This outlines contemporary approaches to play spaces, including integrating plantings with play spaces; incorporating water features; interaction with nature; use of public art; incorporating educational or interpretive elements and creation of universally accessible play spaces. It also recommends that five regional play spaces be created for the CoGB. Issues relevant to the Bendigo Botanic Gardens are:

- The report recommends a regional level children's garden/access for all play space be developed in the White Hills precinct, indicative costing for this play space in this report is \$1,000,000-\$1,500,000.
- The White Hills-Jackass Flat area has been identified as one of the three areas of highest priority for play space development using the Play Space Assessment Tool
- A water park with water jets, aqueducts, water wheels, etc, was identified by the general community, key stakeholders and the report writers as a play space that would greatly enhance the play experience of all members of the community



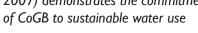








Bendigo Sustainable Water Use Plan (June 2007) demonstrates the commitment







5.0 STRATEGIC CONTEXT



Permanent and temporary public art could be displayed in the Gardens



Good access for prams, pedestrians and bicycles encourage community visitation and contribute to better public health

5.7 Other Council Strategies, Policies and Plans

There are a number of other strategies, policies and plans of the City of Greater Bendigo that are relevant to the rejuvenation and extension of the Bendigo Botanic Gardens. A summary of relevant issues is included in the following table.

Plan	Content	Relevance to Master Plan
Natural Environment Strategy: The Green Plan 2 2007-2010	This strategy sets out ways to manage change to improve and maintain a healthy and functioning natural environment in a time of climate warming and decreased rainfall.	Action 3.2 is to encourage and promote efficient use of water
Arts and Cultural Strategy 2008-2011	This strategy recognises the significance and value of arts and culture.	There may be opportunity within the Bendigo Botanic Gardens for permanent or temporary art and arts festivals in this public space.
Bendigo Sustainable Water Use Plan (June 2007)	This plan demonstrates the commitment of CoGB to sustainable water use. Council has a strategy to increase water use awareness.	As shown by the RBGM, botanic gardens can be leaders in water efficiency and in creating examples of waterwise landscapes, and sharing this knowledge with the visiting public. Also, recycled water is now available to the site. Riparian vegetation will be returned to the Bendigo Creek in line with the strategy.
Bendigo Waterways: Scoping for future management (November 2007)	Sets strategic direction for the future management of the Bendigo Creek and its tributaries.	Recommends investigating a stormwater treatment wetlands in the vicinity. Archaeological investigation will be required for any proposed works on waterways. Carry out weed control and revegetation.
Great Bendigo Cycling and Walking Strategy November 2006	Identifies existing cycling and walking pathways and recommends proposed additions.	On road and off road bicycle and walking paths pass directly by and through Botanic Gardens, which acts as an important destination and node.
Health and Wellbeing Strategy 2008-2011	This Strategy aims to promote community safety and healthy living.	The Bendigo Botanic Gardens will be a child friendly space. Recommends a regional acessible playspace which is considered for inclusion in the extension for the Botanic Gardens. The gardens will be used to communicate the impacts of climate change, including sustainable use of water. The garden will be a place of social inclusion and be accessible to all.
Greater Bendigo Economic Development Strategy (July 2008)	This strategy sets out how the Greater Bendigo region will respond to its economic development challenges.	Deliver initiatives to respond to climate change.

rable 1. Other Council Strategies, Folicies and Flans







The Arch of Triumph (circa 1951) showing the picket fence and hedge either side of entry



It is possible that some of the River Redgums beside the billabong pre-date white settlement of the area

6.1 General Arrangement

The site is located in the Bendigo suburb of White Hills some 4.5 kilometres north of the city centre. On its east it has a small, but important, frontage to Napier Street, which is also the main highway. This boundary features the impressive Arch of Triumph, a memorial arch constructed to honour those who served in the WWI.

The Heritage Significance Assessment and Strategy recommends to 'reconstruct decorative timber picket fence flanking Arch of Triumph' as a priority 3 action (Lee Andrews 2008: 13).

Other boundaries occur along Scott Street on the north, Kennewell Street on the west, Napoleon Crescent on the east and parts of Hamelin Street east and west of Bendigo Creek. Land south of Hamelin Street is bounded by the rear or side fences of residential properties that face Hamelin Street, Kennewell Street, Louey Drive, Sharyn Street, Bosquet Street and Raglan Street.

The overall site is broadly divided into four quarters by Hamelin Street running approximately east-west and Bendigo Creek running approximately north-south. These quarters can be defined as:

- North-east –Heritage Botanic Gardens Zone. This is the site of the original Botanic Gardens at White Hills. (±6.4Ha [±15.8acres])
- North-west White Hills Recreation Reserve. Originally this was the acclimitisation reserve, although its use for this purpose was not long or significant. (±5.4Ha [±13.3acres])
- South-east greenfield site for extension of the botanic gardens. (±3.6Ha [±8.9acres])
- South-west greenfield site for extension of the botanic gardens. (±4.8Ha [±11.9acres])

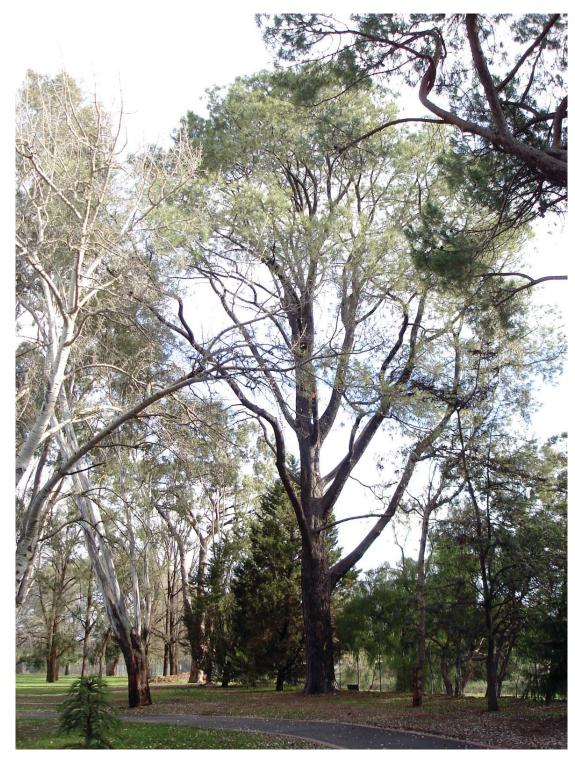
In addition, large areas of Hamelin Street and all of Bendigo Creek that runs through the site are included in the Master Plan development. The overall site under consideration, including the above, is approximately 25 Hectares (61.5 acres).

6.2 Existing Vegetation and Features

6.2.1 Botanic Gardens at White Hills

Vegetation on site is predominantly introduced, with just a few River Redgums (Eucalyptus camaldulensis) possibly predating white settlement of the area. A tree survey carried out in 2006, as part of the Heritage Significance Assessment and Strategy, (Lee Andrews 2008) names the trees and larger shrubs on the site. It does not name all plants, especially smaller ones, nor species of which there are multiples, such as the more recent boundary planting along Scott Street and Napoleon Crescent. It does not appear to include the 'Whipstick Collection', nor the Cannas, Dahlias and Kniphofias. The species listing is not complete and it is recommended that a complete listing be created once a proper plant record management system has been adopted.

The report lists 307 plants from 35 genera with a total of 69 species identified. The broadest representation is Eucalyptus with 10 species. There are also two Corymbia (which until recently were plants included in the Eucalyptus genus) and two of the very closely related Angophora. The second largest representation is of Elms (Ulmus sp) with 6 taxa. It should be noted that of the Australian native plants on site a number are indigenous to the Bendigo area and are either revegetation or new plantings. It is not known however, if these plantings are natural revegetation, deliberate plantings of local provenance or of locally occurring species propagated from forms growing elsewhere in Australia.



The rare Soledad Pine (Pinus torreyana) stands at the western edge of the existing Botanic Gardens area



A Melaleuca armillaris specimen near the billabong



A line of mature oaks line Hamelin Street west of the Bendigo Creek



Cockatoos form part of the avifaunal exhibit

The breakdown given of the range of species is:

Exotic evergreens

Acacia (1), Araucaria (2), Cedrus (2), Choisya (1), Cupressus (3), Dovyalis (1) Polyspora (1), Juniperus (1), Phoenix (1), Pinus (5), Schinus (2), Viburnum (1), and Yucca (1)

Australian native evergreens

Acacia (1), Angophora (2), Brachychiton (1), Callistemon (1), Casuarina (1), Corymbia (2) Eucalyptus (10), Ficus (2), Grevillea (1), Lagunaria (1), Livistona (1), Melaleuca (1), Stenocarpus (1), and Tristaniopsis (1)

Exotic deciduous

Fraxinus (2), Liquidambar (1), Platanus (1), Populus (3), Prunus (1), Quercus (4), Salix (2) and Ulmus (6)

Australian native deciduous *Melia* (1)

This range of species probably does not represent the breadth of plants that have been grown over the decades at the Botanic Gardens. A review of aerial photos shows that canopy cover has considerably reduced, especially in the second half of the 20th century. It should also be noted that, for a botanic gardens, it is an extremely narrow range, especially when compared to other regional botanic gardens.

The various species seem to be well blended across the whole site, that is, there does not seem to have been a distinct 'pinetum' or grouping of Australian natives together, etc. There was an avenue of conifers running parallel to Scott Street in the western half of the heritage gardens, and remnants of this feature are still in place. Conifers also feature heavily in the vicinity of the western boundary, to the east of the Bendigo Creek. An avenue of Elms runs along the eastern part of the Hamelin Street boundary. Two mature Moreton Bay Figs occur on Napoleon Crescent and it is possible these marked an early entrance to the site.

The HSAS states as Priority I actions to 'undertake tree pruning and associated works' and to 'develop a tree replacement and propagation programme' (Lee Andrews 2008: I2)

Existing landscape features include the billabong; actually part of the original Bendigo Creek that is now cut off. Other existing features include the animal enclosures and walk-through aviary; Samuel Gadd Centre; works depot; swimming pool; toilet block; play equipment and barbecues. There is a considerable network of paths, including some of gravel and some of asphalt.

6.2.2 White Hills Recreation Reserve

The Scott Street and Hamelin Street boundaries of the White Hills Recreation Reserve are planted with evenly spaced deciduous exotic trees of considerable age. Most are English Oaks (Quercus robur) with an occassional Algerian oak (Q. canariensis) and possibly an Elm (Ulmus sp).

These rows represent a deliberate attempt at some stage to 'mark' the site boundary with plantings. An aborist's assessment of the trees on the southern boundary was undertaken in 2008. This determined the species present, and their health, vigour and useful life expectancy. Unfortunately, the report recommends removal of seven trees. Remedial tree surgery is required for all the others.

Other trees on site are much more recent plantings and are a mixture of exotics and natives, including some indigenous species. The existing trees, including the historic northern boundary planting, need to be assessed.

6.2.3 Botanic Gardens Greenfield Site

No mature plants exist over the site. Nearly all are deliberate plantings, mostly of the last twenty years or so. There are some indigenous species planted along parts of the Bendigo Creek, in particular, its eastern edge and in the vicinity of the bicycle/walking track. A double row of Eucalypts is present in the south-west. These appear to be Spotted Gum (Corymbia maculata) and Eucalyptus scoparia. There are only a few other scattered plantings on site including Bristle Oak (Quercus accutissma).

Along the Bendigo Creek a lot of the existing trees are actually weed species, such has Desert Ash (*Fraxinus oxycarpa*) and Cherry Plum (*Prunus* sp.). These and other weeds also occur near the bicycle/walking track.

Apart from the creek and its bridge, few features are evident on the greenfield site. There is a valve evident in the far south-western section of the site. This is part of the stormwater easement and flood mitigation system there. A levee is at the rear of the properties that face Kennewell Street and this is also part of the flood mitigation system. There is also a small sewerage pumping station.

6.3 Existing Animal and Avifauna Exhibits

The Botanic Gardens at White Hills has a long and continuous tradition of displaying birds and animals as part of a small zoological collection, which began around 1862. The Heritage Significance Assessement and Strategy lists the 'tradition of having a zoological collection in the Gardens' as being of Primary Cultural Significance (Lee Andrews 2008: 249) and also recommends as Priority I action to 'repair and improve animal enclosures' (Lee Andrews 2008: 12).

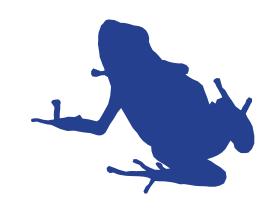








Fig 6.1 Existing Features Plan

LEGEND



BENDIGO BOTANIC GARDENS -CURRENT EXTENT



ACTIVE RECREATION AREA



GREENFIELD SITE



POTENTIAL RESIDENTIAL AREA



SITE BOUNDARY - CURRENT SITE BOUNDARY - POTENTIAL NEW ALIGNMENT



FENCES



BUILDING/STRUCTURE



OTHER FEATURE



HERITAGE LISTED TREE



SIGNIFICANT HISTORIC TREE LINE



FEATURE LABEL (see below)

AV AVIARY

AR ARCHES OF TRIUMPH
BR BRIDGE - PEDESTRIAN
CO COCKATOO CAGE
CR CREEK REMNANT

DE DEPOT

DS DEER SCULPTURE FL FLOWER BASKETS

HS HISTORIC PICNIC SHELTER
KA KANGAROO ENCLOSURE

NE NETBALL COURTS
ON OLD NETBALL COURTS

MO MOUND

PL PLAY GROUND

PO POOL

SA SAMUEL GADD CENTRE SP SPORTS PAVILLION

TO TOILETS

WA WALLABY ENCLOSURE



The picnic shelter was constructed very early in the 20th Century



The existing pool infrastructure is aged and in poor condition



Existing enclosure for Swamp Wallaby

Broadly speaking there are four enclosures.

Napoleon Crescent Enclosures

Along Napoleon Crescent are enclosures that currently house the wallabies. This is fenced with high cyclone wire fencing. Unfortunately the position beside the roadway can mean access by dogs or people, leaving the animals open to attack.

The HSAS recommends as Priority 2 action to 'retain and improve fauna enclosures along Napoleon Crescent to a high animal welfare and visual standard' (Lee Andrews 2008: 12).

Hamelin Street Enclosures

The Hamelin Street enclosures currently house eastern grey kangaroos. This is fenced with high cyclone wire fencing. The HSAS recommends as Priority 4 action to 'remove the fauna enclosures along Hamelin Street and return area to Gardens' (Lee Andrews 2008: 13).

Cockatoo Cage

The cockatoo cage currently houses sulphur-crested cockatoos. There is concern that the facility is not large enough for birds of this size. There are also ongoing problems with vermin. The captive birds also 'call down' wild birds which subsequently damage trees and plants within the Gardens.

Originally it was believed that the cockatoo cage was the 1945 monkey enclosure. However, a photograph that has emerged since the HSAS was completed shows an earlier monkey enclosure. It is believed that the current enclosure therefore is a later structure probably from the 1950s or early 1960s. The HSAS lists the current cockatoo cage as primary cultural significance, however, this needs to be questioned in light of hte new evidence. Both structures housed monkeys in the mid 20th Century, up until the mid 1970s, when the last of the monkeys were removed.

Walk-through Aviary

The walk-through aviary is a pine log and wire structure that allows visitors to pass through and see the birds in a relatively natural habitat. It is the newest of the enclosures, however, at over 20 years of age it needs to be assessed structurally and for suitability of purpose. This facility is not open to the public on weekends, as it requires staff to be present.

It should be noted that in early 2009 the Greater Bendigo City Council made a resolution to phase out the bird and animal collections.

6.4 Existing Facilities and Buildings

6.4.1 Heritage Botanic Gardens

Public Toilets

The existing public toilet block was built in the late 1970s. It is in reasonable condition, however, it does not meet contemporary expectations regarding such facilities, particularly in relation to access for people with disabilities and baby change facilities.

The HSAS recommends as Priority 4 action to 'remove existing toilet block and relocate in less prominent postion' (Lee Andrews 2008: 13).

Samuel Gadd Centre

This building was completed in the early 1980s and served as the residence of the gardener. For a short time it was commercially rented to residential tenants. In 2007 internal changes were made to the building to convert it from a residence to a multipurpose facility. It is currently used as office and lunch room by Gardens' staff and as meeting and activity space for the Friends of Bendigo Botanic Gardens and occasionally other groups too.

The HSAS recommends as Priority 4 action to 'remove brick veneer cottage and construct a new purpose-built facility' (Lee Andrews 2008: 13).

Works Depot

Two brick sheds exist beside the Samuel Gadd Centre and these serve as works depot for the staff working within the Botanic Gardens. There is also a small glasshouse behind the Samuel Gadd Centre that is used for propagation by both staff and the Friends. A shade structure to protect seedlings and potted plants in the area behind the Samuel Gadd Centre has been installed recently.

The HSAS says the current works depot is of 'contributory cultural significance' but its the 'fabric and location' is of 'no appreciable significance' (Lee Andrews 2008: 249) and recommends as Priority 2 action to 'construct new nursery facilities including propogation facilities and hardening off areas' (Lee Andrews 2008: 12).

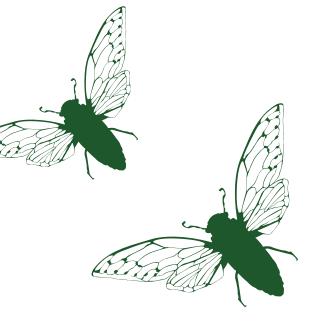
Picnic Pavilion

The current picnic pavilion was constructed in the first decade of the 20th century. It is in fairly good condition, although the floor is uneven. The HSAS lists the 'design and location of shelter, including fixed tables and bench seating' as being of primary cultural significance (Lee Andrews 2008: 249) and that it is a Priority I acton to 'carry out maintenance work on the pavilion' (Lee Andrews 2008: 12).

Swimming Pool

The White Hills Swimming Pool is a concrete pool constructed in the late 1950s. There is also a wading pool for small children and buildings housing a kiosk, toilets etc. There is also a building housing chemical storage as well as open air pumps, filters, etc. The pool is in poor condition, while the concrete paving is in very poor condition. It is understood that the chemical storage and associated works buildings meet guidelines, but are not up to modern expectations for such facilities.

The HSAS lists the pool as 'intrusive' (Lee Andrews 2008: 249) and recommends as a Priority 4 action to 'remove swimming pool and reconstruct the lost section of the billabong, early island and footbridge, based on documentary evidence' (Lee Andrews 2008: 13).







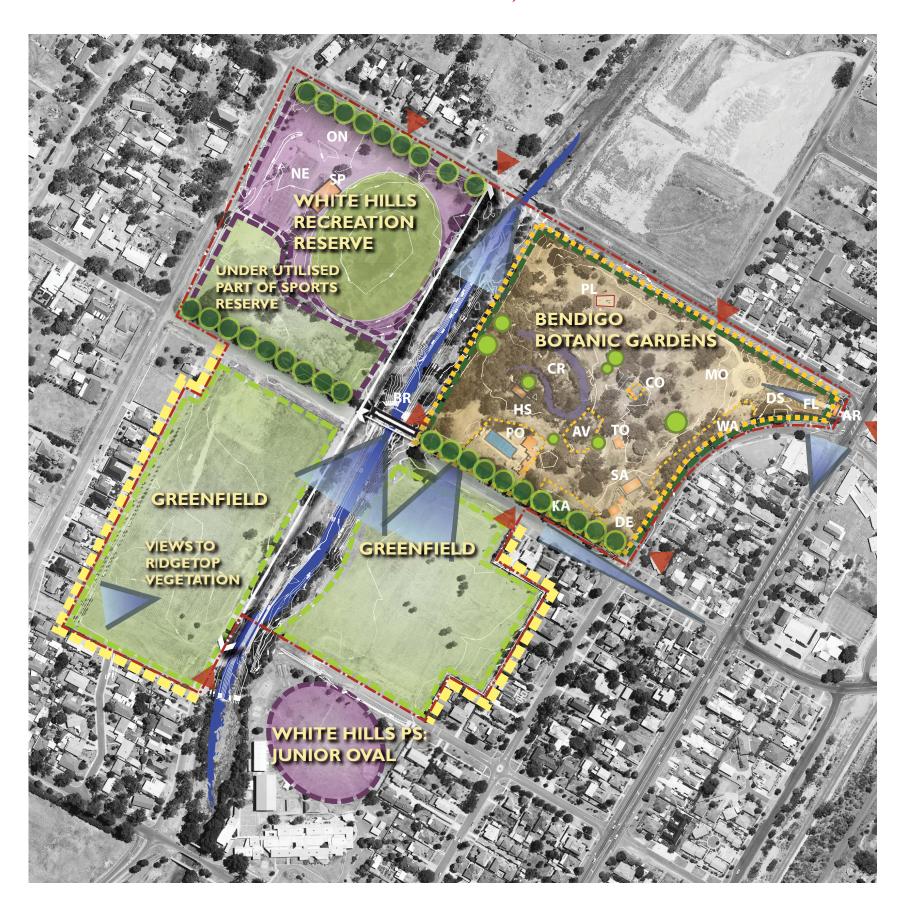


Fig 6.2 Access & Amenity Plan

LEGEND



AREA LISTED ON VICTORIAN HERITAGE REGISTER



ACTIVE RECREATION AREA



GREENFIELD SITE



SITE BOUNDARY - CURRENT



IMPORTANT VIEWS INTO AND OUT OF SITE



RESIDENTIAL BACK FENCES PRESENTING A POOR INTER-FACE TO THE SITE





EXISTING ENTRY POINTS



FENCES/BUILDING/STRUCTURE



HERITAGE LISTED TREES

SIGNIFICANT HISTORIC TREE LINE

FEATURE LABEL (see below)

L	4\/	

AVIARY ΑV

ARCH OFTRIUMPH AR **BRIDGE - PEDESTRIAN** COCKATOO CAGE CO CR CREEK REMNANT

DE DEPOT

DS DEER SCULPTURE FL **FLOWER BASKETS**

HS HISTORIC PICNIC SHELTER KA KANGAROO ENCLOSURE **NETBALL COURTS** NE

OLD NETBALL COURTS ON MO MOUND

PLPLAY GROUND

PO **POOL**

SAMUEL GADD CENTRE SPORTS PAVILLION

TOILETS TO

WA WALLABY ENCLOSURE





The nearly completed extension to the pavilion of the White Hills Recreation Reserve

Priority 4 recommendations of the HSAS were not adopted by Greater Bendigo Council and so this recommendation has not been confirmed and therefore is subject to further consideration.

Alternatives to the pool in the form of water play and a swimming lagoon were included in the options paper for public consideration and consultation.

6.4.2 White Hills Recreation Reserve

Pavilion

The pavilion at the White Hills Recreation Reserve has a range of facilities used by the various user groups and visitor clubs. This includes toilets, change and shower facilities, a canteen, viewing area and social facilities. The facility recently underwent refurbishment and extension.

6.5 Land Ownership, Zoning and Current Planning Conditions

6.5.1 Land Ownership

The site of the Bendigo Botanic Gardens is crown land, with the City of Greater Bendigo as its committee of management. The White Hills Recreation Reserve is also crown land with the City of Greater Bendigo as committee of management. The creek line is crown land classified as public land water frontage. There is also a small parcel of crown land between the western edge of the heritage site and the creek land that is uncategorised public land. Apart from the above and the road reserves, the balance of the land (ie, the greenfield site) is owned outright by the City of Greater Bendigo. The south-east section was purchased in December 1990. The south west section was purchased in late 1999.

6.5.2 Zoning, Conditions and Overlays

The Botanic Gardens at White Hills is zoned PPRZ (Public Parks and Recreation Zone). It is covered by a Heritage Overlay (HO679) which indicates that a planning permit will be required for most works. The White Hills Recreation Reserve is also zoned PPRZ, as is the creek. The land set aside for the extension of the Gardens east and west of Bendigo Creek and south of Hamelin Street is currently zoned RIZ (Residential Zone). The houses and land that adjoin this land are also zoned RIZ. The White Hills Primary School is zoned PUZ (Public Use Zone).

