Park Roof
A Landscape Architects Perspective

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INTRODUCTION

There have been many different applications and scales of green roofs through history. This paper is focused on passive recreational space provided in high density developments. These recreation areas are sometimes referred to 'Private Public space' when they are gated or 'internal.' They are often built over an underground car park area or increasingly on rooftops of multi use multi unit residential buildings. This paper considers the nature of these projects and examines some of the opportunities, technical aspects and how they can most effectively contribute to the development of 'Green Park Roofs'

Green Park Roofs can make a valuable contribution towards a sustainable planet.

How many plants you fix on the face of a building or layout across the roof or plant around or through a building, has no real bearing on how 'green' a building is. Many 'jungled up' buildings perpetuate a far greater carbon footprint in their production and upkeep than a spatially and materially well thought out space that is sympathetic to its aspect, location, climate and seasons.

A Park is often defined as "any area set aside for public recreation". And 'Green' in the modern political sense is not to do with plants but refers to a considered contribution to planetary environmental sustainability. This is no different in the discipline of Landscape Architecture. An accessible rooftop of say nothing more than sand and a safety fence is a very good example of a 'Green Park Roof'. It alleviates pressure on local public parks by providing an alternative recreation area for residents but represents a low carbon footprint in terms of implementation and ongoing maintenance. To sharpen the definition further a 'Green Roof' alone may not even be accessible to the buildings occupants. For example an office block mounted with wind turbines and solar panels but no recreational access is equally a 'Green Roof'.

A 'Park Roof' would contribute to the social environmental benefits that a park offers an area or a suburb, such as relaxation and social interaction in a seemingly less constructed environment. It should also be 'Green' in the planetary sustainability sense and that apart from some other benefits this is achieved by the minimisation of 'carbon heavy' construction materials and methods and or a design that is as self perpetuating as possible over time i.e. the lowest possible ongoing maintenance requirements to achieve the desired usage outcome.

BENEFITS

- Provision of beautiful dramatic aspects

-Park roofs can have a longer life-span than standard roofs because they are protected from ultraviolet radiation and the extreme fluctuations in temperature that cause roof membranes to deteriorate.

-Sound insulation such as from jets or other ambient noise.

- A valuable community asset. In densely populated areas additional passive recreational space takes pressure off public spaces. The rooftop of the M Central Building in Ultimo is regularly used for dog walking and has facilities such as dog bag dispensers in place.

- A valuable development asset. The addition of a green roof can be a minimal outlay when compared to the cost of the whole project and the reaction and value it can add to a development.

-Power generation. Our cities are among our greatest power consumers. As roof tops are generally located in the windiest and sunniest part of the city there is clearly great potential for power generation such as wind or solar. Even just to supplement individual buildings draw from the electricity grid.

-Site activation and the benefit of passive surveillance. This applies to both the immediate site as well as adjoining areas. Vandalism can be greatly reduced in a Park Roof environment as a result of group ownership mentality. There is also the potential surveillance value of overlooking adjoining public sites.

-Moderation of the urban heat island effect;
The heat island effect is a phenomenon resulting from the concentration of city infrastructure which in turn retains heat and elevates temperature when compared to the city surrounds. The reduction of hard reflective surface area and the process of evapotranspiration from foliage reduce this effect. While arguably negligible against the heat generated from an entire city with the current percentage of green roofs this process certainly contributes to the amenity of local or microclimates.

-Improved storm water management;
Foliage surface area alone can hold a substantial amount of water before it starts to pool and head to drain points. The growing media can absorb a great deal of water that would otherwise go straight to stormwater drains thus reducing peak flows. This is then released back into the atmosphere either directly from the soil or via the plant stock. Water that does make it through the soil will have a large amount of particulate matter removed by growing media filtration.

-A reduction in energy consumption;
Thermal insulation, depending on a buildings proportions the growing media, planting and construction method of a Green Roof Park it can contribute a significant amount of thermal insulation to a building reducing air conditioning costs.

- Localisation in the City of Villages, people could be more inclined to take the lift or the stairs to the ‘park’ rather than jump in the car.

-Habitat & Biodiversity
Rooftop habitats can link isolated habitats, provide protected areas for threatened species such as plants or ground nesting birds or even just habitat for urban birds thus adding to the appeal of the spaces to the human users.

DESIGN CONSIDERATIONS
-It is important to consider that while this is a park space, there is a defined user group in the case of a multi unit residential building. This generally means we can provide a more intimate setting in the sense that it is directly attached to domestic dwellings and the risk of vandalism, theft or violence is partly reduced. In the past I have added semi secluded areas like reading lawns along with communal BBQ areas and making provision for private courtyards within the roof space.

