

## Inner Melbourne Action Plan

### Final Report

#### Action 9.4 Green Demonstration Projects – Growing Green Guide

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##### Purpose

1. To update the Committee on the progress of the Growing Green Guide for Melbourne project.
2. To seek approval for the amended demonstration sites report.
3. To initiate a discussion on whether the project should be completed as originally budgeted and planned, or whether the project, in particular the policy options can and should be progressed further.

##### Background

4. The 'Growing Green Guide for Melbourne: A how-to guide for green roofs, walls and facades' project is a partnership between the IMAP councils, the University of Melbourne and the Department of Environment and Primary Industries. It received funding from IMAP and the *Victorian Adaptation and Sustainability Partnership* (VASP) program. The project is aligned with IMAP Action 9.4: Green Demonstration Projects.
5. The project has identified policy options for encouraging the uptake of green roofs, walls and facades; has investigated potential demonstration sites in inner Melbourne; and has completed 'A guide to green roofs, walls and façades' (the Guidelines).
6. The project is due to be finalised in April 2014, at which point all funding will be expended and staff contracts completed.

##### Growing Green Guide for Melbourne Project Update

7. Two launches were held on Thursday 20 February to officially launch the Guidelines and website [growinggreenguide.org](http://growinggreenguide.org) and celebrate the completion of the Growing Green Guide for Melbourne Project.
8. The official launch was held on The University of Melbourne's green roof at the Burnley Campus and a mayor or councillor from each partner council spoke at the launch. Approximately 100 people attended.
9. Councillors and key staff at each Council, the IMAP Implementation Committee along with other project partners and reference group members, were invited to the official launch.
10. An industry launch was held on the same day at an ESD solutions cocktail event as part of the Sustainable Living Festival. The Guidelines and website were launched with a number of activities on the night including speeches, a discussion panel, two workshops, and a staffed stall. Approximately 300 industry professionals attended.
11. Architects, sustainability designers, project managers, staff from local councils and members of the green roof, wall and façade industry were invited to the industry launch.
12. Project expenditure to date is \$345,000. The project budget of \$380,000 is planned to be fully expended by the finalisation of the project. Further payments include staff wages and payment to the University of Melbourne. A final payment is also anticipated from the VASP program once the project completion report and evaluation is submitted.

## Project Completion

13. When the project ends in April no further resources are currently proposed to be spent in any of the IMAP councils. Each council will be responsible for progressing policy options and demonstration sites relevant to their municipality. Administration of the website will be handled by the IMAP Executive Officer. An ongoing annual cost of approximately \$300 will be incurred to host the website, after the initial 12 months.
14. Ongoing resources are required to handle queries, finalise the project reporting and evaluation and handle requests for presentations about the project. Some savings in the budget will be used to continue employment of the Project Officer on a part time (two day a week) basis during March/April 2014. It is likely that further resources beyond this date will still be required and will have to be absorbed by existing staff, primarily at the City of Melbourne.
15. Once the Growing Green Guide for Melbourne Project is complete a working group could be set up to progress, in particular, the policy options for green roofs, walls and facades. It is suggested that the Policy Reference Group set up during this project reconvene to determine further options to progressing joint policies and then report back to the committee.
16. The Demonstration Sites report has been referred back to the IMAP Implementation Committee after the City Of Yarra requested "*some modification to bring the case study material up to date*". The attached report, as modified by the City of Yarra, updates the wording within the report and deletes the majority of the City of Yarra project investigation sites; including Post Office lane, Church street and Fitzroy Town Hall – the latter being the site subsequently chosen for the concept development stage. The Demonstration Sites report summarises progress and highlights the sites that were considered in detail and will complement the consultant's reports which are on the website. The integrity of this report is reduced by the deletion of many sites from one of the partner councils. This amended report is attached for consideration (*refer Attachment 10a*).

## Recommendations

17. That the IMAP Implementation Committee resolve to:
  - a. **Request** the demonstration sites report be amended to include all sites that moved to "concept development stage", with minor modifications to bring it up to date as was requested, and that this report be made available.
  - b. **Note** this final report.
  - c. **Agree** that the Policy Reference Group reconvene to see if any further action is required to progress the policy options and report back to the Committee.

# GROWING GREEN GUIDE

## Working toward demonstration sites for green roofs, walls and facades in Melbourne *Final report*

February 2014

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## Disclaimer

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The design, construction and installation of green roofs, walls and facades is subject to the relevant authorities granting the required permits, approvals and consents; specific information should therefore be obtained from such authorities prior to the commencement of any such projects.

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The project partners reserve the right to make changes to the guide at any time.

# Introduction

This document outlines potential sites that could be used in Melbourne to demonstrate rooftop and vertical greening. It summarises the work investigating demonstration sites as part of the Growing Green Guide for Melbourne project, which was established to improve knowledge on green roofs, walls and facades and create solutions for the current barriers to implementation.

The Growing Green Guide for Melbourne (GGGM) project was funded by the four Inner Melbourne Action Plan (IMAP) councils and the Victorian Government's Victorian Adaptation and Sustainability Partnership.

It is intended that this report be used to generate discussion about demonstration sites in Melbourne and to provide ideas for others considering their own development of roofs, walls or facades.

The GGGM project included an investigation into demonstration sites on the basis that if funding could be found to develop a green roof, wall or facade demonstration project, the momentum from the Growing Green Guide project would be carried forward. This initial work to scope out demonstration sites was intended to provide councils with a foundation for seeking funding for a demonstration project.

Demonstration projects are important as a means to build on GGGM by:

- showcasing to the public what is involved in construction and maintenance of green roofs, walls or facades, and what benefits they provide
- testing the relevance and breadth of Victoria's Guide to Green Roofs, Walls and Facades (developed as part of the GGGM project). Lessons learned would be used for any future edition of the Guidelines.

