

8 December 2016

The North Plot – Design statement and maintenance proposal

This design statement provides a response to submissions and assessment of the proposed amended development in relation to the State Significant Development (SSD) Development Application (DA) for the development of the North Plot and Square in Darling Square (SSD 7021).

Green Roof design

The roof of the North Plot has been treated at the 5th façade of the building as it is viewed from the above by surrounding adjacent developments. The Green Roof responds to this by providing an interesting outlook for surrounding building occupants whilst also providing a planting palette that introduces biodiversity of plant species by mixing a combination of plants into each 'swathe'. This biodiversity of plant species is important to encourage further biodiversity of fauna but also to ensure a more resilient green roof.

When considering the plant species for the green roof on the North Plot, we have looked at a combination of indigenous and exotic species. The exotic species have been chosen mainly for their ability to act as a colonizing species that can grow rapidly to create a natural mulch whilst some of the slower growing species establish.

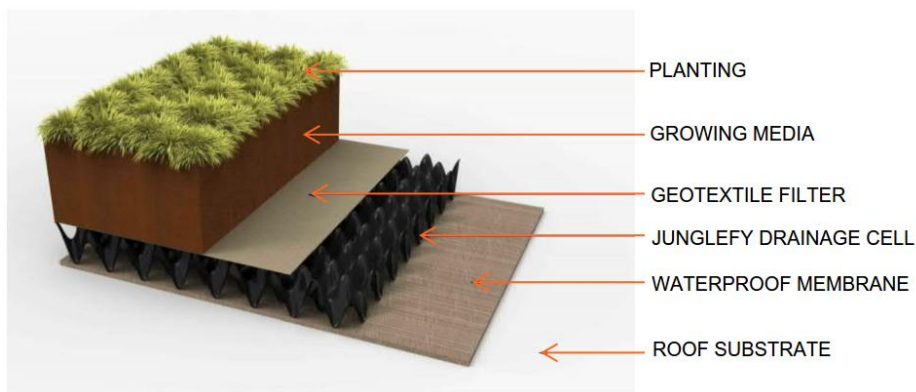
All species are drought tolerant once established and relatively low maintenance. The plants species have been used on green roofs throughout Sydney by Junglefy and are proven performers.

The plants will be planted in random arrangement with-in the 4 plant groupings to avoid planting in swathes which can cause problems long term with regards to pest and disease outbreaks and maintenance requirements.

Green Roof system

A lightweight green roof system has been proposed for the project to accommodate the structural design of the building. The growing media depth on the project is 120mm and in order to ensure success with this depth of media it is very important to get the right combination of drainage components and growing media to suit the structural limitations of the project and to ensure long term plant success.

We have selected the following drainage components as identified and explained in the detail below:



Waterproof protection layer

This layer serves as a moisture retention mat and also as protection of the waterproof membrane during installation. It is a thick geo-textile fabric about 7mm thick.

Drainage cell

The drainage cell enables the rapid movement of water off the roof during rainfall events whilst at the same time acting as a reservoir. Any water that is held in the drainage cell is released back into the growing media via evaporation as the growing media dries up. Some plant species will also 'dip' their roots into this stored water. The water is only stored in the bottom half of the drainage cell which keeps the upper geotextile fabric clear of being in contact with the water and thereby reduces any chance of a waterlogged growing media.

Geotextile filter sheet

This filter sheet stops the growing media disappearing into the drainage cell and is approximately 1.4mm thick.

Mineral based growing media

For a green roof media, it is imperative that it is designed for longevity as it is cost prohibitive to be replacing growing media that may have decomposed over time. The growing media we have designed is 75% mineral based components that will never breakdown or decompose thereby ensuring there is always a significant layer of growing media for the plants to survive. The organic components used in the growing media are stable organics such as composted pine bark and coconut coir. The use of residential composted organics should be avoided in a green roof growing media as the ingredients are unknown and can affect the chemical composition of the media. The 25% organic components should last from 3-10 years and their volume is replaced constantly through plant processes such as leaf and root breakdown.

Sub-surface irrigation

Given the shallow profile of the growing media it is not possible to use a typical drip irrigation pipework as the wetting pattern is centric to the drip emitter. We have proposed a drip irrigation system that sits within the growing media and is designed to disperse the water laterally from the drip emitter whereby the water is then moved vertically and horizontally via capillary wicking.

The fact the irrigation is sub-surface also means it is hidden from view which is beneficial from an aesthetic point of view but also from a long-term protection from damage point of view.