The vast majority of the land – with the exception of the high ground directly behind the Arch of Triumph in the heritage zone, and a section along Kennewell Street at the recreation reserve – is covered by an LSIO (Land Subject to Inundation Overlay). The intention of this overlay is to identify land subject to one in one hundred year flooding and means most works will need permits.

The area either side of and including the Bendigo Creek is part of a ESO I (Environmental Significance Overlay) which is designed for watercourse protection. Permits may be required for certain works. Similarly, the area 200 metres either side of and including the Bendigo Creek is part of a culturally sensitive area and so is subject to the Aboriginal Heritage Act 2006 and Aboriginal Heritage Regulations 2007. An assessment of the site in relation to Aboriginal Heritage is required prior to the issue of permits and works.

The Botanic Gardens at White Hills area is on the Victorian Heritage Register (No. H1915) and as such is covered by the Heritage Act. Routine maintenance can be carried out, but any significant changes must be approved by Heritage Victoria.

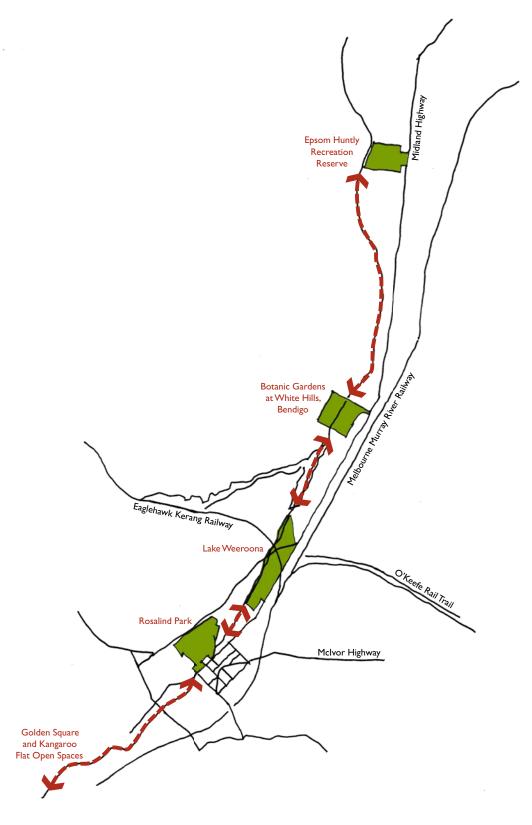


Fig 6.3 Open Space Context Plan





The White Hills Primary School borders the South eastern corner of the greenfield site east of the Bendigo Creek



The design of future collections will need to consider the impacts of climate change



Continuing years of insufficient rainfall are causing major challenges for grass survivial in high impact areas

6.6 Open Space Context

The Botanic Gardens at White Hills is the oldest public open space dedicated to passive recreation in the City of Greater Bendigo. Within the vicinity of the site there is very little public open space. There are a number of small reserves, mostly with play equipment, in subdivisions about one kilometre away. The nearest major public open space is Lake Weeroona, over two kilometres to the south.

6.7 Urban Context

The area directly surrounding the Bendigo Botanic Gardens site is largely given over to residences and residential land. The White Hills Primary School lies directly south of the south-eastern section of the greenfield site. Some businesses - hotels, motels, retail, etc - occur along Napier Street in close proximity to the site. The White Hills Pre-school is at 62 Raglan Street, within walking distance of the site.

6.8 Climate & Climate Change

Understanding the climate - and projected climate change - is critical for planning any garden and the plants that will be grown there. With the Bendigo Botanic Gardens the vision is for a garden that will be developed and maintained well into the future, so understanding the projected climate some 50 to 100 years away is important for the success of such a landscape.

Bendigo's weather usually features cool, wet winters and warm to hot summers that are dry. This climate is described as Mediterranean, and is shared with other parts of the world, including south-western USA and parts of Mexico, South Africa, parts of Chile and the Mediterranean basin. The data in Tables 2-4 and information are based on information supplied by the Victorian Government and is discussed in the context of the north central region of Victoria. (DSE 2008)

	Average daily temperature (°C)	Average daily maximum temperature (°C)	Average daily minimum temperature (°C)	Average rainfall (mm)
Annual	14.8	21.2	8.5	491
Spring	14.2	20.7	7.7	130
Summer	21	28.9	13.1	90
Autumn	15.3	21.5	9.1	122
Winter	8.7	13.6	3.8	150

Table 2: Seasonal and annual average temperatures and rainfall in the north central region (1961-1990)

	Lower emission growth	Higher emissions growth
Spring	1.5°C warmer, 11% less rain	2.9°C warmer, 20% less rain
Summer	I.6°C warmer, 2% less rain	3.1°C warmer, 4% less rain
Autumn	I.4°C warmer, 2% less rain	2.7°C warmer, 4% less rain
Winter	1.2°C warmer, 7% less rain	2.2°C warmer, 13% less rain

Table 3: Expected changes for the region in 2070

	Current	Lower emissions growth	Higher emissions growth
Frosts*	35	20	11
Days over 30°C	44	59	75
Days over 35°C	11	18	28
Days over 40°C	I	3	5
Rainy days **		- 8.1%	-1.6%
Extreme daily rainfall intensity		+ 3.6%	+6.9%
* 2° or less		·	•

Table 4: Average number of days per year by 2070 for Bendigo



22. [7 200]

The newly commissioned recycled water infrastructure



The gardens is relatively flat across most of the site

32

6.0 SITE SUMMARY, CONTEXT & ANALYSIS

In summary, by 2070, under a higher emissions growth scenario, Bendigo's temperatures would resemble those of present day Ouyen, while annual rainfall would be similar to Charlton.

As well as becoming hotter and drier, it is important to consider the extremes as these also affect plant success and also the planning for amenities and infrastructure such as shade structures, stormwater systems and the like.

While Bendigo is likely to suffer less frosts, it should be understood that even one heavy frost will be enough to kill or seriously damage plants if they are not adapted to such conditions. Also, less rainy days but more occurrences of heavy rainfall events means that less rain is likely to soak into the ground and more 'flash flooding' is going to occur.

It should also be understood that the change in climate will have an impact on biodiversity. Species may alter their distribution and some that are currently under threat or have an extremely limited range will be under further pressure. This, in turn, has an influence on the Gardens' role in local plant conservation.

6.9 Soil

Being located within the goldfields bioregion, the site is part of a broader landscape generally characterised by the presence of box-ironbark forests. The original soil complex is that of clay duplex soils produced from the erosion of Lower Ordovician sedimentary rocks. These soils generally have low fertility, but despite this often feature high biodiversity.

As the Bendigo Creek runs through the site, and the site itself is relatively flat, it is likely that the majority of the site was originally, and remains, alluvial soil, with sedimentary in the higher areas. It should be noted that the alignment of the creek has been changed significantly. Also, the original

Botanic Gardens site will have been highly modified over the years, especially with the input of organic matter. The Recreation Reserve and the greenfield site will have been modified by decades of grazing.

A soil assessment of the site has been carried out by a professional consultant.

6.10 Water

6.1.1 Water Supply

The site is serviced by both potable and recycled water. Potable water is supplied by Coliban Water and over recent years its use has been seriously restricted by ongoing water restrictions. This is likely to continue to be the case for many years to come. The recycled water is available currently to the heritage site and also the oval. Further tap-ins may be required to service the extension site in particular. Other infrastructure such as stormwater, irrigation, garden taps, etc are present throughout the Gardens. An automatic irrigation system using recycled water was recently installed throughout the heritage section of the Gardens.

Analysis of the recycled water in April 2008 (CoGB: 2008) showed higher than recommended concentrations of Phosphorous. This can be a problem horticulturally for phosphorous-sensitive plants such as many Australian natives. There is also the risk of algal growth if used in the billabong. These and other issues with the recycled water will need to be addressed and monitored as the water is used within the site.

6.1.2 Sewage Infrastructure

There are sewer lines in the greenfield site west of the Bendigo Creek, as well as a stormwater easement in the southern section of this zone as well. Sewer lines are also present from the public toilets and the Samuel Gadd Centre within the heritage zone.

A sewer line runs from the rear of the White Hills Recreation Reserve pavilion and heads towards Scott Street, meeting the main sewer line in the north-east corner of the reserve. Stormwater pipes also run across the site.

6.1.2 Drainage & Flooding

The vast majority of the land, with the exception of the area of high ground directly behind the Arch of Triumph in the heritage section and a section along Kennewell Street is classified as Land Subject to Inundation (LSIO). There is also an over land flood path running from the south-west corner heading in a north-easterly direction to the creek. This is to take a one in one hundred year flood event. A stormwater pipe runs in an easement at the south-west section of the site.

Stormwater drainage pipes also exist in the Recreation Reserve running from the pavilion to the creek in the northeast. In the current Botanic Gardens site stormwater runs into the billabong before overflowing into Bendigo Creek.

6.11 Topography

Overall, the site is relatively flat. There is less than four metres height distance over the whole site, with the exception of the Bendigo Creek and the Napoleon Crescent boundary. The highest point is at Napier Street at the Arch of Triumph which is about four metres above the general ground plane through the rest of the site. Similarly, the land within what is currently the wallaby enclosure rises sharply up to Napoleon Crescent. The greenfield site east of the creek is relatively flat, but it, too, rises sharply as it approaches Raglan Street on the east. Here it is approximately two metres above the flatter area.



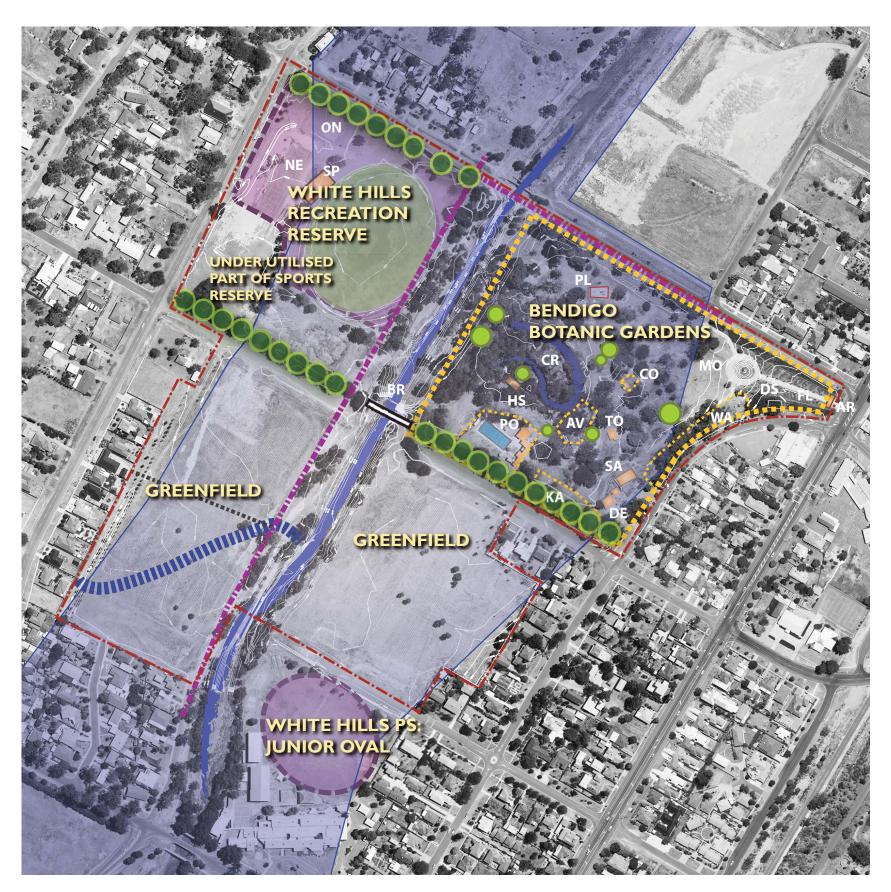


Fig 6.4 Flooding & Drainage Plan

LEGEND



EXTENT 1 IN 100 YEAR FLOOD LEVEL (LSIO) -INDICATIVE ONLY



OVERLAND FLOW PATH



EXISTING RECYCLED WATER PIPE



EXISTING SEWER



FENCES/

BUILDING/STRUCTURE



HERITAGE LISTED TREES

SIGNIFICANT HISTORIC TREE LINE



FEATURE LABEL (see below)

AVIARY

AR **ARCHES OF TRIUMPH BRIDGE - PEDESTRIAN** BR **COCKATOO CAGE** CO CR **CREEK REMNANT**

DE **DEPOT**

DS DEER SCULPTURE FL **FLOWER BASKETS**

HISTORIC PICNIC SHELTER HS KA KANGAROO ENCLOSURE

NETBALL COURTS NE **OLD NETBALL COURTS**

ON MO MOUND

PLPLAY GROUND PO **POOL**

SA SAMUEL GADD CENTRE SP SPORTS PAVILLION

TOILETS TO

WA WALLABY ENCLOSURE



Currently a car park is located inside the Botanic Gardens site with an entry off Scott Street



The Bendigo Creek Linear Trail runs through the middle of the site providing a valuable connection to other parts of Bendigo

The creek contours vary over the site with a gentle gradient to waterline at the northern end and much steeper embankments towards the south, especially in the vicinity of the White Hills Primary School. West of the creek the land remains relatively flat, with a rise of less than two metres overall.

6.12 Access and Parking

6.12.1 Vehicle Access

The Gardens are approximately 4.5 kilometres north of the city centre. The Arch of Triumph is situated on Napier Street, which is also the Midland Highway. The northern boundary is Scott Street, which is a local road, as is Napoleon Crescent to the east. Bosquet Street forms part of the southern boundary, and while this is a local road it provides access to the rear of the White Hills Primary School and is a major pick up and drop off point for the school. Hamelin Street, a local road, enters the site on both east and west. Kennewell Street is a collector road and it, and houses that face it, forms the western boundary. The southern boundary is formed by houses, but two local streets, Louey Drive and Sharyn Street, enter here. Additionally, along the Bendigo Creek is an asphalted path, known as the Bendigo Creek Linear Trail, that serves for both cyclists and walkers.

Traffic counts in the vicinity of the Botanic Gardens at White Hills, Bendigo show particularly high volumes of traffic in Napier Street (Midland Highway) with over 16,000 vehicles per day measured in 1999. The Gardens has a small highway frontage, marked by the Arch of Triumph, but the majority of the Gardens is actually set back from the highway itself. This allows a fantastic opportunity to attract passing tourists to the site. The proximity to the highway also means access to the site by both residents and visitors should be simple.

In this regard Bendigo is quite fortunate that the Botanic Gardens is quite close to a major highway, but, because it is set back from it the negative impact of noise, air and visual pollution is minimised. Most of the regional botanic gardens, with the exception of Benalla, do not have highway frontage.

There is currently a small car parking area at the eastern end of Napoleon Crescent. There is a substantial amount of angle parking along Scott Street as well as parking bays just inside the Gardens here.

Traffic numbers for Scott Street show an average 1492 vehicles per day pass the entry to the White Hills Recreation Reserve in April 2008. Car parking at the White Hills Recreation Reserve is informal, with no marked bays, either along Scott Street or within the site.

At the western end of Bosquet Street marked parking bays are allocated directly to the north of the school oval. This area is heavily used at school drop off and pick up times, and site inspection shows there is currently insufficient parking for these peak periods.



This car parking area at the Royal Botanic Gardens at Cranbourne provides a safe and capacious car park for visitors while also contributing to storm water management and indigenous habitat

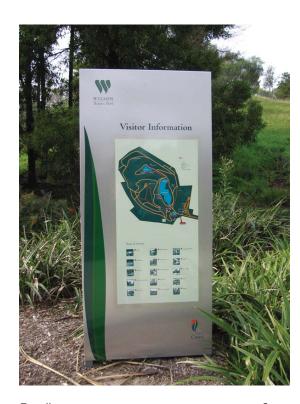
6.12.2 Pedestrian and Bicycle Access

The Bendigo Creek Linear Trail runs through the middle of the proposed site, parallel to the Bendigo Creek. This suggests that the Botanic Gardens will continue to be an important stop for those using this trail. Cyclists and pedestrians also have access to the site from a number of roads and footpaths in the area.

There is anecdotal evidence that some cyclists cut through the heritage site diagonally to get to Napier Street, rather than progressing up Scott Street. There is potential conflict here with passive users of the space and the issue of bike riding within the Botanic Gardens will need to be addressed.



6.0 SITE SUMMARY, CONTEXT & ANALYSIS



Excellent signage promotes a strong sense of place and value, as well as providing location and interpretation information for visitors



A purpose built structure within the Ian Potter Children's Garden at the Royal Botanic Gardens, Melbourne is the location for educational programs

6.12.3 Public Transport

The Huntly bus on Route 8 has a stop at the intersection of Napier and Scott Streets, right at the Arch of Triumph. Another bus, the Epsom bus on Route 10, has a stop at the intersection of Scott Street and Goynes Rd, servicing the western side of the area under discussion.

6.13 Educational and Institutional Context

One of the principal roles of a botanic gardens is that of education. In regional gardens this has largely taken place by passive means. That is, plant labelling, signage and interpretation enables visitors to absorb information in an informal and unstructured way.

In Bendigo's case there is the real possibility to create formal and informal relationships with educational institutions at all levels. Within walking distance are two primary schools, Holy Rosary Catholic Primary School and White Hills Primary School, which already enjoy some educational experiences at the Gardens. These experiences can be further developed, expanded and targeted at various levels, then made available to all schools in the Greater Bendigo area, including special needs schools and the secondary colleges.

The Interpretation Strategy has identified a substantial number of opportunities to create learning opportunites within the Bendigo Botanic Gardens which align with current primary and secondary school curricula. Refer to the Interpretation Strategy in the Appendix.

Use of the Gardens for post secondary education also has very strong possibilities. Informal agreement has already been made with Tony Misson, Lecturer, Conservation and Land Management at Bendigo Regional

Institute of Technical and Further Education (BRIT) to use the Gardens for student study, practical work and research, etc, (Tony Misson, Pers. Comm, 21 July 2008).

Horticulture courses also taught at BRIT could use the Gardens as well as students from LaTrobe University, Bendigo where studies in Botany and Natural Resources Education and other relevant subjects are taught.

Further discussion of education is found in the Master Plan, included in the Interpretation Strategy.



Local primary school students were involved in the concept design and the planting of the Camp HIII Primary School playground at Rosalind Park, Bendigo



Costing Calculations

There has been considerable effort devoted to the costing of the current design. The summary items are contained in Volume 1.

Following are the detailed calculations showing the items, units, rates and extended amounts of the costings. It must be noted that these are based on the Master Plan document and are provided as s guide only. Detailed cost estimates will be required at each stage of the design development to provide more accurate information..

NDIGO BOTANIC GARDENS									
nion of Probable Cost - August 2009									
Description of Work	Unit	Estimated	Ur	nit Cost	E×	tended	Unit Cost	F	xtended
		Quantity		ver Rate	Aı	nount er Cost	Higher Rate	A	Amount gher Cost
RITAGE SITE									,
Costings based on jobs fund application for lower cost item, + 20%	- 25 % for higher	cost item							
	25 % for migner	cost item							
Detailed Design + Documentation 10 % of for detailed design and documentation	Item	T ı	Т		\$	150,534		\$	180,6
		SUB-TOTAL DO	CUMEN	NTATION	\$	150,534		\$	180,6
Site Preliminaries									
10 % of construction value, incl. fencing, weed control, location of					\$	136,849		\$	164,2
services, site conveniences, fees+ charges.	Item	1							
	SUB-TO	TAL ITEM I: SITE I	PRELIM	INARIES	\$	136,849		\$	164,2
Demolition of exisitng structures									
Removal of animal enclosures (PC)	Item	- I	\$	5,000	\$	5,000	\$ 7,500	\$	7,5
Removal of toilet block	Item	ı	\$	5,000	\$	5,000	\$ 7,500	\$	7,5
Removal of playground + BBQ's	Item		\$	2,500	\$	2,500	\$ 3,500	\$	3,5
Removal of playground - BBQ's	item	·			Ψ	2,500	3,500	¥	3,3
		SUB-TOTA	L DEMO	DLITION	\$	12,500		\$	18,5
Paving and Surfacing									
Demolition of existing path network	Item	I	\$	147,290	\$	147,290	\$ 184,100		184,1
Construction of new paths	Item	I ITEM BAVING A	\$	555,400	\$	555,400 702,690	\$ 610,940	\$	610,9 795,0
	SOB-TOTAL	L ITEM PAVING AI	4D 30K	FACING	Þ	702,670		Þ	773,0
Irrigation Changes to existing irrigation system	Item	1 1	\$	10,000	s	10,000	\$ 12,500	\$	12,5
Changes to existing irrigation system	item	'	۳	10,000	Ψ	10,000	Ψ 12,500	Ψ	12,3
		SUB-TOTA	L IRRIC	GATION	\$	10,000		\$	12,5
Garden Beds incl. edging and mulching									
Creation of new garden beds	Item	1	\$	300,000	\$	300,000	\$ 375,000		375,0
Reinstatement of a section of the Bendigo Creek	Item	SUB-TOTAL	\$ GARDI	20,000 EN REDS	\$	20,000 320,000	\$ 30,000	\$	30,0 405.0
		30D-101AL	CARD	LIVELDS	4	320,000		¥	-103,0
Trees Semi-advanced trees, 40 I	No.	30	\$	250	\$	7,500	\$ 300	\$	9,0
зенн-ачинсей и еез, чот	140.			ALTREES	\$	7,500	Ψ 300	\$	9,0
Furniture, Fittings, Lighting, Signage									
Backed parks seats	No.	5	\$	1,500	\$	7,500	\$ 1,800	\$	9,0
Bench seats	No.	5	\$	1,200	\$	6,000	\$ 1,500	_	7,5
Drinking fountain	No.	1	\$	2,500	\$	2,500	\$ 3,000	-	3,0
Litter bin enclosures to suit 240L wheelie bins Timber banquet picnic setting 3.6m length, 0.9m wide	No.	5 2	\$	5,000	\$	4,000 10,000	\$ 1,200 \$ 6,000	_	6,0
Standard timber picnic setting 1.8m length, 0.9m wide	No.	3	\$	3,600	\$	10,800	\$ 4,000		12,0
Lighting (PC)	Item	i	\$	15,000	\$	15,000	\$ 25,000		25,0
Signage	ltem	I	\$	30,000	\$	30,000	\$ 40,000		40,0
	SUB-TO	OTAL FURNITURE	AND F	ITTINGS	\$	85,800		\$	114,5
Structures									
Reinstatement of Bridge	ltem	l l	\$	60,000	\$	60,000	\$ 90,000	-	90,0
Reinstatement of 19th century shelter shed	Item	1	\$	25,000	\$	25,000	\$ 30,000	_	30,0
Reinstatement of 19th century trellis grape walk Reinstatement of picket fence at Arch of Triumph	ltem ltem	1	\$	20,000 5,000	\$	20,000 5,000	\$ 30,000 \$ 7,500		30,0 7,5
Construction of replacement shelter including 2 x Public Toilets	Item	 	\$	100,000	\$	100,000	\$ 100,000		100,0
Creek Markers/ Artistic Interpretation (PC)	No.	20 SUB-TOTA	\$	1,000	\$	20,000	\$ 1,500	_	30,0
		303-1017	J . NO	J. JRES	*	250,000		4	207;3
	TOTAL	<u> </u>			\$	1,335,873		\$	1,581,8
CON	TINGENCY 10%				\$	133,587		\$	158,1
	ND TOTAL				\$ 1.4	469,460		\$	1,740,05

