

## LIVING WALLS AND ROOFS

### INTRODUCTION

This TECHnote highlights design and construction issues for consideration and suggests suitable NATSPEC worksections for the documentation of living walls and roofs. Also referred to as green walls and roofs, these are building walls or roofs, partially or completely covered with vegetation and a growing medium, over a waterproofing membrane and/or rigid insulation. Additional layers such as a root barrier and drainage and irrigation systems may also be included.

Whilst living walls and roofs have been used for centuries, the current focus on energy conservation and the protection of the natural environment has seen an increased need for designers to comprehensively document and specify their designs.

### THE BENEFITS OF LIVING WALLS AND ROOFS

Direct benefits attributed to living walls include:

- Reduction of urban heat island effect of cities.
- Reduction and control of heat gain and loss by increasing the thermal efficiency of a structure.
- Stormwater management assistance.
- Sequestration of carbon and cleaner air.
- Additional sound insulation.
- Additional amenity space.
- Creation of habitats and assistance in maintaining biodiversity.
- Aesthetic benefits.

### LIVING ROOFS

There are two basic types of living wall and roof systems, Extensive and Intensive.

#### Extensive systems

- Shallow soil or growing media profile e.g. 100 to 300 mm.
- Weight between 150 and 430 kg/m<sup>2</sup>.
- Planted with low growing plants such as succulents and drought tolerant grasses.
- Irrigation essential.
- Require regular maintenance.
- Not normally trafficable.

#### Intensive systems

- Deeper soil or growing media profile i.e. > 300 mm.
- Heavier, with greater structural implications.
- Plants can be more varied.
- Irrigation recommended.
- Require more maintenance.
- More likely to be accessible.

### LIVING WALLS

- Depth of living wall system 50 to 250 mm.
- Weight of system between 50 and 150 kg/m<sup>2</sup>.
- Large variety of plants depending on aspect.
- Irrigation essential.
- Require regular maintenance.

### DESIGN AND CONSTRUCTION CONSIDERATIONS

Critical issues to consider when designing living walls and roofs:

- The structural implications of the mass of growing media, especially wet saturated media e.g. after rain or snowfall.
- Access for craneage for the installation of heavy growing media. Whilst not a direct design issue, the ease of installation will affect cost and the viability of the design.
- Drainage falls and stormwater outlet locations to achieve the correct drainage on roofs.
- Appropriate construction of planting substrates, roof finish and structure, to prevent interstitial condensation.
- Temporary irrigation to establish planting in the first growing season.
- The specification of prototype panels may assist, especially in large projects.
- Living roofs and walls are often installed during the construction of the building. This can result in damage to planting and growing media, caused by the dumping of waste such as concrete, mortar or polluted water. Some trade operations, such as paver or stone cutting in the immediate vicinity of the planting and growing media, may cause damage. With living walls, upper planted panels may be installed first, and lower areas left empty to avoid damage. Specifiers should instruct contractors to avoid damage and review construction programs to avoid works immediately adjacent to installed living roofs or walls.
- Protection and access for maintenance to the end of the defect's liability period.
- Specialist ongoing maintenance.

### SPECIFYING LIVING WALLS AND ROOFS USING NATSPEC

The design and construction of living walls and roofs entails a variety of trades. NATSPEC provides a number of worksections suitable for documenting the construction of living walls and roofs:

#### For the supporting structure

- 0310 Concrete – combined.
- 0341 Structural steelwork.
- 0344 Steel – hot-dip galvanized coatings.
- 0345 Steel – protective paint coatings.

#### For the roof finish

- 0411 Waterproofing – external and tanking.
- 0420 Roofing – combined.
- 0471 Thermal insulation and pliable membranes.

#### For the soft landscape

- 0251 Landscape – soils.
- 0252 Landscape – natural grass surfaces.
- 0253 Landscape – planting.
- 0254 Irrigation.
- 0255 Landscape – plant procurement
- 0256 Landscape – establishment.

#### For access and maintenance

- 0193 Building access safety systems.
- 0276 Paving – sand bed.
- 0278 Granular surfaces.
- 0552 Metalwork – fabricated.

#### Living wall



#### Intensive living roof



### PUBLICATIONS

There are no relevant Australian Standards in relation to living walls and roofs.

Various standards for material and construction are cited in the particular NATSPEC worksection *Templates*.

A useful publication is *Guidelines for the Planning, Construction and Maintenance of Green Roofs* 2018 published by the German Landscape Development and Landscaping Research Society (FLL).

Germany is comparatively advanced in the design and construction of living walls and roofs and has developed guidelines which are being adopted in other countries.

### ADDITIONAL INFORMATION

AIA Acumen Note *Living walls – A way to green the built environment*.

AIA Acumen Note *Green roofs for energy efficiency – A simulation study in Australian climates*.

*Living Architecture: Green Roofs and Walls*. Graeme Hopkins and Christine Goodwin. Pub. 2011 CSIRO Publishing. [www.publish.csiro.au](http://www.publish.csiro.au)

Green Roofs Australasia [www.greenroofsaustralasia.com.au](http://www.greenroofsaustralasia.com.au)

Green Roof Technology [www.greenrooftechology.com](http://www.greenrooftechology.com)

*Sydney City Council Green Roof Resource Manual*. [www.cityofsydney.nsw.gov.au](http://www.cityofsydney.nsw.gov.au)