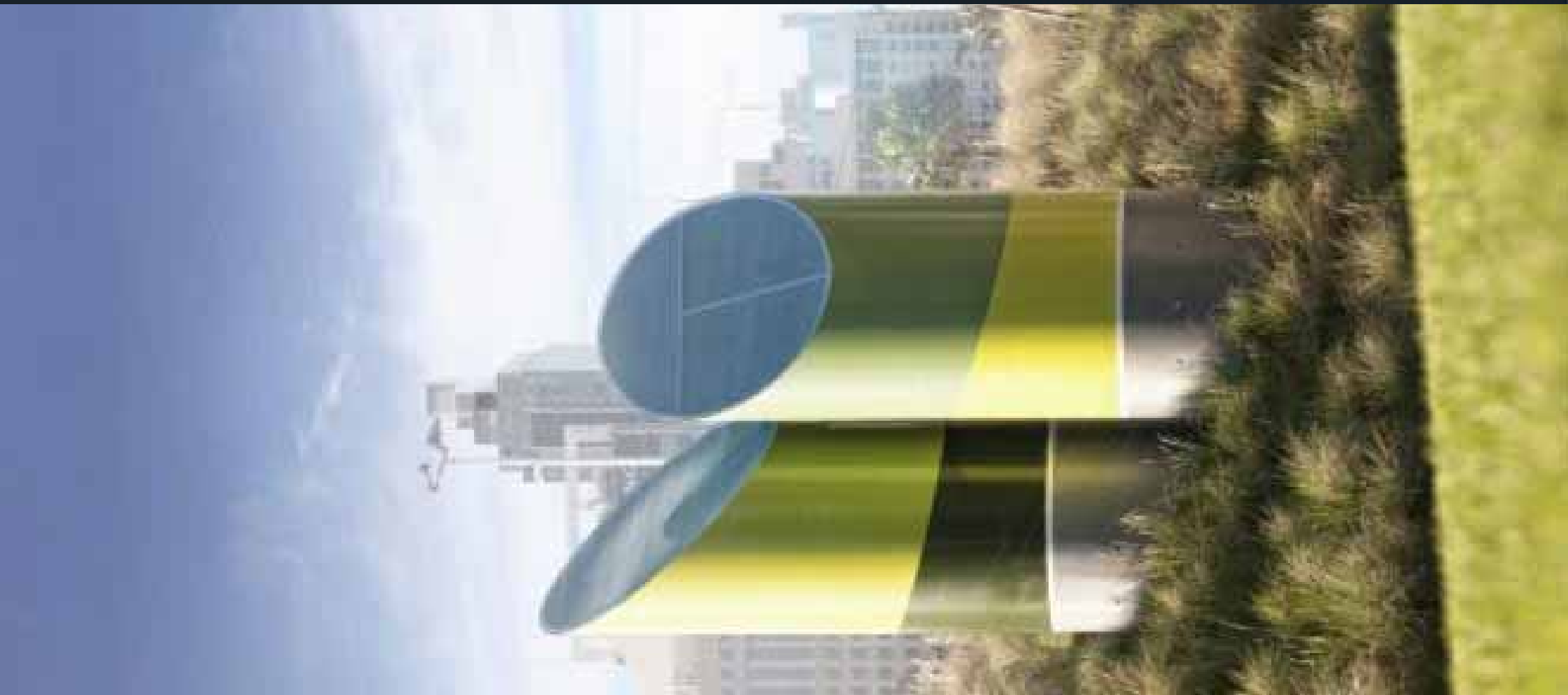
Green Roofs and Walls Policy Implementation Plan



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Images
Front cover: Prince Alfred Park pool green roof
City of Sydney

Unless stated, all images are by Lucy Sharman – the City of Sydney's Senior Project Officer Green Roofs and Walls.

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Executive summary

Green Roofs and Walls have been part of the City landscape since the 1930's. Much has changed in the last eighty years as the City of Sydney has evolved into an urbanised and global city.

With the residential population set to increase by 40% by 2030 and as we continue to experience the effects of a changing climate, greater demands will be placed on the City's infrastructure and green spaces. With these demands comes the need to use our city spaces creatively, so we can continue to provide a welcoming, healthy and vibrant city.

The City of Sydney recognises the many benefits green roofs and walls can provide our city and is committed to supporting green roofs and walls to enhance climate change resilience and the adaptive capacity of the built environment.