A three stage process was used to identify sites.

1. **Opportunities Assessment** - identify potential sites in each IMAP municipality for green roof, wall or facade demonstration projects. Undertaken by council officers in December 2012
2. **Feasibility Study** – test the feasibility of the sites selected in the opportunities assessment. Undertaken by Aspect Studios in March 2013.
3. **Concept drawings and costing** – identify indicative costs and concept design for some of the sites that are assessed as feasible. Undertaken by Bent Architecture in July 2013.

The cost for this investigation into demonstration sites in Stages 2 and 3 was \$60,000. Stage 1 was developed in house.

The Project Control Group decided on the sites that progressed from stage 1 to 2 and then from stage 2 to 3.

The fourth stage, outside of scope of GGGM, is funding bids, business case development and project management.

This report summarises the first three stages. The full reports for the Feasibility Study (written by Aspect Studios) and the Concept Design and Cost Estimates (written by Bent Architecture), can be viewed at [www.growinggreenguide.org](http://www.growinggreenguide.org). This site also provides further information and contact details for the GGGM project.

## Stage 1: Opportunities Assessment

The purpose of the opportunities assessment was to identify sites with potential for a green roof, wall and/or facade demonstration project in each of the four inner Melbourne municipalities. When conducting the opportunities assessments, each council considered the following:

- Planned works on particular sites which might loan themselves to incorporation of green infrastructure (redevelopments)
- Ownership of building – private, public, state or local government. Any known interest from building owners to incorporate green roofs, walls or facades
- Likelihood of significant impact – e.g. in an urban hot spot where other works to promote cooling are likely to occur; or in a location where stormwater run-off is a particular problem
- Planning and other regulatory requirements
- Strategic direction of Council and existing greening / climate adaptation / sustainability plans.

As a minimum requirement, each council ensured that:

- Sites are publicly accessible
- Sites will be viewable by a consultant who will undertake a more detailed feasibility study
- Sites had a likelihood to proceed to construction if found to be feasible.

A number of potential sites for green roofs, walls and/or facades were identified across the municipalities in the opportunities assessment.



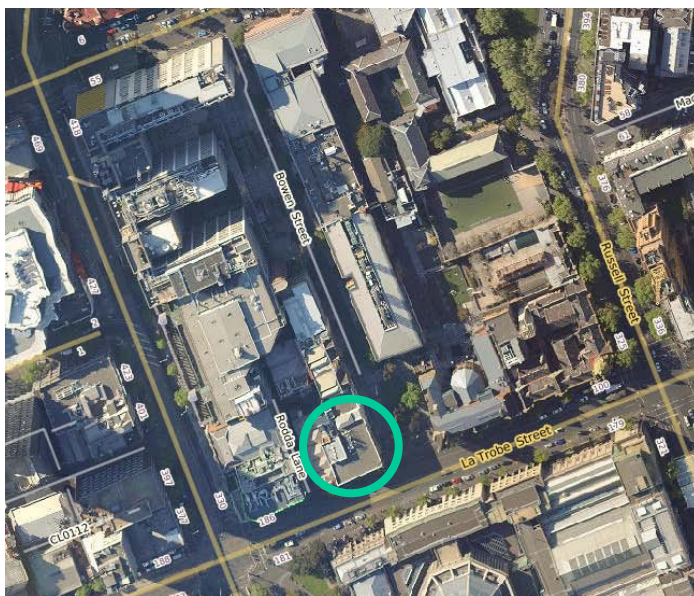
## City of Melbourne sites

### Green roof: RMIT City Campus Building 2

**Location:** Swanston Street,  
Melbourne

**Ownership:** University – semi  
public

**Description of public access (ability to function as a demonstration to the community):** The University provides access to its campus for students and visitors during the day and many early evenings. Many buildings on campus are being refurbished to reduce their environmental impact and improve facilities, this gives the opportunity to improve green infrastructure on campus.



**Design intention:** A space that can accommodate people and plants. There is potential for this to be a teaching and research space. It is possible that this design could include both walls and a green roof, which would improve thermal efficiency of the building and reduce UHI.

### Green roof: Melbourne Town Hall

**Location:** 120 Swanston Street (administration building roof)

**Ownership:** City of Melbourne

**Description of public access (ability to function as a demonstration to the community):** The building is accessible to the public in some areas during the daytime on weekdays. There is currently no access to the public to the rooftop but a refurbishment of the building is planned.

**Any known interest by council or building owner in green infrastructure:** The administration building is proposed to be refurbished to showcase an environmentally retrofitted heritage building.

**Design intention:** A space that can accommodate people and plants. Aesthetic improvements are a key as this building roof is overlooked and has a number of plant housings that could be improved with the potential for walls as well as a green roof. This building has high heritage



value that needs to remain intact. A key to the refurbishment will be to minimise required plant equipment so improving thermal efficiency of the building is important. Opportunities for either Water Sensitive Urban Design and/or habitat creation would help demonstrate some of our key strategies.

## Green roof: Melbourne Central rooftop

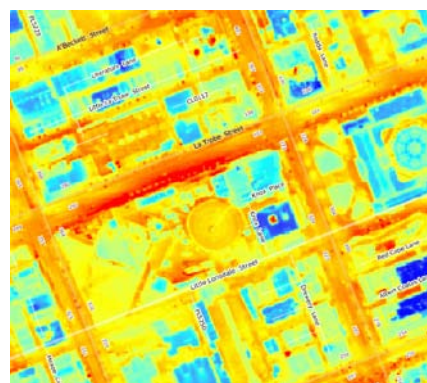
**Location:** Melbourne central shopping centre, between Lonsdale and Little Lonsdale Streets, Melbourne

**Ownership:** Private

**Description of public access (ability to function as a demonstration to the community):** The site is managed by the GPT group. The shopping centre is open seven days a week between 9am and midnight. Lift access is already provided to this rooftop area from within the publicly accessible (but not very obvious) areas of the shopping centre.

