



Technical Manual for the green roof on the C1 Building at Barangaroo

The technical manual been written with regards to Drawing Number BCC1AD30700 Rev 6 as prepared by Tzannes for Lendlease

Client Contact Information

Client	C1 Barangaroo
Client contact	
Contact phone number	
Contact email	
Site Address	Barangaroo
Site contact name	TBC
Site contact phone number	TBC

System Specification

Type of job	Green Roof
Type of drainage	Run to Waste
Type of irrigation	13 mm, 2L/hr drip line
Type of irrigation controller	Weathermatic
Location of irrigation controller	TBC
Type of filter	Disk filter
Location of filter	In the irrigation manifold
Location of water shut-off valve	In the irrigation manifold
Type of fertilising	Dosatron via manifold

1 Scope

This Technical Manual sets out the operations and horticultural maintenance processes and procedures that will deliver a successful green roof installation.

All parties using this manual are encouraged to use the contents as a template and may add to or amend the contents of this manual as dictated by the needs of the respective parties. Any changes to the Maintenance Manual must be agreed by both parties in writing.

2 Operations & Maintenance Procedure

2.1 Daily Inspections

As the client is onsite constantly, it would be appreciated if plant health can be observed casually on a daily basis to ensure that any potential issues or concerns are addressed in an efficient and timely manner. If any of the following issues are observed Junglefy needs to be notified immediately:

- Drooping plants
- Excessive yellow leaves
- Excessive leaf drop
- Unusual sounds coming from the reservoir/pumping facilities
- Water leaks or pooling

Name	Mobile number
Leigh Stammers	0448 141 417
Andrew Wands	0404 896 283

2.2 Planned Maintenance Visits

For C1, maintenance visits will vary depending on season and the establishment of the plants. A major service may be necessary in spring and this is when we will hard prune certain species. Below is a summary of the observations and actions that are carried out during each visit. A Junglefy employee will summarise the performance of the roof in an email to the client; additional information, including photos of the roof will be available upon request.

Observations

- Brief comments on plant performance.
- Look for damage resulting from pests or disease on each species present
- Check moisture levels of media

Actions

- Adjust pH or nutrient levels to the plants desirable specification, record volumes added
- Check for pests & diseases and treat accordingly
- Remove irrigation filter and clean
- Clean guttering or grates of fallen plant matter or growing media

- Check over for dead or unhealthy foliage and remove
- Prune plants
- Remove weeds or plants which are unsightly and performing poorly

Recording

- Observations of plant performance.
- Current irrigation schedule, and if modified the new schedule.
- Record if pictures were taken for reference.
- Additions for nutrient or water balance, buffers, nutrients etc.
- Pest or disease treatments applied, what and where.

2.3 Additional Maintenance

If an unplanned maintenance visit is required because of a client request, then the request must be made in writing stating the reason for the request and a proposed time and date. Additional charges will apply for unscheduled maintenance visits.

2.4 Emergency Maintenance

Emergency maintenance may be required in the event such as burst pipe, blocked dripper or a blocked pipe. If emergency maintenance is required then immediate access must be granted to Junglefy to address the problem. Junglefy will notify its insurance provider as a pre-emptive step so as to minimise any potential delays in fixing a problem. In an emergency please contact:

Leigh Stammers 0448 141 417

Andrew Wands 0404 896 283

2.5 Emergency Irrigation Shut Off

If a leak is identified, please undertake the following steps:

1. Locate the Controller and Ball valve
2. Isolate the Ball Valve
3. Turn to the off position
4. Notify Junglefy Staff identified in the emergency response list

3 Operational information

3.1 Fertiliser

The Junglefy Green Roof media has a slow release fertiliser incorporated into it, this will last for 6 months. Once this has expired the easiest way to fertilise the green roof is via an application of a general landscape grade slow release fertiliser, this should be applied as per the manufacturers guidelines.