Green Roofs and Walls Policy

In 2014 Council adopted the Green Roofs and Walls Policy, with the aim of the policy being to increase the number of high quality green roofs and walls in the City of Sydney.

The Policy was developed after analysis of community and industry perceptions, reviewing international policies and programs, giving consideration to current development and industry drivers, as well as public consultation and feedback.

Policy Objectives

The City Of Sydney will support the growth of quality green roofs and walls through:

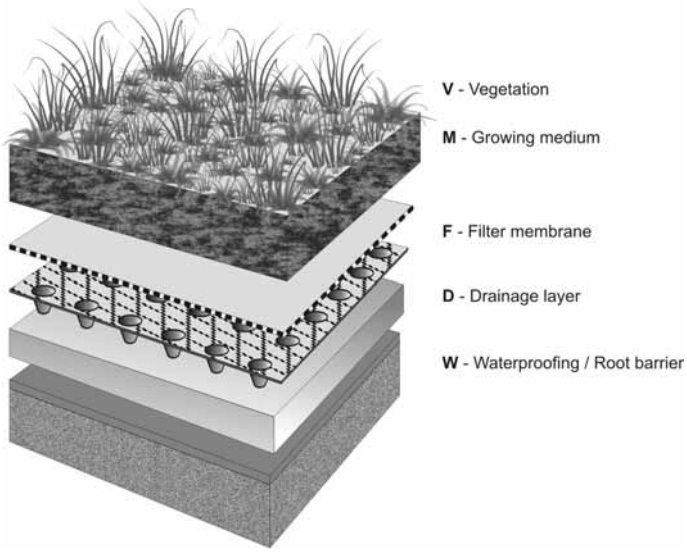
1. **Providing leadership in supporting the development of green roofs and walls;**
2. **Addressing barriers to the adoption of green roof and wall technology;**
3. **Supporting sustainable design through research, education, guidelines and standards;**
4. **Collaborating with community, industry and other stakeholders;**
5. **Informing and educating the community about green roofs and walls;**
6. **Supporting local, practical research;**
7. **Supporting the recognition of green roofs and walls in existing planning systems and rating tools;**
8. **Installing green roofs and walls on Council properties; and**
9. **Monitoring, evaluating and reporting on progress.**

Taking Action

The Green Roofs and Walls Policy sets out the objectives for the City of Sydney. The Implementation Plan sets out the context and background for the policy as well as the specific actions Council will take to ensure the policy is effectively implemented. As well as broadly addressing each policy area, the Policy Implementation Plan also has a detailed list of actions and timeframes provided at Appendix A.

Introduction

Incorporating plants into building design creates a city that is more beautiful, liveable and resilient to a changing climate. The Green Roofs and Walls Policy Implementation Plan provides information on the progress of green roofs and walls globally and in Sydney. It outlines how the City of Sydney intends to implement its Green Roofs and Walls Policy and work with partners and stakeholders to support an increase in the number of high quality green roofs and walls in our local government area.



Typical green roof profile

Definitions

Green Roofs

There are many different types of green roofs. Typically they include layers of waterproofing, drainage, soil and plants. They can be constructed either in modules or in 'loose lay'. Modular designs have all the layers pre planted in light weight plastic boxes which clip together on the roof. A loose lay design is where the full available area of the roof is covered with layers of soil and plants.

Green roofs can be shallow (150mm or less) lighter weight constructions called 'extensive' green roofs. Green roofs with deeper soil (greater than 150mm) are called 'intensive' green roofs. These are typically more complex landscapes on roofs that are engineered to take heavier loads.

The City recognises that significant planter box landscaping on roofs and podiums can also provide benefits to the building and surrounding environment. In order to provide environmental benefit, the vegetation must cover a minimum 30% of the available roof space in order to be considered a 'green roof' by Council.

The majority of green roofs in Sydney are a mix of intensive (deep) and extensive (shallow) plantings. A good local example is M Central at Ultimo. Deep and shallow landscapes are combined with water features, barbecues and pathways to create a beautiful open parkland area for residents and visitors.

M-Central – Green Roof - Ultimo

Green Walls

There are two main types of green walls – *green façades* and *living walls*.

i) Green façades

These are simple systems where plants are grown directly into soil and trained up a frame or trellis system to cover the wall. Plants can be grown directly in the ground, or in containers or planter boxes installed on the ground or at intervals on the wall. A typical example is the Cumberland Street wall pictured below, which covers the access to the Sydney Harbour Bridge.