**Any known interest by council or building owner in green infrastructure:** GPT have shown interest in greening this space as a new retail area.

**Design intent:** To create a green space that reduces the heat impact of the building (see thermal image) and also provides a unique retail space that is publicly accessible.



## City of Port Phillip sites

### Green roof/wall: South Melbourne Market

**Location:** 322-326 Coventry Street,  
South Melbourne

**Ownership:** City of Port Phillip

**Description of public access:** Excellent public access from all sides and highly visible roof to apartments to the north of the market. Highly patronised site, very close to or on the way to a range of other well patronised sites in South Melbourne.



**Any known interest by council or building owner in green infrastructure:** Council has initiated discussion on developing a green roof or wall for the north side of the market. The roof was traditionally a carpark only. The market is currently gaining a new roof with extensive solar PVs over the car park, and some water harvesting for flushing. Council wants to consider feasibility of a container garden (up to 2 metres wide) or green wall along the entire northern roof line, combining cascading plants and shrubs, to clean and treat washdown wastewater and return it for reuse (flushing or washdown).

**Possible opportunities that would assist with construction of a demonstration site:** Idea has already been flagged and initial discussions initiated by the site manager and the Committee of Management.

**Other information about the site:** The market also gets very hot in summer and part of the rationale for the northern green container roof or green wall is to aim to reduce heat gain and provide shading to this wall. Washdown is currently untreated.

### Green wall/facade: Balaclava Station

**Location:** Carlisle Street, St Kilda

**Ownership:** State Government

**Description of public access (ability to function as a demonstration to the community):** Access from Carlisle Street and a range of side streets, including a major carpark for the station.

**Any known interest by council or building owner in green infrastructure:** Council is investigating options for a green facade or wall on the east wall (Platform 1 side). This wall is already being considered for capacity as an 'art wall' (art installations), so there is some possibility in including a green facade. Public Transport Victoria are yet to confirm interest but have an issue with any kind of vegetation egress into high voltage powerlines, therefore only a green facade or wall could be contemplated.

**Possible opportunities that would assist with construction of a demonstration site:** The final design would be fully funded for implementation, subject to consultation and approvals.



## Green roof: St Kilda Library

**Location:** 152 Carlisle Street, St Kilda

**Ownership:** City of Port Phillip

**Description of public access (ability to function as a demonstration to the community):** Highly accessible from Carlisle Street as well as Duke Street (runs behind library) – Carlisle Street is one of the city's activity centres and Duke Street is a popular route for pedestrians coming to Carlisle Street.



**Any known interest by council or building owner in green infrastructure:** Council is considering major improvements to this building. As part of the initial scope, Council is interested in exploring feasibility and community interest in a green roof with capacity for stormwater retention, treatment and reuse. In terms of what the green roof could contain, Council is also interested in exploring a range of green roof options that could be 'taken home' for use at smaller (read residential) sites. Highly visible and accessible site from 2 streets; roof is also relatively low so would be visible from street.

**Design intention:** To be publicly accessible and to demonstrate a range of ways that a roof can be used, e.g. grow food. Perhaps could include different plots across the roof.

## Green wall or facade: 222 Bank Street



**Location:** 222 Bank Street, South Melbourne

**Ownership:** City of Port Phillip

**Description of public access (ability to function as a demonstration to the community):**

Access is from Bank Street and Fishley Street. The site is opposite South Melbourne Town Hall in the historic precinct of Emerald Hill, just off a popular strip of the Clarendon Street Activity Centre. 222 Bank Street is provided as low cost

accommodation to a range of arts organisations with the major tenant being Auspicious Arts.

**Any known interest by council or building owner in green infrastructure:**

Both Council and tenants are interested in investigating option for a green wall and/or facade on the south and east side of the building (see photo).

**Possible opportunities that would assist with construction of a demonstration site:**

Currently part of the Emerald Hill suite of redesign for a range of outcomes including DDA compliance, with an initial green facade/wall already being considered through current community and tenant consultation.

**Design intention:** To test a facade and a wall treatment in an area with narrow footpath and to use water from the roof to irrigate the plants. The 'feature posts' offer opportunity for a

deciduous green facade combined with a green wall at mid-wall level (concrete strip between 1<sup>st</sup> and 2<sup>nd</sup> floor).

## City of Yarra sites

### Green roof: North Fitzroy Community Hub

**Location:** 182-186 St Georges Road, North Fitzroy

**Ownership:** City of Yarra

**Description of public access (ability to function as a demonstration to the community):** The project is for a rooftop garden for the Hub. The Hub will be a public building, housing a library, community meeting rooms, and the Maternal Child and Health Centre.

**Any known interest by council or building owner in green infrastructure:** The current concept includes provision for gaining a 6 star rating, and a rooftop garden.

**Possible opportunities that would assist with construction of a demonstration site:** An accessible roof garden is included in the schematic design, and the community appear to be supportive of a space that can be accessed by the public for reading, parent and child groups, etc.

**Desired outcomes:** It is expected to provide a rooftop garden of 187m<sup>2</sup> – focus on a public space for casual use with aesthetic and cooling benefits. Area for the green roof could be around 200m<sup>2</sup> – focus on environmental benefits including insulation, energy reduction, runoff reduction.



### Green wall: Lourdes Family and Children's Hub, Abbotsford

**Location:** St Heliers Street, Abbotsford.

**Ownership:** City of Yarra

**Description of public access:** The proposed hub would provide childcare, maternal child health services, and a community meeting space to the community. The wall would also be visible from the adjacent car park to the Collingwood Children's Farm and Abbotsford Convent.

