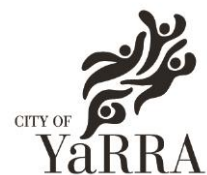

Embedding Green Infrastructure into Local Government Streetscapes: Best Practice Case Studies

The City of Yarra 2016



alluvium



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GREENING THE WEST, STRATEGIC SUPPORT FOR GREEN INFRASTRUCTURE

Introduction

This case study was written under the City of Yarra's Green Infrastructure toolkit project.

The project: Greening the West is a regional initiative focusing on Metropolitan Melbourne's six westernmost municipalities with a vision to 'to enable sustainable, liveable, healthy communities through urban greening'.

The case study: Highlights the importance of a strategy and partnerships in getting support for and guiding the implementation of green infrastructure. While there are many small scale examples, Greening the West sets an ambitious vision that has led to GI initiatives large and small.

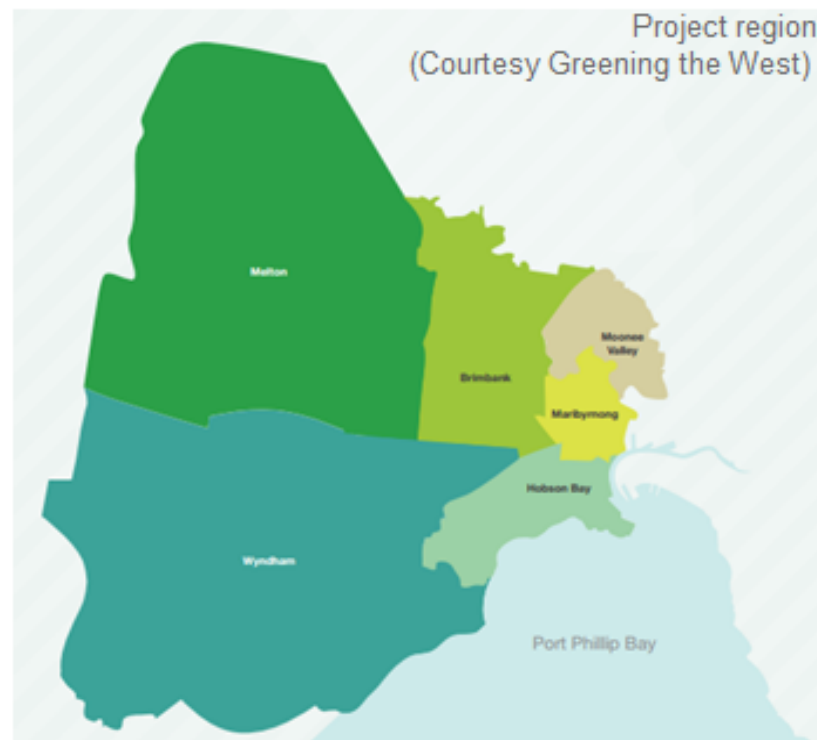
The project

The **scope** of Greening the West (GTW) is to deliver health and social benefits to communities in Melbourne's west through urban greening. A broad range of partners have signed up to the strategy across local government, water authorities, government departments and community groups.

The **solution** (in the form of this strategy) was delivered through a multi-organisation steering committee that identified eight clear goals (below right) and associated targets for the region across criteria including urban greening, tree canopy cover, the quality, availability and functionality of green space, the health and well being of residents, water supply to maintain green infrastructure and advocacy to government.

Implementation challenges include understanding the return on investment on greening projects, working across organisations, sharing knowledge and getting organisations to commit to and endorse the strategy and identifying lead organisations for projects that come from the strategy.