Cumberland Street – The Rocks

ii) Living walls

Living walls are more complex systems where panels or pockets are fixed directly to the wall and plants grown in the pockets. These systems often use very little soil to minimise the weight load on the walls. Instead plants are fed through nutrients in the irrigation water. One of the best local examples is the 1,100 square metre series of living wall panels on the Central Park development on Broadway. Similar systems are installed in the Patagonia store in Bathurst Street, (indoor).

Indoor green wall - Patagonia store

1 Central Park - Broadway

Benefits

Green roofs and green walls are one of the few building technologies that provide multiple social, environmental and economic benefits. They are used around the world as an important climate change adaptation tool.

The City of Sydney recognises the significant benefits green roofs and walls can provide our city. Incorporating plants into building design creates a city that is more beautiful, liveable and resilient to a changing climate.

The former Readers Digest building – Surry Hills

Air quality	Greenery on roofs and walls helps remove harmful pollutants from the air, keeping city air cleaner and healthier. They can also improve air quality inside the building.
Beauty	Green roofs and walls are beautiful. They can turn a drab wall or bitumen roof into a striking building feature.
Biodiversity	Green roofs and walls provide space for insects, reptiles and bird life to find water, food and shelter. Biodiversity is vital for a healthy urban environment.
Health	The human need to be around living plants is called 'biophillia'. There are numerous studies showing the physical and mental health benefits human beings experience from being in and around growing plants.
Insulation	Green roofs and walls insulate buildings, reducing reliance on active heating and cooling and reducing energy consumption.
Noise	Green roofs and walls insulate the building from outside noise, creating a quieter, more peaceful indoor environment.
Space	With green roofs and walls, previously unused space can be turned into valuable space for recreation, growing food, gardening etc.
Roof life	Green roofs have been proven to extend the life of a roof by up to 40 years. The green roof limits the roofs exposure to sun and weather. It keeps roof temperatures more even and minimises expansion and contraction from temperature changes.
Solar panels	Green roofs improve the efficiency of solar panels by keeping the surrounding temperature at an optimum level for solar panel efficiency.
Urban Heat Island Effect	Heat from the sun is absorbed by hard surfaces and re-radiated out into the environment, leading to higher city temperatures. Green roofs and walls lower this Urban Heat Island effect, making the city a more comfortable place to be.
Water	Green roofs slow and clean the rainwater run-off from buildings, helping waterways by reducing run-off and water pollution.

International experience

Dozens of cities around the world actively support the installation of green roofs and walls through:

- Direct financial incentives such as grants and subsidies;
- Indirect financial incentives such as fee reductions and floor space density bonuses;
- Regulations and standards that encourage or mandate green roof installations; and
- Intangible incentives – by far the most common form of support. Examples include research, education and training, technical guidelines and awards programs.

Green roofs and walls are encouraged globally because they are one of the few technologies that combat a range of social, health and environmental issues. Green roofs and walls are commonly used because they:

- Provide valuable open space in built up cities – e.g. Austria, New York
- Improve air quality – e.g. China, Singapore
- Prevent waterway pollution – e.g. Toronto, British Colombia, Germany; and
- Create a more climate change resilient city – e.g. Copenhagen, Switzerland.

The most effective programs internationally have included significant education and engagement programs. Cities that now enjoy high rates of green roof installations (greater than 20% of all roof space) have provided support over many years at national, regional and local levels.

International examples

Copenhagen	Copenhagen has set targets to be carbon neutral by 2050 and sees green roofs as a key tool to achieve this target. All new roofs of less than 30 degree pitch are required to be green roofs in Copenhagen.
Germany	First country to develop national green roof standards in the 1970's. Green roofs are supported at a national, regional and local level. More than 80 German cities offer green roof incentive programs. More than 15% of all roofs in Germany are green roofs (around 1 billion square metres).
Linz Austria	Experienced rapid industrialisation in the late 70's which led to a loss of open space and air quality issues. City policies introduced in 1985 led to significant green roof installations. Linz now has more than 15% of all roofs as green roofs.
New York	South Bronx had asthma rates seven times the national average and high rates of diesel pollution. The city funded demonstration green roof projects, low interest and revolving loans to support green roofs in The Bronx.
Toronto	Has supported green roofs with technical guidelines, workshops, demonstration sites, grants and subsidies. In 2009 Toronto City Council bought in a mandatory green roofs by law for all developments over 2,000 square metres. Prior to the by law Toronto had around 36,000 square metres of green roofs. In the few years since the bylaw was introduced, more than 170,000 square metres of green roofs are planned or under construction.