3.2 pH Adjustment

pH is important to ensure minerals are available to the plants. The ideal pH for the plants in this medium is between 6.5 & 7.0. Small movements (0.1-0.2) are allowable due to sampling error but gradual shift of pH away from this range are to be avoided. The growing media contains specific elements which limit this change and have a large buffering capacity.

If the pH requires adjusting use pH solutions available from hydroponic suppliers to either raise (pH up=Alkaline or Base) or lower (pH down=Acid).

3.3 Irrigation Scheduling

It is important to ensure that 20% run off is achieved after each irrigation cycle, otherwise salts can build up within the media.

Please see Appendix 3 for the Irrigation scheduling for each level.

3.4 Plant Replacement

At times, certain plants may fail due several external factors. If this is due to reasons outside of Junglefy's reasonable care, then replacing plants may be warranted. This is most often during the establishment period as plants are acclimatising to their new environment and light conditions.

Junglefy will replace plants that have died as part of our maintenance service and pricing. This is in line with our horticultural warranty if Junglefy is contracted to maintain the roof.

Junglefy will plant small plants into the roof to fill small gaps as these small plants will have a better success rate than larger stock and due to the shallow depth of media.

3.5 Pest & Disease Treatment

All plants that are used in a Junglefy installations are healthy and free from pests and diseases at the time of installation. If any pest or disease issue is detected in situ, this must be reported immediately, and appropriate action taken. Junglefy's philosophy on pest and disease management is to use least toxic methods for control and aim to have healthy plants that are resilient to attack in the first place. Initial stages of plant establishment produce lush soft growth which is most prone to disease attack so diligence is required.

Plants may be susceptible to root borne pathogens if over-watered. If root disease is suspected, a periodic drying cycle should be implemented with a precautionary natural soil conditioner used in the irrigation water.

Many common pests to plants can be controlled by a mild soap spray or horticultural oil which can be applied in-situ to the affected plants. There are several commercial soap or natural oil sprays which can also be used, these are non-toxic. If stronger control measures are required organic preparations are preferred and can be discussed with a Junglefy representative prior to application.

3.6 Green Waste

All green waste from the roof will be collected and processed in the waste facility in the basement.

3.7 Water Use and water sources

It is our recommendation to use recycled water for irrigation of the green roof. It is important however that the quality of water used is of a high standard. If the water is being treated then the water needs to be of a quality that is similar to drinking water or rain water. Rain water directly off buildings is suitable also.

It is very important that the collected water does not come from areas where there is potential for contamination from cleaning products or vehicles.

The estimated water use for the green roof based on 1,800m² of green roof is as follows:

Irrigation

Location	Irrigation Schedule
Zone 1 – 450m ²	Estimated annual water use = 365,000L
Zone 2 – 450m ²	Estimated annual water use = 365,000L
Zone 3 – 450m ²	Estimated annual water use = 365,000L
Zone 4 – 450m ²	Estimated annual water use = 365,000L

- Maximum average estimated daily water use will be 4,000L
- Irrigation times, run times and regularity will change on a seasonal basis
- Actual water-use is expected to be less than this

4 Fault Handling Procedures

In the event of a fault please contact one of the people listed below

NAME	MOBILE NUMBER
Leigh Stammers	0448 141 417
Andrew Wands	0404 896 283

5 Maintenance Schedules (major tasks)

Task	Regularity
Fertilise the green roof via nutrient dosing system	Monthly
General maintenance and roof inspection	Monthly
Inspection of box gutter and symphonic drains to ensure clear of debris	Monthly
Inspection of panels to ensure foliage is not growing over the edges thereby affecting solar panel performance	Monthly
Management of foliage around BMU rails	Monthly
Major Service - hard prune the roof, if required, as per good horticultural practices. Typically grass species are cut right back to allow for new growth and to minimize dry leaf matter.	Once per year - spring

6 Warranty

Inclusions to be covered by Junglefy's warranty will be defined in two parts, those components considered to be structural to the installation (Materials), and those to be associated with the plants (Horticultural).