The irrigation controller should have a built in monitoring system to measure flow and be able to provide alerts in the event of an irrigation failure. These types of systems connect to a wireless network and not to the building BMS.

Plants and mulches

The plants chosen for the project can be seen in the concept plan and are a combination of indigenous and exotic species.

We do not recommend the use of mulches for extensive green roofs. Organic mulches such as bark chip or composts are easily dispersed by wind. Pebble mulches add additional weight and can be dangerous if birds can pick them up. We recommend the use of fast growing ground cover plants to act as a natural mulch and grasses to act as wind breaks.

Saturated weight of extensive green roof

The indicative weight of the extensive green roof build-up including stored water, saturated weight of the growing media and plants is 150 kg/m².

An allowance needs to be made for the live load for maintenance purposes.

Green Roof maintenance considerations

As with any successful garden there is a requirement for regular maintenance to ensure its long-term success. For extensive green roofs we recommend 5 maintenance visits per annum; one for each season with an additional maintenance visit in the spring/summer period.

It is important to consider how the green waste will be removed from the roof. On a roof of this size it can be expected to remove 5-10m³ of green waste at the start of spring when everything gets a heavy prune and then an additional 0.5m³ of green waste for each subsequent maintenance visit. This waste should be removed from site by the contractor rather than having green waste bins on site.

Below are typical maintenance tasks and processes that should be carried out during maintenance visits.

1. Regular Inspections

The green roof is to be observed by the client on a regular 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 the maintenance contractor needs to be notified immediately:

- Dying plants
- Drooping plants
- Excessive yellow leaves
- Excessive leaf drop
- Water leaks or pooling

2. Planned Maintenance Visits

Below is a summary of the observations and actions that should be carried out during each maintenance visit. This information is to be recorded on a Maintenance Checklist. A copy of the checklist should be emailed to the client, with the original filed.

Observations

- Brief comments on plant performance. Make note of each species in reference to their appearance since last visit in Maintenance Visit Checklist.
- Look for damage resulting from pests or disease on each species present

Actions

- At commencement of maintenance visit test moisture levels within the growing media using a moisture probe ensuring that moisture level is 'good' and not dry or wet. Note levels on maintenance checklist. Test at least 5 areas across the roof.
- MANUALLY RUN THE IRRIGATION CYCLES DURING THE MAINTENANCE VISIT AFTER TESTING MOISTURE LEVELS.

- Check for pests & diseases and treat accordingly
- Remove irrigation filter and clean every month. Ensure that irrigation valves are turned to the on position. Confirm this operation by taking photo and send to maintenance supervisor to confirm valve has been turned on.
- Check water level in fertiliser reservoir (if applicable).
- Clean guttering or grates of fallen plant matter or growing media
- Check over roof for dead or unhealthy foliage and remove
- Prune any plants that are growing too tall and causing over-shadowing
- Cleaning the plants' foliage – removing dust and other contaminants
- Trim plants that may need to be encouraged to grow laterally (ie. To bush out)
- 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 of fertilisers (slow release and foliar)
- Pest or disease treatments applied, what and where.

3. *Additional Maintenance*

If an unplanned maintenance visit is required as a result of a client request then the request must be made in writing stating the reason for the request and a proposed time and date.

4. *Emergency Maintenance*

Emergency maintenance may be required in the event of a burst pipe, blocked dripper, a blocked pipe or a major storm event. If emergency maintenance is required, then immediate access must be granted to the maintenance contractor to address the problem.

5. *Plant Replacement*

- At times certain plants may fail due a number of external factors. If this is the case, replacing plants may be warranted. This is most often during the establishment period as plants are acclimatising to their new environment.
- As the living roof grows, plants with certain plant habits (such as scramblers and ground covers) are encouraged to grow into areas where other plants have not colonised by layering and aerial rooting. This negates the requirement for actual re-planting species in some cases while keeping the vegetated area as planned. This method minimises disruption to the growing media and mess associated with re-potting.
- If the plants growth characteristics do not allow it to be layered then cuttings may be taken to strike in-situ or preferable good quality tube stock can be sourced for replacement.

6. *Pest & Disease Treatment*

- All plants that are used during installation should be healthy and free from pests and diseases. If any pest or disease issue is detected in situ this must be reported immediately and appropriate action taken. The maintenance contractors philosophy on pest and disease management should be to use least toxic methods for control and aim to have healthy plants that are resilient to attack in the first place. Early 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 which may find their way into the green roof can be controlled by a mild soap spray 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, then appropriate safety measures need to be implemented or then affected plant species removed altogether and replanted with a different plant species