Punggol Singapore Green Roof
Photo: Elmich

City of Sydney

The City of Sydney local government area covers around 26 square kilometres. It is home to more than 180,000 residents, nearly 400,000 jobs and leading commercial, educational and cultural facilities. When the workforce and visitor numbers are combined with residents and hotel guests the local area hosts around one million people each day. Projected population increases to 252,000 residents by 2030 will place increasing demands on the City's buildings, infrastructure, open and green spaces.

Green Roofs and Walls in the City

By March 2014, the City of Sydney had recorded more than 98,000m² of green roofs and walls installed in the local government area. Many of these sites are able to be viewed by the public. For a full listing see Appendix B.

Currently Council is receiving on average one new development application a week which includes a green roof or green wall. This is an impressive number, however, there are still many opportunities to expand the use of green roofs and walls in Sydney.

Currently green roofs equate to less than 1% of the total roof space available in the City of Sydney. Analysis conducted by the University of New South Wales confirmed that around 18% of roofs in the central business district of Sydney may be able to be retrofitted to include a green roof.

Policy context

Sustainable Sydney 2030

The City of Sydney has consulted widely with the community in the development of Sustainable Sydney 2030. This comprehensive plan sets ambitious targets that confirm the City Of Sydney as a Green, Global and Connected City.

As part of the Council's commitment to green Sydney, a range of strategies and plans have been developed to increase green cover in the local government area. The Green Roofs and Walls Policy Implementation Plan also supports the objectives of the:

- Greening Sydney Plan;
- Urban Ecology Strategy;
- Urban Forest Strategy; and
- Decentralised Water Master Plan.

Green roofs and walls are listed in each of these plans and strategies as tools that support the objectives of Sustainable Sydney 2030. Green roofs and walls can be used to provide habitat for biodiversity, clean and slow stormwater and increase the City's canopy cover.

Sustainable Sydney 2030 and the strategies and plans listed above are all available on the City's website at www.cityofsydney.nsw.gov.au

Policy objectives

Key objectives

The intention of the City of Sydney is to work with our community, industry, building owners and other stakeholders, to advance the use of green roofs and walls in the City Of Sydney. Council will support the installation of quality green roofs and walls through:

1. **Providing leadership in supporting the development of green roofs and walls;**
2. **Addressing barriers to the adoption of green roof and wall technology;**
3. **Supporting sustainable design through research, education, guidelines and standards;**
4. **Collaborating with community, industry and other stakeholders;**
5. **Informing and educating the community about green roofs and walls;**
6. **Supporting local, practical research;**
7. **Supporting the recognition of green roofs and walls in existing planning systems and rating tools;**
8. **Installing green roofs and walls on Council properties; and**
9. **Monitoring, evaluating and reporting on progress.**

Listed below are each of the Policy objectives, with information on how the City has and will progress each policy area.

A more detailed list of actions and timeframes for implementing the policy is provided at Appendix A.

1 Bligh Street – Sydney central business district

> Wisdom demands a new orientation of science and technology towards the organic, the gentle, the elegant and the beautiful.
>
> E. F. Schumacher

Leadership

The City Of Sydney Council has taken a leadership role in the development of green roofs and walls in the local government area. A table of the City's most recent achievements is provided below.

The City of Sydney has an ethos of not only supporting important environmental, cultural and social sustainability initiatives, but also in sharing our experience and information with others.

The City will continue to take an active leadership role in the development of green roofs and walls in Sydney and nationally through the development and adoption of a Green Roofs and Walls Policy and through the actions provided in this Implementation Plan.