The **outcome** of the strategy has been to deliver projects of regional significance including '1 million trees' (to be planted across the region) and the Upper Stony Creek Transformation Project that will naturalise an existing concrete lined channel. When endorsing GTW they committed to five things which have been achieved: 1) planting 180k trees by 2017 2) Planning regulations requiring a minimum number of trees in front yards for sub-divisions and extensions 3) Urban Forest Strategy, 2016 4) 'Branchout Brimbank' website dedicated to promoting trees in the urban environment 5) Research with RMIT(current) to develop adaptive GIS system that regularly monitors the lifecycle of trees as assets.



What we learned:

Strategic documents provide critical support and direction for the effective implementation of green infrastructure.

Greening the West has successfully established the big picture vision and encouraged a partnership approach.

Brimbank has successfully leveraged Greening the West to progress and promote its own GI strategies, projects and successes.

Summary:

Strategies enable effective GI implementation at the local or regional scale by providing a vision, clear direction and targets (across tree canopy cover, stormwater quality, access and quality of open space etc.) that drive implementation.

Greening the West objectives

1. Maximise urban greening
2. Improve quality and functionality of green space
3. Increase use and interaction of residents in green space
4. Improve health and well being of residents
5. Showcase the economic and intrinsic value of urban green space
6. Improve environmental quality
7. Advocate green spaces to all levels of Government
8. Maximise sustainable water supplies to establish and maintain green space

MAINTAINING GREEN INFRASTRUCTURE

Introduction

This case study was written under the City of Yarra's Green Infrastructure toolkit project.

The project: A framework for good maintenance processes and practices for green infrastructure.

The case study: Focusses on the Brimbank City Council (BCC) and their work in establishing a process for the maintenance of green infrastructure.

The project

The **scope** is to understand BCC's processes for maintaining GI including how teams within Council collaborate and how those relationships have been built over time. These processes are part of BCC's evolution in its approach to GI (and water sensitive urban design (WSUD) from a 'nice to have' approach to GI becoming integrated into business as usual.

The **solution** begins in 2006 when BCC delivered three large scale stormwater intercept/harvesting projects at sporting reserves. Following this a WSUD officer position was created within Engineering Services (2012-2014) to develop capacity within BCC and to design and maintain WSUD infrastructure. Water quality (TN, TP and TSS), potable water and stormwater harvesting targets were set through the BCC's Sustainable Water Strategy. At the same time an Integrated Water Management Committee was formed to ensure all departments involved in the asset lifecycle (from design to construction and maintenance) were part of ongoing discussion.

Implementation included training programs delivered to staff across urban design, engineering, parks, roads, risk management, environment and asset services to make people aware of the reason for GI. Also, risk management were interested in the risks they presented to Council and how these could be managed. Once comfortable that the risks were manageable, GI began to be integrated into conventional processes. Separate budgets were created within the Parks operational budget to maintain new WSUD assets. In 2015/16 BCC delivered 15 streetscape raingardens (adding to the existing 75). Once installed, a maintenance check list is uploaded to an asset register. Maintenance crews get an email notifying them of timing to visit those assets. There is a follow up to check if that's occurred.

The **outcome** is that today there is an agreed understanding of the design and maintenance standards for these assets and how these assets support stormwater quality and greening objectives. The asset management team have ensured that there is a transparent process for tracking GI assets within asset registers to ensure maintenance and inspection and ongoing lifecycle costs are planned.

Asset management process....



What we learned:

Everyone has their role to play in getting the process to this point. In this case the initial WSUD officer and then IWM committee drove the process. Interestingly, the risk management team were instrumental in driving the process as they sought to understand the risk profile of GI.

Across department trust is critical. In this case trust was established through initial cross departmental training and engagement where the strategic reason for GI was shared and understood.

Summary:

One of the main barriers to GI adoption are the processes and budgets for asset maintenance.

The Brimbank model illustrates that broad and early communication and transparent processes enables GI to be 'mainstreamed' along with grey assets that are maintained according to similar principles.

APPERLEY ST WETLAND – GREENING RESIDENTIAL LANDSCAPES

Introduction

This case study was written under the City of Yarra's Green Infrastructure toolkit project.

