Milestone Report 1.

DIY laneway greening – simplifying vertical greening at a community level

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Project code

GC17002

Overall objective

The objective of this project is to establish an enabling environment to facilitate the uptake of vertical greening systems, more commonly known as 'Green Walls', within urban environments at a community level. To achieve this, a coherent framework will be provided, that will provide guidance on planning, designing and managing a green wall within community space. This project is a collaborative enterprise that unites academia, government and community know-how to produce a complete, practical and inclusive means of enabling the expansion of urban greening. We propose to achieve this by research that will identify and communicate:

- What barriers and legislative concerns relate to urban green walls? Is planning or other approval needed?
- What plants work best in green wall applications, and which green wall system should be used in common urban scenarios?
- How aesthetically appealing and functional green wall systems can be built on a DIY budget?
- How the community will benefit from the presence of community green walls?
- How to mobilise local communities to get involved?

The current Milestone addresses the first of these points.

Background statement

Urban forestry and green infrastructure, in particular when integrated as a design component of the built environment, including green wall and green roofs, is gaining in popularity. These structures not only help ameliorate many problems associated with urban consolidation, but may also enable a sustainable strategy for further urban developments in conjunction with traditional urban forestry and dedicated green space. A diverse range of services have been associated with green walls, including community engagement; provision of social, psychological, and biophilic satisfaction; a reduction in the urban heat island effect; reductions in building energy consumption; enhanced air quality; increased biodiversity; and improved storm water management. Green walls can also reduce noise pollution and facilitate greater urban food production.

Over the last two decades, green wall technology has been widely implemented in North America, Western Europe, and Singapore; mainly through retrofitting to existing buildings and structures. Government instruments and support provided through financial incentives, policies and standards, appear to be driving this increase in projects. For example, Stuttgart, Germany, has employed a combination of green wall policies and subsidies which have led to the creation of an estimated 2 km^2 of green rooftops. In contrast, green wall technology has been much less frequently implemented in Australia. This can be attributed to a number of constraining factors, such as a lack of standards for construction and installation; a limited number of installers; a lack of community awareness resulting from few effective examples to give people confidence in the value of the technology; and a possibly well-founded perception that little information is available associated with successfully growing vertical gardens within Australia's diverse climates. This trend notwithstanding, green wall projects have increased in frequency somewhat in Australia in the past 6 years, despite the absence of easily available instructional guides or handbooks, and a general lack of understanding on how vertical gardens can be integrated in urban environments at the community level.

Certain local councils in Australia have been attempting to encourage green wall uptake, by implementing various policies and guidelines with the objective of reducing or overcoming the factors constraining green wall use. Whilst the efforts of these councils are aimed at supporting and encouraging the uptake of green wall projects on large scale projects, no overall green wall guide has been developed for Australian local communities and, more importantly, there is little creditable information widely available on the practical, legal and economic aspects of green wall construction and maintenance at the community level.

Outcome statement

The intended result of the overall project is to establish an enabling environment by developing a Guide to facilitate the expansion of the use of green walls in metropolitan Australia. Additionally, communication of the project findings will improve consumer understanding of the benefits of green walls, and the options for developing vertical greenspace in the different types of small spaces typically found in medium and high-density residential developments and laneways.

Part 1. (Milestone 102) **Engagement with policy makers and the Horticultural community regarding regulatory and legislative considerations related to laneway greening.**

The initial stage of this project involved the compilation of information on the legislative and regulatory constraints surrounding the installation on green walls in public and private spaces in urban laneways

Through principal collaboration with the Inner West Council (Jean Brennan & Natalie Pelleri), a correspondence was established to guide the project, and to develop a basis for the generation of a considered framework for laneway greening. Further engagement is planned with additional councils.

The project team has additionally liaised with a significant number of horticulture experts and experts in urban greenspace regulation development. Along with our existing knowledge, a sample of representative local governments provided clear guidelines for the legal restrictions surrounding the development of vertical greening systems to determine whether legislative requirements are consistent across greater urban areas (Please see Appendix).

With respect to exploring the current barriers to adoption of greening laneways, information on the legislative and regulatory barriers surrounding the installation on green walls in public and private spaces in urban laneways was compiled, in association with the collaborative cross-disciplinary coalition developed as part of this project. This work is ongoing, as our network expands and due to the variable availabilities of key stakeholders, in particular councils.