Beare Park amenities block, Elizabeth Bay

Date	Action
2008	Installed green roof and walls in Beare Park
2010	Commissioned the Green Roof Design Resource Manual.
2011	Commissioned the University of New South Wales to inventory green roof and wall sites in the local government area.
2012	Endorsed the Greening Sydney Plan which includes green roofs and walls as a tool for increasing urban greening.
2012	Adopted the Green Roofs and Wall Strategy.
2012	Conducted research to establish the hardiest combination of native plants for the green roof at Prince Alfred Park.
2012	Established the Green Roofs and Walls Technical Advisory Panel to provide expert advice on advancing green roofs and walls.
2012	Commissioned the Green Roofs and Walls Perception Study which highlighted community support and the barriers to green roof and wall installations.
2012	Commenced Green Wall trials on the Goulburn Street Car Park.
2013	Provided funding for Urban Rooftop Agriculture research at the University of Technology Sydney, Faculty of Design and Built Environment.
2013	Provided funding to the University of Technology Sydney, Institute for Sustainable Futures, to research the impacts of urban greening on indoor and outdoor air quality.
2013	Partnered with the Cooperative Research Centre for Low Carbon Living to investigate the benefits of green roofs and walls on minimising the Urban Heat Island effect.
2013	Opened the 2,000 square metre green roof meadowland on the Prince Alfred Park Pool
2013	Promoted the benefits of green roofs and walls through presentations and workshops to more than 1000 residents and stakeholders.
2014	Adopted the Green Roofs and Walls Policy. The first of its kind in Australia.

Commenced and planned activities
Develop planning controls to support the establishment of green roofs and walls on new developments.
Support research into the social and environmental benefits of green roofs and walls.
Continue to install green roofs and walls on appropriate Council facilities.
Investigate potential incentives to promote the advancement of green roofs and walls in the City Of Sydney.
Conduct regular presentations, workshops and information sessions for residents and businesses to advance understanding and acceptance of green roof and green wall technology.
Advocate for national green roof and green wall standards.
Establish a local council green roofs and walls networking forum.
Help to establish a roof top agriculture network.

Four Seasons Hotel – Pool side green wall

Addressing Barriers

In 2012 the City commissioned the *Green Roofs and Walls Perception Study*. The study detailed a number of factors which are acting as significant barriers to the adoption of green roof and wall technology in Australia. These were confirmed through discussions with the City's Technical Advisory Panel and industry representatives. Removing or minimising these barriers is an important focus for the City of Sydney.

Many of the existing barriers relate to gaps in technical and general information. The City will fill these gaps by working with industry and research bodies to better articulate the benefits and costs of green roofs and walls – as well as expand general knowledge of the technology through information sharing, skills training, education programs and technical support.

Cost Barriers

A key barrier to installing a green roof or wall is the lack of concise information about the costs associated with the design, installation and maintenance of green roofs and walls and the benefits they provide. The City will develop easy to use guides for industry and the community on different green roof and wall designs, as well as indicative costs for installation and maintenance.

Research being conducted (see below) will also help clarify the specific environmental, social and economic benefits of green roofs and walls as an important comparison to the overall costs.

Technical issues

Waterproofing

Waterproofing is still a concern for some building owners. There is significant evidence that green roofs extend the life of a roof by reducing exposure of the water proofing layer to sun and weather. In order to counter the perception of water proofing issues, the City will develop technical guidelines and advice to support building owners with information on the optimum water proofing and installation techniques.

Species selection

Selecting the right plant species for a green roof or wall was an issue raised through the Perception Study. There is a large amount of local knowledge on how specific plants function on green roofs and walls, although this information is often difficult to find. The City will develop guides on plant species that are most suited to different green roof and wall systems as well as to different climatic conditions. This includes providing information on species that will provide specific benefits e.g. cooling buildings or providing habitat for biodiversity.

Commenced and planned activities
Publish the results of research to improve understanding of the social and environmental benefits of green roofs and walls compared to costs.
Develop and publish a design guide series that provides information on different design specifications for green roofs and walls.
Develop technical guidelines including best practice guide to waterproofing.
Publish planting guidelines for different building environments and for different environmental outcomes.
Develop detailed case studies on existing and planned green roof and wall installations.
Develop a decision making tool to guide building owners through the process of designing, installing and maintaining a green roof or wall system.
Develop price guides for different types of green roofs and walls.

Sustainable Design

In order to maximise the benefits of green roofs and walls, their design, installation and maintenance need to take into consideration ecologically sustainable development theory and practice.

Green roofs and walls need to be designed to:

- minimise resource use;
- maximise recycled or reusable products in their construction and use;
- minimise water usage including incorporating sustainable water sources;
- maximise longevity through appropriate design and maintenance regimes; and
- minimise any potentially harmful impacts on the environment.

Council will support this objective through:

Research – including developing research projects to better understand the potential water and nutrient requirements of green roofs and walls and their potential run off loads to stormwater.