-Similar environments;
It is interesting to note some of the defining characteristics of the roof park space. Security, this generally comes down to limited accessibility and usage by people (compared to general public access at ground level), exposure to the elements, limited depth to the substrate or sub soil foundation, dramatic and panoramic views. Different elements of a roof park can be experienced at ground level such as a park on shallow rock situated on an ocean headland.

-Species;
Species should be selected to suit the user requirements but it is equally important that they have evolved in a similar natural environment to the rooftop scenario. In the Sydney example think coastal cliffs or Sydney gully ridges, though similar environments have co evolved all over the world and often an exotic species is better suited to our needs than a native one in our artificial fabricated cities.

- Irrigation;
A comprehensive automated irrigation system is an easy way to artificially manipulate an environment and reduce the challenge of species selection and in theory the level of maintenance required. This is particularly pertinent in the Park Roof environment where conditions such as temperature and wind buffeting (leading to drying, wind chill and mechanical damage) are generally more extreme. However, ideally a Landscape Architect should endeavor to eliminate the requirement for an irrigation system here as in any project. This can be achieved through rigorous species selection as relevant to various microclimatic conditions.

- Drainage and sub structure;
In retro fitted buildings the additional beams required to strengthen the roof to support the load of a roof park must be considered. In some circumstances these beams extend above the general park surface. This requires drainage of individual compartments across the roof space between the beams. If feasible, by raising the finished park level high enough to negate the beams dividing the soil volume has proven a highly preferable. In the case of M Central Ultimo site, surface was raised above the beams, and the compartments between beams were filled with cut foam blocks surrounded with drainage cell sheets and covered in geotextile. An even ground plane to layout a design with unimpeded access has been a far more attractive outcome. Soil depths across the roof are then also consistent. In the case of a new structure, if there is an intent for a Park Roof space then the Landscape Architect, Engineers and Architects should all be engaged together from the buildings conceptualisation to ensure a beautifully integrated outcome. The ceiling of the roof slab and the finished level of the roof garden support structure are opposite sides of a specialized relief which needs to be fully integrated into the building structure.

- Trees
Trees will often heavily inform the requirements of the substructure. Tree roots reflecting the form of the canopy is the ultimate botanical myth! In most cases even the biggest trees roots don't go much deeper than about half a meter. In fact they spread out in a 'root plate' often multiple times the diameter of the tree canopy. The tree is engineered this way for reasons of stability and water and oxygen harvesting among other things. You can easily begin to see why tree roots are a problem on roofs when they are crammed into tiny planting boxes. Apart from this, if we can engineer a building to take multiple storeys of concrete and wind loading and keep the whole thing watertight, we can easily accommodate even the largest trees on roofs with proper consideration and a little enthusiasm.

- Access
Again the main issue here is having the roof slab integrated for a roof park from the beginning of the project. If correct set downs are allowed from access points then the roof space is like setting out any other park accepting there are special considerations to be made at the boundary. At the park boundary consideration must be made for safety and to accommodate access to views or lookout points. There is often a smattering of 'no go zones' in these environments. These often exist around service equipment, AC plant or areas where a person may overlook private areas. Design solutions that avoid unsightly barrier fences are desirable in an open roof area. Where feasible, one alternative to barrier fencing has been a ground plane of large aggregate material. As this is generally difficult to walk on it excludes all except the most deliberate.

- Aspect
One of the attractive elements of these spaces is that they are dramatic and elemental to be in. It is important to think of these spaces as 'Parks' in the sense that they are generally good weather spaces. The provision of BBQ or picnic shelters is one thing but 'shelter creep' can be a problem with these projects where the ultimate pleasure of these spaces is lost and they virtually become another mostly covered level of the building.

CONCLUSIONS

Early cooperative integration
The integration of roof park sub structure is a primary point for consideration. Often designers are asked to look at the roof park possibilities after much of the structural thinking has been set in place. Again if the assimilation of the roof space and building below can be coordinated from the inception the resulting value and experience of the roof space (and thus the whole building from the users perspective) can be greatly increased without compromising any of the requirements of ceiling heights and or services below. The overall finished height of the structure should be an integrated investigation from the onset and may be negotiable with positive reaction towards a green roof space from Development Authorities.