We acknowledge that the legislative limitations may be perceived as intimidating and not conducive to DIY community activity. Given the potential liability consequences related to this work, at this stage, we nonetheless propose that stakeholders need to be aware of the relevant legislation.

Correspondence has been initiated or there is a planned meeting with the following stakeholders for engagement. After approval from HortInnovation, the guidance document produced in Objective 2 will be cross-verified with the stakeholders.

Stakeholder	Company/Affiliation	Location	Date of correspondence
Jean Brennan	Inner West council	(Marrickville, NSW)	5/2/2019 - 4/4/2019
Natalie Pelleri	Inner West council	(Marrickville, NSW)	5/2/2019 - 4/4/2019
Jock Gammon	Junglefy P/L	(Banksmeadow, NSW)	1/1/2019-1/5/2019
Angela Dacunto	Altus Group		1/1/2019-1/5/2019
Maria Efkarpidis	Rock Development Group		16/1/2019
Penny Gibson	ACT Climate Change Council		16/1/2019
Bob Stevenson	Water Ups from Down Under		9/4/2019
Steven Tupu	Terrain Architecture	(NY, USA)	26/04/2019
Cameron Hall	Kuranga Native Nursery	(Mount Evelyn, VIC)	23/04/2019
Mark Hursch	Victorian Indigenous Nursery Co-op (VINC)	(Fairfield, VIC)	23/04/2019

Hardy (No surname provided)	Ironstone Lagoon Nursery	(Knuckey Lagoon, NT)	23/04/2019
Roberto Lo Piccolo	Elmich Australia	(Newington, NSW)	23/04/2019
Mark (No surname provided)	Domus Nursery	(Hacketts Gully, WA)	24/04/2019
Edward Warburton and Marianne Mentis	Greenwall Solutions	(Darlinghurst, NSW)	21/3/19 and 25/3/19
Dave	Sydney Wildflower Nursery	(Heathcote, NSW)	24/03/2019
James	Garden Grove	(Golden Grove, SA)	26/03/2019
Daniel Haeyen	Vertical Gardens Direct	(Braeside, VIC)	26/03/2019
Ted Maguire	Greenstock Nurseries	(Elimbah, QLD)	28/03/2019
Greg Lamont	Growing Friends Nursery	(Royal Botanic Garden, NSW)	1/04/2019
Ellen	Benara Nurseries	(Forrestdale, WA)	1/04/2019
Paul Taylor	Atlantis Corporation	(Chatswood, NSW)	2/04/2019
Stephen Collis	Wallgarden Australia	(Sorrento, NSW)	4/04/2019
Jeff Lugg	Zoos South Australia	(Adelaide, SA)	7/04/2019
Kerrie	The Greenwall Company		25/03/2019
Mark Paul	Vertical Gardens Australia	(Richmond, NSW)	17/04/2019
Jamie	Chandlers Nursery	(Sandy Bay, TAS)	23/04/2019
Stephanie Watson	Bunnings Warehouse	(Alexandria, NSW)	27/04/2019
Billy Ryan	Fytogreen	(Northbridge, NSW)	24/04/2019
Erik Van Zuilekom	Elmich Australia	(Newington, NSW)	4/04/2019
Roberto Lo Piccolo	Greenwall Company		4/04/2019
Mark Paul	Growing Well Garden Desgin	(Sydney, NSW)	4/04/2019
David Stenford	Atlantis Corporation	(Chatswood, NSW)	4/04/2019

Prospective engagement.

Stakeholder	Company/Affiliation	Position	Date of prospective meeting
David Callow	City of Melbourne Council	Team Leader – Urban Forest & Ecology	24/5/2019
Charles Casuscelli	Western Sydney Regional Organisation of Councils	Chief Executive Officer	24/5/2019
Peter Davies	Smart Green Cities, Macquarie University	Associate Professor	24/5/2019
John Douglas	Ryde TAFE	Head of Arboriculture	24/5/2019
Gwilym Griffiths	Urban Forest Manager	Inner West council	24/5/2019
Jemilah Hallinan	Environmental Defenders Office New South Wales (EDO NSW)	Outreach Director	24/5/2019

It should be noted that most policies relating to green infrastructure in Australia are mainly relevant to green roofs. Currently, policy instruments related to green wall projects are scarce, with only limited governmental guidance on applicability, installation and maintenance. The most notable and comprehensive green infrastructure policies for each Australian major city local Council are shown in the Appendix.