Design guides – develop design guides for green roofs and walls which encourage the minimisation of resource use and maximise positive environmental impacts.

Education – promote the sustainable design, installation and maintenance of green roofs and walls in Sydney through research, workshops, written information and presentations.

Collaboration & Engagement

The City of Sydney has a proud history of providing opportunities for partnerships, collaboration and engagement. The core strategic document for the City (Sustainable Sydney 2030) is based on extensive consultation and engagement with our community and recognises the desire of our residents and businesses to be part of a Green, Global and Connected city.

The Green Roofs and Wall Policy was developed with valuable input from Council's Green Roofs and Walls Technical Advisory Panel made up of academics, architects, designers, installers and sustainability experts.

City staff also meet regularly with building owners, architects, academics, designers, green roof and wall suppliers and community members in order to understand issues, concerns and interest in green roofs and walls.

The Draft Green Roofs and Walls Policy and Implementation Plan were also placed on public exhibition and feedback integrated into the final documents.

The Green Roofs and Walls Policy and Implementation Plan are designed to be living documents. As the industry changes and develops the documents will be reviewed and feedback from stakeholders integrated into the City's activities.

Information & Education

Presentations will also be provided to stakeholders such as the green roofs and walls suppliers and installers, building owners and architects as well as local businesses and residents groups. Just as importantly, presentations and information will be provided to City of Sydney staff across different divisions to ensure the Policy is understood and implemented across Council.

Commenced and planned activities
Host the Green Roofs and Walls Technical Advisory Panel to provide direction and monitor the implementation of the Green Roofs and Walls Policy.
Meet regularly with key internal and external stakeholders to review progress and understand issues and opportunities.
Develop an annual stakeholder consultation and engagement plan in conjunction with Council's City Engagement staff, business, industry and community stakeholders.
Establish a rooftop agriculture networking group.
Actively participate in the City of Sydney Greening Sydney meetings and activities.

Macdonaldtown rail bridge – green facade

One of the issues with green roofs and walls is the difficulty in finding appropriate and reliable information. Council's objective is to ensure that relevant, high quality information is developed and made available to the City of Sydney community and more widely.

Council's website is regularly updated with useful information and includes a map of green roofs and walls in the local government area, including information on publically accessible sites. The City has run green roof and green wall workshops and a large forum on green roofs and walls as part of the Sydney Design Festival. Feedback from these activities will help to improve future activities.

The information and education activities provided are designed to ensure that appropriate programs are being offered to improve understanding of, and skill in, green roof and wall installations. The planned activities will provide information at a range of levels, from the simple through to the more technical.

Commenced and planned activities
Develop an annual program of green roof and green wall education programs including: ▪ Hold an annual forum on green roofs or walls; ▪ Host regular workshops each year; ▪ Produce step-by-step guide to planning and installing a green roof or green wall; and ▪ Publish fact sheet on green walls including a green roofs and walls growing food guide.
Present regularly to community, business and government groups and organisations on the benefits of green roofs and walls.
Publish and distribute new information on green roof and wall technology via the Green Village news and Council's website.
Design and publish a self-guided tour of publically accessible local sites.
Provide regular presentations to internal staff on the City's policy and strategies for green roofs and walls.
Regularly review and update the City's green roofs and walls webpage with new information.

Green roofs and walls forum Sydney Design Festival
Photo: Courtesy The Powerhouse Museum

Research

The environmental benefits of green roofs and walls and the way they function depends largely on the way they are designed and the specific environmental conditions of the site. For example a typically shallow green roof in Germany will not slow and clean stormwater in the same way that a deeply planted green roof will in Sydney.

If we are to develop a strong understanding of the benefits and costs of green roofs and walls, we need to understand how they function in Sydney's unique environment. What depths and types of soils retain stormwater? Which plant species thrive on shaded roofs? What foods can be grown on walls? Exactly how will a green roof or wall benefit a building and the surrounding environment? All of these questions and more are important to understand the full benefits green roofs and walls can provide a building as well as the broader city environment.

In late 2012 the City of Sydney investigated the gaps in local information on green roofs and walls. A Research Priority Plan was developed to direct the City's research efforts and address key gaps in our understanding of green roof and green wall technology. The Research Priority Plan is provided at Appendix C.

Consultation has also taken place with local universities and other potential research partners to develop relevant local and practical research.