nion of Probable Cost - August 2009										
Description of Work	Unit	Est	imated	Un	it Cost	Е	xtended	Unit Cost	E	xten
		Qu	antity	Low	er Rate		Amount wer Cost	Higher Rate		mou her
TRY PLAZA										
Detailed Design + Documentation										
10 % of construction value for detailed design and documentation	Item	\$ SUB-T	OTAL DO	UMEN	TATION	\$	113,578 113,578		\$ \$	
Site Preliminaries										
10 % of construction value, incl. fencing, weed control, location of	Item					\$	103,253		\$	-
services, site conveniences, fees+ charges.		SUE	B-TOTAL P	RELIMI	NARIES	\$	103,253		\$	
Excavation and Bulk Earthworks										
Cut , transport and deposit of surplus soil material	M ³	\$	2,700	\$	6	\$	16,200	\$ 10	\$	
SUB-1	TOTAL EXCAV	ATION A	ND BULK I	ARTH	WORKS	\$	16,200		\$	
Services Power to site including earthworks and fees	Lin. M.	\$	125	\$	40	\$	5,000	\$ 60	\$	
							10.500			
Gas through site to central building incl. earthworks and fees Water supply through site to central building incl. earthworks and fees	Lin. M. Lin. M.	\$	125	\$	100	\$	12,500	\$ 130 \$ 100	_	
Storm water through site incl. earthworks and fees	Lin. M.	\$	125	\$	80	\$	10,000	\$ 100	\$	
			125							
Sewer through site incl. earthworks and fees Telecom incl. earthworks and fees	Lin M, Lin M,	\$	125	\$	145	\$	18,125 5,000	\$ 180 \$ 60	_	
			SUB-TO	TAL SE	RVICES	\$	60,625		\$	
Drainage and Water Management	T		252		- 10		10.000	.		
Supply and install sub-surface drainage lines Supply and Install drainage pits,	Lin. M. No.	\$	250 8	\$	40 250	\$	2,000	\$ 50 \$ 350		
Supply and Install strip drains	Lin. M.	\$ IAGE AND	80 WATER N	\$ 1ANAG	150 EMENT	\$	12,000 24,000	\$ 250	\$	
Paving and Surfacing										
Concrete slab paving - high quality	M ²	\$	1,320 320	\$	180	\$	237,600	\$ 250 \$ 400	+	3
High quality insets (geology stripes) Asphalt paving,	M ²	\$	-	\$	50	\$	96,000	\$ 400 \$ 65	+	
Asphalt path 3.6 m wide incl. edging	Lin. M.	\$ -TOTAL P	60 AVING AN	\$ D SURI	255 FACING	\$	15,300 348,900	\$ 295	\$	
Irrigation						_	2 /3// 22		_	
Installation of irrigation system supplying all garden bed and irrigated	Item	\$	I	\$	15,000	\$	15,000	\$ 25,000	\$	
lawn areas	<u> </u>	SUB-TOTA	AL ITEM 12	: IRRIG	ATION	\$	15,000		\$	
Garden Beds incl. planter walls										
Intensive plant collection bed, 6 plants/sq.m	M ²	\$	835	\$	80	\$	66,800	\$ 100	\$	
Raised planters, contemporary concrete work, average 0.5 high	M ²	\$	B-TOTAL	\$ CARDE	400	\$	60,000 126,800	\$ 600	\$	
Turn		30				<u> </u>	. 20,000		_	
Trees Advanced trees, 75 I container	No.	\$	9	\$	500	\$	4,500	\$ 750	\$	
Tree pits in paved area	No.	\$	9	\$	3,000	\$	27,000	\$ 4,000	_	
			306	-101A	L TREES	Þ	31,500		Þ	
Furniture, Fittings, Lighting, Signage, Fence Backed parks seats	No.	\$	6	\$	2,000	T \$	12,000	\$ 2,500	1 \$	
Bench seats	No.	\$	10	\$	1,500	\$	15,000	\$ 2,000	\$	
Water fountain Litter bin enclosures to suit 240L wheelie bins	No.	\$	3	\$	2,500 1,000	\$	2,500 3,000	\$ 3,000 \$ 1,500		
Light pole + luminaires	No.	\$	9	\$	3,000	\$	27,000	\$ 4,000	_	
Signage	Item	\$	I	\$	20,000	\$	20,000	\$ 30,000	_	
Main entry gate, remotly operated,	SUB-TO	\$ DTAL FUR	NTITURE A	\$ AND FI	50,000 TTINGS	\$ \$	50,000 129,500	\$ 80,000	\$	
Structures										
Pergola Structure	M2	\$	350	\$	800	\$	280,000	\$ 1,000	\$	3
		S	UB-TOTAL	STRU	CTURES	\$	280,000		\$	3
	TOTA	ıL.				\$	1,249,355		\$	1,6
201	TINGENCY 14	%				e	124 027		Œ	
CON	TINGENCY 10	%				\$	124,936		\$	16

Fig 10.2 Preliminary Option 1



	Description of Work	Unit	Estimated Quantity	Unit Cost Lower Rate	Extended Amount Lower Cost	Unit Cost Higher Rate	Extended Amount Higher Cost
AR	DEN FOR THE FUTURE						Ü
	Detailed Design + Documentation						
	10% of construction value for detailed design and documentation	Item	SUB-TOTAL DO	CUMENTATION	\$ 267,968 \$ 267,968		\$353,3 \$353,3
	Site Preliminaries						
	10 % of construction value, incl. fencing, weed control, location of services, site conveniences, fees+ charges.	Item			\$ 243,608		\$321,2
	site conveniences, fees+ charges.	s	SUB-TOTAL SITE	PRELIMINARIES	\$ 243,608		\$321,2
	Demolition/Tree Removal			,	, , , , , , , , , , , , , , , , , , , ,		
	Removal of trees, 6 m high	No.	25 SUB-TOTA	\$ 400 AL DEMOLITION	\$ 10,000 \$ 10,000	\$ 600	\$15,0 \$15,0
	Excavation and Bulk Earthworks					_	
	Cut , transport and deposit of surplus soil material	M^3	7000		\$ 42,000	\$ 10	\$70,0
	SUB-	TOTAL EXCAVA	TION AND BULK	EARTHWORKS	\$ 42,000	l	\$70,0
	Services Power to site including earthworks and fees	Lin. M.	1000	\$ 41	\$ 40,000	\$ 60	\$60,0
	Water supply through site to fountain	Lin. M.	50		\$ 4,000		\$5,0
	Storm water through site incl. earthworks and fees	Lin.M	530	\$ 8	\$ 42,400	\$ 100	\$53,0
	Telecom incl. earthworks and fees	Lin M,	125		\$ 5,000	\$ 60	\$7,5
			20B-16	OTAL SERVICES	\$ 91,400	<u> </u>	\$125,5
	Paving and Surfacing Concrete slab paving as shown including subgrade preparation,	M ²	0	<u> </u>			
	reinforcement						
	Asphalt path 3.6 m wide incl. edging	Lin. M. Lin. M.	535 980	\$ 255		\$ 295 \$ 200	\$157,8 \$196,0
	Asphalt path 2.1 m wide incl. edging Asphalt path 1.5 m wide incl. edging	Lin. M. Lin. M.	980		\$ 161,700 \$ -	\$ 200 \$ 160	\$196,0
	Gravel path, 0.8 m wide, 75mm depth including 75mm compacted FCR	Lin. M.	360		\$ 34,200	\$ 115	\$41,4
	base, incl. edging						
	Gravel surface areas	sq.m SUB-T	3900 OTAL PAVING A		\$ 97,500 \$ 332,325	\$ 35	\$136,5 \$395,2
	Grassing					_	
	Grassing, intensive maintenance regime, irrigated, instant turf	M ²	1500	\$ 20	\$ 30,000	\$ 25	\$37,5
	Grassing, intensive maintenance regime, irrigated, by seeding	M ²	5900		\$ 88,500	\$ 18	\$106,2
	Grassing, extensive maintenance, non-irrigated, by seeding	M ²	3200 SUB-TO	\$ II	\$ 38,400 \$ 156,900	\$ 15	\$48,0 \$191,7
	Irrigation					-	
	Installation of irrigation system supplying all garden bed and irrigated lawn	Item	I	\$ 200,000	\$ 200,000	\$ 250,000	\$250,0
	areas		SUB-TOTA	AL IRRIGATION	\$ 200,000	\$ 250,000	\$250,0
	Garden Beds incl. edging and mulching						
	Intensive plant collection bed, 6 plants/sq.m	M ²	7900	\$ 115		\$ 145	\$1,145,5
	Extensive plant collection bed, 3 plants/sq.m	M ²	1500		\$ 127,500	\$ 105	\$157,5
	Low densitiy plant collection/ shrub planting Tubestock planting 4/m ²	M ²	2310		\$ 161,700 \$ -	\$ 90 \$ 55	\$207,9
	Tubestock planting 4/III	rı .		GARDEN BEDS	\$ 1,197,700	3	\$1,510,9
	Trees						
	Super-advanced trees 100 I container	No.	15	\$ 800	\$ 12,000	\$ 1,200	\$18,0
	Advanced trees, 75 I container	No.	30	\$ 500		\$ 750	\$22,5
	Semi-advanced trees, 40 I	No.	II5 SUI	\$ 250 B-TOTAL TREES	\$ 28,750 \$ 55,750	\$ 300	\$34,5 \$75,0
	Furniture, Fittings, Lighting, Signage						
	Backed parks seats	No.	15	\$ 1,500	\$ 22,500	\$ 1,800	\$27,0
	Bench seats	No.	10	\$ 1,200		\$ 1,500	\$15,0
	Drinking fountain	No.	5	\$ 2,500		\$ 3,000	\$15,0
	Litter bin enclosures to suit 240L wheelie bins Standard timber picnic setting 1.8m length, 0.9m wide	No.	10	\$ 3,600		\$ 1,200 \$ 4,000	\$12,0 \$16,0
	Lighting (PC = provisional cost item)	Item	I	\$ 100,000		\$ 150,000	\$150,0
	Signage (PC)	Item UB-TOTAL ITEM	18: FURNTITURE	\$ 30,000 AND FITTINGS	\$ 30,000 \$ 185,000	\$ 40,000	\$40,0 \$275,0
	Structures						
	Outreach Shelter I	M2	50	\$ 500	\$ 25,000	\$ 800	\$40,0
	Rotunda/Shelter 2	M2	50	\$ 500		\$ 800	\$40,0
Ξ	1/2 Circle Structure	M2	30				\$24,0
	Sculptures (PC)	Item Si	UB-TOTAL ITEM	\$ 100,000 7: STRUCTURES	\$ 100,000 \$ 165,000	\$ 200,000	\$200,0 \$304,0
	1	TOTAL			\$ 2,947,651		\$3,886,9

	Description of Work	Unit	Estimated Quantity	Unit Cost Lower Rate		extended ount Lower Cost	Unit Cost Higher Rate	Amoun
RE	EK WORKS							
	Detailed Design + Documentation 10 % of construction value for hydraulic engineering	Item			\$	243,137		\$ 322
_		iceiii	SUB-TOTAL DO	OCUMENTATION	_	243,137		\$ 322
	Soil Testing/Environmental Audit Soil Testing Fees	Item		\$ 75,00	0 \$	75,000	\$ 100,000	\$ 100
	Environmental Audit	Item	i	\$ 40,00	0 \$	40,000		\$ 60
			SUB-TOTAL SOII	L TESTING/AUDI	Γ \$	115,000		\$ 160
	Site Preliminaries							
	10 % of construction value, incl. fencing, weed control, location of services,	Item			\$	221,034		\$ 292
_	site conveniences, fees+ charges.		SUB-TOTALSITE	PRELIMINARIES	\$	221,034		\$ 292
_								
	Demolition/Tree Removal Removal of trees, 6 m high	No.	30	\$ 2	0 \$	7,500	\$ 400	\$ 12
_		1		AL DEMOLITION		7,500		\$ 12
	Northwest Continu							
	Northern Section							
	Excavation and Bulk Earthworks Cut , transport and deposit of clean soil material on site	M ³	12700	\$	6 \$	76,200	\$ 10	\$ 127
_	Forming of new creek bed	M ²	8,760		2 \$	17,520		\$ 26
	SUI	3-TOTAL EXCAV	ATION AND BUL	K EARTHWORKS	\$	93,720		\$ 123
	Related Infrastructure							
	Rock beaching (nominally)	M2	200	\$ 4	0 \$	8,000	\$ 50	\$ 10
		SUB-T	OTAL RELATED II	NFRASTRUCTUR	\$	8,000		\$ I
	Grassing							
	Grassing, extensive maintenance, non-irrigated, by seeding, on	M ²	7860	\$	2 \$	94,320	\$ 15	\$ 117
	embankment		SI ID T	OTAL GRASSING	•	94,320		\$ 117
			302-1	OTAL GILASSING	Ψ	74,520	ı	Ψ 11.
	Riparian Revegetation	12	200		0 6	0.000	. 13	
	Jute-matting Tubestock planting 4/m ² (incl. geological stripes)	M ²	900		0 \$ 0 \$	9,000 36,000	\$ 12 \$ 55	\$ 10
			IB-TOTAL ITEM I		\$	45,000	,	\$ 60
	Trees							
	Semi-advanced trees, 40 I	No.	15		0 \$	3,750	\$ 300	\$ 4
			SI	JB-TOTALTREES	\$	3,750		\$ 4
			TOTAL NOR	THERN SECTION	\$	244,790	l	\$ 319
	Central Section							
	Excavation and Bulk Earthworks Cut , transport and deposit of clean soil material on site	M ³	12700	\$	6 \$	76,200	\$ 10	\$ 127
	Forming of new creek bed	M ²	4300		2 \$	8,600	\$ 3	\$ 12
	SU	B-TOTALEXCAV	ATION AND BUL	K EARTHWORKS	\$	76,200		\$ 127
	Access Ramp from Plaza to Central Pond							
			150		ماد	27.500	¢ 220	¢ 41
	Footings for concrete walls	Lin. M.	150 225	\$ 2:		37,500 67,500	\$ 330 \$ 350	
	Footings for concrete walls Precast, textured til-panel concrete walls, above ground structure Steps, concrete works	M ² Lin. M.	225 105	\$ 30 \$ 15	0 \$	67,500 15,750	\$ 350 \$ 200	\$ 78 \$ 2
	Footings for concrete walls Precast, textured tilt-panel concrete walls, above ground structure Steps, concrete works Hand rails, collapsible structure	M ² Lin. M. Lin. M.	225 105 150	\$ 3I \$ I! \$ 2.	0 \$ 0 \$ 0 \$	67,500 15,750 34,500	\$ 350 \$ 200 \$ 300	\$ 78 \$ 2 \$ 45
	Footings for concrete walls Precast, textured til-panel concrete walls, above ground structure Steps, concrete works	M ² Lin. M.	225 105 150 480	\$ 3I \$ I! \$ 2.	0 \$ 0 \$ 0 \$	67,500 15,750	\$ 350 \$ 200 \$ 300	\$ 78 \$ 21 \$ 45 \$ 96
	Procast, textured tilt-panel concrete walls, above ground structure Steps, concrete works Hand rails, collapsible structure Access ramp paving, Concrete slab paving - medium quality	M ² Lin. M. Lin. M.	225 105 150 480	\$ 31 \$ 11 \$ 22 \$ 14	0 \$ 0 \$ 0 \$	67,500 15,750 34,500 67,200	\$ 350 \$ 200 \$ 300	\$ 78 \$ 2 \$ 49 \$ 96
	Footings for concrete walls Precast, textured tilt-panel concrete walls, above ground structure Steps, concrete works Hand rails, collapsible structure Access ramp paving, Concrete slab paving - medium quality Central Pond	M ² Lin. M. Lin. M. M ²	225 105 150 480	\$ 31 \$ 1: \$ 2: \$ 1. AL ACCESS RAM	0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$	67,500 15,750 34,500 67,200 222,450	\$ 350 \$ 200 \$ 300 \$ 200	\$ 76 \$ 2 \$ 4! \$ 96 \$ 296
	Procast, textured tilt-panel concrete walls, above ground structure Steps, concrete works Hand rails, collapsible structure Access ramp paving, Concrete slab paving - medium quality	M ² Lin. M. Lin. M.	225 105 150 480 SUB-TOTA	\$ 31 \$ 1! \$ 2: \$ 1. AL ACCESS RAM	0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$	67,500 15,750 34,500 67,200	\$ 350 \$ 200 \$ 300	\$ 78 \$ 21 \$ 45 \$ 96 \$ 290
	Footings for concrete walls Precast, textured tilt-panel concrete walls, above ground structure Steps, concrete works Hand rails , collapsible structure Access ramp paving, Concrete slab paving - medium quality Central Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way Bridge: Semi-circular deck structure, vehicle rated	M ² Lin, M. Lin, M. M ² M ² Item M ²	225 105 150 480 SUB-TOTA	\$ 30 \$ 11 \$ 2 \$ 14 AL ACCESS RAM \$ 100,00 \$ 30	8 \$ 0 \$ 10 \$	67,500 15,750 34,500 67,200 222,450 56,000 100,000 120,000	\$ 350 \$ 200 \$ 300 \$ 200 \$ 200 \$ \$ 250 \$ 150,000 \$ 350	\$ 76 \$ 21 \$ 45 \$ 96 \$ 290 \$ 150 \$ 140
	Footings for concrete walls Precast, textured dit-panel concrete walls, above ground structure Steps, concrete works Hand rails, collapsible structure Access ramp paving, Concrete slab paving - medium quality Central Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way Bridge: Semi-circular deck structure, whicle rated Hand rails, collapsible structure	M ² Lin. M. Lin. M. M ² M ² Item M ² Lin. M.	225 105 150 480 SUB-TOTA	\$ 31 \$ 11 \$ 22 \$ 1- AL ACCESS RAM \$ 100,00 \$ 31 \$ 22	0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$	67,500 15,750 34,500 67,200 222,450 56,000 100,000 120,000 32,200	\$ 350 \$ 200 \$ 300 \$ 200 \$ 200 \$ 350 \$ 350 \$ 350	\$ 77 \$ 2 \$ 44 \$ 99 \$ 294 \$ 15 \$ 14 \$ 44
	Footings for concrete walls Precast, textured tilt-panel concrete walls, above ground structure Steps, concrete works Hand rails , collapsible structure Access ramp paving, Concrete slab paving - medium quality Central Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way Bridge: Semi-circular deck structure, vehicle rated	M ² Lin, M. Lin, M. M ² M ² Item M ²	225 105 150 480 SUB-TOTA 2000 1 400 140	\$ 30 \$ 11 \$ 2 \$ 14 AL ACCESS RAM \$ 100,00 \$ 30	0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$	67,500 15,750 34,500 67,200 222,450 56,000 100,000 120,000	\$ 350 \$ 200 \$ 300 \$ 200 \$ 200 \$ 350 \$ 350 \$ 350	\$ 7/ \$ 2 \$ 4! \$ 9/ \$ 29/ \$ 15/ \$ 15/ \$ 14/ \$ 4*
	Footings for concrete walls Precast, textured dit-panel concrete walls, above ground structure Steps, concrete works Hand rails, collapsible structure Access ramp paving, Concrete slab paving - medium quality Central Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way Bridge: Semi-circular deck structure, whicle rated Hand rails, collapsible structure Belvedere Structure	M ² Lin. M. Lin. M. M ² M ² Item M ² Lin. M.	225 105 150 480 SUB-TOTA 2000 1 400 140	\$ 30 \$ 11 \$ 22 \$ 1 1 AL ACCESS RAM \$ 100,00 \$ 30 \$ 2 \$ 8 0,00	0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$	67,500 15,750 34,500 67,200 222,450 56,000 100,000 120,000 32,200 80,000	\$ 350 \$ 200 \$ 300 \$ 200 \$ 200 \$ 350 \$ 350 \$ 350	\$ 7/ \$ 2 \$ 4! \$ 9/ \$ 29/ \$ 15/ \$ 15/ \$ 14/ \$ 4*
	Footings for concrete walls Precast, textured dit-panel concrete walls, above ground structure Steps, concrete works Hand rails, collapsible structure Access ramp paving, Concrete slab paving - medium quality Central Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way Bridge: Semi-circular deck structure, whicle rated Hand rails, collapsible structure	M ² Lin. M. Lin. M. M ² M ² Item M ² Lin. M.	225 105 150 480 SUB-TOTA 2000 1 400 140	\$ 31 \$ 1! \$ 2. \$ 1 AL ACCESS RAM \$ 100,00 \$ 31 \$ 2 \$ 80,00 CENTRAL PONE	0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$ 0 \$	67,500 15,750 34,500 67,200 222,450 56,000 100,000 120,000 32,200 80,000	\$ 350 \$ 200 \$ 300 \$ 200 \$ 200 \$ 350 \$ 350 \$ 350	\$ 78 \$ 21 \$ 96 \$ 296 \$ 150 \$ 150 \$ 100 \$ 509
	Footings for concrete walls Precast, textured dit-panel concrete walls, above ground structure Steps, concrete works Hand rails, collapsible structure Access ramp paving, Concrete slab paving - medium quality Central Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way Bridge: Semi-circular deck structure, whicle rated Hand rails, collapsible structure Belvedere Structure Belvedere Structure Big Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way (PC)	M² Lin, M. Lin, M. M² M² Item M² Item M² Item M² Lin, M. Item	225 105 150 480 SUB-TOT/ 2000 1 400 140 1 SUB-TOTAL	\$ 31 \$ 12 \$ 2 \$ 14 \$ 100,00 \$ 30,00 \$ 80,00 \$ 80,00 \$ 80,00 \$ 80,00 \$ 100,00 \$ 100,0	00 \$	67,500 15,750 34,500 67,200 222,450 56,000 100,000 120,000 32,200 80,000 388,200	\$ 350 \$ 200 \$ 300 \$ 200 \$ 200 \$ 350 \$ 150,000 \$ 350 \$ 100,000 \$ 35 \$ 150,000	\$ 78 \$ 2 2 \$ 45 \$ 99 \$ 290 \$ 77 \$ 150 \$ 144 \$ 100 \$ 10
	Footings for concrete walls Precast, textured dit-panel concrete walls, above ground structure Steps, concrete works Hand rails, collapsible structure Access ramp paving, Concrete slab paving - medium quality Central Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way Bridge: Semi-circular deck structure Belvedere Structure Belvedere Structure Big Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way (PC) Bridge: Semi-circular deck structure, spill way (PC) Bridge: Semi-circular deck structure, vehicle rated	M² Lin, M. Lin, M. M² M² Item M² Lin, M. Item M² Lin, M. Item	225 105 150 480 SUB-TOTA 2000 1 400 140 1 SUB-TOTAL	\$ 31 \$ 1! \$ 2. \$ 1 \$ 1 \$ 100,00 \$ 31 \$ 2. \$ 80,00 CENTRAL PONE	00 \$ 00 \$ 00 \$ 00 \$ 00 \$ 00 \$ 00 \$ 00	67,500 15,750 34,500 67,200 222,450 56,000 100,000 120,000 32,200 80,000 388,200	\$ 350 \$ 200 \$ 300 \$ 200 \$ 200 \$ 350 \$ 350 \$ 150,000 \$ 35 \$ 150,000 \$ 35 \$ 350 \$ 350	\$ 78 \$ 21 \$ 44 \$ \$ 94 \$ \$ 96 \$ 296 \$ 70 \$ 150 \$ 100 \$ 506 \$ 111 \$
	Footings for concrete walls Precast, textured dit-panel concrete walls, above ground structure Steps, concrete works Hand rails, collapsible structure Access ramp paving, Concrete slab paving - medium quality Central Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way Bridge: Semi-circular deck structure, whicle rated Hand rails, collapsible structure Belvedere Structure Belvedere Structure Big Pond Pond liner Formed, reinforced conrete edge, weir structure, spill way (PC)	M² Lin, M. Lin, M. M² M² Item M² Item M² Item M² Lin, M. Item	225 105 150 480 SUB-TOT/ 2000 1 400 140 1 SUB-TOTAL	\$ 31 \$ 12 \$ 2 \$ 14 \$ 100,00 \$ 30,00 \$ 80,00 \$ 80,00 \$ 80,00 \$ 80,00 \$ 100,00 \$ 100,0	8 \$ \$ 0 \$ \$ \$ 0 \$ \$ \$ 0 \$ \$ \$ 0 \$ \$ \$ 0 \$ \$ \$ 0 \$ \$ \$ 0 \$ \$ \$ 0 \$ \$ \$ \$ 0 \$ \$ \$ \$ 0 \$ \$ \$ \$ 0 \$ \$ \$ \$ 0 \$ \$ \$ \$ \$ 0 \$ \$ \$ \$ \$ 0 \$ \$ \$ \$ \$ 0 \$ \$ \$ \$ \$ \$ 0 \$ \$ \$ \$ \$ \$ \$ 0 \$ \$ \$ \$ \$ \$ \$ \$ 0 \$	67,500 15,750 34,500 67,200 222,450 56,000 100,000 120,000 32,200 80,000 388,200	\$ 350 \$ 200 \$ 300 \$ 200 \$ 200 \$ 350 \$ 150,000 \$ 350 \$ 100,000 \$ 35 \$ 150,000	\$ 78 \$ 2 2 \$ 45 \$ 99 \$ 290 \$ 77 \$ 150 \$ 144 \$ 100 \$ 10