Importantly, policies relating to new green infrastructure technologies require several phases of policy establishment before successful policy implementation. These phases include introduction and awareness; community engagement; action plan development and implementation; and technical research (Lawlor et al. 2006).

Part 2. Documentation of regulatory and legislative considerations related to laneway greening

The Limitations to Green Wall Technology

The framework for DIY Green Wall Laneway projects is complicated and presents several hurdles and obstacles for those wishing to participate in greening our cities throughout Australia. In Australia, the main authorities regulating urban development and thus policies, is local government. Local government is the closest tier of government to local communities, and deals with land management, land-use planning, policy development, and development control. There are over 500 Councils in Australia, with no common policy, legislation or guidelines common to all.

The sections below detail the current legislation, regulations and guidelines that must be considered when constructing a green wall. It is evident that Councils and Legislative bodies are integral in not only the ease of undertaking these projects, but also the ability to do so. Further work is required by all parties to make large-scale projects, or even those on a small scale, go ahead.

Local / State Policies and Planning Controls

Local and state governments are responsible for creating regulations and policies to control and guide land use within their municipality / state throughout Australia. Prior to undertaking a DIY Lane Way project it is strongly recommended that the Local Council is contacted to ensure that the works are permissible under law and that the design is suitable. Each state and local government may have its own reasoning for either permitting or not permitting a certain project to proceed as listed below;

- **Aesthetics**; for instance a proposed fence or façade system should be suitable or deemed to enhance the characteristics of area and / or streetscape where the works are proposed.
- **Heritage**; a proposed green wall or green fence line could be deemed 'inappropriate' or 'taking away' from the value of a heritage listed item.
- **Safety**; for instance fire hazards, bush fire prone locations, structural capacity, certification, tripping hazards and health hazards to name a few, may be of concern when undertaking a project.
- **Biodiversity**; councils may have policies or guidelines on the types of plants they deem appropriate for an area, which may affect plant selection for a DIY system. This particularly relates to plant species that have the potential to become invasive.
- **Property boundaries**; most Councils do not allow developments to exceed beyond a lot boundary. A DIY green wall built on private land facing a lane way may require a permit or a contribution to be paid to Councils. Further, permission by the landowners would be required.

Legal considerations

Design

NCC & AS Requirements:

Regulations regarding the construction of green walls can seem imposing. We have provided the following guidance to provide stakeholders with an awareness of the issues that they may encounter. Not all of these regulations will apply in all circumstances, particularly for small systems on private land. To ensure that you are legally covered, we strongly recommend that the local Council be contacted before any major construction, or structures that can affect public space, are commenced.

All built forms and structures are to be built in compliance with the National Construction Code (NCC) and Australian Standards throughout Australia.

The NCC is updated regularly by the Australian Building Codes Board and sets out requirements in relation to fire safety, structure, egress, energy efficiency, access, health and even amenity. Further information on the code can be found here:
https://ncc.abcb.gov.au/ncc-online/NCC

Several Australian Standards Apply to the implementation of green wall systems and greatly depend on the design of a building. Further information can be sort here:

https://infostore.saiglobal.com/en-au/Search/Standard/?sortKey=date-desc&productFamily=STANDARD&publisher=AS&publicationStatus=Current&classification=Standard

As a general guide, the following considerations should be made in regards to both the NCC and AS Standards:

- **Structure**- When designing a DIY green wall project, it is important to consider the load-bearing capacity of the wall or surface in which the green wall system is proposed. The design should be adequate and should not lead to a risk of the structure failing which could potentially cause harm or damage. It is recommended that a professionally qualified structural engineer is contacted to provide advice on the suitability of the structure on which the green wall is proposed and, ideally, to provide certification of the proposed design. Once the design is built, the structural engineer should be contacted to undertake an inspection to certify that the design has been built in accordance with the approved structural plans.

- **Fire Requirements** - Consideration should be given to the fire safety issues that the DIY green wall system could potentially cause. Green walls raise several concerns in regards to fire safety, such as combustibility and segregation (see below). A Building Code specialist such as a building surveyor will be able to guide and advise what materials are suitable for application. Occasionally, advice from a Fire Safety Engineer may be required for larger scale projects.