- Similar environments: This is not just a climatic consideration. The growing media and the root volume dimensions and other, sub finished levels, are critical to the success of the intended vision. We should consider the elevated parkland to be an integrated part of the structure of the project. If it is intended to gain the most benefit from the proposed areas for the project and end users, then collaborative thinking between disciplines is required from the inception of the project. Obviously the potential of a passive recreational roof space will be limited if it is only an addition considered when a buildings is structurally resolved. For example the roof slab is already decorated with its various protrusions relating to air conditioning, lift shafts, water pumps, maintenance access, light wells and the form, levels and load bearing of the resulting roof slab is a reflection of the activities taking place below it without consideration for those above.

Apart from the consideration of the horizontal alignment of elements on the roof there is the consideration of the roof slab arrangement. In fairness to the end user neither spaces above or below the roof slab should suffer as an afterthought as per any storey of the building. To create the effect of stepping into a park requires access points to the roof space that have allowed for soil depth extended from the roof slab (generally 50mm drainage, 300mm soil, 80mm mulch). For trees 600mm is more generally required and so vertical retaining can be integrated into a formed slab to step or ramp some finished soil levels up. A preformed slab accommodating the level

requirements of the proposed roof space also ensures access ways can run level from access points. As a result, any decking substructure can then be accommodated below door thresholds. Without these types of slab considerations in place the roof park designer is stuck with the problem of trying to create planting volume in raised planters on a flat slab with walkways stepping up from doorways and to lawn islands.

Value adding
A green park roof can be defined as "Value adding to a community and stakeholders while reducing negative environmental impact".

Over the past decade green roofs have grown significantly in popularity. Many start as simple explorations of WSUD principles or rooftop design projects, often evolving as additional to the original brief. The expansion of projects to include these aspects beyond the initial requirements has generally lead to an increased sales potential for the attached dwellings and thus more enthusiastic funding from contented clients who recognise a good investment return compared to the outlay of the Park Roof. To take a simplified example think of the cost of adding an additional lift level or stair to a public access point and some safety fencing, timber decking and lawn across a roof top compared to the entire building project cost, its minimal. And then compare the positive impact reaction from potential tenants or buyers who have access to all that additional good weather space for book reading, sun lounging, dog walking, taking in the view with visitors or hosting a BBQ and in the knowledge that generally only people from their building community or their guests will be up there. The Park Roof can also bring a more positive reception from Development Approval Authorities.

The Green Park Roof is a comparatively simple technical component of a proposed building or a retrofit when considered from the onset of the project.

The Green Park Roof is a sound development investment when the appeal of the space to potential buyers is compared to the cost of the space in relation to the whole project.

The Green Park Roof makes a number of Social, climatic and biological environmental contributions towards the goal of sustainable communities.

BIOGRAPHY

Liam Noble began his career as a demolition construction labourer in 1987 then Landscaping and working as a Landscape Foreman while studying Horticulture and Engineering. Eventually going on to study landscape Architecture at UNSW where he still takes time out from work from year to year to Tutor design students. He has a BLA Hon 1, Bachelor of Landscape Architecture, University of NSW (Hons 1) - Thesis: Management of Hybrid Ecosystems in the Sydney Region (Hons 1); Assoc.Dip Hort Eng.; Associate Diploma Engineering/ Horticulture/ Land Management, Ryde Horticultural College.

From 2003-2008 he worked for 3600 Landscape Architects, Design Lead, Senior Landscape Architect. He was a Tutor at UNSW, Final year design studio with Professor James Weirick. 2002-2003. L.A.N.D. Horticultural consultancy and design. (self employed consultancy) 2000-2002. Jane Irwin Landscape Architecture, Landscape Architect Urban Design / Public Works projects: Sydney University multi-area landscape improvements, Bronte Retail Centres Public Domain Improvements Plan, Broughton Anglican College (Sydney), St Peters Anglican College (Sydney).

Liam is currently a Senior Landscape Architect at Complete Urban.

COMPETITIONS AND AWARDS

- 1998 Lindsay Robertson Memorial Prize for design.
- 1999 Nominated for the Hassall Prize.

SOME MAJOR PROJECTS

- 2003- Present Sam Fizsman Park Bondi, Client; Waverley Council
- Merino Central Wool store Conversion, Client; Caverstock
- Silos, Client; Grant Samuel Property
- Westons Biscuit Factory Conversion, Client; MM Group
- Sugar Valley West Walls End Newcastle. Client; Australian Enterprise Holding
- Penrith New Town Centre, Client; The Davis Group
- Redfern National Indigenous Development Centre, Client; Indigenous Land Corporation
- 207 Whale Beach Road, Client; David Wilkie