	iption of Work	Unit	Estimated	Unit Cost		Extended	Unit Cos	st	Extende
			Quantity	Lower Rate	Am	ount Lower Cost	Higher Rate		Amount Higher Co
ВОТА	NIC PARK								
Detaile	d Design + Documentation								
	construction value for detailed design and documentation	İtem	TOTAL DOCUM	4ENTATION	\$	178,660 178,660		9	231
		306-	TOTAL DOCOR	TENTATION	ş	170,000	l	4	231
	eliminaries construction value, incl. fencing, weed control, location of services,	Item		T	\$	148,884		\$	198
	reniences, fees+ charges.							,	
		SUB-T	OTAL SITE PREI	LIMINARIES	\$	148,884		3	19
	tion/Tree Removal								
Removal	of trees, 6 m high	No.	30	\$ 200	\$	6,000	\$ 30	0 \$;
			SUB-TOTAL DE	EMOLITION	\$	6,000		\$;
Excavat	tion and Bulk Earthworks								
	nsport and deposit of surplus soil material	M ³	210	\$ 6	\$	1,260	\$ I	0 \$	
Import o	f suitable fill	M ³	3900	\$ 16	s	62,400	\$ 2	0 \$. 7
,				1	Ľ			,	
	SUB-TOT/	ALEXCAVATION	AND BULK EAR	THWORKS	\$	63,660		\$	8
Service	s								
Power to	o site including earthworks and fees	Lin. M.	560	\$ 40	\$	22,400	\$ 6	0 \$	3
Water si	upply to events space, BBQ + Children's garden	Lin. M.	250	\$ 80	\$	20,000	\$ 10	0 \$. 2
-			250			20.000			
Storm w	ater through site incl. earthworks and fees	Lin. M.	250	\$ 80	\$	20,000	\$ 10	0 \$. 2
	rough site incl. earthworks and fees	Lin M,	250	\$ 145		36,250	\$ 18		
	onnection points for portable toilets incl. earthworks and fees	No. Lin. M.	3 250	\$ 1,500 \$ 40		4,500 10,000		0 \$	
		'	SUB-TOTA	LSERVICES	\$	113,150		3	i 14
Paving :	and Surfacing								
Concret	e slab paving - medium quality	M ²	1100	\$ 140		154,000		0 \$	
	oath 3.6 m wide incl. edging oath 2.7 m wide incl. edging	Lin. M.	325 730	\$ 255 \$ 200		82,875 146,000	\$ 29 \$ 25		
Gravel s	urface areas - high quality - River Path	M ²	1540	\$ 40	\$	61,600	\$ 5	0 \$; 7
Gravel s	urface areas - medium quality	M ² SUB-TOTAL	4840 LPAVING AND S	\$ 25 SURFACING	\$	121,000 382,875	\$ 3	5 \$	49
					<u> </u>			_	
Grassing Grassing	g , intensive maintenance regime, irrigated, instant turf , events lawn	M ²	5800	\$ 20	\$	116,000		\$	i 14
							-	5	
Grassing	, extensive maintenance, non-irrigated, by seeding	M ²	13900 SUB-TOTAL	\$ 8	\$	111,200 227,200	\$ I	2 \$	31
							!	_	
Irrigatio	on of irrigation system to events lawn	Item	1	\$ 50,000	\$	50,000	\$ 80,00	0 \$; 8
			SUB-TOTAL IR	RIGATION	\$	50,000		7	8
Caudan	Beds incl. edging and mulching								
	um planting, 2 plants/ sq.m, including soil + mulch	M ²	10200	\$ 35	_	357,000	\$ 4	5 \$	
			SUB-TOTALGA	RDEN BEDS	\$	357,000		\$	45
Trees									
	vanced trees 100 I container ranced trees, 40 I	No.	5 25	\$ 800 \$ 250	\$	4,000 6,250	\$ 1,20 \$ 30		
Palm tre		No.	83	\$ 800	\$	66,400	\$ 1,20	0 \$; 9
			SUB-TO	OTALTREES	\$	76,650		\$	i II
	re, Fittings, Lighting, Signage								
Backed p Bench se	narks seats	No.	5	\$ 1,500 \$ 1,200		7,500 12,000		0 \$	
Drinking	fountain	No.	I	\$ 2,500	\$	2,500	\$ 3,00	0 \$	i
	n enclosures to suit 240L wheelie bins panquet picnic setting 3.6m length, 0.9m wide	No.	3	\$ 5,000		8,000 15,000		0 \$	
Standard	timber picnic setting 1.8m length, 0.9m wide	No.	5	\$ 3,600	\$	18,000		0 \$	
	- Botanic Park Entry (PC) PC)	ltem ltem	I I	\$ 50,000 \$ 20,000		50,000 20,000	\$ 75,00 \$ 30,00		
Signage (TOTAL ITEM 18: I	URNITURE ANI	FITTINGS	\$	133,000		\$	18
Signage (res								
Signage (m2	I	\$ 800	\$	800	\$ 1,00	0 \$	
Structu	Structure - entry boulevard near car park								
Structu	Structure - entry boulevard near car park							0 0	
Structu		m2	7	\$ 500	\$	3,500	\$ 80	0 \$	i
Structu Pergola S		m2	7	\$ 500	\$	3,500	\$ 80	10 3	i
Structu Pergola S	ekers	m2 Item	7	\$ 500 \$ 75,000		3,500 75,000	\$ 100,00		
Structu Pergola S BBQ- Sh	ekers								
Structu Pergola S BBQ- Sh	ekers								
Structu Pergola S BBQ- Sh	ekers	ltem		\$ 75,000					
Structu Pergola S BBQ- Sh	ekers	ltem	ı	\$ 75,000		75,000			; 10

ion of Probable Cost - August 2009						
Description of Work	Unit	Estimated Quantity	Unit Cost Lower Rate	Extended Amount Lower Cost	Unit Cost Higher Rate	Am Highe
CHILDREN'S GARDEN - 5,400 sq.m						
The Children's Garden is anticipated to be a unique space providing an outstanding high quality play experience for children based around plant themes. As detailed design has not been undertaken yet, a square metre rate based on the construction costs for a similar project (The lan Potter Foundation Children's Garden at the Royal Melbourne Botanic Gardens) has been assumed. Main cost items include soil preparation, fencing, play and shelter structures.						
Detailed Design + Documentation						
10 % of construction value for detailed design and documentation	Item SUB-T	OTAL DOCUM	IENTATION	\$108,000 \$108,000		
					•	
Construction Costs Construction of complete Children's Garden derived from an average	M ²	5400	\$ 200.00	\$1,080,000	\$ 250.00	
square metre rate					ψ 250.00	
	SUB-TOTA	L CONSTRUCT	TION COSTS	\$1,080,000		
		_				
				£1 100 000		
CON	TOTAL			\$1,188,000		
	NTINGENCY 10%			\$1,306,800		
GRA	NTINGENCY 10%	Estimated	Unit Cost	\$118,800 \$1,306,800 Extended	Unit Cost	Ext
GRA DIGO BOTANIC GARDENS on of Probable Cost - August 2009	NTINGENCY 10%	6	Unit Cost Lower Rate	\$118,800 \$1,306,800		Ext An
GRA DIGO BOTANIC GARDENS on of Probable Cost - August 2009	NTINGENCY 10%	Estimated	Lower	\$11,306,800 \$1,306,800 Extended Amount	Unit Cost Higher	\$I Ext
GRA DIGO BOTANIC GARDENS on of Probable Cost - August 2009 Description of Work	ND TOTAL Unit	Estimated	Lower	\$11,306,800 \$1,306,800 Extended Amount	Unit Cost Higher	\$I Ext
DIGO BOTANIC GARDENS on of Probable Cost - August 2009 Description of Work PLAY SPACE - The play space will compliment the play experience of the Children's Garden with more active, play equipment based play opportunities. This area will cater for children of an older age. (10 - 16 years of age). Costs have been assumed to be similar to the Children's Garden.	Unit	Estimated Quantity	Lower Rate	\$1,306,800 \$1,306,800 Extended Amount Lower Cost	Unit Cost Higher	Ext An High
DIGO BOTANIC GARDENS on of Probable Cost - August 2009 Description of Work PLAY SPACE - The play space will compliment the play experience of the Children's Garden with more active, play equipment based play opportunities. This area will cater for children of an older age. (10 - 16 years of age). Costs have been assumed to be similar to the Children's Garden.	Unit	Estimated	Lower Rate	\$11,306,800 \$1,306,800 Extended Amount	Unit Cost Higher	Ext An
DIGO BOTANIC GARDENS on of Probable Cost - August 2009 Description of Work PLAY SPACE - The play space will compliment the play experience of the Children's Garden with more active, play equipment based play opportunities. This area will cater for children of an older age. (10 - 16 years of age). Costs have been assumed to be similar to the Children's Garden. Detailed Design + Documentation 10 % of construction value for detailed design and documentation	Unit	Estimated Quantity	Lower Rate	\$11,306,800 \$1,306,800 Extended Amount Lower Cost	Unit Cost Higher	Ext An High
DIGO BOTANIC GARDENS on of Probable Cost - August 2009 Description of Work PLAY SPACE - The play space will compliment the play experience of the Children's Garden with more active, play equipment based play opportunities. This area will cater for children of an older age. (10 - 16 years of age). Costs have been assumed to be similar to the Children's Garden.	Unit	Estimated Quantity	Lower Rate	\$11,306,800 \$1,306,800 Extended Amount Lower Cost	Unit Cost Higher	Ext Ann High
DIGO BOTANIC GARDENS on of Probable Cost - August 2009 Description of Work PLAY SPACE - The play space will compliment the play experience of the Children's Garden with more active, play equipment based play opportunities. This area will cater for children of an older age. (10 - 16 years of age). Costs have been assumed to be similar to the Children's Garden. Detailed Design + Documentation 10 % of construction value for detailed design and documentation Construction Costs	Unit Item SUB-TG	Estimated Quantity I DTAL DOCUM	Lower Rate Rate ENTATION \$ 200	\$11,306,800 \$1,306,800 Extended Amount Lower Cost \$ 68,000 \$ 68,000	Unit Cost Higher Rate	Ext Ann High
DIGO BOTANIC GARDENS on of Probable Cost - August 2009 Description of Work PLAY SPACE - The play space will compliment the play experience of the Children's Garden with more active, play equipment based play opportunities. This area will cater for children of an older age. (10 - 16 years of age). Costs have been assumed to be similar to the Children's Garden. Detailed Design + Documentation 10 % of construction value for detailed design and documentation Construction Costs Construction Costs Construction of complete Children's Garden derived from an average	Unit Item SUB-TG	Estimated Quantity	Lower Rate Rate ENTATION \$ 200	\$11,306,800 \$1,306,800 Extended Amount Lower Cost \$ 68,000 \$ 68,000	Unit Cost Higher Rate	Ext Ann High
DIGO BOTANIC GARDENS on of Probable Cost - August 2009 Description of Work PLAY SPACE - The play space will compliment the play experience of the Children's Garden with more active, play equipment based play opportunities. This area will cater for children of an older age. (10 - 16 years of age). Costs have been assumed to be similar to the Children's Garden. Detailed Design + Documentation 10 % of construction value for detailed design and documentation Construction Costs Construction Costs Construction of complete Children's Garden derived from an average	Unit Item SUB-TO	Estimated Quantity I DTAL DOCUM 3400 TAL SITE PREL	Lower Rate ENTATION \$ 200 IMINARIES	\$11,306,800 \$1,306,800 Extended Amount Lower Cost \$ 68,000 \$ 68,000 \$ 68,000 \$ 680,000	Unit Cost Higher Rate	\$
DIGO BOTANIC GARDENS on of Probable Cost - August 2009 Description of Work PLAY SPACE - The play space will compliment the play experience of the Children's Garden with more active, play equipment based play opportunities. This area will cater for children of an older age. (10 - 16 years of age). Costs have been assumed to be similar to the Children's Garden. Detailed Design + Documentation 10 % of construction value for detailed design and documentation Construction Costs Construction of complete Children's Garden derived from an average square metre rate	Unit Item SUB-TG	Estimated Quantity I DTAL DOCUM 3400 TAL SITE PREL	Lower Rate Rate ENTATION \$ 200 IMINARIES	\$11,306,800 \$1,306,800 Extended Amount Lower Cost \$ 68,000 \$ 68,000	Unit Cost Higher Rate	Exx An High









Description of Work	Unit	Estimated Quantity	Unit Cost Lower Rate	Extended Amount Lower Cost	Unit Cost Higher Rate	Extend Amour Higher C
reation Reserve						
Detailed Design + Documentation						
10 % of construction value for detailed design and documentation	Item	SUB-TOTAL DO	CUMENTATION	\$ 19,681 \$ 19,681		\$ 2 \$ 2
Site Preliminaries				-	-	-
10 % of construction value, incl. fencing, weed control, location of services, site conveniences, fees+ charges.	ltem			\$ 17,892		\$ 2
	SUB-TO	TAL ITEM I: SITE	PRELIMINARIES	\$ 17,892	1	\$ 2
Excavation and Bulk Earthworks						
Cut , transport and deposit of soil material	M ³	1420	\$ 6	\$ 8,520	\$ 10	0 \$ I
	OTAL EXCAV	ATION AND BULK	EARTHWORKS	\$ 8,520		\$ I
Paving and Surfacing		170	T	I 24000	\$ 250	1.
	Lin. M.	170	\$ 200	\$ 34,000		
Asphalt path 2.7 m wide incl. edging					\$ 250	\$ 4
Asphalt path 2.7 m wide incl. edging	SUB-T	OTAL PAVING A	ND SURFACING	\$ 34,000	\$ 250	
Asphalt path 2.7 m wide incl. edging Garden Beds incl. edging and mulching	SUB-T	OTAL PAVING A	ND SURFACING	\$ 34,000	\$ 250	\$ 4
	SUB-T	3,600	\$ 35	\$ 34,000		\$ 4
Garden Beds incl. edging and mulching		3,600				\$ 4
Garden Beds incl. edging and mulching		3,600	\$ 35	\$ 126,000		\$ 4
Garden Beds incl. edging and mulching Aboretum planting, 2 plants/ sq.m, including soil + mulch Grassing Grassing, extensive maintenance, non-irrigated, by seeding, on spectator		3,600	\$ 35 GARDEN BEDS	\$ 126,000	\$ 45	\$ 4
Garden Beds incl. edging and mulching Aboretum planting. 2 plants/ sq.m, including soil + mulch Grassing	M ²	3,600 SUB-TOTAL	\$ 35 GARDEN BEDS	\$ 126,000 \$ 126,000	\$ 45	\$ 16
Garden Beds incl. edging and mulching Aboretum planting, 2 plants/ sq.m, including soil + mulch Grassing Grassing, extensive maintenance, non-irrigated, by seeding, on spectator	M ²	3,600 SUB-TOTAL	\$ 35 GARDEN BEDS	\$ 126,000 \$ 126,000 \$ 10,400	\$ 45	\$ 16 \$ 16 \$ 1
Garden Beds incl. edging and mulching Aboretum planting, 2 plants/ sq.m, including soil + mulch Grassing Grassing, extensive maintenance, non-irrigated, by seeding, on spectator mounds	M ² M ² TOTAL	3,600 SUB-TOTAL	\$ 35 GARDEN BEDS	\$ 126,000 \$ 126,000 \$ 10,400 \$ 10,400	\$ 45	\$ 16
Garden Beds incl. edging and mulching Aboretum planting, 2 plants/ sq.m, including soil + mulch Grassing Grassing, extensive maintenance, non-irrigated, by seeding, on spectator mounds	M ²	3,600 SUB-TOTAL	\$ 35 GARDEN BEDS	\$ 126,000 \$ 126,000 \$ 10,400	\$ 45	\$ 16 \$ 16 \$ 1

	Unit	Estimated Quantity	Unit Cost Lower Rate		Extended nount Lower Cost	Unit Cost Higher Rate	Extended ount High Cost
CAST IRON CONSERVATORY							
The City of Greater Bendigo owns and stores the remnants of a large cast iron conservatory. The reconstruction of the Cast Iron Conservatory is a very unique building project. No comparable figures could be found. The reconstruction would nvolve the use of existing blue stone base rocks and the cast ron structural members. It is not known how many of the original members still exist. Glazing to current structural safety standards will be major cost factor. A per-squaremetre rate similar to building costs for a new building was assumed.							
Detailed Design + Documentation							
0 % of construction value for detailed design and documentation	ltem	I		\$	204,000		\$ 255,
		SUB-TOTAL D	OCUMENTATION	\$	204,000		\$ 255,
Reconstruction of the Cast Iron Conservatory Reconstruction of the Cast Iron Conservatory	M ²	1020	\$ 2,000	T _{\$}	2,040,000	\$ 2,500	\$ 2,550,

Description of Work	Unit	Estimated Quantity	Unit Cost Lower Rate	Extended Amount Lower Cost	Unit Cost Higher Rate	Amour Higher C
CENTRAL BUILDING - 500 sq.m						
contemporary, high quality public building with commercial cooking facilities.						
Detailed Design + Documentation						
10 % of construction value for detailed design and documentation	Item SUB-T	TAL DOCUM	ENTATION	\$125,000 \$125,000		\$1. \$1.
					'	
Construction Costs - Central Building Construction of contemporary, public building	M ²	500	\$ 2,500.00	\$1,250,000	\$ 3,000.00	\$1.5
Construction Costs - Central Building Construction of contemporary, public building.	M ² SUB-TO	500 TAL SITE PREL	\$ 2,500.00 IMINARIES	\$1,250,000 \$1,250,000	\$ 3,000.00	\$1,5 \$1,5
		TAL SITE PREL			\$ 3,000.00	

Jpir	nion of Probable Cost - August 2009						
tem No.	Description of Work	Unit	Estimated Quantity	Unit Cost Lower Rate	Extended Amount Lower Cost	Unit Cost Higher Rate	Extended Amount Higher Cost
	SERVICE AREA						
	Detailed Design + Documentation						
	10 % of construction value for detailed design and documentation	Item	1		\$59,895		\$67,70
	-	SUB-	TOTAL DOCUM	ENTATION	\$59,895		\$67,70
	Site Preliminaries						
I	10 % of construction value, incl. fencing, weed control, location of	Item			\$54,450		\$75,0
	services, site conveniences, fees+ charges.		OTAL SITE PREL		\$54,450		\$75.0
	Paving and Surfacing Concrete slab paving - medium quality	M ²	150	\$ 140.00	\$21,000	\$ 200.00	\$30,0
	Gravel surface areas - medium quality	M ²	3380	\$ 25.00	\$84,500		\$118,3
		SUB-TOTAL	PAVING AND S	URFACING	\$105,500		\$148,3
	Buildings + Structure						
	Staff building incl. club rooms	M ²	225	\$ 1,500.00	\$337,500		\$450,0
	Potting + Storage Shed	item	1	\$ 50,000.00	\$50,000		\$75,0
	Bulk material storage	item	1	\$ 20,000.00	\$20,000	,	\$30,0
	Relocation of glas house Relocation of shade structure	item	1	\$ 5,000.00 \$ 5,000.00	\$5,000 \$5,000		\$7,5 \$7,5
	Irrigation	item	+ ;	\$ 10,000.00	\$10,000		\$15,0
	Lighting -	Item	 	\$ 10,000.00	\$10,000	_	\$15,0
	Signage	Item	i	\$ 1,500.00	\$1,500		\$2,0
		SUB-TOTAL BU	ILDING AND ST	RUCUTRES	\$439,000		\$602,0
		тота			0/50 0/5		
		IOIA	<u> </u>		\$658,845		\$893,0



BEN	DIGO BOTANIC GARDENS						
Opin	ion of Probable Cost - August 2009						
	Description of Work	Unit	Estimated Quantity	Unit Cost Lower Rate	Extended Amount Lower Cost	Unit Cost Higher Rate	Extended Amount Higher Cost
	Detailed Design + Documentation						
	10 % of construction value for detailed design and documentation	Item	ı		\$ 9,053		\$ 12,870
			SUB-TOTAL DO	CUMENTATION	\$ 9,053		\$ 12,870
	Site Preliminaries						
	10 % of construction value, incl. fencing, weed control, location of services, site conveniences, fees+ charges.	Item			\$ 8,230		\$ 11,700
L		S	L SUB-TOTAL SITE I	PRELIMINARIES	\$ 8,230		\$ 11,700
	Excavation and Bulk Earthworks						
	Cut , transport and deposit of surplus soil material	M ³	1800	\$ 6	\$ 10,800	\$ 10	\$ 18,000
	SUB-	TOTAL EXCAVA	TION AND BULK	EARTHWORKS	\$ 10,800		\$ 18,000
	Services						
	Undergrounding of power	Lin. M.	250	\$ 100	\$ 25,000	\$ 150	\$ 37,500
	New Substation	Item	I	\$ 3,500	\$ 3,500	\$ 5,000	\$ 5,000
			SUB-T	OTALSERVICES	\$ 28,500		\$ 42,500
	Paving and Surfacing						
	Asphalt paving, adjust near new road	M ²	500	\$ 50	\$ 25,000	\$ 65	\$ 32,500
		SUB-1	OTALPAVING AN	ND SURFACING	\$ 25,000		\$ 32,500
	Trees						
	Palm trees	No.	60	\$ 300		\$ 400	\$ 24,000
			SUB	3-TOTAL TREES	\$ 18,000		\$ 24,000
		TOTAL			\$ 99,583		\$ 141,570
	CON	TINGENCY 10%			\$ 9,958		\$ 14,157
					Stage I		Total
	GRA	ND TOTAL			\$ 109,541		\$ 155,727

