



Evolving Roof Gardens of Public Housing Estates in Singapore

Building Heartware via Skyrise Greenery

Text by Rachel Teo
Images as credited

The greenery helps to soften hard, concrete surfaces of car park roof decks and provide visual relief from the otherwise bare concrete surfaces.

For over five decades, the Housing & Development Board Singapore (HDB) has been providing green spaces for residents to enjoy—from landscaped areas within the housing precinct (Fig. 2), to neighbourhood parks, and Common Greens (Fig. 1). In fact, till the 1980s, HDB also designed and developed town parks and regional parks, which now are undertaken by the National Parks Board (NParks).

In the last decade, HDB has introduced roof gardens in public housing estates to provide more greenery, improve the environment, and create communal spaces for residents to enjoy. With that, they evolved into integral community and recreational spaces for residents, and even gardening plots. This article considers the design principles behind them and their role in shaping the community.

Public Housing Estates for Better Living

Recognising that greenery is vital in creating a quality living environment, HDB has been exploring ways of introducing more greenery in public housing estates, given the increasingly limited ground space. Back in the 1970s and 1980s, HDB estates were mostly made up of slab blocks with surface car parks interspersed with simple landscaping on the ground. However, with changing socio-economic and demographic environments, HDB estates evolved, and new housing block typologies and Multi-Storey Car Parks (MSCPs) developed.

With this, greenery provisions in public housing estates also expanded to embrace a wider variety of greenery types, including rooftop gardens. Since the 1990s, besides ground-level landscaping, HDB has also been providing greenery on the roof decks of car park structures, such as roof gardens on MSCPs. The greenery helps to soften hard, concrete surfaces of car park roof decks and provide visual relief from the otherwise bare concrete surfaces.

Greenery on roof decks also helps to lower ambient temperatures, making the living environment more pleasant, particularly in Singapore's hot climate. In addition, roof gardens provide recreational spaces for residents to enjoy. They play a vital role in supplement-

ing and replacing the ground-level greenery in HDB estates, where ground space is limited. In some precincts, roof gardens serve as the main recreational and landscape space.

Today, all new MSCPs are provided with a landscaped roof deck that is accessible to residents. They are also designed to allow for community gardening, a leisure activity that is gaining popularity among residents. Supporting amenities, such as water points, spaces for tool sheds, and seating, are provided. Such community gardening could be a form of exercise for residents that also helps to foster community ties.

To date, HDB has built more than a hundred roof gardens, with more currently under construction and some existing MSCPs being upgraded to include landscaped decks.

Types of Roof Gardens

Generally, roof gardens in public housing estates are located on the roof decks of car park structures. They can be categorised into two broad categories, depending on the amount of facilities provided and the intensity of planting.

Roof gardens that have more facilities and planting are well integrated with the residential blocks by way of link bridges and usually serve as the main recreational spaces within precincts. Generally, these decks sit on lower but more extensive car park structures. On these roof gardens, "3-Generation" (3G) facilities, encompassing children's playgrounds and elderly and adult fitness corners, are located. There may be jogging tracks, hard courts, and plenty of spaces to sit and relax.

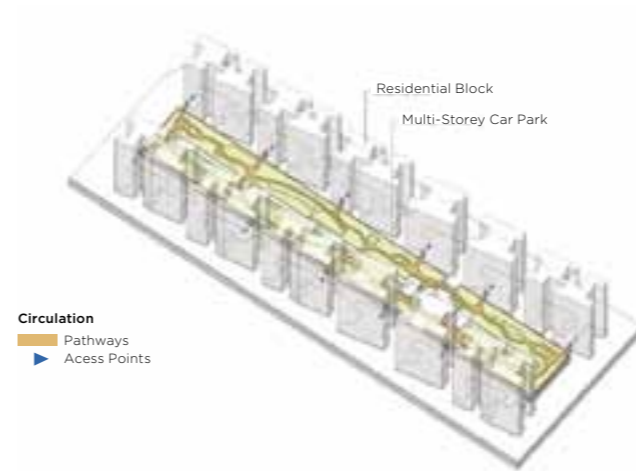
Another type of roof garden is one with fewer facilities and less intense planting. They are simpler, with modest facilities, such as benches and trellises. Usually these roof gardens are located on taller MSCPs, with access via the car park lift, and sometimes supplemented by one or two link bridges connecting it to nearby residential blocks. These gardens play an important role in softening the harsh building environment with landscaping and provide additional space for community gardens.