**Any known interest by council or building owner in green infrastructure:** The building would be council owned and run. Access would be to building users. The project is aiming to have a 6 star energy rating, and the schematic concept shows a green wall to the east boundary of the building.



**Other information about the site:** The planned construction for the project is 2015, however this is subject to meeting heritage requirements in the design.

## City of Stonnington sites

### Green wall/facade: Tooronga Depot

**Location:** 293 Tooronga Road Malvern

**Ownership:** City of Stonnington

**Description of public access (ability to function as a demonstration to the community):** The depot is used for a range of educational programs, particularly sustainability programs to do with recycling and management of waste, so having green walls/facades within the compound would be a worthwhile addition and would contribute to the various programs plus reduce the amount of hard surfaces/heat radiation.

**Any known interest by council or building owner in green infrastructure:** City of Stonnington is committed to installing good examples of green walls/facades and roofs to use as demonstration projects and to test their maintenance requirements and more generally their value to the community.

**Other information about the site:** A green wall/facade would reduce temperatures and reduce heat as well as providing a well-placed example that can be checked and assessed regularly re maintenance, plant selection etc. Likelihood that storm water can be redirected and used to water the green walls.

## Green roof, wall & facade: Elizabeth St car park

**Location:** Elizabeth Street, South Yarra (and Barry St South Yarra)

**Ownership:** City of Stonnington

**Description of public access (ability to function as a demonstration to the community):** Well located in a prominent and densely populated location close to Chapel St and behind the Prahran Market.

**Any known interest by council or building owner in green infrastructure:** There is strong Council interest in seeing a green roof or wall or facade constructed on site and this location. Residents face the car park on its north side in Barry St so from an aesthetic point of view the car park could be vastly improved. A combination of green wall/facades and a roof - on part or whole of the building could be considered as it is free standing and easily accessible from all sides as well as internally.

**Other information about the site:** A green roof/wall or facade would assist in reducing the heat island effect in this area together with providing possible recreational space for community members on the roof. Stormwater runoff could very easily be used for this project as the footprint is large. Note: lots of possibilities at this site but the location and proximity to residential area will be a factor that restricts use of the site in the evening.



## Green roof/wall/facade: Chadstone Shopping Centre

**Location:** Chadstone

**Ownership:** Private

**Description of public access (ability to function as a demonstration to the community):** New extension to the shopping precinct proposed at present and opportunity to 'value add' to the project. Access from a range of entries and open 7 days a week and visited by a very broad range of people.

**Any known interest by council or building owner in green infrastructure:** Not sure but would be an opportunity for the owners to establish some 'green' credentials and site should provide a broad range of possible sites to incorporate green roofs, walls &/or facades.

**Possible opportunities that would assist with construction of a demonstration site:**

Council has expressed strong interest in pursuing this opportunity and the site offers a myriad of opportunities.

**Other information about the site:** Located in an urban hot spot so opportunity to 'green' spaces and reduce heat island effects – especially in areas where people/vehicles are exposed to long periods of sun and no shade is provided. Stormwater run-off could be used depending on the sites selected.



## Green wall/facade: South Yarra car park

**Location:** 11-17 Daly St South Yarra

**Ownership:** Private

**Description of public access (ability to function as a demonstration to the community):** Located in a street that runs off Chapel St in a prominent and densely populated location experiencing rapid development (Forrest Hill precinct). Readily accessible from Daly St.

**Any known interest by council or building owner in green infrastructure:** The car park is in an area where a number of developers are building high rise apartments in Daly St, Claremont St and Yarra St. The car park detracts from an otherwise attractive streetscape. A 'green' wall/facade on part or whole of the building could screen the building and 'cool' the streetscape.



**Possible opportunities that would assist with construction of a demonstration site:**

Council is contributing funding on a yearly basis to ensure the quality of the streetscapes within Forrest Hill are designed and built to a high standard and that their design assists in activating the street at ground level.

**Other information about the site:** The proximity of the car park to an east-west link that connects Daly St to Claremont St and Yarra St is also an important consideration.

## Green roof/wall: Powerhouse Rowing precinct

**Location:** Alexandra Avenue South Yarra

**Ownership:** Council owned facility

**Description of public access (ability to function as a demonstration to the community):** An extension on the current rowing shed is proposed so a green roof and possibly green wall/facade would contribute greatly to the architectural and environmental values of the building and the precinct which is currently being 'improved' with indigenous planting and recreational opportunities. The shed is opposite Herring Island. The shared bicycle path along the Yarra passes here.

**Any known interest by council or building owner in green infrastructure:**

The establishment of a 'green' roof/wall in this area would complement other environmentally focused projects currently being carried out by Stonnington in this area along the Yarra River and on Como Park North/Thomas Oval (opposite).



**Possible opportunities that would assist with construction of a demonstration site:**

The adjacent projects in this zone are improving the environment/habitat/ biodiversity of the area. A green roof/wall would complement these projects.

**Other information about the site:** Stormwater run-off could be used if required.



## Green wall/facade: Surrey Road Park

**Location:** Surrey Road South Yarra

**Ownership:** City of Stonnington

**Description of public access:** Stage one of park works about to proceed. A green wall along the southern boundary adjacent to the railway line would be accessible and could be fitted in to the construction program (Stage 2 – scheduled for 2013)

**Any known interest by council or building owner in green infrastructure:** Supported by executive management team at Council and fits in well with master-plan implementation and high quality design for park in densely populated zone close to Toorak Rd and Chapel St.

**Aspects to emphasise:** The park has been designed to a high standard with an emphasis on environmental design. The location is inner city and adjacent to a railway line so a green wall/facade would complement the design and reduce noise/pollution.

