CASE STUDY

Royal Botanic Gardens Melbourne

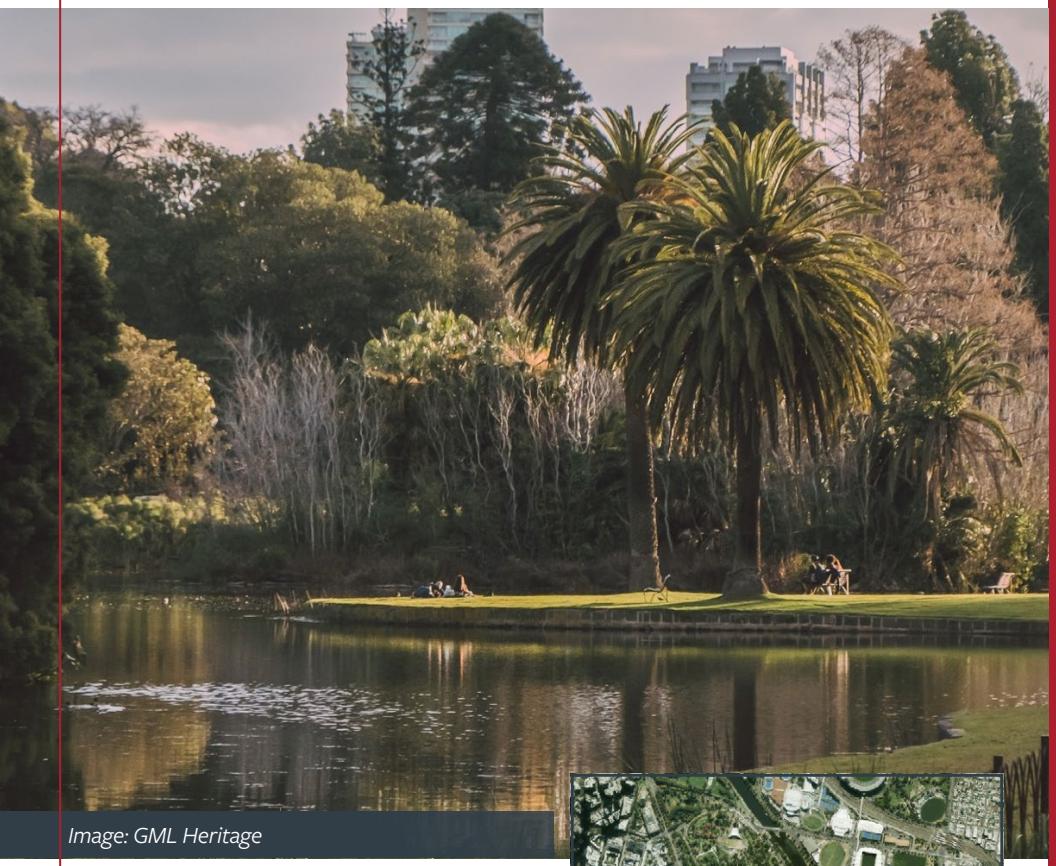

Image: GML Heritage

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The place

Royal Botanic Gardens Melbourne was established in 1846. The site covers 38 hectares and supports more than 7500 species of plants from around the world, as well as buildings and other built elements. The layout, established by director William Guilfoyle between 1873 and 1909, has been maintained by subsequent directors.

The Gardens comprise a living collection that has a role in botanical research and public education. Managed by Royal Botanic Gardens Victoria, it is open to the public and used for events and programs, as well as scientific research and recreation.

HERITAGE COUNCIL VICTORIA

Location

Melbourne, City of Melbourne

Traditional Owners

Bunurong and Wurundjeri Peoples

Main Impacts

Average annual temperature **increase** of up to **2.4°c**

More **intense** downpours

Type

Historical botanical garden, comprising:

- trees and other plants
- landscaping, paths and other built elements.

Heritage Listing

Victorian Heritage Register

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Scorched plants during a hotter period. Species viability is under threat due to a hotter prevailing climate. (Image: Royal Botanic Gardens Victoria)

Heritage significance

Royal Botanic Gardens Melbourne is significant as Victoria's earliest botanic garden. It contains some of Victoria's oldest cultivated and commemorative trees. Together with the National Herbarium of Victoria, the Gardens have been the centre of botanical research, plant acclimatisation and species introduction into Victoria since its establishment in 1846. The layout and planting of the Gardens is significant as a 19th century style established by William Guilfoyle, and some buildings in the Gardens are architecturally significant.

Climate change impacts

As a result of climate change, the Gardens is expected to experience changes in seasonal rainfall. These changes are likely to cause less predictable and more frequent and intense storms, and more frequent and sustained drought. Severe storms and strong winds are associated risks of treefall and safety and damage to structures (for example, from hail damage).

Higher temperatures and changes in rainfall patterns are likely to favour the movement of new pests and diseases into the region, particularly from more northerly areas of Australia.