•						
Description of Work	Unit	Estimated Quantity	Unit Cost Lower Rate	Extended Amount Lower Cost	Unit Cost Higher Rate	Extende Amount Hi Cost
Kennewell St Car Park						
Detailed Design + Documentation						
10 % of construction value for detailed civil engineering	Item	SUB-TOTAL DO	CUMENTATION	\$ 71,269 \$ 71,269		\$
Site Preliminaries						
10 % of construction value, incl. fencing, traffic control , location of	Item			\$ 64,790		\$
services, site conveniences, fees+ charges.		SUB-TOTAL SITE	PRELIMINARIES	\$ 64,790		\$
Excavation and Bulk Earthworks						
Cut , transport and deposit of clean soil material on site	M ³	1000	\$ 6	\$ 6,000	\$ 10	\$
SUB-TOTAL	ITEM 3: EXCAV	ATION AND BULK	EARTHWORKS	\$ 6,000		\$
Drainage + Services	_					,
Storm water pipes, incl. excavation and connection Pits	lin.m no.s	750 4	\$ 100 \$ 1,500	\$ 75,000 \$ 6,000	\$ 150 \$ 2,000	
rits	no.s		OTAL DRAINAGE	\$ 81,000	\$ 2,000	\$ 1
Kerbs, Surface + Line Marking					•	
Kerb + channel, standard detail	lin.m	700	\$ 40	\$ 28,000	\$ 60	\$
Pram crossings	No.	4	\$ 500	\$ 2,000	\$ 700	\$
Base course, trafficable areas	M ²	5000	\$ 65			-
Asphalt course	M ²	5000	\$ 20			
Line marking for bays and turning circle Asphalt foot path along median	ltem lin.m	100	\$ 2,000 \$ 140			
		KERBS, SURFACE		\$ 471,000	·	\$ 5
Landscaping						
Semi-advanced trees, 40 I	No.	45	\$ 250	\$ 11,250	\$ 300	\$
Extensive plant collection bed, 3 plants/sq.m	M ²	250	\$ 85		\$ 105	
Grassing, extensive maintenance, non-irrigated, by seeding	M ²	SUB-TOTAL	\$ 12 LANDSCAPING	\$ 12,000 \$ 44,500	\$ 15	\$
Lighting						
Power to lights	lin.m	220	\$ 70	\$ 15,400	\$ 90	\$
Light poles incl. luminaires (PC)	Item	I	\$ 30,000		\$ 40,000	
	1	SUB-TO	OTAL LIGHTING	\$ 45,400		\$
	TOTAL	L		\$ 783,959		\$ 99
co	NTINGENCY 10%			\$ 78,396		\$ 9
TOTAL KENNEW	ELL ST CAR PAR	К		\$ 862,355		\$ 1,0
Scott St Car Park / Road Realignment						
Detailed Design + Documentation			T	T- 1000	T	
10 % of construction value for detailed civil engineering	Item	SUB-TOTAL DO	CUMENTATION	\$ 68,992 \$ 68,992		\$ 8
Site Preliminaries						
10 % of construction value, incl. fencing, traffic control , location of	Item			\$ 62,720		\$
services, site conveniences, fees+ charges.		SUB-TOTAL SITE	PRELIMINARIES	\$ 62,720		\$
					•	
Demolition of existing car park within the Botanic Gardens Removal of existing asphalt car park within garden boundaries incl.	M ²	1400	\$ 20	\$ 28,000	\$ 30	\$
disposal fees Removal of existing Scott St Road carriage way incl. disposal fees	M ²	700	\$ 20	\$ 14,000	\$ 30	\$
Removal of existing scott at road carriage way incl. disposal fees	М		AL DEMOLITION		ş 30	\$
Excavation and Bulk Earthworks						
Cut , transport and deposit of clean soil material on site	M ³	300	\$ 6	\$ 1,800	\$ 10	\$
Import of suitable fill	M ³	700	\$ 16	\$ 11,200	\$ 18	\$
SUE	-TOTAL EXCAV	ATION AND BULK	EARTHWORKS	\$ 13,000		\$
Drainage						
Storm water pipes, incl. excavation and connection	lin.m	400	\$ 40	\$ 16,000	\$ 60	\$



\$618,000

APPENDIX A - COSTING DETAILS

Description of Work	Unit	Estimated Quantity	Unit Cost Lower Rate	Amoun	ended t Lower ost	Unit Cost Higher Rate	Amou	tend int H Cost
Kerbs, Surface + Line Marking								
Kerb + channel,	lin.m	800	\$ 40	s	32,000	\$ 60	\$	
Base course, trafficable areas	M ²	4600	\$ 65		299,000	\$ 80		
Asphalt course	M ²	4600	\$ 20	_	92,000	\$ 25	-	
Line marking for bays and turning circle	Item	I	\$ 2,500	\$	2,500	\$ 3,000	\$	
Foot path along BBG boundary fence	lin.m	185	\$ 140	\$	25,900	\$ 160	\$	
Foot path along northern side	lin.m	220	\$ 140		30,800			
Gravel Foot path along median	lin.m SUB-TOTALE	170 CERB, SURFACE &	\$ 120 LINE MARKING		20,400 502,600	\$ 140	\$	
Landscaping								
Semi-advanced trees, 40 I	No.	31	\$ 250	\$	7,750	\$ 300	\$	
Planted garden beds	M ²	310 SUB-TOTAL	\$ 85 LANDSCAPING	\$	26,350 34,100	\$ 105	\$	
		JOD TOTAL	L. I.I.	*	31,100		*	_
Lighting Lighting (P.C.)	ITEM	1	\$ 15,000	\$	15,000	\$ 20,000	\$	
Eignung (r.c.)	11211	SUB-TO	TAL LIGHTING	\$	15,000	\$ 20,000	\$	
601	TOTAL			\$	758,912		\$	9
	T ST CAR PARK			\$	75,891 834,803		\$	Ι,
Bosquet St Car Park								
Detailed Design + Documentation								
10 % of construction value for detailed civil engineering	Item	SUB TOTAL DO	CUMENTATION	\$	312,279		\$	
		SUB-TOTAL DO	CUMENTATION	\$	312,279	l	\$	
Site Preliminaries	1.	ı	ı	1.0	20.22		1.0	
10 % of construction value, incl. fencing, traffic control, location of services, site conveniences, fees+ charges.	Item			\$	28,389		\$	
services, site conveniences, rees - charges.	SL	JB-TOTAL SITE	PRELIMINARIES	\$	28,389		\$	
Demolition of existing car park within the Botanic Gardens				,				
Removal of existing road surface	M ²	450 SUB-TOT	\$ 20 AL DEMOLITION		9,000	\$ 30	\$	
5 0 10 15 0 1								
Excavation and Bulk Earthworks Cut , transport and deposit of clean soil material on site	M ³	100	\$ 6	\$	600	\$ 10	\$	
			,	ľ		,	Ť	
Import of suitable fill	M ³	700	\$ 16	\$	11,200	\$ 20	\$	
SUB-1	OTAL EXCAVA	TION AND BULK	EARTHWORKS	\$	11,800		\$	
Drainage								
Storm water pipes, incl. excavation and connection	lin.m	240	\$ 40		9,600	\$ 60		
Pits	no.s	4 SUB TO	\$ 1,500		6,000	\$ 2,000	\$	
		SUB-TO	TAL DRAINAGE	\$	15,600		\$	
Kerbs, Surface + Line Marking								
Kerb + channel,	LIN.M	240	\$ 40	-	9,600	\$ 60		_
Base course, trafficable areas	M²	1800	\$ 65		117,000	\$ 80		
Asphalt course	M ² ITEM	1800	\$ 20 \$ 2,000		36,000 2,000	\$ 25 \$ 3,000	-	
Line marking for bays and turning circle Asphalt Foot path 1.5m wide, along BBG boundary fence + school fence	lin.m	180	\$ 2,000		25,200	\$ 3,000	-	
	SUB-TOTAL K	ERBS, SURFACE	LINE MARKING	\$	189,800		\$	
Landscaping						•		
Semi-advanced trees, 40 I	No.	3	\$ 250	\$	750	\$ 300	\$	
Planted garden beds	M ²	420	\$ 85		35,700			
Grassing, extensive maintenance, non-irrigated, by seeding	M^2	520	\$ 12	\$	6,240	\$ 15	\$	
		SUB-TOTAL	LANDSCAPING	\$	42,690		\$	
Lighting	y			1-				
Lighting (P.C.)	ITEM	SUB-TC	\$ 15,000 TAL LIGHTING	\$	15,000	\$ 20,000	\$	
SUB TOTAL BOSQUE	T ST CAR PAPE			\$	624,558		\$	7
CON	TINGENCY 10%			\$	62,456		\$	
TOTAL BOSQUET	I ST CAR PARK			\$	687,014		\$	

Description of Work	Unit	Estimated Quantity	Unit Revenue Lower Rate	Extended Amount Lower Cost	Unit Cost Higher Rate	Exte Amo
LAND DEVELOPMENT						
The subdivision of the areas earmarked for future property development can incur revenue for the City of Greater Bendigo. Two development options are possible. The land can either be sold undeveloped with a lesser revenue or the City of Greater Bendigo could actively develop the land and sell the lots at a higher value. These tow scenarios have been chosen for the lower and the higher revenue value.						
Louey St lots, approx. 450 sq.m each.						
Louey St lots, approx. 450 sq.m each. Property sale value fully developed: Aprox. \$ 70.000. Land value only 30 % of sales value = \$ 21,000.	Lot	7	\$ 21,000.00	\$147,000		
Louey St lots, approx. 450 sq.m each. Revenue from sales, if fully developed = 60 % of \$ 70.000.	Lot	7			\$ 42,000.00	
		SUB-TOTAL L	ouey St lots	\$147,000		
Unnamed road lots						
	Lot	6	\$ 30,000.00	\$180,000		
Un St lots, approx. 850 sq.m each. Property sale value fully developed: Aprox. \$ 90.000. Land value only 30 % of sales value = \$ 30,000.						

BENDIGO BOTANIC GARDENS

GRAND TOTAL

Opinion of Probable Cost - September 2009

Full project cost, does not assume alternative sources of funding, although several have been identified

\$327,000

Item No.	Description of Work	Extended Amount (\$) Lower Costs	Extended Amount (\$) Higher Costs
l .	Heritage Site	\$1,469,000	\$1,740,000
2	Entry Plaza	\$1,374,000	\$1,859,000
3	Garden for the Future	\$3,242,000	\$4,280,000
4	Creek Works	\$3,068,000	\$4,070,000
5	Arboretum/Botanic Park	\$1,998,000	\$2,670,000
6	Recreation Reserve	\$238,000	\$310,000
7	Children's Garden and Play Space	\$2,130,000	\$2,660,000
8	Cast Iron Conservatory	\$2,468,000	\$3,090,000
9	Central Building	\$1,513,000	\$1,820,000
10	Service Area	\$725,000	\$980,000
П	Hamelin St East	\$110,000	\$160,000
12	Car Parking	\$2,384,000	\$3,000,000
13	Subdivision	\$330,000	\$620,000

	GRAND TOTAL	\$21,049,000	\$27,259,000
		-	-
Swimming Lagoon		\$4,753,000	\$5,280,000



BI Bendigo Botanic Gardens Living Plant Collections Vision statement

The Living Plant Collections of the Bendigo Botanic Gardens will tell the story of plants relevant to the Bendigo region, both indigenous and cultivated, and those suited to its current and projected climate.

B2 Introduction

At the very core of any botanic gardens is its collections of living plants. It is essential that these collections are derived from clear policies and visions. This document sets out the Living Plant Collections Plan for the Bendigo Botanic Gardens, White Hills.

This plan has used the Living Plant Collections Plan of the Royal Botanic Gardens, Melbourne, as its guide to developing its own policies for Bendigo. This plan is featured in the Implementation of Royal Botanic Gardens Master Plan (1997): A Ten Year Review (June 2008). Using this plan has been sanctioned by the RBGM as it allows for consistency of approaches across various botanic gardens and reduces duplication of collections, where such duplication is felt to be inappropriate.

Reference was also made to several international documents including International Agenda for Botanic Gardens in Conservation, which states 'one of the main targets for an individual botanic garden may be to achieve the conservation of the flora of their region' (2000:22).

B3 Definition and roles of living plant collections

As stated by the RBGM 'a collection is defined as a managed group of plants demonstrating a particular theme(s). It serves one or more of the general goals of research, conservation, education or ornamental display. It is an essential feature of botanic gardens that they contain accurately identified, documented and

labelled collections of plants for the purposes of conservation, reference, research, interpretation, education or pleasure. This is one of the features of botanic gardens which distinguishes them from other public gardens and parks, and highlights their role as a valuable scientific and cultural resource.'

B4 Locations of living plant collections

Living plant collections are, and will be, positioned variously throughout the Bendigo Botanic Gardens, depending principally on their size and their interpretive objectives. Some plant collections will be grown together in one area. For example, an ecologically based collection may be placed together in order to help tell the story of that plant community. However, it is possible to hold a living plant collection and have that collection spread over the whole site. This is particularly the case with collections which feature larger plants such as shrubs and trees, where their size dictates that they cannot be grown together.

B5 Themes and nominated collections

Each plant collection should have a particular theme. Themes, and their definitions as included in the RBGM Living Plant Collections Plan, are outlined below. Also included are statements on the focus of each theme as well as collection principles.

Within each of the themes is a listing of the proposed living plant collection(s) for the Bendigo Botanic Gardens, along with the general and interpretive objectives of the collection. Management of each collection will be laid out in separate documents, but a template of a management plan is included as Appendix B.

B5.1 Geographic

Definition: a collection of plants from a defined geographic area.

Collection focus: geographic areas with a climate match to Bendigo (known as homoclimes)

Collection principles: Geographic collections will demonstrate one or more of the following attributes:

- Suitability for use in home gardens and public landscapes
- Represent key vegetation communities of the region

Collections: Southern California

Objectives of collection: To demonstrate a range of plant species of southern California, with an emphasis on plants from homoclimes. To research and demonstrate the potential to use these plants in home and public landscapes. Interpretation objectives: There are many parallels between central Victoria and southern California, both culturally (ie, gold rushes, lifestyle, etc) and climatically. Many Californian plants are suitable to Bendigo growing conditions. Some taxa from this area are rare, threatened or endangered in their natural range and botanic gardens have a role to play in their conservation. Plants from homoclimes have weed potential so we must act responsibly in this regard.

North Africa

Objectives of collection: To demonstrate a range of plant species of North Africa, with an emphasis on plants from homoclimes. To research and demonstrate the potential to use these plants in home and public landscapes. Interpretation objectives: There are many plants from North Africa, the Canary Islands and the south-western Mediterranean which are already grown in our parks and gardens because they suit this climate. There are less commonly known taxa from this area which are also suited to central Victorian gardens. Some taxa from this area are rare, threatened or endangered in their natural range and botanic gardens have a role to play in their conservation. Plants from homoclimes have weed potential so we must act responsibly in this regard.

B5.2 Ecological

Definition: a collection of plants which typically grow together in an ecological community defined by a range of environmental conditions.

Collection focus: Ecological collections will focus on habitats within and near the City of Greater Bendigo, with a particular emphasis on threatened EVCs.

Collection principles: Ecological collections will demonstrate one or more of the following attributes:

- Characteristic plant associations of the particular ecological community
- Suitability for use in home gardens and public landscapes

Collections: Whipstick-Kamarooka

Objectives of collection: To show the range of plants indigenous and endemic to the Whipstick-Kamarooka area. Interpretation objectives: To illustrate the beauty and unique character of the plants of this region. To show the inter-relationships of these plants. To show that many of these plants are suitable for home gardens. Also to use this collection to explain the terms endemic, indigenous, native and exotic.

Goldfields Creekline Grassy Woodland EVC

Objectives of collection: To show the natural composition of this flora, including dominants, floristic composition and spatial density. Interpretation objectives: To give an example of the original vegetation that would have occurred in the creek vicinity and its importance to riverine health. To tell the story of aboriginal relationships to these plants including names, uses and other aspects.



Northern Plains Grasslands

Objectives of collection: To show the unique floristic composition of the EVC. Interpretation objectives: To create an understanding of this threatened Victorian EVC. To create an appreciation of why it is important to protect threatened ecosystems and individual species. To explain what is being done to protect and conserve this EVC in the wild.

To illustrate the beauty and unique character of the plants of this region.

To show the inter-relationships of these plants. To show that many of these plants are suitable for home gardens. Also to use this collection to explain the terms endemic, indigenous, native and exotic.

B5.3 Cultural and Ornamental

Definition: a collection of plants which display ornamental, historic and/or social values relating to our cultural heritage.

Collection focus: Cultural and Ornamental collections will focus on plants grown in Victorian domestic and public gardens in the late 19th and early 20th Century (within the heritage section) and plants suited to the Bendigo region's current and predicted climate (heritage and new sections).

Collection principles: Cultural and Ornamental collections will demonstrate one or more of the following attributes:

- Traditional or modern horticultural design styles
- Hybrids, cultivars and species grown for horticultural interest and display
- Plants which have heritage associations with the Gardens. This may include re-introducing past collections
- Plants of historic importance which demonstrate original design intent
- Plants which are linked to the traditional use, belief systems, art, medical treatments, etc, of a defined cultural group

- Plants which demonstrate modern horticultural responses to the region's current and predicted climatic conditions
- Suitability for use in home gardens and public landscapes

Collections:

Cannas

Objectives of collection: To collect, preserve and grow a representative range of ornamental Canna species and cultivars that would have been grown in Victorian gardens in the late 19th and early 20th Century, with a cut-off date of 1940. To collect and grow a range of Canna species and cultivars known to have been bred by and/or donated to Bendigo by John Cronin (Director, Melbourne Botanic Gardens). To collect and grow a range of Cannas known to have been grown previously in the Bendigo Botanic Gardens. Interpretation objectives: Tell the story of plant donation from the Melbourne Botanic Gardens to Bendigo. To explain the continuity of growing Cannas at the Bendigo Botanic Gardens. To give an example of the type of Canna bedding display typical of early in the 20th century. To tell the story of plant collecting and breeding of an ornamental species which was typical of horticultural pursuits of that period.

Bearded Iris

Objectives of collection: To collect, preserve and grow a representative range of ornamental Bearded Iris cultivars that would have been grown in Victorian gardens in the late 19th and early 20th Century, with a cut-off date of 1910. Interpretation objectives: To tell the story of plant collecting and breeding of an ornamental species which was typical of horticultural pursuits of that period. To show a classic garden plant that is also waterwise and suitable for local gardens.

Lavenders

Objectives of collection: To collect, preserve and grow a comprehensive range of Lavandula species, hybrids and cultivars.

Interpretation objectives: To tell the story of Lavender and its cultural history and uses. To tell the story of the collecting, breeding and selection of an ornamental and economic species.

Dry climate edibles

Objectives of collection: To collect and grow a range of plants which are suited to the region's current and predicted climatic conditions and which have edible parts. Interpretation objectives: To show and interpret a range of examples of alternatives to the current range of high water-using edibles traditionally grown in domestic gardens.

Winter flowering plants

Objectives of collection: To collect and grow a range of plants which flower over the winter months Interpretation objectives: To show there are many plants which can bring interest to the winter garden.

Cottage garden plants of the Victorian goldfields

Objectives of collection: To collect and exhibit a range of traditional, mostly flowering, plants which would have been available and grown in domestic gardens of Bendigo and goldfields in the second half of the nineteenth century. Interpretation objectives: To show that early gardens featured many colourful, low water use plants. To exhibit a range of historic plants, most of which are still suitable for domestic gardens.

Edwardian plants

Objectives of collection: To collect and exhibit a range of traditional, mostly flowering, plants which would have been available and grown in domestic gardens of Bendigo in the first half of the twentieth century. To show the garden styles and feature plants typical of early twentieth century gardens. Interpretation objectives: To illustrate the changing fashions of domestic gardens.

Home demonstration gardens

Objectives of collection: To collect, trial and exhibit a range of plants that are of interest to home gardeners of the region and which are sustainable. Interpretation objectives: To show it is possible to have an interesting and colourful garden which is also sustainable.

B5.4 Taxonomic and Evolutionary

Definition: a collection of plants which demonstrate principles of plant classification or evolution.

Collection focus: Taxonomic and Evolutionary collections will focus on evolutionary adaptations

Collection principles: Taxonomic and Evolutionary collections will demonstrate the following attributes:

 Plants which demonstrate evolutionary adaptations to particular sets of environmental conditions

Collections:

Dry dormant plants

Objectives of collection: To demonstrate a range of plants which have evolved a cycle of wet season growth and dry season dormancy as a response to dry climates. To demonstrate the potential to use these plants in home and public landscapes. Interpretation objectives: There are many ways plants have evolved to survive extended dry periods and dry season dormancy is one of these. Many of these plants are suitable for home and public gardens.



Eucalyptus (Bendigo region)

Objectives of collection: To collect and grow a complete range of the Eucalyptus species and forms found within a 60 kilometres radius of the Bendigo Botanic Gardens. Interpretation objectives: To show the diversity of Eucalyptus in the region and explain their evolutionary and taxonomic relationships and points of difference. To explain the geographic range over which they occur and why. To explain their importance in the ecology of the area. To explain their uses by both aboriginal and early settlers.

Callitris

Objectives of collection: To collect and grow a complete range of Callitris species, hybrids and cultivars.

Interpretation objectives: To show that Australia has its own conifer and explain the history of its uses, etc. To show the similarities and differences within the genus. To illustrate possible uses for small and large gardens and farms.

Pinus (dry climate)

Objectives of collection: To collect and grow a range of Pinus species, which come from and are adapted to dry climates. Interpretation objectives: To show that Pinus species were once prominent at the BBG, particularly in the Pine Avenue. That Pinus were part of the acclimatisation movement. That many Pine species are suitable to Bendigo growing conditions. Some Pinus taxa are rare, threatened or endangered in their natural range and botanic gardens have a role to play in their conservation.

B5.5 Research and Conservation

Definition: a collection of plants developed in line with state, national and international conservation plans for the ex situ protection of plant biodiversity, highlighting rare and threatened species and remnant vegetation.

Collection focus: Conservation collections will focus on plants from the greater Bendigo region.

Collection principles: Conservation collections will demonstrate one or more of the following attributes:

- Rare and threatened plants identified under the Flora and Fauna Guarantee Act.
- Plants existing within the site which are rare, threatened or endangered in Australia or overseas
- Remnant vegetation within the site

Collections:

Rare and threatened species of the greater Bendigo region

Objectives of collection: To demonstrate the full range of rare and threatened plant species of the district. To undertake the role of ex situ conservation of threatened species. To demonstrate the potential to use these plants in home and public landscapes. Interpretation objectives: To show living examples of the rare and threatened plant species of the Bendigo region. To explain how and why they are on 'endangered' lists. To explain how 'endangered' lists are devised, defined and monitored. To demonstrate the Bendigo Botanic Gardens' role in their conservation. To demonstrate that many of these plants are suitable for home and public gardens. Garden Plant Conservation Association of Australia collections The Garden Plant Conservation Association of Australia (GPC) is an organization dedicated to the establishment, development and maintenance of collections of cultivated garden plants, usually based on a particular genus. Most collections aim to hold examples of forms of plants that have fallen out of circulation, as well as examples of rarer and newer forms worthy of trialling. Two of the Bendigo Botanic Gardens living plant collections are worthy of establishing and registering as GPC collections. These are Cannas and Lavenders.

B5.6 Suggested Additional Collections

During the consultation phase of developing the Living Plant Collections Plan a number of other potential collections were put forward. These included Box-Ironbark, Philotheca and South African plants. For a number of reasons it was decided not to proceed with such collections at this stage. This does not mean that these potential collections could not be included in the future. Selection of additional collections Future additional collections can be considered during the ongoing development of the Bendigo Botanic Gardens. Any new collections will need to be selected in accordance with the themes, collection principles and foci set out in this plan. New collections will need to take into consideration a range of factors as outlined at Appendix C at the rear of this plan, including: vision matching; conservation; research; site suitability; sustainability; interpretation; uniqueness; and the existing plant collections.

Plants grown which are outside the collections

It is acknowledged that the Bendigo Botanic Gardens should - and does - grow a large and diverse range of plants that are outside the 'official' collections developed within this plan. These plants, too, should be measured against the criteria set out in Appendix C. In the case of those plants growing within the heritage section, an emphasis should be placed on reflecting 19th and early 20th century plants and styles and be in keeping with the Heritage Significance and Assessment Strategy. Plant sources and acquisitions Plants acquired for the Living Plant Collections should be of known provenance and identity as such plants have the most value from a scientific, research and interpretive position.