**Other information about the site:** If a green wall cannot be attached the existing sound wall then there is an opportunity to build a green facade around the walled shed located on the street boundary. Opportunity to build a free-standing frame to support plants along the edge of the railway line – between the shed and the sound wall, to act like a semi permeable coloured vegetation screen.



## Stage 2: Feasibility Study

From the original 15 sites identified in the Opportunities Assessment, the list was narrowed down to 7 sites for the Feasibility Study, reflecting those sites that the Project Control Group (PCG) felt were most likely to be considered by their organisations or partner agencies in the immediate future and represented a good selection of demonstration sites with a range of building types and a variety of green infrastructure designs. The sites selected were:

- RMIT City Campus Building 2 (City of Melbourne)
- Melbourne Town Hall (City of Melbourne)
- St Kilda Library (City of Port Phillip)
- 222 Bank Street (City of Port Phillip)
- North Fitzroy Community Hub (City of Yarra)
- Elizabeth St Car Park, Prahran (City of Stonnington)
- Surrey Road Car Park (City of Stonnington)

The Feasibility Study determined the feasibility of completing the potential green roof, wall or facade projects outlined in the opportunities assessment. The contract for the feasibility study was awarded to Aspect Studios following a Request for Quote process.

The feasibility assessment for each site included investigation of the following criteria:

- Roof and building construction materials and load bearing capacity (structural capacity information is essential in all roof and green wall sites)
- Shading / sunlight availability (aspect)
- Wind considerations
- Height of building
- Access to site for cranes and other machinery
- Public accessibility potential (lift, visible in the public realm)
- Accessibility for maintenance
- Size of useable roof or wall area
- Available water collection and storage opportunities
- Available space for plants to be grown from ground level up the sides of the building (for facade opportunities)
- Opportunities for more than one type of roof, wall or facade. What type of roof, intensive or extensive?
- Access to utilities (water, electricity)
- Existing use of building e.g commercial, residential
- Existing energy use of building (to determine whether heating and cooling requirements will be reduced)
- Existing conditions e.g. flat or sloped roof, plant equipment requirements, insulation (R value) etc
- Likelihood that a demonstration site would face hurdles in terms of planning and building permit requirements/restrictions, heritage issues and impact on street accessibility (potentially triggering a problem with disability access).
- Any existing noise concerns (e.g. plant equipment)
- Safety considerations (parapet height/railing requirements)
- Stormwater discharge point of building

These results of the feasibility study for each of these sites is summarised in the following pages. To view the full report, written by Aspect Studios, go to [www.growinggreenguide.org](http://www.growinggreenguide.org)

## RMIT City Campus Building 2

### Summary of the feasibility study

The opportunity to construct a green roof on this building is considered great, especially in the context of the University's interest in green infrastructure and climate change adaptation. Possible design foci could include water sensitive urban design (WSUD), public access, teaching and research, acoustic benefits, improving air quality and the thermal performance of the building. The building has strong load bearing capacity and good access with a lift and staircase to the roof.



The RMIT Landscape Architecture Program could be a driver of the scope and performance requirements for the roof, as it would afford both design exploration and scientific monitoring opportunities.

Furthermore, given the major capital infrastructure upgrade for energy and water efficiency,, the opportunity exists for the roof to play a direct role in the water and energy conservation agenda for the campus. The water storage that will be required to irrigate the green roof so that the plantings can tolerate the summer period, can be used for toilet flushing during winter which will significantly reduce the building's water consumption and contribute to the sustainability of the campus.

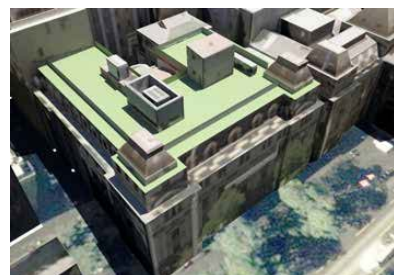
The green roof will make this space significantly more aesthetically pleasing and improve human comfort levels, especially on warm and hot days.

Design emphasis: Thermal, WSUD, research/teaching, public access, acoustic, air quality

## Melbourne Town Hall

### Summary of the feasibility study

The potential development of the Melbourne Town Hall Administration Building provides an opportunity for inclusion of an extensive green roof that will integrate with the overall building performance requirements. However, the load capacity of the existing roof cannot accommodate an intensive green roof without structural strengthening.



The costs associated with bringing the load capacity of the roof up to support public access may be feasible, provided the full value of the benefits that the green roof can accrue are factored in. Even if the cost / benefit payoff for a publicly accessible green roof cannot be made to work, an extensive green roof could still provide tangible benefits. In this instance, only maintenance staff could access the roof – therefore providing lower value as a demonstration site. The water storage that will be required to irrigate the green roof through the summer months can also be used for toilet flushing during winter, contributing to a reduction in potable water consumption of the building.

The prominent location of a green roof up on the Melbourne Town Hall Administration Building will help to raise awareness of the issues of urban sustainability and highlight the possibilities of design innovation and integration of vegetation.

Design emphasis: thermal, public access, aesthetic, WSUD, biodiversity, teaching/research

## St Kilda Library

### Summary of the feasibility study

The redevelopment of the St Kilda Library provides an opportunity to include a green roof that will integrate with the overall building performance requirements. The current building structure will not support a green roof, but the redevelopment of the building presents an opportunity to increase the load bearing capacity. The costs associated with bringing the load capacity of the roof up to that required for public access may be offset by the long-term financial benefits, as the green roof will improve the energy efficiency and amenity of the building. A green roof with shallower substrate would require less structural reinforcement and may provide similar benefits for a lower cost.

The existing roof drainage infrastructure is suitable for a green roof, and there is a large water storage tank located in the basement, with a pump system. This could be used for irrigation of the green roof and other fit-for-purpose uses. Considering the existing infrastructure, a relatively high capacity stormwater capture and storage system could be set up at relatively low cost.