- **Wind Requirements** – Depending on the location in Australia, tropical storms and high-speed winds may be an issue when designing the green wall system (Tamási and Dobszay 2015). Additionally, green walls may be exposed to high wind speeds through site specific factors such as orientation and urban geometry. A structural engineer may be required to advise on the fixing requirements to provide an adequate solution to ensure that the green wall is fixed based on the location, and in accordance with the Building Code of Australia (BCA).

- **Waterproofing / Drainage / Geotextile** – A DIY Greenwall system may require some level of waterproofing and drainage if an irrigation system is to be used. It may be necessary to consult a waterproofing specialist and potentially a plumber for advice prior to installing the green wall.

- **Crime Prevention** – Some Council areas may have a crime prevention strategy. Some green wall systems may allow people to climb or scale buildings which may violate the crime

prevention strategy. Advice from the local council should be sought in installations that could be accessed by children or intruders onto private property.

- **Disability Access** – Green walls that protrude onto a footpath may inhibit access for those who are either visually or mobility impaired. It is therefore important to ensure that the green wall complies with Council's guidelines and with the AS Standards and NCC legislation prior implementation of the green wall.
- **Growing Media / Plant Selection** – Growing media and plant selection should always be considered based on the context of the local climate to ensure that the system will not require excessive maintenance. Further, while some plant species are easy to grow and do not require much maintenance, these same plant species may pose an environmental threat to the local endemic biota. A local nursery should be contacted for plant supply and recommendations. [NOTE: a detailed guide on suitable species will be provided in the final report]

- **Other Items to consider**: Maintenance should always be a consideration for DIY projects. This may include an irrigation system and a maintenance strategy to keep the green wall healthy and ensure an aesthetically pleasing lane way. Additionally, it is recommended that the wall not exceed rear laneway boundary fence restrictions which are commonly 1800 mm in height.

Legal aspects – leases and licences

By its nature, a green wall has unique characteristics which present issues that must be dealt with in a legal and practical context. Each wall will have to be treated in a unique way; each building and laneway will have different ownership structures, aspects, orientations and qualities, and the building or location will have physical limitations that will determine the type of use to which it is put.

The top nine issues that are most commonly dealt with when a green wall is built as detailed by The Royal Institution of Chartered Surveyors (Adapted from RICS Green Roofs and Walls, 1st edition guide) are shown in the following table.

1	Structural loads	Extra loads, both point loads and overall mass, have to be accommodated with the existing structure. A building surveyor or suitably experienced structural engineer can advise on the integrity of the existing structure, and how it may be affected by structures and plants being placed on it.
2	Irrigation and drainage	Water supply is usually a simple tap, but a horticulturalist may be required to determine if irrigation is needed, and a hydraulic engineer to review how it is to be serviced and drained. Drainage is critical, particularly at times of heavy rainfall.
3	Access	Green walls require regular maintenance so safe access must be considered and included in any green wall design. The rights of the party through which access is granted will need to protect their
4	Storage of equipment	Equipment will be required to maintain the plants and this will need to be stored safely in close proximity. A dedicated room or shed may
5	Insurance	Insurance will be required by the party maintaining the green wall or produce area, as well as insurance for visitors and general public; also liability for work, health and safety legislation.
6	Repair maintenance	The green wall will have to be maintained. The biomass will not tolerate absentee landlords or licensees with other commitments. The maintenance contracts will have to be articulated so that the tenant or third-party landlord knows that ongoing care and maintenance will be required to a certain standard.
7	Reinstatement obligations or dilapidation liability	Green walls are relatively new to the urban context. If the green wall has been installed by a tenant they may have to remove it and reinstate the original finishes and structure at the end of their lease.
8	Consideration or rent	A licensee may agree to pay a token rent, take part in commercial profit sharing or give any outputs to a worthy third-party cause, i.e. a charity. The license can describe how these non-monetary considerations are to be paid or delivered.
9	OH&S	The licensee will be required to adhere to current OH&S guidelines, the relevant State law, and generally comply with all council regulations

Approval Process / Council Requirements:

Currently there is no simplified Australian Standard to deal with Green Wall Systems, which complicates the appropriate installation of DIY systems.

For further information regarding guidelines, policy and legislation, please refer to the Appendix .