The project: Apperley St involves the greening of a high density residential street through the installation of an ephemeral wetland.

The case study: How successful green infrastructure projects can be integrated into the existing urban landscape to improve urban amenity, stormwater quality and the performance of downstream assets.



The project

The **scope** of the Apperley St project began with the aim of protecting the downstream Edinburgh Gardens stormwater harvesting (SWH) scheme. The scheme had been receiving greater than expected sediment loads (in excess of design specifications) and an intervention solution was required to reduce sediment loads downstream and trap gross pollutants. Additional project benefits included improving streetscape amenity and adding greening along a popular shared path.

The **solution** was led by the Asset management (water) who planned the project to install an 'ephemeral wetland' in Apperley St, Fitzroy North. The wetland is integrated into a dense urbanised street and is designed to hold back stormwater flows, retaining gross pollutants and reducing sediment loads going downstream as well as greening the local streetscape.

Implementation Construction of this asset went relatively smoothly, other than issues with moving existing underground assets that was not unexpected.

The **outcome** of the process of constructing Apperley St is that the departments involved: asset management, engineering services and open space planting, better understands why GI is installed and its design, construction and maintenance requirements. The maintenance requirements for this asset are tracked with budgets allocated. It takes about 1 hour a month to maintain with heavier maintenance required twice a year. Litter removal varies from ~ 2000L initially to 50L then 100L. After some initial resistance to the project, Apperley St has become a popular example of a small scale GI asset within Council and surrounding residents. The plants have established well and an effective and utilised space has been created where previously there wasn't one.

What we learned:

Good design can incorporate GI into limited spaces and achieve multiple objectives. If the asset was built again, Council would include a maintenance path to provide easier access. Currently maintenance is via raking and shovelling. A learning from the Cremorne St case study: when standing water was observed by a passer by, there was a more measured response to the potential risk with more appropriate less intensive fencing installed.

Summary: *This example of GI is an example of successful function and design. It is noticed by external landscape architects and engineers and is a good example of GI within the City of Yarra.*



CREMORNE ST RAINGARDENS – GREENING INDUSTRIAL LANDSCAPES

Introduction

This case study was written under the City of Yarra's Green Infrastructure toolkit project.

The project: The Cremorne Street bioretention assets are some of the earliest examples of green infrastructure within Melbourne and the City of Yarra having been installed in 2003/04.

The case study: Looks at early issues associated with installing GI and the long term performance of the Cremorne St water sensitive urban design (WSUD) assets.



The project

The **scope** of the Cremorne St project was to install raingardens to treat stormwater within a highly urbanised landscape. The project aimed to trap and remove sediment, litter, nutrients and other pollutants before they flowed into the Yarra River. At the time roadworks in Cremorne St meant that the City of Yarra had an opportunity to reimagine the urban streetscape.

The **solution** was to install bio-filtration assets within traffic outstands. Sub-surface filter media infiltrated stormwater that then flowed to slotted pipes before being discharged to the conventional drainage system. The bio filtration assets were planted with approximately three thousand plants and about thirty street trees, greening the streetscape and providing shade. The project was an early example of collaboration between Council's roads, drainage engineers and landscape architects and is viewed as highly successful, winning Stormwater Victoria's innovation award in 2004.

There were some **implementation** issues that reflected the innovative nature of the project. These were addressed during subsequent reinstatement activities. For example, in 2008 work was done to raise pit levels and repair the concrete finish. At this time ~60% of the plants were replaced and 150mm of silt scraped away. In 2016 there was a reinstatement of media and plants. Prior to this the assets were functioning well as litter traps. The assets require 3-5 hours of maintenance a month that is relatively time consuming, with approximately 2000 L of litter removed from them each month. Initially there was a perceived risk associated with the drop associated with the bluestone kerbing. The response was relatively conservative, creating fencing and bollards that in turn created maintenance requirements.