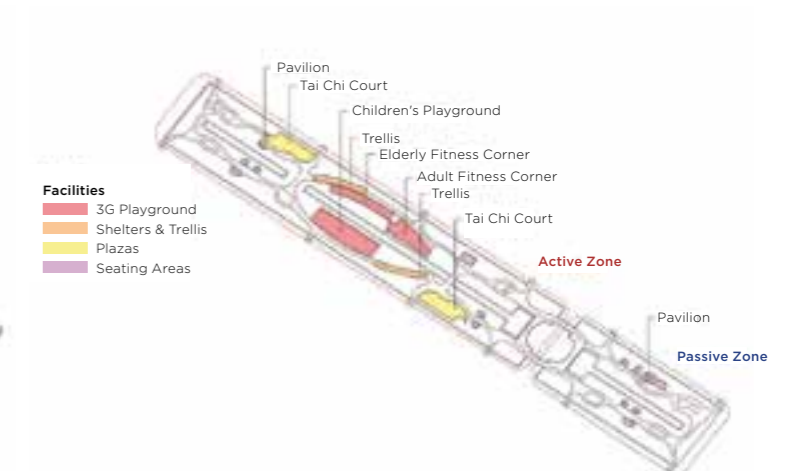
1. Example of a Common Green in Punggol (Photo: Hoo Xin Yu).

2. Landscaping within a housing precinct (Photo: Rachel Teo).

3. Spaces are defined by the curvilinear planter shapes, creating a garden-like experience with meandering paths (Photo: Loo Sai Boo).



4
Circulation Paths and Access Points to the Roof Garden in Punggol Breeze (Diagram: Rebecca Sng)



5
Location of Facilities on the Roof Garden in Punggol Breeze (Diagram: Rebecca Sng)

Guiding Design Principles

Several principles that guide the design of ground-level landscaping are also applied to roof gardens. The differences are technical in nature, as the greenery of landscaped decks is not planted on true ground. A key driver of HDB's roof gardens is the user experience and friendliness.

Spaces

Spaces on the roof garden are designed to cater to various activities. For instance, community gardens require planting beds, while *tai chi* corners require open spaces. These activity spaces are located to complement one another and take into account infrastructure such as ventilation voids and staircase accesses from car parks.

Following the layout of spaces, the detailing and use of materials help to define these spaces. An open plaza on the roof garden may be defined by using a different paving material from the footpaths. Plants may also be used to frame or anchor a plaza space and provide shade. Planter beds are designed to define the space and provide seating.

Spaces are also enhanced to evoke unique spatial experiences and qualities. Plants are carefully selected to provide shade over seating areas and give a sense of tranquillity or vibrancy.

Access

Consideration is given to access *to* and *within* the roof garden. To encourage residents to use the roof gardens, they are made easily accessible via link bridges from residential blocks or by way of staircases and lifts in car parks.

On the roof garden, connections between spaces are designed such that one space flows seamlessly to the next. A looped circulation is preferred for spatial continuity and dead-ends are generally avoided for security reasons.

Context

The roof garden is laid out with the structure of the MSCP in mind. The presence of features, such as ventilation voids for car parks, and the location of staircases and lifts help to determine the location of footpaths and various activity spaces, as well as planting. Taller trees are located above columns, which help to bear their load.

Facilities are also placed on the deck in relation to surrounding residential units. Generally, noisy facilities are located away from the units to minimise disturbances. The shadows cast by blocks provide shade for activity spaces.

Maintenance

It is important to design roof gardens to ensure ease of maintenance. For example, planting beds are designed such that they can be easily accessible for pruning of plants, removing of dead leaves, and loosening of soil. Hence plants should preferably be within arm's reach from access locations. Watering systems are also provided so that plants are watered with just the turn of a tap.

Suitable hardy and durable plant species for rooftop planting that require low maintenance are chosen to ensure the survival and sustainability of the plants in the long run. Plants that need less maintenance will reduce manpower.

A Stroll Through Punggol Breeze

Punggol Breeze, a recently completed Built-To-Order project by HDB, illustrates how these design principles may be realised in a project. Located in Punggol, one of HDB's newest towns, Punggol Breeze, sits at the intersection of Punggol Drive and Edgefield Plains. The roof garden is located on the top deck of the two-storey MSCP and flanked by two rows of residential blocks. Access to the roof garden is provided via link bridges, which connect all blocks to the roof garden (Fig. 4).