Some Councils do not provide any form of green wall design or policy guide. Each Council and state that does have a policy has a unique set of requirements for the design of green wall systems. It is thus recommended in every instance where a green wall may have any impact on public space that Council is contacted directly.

There may be a a range of outcomes after contacting Council:

1. Council may permit the DIY project as “exempt development” with the proviso that the system is constructed in a certain way and to a certain requirement. In this case, no development application fees will be necessary, but it is generally advised to ask what fees may be associated with the construction process such as the cost of permits to undertake the works on the Council’s footpaths or road ways or hoarding fees. It is advised that any correspondence with Council is saved in writing to avoid a “he/she said” or “you said” scenario.

2. Council may require an approval for the design and construction of the system; this is known as the development application process. The Council in most instances will provide a list of documents required which may include structural adequacy certificates from an engineer, architectural plans, and fire safety engineering advice. This will incur development application fees as well as design consultant fees. In NSW, once Development Approval (DA) to construct the system is granted, it may be necessary to get a Construction Certificate from a Building Certifier to undertake the works and all necessary inspections to ensure the system is compliant to the DA approved Plans. Without these, there is a risk that the design will not be compliant and you may be required to rectify or remove any structure you have built illegally. Building of any illegal structure could also incur penalties and fines.

Construction Certificate and Permits

In general, if your green wall system is not considered exempt development then you will need a Construction Certificate either from a Private Building Certifier or Local Council prior to starting your project (see state legal authority in the reference list, for additional information contant your local council). Failure to obtain this certificate can result in penalty notice or fines, or an order requiring you to knock the structure down (e.g. Randwick City Council issues an on-the-spot penalty infringement notice for each offence of up to $3000 for an individual and $6000 for a company). Ensure that if your green wall requires a Construction Certificate that all conditions of the certificate are met, including all inspections. These are essential if you are to be granted a final sign off, known as a Certificate of Occupation, at the end.

Occupational Health and Safety

When constructing your green wall you will have to consider any risks to the public or yourself. If you need to close down or occupy a footpath, for instance, you will have to ask permission from Council. Further, if a road closure is required the same will apply. Fees may be required in order for either of these processes. If the green wall system is quite tall you may also need to consider scaffolding, or even hoardings to segregate the public from your installation process. All personal protective equipment must be considered and you may have to complete a risk register to ensure yourself and others understand what the risk mitigation measures are, what hazards you may encounter and what procedures might be required to deal with these issues.

Fire Risk

Fire risk must be considered as this will influence the choice of vegetation, and possibly structural materials. In hot and dry climate zones, or areas where fire rating specify, the vegetation and green wall structural components must not create fire hazards and have fire resistance ratings respectively. The fire rating of the green wall can be increased through the use of fleshy succulent plants which will help mitigate threats of fire. In addition to these considerations, the green wall must comply with the local building regulations and laws in regards to safety.

Green walls are not addressed directly in the BCA. The National Construction Code (NCC) Clause C1.9 states that a buildings' external walls, including all components incorporated in them including the façade covering, framing and insulation, must be non-combustible. These building regulations may not apply to green walls not directly attached to buildings.

The following is an example of the fire risks that may arise from the installation of a green wall; to the building occupants, fire brigade and the asset (adapted from a fire engineers' consultancy communicated to a commercial green wall installer)

Summary of the fire risks

Risk	Degree	Assessment
Ignition of the plant matter incorporated in the green wall	Ignition temperature of 200 °C (conservative value for dry cellulose material)	The risk of ignition of green matter is high in the event of radiant heat or flame incident on the plant matter. Although the green matter is expected to burn quickly and at low temperatures as it is low in density and will be wet. Possible risk of fire spread to plastic pots or casing, if present.
Melting, deformation and dripping of plastic pots or casing	Melting point of plastic can range from 85-140 °C	The dripping of burning plastic can fall onto occupants, block exits and impact brigade intervention. Furthermore, it can cause the detachment of the green wall, falling onto the street and causing severe injury.
Ignition of plastic components	Auto ignition: approx. 330-410°C; Flash point: approx. 340°C	Could lead to the complete failure of the system, spread flame between compartments, levels and adjacent buildings.
Release of fumes from burning plastic		Risk of inhalation of toxic fumes. Finely dispersed particle matter could be in air which is an irritant and toxin.