The following list details acceptable quality of acquisitions by the Bendigo Botanic Gardens, and are presented in order of priority.

- Plants collected in the wild with full provenance details
- Plants obtained from other botanic gardens or accredited collectors, either as offspring of plants collected in the wild, or grown without danger of hybridization
- Plants propagated from the Gardens' existing plants, particular older and rarer taxa.
- Cultivars or hybrids that can be linked without doubt to their originator, and which reflect the development of plant breeding or selection
- Cultivars or hybrids of known origin and confirmed identity

Plants will acquired from the following sources:

- Direct collection from the wild by BBG staff and/or reputable collectors
- Request/exchange from other botanic gardens or collectors
- Donations from reputable sources
- Purchase from reputable nursery or collectors
- Collections from old gardens, nurseries, etc

Plants in the following categories will not be acquired:

- Plants which contravene the CITES (Convention of Trade in Endangered Species) policy on plant collecting and trading
- Prohibited imports

Plants in the following categories will not be acquired except for specifically approved research or display:

- Declared noxious weeds
- Likely or known environmental or agricultural weeds
- Plants known or with the potential to facilitate the transmission of disease to commercial crops
- Likely sources of introgression (genetic contamination)



Living plant collections management
Policies regarding record management
and collections management will
be devised during the policies
development phase of this project.

A template of a living plant collection management plan has been developed and is included as Appendix B.

A policy for assessment of weed potential will also be developed in line with BGANZ Weed Risk Assessment Procedure.

Holding of a seed collection

As suggested by its title, this plan relates to the living plants growing - and to be grown - at the Bendigo Botanic Gardens, White Hills. However, it is appropriate that the BBG also be home for a seed collection, more commonly known as a seed bank. As stated in International Agenda for Botanic Gardens in Conservation 'the storage of material in the form of seeds is one of the most widespread and valuable ex situ approaches to conservation' (2000:46) It is recommended that a seed bank be stored at, and managed by, the Bendigo Botanic Gardens. The emphasis of the seed bank should be for the purposes of conservation. However, seed banking of more common local indigenous species for reintroduction to remnant vegetation and public reserves could also be undertaken.

Review

The living plant collections plan should be reviewed every five years, with the next review due in 2014.

B6 Summary of Living Plant Collections

Geographic: Southern California North Africa

Ecological:
Whipstick/Kamarooka
Goldfields Creekline Grassy Woodland EVC.
Northern Plains Grassland

Cultural and Ornamental:
Canna (cultivars of the 19th and early 20th century) [GPC collection]
Bearded Iris (cultivars of the 19th and early 20th century)
Lavandula [GPC collection]
Dry climate edibles
Winter flowering plants
Cottage garden plants of the
Victorian goldfields
Edwardian plants
Home demonstration gardens

Taxonomic and Evolutionary:
Dry dormant plants
Eucalyptus (Bendigo region)
Callitris
Pinus (dry climate species)

Research and Conservation: Rare and threatened species of the Bendigo district.

B7 Living Plant Collections Management Plan - template

Name of Collection:

Location:

Area: (approx m²)

Primary collection category: (as per collections policy)

Objectives of collection:

Interpretation objectives: (broad messages to be interpreted from collections)

Current status versus objectives:

Selection criteria for inclusion in collection: (geographic range, date range, collection emphasis, etc)

Priorities for further development of the collection: (genera, taxa, plant type, etc)

Strategies: (how will we achieve the collection development aims?)

Actions: (concise statement of action with nominal time frames)

Current site conditions:

Strategies for site improvement: (if appropriate)

Brief history of the collection: (collection origins, major donors or collectors, age of specimens, periods of major development, etc)

Horticultural management notes: (brief summary of information regarding: timing of operations, fertilizing requirements, irrigation requirements, pests, diseases or other problems and indicators, propagation of particular taxa, etc)

Reference material: (List of the most useful references – literature, people, organizations, etc for access of information regarding this collection)

First point of contact for this collection: (name of person principally responsible for this collection)

Management plan compiled by:

Reviewed:

Suggested next review:

B 8 Living Plant Collections and general plant selection - Measurement criteria

The existing and proposed plant collections and general plantings should be measured against a set of criteria to weigh up their suitability for the Bendigo Botanic Gardens. It should be understood that not all criteria are of equal weight in the decision making process. Also, some collections may not score highly against all the criteria, but can still be considered because of the strength of the 'scores' in particular criteria. The following is a list of the criteria with some explanation.

Vision matching

The plant collections should match and reinforce the stated vision and mission of the gardens, including the Living Plants Collections Vision Statement.

Conservation

It is increasingly the role of botanic gardens to hold examples of plants - and even whole plant communities - that are under threat. These can be from any part of the world, but according to the priorities of the Botanic Gardens Conservation International (BGCI) global strategy for plant conservation, first priority should be given to conservation of rare or threatened species of the local or regional flora.

The conservation role also extends to heritage collections of old-fashioned species and cultivars which may also be under threat. That is, taxa which may have been available in past eras, but are now disappearing from nurseries and planted landscapes. In both cases the degree of threat should be considered.

Research

The level of research can be incredibly complex or quite straightforward, and depends to a large extent on the vision and resources of the botanic gardens management. It is also directly tied to the interpretation criteria.

Site Suitability

Plants should be suitable for the growing conditions of the site to minimise the need for intervention to sustain the plants. This means taking into account the soil, topography, drainage and other edaphic aspects. Importantly, it means considering the projected climatic growing conditions (rainfall, temperature, evaporation) as modeled for our changing climate, to ensure the long term viability of the collection, along with minimal external input (particularly water).

Sustainability

Carbon output to maintain the collection should be kept to a minimum. Consideration needs to be given to the carbon outputs that could arise in the longer term from mechanised pruning, heating of glasshouses, etc. Use of water must also be minimised. The use of chemicals and non-organic techniques to control pests, diseases and other pathogens should be minimised or eliminated.

Matching collections and general plantings to staff resources is another aspect. Some plant collections require little input whilst others can place a high demand on human resources.

Interpretation

The educational role of a botanic gardens is extremely important and the ability of the collections to inform the public is paramount.

Uniqueness

Plant collections that are unique, unusual or different from those of other institutions reduce unnecessary duplication and add to the attractiveness of the gardens.

Existing plant collections

In the Bendigo Botanic Gardens case it is worthwhile taking into account the plants already existing on site and whether this existing stock can form the basis from which to grow a collection that meets the above criteria.

Bendigo Botanic Gardens, White Hills Master Plan - Volume 2 February 2010



APPENDIX C - EVENTS PROGRAMME

CI Introduction

Expanding the existing Bendigo Botanic Gardens at White Hills provides a singular opportunity to create a landscape that supports and allows for flexible use of the site. As far as events go, a well-designed purpose built space would be a significant asset to the municipality's event capacity, complementing existing venues and relieving stress on highly utilised and more fragile sites. It would also actively attract events to the site.

A rich and well-developed program of one-off and annual events will encourage higher visitation, broaden the visitor demographic and raise the profile of the BBG within the municipality and the state. An ongoing program that provides economic and cultural benefits to the community will promote a high standard of maintenance and further capital expenditure on the site.

The challenge in incorporating multipurpose spaces with events capability into the Bendigo Botanic Gardens is to ensure the appearance and operation of these spaces is complementary to the primary purpose of the BBG.

C2 Event Types

This site has potential for a range of event types. These include existing recurring events, festivals with multiple venues, one-off commercial events, community focused events, corporate events and small private events. The following table illustrates potential events for the space. Some of these currently occur within Bendigo, others are examples of suitable events for the Botanic Gardens context.

It is also critical that potential events are matched with a suitable space within the BBG that supports the event requirements. A poorly matched event will lead to

wearing of the landscaping, a negative impact on surrounding areas and a poor customer response. The capability of each space should be tightly defined to highlight capability and to exclude unsuitable events. This should be agreed upon by all the parties above, to minimise future conflict.

C3 Landscape Character

The Bendigo Botanic Gardens will be a landscape of unique character within Bendigo. Some areas of the overall gardens will be developed with intensive horticultural displays, while others will be developed as arboretum style parkland; an open landscaped area characterised by the presence and arrangement of the tree collection and the underlying landform.

The character of surrounding vegetation and the immediate context of a space should indicate what scale and type of event may be suitable. Developing the space as an event venue should not be detrimental to the character of the space, either when an event is in operation, or when vacant.

When an event is in operation the site should be designed to minimise impacts on the character of other areas. These impacts may include noise, crowding and inappropriate activities.

C4 Event Scale

As can be seen in the above list, the ranges of potential events are of both small and large scale. A critical factor in assessing suitability of an event for a particular space is whether the scale of the space is a good match for the event infrastructure (marquees etc), the number of attendees and requirements for open space.

The BBG site should therefore be designed to allow for events of different size and nature. Similarly, events of different scale and nature require different levels of supporting infrastructure to make them attractive to users. Table C2 lists some sample events and their requirements.

Events could also be run over more than one site within the BBG. An example of this would be a sculpture exhibition, with multiple installation points.

C5 Infrastructure Provision

One measure of the attractiveness of an event space to event managers is the level of inbuilt infrastructure. This decreases the costs of running the event, and simplifies the operation. The appropriate provision and arrangement of infrastructure can also improve public safety, amenity and the accessibility of an event.

By providing well-equipped event spaces, not only are larger events of economic benefit attracted, but it reduces the costs for running community events. A well-designed space will also ensure that the space operates as anticipated, minimising adverse effects to the surrounding space.

Multi-Venue	Commercial Events	Corporate	Community	Private
Festival Events			/ Cultural	
Summer in the Parks Bendigo Summer Fiesta	 Sustainable Landscaping Expo Wine Festival Olive Festival Orchestral Performances Movie Screenings Acoustic Music Shakespeare in the Park Jazz in the Park Garden Market 	 Corporate Anniversaries Christmas Parties 	 'ParticipAction Day' Model Flying Club Day Carols by Candlelight International Women's Day Cultural Diversity Week Naidoc Week Australia Day Dad's Day Out Show & Shine Family Fun Day Sculpture Exhibition Children's Week World Environment Day Water Week 	 Weddings Christmas Parties Namings Family Reunions

Table C1: Potentially Suitable Events for the Bendigo Botanic Gardens
These should be considered as preliminary ideas only, no offers have been extended or agreements made



APPENDIX C - EVENTS PROGRAMME

Some infrastructure may be required for an event (particularly of a commercial nature) but impact negatively on the landscape character and safety of the space. Fencing would be a good example of this, and should be installed for as short a period as is practical.

Of primary importance is the robust arrangement, detailing and construction of the site to support the wear and tear that events produce. Research should be conducted into service arrangement, surface capabilities and the preparation requirements to develop a vigorous and resilient grassed surface.

There is also a need to protect the existing infrastructure from damage during events. Actions to support this include obtaining an accurate as-built survey for underground services, burying services and irrigation more than one metre deep and requiring bonds from event producers.

C6 Access Provision

The Botanic Gardens site is not within walking distance of the Bendigo CBD, and so it is anticipated that most visitors will arrive by car. Car parking should be provided at the various entry points to the site, and event spaces located at reasonable distances from these points.

Public transport is not well provided, being some distance from the site and relatively infrequent. Chartered bus services may assist in bringing visitors to an event.

Event	No. Attendees	Required Equipment	Size Requirements	Other Requirements
Private Wedding	120	20 Chairs 2 tables	300m2	Grassed surface, attractive surrounding vegetation
Carols by Candlelight	500	Stage, lighting, public address system, toilets, vehicle access	1000m2	Lighting to entrance, dark context
Corporate Christmas Party	200	Marquee, catering facilities, refrigeration, toilets, vehicle access	400m2	Bus parking, grassed surface clear of trees and services
Wine Festival	1000	Multiple small tents, hand washing and equipment clean up, bins, toilets, power supply for refrigeration, vehicle access, restricted access fence	2500m2	Gravelled area for stalls, grassed and shaded "break-out" space
Summer in the Parks Music Performance	1000	Stage, shelter, front-mix desk, 3 phase power, vehicle access, performer areas, restricted access fence, toilets, food and drink sellers, bins	2500m2	Sloping grassed surface with high canopy trees

Table C2:Typical Event Requirements

These should be considered as preliminary ideas only, no offers have been extended or agreements made



APPENDIX D - EXECUTIVE SUMMARY, HERITAGE SIGNIFICANCE ASSESSMENT & STRATEGY REPORT

DI Introduction

This section includes extracts from the Heritage Significance & Strategy report produced by Lee Andrews & Associates in 2007.

Sections One, Two and Three of the Executive Summary of this report were adopted by council in September 2007.

D2 Executive Summary

White Hills Botanic Gardens is an integral part of a network of over twenty Victorian regional botanic gardens developed between 1849 and 1886. This extraordinary collection, unique to Victoria, and possibly unrivalled anywhere in the world, represented an outstanding confidence in the future of the newly proclaimed colony of Victoria, demonstrated a belief in the intellectual and economic ascendancy of Melbourne, and was financially assisted, in part, by the 1851 gold rushes.

White Hills Botanic Gardens was the first, and for many years, the only, public garden in Bendigo, predating the reservation of well-known Rosalind Park by some seven years, and actively developed at least a decade earlier.

White Hills Botanic Gardens is of historic, aesthetic, social and scientific cultural significance to the State of Victoria and the people of Bendigo and its environs. This is acknowledged by its listing on the Victorian Heritage Register.

This study contains the first and only comprehensive examination of the history and extant landscape elements of White Hills Botanic Gardens. This has revealed the sequence of the site's development, from its initial laying out and planting in the early 1860s, to its rejuvenation by the newly appointed curator Samuel Gadd in the 1870s,

and again in the 1890s after the destruction of much of its vegetation from insidious soil salinity. Throughout the twentieth century, and despite incursions in the 1930s from campers, and the construction of a swimming pool in its grounds in the 1950s, the Gardens has been regarded with continuing affection by its many visitors.

White Hills Botanic Gardens continues today have a great capacity to tell many 'illustrated' stories about ways of life, traditions, and intellectual and economic endeavour in Bendigo's and Victoria's past. This story-telling, which is at the heart of all cultural heritage, is made possible by the Gardens' collection of important landscape elements, many of which are intact and in good condition. Remnants of its early layout can still be seen, including sections of the perimeter and 'lagoon' path and part of the early island on which sits the decorative picnic shelter. The majority of its original trees were donated to the fledgling Gardens in the 1860s by Baron Ferdinand von Mueller, legendary director of the Melbourne Botanic Gardens. These trees, many now rare, are symbolic reminders of the acclimatisation imperative of nineteenth century botanic gardens. White Hills Botanic Gardens has also enjoyed a long and unbroken tradition of displaying animals in its grounds, and the fenced enclosures along Napoleon Crescent, extant since at least 1955, and the Cockatoo Cage, originally built for monkeys in the 1940s, illustrate this. At the time of the Gardens' inception, the naturally occurring lagoon formed by Bendigo Creek provided a readymade and centrally placed aesthetic and social focus (and one which other botanic gardens were forced to artificially create), and this continues to provide a great source of interest and pleasure to visitors to the Gardens. Its fine Arch of Triumph, erected in 1925 at the entrance to the Gardens, speaks to generations about great sacrifice in time of war, and reflects the social importance of White Hills Botanic Gardens to the people of Bendigo.

Through the analysis and assessment of White Hills Botanic Gardens conducted as part of this report, it has been possible to identify ways in which the Gardens might be developed and managed in the future to protect those qualities which make it culturally significant, and to more clearly convey its many stories to the visiting public.

White Hills Botanic Gardens, from its original design and planting, has fulfilled the dual roles of botanic study and passive recreation. These roles were common to all nineteenth century botanic gardens in Australia. Over the past thirty years, the City of Greater Bendigo has sought to improve and revitalise the Gardens on a number of occasions, largely through new works which focussed on engineering (paths and traffic) and construction (caretaker's residence, flight aviary, new island, toilets and improved fauna habitat). These works did not take into account cultural significance, but were a pragmatic response to everyday problems in the Gardens. Despite the valiant attempts of Bendigo's past Parks and Gardens' superintendents to focus on the botanical work of the Gardens, and some quite visionary attempts to treat the Gardens as the centre of an expanded garden precinct, valuable financial resources, where available, were put into highly visible hard landscaping, while the Gardens' flora languished and further declined.

Taking these recent approaches into account, and closely informed by a new understanding of the historic, aesthetic, social and scientific values of the Gardens, this report has identified the following actions needed to secure the future of White Hills Botanic Gardens in a way which balances its dual roles of botanic study and passive recreation.

These actions fall into 4 categories – actions to protect existing culturally significant elements, and actions to extend and enhance the Gardens' cultural significance in the short and long term.

D3 Priority I Actions

Actions to protect existing culturally significant elements.

The most urgent actions involve preservation and arresting the decay of existing elements of the Gardens which have been identified in this report as culturally significant. These are

- Secure a long term, reliable water supply for the lagoon and irrigation
- Carry out maintenance work on Picnic Pavilion
- Repair and improve animal enclosures
- Undertake tree pruning and associated works as identified in the Tree Report
- Develop a Tree Replacement and Propagation Programme (part of a comprehensive plant management programme— see below)
- Develop a Weed Assessment and Management Programme (part of a comprehensive plant management programme— see below)
- Develop a Water Management Plan (part of a comprehensive plant management programme— see below)





D4 Priority 2 Actions

Actions to enhance and extend the Gardens' cultural significance.

These comprise actions which recognise and reaffirm the Gardens' role as that of a botanic garden, and acknowledge those resources necessary to carry out defining activities of a botanic garden.

Actions which extend key botanical and social functions of the Gardens include

- Apply for re-reservation of the Gardens as Botanic Gardens
- Re-instate the position of curator of White Hills Botanic Gardens, either by creating a new position or by the training and support of existing head gardener
- Create a small, dedicated core team of horticulturally trained garden staff based solely in the Gardens
- Develop and implement a comprehensive plant management programme which includes
 - a Tree Replacement and Propagation Programme
 - a Weed Assessment and Management Programme
 - a Water Management Plan
 - a long term garden development plan
 - an annual maintenance schedule
 - initiation of computer-based record-keeping, especially plant collection and inventory data
- Construct new nursery facilities including propagation facilities and hardening off areas
- Create a comprehensive Plant
 Collections Policy, based on relevant
 cultural themes such as Californian
 conifers, endangered Australian plants
 and indigenous goldfields flora

- Develop an integrated public educational plan including plant labelling to all major trees, shrubs, and collections, interpretative / information panels / maps / brochures and web page
- Retain and improve fauna enclosures along Napoleon Crescent to a high animal welfare and visual standard

D5 Priority 3 Actions

Actions to enhance and extend the Gardens' cultural significance.

These identify important landscape elements which have been lost and which, because of their cultural significance, should be reconstructed where possible.

- Implement planting based on a comprehensive plant management programme (see Priority 2), including shrub beds, borders, trees and floral displays
- Reconstruct representative trellising and vine-covered arbours
- Reconstruct shelter shed north of lagoon, near Kei Apple
- Remove front entry garden, including mound and central path, and redesign area to reflect its high degree of cultural significance
- Reinstate massed floral displays near entrance
- Remove internal car parking spaces, return road to perimeter path, and replant lost sections of the early pine avenue along Scott Street boundary using photographic evidence
- Reconstruct path network where possible using the 1877 Gardens plan as a guide
- Reconstruct decorative timber picket fence flanking Arch of Triumph

D6 Priority 4 Actions

Actions to enhance and extend the Gardens' cultural significance.

These are desirable actions which are either of lower priority or depend on the removal of existing elements before they can be considered.

- Remove swimming pool and reconstruct the lost section of the lagoon, early island and footbridge, based on documentary evidence
- Construct a display conservatory
- Remove the fauna enclosures along Hamelin Street and return area to Gardens
- Remove brick veneer cottage and construct a new purpose-built facility
- Remove existing toilet block and relocate in less prominent position

Appropriate new attractions in such a botanic gardens extension could include a Children's Garden (located near the primary school), a Chinese garden, café and visitor's centre, and a free range fauna park. Such an extension of the Gardens would also allow seamless links with Bendigo Creek Linear Park.

This report has also identified the need to prepare a Conservation Management Plan for White Hills Recreation Reserve to inform decisions regarding the future of this site.

D7 Proposed Extension of White Hills Botanic Gardens

A fundamental finding of this report is that in order for the cultural significance of White Hills Botanic Gardens to be protected, strengthened and communicated to the wider public, funding must be committed to the works listed prior to any future extension of the Gardens into the adjacent vacant allotments. Failure to make White Hills Botanic Gardens, as defined by its current boundaries, a top priority, would greatly jeopardise the future of this important state asset. However, with the necessary works on the Gardens completed, the Gardens would be well placed to become the centre-piece of a wider garden precinct. This represents an exciting and unique opportunity for the expansion of a botanic garden from its original site, and would undoubtedly be a powerful stimulus to tourism.



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APPENDIX E - VICTORIAN HERITAGE REGISTER ENTRY

El Registration Details

White Hills Botanic Gardens (VHR Number: H1915) is listed on the Victorian Heritage Register as a Heritage Place.

E2 Statement of Significance

What is significant? A Reserve for a Botanic Garden is shown on an 1854 plan of the township of White Hills. The garden was formed around the Bendigo Creek which was later straightened to form an ornamental lake.

By 1869, 266 trees had been planted, including 180 Blue Gums. In May 1870 a total of 1857 plants were recorded and another 1117 plants were ready for planting. The planting included 600 Blue Gums, 292 *Pinus halepensis* and 40 *P. radiata*. Plants had been received from Ferdinand von Mueller of the Melbourne Botanic Gardens including 20 sultana cuttings in 1871.

By 1872 the gardens included a hothouse, rotunda, 200 roses, and a zoo with monkeys, koalas and birds. In 1882 there was a good collection of trees and shrubs representing the flora of every country and it was a popular place for picnics. A pavilion was built in c1910 and in 1925 an Arch of Triumph was erected at the main entrance as a memorial to those who served in the First World War.

Today there is a fine collection of trees and shrubs, flower beds, animal enclosures and aviaries.

How is it significant? The White Hills Botanic Gardens are of historical, architectural, scientific (botanical), aesthetic and social significance to the State of Victoria.

Why is it significant? The gardens are of historical significance as one of Victoria's earliest regional botanic garden reserves. First shown on a plan of 1854, a date that

coincides with legislation that allowed for municipal Councils to make bylaws for the establishment of botanic gardens.

The reserve was gazetted in 1857, along with other botanic gardens at Ballarat, Malmsbury and Hamilton. Earlier Gardens had been established at Melbourne (1846), Geelong and Portland (1851) and Williamstown 1856. The Gardens are of historical significance as one of only two in Victoria (the other being the Hamilton Botanic Gardens) that still retain animal exhibits related to the acclimatization movement established in the nineteenth century.

The 1925 Arch of Triumph is of historical and architectural significance as a rare example of this building type in Victoria. The only other arches, all First World War memorials and of different designs, occur at Ballarat (1920), Murtoa (1921) and Mansfield (c1923). The Arch of Triumph is a Mannerist design with massive rusticated voussoirs and decorated with wreaths. The Arch incorporates a list of servicemen on two metal plates.

The gardens are of aesthetic significance, forming a picturesque landscape around a central lake planted with remnant River Red Gums and exotic trees. The mature conifer planting along the western boundary comprising of Pinus pinea, P. radiata, P. halepensis and individually significant P. torreyana and P. roxburghii, both rare in cultivation, is an important and prominent landscape planting.

The landscape is further enhanced by an avenue of *Ulmus x hollandica* along the southern boundary, stands of *Eucalyptus*, including remnant *E. camaldulensis*, *E. melliodora*, and a cultivated *E. globulus subsp. globulus*. Near the main entrance are two large *Ficus macrophylla* and a *Cedrus deodara*. The gardens are of scientific (botanical) significance for a number of rare plants and fine specimens. The *Acacia karroo* is rare in Victoria, only two other plants are known,

at Williamstown (Holy Trinity Vicarage) and the Royal Botanic Gardens, while the only other example of *Dovyalis caffra* is at Werribee Park and a small plant in the Royal Botanic Gardens. The White Hills tree is the finest and largest of the species in Victoria.