The **outcome** is that approximately 90% of runoff from the surrounding catchment is treated before reaching the Yarra. The assets were recently replanted (2016), and during reinstatement local residents expressed 'ownership' and pride in the assets, and were positive about how they have influenced streetscape amenity, which is viewed by Council as a positive community response and outcome.

What we learned:

Over time more experience has meant that contractors understand and can execute the design principles of GI and WSUD more consistently. The fencing and bollards installed were a response to a perceived risk and it is likely that the response would be less conservative today (see the Apperley St case study) requiring less maintenance. The community like and take pride in these assets providing positive reinforcement for Council.

Summary:

The Cremorne St raingardens are a pioneering example of streetscape GI that fulfilled stormwater treatment and amenity objectives and continue to be valued by their community today.



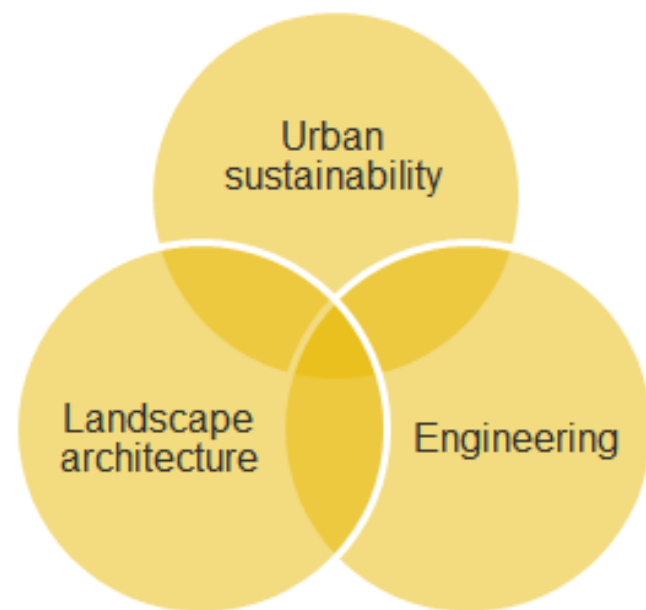
DRIVING CHANGE – THE GI CO-ORDINATOR

Introduction

This case study was written under the City of Yarra's Green Infrastructure (GI) toolkit project.

The project: Driving Change is less about a physical project and more about a critical ingredient of getting GI projects into the ground.

The case study highlights the importance of individuals and co-ordinating roles within organisations that drive the implementation of GI.



The project

The **scope** of his case study was to examine the role and influence of individuals who co-ordinate the delivery of GI. The case study highlights examples of these roles and the behaviours and experience of the individuals involved.

The **'solution'** in this context is the creation of a co-ordinating role, responsible for bringing together the elements to deliver GI. A key reference for this case study was the 'Urban Sustainability' team at the City of Melbourne (CoM) who created a role to co-ordinate and deliver the 10 year 'Climate adaptation for streetscapes' program, that identifies streets that could be improved via GI. A number of things are unique about this role: 1) the role focusses on a program' rather than projects – this defines the pipeline of works and associated budgets 2) there is flexibility within the program to take advantage of opportunities as they arise 3) the role sits outside of the engineering and landscape architecture (LA) teams, focusing on co-ordinating the two teams as they deliver the program.

Implementation: At the CoM the co-ordinator has moved from a career in engineering, becoming a bridge between engineering and LA. The role relies on relationships built on trust and technical understanding with an ability to collaborate. In practice GI opportunities are identified (often in underutilised public space), by the co-ordinator as well as the engineering and LA teams. LA develop concepts based on agreed engineering standards. Internal consultation and review precedes joint sign off between LA and engineering. In the event that an innovative method is proposed, the co-ordinator drives the effort to present evidence and / or to create the space for a trial or pilot project to evaluate new ideas. Effective co-ordinators require support at Councillor, executive and management levels as well as endorsed strategies to legitimise and guide the program of works. "We've all got good ideas, it's about making them happen". This quote summed up a culture of implementation and innovation that has been enabled in part by the champion role.