The City has also already commissioned and completed green roofs and walls research. The most important of these is the *Green Roofs and Walls Perception Study*. Amongst other things, the study aimed to understand community recognition of green roofs and walls and their benefits, articulate the barriers to installing green roofs and walls and provide recommendations on the role the City of Sydney could play to advance use of green roofs and walls. Recommendations from this research have been integrated into the Green Roof and Walls Policy.

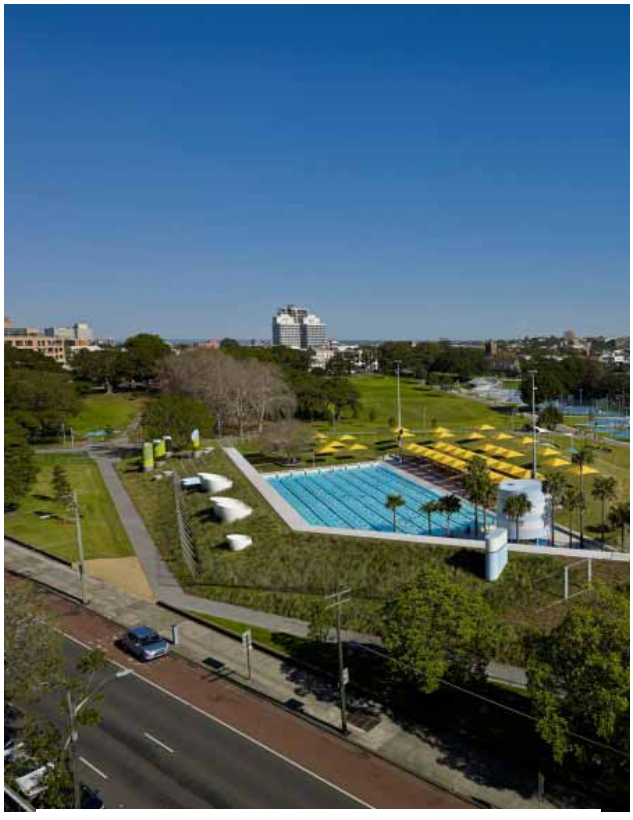
The City will continue to support research that meets the objectives set out in the Research Priorities Plan. Research results will be made available to the public and provided on our website in order to advance community understanding of the benefits of green roofs and walls.

Commenced and planned activities
Research Priorities Plan developed and reviewed annually.
Collaborate with the University of Technology Sydney's Institute for Sustainable Futures on the effects of Urban Greenery on Indoor and Outdoor Air Quality.
Collaborate with the University of Technology Sydney's – Design and Built Environment on Urban Roof top Agriculture.
Support green roof and wall research via the City's partnership with the Cooperative Research Centres – Low Carbon Living research program.
Support the Cooperative Research Centre for Low Carbon Living research on the impact of green roofs and walls on urban microclimates and the Urban Heat Island effect.
Work with local universities to establish green roof and wall research sites in line with the Research Priorities Plan.
Review existing green roofs and walls installed by the City of Sydney and develop detailed case studies reviewing their cost and benefits.
Publish results from the Goulburn Street Green Walls trial.

Council properties

The City of Sydney has led the way by installing and maintaining green roofs and walls on its own properties and in the public domain.

Currently the City has seven green roofs and five green walls that are owned by or under the care and control of the City. The City has won architectural awards for two of its green roof developments at the Surry Hills Library and the Prince Alfred Park Pool.



Prince Alfred Park Pool – 2,000m² green roof
Photo: Brett Boardman

Green Walls	Address
Beare Park	13 Esplanade, Elizabeth Bay
Goulburn Street car park	101 Goulburn Street
Macdonaldtown railway bridge	Macdonaldtown
Waterloo Youth Family and Community Centre	Waterloo
William Street Overpass	William Street

Green Roof	Address
Beare Park	13 Esplanade, Elizabeth Bay
Embarkation Park	71 Cowper Wharf Road
Lawrence Hargrave Park	9 Elizabeth Bay Road
Paddington Reservoir Gardens	251 Oxford Street
Prince Alfred Park pool	Prince Alfred Park
Surry Hills Library	Chalmers Street Surry Hills
The Domain	Prince Albert Road

Commenced and planned activities
Develop and publish detailed case studies of existing City green roofs and walls including key design considerations, site information and plant species.
Develop criteria to assess additional Council properties to determine which properties could be retrofitted to include a green roof or wall.
Develop building and site criteria to assist building owners to assess their own properties and determine their potential to be retrofitted for a green roof or wall.
Investigate the potential for Council owned sites to be the subject of future research programs in order to monitor and test their efficacy against a range of environmental outcomes such as stormwater and flood mitigation benefits, air quality, biodiversity etc.