The Callistemon brachyandrus is an exceptionally large specimen and the Livistona australis, Juniperus virginiana, and Schinus terebinthifolius are fine specimens and uncommon in cultivation.

The gardens are of social significance for their on going use by the community for recreation and education. The Arch of Triumph is an important place of remembrance to those who served in the First World War.

E3 Extent of Registration

Refer Fig E1:VHR White Hills Botanic Gardens Plan

- I.All the buildings and structures marked as follows on Diagram 1915 held by the Executive Director: BI Arch of Triumph and gates B2 Pavilion B3 Brick gutter remnant B4 Deer B5 Stone flower baskets x2
- 2. All of the landscape features marked as follows on Diagram 1815 held by the Executive Director: \$1 Lake and island
- 3. All of the trees marked as follows on Diagram 1915 held by the Executive Director:T1 Acacia karroo T2 Dovyalis caffraT3 Callistemon brachyandrusT4 Pinus torreyanaT5 Pinus roxburghiiT6 Livistona australisT7 Schinus terebinthifoliusT8 Juniperus virginiana
- 4.All of the land known as the White Hills Botanic Gardens and gazetted as Crown Reserve Rs 4855 [P126799] and permanently reserved for Public Gardens and part of the Napoleon Crescent road reserve marked L1 on Diagram 1915 held by the Executive Director.



APPENDIX E - VICTORIAN HERITAGE REGISTER ENTRY

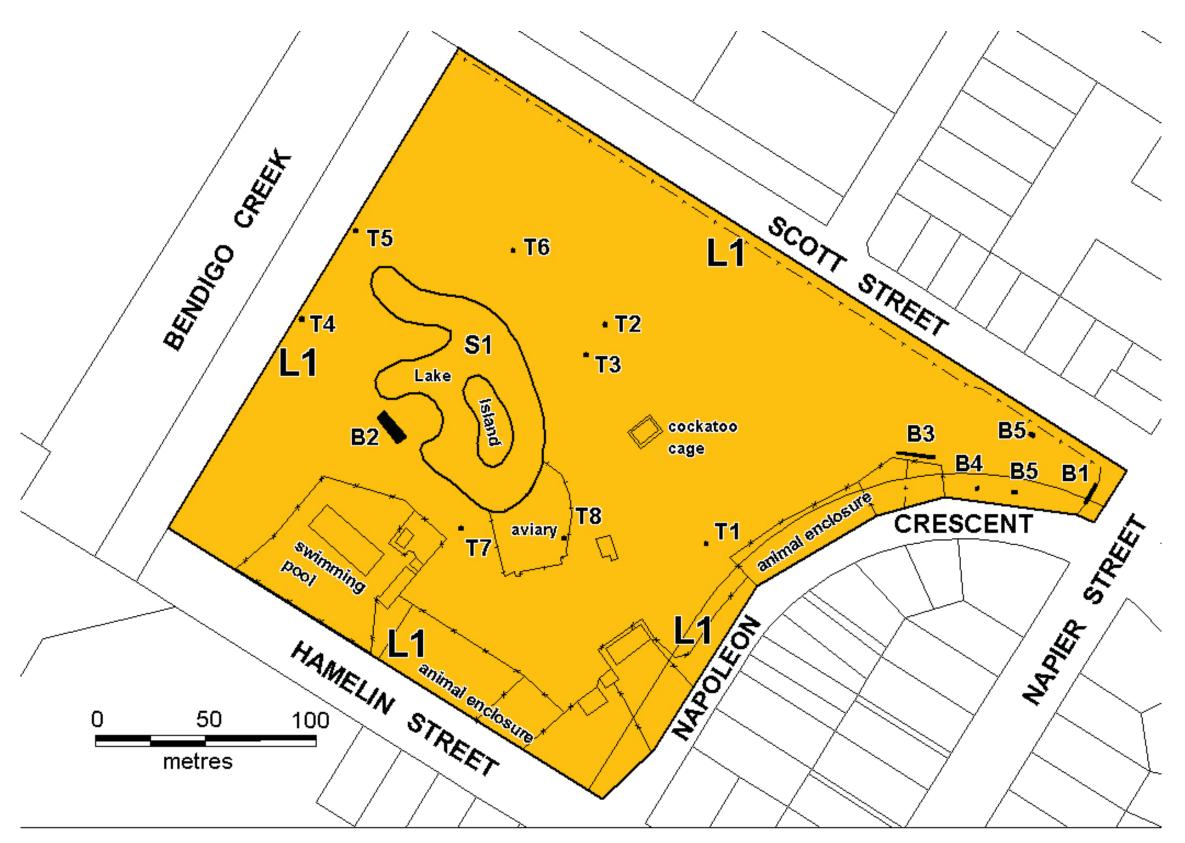


Fig. E I Victorian Heritage Register: White HIlls Botanic Gardens Plan



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Introduction to Soil Assessment Report

In early 2009 the City of Greater Bendigo commissioned a preliminary soil assessment across the Bendigo Botanic Gardens site in order to gain an understanding of soil issues which may affect the master planning for the site. The work was undertaken by Dr Peter May of May Horticulture Services, assisted by Sportsturf Consultants. The following is their report.

APPENDIX F - SOIL ASSESSMENT REPORT

Soil Inventory – Botanic Gardens at White Hills, Bendigo P Summary

1. Soil properties in the study area are generally within reasonable limits, with the following exceptions:

Compaction in the old council stockpile area and the western paddock; Subsoil acidity in the old council stockpile area;

Subsoil salinity in the eastern paddock;

High phosphorus levels in the eastern paddock (potential hazard for P intolerant species).

2. Careful plant selection and site preparation in response to these observations should allow for satisfactory plant performance at the site.

Brief

In response to a request by City of Greater Bendigo Landscape and Open Space Planning, to examine the soils at the site of the proposed extension of the Botanic Gardens at White Hills with a view to identifying any, but primarily chemical, issues that may affect master planning for the site.

Method

The site was visited on two occasions early in 2009 and soil samples collected for subsequent analysis. On the first visit samples were collected with a hand auger but soil hardness precluded further hand sampling. On the second visit a back hoe was used to dig the holes and samples were collected from these.

A total of 14 samples were collected. These were two samples at each of seven different sites. At each site, three holes were dug and the materials from those holes were pooled to make a single sample. At each site, one of those pooled samples was collected from the surface 150 mm and the other sample at a depth of approximately 500 mm. The location of the sample sites is indicated in Figure 1.



Figure 1: Location of sample collection sites (source: Google Maps)

After collection, the soil samples were delivered to Sportsturf Consultants for soil analysis. The laboratory report is attached as an appendix.

Figures 2 and 3 show typical profiles exposed by the back hoe on the second day of sampling.



Figure 2: Sample Site 4 in the west paddock (note hard-set massive lumps of topsoil – poor physical condition)



Figure 3: Sample Site 7 in the east paddock (friable topsoil compared to the west paddock).

Bendigo Botanic Gardens, White Hills Master Plan - Volume 2 February 2010



Observations and results.

Topography

The area is generally flat and the soil found on the site is alluvial in origin. Previous site use will have modified soil properties from their natural condition.

Soil profiles

At Sample Sites 1 and 3-7 the soil profile was much as expected with a loamy topsoil overlying a red/orange clay subsoil. At Site 4 the topsoil contained layers of gravel suggesting the presence of an old road or track. At Sample Site 2 profiles appeared man-made, as a result of previous land use as a council stockpile area. Sample Sites 1, 2, 3, 4 and 5 all showed evidence of soil compaction in their surface layers and Site 2 was also compacted at depth. Sites 6 and 7 were easily dug.

Soil data: summary of information from laboratory report

Site 1: Reference site within the Gardens Precinct

Very hard to dig by hand, dry to 500 mm

Summary of 0-150 mm sample (WH 1-1): pH: slightly acid salt: non-saline* nutrients: low P, others satisfactory** sodium balance: satisfactory***

* see note on salinity interpretation at the end of this section.

** available nitrogen was not tested but it is assumed that N will be limiting for growth at this site if adequate water is available for plant growth.

*** if sodium is > 5% of exchangeable cations, the soil is likely to be dispersive, leading to poor physical conditions. This can be remedied by the use of gypsum applications.

Summary of 500 mm sample (WH 1-2): pH: slightly acid salt: non-saline nutrients: no specific comments**** sodium balance: high

**** the values and their interpretation are provided in the laboratory report.

Subsoil nutrient status is less critical than topsoil and so no discussion beyond sodium balance is provided here.

Site 2: Small field adjacent to oval – previous old council stockpile area Extremely hard to dig by hand, dry to 500 mm

Summary of 0-150 mm sample (WH 2-1): pH: acid salt: slightly saline nutrients: P very high, others satisfactory sodium balance: satisfactory

Summary of 500 mm sample (WH 2-2): pH: strongly acid salt: non-saline nutrients: no specific comments sodium balance: satisfactory

Site 3: Field to west of creek, eastern side Very hard to dig by hand, dry to 500 mm

Summary of 0-150 mm sample (WH 3-1): pH: acid salt: non-saline nutrients: satisfactory sodium balance: satisfactory

Summary of 500 mm sample (WH 3-2): pH: slightly acid salt: non-saline nutrients: no specific comments sodium balance: satisfactory

Site 4: Field to west of creek, south west corner Hard to dig by machine, dry to 500 mm

Summary of 0-150 mm sample (WH 4-1): pH: acid salt: non-saline nutrients: satisfactory sodium balance: satisfactory

Summary of 500 mm sample (WH 4-2): pH: slightly acid salt: non-saline nutrients: no specific comments sodium balance: high

Site 5: Field to east of creek, north west corner Hard to dig by machine, dry to 500 mm

Summary of 0-150 mm sample (WH 5-1): pH: slightly acid salt: non-saline nutrients: P very high, others satisfactory sodium balance: satisfactory

Summary of 500 mm sample (WH 5-2): H: alkaline salt: moderately saline nutrients: no specific comments



sodium balance: high

Site 6: Field to east of creek, western side

Relatively easy to dig by machine, some moisture to 500 mm

Summary of 0-150 mm sample (WH 6-1):

pH: acid

salt: slightly saline

nutrients: P very high, others satisfactory

sodium balance: high

Summary of 500 mm sample (WH 6-2):

pH: strongly alkaline salt: moderately saline

nutrients: no specific comments

sodium balance: high

Site 7: Field to east of creek, south west corner

Relatively easy to dig by machine, some moisture to 500 mm

Summary of 0-150 mm sample (WH 7-1):

pH: acid

salt: non-saline

nutrients: P very high, others satisfactory

sodium balance: satisfactory

Summary of 500 mm sample (WH 7-2):

pH: alkaline

salt: moderate-severely saline nutrients: no specific comments

sodium balance: high

Note: Interpretation of soil salt data

Because the interpretation of a 1:5 extract EC value requires an interpretation that takes soil texture into account, an alternative expression of soil salinity that is sometimes used is ECe, the electrical conductivity of a saturated paste extract. This value can be derived from the EC of a 1:5 extract by multiplying the 1:5 value by the factor given in the table below.

Soil texture class	Multiplication factor
Sand	17
Loam	10
Clay Loam	9
Light Clay	8
Medium Clay	7

Interpretation of the soil test results for this site has used this conversion, assuming that the surface soils are loams and the subsoil samples are light clays. The salinity hazard is then based on the following categories.

Soil salinity classes defined by ECe:

Non-saline <2 dS/m

Slight salinity 2 – 4 dS/m Moderate salinity 4 – 8 dS/m Severe salinity 8 – 16 dS/m Extreme salinity > 16 dS/m

Source: Trees for Saltland, N.Marcar et al., CSIRO, 1995

Implications of the data collected in this survey for plant and water management.

Chemical fertility

In a climate like that of Bendigo's, nutrients are not as important as water availability in terms of successful plant growth. If new plantings are to be irrigated, the soil nutrient data suggests that most sites have reasonable supplies of nutrients for woody plant growth. Herbaceous plantings and turf may require nutrient supplements. If new plantings are to have minimal irrigation, nutrient status will not be important in plant performance.

The eastern paddock has much higher P levels than the rest of the area, possibly reflecting earlier use, and these may be high enough to be detrimental to the growth of P-sensitive species.

Soil pH is mostly within the range that presents no great risk to new plantings but the very acid subsoil at Site 2 and the alkaline subsoils in the eastern paddock may affect performance of plants if selection of species does not take this into account.

Salinity

Salt levels across most of the site present no real risk to new plantings with the exception of the high levels of salt in the subsoils of the eastern paddock. At Site 6, the surface sample also has elevated salt. Chloride levels are also high to very high in this precinct, especially at depth. Plant selection for this area should take this into account. Note that growth of eucalypts near Site 6 is quite good indicating that soil salt content is not prohibitively high if the species has reasonable tolerance. Irrigation should be managed carefully in this area to avoid the formation of a perched water table on top of the subsoil that could cause salt to rise by capillarity into the surface soil.

Soil physical properties

Soil compaction information was not specifically requested but observation during digging suggests that in the western paddock and at Site 2, soil decompaction will be necessary to enhance plant growth. Normal preplanting site preparation by ripping or similar should accomplish this.

The subsoil samples at all sites except 2 and 3 had high exchangeable sodium levels. This will mean that the subsoil clays are dispersive and poorly drained. Gypsum incorporation by deep ripping will enhance tree growth in these areas.

Irrigation water quality must be carefully monitored to ensure that the sodium balance of the soils is not disturbed. This would lead to crusting of the surface and reduced drainage rates.

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End of report



Soil Nutrient Analysis - Results

CITY OF GREATER BENDIGO

BOTANIC GARDENS, WHITE HILLS

Surface samples (0 - 150 mm)

17 February 2009

	Ideal Range	WH 1-1	WH 2-1	WH 3-1	WH 4-1	WH 5-1	WH 6-1	WH 7-1		
pH (water)	6.0 - 7.0	6.5	5.5	5.8	5.6	6.2	5.7	5.8		No. of Part Control
Electrical Conductivity (mS/cm)	< 0.27	0.09	0.41	0.10	0.09	0.07	0.29	0.14		
Total salts (ppm)	< 800	267	1,218	297	287	208	881	418		
Phosphorus (Colwell) (ppm)	50 - 80	27	120	53	55	290	170	220		7
Exchangeable cations										
Potassium (meg /100g)	0.5 - 0.6	0.6	1.0	0.6	0.6	0.8	0.6	0.8		1
Calcium (meq /100g)	> 3.5	4.0	4.1	3.2	2.6	4.2	4.4	4.1		
Magnesium (meg /100g)	0.8 - 1.0	3.3	3.1	2.1	23	1.1	1.1	0.9	4	
Calcium Magnesium Ratio	2 - 5	1.2	1.3	1.5	1.1	3.9	4.0	4.6		
Cation Exchange Capacity (meq/100g)	> 5	8.1	8.5	6.1	5.9	6.2	6.9	6.1		
Base Saturation Levels (% cations)										
Potassium (%)	> 10	7	12	10	11	13	8	13		
Calcium (%)	60 - 70	49	48	52	44	67	63	68	1	
Magnesium (%)	20 - 23	40	36	34	39	17	16	15		
Sodium (%)	< 5	3	3	2	5	1	11	3		
Trace Elements										
Sulphur (ppm)	10 - 50	8	210	8	7	3	28	8		
Zinc (ppm)	1 - 10	11.0	8.1	2.9	5.5	140.0	12.0	6.3	1	
Copper (ppm)	1 - 10	1.4	2.4	1.3	1.2	2.8	1.0	0.8	1	
Manganese (ppm)	0.1 - 4.0	10	20	12	8	5	15	11		
Iron (ppm)	10 - 60	230	130	220	540	170	170	190		
Boron (ppm)	0.3 - 1.0	0.9	1.1	0.6	0.6	0.5	0.7	0.5		
Chloride (ppm)	< 100	31	43	45	35	13	220	110		
Organic carbon (%)										



acceptable high

DISCLAIMER: Results are based on the analysis of the samples as received. Because of the variability of the sampling procedures, environmental and managerial conditions, the Company does not accept liability for lack of performance based on these recommendations. Recommendations are made in good faith based on the sample and information supplied.

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Soil Nutrient Analysis - Results

CITY OF GREATER BENDIGO

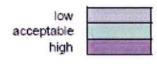
BOTANIC GARDENS, WHITE HILLS

Sub-surface samples, (approx. 500 mm)

17 February 2009

	Ideal Range	WH 1-2	WH 2-2	WH 3-2	WH 4-2	WH 5-2	WH 6-2	WH 7-2		
pH (water)	6.0 - 7.0	6.6	4.7	7.0	6.9	7.4	8.8	7.6		
Electrical Conductivity (mS/cm)	< 0.27	0.23	0.17	0.08	0.09	0.63	0.85	1.01		
Total salts (ppm)	< 800	683	505	178	267	1,871	1,931	3,000		
Phosphorus (Colwell) (ppm)	50 - 80	7.5	19	13	8.6	38	36	18		
Exchangeable cations			Tanana and A							
Potassium (meq /100g)	0.5 - 0.6	0.2	0.4	0.3	0.5	1.8	0.5	0.3		
Calcium (meg /100g)	> 3.5	1.5	2.0	2.4	1.6	3.6	1.7	3.3		
Magnesium (meq /100g)	0.8 - 1.0	2.2	2.1	2.5	2.5	2.7	1.6	2.1		
Calcium Magnesium Ratio	2 - 5	0.7	1.0	1.0	0.6	1.3	1.1	1.6		
Cation Exchange Capacity (meg/100g)	> 5	4.8	5.4	5.3	4.9	9.4	0.5	9.0		
Base Saturation Levels (% cations)										
Potassium (%)	> 10	4	7	8	11	19	8	3		1
Calcium (%)	60 - 70	31	37	45	33	38	26	36		1
Magnesium (%)	20 - 23	45	38	48	50	28	24	23		1
Sodium (%)	< 5	20	2	3	7	14	41	38		
Trace Elements										
Sulphur (ppm)	10 - 50	17	87	4	14	64	87	100		
Zinc (ppm)	1 - 10	2.0	3.3	0.7	0.4	3.8	0.5	0.6		
Copper (ppm)	1 - 10	0.5	1.3	0.6	0.7	0.7	0.1	0.4		
Manganese (ppm)	0.1 - 4.0	3	29	8	4	0	1	2		
Iron (ppm)	10 - 60	76	220	33	31	9	6	12		
Boron (ppm)	0.3 - 1.0	0.4	0.5	0.5	0.5	1.5	0.6	0.6	1	
Chloride (ppm)	< 100	230	10	26	38	630	650	1,200		
Organic carbon (%)										





DISCLAIMER: Results are based on the analysis of the samples as received. Because of the variability of the sampling procedures, environmental and managerial conditions, the Company does not accept liability for lack of performance based on these recommendations.

Recommendations are made in good faith based on the sample and information supplied.

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Karoline Klein Landscape Architect Landscape and Open Space Planning City of Greater Bendigo PO Box 733 BENDIGO VIC 3550 26 February 2009 bendgr26-209

ANALYSIS OF SOIL SAMPLES Ex: Botanic Gardens, White Hills O/N 083992

Fourteen soil samples from seven sites around the Botanic Gardens, White Hills were submitted for full nutrient analysis.

At each site the samples were collected from 'Surface' soils at a depth of 0-150mm; and 'Subsurface' soils at a depth of approx. 500mm.

RESULTS

The results have been tabulated in separate format are attached.

COMMENTS

Surface Samples

- One sample (WH 2-1) has a strongly acid pH; 4 samples (WH 3-1,4-1,6-1, and 7-1) have moderately pH levels; and two samples (WH 1-1 and 5-1) are slightly acid.
- Sample (WH 2-1) has quite a high salinity level; sample WH 6-1 has moderate salinity; while the other samples have low salinity levels.
- Sample WH 1-1 has a low phosphorus content; samples 3-1 and 4-1 have moderate phosphorus; while samples 2-1, 5-1, 6-1 and 7-1 range from high to very high phosphorus levels.
- · All samples have good potassium levels.
- Calcium levels are generally moderate although samples 3-1 and 4-1 are slightly lower than desired.
- Magnesium levels in samples 1-1. 2-1, 3-1, and 4-1 are high and typical of heavier textured soils, resulting in a low calcium/magnesium ratio.
- . The Base saturation Level of sodium (ESP) is very high in sample 6-1.
- Sample 2-1 has a high sulphur level that could reflect a recent gypsum application or a
 poorly aerated and compacted soil. Most other samples have low sulphur levels.
- Zinc levels are quite high in samples 1-1, 5-1 and 6-1; other samples are normal.
- Copper is low in samples 6-1 and 7-1.
- Manganese and iron are high in all samples.
- Chloride is very high in sample 6-1.

Sub-Surface Samples

The sub-surface samples vary considerably from the surface samples; nutrient levels are generally lower as expected.

- Sample 2-2 has a very strongly acid pH which coincides with the surface sample. All other samples have higher pH levels than their 'surface' pair; with samples 5-2 and 7-2 being slightly alkaline, and sample 6-2 being strongly alkaline.
- Samples 5-2, 6-2 and 7-2 have much higher salinity levels than their surface soils; and when the sodium and chloride levels are taken into account indicate a strong salinity problem at depth.
- All samples have low phosphorus levels.
- Except for sample 5-2 which has a high potassium level; all other samples have low to moderate potassium levels.
- Calcium levels of all samples are lower than desired and this is reflected in the very low Base saturation levels.
- Magnesium remains high in all samples, which is typical of sub-surface soils.
- Levels of the other elements are generally lower than their surface sample; sulphur and chloride levels in sample 5-2, 6-2 and 7-2 are the exception.

These results have also been forwarded to Dr Peter May as requested.

If you have any queries please contact me on 0418 176 758.

Ron MacCartney



Introduction to Creek Assessment Report

In mid 2009 the City of Greater Bendigo commissioned a preliminary study to assess the possibility of requiring an Environmental Site Assessment. A desktop study of the Bendigo Creek within the Bendigo Botanic Gardens site was undertaken in order to gain an understanding of issues which may affect the master planning for the site. The work was undertaken by Parsons Brinckerhoff. The following is the executive summary from their report.

APPENDIX G - PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT



Phase 1 Environmental Site Assessment (ESA), Bendigo Botanical Gardens, White Hills, Bendigo, Vic

Executive summary

Parsons Brinckerhoff was commissioned by City of Greater Bendigo in June 2009 to undertake a Phase 1 Environmental Site Assessment (ESA) at the White Hills Botanic Gardens at White Hills, Bendigo.

The City of Greater Bendigo has formulated a Master Plan for the rejuvenation and extension of the White Hills Botanic Gardens. Bendigo Creek runs through the site and the alignment of the creek has been changed over the years. One option associated with the master plan is further realignment with view to integrating the creek into the design for the future extension of the Botanic Gardens.

The Phase 1 ESA was completed as part of a due diligence process to facilitate the management of soil and sediments during site redevelopment and management of long term risks associated with any impacts. City of Greater Bendigo is concerned about industrial processes at the former Bendigo Gasworks which is adjacent to the Bendigo Creek some 2km upstream of the Botanic Gardens and their potential impact upon the site redevelopment. Historical discharges from the gasworks may have impacted soil, sediment and groundwater downstream of this site.

The objectives of the Phase 1 ESA were as follows:

- Identify potential sources of soil and sediment contamination across and in close proximity to the proposed redevelopment area; and,
- Identify key issues associated with the shallow soils across the site and sediments of Bendigo Creek, including the hydrology of the site that may preclude certain design aspects associated with the rejuvenation and extension of the Botanical Gardens.