Design emphasis: thermal, public access, food, aesthetic, WSUD, research/teaching

## 222 Bank Street, South Melbourne

### Summary of the feasibility study

The integration of greening to the building at 222 Bank Street is feasible, with a green facade or wall a suitable option. Aspect Studios also noted that a green roof would be possible on this site, although they were assessing vertical green options at this time. There is a high level of interest from the stakeholders, and the existing decorative steel struts along the facade could be modified to support climbing plants. There is also space at the southern end of the basement car park for a water storage tank to be installed that would capture water runoff from the existing roof drainage system.



The most suitable location for the green facade is along the eastern and southern sides of the building, but this will not contribute to the thermal performance of the building. The amenity provided by the vegetation will still be significant because the building is in a prominent and busy area. There is also a significant visual impact of a potential green facade when viewed from the internal spaces of the building, which could add to the property value if Council were to sell the building.

Green wall / facade

The building has low-light issues, so a fully vegetated facade would not be suitable. An alternative to this is to mount some vertical fins to the existing steel struts. Planter boxes could be positioned at the upper, middle, and lower panels. Steel cables could be used to support climbing and trailing plants that, if deciduous, would provide a cool green outlook in summer, but allow maximum winter light into the building.

Design emphasis: thermal, aesthetic, WSUD, biodiversity

## North Fitzroy Community Hub

### Summary of the feasibility study

As this building has not yet been constructed, and it is still in design and consultation phase, there is good potential for a green roof, wall and/or facade to be included. The current proposal identifies a publicly accessible space on level 3 that could be a roof top garden, and also mentions the potential for a roof top green roof. It does not include a green facade, however the 3D renders of the Schematic Design Option 1 show large expanses of glazing to the north facing facades which would have a high heat load that would require some form of shading, or expensive heat reflecting glass in order to achieve the stated target 6 star Greenstar rating. The scope for the green roofs and facades to be developed and integrated into this design is considerable.

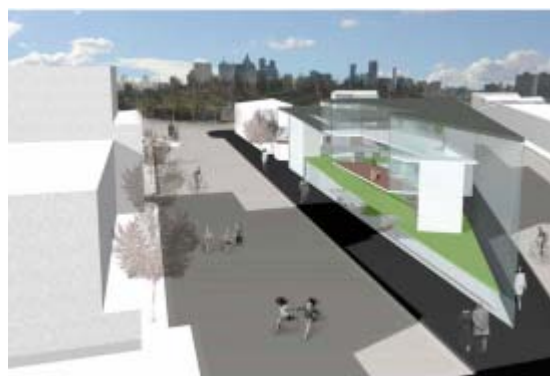
#### Green Roof

The publicly accessible green roof on level 3 will be a flexible space that can be used for a range of community activities. An extensive green roof could be designed for the top of the building without significant changes to the planned weight bearing capacity or cost. Drainage, stormwater capture and storage could all be designed in without significant additional cost, with surplus water during winter being used for toilet flushing. The thermal performance of the building would be enhanced by green roofs, especially the upper roof if it could be designed to cover a significant area. This would be of benefit to both summer cooling loads, and winter heat loads.

#### Green wall / facade

A green facade configured to provide shading to the significant area of glass curtain wall would contribute greatly to overall building thermal performance. This could be designed to provide visual interest and access into and out of the building, while at the same time reducing the heat loads. If designed in an integrated manner it would also contribute to the architecture quality of the building.

Design emphasis: public access, aesthetic, thermal, food, WSUD



## Elizabeth St Car Park, Prahran

### Summary of the feasibility study

The car park is a viable location for a green roof, with a high weight loading capacity and easy access for construction and maintenance. The upper deck of the car park could become a green roof, provided that the removal of the car spaces can be negotiated. An alternative to losing the car spaces would be to provide an additional upper roof canopy over the existing top car park deck, but this would increase the cost of the project significantly. This could be configured to support a green roof which would not impact on the numbers of car parking, and provide a significant amount of usable green open space.

The structural capacity would allow for deeper substrate and could support an urban agriculture garden. Alternatively (or in conjunction with this) the space could become usable public open space and programed to be used for passive recreation, markets, or any range of public entertainment.

The southern elevation of the car park structure could be easily configured as a green wall or facade. This would create strong visual connection of the car park with Elizabeth Street, and the market itself.

Design emphasis: aesthetic, public access, urban agriculture, WSUD



## Surrey Road Car Park

### Summary of the feasibility study

The acoustic wall at Surrey Road Park currently has a very poor visual amenity. This would be greatly improved with the provision of a green wall, a concept which the council are supportive of. The existing structure could easily accommodate the loads imposed by a green wall or facade and there is easy access for maintenance and construction.

There is space for a stormwater capture and storage system in the existing car park, and this would minimise the amount of potable water needed for irrigation. There is also an opportunity to screen the existing ground water decontamination facility with smaller green wall or facade installations.

Design emphasis: aesthetic, biodiversity, acoustic, air quality, WSUD





## Stage 3: Concept Design and Cost Estimate

The final step towards establishing demonstration sites carried out as part of the GGGM was to have detailed concept drawings made of the proposed design for each site. The Project Control Group (PCG) determined that three of the potential sites would be carried through to the concept design and cost estimate stage.. The contract was awarded to Bent Architecture, following a request for quote process.