Material warranty covers those components installed by Junglefy, all of which have a 7-year warranty for installation or manufacturer's product warranty. Manufacturer's Warranty for Junglefy Materials include:

- Weathermatic Controller SL 1600
- Hunter solenoids

These materials include the components installed by Junglefy: drainage connection (workmanship faults and drainage leaks only, other faults will be directed to manufacturer), irrigation manifold installation and irrigation function. Junglefy will not be responsible for damage caused by others to the irrigation manifold or irrigation components. As the Controller is not hardwired, the irrigation manifold needs to be placed in a lockable secure cabinet or lockable area for warranty to be valid.

The horticultural warranty is represented by the plants and their health. Junglefy warrants the success of the Green Roof to cover all plants while Junglefy is the single maintenance contractor. Due to the unique horticultural knowledge associated with plant selection, pest and disease treatment, fertigation, green roof media and plant replacement, should another contractor provide these services we cannot warrant our installation through their services. Junglefy will not be responsible for damage caused by others to the irrigation manifold, irrigation components or to the green roof and plants themselves.

Appendix Schedule

Appendix 1 – Irrigation Run Times

Appendix 2 – Planting Plan

Appendix 1 – Irrigation

Irrigation

Location	Irrigation Schedule
Zone 1 – 450m ²	TBC – Estimated annual water use = 365,000L
Zone 2 – 450m ²	TBC – Estimated annual water use = 365,000L
Zone 3 – 450m ²	TBC – Estimated annual water use = 365,000L
Zone 4 – 450m ²	TBC – Estimated annual water use = 365,000L

- Irrigation times, run times and regularity will change on a seasonal basis
- Actual water-use is expected to be less than this

Appendix 3 – Planting Suggestions

The plants listed below are indicative plant species that have been use on Junglefy Green Roof installations.

Plants will be planted in a random mix rather than contrived swathes or patterns in order to create a more natural look and functioning ecosystem which will promote resilience and increase biodiversity. Below are some indicative images of green roofs with the proposed random planting.