The **outcome** of the evolution of the role of the GI co-ordinator is a shared understanding of the purpose of GI, shared design standards and performance expectations with ongoing improvement in GI design and delivery. There is now experience and confidence at each stage of the design to delivery process, including contracting. Positive feedback from the community helps to create a positive feedback loop. The program, rather than project budget gives confidence in the delivery of GI over time.

What we learned:

Co-ordinators fill a critical role of bringing people together in the shared space of GI. They don't go it alone and require Councillor, executive, management and strategic support.

A shared technical understanding of the design challenges of GI is a significant advantage as the co-ordinator can meet engineers or LAs 'where they are'. That is they understand their issues and can guide solutions. They can also present opportunities to people, engaging them on a level that is appropriate e.g. 'we have a design challenge', or 'we have a landscape architecture challenge'

The program rather than project approach supports a more confident and approach to delivering on GI related strategy targets. Every project is an opportunity to collaborate and improve design standards

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EDWARD AND UNION ST, BRUNSWICK – COMMUNITY LED MAINTENANCE

Introduction

This case study was written under the City of Yarra's Green Infrastructure toolkit project.

The project: Edward St (Brunswick East) and Union St, Brunswick

The case study: A community led approach to greening streets and the ongoing maintenance of green infrastructure. There are lessons in the way Council interact with and support these groups.

The project

Scope: the journey of two community groups leading an approach to the design, planting and maintenance of green infrastructure in established areas. The first group are the "Friends of Edward St" in Brunswick East and Brunswick in inner Melbourne has a small reserve on both sides of the road. The **solution** was to create a greener, more native road reserve, and to ultimately create a green link between Merri Creek and Moonee Ponds Creek. The group coordinate events providing labour to weed, plant and maintain the nature reserve. The other group is the Brunswick Communities for Nature (BCFN). BCFN was established to continue Adopt-a-Tree and Moreland Energy Foundation's "Communities for Nature" project to create a biodiversity corridor from Merri Creek to Moonee Ponds Creek through converting grassed nature strips into native gardens. The group has defined its own preparation method, propagates plants, and uses email groups, Facebook, mailbox drops and local newsletters to share news.

The outcome: streets are greener, with more native vegetation and collectively these groups have shown how a group of passionate individuals can come together to build a community network and maintain sections of green infrastructure. The maintenance of these garden beds isn't without issues, as Council still has a role to play and there is uncertainty regarding the standard these areas need to be maintained to. The council has supported these groups in several ways: developing Nature Strip Beautification Guidelines; supplying mulch and plants for various events; and advertising the events through their own publications and newsletters.

What we learned

Communities can participate and be a valuable resource to convert nature strips into native gardens.

There is no one model for community groups to play a role. Their drivers, structure, capacity, skills, interests, and available time will vary from group to group.

Council can support these groups in a variety of ways, but must update their processes and guidelines to help the groups with the long term maintenance of green infrastructure.

Summary

Community groups and Council can work together to establish and maintain GI projects. The project transfers stewardship of the environment to the community, creating habitat and community relationships through better use of open space.



Brunswick Communities for Nature - FB: <https://www.facebook.com/BrunswickC4N>
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HALL ST, BRUNSWICK – COMMUNITY LED DESIGN

Introduction

This case study was written under the City of Yarra's Green Infrastructure toolkit project.

The project: The introduction of nature strips and raingardens in Hall St (Brunswick) with community support and reducing grey infrastructure.

The case study: Bringing back nature strips, and ensuring that maintenance is factored into this new streetscape, and saving budget through managing stormwater at the surface.