The Phase 1 ESA found that:

- Bendigo Creek flows northwards through the central Master Plan area. The creek flows along the northern side of the current Botanic Gardens. An existing billabong in the current Botanic Gardens is a remnant of the original Bendigo Creek alignment. It is understood that this is the only section of the creek in its original alignment within the Bendigo urban area.
- Old drawings of the Botanic Gardens and immediate environs detail previous alignment to Bendigo Creek immediately south west and north west of the current gardens. These changes were inherent in historic garden design. Re-alignment may also have occurred due to historic mining activities. Upstream and downstream of the Bendigo urban area, the creek is a natural channel but through the urban areas many sections of the bed or banks have been protected by lining.
- Levee's have been constructed along on the banks of the Bendigo Creek across the Greenfield
 areas. It is understood that these were constructed to help mitigate inundation during flood events.
 It is unknown what the levee's are constructed off and when they were constructed.
- The local planning scheme details that site is subject to a Land Subject to Inundation Overlay. Approximately 90% of the overall site under consideration in the Master Plan is land in a flood storage or flood plain fringe area affected by the 1 in 100 year flood.
- The groundwater regime beneath the site is considered to be influenced by the mining legacy across the region. Bendigo Mining has recently been redeveloping some historic underground mine workings in the Bendigo region. One aspect of this is a local lowering of regional groundwater level from surrounding mine shafts or wells.



APPENDIX G - PRELIMINARY ENVIRONMENTAL SITE ASSESSMENT



Phase 1 Environmental Site Assessment (ESA), Bendigo Botanical Gardens, White Hills, Bendigo, Vic

- White Hills Botanic Gardens and the site of the proposed extension overlie the Shepparton Formation of Quaternary age. These deposits are alluvial flood plain deposits. These are found to overlie the Palaeocene White Hills Gravel that are river valley and colluvial deposits comprising gravel, conglomerate and rubble, which in turn overlie Ordovician bedrock of the Castlemaine Group.
- Alluvial workings of shallow, minor and deep leads are featured across the Master Plan area. These are shown to thin out across the north west site (White Hills Recreation Reserve). Alluvial diggings are detailed along Bendigo Creek and it is reported that the diggings were extensive, often destroying the original creek terracing. Given the close proximity of the channel to the site, disturbed ground from alluvial workings can be expected to underlie the site.
- The Bendigo Gasworks is immediately adjacent to Bendigo Creek, some 2km upstream of the Botanic Gardens. There is the potential for offsite impacts; however, the creek is understood to be more of a drain these days (concrete lined) so it is not obvious, whether there are any direct impacts upon the creek sediments and shallow soils bordering the creek.
- Groundwater discharge from old mining activities during periods of high groundwater levels are reported to have contributed to the creek changing from an ephemeral to a permanently flowing perennial stream. Due to the geological setting and mining legacy, a potential exists for Bendigo Creek to be impacted by elevated concentrations of arsenic and mercury within sediments and shallow soils, and further from urban and industrial runoff.
- In the gold mining region of Victoria, arsenic is a naturally occurring compound in soil and rock. Gold mining works created tailings and leftover material such as rock, sand and earth which may or may not be higher in arsenic than the surrounding soil and rock. A local amendment in the Bendigo region for arsenic is recognised due to naturally occurring background levels.

There is a potential for shallow soils across the Master Plan area to be impacted from mine tailings in fill across the site and this material may have been used in levee construction along the banks of Bendigo Creek. There is a potential of mine tailings to contain elevated concentrations of heavy metals. There is also the potential for contaminated sediments entrained in flood waters during inundation events to have spread across the Greenfield sites south west of the Botanic Gardens.

he following sensitive uses of the proposed Master Plan have been identified:

Bendigo Creek incorporated into extended gardens,

Children's Garden/ Access for All Play Space including Multi Purpose Space, and;

New residential lots overlooking gardens.

he following recommendations are suggested for the area under consideration in the master plan:

Re-assess the potential for Bendigo Gasworks to impact upon Bendigo Creek upon completion of environmental assessments that are understood to be in progress at the gasworks site.

The collection of soil and sediment samples across the sensitive uses of the proposed Master Plan. Soil characterisation is also required to verify if the soil complies with Clean Fill criteria if excavating and relocating soil material. The sample density should comply with the requirements of Australian Standard AS4482.1 (2005).

Soil and sediment samples submitted for laboratory analysis comprising metals (including As and Hg), and selected samples for chemicals of concern with respect to Bendigo Creek, and general site areas for classification purposes.



APPENDIX H - FLOODING LEVELS FROM NCCMA

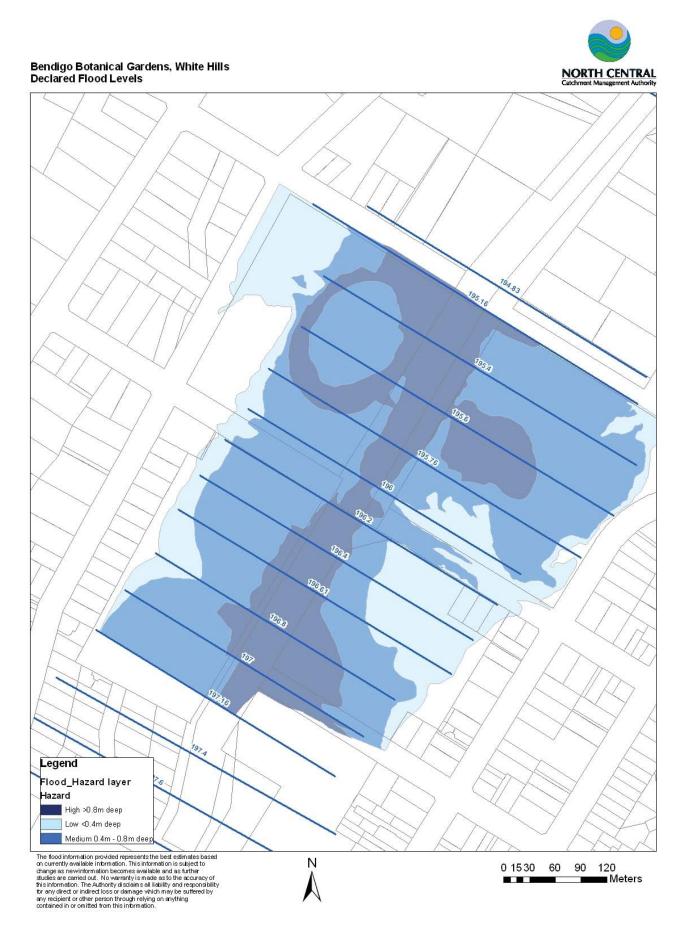
Introduction to Flood Level Plans

The City of Greater Bendigo has had a number of discussions with the North Central Catchment Management Authority (NCCMA) regarding the Bendigo Creek through the Botanic Gardens. In response to enquiries from CoGB the NCCMA flood unit has produced two diagrams which outline the potential flood hazard layers with a one-in-onehundred-year flood event and the diagrams are included here. The depth of water is indicated with colors. Dark blue represents a high level of >0.8m depth, mid blue is 0.4-0.8m depth and pale blue is <0.4m depth. Design work for the Botanic Gardens will take into consideration these one-inone-hundred-year flood levels.





APPENDIX H - FLOODING LEVELS FROM NCCMA





APPENDIX I - TREE REPORT FOR OAK AVENUE HAMELIN STREET, WEST OF BENDIGO CREEK

Author: Adrian Ryan, Arborist, CoGB Date prepared: 30/10/2008 Individual photographs of each tree have also been recorded as a part of this report

II Purpose

The purpose of this report is to assess the viability of twenty-four (24) Oak trees located to the southern end of the White Hills Sports Oval, which form an avenue along the un-made section of Hamlin Street. This area is the subject of a development proposal aimed at better utilizing the space for passive and sporting recreation.

12 Background

It is estimated that this avenue of trees were planted around 150 years ago to mark the southern boundary of what was the 'Acclimatisation Reserve' west of the botanic gardens, thus giving them horticultural significance regarding Bendigo's horticultural history. A matching run of trees marks the northern boundary of the reserve.

Of the twenty-four trees (from #1 at the Kennewell Street end to #24 At the Bendigo Creek end), twenty-two are *Quercus robur* (English Oak), with the remaining two trees (#'s 12 & 17) appearing to be *Quercus canariensis* (Algerian Oak).

In recent history the trees and surrounding area have received very little in the way of maintenance, other than regular grass slashing and the regular powerline clearing of the tree closest to Kennewell Street.

Judging by the regular spacing's between trees, the avenue had originally contained twenty-eight (28) trees, meaning that four trees within the avenue no longer exist. One of these four trees was removed in 2006 to facilitate the construction of the recycled water pipeline. It had been considered non-viable at that time.

13 Discussion

The trees are generally in poor health, due largely as a result of the adverse environmental conditions being experienced over the last several years. Of the twenty-four (24) trees surveyed, eight have been flagged as either 'recommend' or 'consider' for removal.

Of the five trees 'recommended' for removal, two are dead (#'s 3 & 6) and three (#'s 9, 14 & 15) are in very poor health, having only epicormic growth on severely declining limbs. It is likely that the level of decline in these trees is too advanced to facilitate any chance for their recovery.

All of the three trees that are 'considered' for removal have major structural issues and may be better removed and replaced should re-establishment of the avenue be development objective.

The first of these three trees (# 8) is healthy and low growing with several stems, but resembles a bush with no ideal central leader to formatively prune back to. It is difficult to tell if this was an original tree, but its location and form suggest a formal connection.

The other two trees both have major stem defects. The first (# 10) is stunted in form with no upright stem within the canopy, and is declining in health. The stem itself has a vertical cavity from ground to branching region (3m) which may require the insertion of a bolt and/or cable system to increase its Useful Life Expectancy (ULE).

The final tree in this group (# 23) is a large and quite healthy tree that has suffered an extensive and quite recent limb failure. A large cavity now dominates the southern side of the stem, which is currently home to a bee hive. The structure of the tree has been severely compromised, but it is conceivable that weight reducing the canopy would extend the ULE of this tree. The stem cavity could also be filled if desired.

I4 Useful Life Expectancy (ULE)

A Useful Life Expectancy (ULE) was attributed to each tree based on their current health, structure, management type and environmental conditions (assuming that no alternate human intervention is to be implemented in the near future). Overall the trees have very low ULE's, largely due to the condition of their health rather than their structure. It is envisaged that the majority of the twenty-four trees would respond favorably to a combination of amelioration techniques, thus markedly increasing their ULE, provided appropriate action is taken soon.

15 Irrigation and Mulching

To facilitate the improvement to the health of the Oaks, adequate irrigation must be applied either naturally or artificially. Mulching of the root zones will assist to reduce soil moisture loss (provided adequate irrigation is applied), suppress weeds and assists to encourage microorganism activity in the soil.

16 Existing Fence

The old timber post and wire mesh fence is likely to be removed as an aesthetic improvement measure for the proposed site upgrade. The replacement of this fence will also be determined by the objectives of the upgrade, and if the adjacent un-made section of Hamlin Street is to be retained as a roadway.

Removal of the old fence would greatly assist with the facilitation of the amelioration of the trees. A temporary fence could be constructed between the extremities of the tree canopies and Hamlin Street if required, until the amelioration works are complete.





17 Elm and Oak Suckers

A considerable number of Elm and Oak suckers exist in association with the avenue, particularly the first half of the avenue from the Kennewell Street end. It is advisable that these be removed to improve the aesthetics of the area, to reduce un-wanted competition and to control pests and diseases.

An opportunity exists to harvest Oak suckers on site for the re-establishment of the avenue, if desired.

18 Re-establishment of the Avenue

In order to retain the Oak Avenue, the implementation of a number of steps is recommended, as follows:

- Remove old fence
- Exterminate European Bee hives
- Remove of non-viable trees
- Remove of Elm and Oak suckers
- Remove dead and diseased limbs from the viable trees
- Weight reduce viable trees as required
- Perform other specialized
 Arboricultural tasks as required
- Plant new trees to infill existing gaps
- Mulching of tree root zones
- Insertion of an irrigation system
- Ongoing monitoring

19 Re-planting

Although re-planting new trees in the locations of missing or removed trees would seem to be the most logical to re-establish a historical tree avenue, it may not achieve a viable outcome horticulturally or aesthetically. The main issue will be with competition for light, nutrients and water which will severely suppress the growth of several new trees if planted in this manner. In order to achieve a superior result in

terms of growth rate and aesthetics, some locations should not be re-planted at all, and other locations should be planted with one tree where two had previously been.

See the tree planting column for planting details.

II0 Transplanting

The option of transplanting the trees from the avenue is most likely unviable due to the cost of moving such large trees, and because of the poor health of the trees. Any tree can be transplanted however this comes at a financial cost, and there is no guarantee that the tree will survive the move. Ideally a twelve-eighteen month lead-up is also required to better prepare the tree to be moved.

III Conclusion

The majority of the twenty-four trees surveyed are still viable, but they are in slow decline due to the adverse environmental conditions. Generally the ULE of the trees is quite low and they will continue to decline to the extent where the majority of the trees will either be dead or un-viable within the next ten years. It is envisaged though that this decline can be reversed by the application of artificial horticultural intervention, provided it is undertaken soon.



APPENDIX I - TREE REPORT FOR OAK AVENUE HAMELIN STREET, WEST OF BENDIGO CREEK

No.	"Location(m)"	Species	DBH	HxW	ULE	Description	Age	Health	Structure	Form	Comment	Works req'd	Planting	Significance	Date
I	5 metres from Kennewell Street property line	Quercus robur (English Oak)	842	14 x 15	<10	One sided	150	Fair	Poor	Asemetric	Heavily pruned for powerlines	Large deadwood removal. 3 stems from 3m up, I to be removed as it is hollow. Canopy lift Remove suckers - Oak & Elm		Age and location	17/10/2008
*											*Missing tree		Don't re-plant		
2	Add I5m	Quercus robur (English Oak)	735	13 x 15	10-20	Open spreading	150	Fair	Fair	Symetrical	No stem wounds or lopping cuts	Deadwood removal. Sucker removal - Elm		Age and location	17/10/2008
3	Add 8m	Oak. Conceivably an Elm responsible for the mass of Elm suckers	591	13 x 14	0		150	Dead	Poor			Removal. Heavily infested with Elm suckers.	Plant I tree between tree no. 3 and missing tree location after tree no. 3 is removed.	Location	17/10/2008
*											*Missing tree				
4	Add 16m	Quercus robur (English Oak)	Approx 750 Bee hive in stem	12 × 13	5-10	Open spreading	150	Poor	Poor	Symetrical	Bees entering cavity at ground level. Much tip dieback.	Large deadwood. Many Elm suckers. Canopy lift.		Age and location	17/10/2008
5	Add 8m	Quercus robur (English Oak)	545	13 x 13	5-10	Squat / spreading	150	Poor	Fair	Symetrical	Wire through stem - several strands. Sparse open crown - much tip dieback. No stem cavities.	Some deadwood. Canopy lift. Oak & Elm suckers.		Age and location	17/10/2008
6	Add 8m	Quercus robur (English Oak)	639	10 × 6	0		150	Dead	Poor		One branch with epicormic growth rem. No suckers	Removal.	Re-plant	Location	17/10/2008
7	Add 8m	Quercus robur (English Oak)	839	14 × 14	<5	Open spreading	150	Vey poor.	Poor	Symetrical	Live growth largely epicormic. Suspect major internal defect in stem.	Extensive dead wooding - large & small. Some Oak suckers.		Age and location	17/10/2008
8	Add 8m	Quercus robur (English Oak)	-	3 x 5	0	Bush shape	20?	Good	Poor	Stunted	May be form pruned	Condider for Removal.	Form prune or replace	Location	17/10/2008
9	Add 8m	Quercus robur (English Oak)	Approx 650 Bees	8 x 8	0	Severe decline	150	Vey poor.	Poor		Bees in stem 1.5 from ground. Leaning stem.	Removal.	Re-plant	Age and location	17/10/2008
10	Add 8m	Quercus robur (English Oak)	646	8 × 8	<5	Stunted, declining.	150	Poor	Poor		Major stem defect from ground to branching location.	Consider for Removal. Deadwood. Cable brace?		Age and location	17/10/2008
*											*Missing tree		Re-plant in gap between tree no. 10 and the missing tree location should tree no. 10 be removed.		
П	Add 16m	Quercus robur (English Oak)	790	13 × 10	<5	Severe decline	150	Vey poor.	Very good		Heavy dieback. Extensive epicormic growth.	Extensive deadwooding.		Age and location	17/10/2008
12	Add 8m	Quercus canariensis ?	675	17 x 15	5-10	Asymetrical 3 upright stems dominate structure.	150	Fair	Fair		Some tip dieback.	Deadwood removal. Remove lower stem epicormic growth.		Age and location	17/10/2008
13	Add 8m	Quercus robur (English Oak)	620	15 x 14	5-10	Symetrical. Narrow b/w trees spreading sideways.	150	Fair	Poor		Some dieback. Solid stem.	Deadwood removal. Canopy lift. Remove stem epicormics.		Age and location	17/10/2008
14	Add 8m	Quercus robur (English Oak)	812	12 x12	0	Very open / spreading	150	Vey poor.	Poor		Decay in live scafold limbs. Extensive dieback.	Remove.	Re-plant with I tree between tree no's 14 & 15 should they be removed.	Age and location	17/10/2008
15	Add 8m	Quercus robur (English Oak)	655	ll×7	0	Severely declining.	150	Vey poor.	Very poor			Remove.		Age and location	17/10/2008
16	Add 9m	Quercus robur (English Oak)	910	14 × 18	20+	Dense/ Spreading.	150	Good	Very good		Very good specimen. Recommend retention.	Deadwood. Canopy lift? Sucker removal - Oak.		Age and location	17/10/2008

Table JI: Tree Report Data for Oak Avenue, Hamelin Street, West of Bendigo Creek



APPENDIX I - TREE REPORT FOR OAK AVENUE HAMELIN STREET, WEST OF BENDIGO CREEK

No.	"Location(m)"	Species	DBH	HxW	ULE	Description	Age	Health	Structure	Form	Comment	Works req'd	Planting	Significance	Date
17	Add 7m	Quercus canariensis ?	344	9 × 6	<5	Open / upright	150	Vey poor.	Good		Severely crowded.	Remove Oak suckers.		Age and location	17/10/2008
18	Add 8m	Quercus robur (English Oak)	810	14 × 12	<5	Open / spreading	150	Poor	Fair		Solid stem. Open crown. Dieback.	Deadwood, large and small.		Age and location	17/10/2008
19	Add 8m	Quercus robur (English Oak)	684	14 x 14	5-10	Spreading	150	Fair	Good		Solid upright stem.	Deadwood. Remove low limbs. Remove lower stem epicormics. Oak sucker removal.		Age and location	17/10/2008
20	Add 9m	Quercus robur (English Oak)	624	12 x 13	5-10	Squat / fullish	150	Fair	Poor		No central leader from 3m.	Deadwood.		Age and location	17/10/2008
21	Add 7m	Quercus robur (English Oak)	741	16 x 12	<5	Upright	150	Vey poor.	Good		Retaining large deadwood. Solid upright stem and central leader.	Extensive deadwood removal. Remove low limbs on ground with crack.		Age and location	17/10/2008
22	Add 9m	Quercus robur (English Oak)	650	16 x 13	5-10	Upright - twin stems.	150	Poor	Good		Declining. Some deadwood.	Deadwood. Remove lower stem epicormics. Remove suckers - Oak.		Age and location	17/10/2008
23	Add 9m	Quercus robur (English Oak)	1040	12 x 12	0	Asymetrical due to large limb failure.	150	Good	Very poor		Bees in V - large, lower stem cavity. Decay in all lateral and scaffold limbs.	Consider Removal, requires closer inspection.		Age and location	17/10/2008
*											*Missing tree		Re-plant I tree between tree no. 23 location and the missing tree location should tree no. 23 removed.		
24	Add 16m Tree nearest Bendigo Creek	Quercus robur (English Oak)	1050	16 x 20	20+	Symetrical. Dense / spreading. Tree closest to Bendigo Creek.	150	Good	Fair		Extensive decay in several scaffold limbs.	Deadwood removal. Weight reduce or remove decayed limbs.		Age and location	17/10/2008

Table JI Cont.:Tree Report Data for Oak Avenue, Hamelin Street, West of Bendigo Creek



APPENDIX J - LIST OF ACRONYMS

AFA Access for All

ANBG Australian National Botanic Gardens (Canberra)

BBG Bendigo Botanic Gardens

BGANZ Botanic Gardens Australia and New Zealand
BGCI Botanic Gardens Conservation International

BRAC Bendigo regional Archives Centre

BRIT Bendigo Regional Institute of Technical and Further Education

CMP Conservation and Management Plan

CoGB City of Greater Bendigo

DPI Department of Primary Industries

DSE Department of Sustainability and Environment

ESD Environmentally Sustainable Design

ESOI Environmental Significance Overlay One (CoGB planning scheme)

EVC Ecological Vegetation Class

FAO Food and Agriculture Organization of the United Nations
GPC Garden Plants Conservation Association of Australia (Inc)

HO Heritage Overlay (CoGB planning scheme)

HSAS Heritage Significance Assessment and Strategy

IUCN International Union for Conservation of Nature

LSIO Land Subject to Inundation Overlay (CoGB planning scheme)

NCCMA North Central Catchment Management Authority

OH&S Occupational Helath & Safety

OPCAA The Ornamental Plant Conservation Association of Australia (Inc)
PPRZ Public Park and Recreation Reserve (CoGB planning scheme)

PUZ Public Use Zone (CoGB planning scheme)

RBGM Royal Botanic Gardens, Melbourne

RIZ Rural One Zone (CoGB planning scheme)
UNEP United Nations Environment Program

UNESCO United Nations Educational, Scientific, and Cultural Organization

WHBG White Hills Botanic Gardens
WHRR White Hills Recreation Reserve
WSUD Water Sensitive Urban Design
WWF World Wide Fund for Nature



APPENDIX K - REFERENCES, BIBLIOGRAPHY & RESOURCES

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Botanic Gardens Australia New Zealand: www.bganz.org.au

City of Greater Bendigo: www.bendigo.vic.gov.au

Heritage Victoria: www.heritage.vic.gov.au

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Historic Images

Photos of Botanical Gardens at Bendigo taken from Bendigo for Sunshine Business and Pleasure (BRAC collection)

Bendigo Regional Archives Centre (BRAC), VA 2398 Bendigo City Council, Inward Correspondence, Box 45, January 1897 letter from Penang Botanic Gardens with box of various bulbs and orchids sent to Bendigo council

1896 Photograph of girls enjoying the lagoon at the Bendigo Botanic Gardens (Elaine Harrington, Private Collection)

1854 plan of the Bendigo Botanic Gardens extent and the arrangement of the billabong as a part of the Bendigo Creek prior to its realignment west of the site, (Crown Land Reserve File, 4855)

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Bendigo Regional Archives Centre (BRAC), VA 2398 Bendigo City Council, unprocessed box, surveyor's workbooks, 1877 plan of the path layout within the Bendigo Botanic Gardens

Animals in the Bendigo Botanic Gardens, taken from Bendigo for Sunshine Business and Pleasure (BRAC collection)

City of Greater Bendigo, 1957 aerial photograph of the Botanic Gardens

Arch of Triumph taken from Bendigo, The Golden City (Kevin Walsh, Private Collection)

1896 Photograph of the lagoon at the Bendigo Botanic Gardens (Elaine Harrington, Private Collection)

Entrance to gardens prior to Arch of Triumph, taken from Guide to Golden Bendigo: the Forest City (BRAC collection)

Cast iron conservatory, listed as 'Melbourne Botanic Gardens, the flower parterre and new palm house, Victoria, circa 1880, nla.pic-an10608594-41', National Library of Australia