The design of the roof garden is conceived to be garden-like, with

Benefits of community gardening include being able to grow and harvest fresh food supplies collectively, which is a step towards greater food resilience.

meandering paths (Fig. 3). Lush planting of trees and shrubs evoke a garden setting. To achieve this, structural provisions such as reinforced beams were provided from the outset to enable trees to be planted more freely, instead of being restricted by the locations of the columns of the MSCP below. A variety of spaces is designed along the main footpath. These spaces are provided with small seating niches marked by planting and different ground materials (Fig. 5). Facilities that potentially generate noise disturbances, such as children's playgrounds, are sensitively located on the inner side of the footpath, away from residential units (Fig. 6 - 8).

For ease of maintenance, planting beds are designed to be easily accessible (Fig. 9). Paths between the parapet wall and planting beds allow maintenance works to be carried out along the periphery of the roof garden. This is where rainwater downpipes are also located, where they can be inspected from time to time and checked for any blockages.

Today, the roof garden presents residents with more attractive views of a lush, green landscape, compared to barer concrete decks (Fig. 10). Residents appreciate the importance that roof gardens play in making the environment more conducive and pleasant to live in. The recent Punggol Breeze project illustrates how public housing roof gardens can provide quality landscape spaces for residents and still ensure maintainability in the long run.

Although ground-level greenery is still usually preferred over skyrise greenery, because planting on the ground can be lush and trees can be taller, skyrise greenery offers a significant complement. With increasing densities, more greenery on rooftops is needed to relieve the corresponding effects and create a more conducive environment for living in, by providing more space for residents' use and improving the environmental and aesthetical qualities.

Many residents have learnt to appreciate the greenery on our car park decks and make good use of them for leisure and catching up with neighbours. What more can we achieve with high-rise greenery?

Community Gardening

In recent times, there has been a growing interest in community gardening and urban farming as people become increasingly aware of the benefits and pleasure of gardening. After all,


agriculture and productive landscapes were the original impetuses for landscaping in garden history. HDB has also taken interest in exploring such spaces.

With limited land in Singapore, roof gardens offer spaces for community gardening, in addition to other areas in the Common Greens. Since 2012, HDB has been providing spaces for community gardening on new MSCP roof gardens and though still small this number is expected to grow.

Benefits of community gardening include being able to grow and harvest fresh food supplies collectively, which is a step towards greater food resilience. Examples of food crops include sweet potato and tapioca. Residents also see community gardening as an activity they can participate in to keep fit together with their neighbours. In public housing estates especially, the building of "community" is just as, or even more, important than the "farming" aspect. As community gardens are set up and run by residents, they encourage a greater stake and sense of ownership of greenery in respective estates, which ties back to HDB's larger goal of creating a sense of place and belonging in public housing estates.

During the design phase, infrastructure and facilities for community gardens are provided for, and residents are encouraged to use them. These include planting beds and supporting facilities, such as rest areas and tool sheds. A MSCP roof garden may have an area of approximately 150 square metres set aside for community gardening. The community gardens differ in size depending on the design of the roof garden (Fig. 11).

Ultimately, after the hardware is provided, the "heartware" is needed to bring the space to life. The gathering of like-minded neighbours to form a gardening group is the beginning of forging community bonds and friendships. Once a group is formed, residents can approach the Residents' Committee in their estates to help set up the community gardens. This is further supported by NParks' Community-In-Bloom programme, which offers residents advice and tips needed for starting these gardening plots.

With ground-up initiatives such as opportunities for community gardens, it is the people who will ultimately decide how to use and enjoy the space that is provided for them. Engaging them is instrumental, and would remain one of the many challenges of HDB. After all, people are at the heart of what we do. 



6. Spaces are carved out for seating and defined by their surrounding planting and paving materials (Photo: Rachel Teo).

7. 3-generation facilities such as playgrounds for children are found on the roof garden (Photo: Rachel Teo).

8. Facilities that may generate noise disturbances are located on the inner side of the footpath, further away from residential units (Photo: Rachel Teo).

9. Planting islands are designed to be reachable from both sides for ease of maintenance (Photo: Loo Sai Boo).

10. Aerial view of Punggol Breeze's roof gardens from the adjacent block (Photo: Loo Sai Boo).

11. Example of a community garden on a MSCP rooftop at Dover Crescent (Photo: Hoo Xin Yu).