The project

The Capital Works Team at Moreland City Council were completing a streetscape upgrade (including resheeting of the road, repaving of footpaths and upgraded drainage) in Hall Street, Brunswick. They identified that the 180 metres long street had no nature strip and the majority of the community was supportive of a nature strip. As part of the project it was possible to introduce street trees, WSUD and nature strips into this built up area. These actions were consistent with Council's Watermap and Open Space Strategy (and soon to be completed Urban Forest Strategy).

The **solution** was to plant grass (kikuya and fescue) along both sides of the footpath (1 metre wide), design and construct two raingardens. 12 new Callistemon Salignus (a small tree of about 7-8 metres high with soft, pendulous foliage and papery bark) were planted: some in raingardens, some to replace existing trees and some new. The method of connecting drainage from the legal point of discharges to the raingardens has reduced the cost of laying more underground drainage, thereby saving budget on the project.

The **outcome** was a whole new streetscape with majority community support. In one instance, a new resident, raised concerns with Council about the maintenance regime of the nature strip (in the context that no grass would require zero maintenance from a resident). This highlights why the maintenance regime for new green infrastructure is important.



What we learned

This was a good example of community led design, where Council has demonstrated flexibility and a willingness to listen to the community...

Raingardens, strategically placed, were able to save the Council budget through the avoidance of more underground drainage.

A maintenance schedule is important to mitigate against residential complaints and ensure the Council is able to fall back on that program.

Summary

Reintroducing nature strips is important part of green infrastructure solutions, as is a clear maintenance regime to allay any community concerns.



NORRIS ST, COBURG – SIMPLIFYING THE MAINTENANCE TO ONE SITE

Introduction

This case study was written under the City of Yarra's Green Infrastructure toolkit project.

The project: Norris St, Coburg North involved a street renewal and use of raingarden to filter stormwater and improve maintenance access.

The case study: This is a case study in how to manage stormwater in the kerb (rather than underground) when levels are very flat, and how to reduce maintenance costs by filtering all stormwater in a single place



The project

The **vision** for this streetscape upgrade was to cost effectively widen (700mm) the street and manage drainage issues in this residential area in Coburg North. The street needed to be widened to allow better access of vehicles to the industrial properties. This project enabled Council's capital delivery team to use a raingarden to capture flow while still meeting the needs of the industrial properties in the street.

The **solution** for this street, with approximately 40 houses, was a complete reconstruction of the road, draining the legal point of discharge to the curb, and then allowing that water to flow along the gutter to a raingarden at the southern end of the street. The raingarden is approximately 20 m², with an overflow to a bluestone open channel along VicTrack land. Litter and pollutants used to collect along the channel, but are now retained within the raingarden. Flat levels has made it difficult to ensure the raingarden operates as designed.

The **outcome**. The inlets to the street and the pavement works have been completed to specification and are considered a success. There have been some issues with the raingarden, with concerns about the ability of the raingarden to drain properly and support the appropriate species. One option is to use gravel media, tree species and groundcover species that will survive in a low carbon / nutrient soil media.

What we learned

How to manage stormwater in the kerb in flat terrain. Also how to reduce maintenance costs by filtering all stormwater in a single place, concentrating maintenance into a single area.

The drainage levels are important in managing streets where all stormwater runs along the gutter, as opposed underground drainage.

Summary

Green infrastructure in a mixed use industrial and residential area has benefits in adding greenery to the location, and improving maintenance and stormwater quality.

Further work is required to optimise the operation of the raingarden to satisfy council and community concerns.



FLINDERS ST, MELBOURNE – STRUCTURAL SOILS & STREET TREES

Introduction

This case study was written under the City of Yarra's Green Infrastructure toolkit project. **The site:** Flinders St, between Russell and Exhibition St.

The case study: This project delivers stormwater management, improved tree growing conditions, removes the conflict between the trees and parked cars (previously planted in the road) and a change of species with increased resilience as London Planes represent 70% of the tree population within the CBD area.