Methods to prevent and/or protect from this occurring are summarised in the table below;

Summary of methods to prevent and/or protect against fire risks

Risk	Preventative Measures	Safety Systems
Ignition of plant matter	• Keep plant matter wet • Prune dry plant matter	• Idealy locate a sprinkler system (eg. C3.4 drenchers) above green wall
Melting of the plastic components	• Use plastic containing fire inhibitor to prevent melting and flaming of drips.	• The best option here is to ensure green walls are not located above exits.
Detachment of green wall structural components		• Mechanically secure all components to wall.

Ignition of plastic components	• Use inhibitor in plastic to increase ignition temperature	• Sprinkler system above green wall

Below are some other requirements that are frequently proposed during Fire Engineering Consultation;

Maintenance Requirements

Management of the premises must ensure all necessary steps are taken to prevent fire and reduce the chance of fire spread through regular maintenance of the green wall. The following requirements should be included in the green wall management plan.

- Dried vegetation must be removed to reduce possible ignition sources.
- Regular pruning of plant growth must be conducted to reduce possible fuel loads.
- Vegetation must not protrude from the green wall to a degree that it interferes with the passage of pedestrians and vehicular traffic.
- Waste products (e.g. pruned foliage) are to be held and disposed of appropriately considering potential fire risk of the green wall.
- Exposed electrical components and fixtures within close proximity to the green wall are to be routinely checked for damage and fault.
- Maintenance should be conducted regularly to ensure that the above is adhered to and that other systems incorporated within green walls such as irrigation, drainage and the structural stability of the system is maintained.

Design Requirements:

Some of the design requirements commonly used for commercial green wall systems may be of value, especially in larger community structures. These criteria were sourced from a fire engineers' consultancy communicated to a commercial green wall installer.

- Any polymer used as part of the green wall design is to be made with an inhibitor that prevents the polymer from melting and falling from the structure.
- No part of a green wall is to be located directly above or besides an exit.
- Exposed electrical components, such as lighting around the green wall, are to be limited and properly insulated to reduce possible ignition sources.
- Fuel load and heat release rate of green wall structures should be limited by restricting the material — both plant and structural — used.

- A fire wall with a Fire Resistance Level in line with the NCC prescribed Fire Resistance Level for an external wall is to be installed behind each green wall panel extending 250mm on either side of the green wall panel.

- External wall wetting sprinklers in compliance with NCC Clause C3.4 should be installed above openings that are located directly below a green wall panel (C3.2 Protection of openings in external walls – NCC).

Structural Considerations

The wall on which the green wall is to be constructed on must be able to withstand the dead load as well as the live imposed loads of the system. If a green wall is to be installed, the weight of the plants at a matured state and the substrate in a saturated state must be considered against the bearing capacity of the wall (Chew and Conejos 2016). Structural loading calculations done by engineers concluded that a DIY green wall having a maximum dead load of 700 Pa and lateral wind load of 700-950 Pa (based on 40 m/s winds) was small in comparison to a 3 metre wall designed to International Building Codes (IBC) (Live Wall 2004).

Subsequently, it can be seen that DIY green wall pose a very limited threat to the bearing capacity of a residential house wall which has been built to IBC. However a professional engineer should be engaged if the green wall to be installed is of large scale or there are doubts in regards to the standards and/or structural integrity of the wall the system is to be built on. It is also important to ensure the wall in question is waterproof and that plant roots do not come in direct contact with the wall, so as to not compromise the structural integrity of the wall or lead to water seepage (Chew and Conejos 2016).

A façade-supported green wall (where the planting medium is not integrated in the façade) will place fewer loads on an existing façade (Ottelé et al. 2011) and is easier to retrofit to a building (see appendix for checklist for Green wall retrofit and existing wall evaluation). Note that, in addition to the plants at maturity and soil loads, the weight of additional structures, membranes, frames, walls, trellis, cables, mesh, finishes, etc. and storm loading must be taken into account (Ottele et al. 2011; Chew et al. 2019).

Appendix

Prominent green infrastructure policy and guidance examples across the major Australian cities.