The sites chosen to proceed to concept stage were:

- RMIT City Campus Building 2 (City of Melbourne)
- Elizabeth St Car Park, Prahran (City of Stonnington)
- 222 Bank Street, South Melbourne (City of Port Phillip)

The concept for each site included:

- Analysis of the existing site (considering noise, sunlight, weight loading, etc.)
- Explanation of the design concept
- Photographs and drawings showing before and after construction
- Detailed plan drawings
- Itemised cost estimate for materials and construction

A summary of each concept design is included here. To view the full concept designs and report by Bent Architecture, go to [www.growinggreenguide.org](http://www.growinggreenguide.org)

## RMIT City Campus Building 2

The concept design for RMIT Building 2 includes two separate green roof areas, accessed through a centre stairwell. Roof 1 is smaller and features open field-style planting, with a combination of bluestone paving and trafficable planting. A green facade covers the wall between Roof 1 and 2, and a number of planted vertical features create interest. Roof 2 follows a similar design style, but also includes a large research area and a green facade to cover the existing plant machinery on the roof.

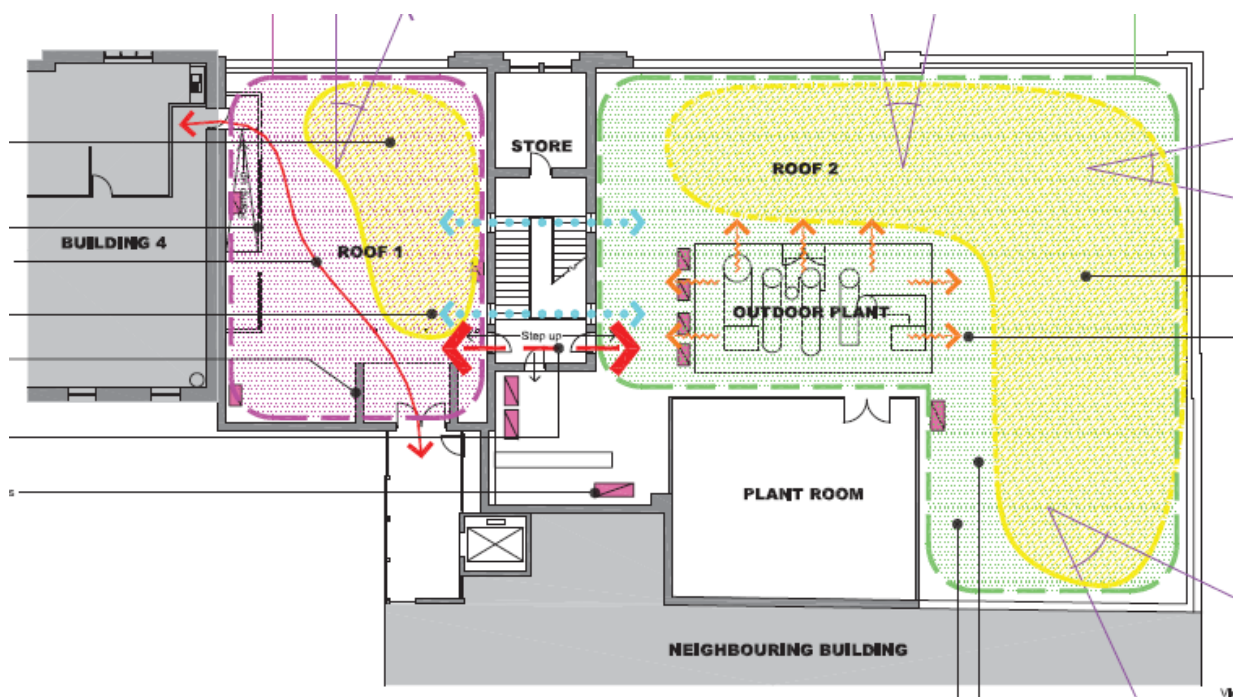
The estimated cost of this roof was \$628,000\*, as detailed below.

Roof 1	\$123,640
Roof 2	\$266,355
Stair Building Modifications	\$ 89,920
Net Building Cost	\$479,915
Design Contingency 10%	\$ 47,992
Cost Escalation 3%	\$ 15,837
Total Building Cost	\$543,744
Construction Contingency 5%	\$ 27,187
Net Project Cost	\$570,931
Consultant's Fees 10%	\$ 57,093
Total Project Cost	\$628,024
<b>Rounded to</b>	<b>\$628,000</b>

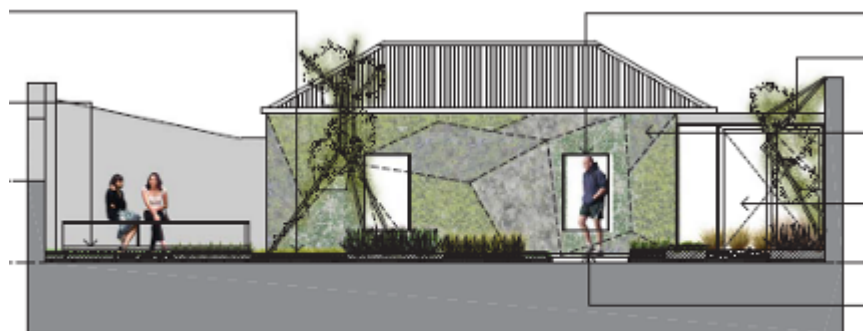
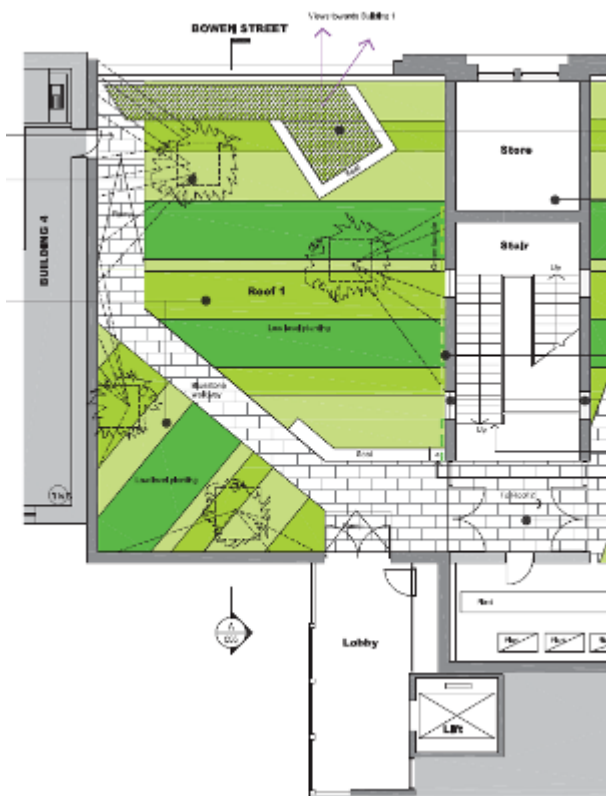