The project

The **scope** of the works was to upgrade the footpath, replace existing London Plane trees and to test the use of a linear trench of structural soils. Ongoing engagement with Yarra Trams enabled the work to commence with the upgrade of the adjacent Yarra Trams super stop. The project manager ensured the schedule was communicated to all parties so everyone was clear on what was happening and when.

The **solution** involved two stages: Stage 1 involved the old trees being removed (due primarily due to poor structural condition) with an extension of the footpath and realignment of the kerb. Stage 2: structural soils and trees were installed. The structural soils were approximately 1.2 metres wide and 800 mm deep. An drain at the base of the trench allows for free drainage of the soils. Stormwater enters the trench through smart soaker pits (with an inlet screen). 17 native Lemon Scented Gums were planted (Corymbia citriodora) along the southern side of the road with an irrigation system. Minor issues: ideally the irrigation control system would be underground but City West Water insisted it be above ground. Also after completion another utility dug up the new footpath.

The **outcome:** While City of Melbourne hasn't monitored or evaluated the solution from a technical perspective, the project is a success and one that can be replicated within the City of Melbourne. The trees have doubled in size in 12 months and have not been subject to the same level of vandalism as other projects. Good design and communication were keys to this success.

What we learned

The need to communicate early and often with other utilities like Yarra Trams to plan together to deliver GI.

Lemon Scented Gums have adapted well to this partially shaded and well drained site, and located around other infrastructure delivers a significant increase in canopy cover.

That a linear system of structural soils enables a more flexible approach to where the stormwater inlet grates are located, and maintenance is concentrated to those pits.

Summary

Linear trench of structural soils, relying on stormwater as main water source with irrigation backup, delivers great tree canopy.



GODFREY STREET, MELBOURNE – GREEN INFRASTRUCTURE ACTIVATION

Introduction

This case study was written under the City of Yarra's Green Infrastructure toolkit project.

The project: Godfrey Street (between Bourke St and Little Collins St) involves the introduction of trees and passive watering into a built up space in the Melbourne CBD.

The case study: This is a good case study in using green infrastructure to reinvigorate underutilised space to assist in the redevelopment process.



The project

The **scope** of the works was to activate and green a dormant area of the city. The project was a collaboration between the Urban Landscape team and Engineering teams.

The solution: In 2010 heat mapping showed Godfrey St as a hotspot. The response involved greenery growing alongside the façade of a building (not technically a green wall), and four street trees in the extended footpath area. The concept originally looked at introducing additional passively irrigated trees in the southern section of the footpath and road, (near Little Collins Street), but this didn't proceed. The trees are Zelkova Serrata 'Green Vase' and the climbers, next to the Donkey House, are Mexican Blood Trumpet Vine and Creeping Fig. The other plants are Dianella and Rosemary.

Rainwater is now collected from the roof of a Godfrey Street building and diverted into a trench of structural cells beneath the footpath. This allows rainwater to passively irrigate trees. Rainwater is also diverted to a new garden bed at the southern end of the street. A green façade was included in the streetscape design that grows up the side of the Donkey Wheel House building from a garden bed at the base of the wall. The garden bed increases the permeability of the footpath. Once fully grown, the green façade will provide additional cooling in the street while the owners of the adjacent café maintain the garden bed, and also use it to grow herbs. The space was widened but the activation has been inhibited as motorcycle riders see it as a perfect place to park, thereby crowding the footpath out.

The outcome. This site is to be redeveloped and the City believes the greening and activation is partly responsible for this result. has been made possible partly through this activation project. This reinforces the value of green infrastructure, as the developer clearly sees value in using it to enhance the public space near their development.

What we learned

That green infrastructure cools urban hotspots and can contribute to reactivating spaces within the CBD. Activation has the potential to also attract unplanned uses, in this case motorcycles.

Summary

Green infrastructure contributes to activation of spaces and increase the chances of developers proceeding with works.

This can be replicated by identifying hotspot that are in activity areas and looking for similar design solutions.