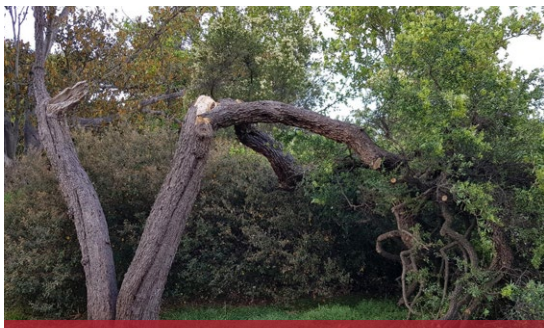
Other key climate change challenges include a significantly hotter prevailing climate (predicted to be on average 3–4°C hotter by 2070) and reduced rainfall (10% less by 2070),[1] which require a strategic climate adaptation response and specific irrigation management across the site to maintain living collections.

Site vulnerability and heritage impacts

As a city botanic garden with an extensive living plant collection, the Gardens is particularly vulnerable to higher temperatures, more frequent and severe droughts, and changes in rainfall patterns, and the consequent risk of new pests and diseases of plants. The Climate Vulnerability Risk Assessment (2017) for the Gardens found that 12% of the current living plant collection is vulnerable and 18% has low to moderate vulnerability. By 2070, however, 26% will be vulnerable and 33% will have low to moderate vulnerability.

The aging plant populations and limited age diversity increase the risk to the

Damage to landscaping including the washing away of paths will be more frequent with higher chances of major downpours. (Image: Royal Botanic Gardens Victoria)



More intense storms and stronger winds can increase the likelihood of treefalls. (Image: Royal Botanic Gardens Victoria)

1 Dave Kendal 2018. *Climate risk assessment of potential threatened species for the living plant collections in the Melbourne Gardens, Royal Botanic Gardens Victoria.*

Moisture ingress in the basement walls of the Magnet House. (Image: Context 2015)

living collection. Trees may become more vulnerable to stronger winds, with a greater likelihood of treefalls and subsequent structural damage to buildings, paths and other infrastructure.

The landscape, living collections and built elements are likely to be damaged by more frequent and severe storms, particularly by strong winds, heavy rainfall and hail. Damage to physical fabric from these impacts is likely to extend to plants, garden beds and lawns and the washing away of heritage granitic and asphalt paths. Hail will damage lightweight structures and block drains, causing flash flooding.

The built fabric, particularly of older buildings, is also vulnerable to damage caused by an abnormal wet–dry cycle. Masonry buildings such as the former Director's residence and the former Melbourne Observatory buildings may experience more extreme movement of their foundations and consequent cracking of walls because of the swelling and shrinking of soils.

Lack of capacity in gutters and downpipes could result in overflowing gutters, allowing excess water to flow back into the building and causing water damage to building fabric, interior finishes and the Gardens' significant herbarium collections, which are particularly vulnerable to damp and mould.

Current management for climate resilience

The Royal Botanic Gardens Board views climate change as a broader strategic issue as well as a maintenance issue. The management strategy is future-focused, shifting towards quantifying vulnerability and risk in future climate change scenarios. *Landscape Succession Strategy Melbourne Gardens 2016–2036* is now in place, and *Melbourne Gardens Master Plan 2020–2040* and the conservation management plan for the Gardens and Melbourne Observatory include strategies for climate change resilience.

Under its Landscape Succession Strategy, the Gardens is expected to reach 100% sustainable water availability and use by 2030 and have 75% of the living plant collection suited to the climate predicted for 2090 by 2036, including a mixed-age selection of plants composed of a diversity of taxa.

Its forward-thinking approach provides a potential model for other gardens and landscapes of heritage significance. Since the millennium drought, when water scarcity became an issue, the impacts of climate change have been readily observed at the site. In response, the functional wetlands system completed in 2012 now captures stormwater from within and outside the Gardens and circulates it through a series of wetlands. This has increased water resilience for the Gardens, particularly during long periods of drought.

Potential strategies for building resilience

Water management with appropriate irrigation is paramount. The long-term aim for the Gardens is to be entirely independent of the potable water supply. Systems to complement the existing irrigation infrastructure could include additional stormwater harvesting from surrounding streets.

Melbourne Gardens Master Plan 2020–2040 identifies a set of actions that will respond to the increasing threat of climate change:

- upgrading to, and maintaining, a sustainable water supply
- increasing shade through tree planting to provide a comfortable environment, especially during hot weather
- capitalising on the Gardens' microclimates to provide a balance between moderate and low water use plants, to help cool the site
- maintaining dense boundary plantings to reduce vehicle pollution
- active planning for mature tree losses by selecting and planting trees that support the Gardens' landscape succession and species diversity goals.

To address the actions and priorities for built structures in the Gardens and Old Observatory grounds, the Royal Botanic Gardens Victoria has commenced work on a strategic asset maintenance and renewal plan that will determine actions to manage the impacts of climate on all built form assets.

The working wetlands system, completed in 2012, has improved water availability and minimised reliance on potable water. (Image: Royal Botanic Gardens Victoria)

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