**SECTION B: THROUGH ROOF 2**  
SCALE 1:100

\* Excluding any structural work to the building to support the additional load







**SECTION A: THROUGH ROOF 1**



**VIEW TOWARDS SOUTH-EAST**

## Elizabeth St Car Park, Prahran

Given the large area of the site, the concept design for the Elizabeth St car park is a green roof that also includes green wall and facade elements. The roof is publicly accessible and the design incorporates garden beds, small trees, a sports area and a community vegetable garden. A combination of green wall units and green facade is used to cover the outer walls of the six level car park.

The estimated cost of the project is \$8,109,333, however it should be noted that this cost includes the construction of a new deck on the car park to avoid losing car spaces. The cost will be lower if the existing top deck is converted into a green roof.

New Car Park Deck	\$3,274,398
Ticket Booth, Kiosk & Public Toilets	\$ 401,497
Roof Garden & associated Works	\$2,360,400
Green Facade	\$ 280,275
Green Wall	\$ 500,000
<b>Net Building Cost</b>	<b>\$6,816,570</b>
Design Contingency 10%	\$ 681,657
Cost Escalation 3%	\$ 224,947
<b>Total Building Cost</b>	<b>\$7,723,174</b>
Construction Contingency 5%	\$ 386,159
<b>Net Project Cost</b>	<b>\$8,109,333</b>
Consultant Fees 10%	\$810,933
<b>Total Project Cost</b>	<b>\$8,920,266</b>
<b>Rounded to</b>	<b>\$8,920,000</b>





## 222 Bank Street, South Melbourne

The concept design for 222 Bank Street incorporates a combination of green wall and green facade elements to cover most of the south and east facing external walls. Large sections of the facade are covered using small potted plants mounted in a steel frame. Modular green wall units protrude slightly from sections of the wall. A mesh trellis system extends over the remaining wall surfaces to allow climbing plants to grow into a green facade.

The estimated cost for this project is \$365,000, as detailed below:

	<b>Cost</b>
Steel Structure	\$ 83,540
Stainless steel climbing mesh supply	\$ 15,750
Planter boxes behind mesh	\$ 15,000
Plants, soil and irrigation for planter boxes	\$ 1,200
Hanging pots in forecourt incl. plants	\$ 6,000
Green wall system including fixing system	\$ 26,720
Green wall planting, soil and irrigation	\$ 25,050
Allowance for supply and installation of water tanks (Approx. 15000L Capacity)	\$ 10,000
Allowance for building integrated PV Cells 3KW (excluding rebates)	\$ 59,400
Builder's Margin for coordination of works 15%	\$ 36,399
<b>Net Cost</b>	<b>\$ 279,059</b>
Design Contingency 10%	\$ 27,906
Cost Escalation 3%	\$ 9,209
<b>Total Building Cost</b>	<b>\$ 316,174</b>
Construction Contingency 5%	\$ 15,809
<b>Net Project Cost</b>	<b>\$ 331,983</b>
Consultant Fees 10%	\$ 33,198
<b>Total Project Cost</b>	<b>\$ 365,181</b>
<b>Rounded to</b>	<b>\$ 365,000</b>



## Moving Forward

The steps taken by the IMAP councils as part of the Growing Green Guide for Melbourne project have identified a range of possible demonstration sites including three different green roof, wall and facade concept designs:

- Green roof (with a green facade) for public access and research, RMIT City Campus Building 2, \$628,000
- Green roof for recreation, including basketball court, community garden, cinema and toilets, along with green walls and facades and new roof deck, Elizabeth St Car Park, Prahran, \$8,920,000
- Green wall and facade on two walls in a low light environment to improve aesthetics, Bank Street community building, South Melbourne, \$365,000

Although funding has not yet been identified for detailed design work, construction or ongoing maintenance, each council will pursue opportunities to fund the development of demonstration sites. Councils recognise that demonstration sites will showcase Council commitment to green roofs, walls and facades (a key element of the policy options available to local government, as identified in the Growing Green Guide for Melbourne's Policy Option Paper). Also, Councils recognise that the process of design, construction and, in the long run, maintenance, of any demonstration site would provide a valuable opportunity to test Victoria's Guide to Green Roofs Walls and Facades (another output of the Growing Green Guide project), and potentially lead to improvements for a second edition.

If followed through to completion, these projects would raise the awareness of green roofs, walls and facades in the broader community and across other councils and industry. With a complementary research program they could also be used to demonstrate the impacts of these kinds of structures on building occupants, the wider community and the environment. To proceed with the demonstration sites, each council will need to develop a business case for their specific project. This business case can be used to make applications for funding from appropriate sources.

**For more information on the Growing Green Guide for Melbourne project:**

[www.growinggreenguide.org](http://www.growinggreenguide.org)

**For more information on the Inner Melbourne Action Plan:**

[www.imap.vic.gov.au](http://www.imap.vic.gov.au)