Recognition in existing systems

There are existing systems and processes that can be used more effectively to support the expansion of green roofs and walls in Sydney.

The City supports green roofs and walls by including them in important strategic documents as well as encouraging their use via Development Control Plans. The City has included green roofs and walls in the general provisions of the Sydney Development Control Plan 2012 (DCP) as well as in specific DCP's for Green Square Town Centre and the Harold Park Development.

Apart from planning controls, there are also sustainability rating and assessment tools used nationally that could also be used more effectively to support green roof and wall development. These tools include the Green Star rating tools from the Green Building Council of Australia as well as NABERS (National Australian Built Environment Rating System), NatHERS (Nationwide House Energy Rating Scheme) and BASIX (Building Sustainability Index).

More information could be provided to building owners and urban precinct designers to better understand these rating tools and how green roofs and walls might apply to improve a buildings sustainability rating.

Research proving the environmental benefits of green roofs and walls in Sydney will be important in advancing the recognition of green roofs and walls within planning controls and rating systems.

Trio Apartments - Camperdown

Commenced and planned activities
Review planned amendments to LEP, DCPs and other planning controls to ensure green roofs and walls are appropriately recognised.
Review the development application process for green roofs and walls and remove potential barriers for the City and applicants.
Develop information to assist building owners to achieve sustainability ratings with the use of green roofs and / or green walls.
Investigate potential research that will provide data necessary to support the inclusion of green roofs and walls in sustainability rating tools.
Work with rating tool agencies to support the inclusion of green roofs and walls in existing rating system assessments.

Monitoring & evaluation

All the actions in this Policy Implementation Plan are designed to support the increase in quality green roofs and walls in the local government area. In order to assess whether our interventions have been effective the City will monitor the number and type of green roofs and walls that are being installed in the local government area.

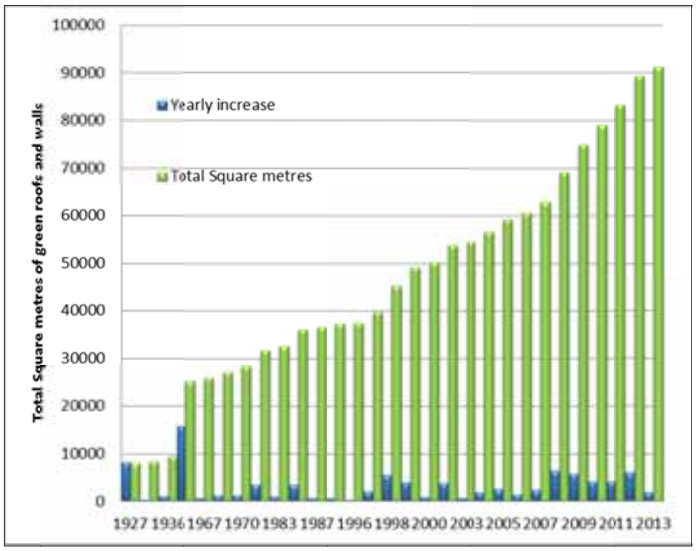
Green roof and wall installations will be monitored through the Development Application process. All approved developments that have a green roof or wall included will be periodically reviewed to monitor the rate at which these developments are being built and the degree to which they are being maintained.

A base line inventory has already been established by Council and will be reviewed and reported on through the City's quarterly Green Report and annual State of the Environment Report.

Monitoring will also occur via regular site visits, consultation with local installers and through direct community and business engagement.

Establishing this monitoring and evaluation process may support the development of appropriate green roof and green wall targets in the future.

Installation area of green roofs and walls 1927 - 2013



Commenced and planned activities
Maintain an inventory of green roof and green wall sites in the local government area.
Periodically review the sites to ensure they are being maintained.
Maintain and inventory of all development applications including a green roof or green wall.
Survey building owners with approved green roof or wall developments to monitor installation rates and outcomes.
Monitor and report on green roof and wall sites quarterly in the City's Green Report and annual State of the Environment Report.