Global Switch – Pyrmont



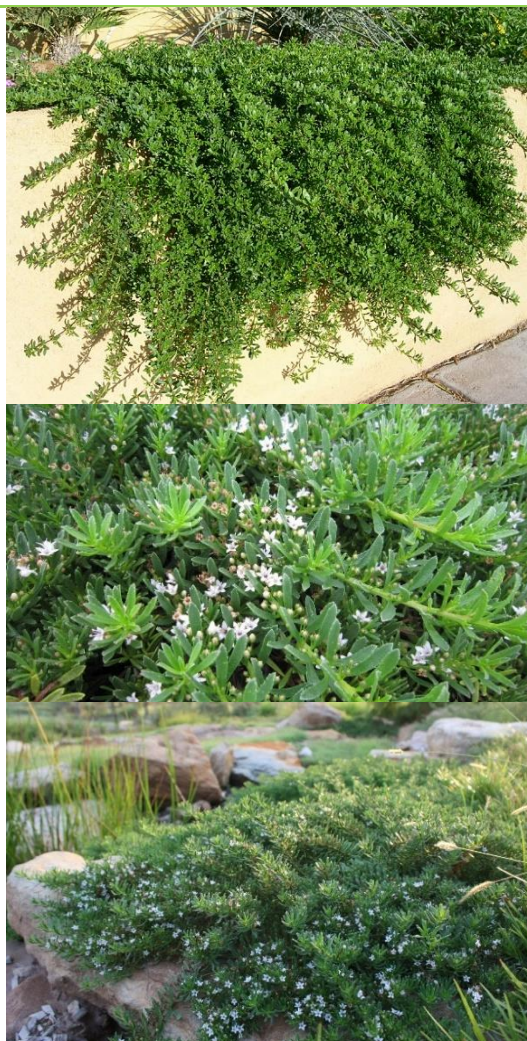
Minifie Park Childcare – Victoria



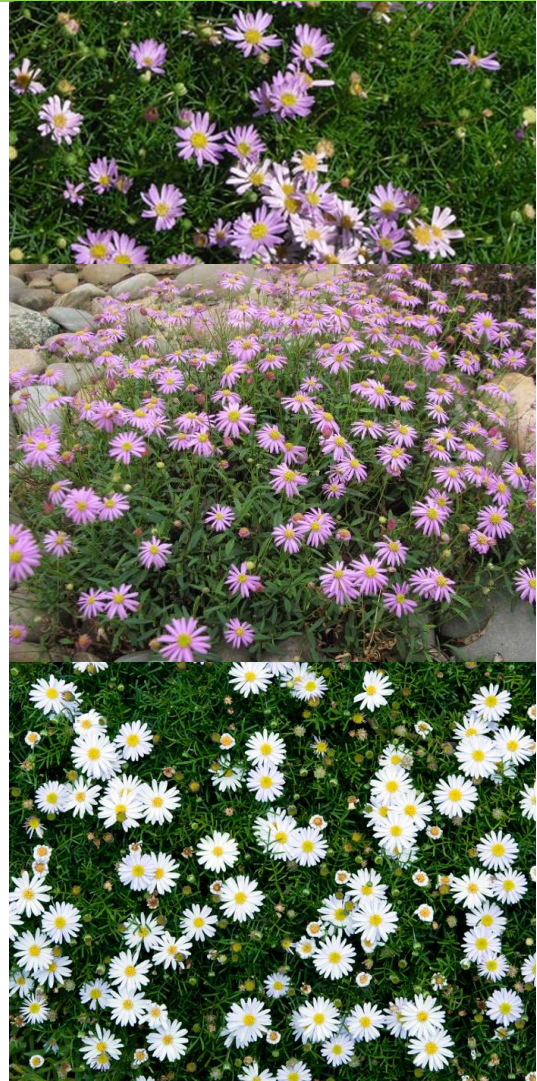
Residential green roof - Newport

Plant Variety

Myoporum parvifolium



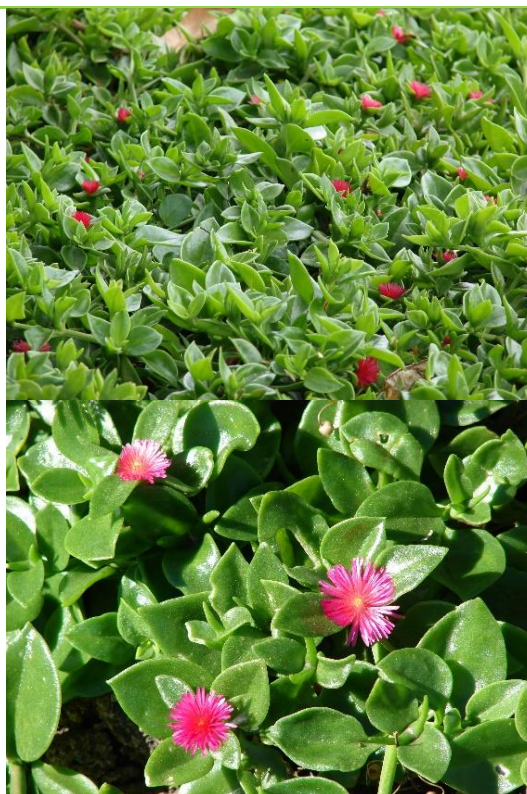
Brachyscome multifida



Hibbertia scandens



Aptenia cordifolia



Gazania tomentosa



Dianella caerulea



Goodenia ovata



Poa poiformis 'Kingsdale'



Themeda australis 'Mingo'



Carpobrotus glaucescens



Crassula multicaeva