City	Policy name	Mechanism	Policy details	Comments
Sydney, Australia	City of Sydney provides Green Roofs and Walls Policy 2014, Green Roofs and Walls Policy Implementation Plan Environmental Performance Grants supported by Sustainable Sydney 2030	Awareness, guidance, financial incentives, green wall monitoring	Information on green wall benefits, barriers to uptake, design considerations. Comprehensive resource manual for Green roofs. Leadership through green wall on council buildings, establishing advisory committee. Subsidies provided case-by-case through environmental performance grants.	Since implementation of green roofs and walls policy in 2014, City of Sydney has experienced 23% increase in total green wall coverage.
Melbourne, Australia	City of Melbourne and 3 other councils endorse the Growing Green Guide 2014 (State of Victoria 2014)	Awareness, guidance	Comprehensive information on green wall benefits; technical design, installation, maintenance considerations; detailed best practice case studies in Victoria. Leadership through green wall on council buildings.	Since 2014 release of guidance document, average uptake of green wall across all Greater Melbourne councils increased.
Adelaide, Australia	Adelaide City Council provides Green Infrastructure Guidelines 2014	Awareness, guidance	Document refers to living architecture, green streets, WSUD, urban forests. Section on green wall, providing brief information on green wall benefits, design.	Negligible increase in green wall uptake since release of guidelines.
Brisbane, Australia	Brisbane City Council provides Plan for Action on Climate Change 2007, and Community Sustainability and Environmental Grants Program	Awareness, financial incentives	Mention of green roofs as strategy for climate action in climate change policy, within strategic land use and planning, and research sections. AUD$1000-$10000 grants awarded on merit to sustainability projects within Brisbane City Council that reduce energy consumption and greenhouse gas emissions of their facilities.	Strong uptake of green wall in Brisbane City Council. Unclear if uptake is associated with policy.
Perth, Australia	No enacted green wall policies or guidance notes.	N/A	N/A	Perth hosts the least number of green wall projects and the smallest total greened area of all capital cities sampled in Australia.

Checklist Questions for Appraising the Suitability of an Existing Wall structure for Green wall Retrofit

This checklist is designed for project managers and residential owners to use in an initial appraisal of an existing wall structure for green wall retrofit (Adapted from RICS Green Roofs and Walls, 1st edition guide).

Please review the following aspects and take into account in your decision making.

1. Position of the wall
What is the position of the wall within the settlement? Is it overshadowed by other adjoining buildings which may affect access to sunlight and the growth of plants?

2. Location of the building
What is the prevailing climatic condition? For example, is the building in a hot arid climate zone or a maritime zone? Each has different characteristics which favour different types of green wall solutions. For example, those locations which experience heavy rainfall may favour a stormwater solution aimed to reduce as much runoff as possible.
Does the location favour:
-Stormwater design
-Thermal design
-Reducing urban heat island
-Reducing noise pollution
-Biodiversity design
-Aesthetic and social space design

3. Orientation of the wall
In the southern hemisphere, north facing walls receive more sunlight than walls oriented towards other directions., whereas south facing walls are oriented towards the sun in the northern hemisphere.

4. Height above ground
How high is the wall you want to construct? In some locations high buildings are subject to high winds and/or fierce heat, which can make growing plants challenging, and create safety challenges in construction

5. Existing wall construction
What is the existing structural form of the wall?
A. Timber
B. Concrete
C. Brick
D. Structural steel

6. Load limitations of the wall
What is the dead load-bearing capacity of the existing wall?
What is the live load-bearing capacity of the existing wall?

7. Preferred planting options
-Is the choice of plants suitable for the level of maintenance available?
-Is there a water supply on site?
-Is there a power supply on site?
-Are there any potential environmental hazards?
-Cross check against Council's list of prohibited and recommended plants
-Assess microclimate (sun, wind etc) and ensure proposed plants are suitable for the microclimate (see above)

8. Is there any windows or air conditioning that may affect the wall to be retrofitted.

9. Access for construction and installation of the wall
What is the access like for construction and installation?

10. Levels of maintenance
What is the access like for maintenance to the plants?

11. Costs
How much money has been sourced to pay for a green wall and its potential council approval?

12 Activation
Is the proposed green wall located in such a way that public space is activated eg. space nearby for seating, lighting etc

References

Standards and Legislation and Guides

Adelaide City Council, 2014. Adding Value through Green Infrastructure: Working effectively with Local Government, Prepared for the Botanic Gardens of Adelaide. June 2014. Retrieved on 30th October from: file:///Users/113984/Downloads/Adding_Value_through_Green_Infrastructure_Working_effectively_with_Local_Government.pdf

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C3.2 Protection of openings in external walls – NCC
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