

## **Legislative Council Panel on Housing**

### **Measures to Increase the Greening Ratio of New Public Rental Housing Estates and the Provision of Recreational Facilities in Existing Estates**

#### **PURPOSE**

This Paper aims to brief Members on the measures implemented by the Hong Kong Housing Authority (HA) to increase the greening ratio of new public rental housing (PRH) estates and the provision of recreational facilities in existing estates.

#### **GREENING MEASURES**

2. In his 2009-10 Policy Address, the Chief Executive stated that we would “Increase the greening ratio of all new public rental housing estates to at least 20%. We will also provide green roofs in low-rise buildings and provide vertical greening in some pilot projects wherever feasible.” The Council for Sustainable Development (SD) has proposed a greening ratio of 20 to 30% for new projects with sites larger than 1 000 m<sup>2</sup>.

3. The HA has launched a number of measures to increase the greening ratio of PRH estates with a view to enhancing green and healthy living environment, implementing the directives in the Policy Address and putting into effect SD’s proposal. Back in 2000, the HA piloted Ching Ho Estate in Sheung Shui as a green estate with various greening measures including vertical greening.

4. The HA formulates comprehensive greening plans with due consideration to site constraints when planning and designing new PRH estates. We adopt the following four measures in our new PRH estates –

- (a) provide planting at grade and slope areas as far as possible;
- (b) arrange green roof or green decking to low-rise structures, covered walkways, carparks and vehicular access where possible;
- (c) install a grass-paving system in open carparks, loading and unloading bays, emergency vehicular access routes and areas with less traffic; and

- (d) implement pilot vertical greening while exploring the inclusion of vertical greening in the greening ratio.

Details on the above four measures are set out in the **Annex**.

5. Furthermore, we are actively conducting research into new greening technologies, and have conducted a technical study for vertical green panels (VGPs) in Yau Lai Estate. Initial findings indicate that a VGP covered wall was about 16°C cooler than bare concrete wall on a hot afternoon. We will monitor the long term performance, installation cost and maintenance cost to keep the green panels in good conditions, before committing to large scale implementation of VGPs.

6. Looking forward, we will continue to enhance greening in new PRH estates. We will increase the greening of our non-accessible roofs with drought tolerant plants in view of their hardiness and low requirement for maintenance. Should the long term performance of the proprietary mulching method and VGPs prove satisfactory, we will adopt more non-conventional vertical greening measures to supplement the traditional climber planting methods. Grass-paving systems will also be promoted under suitable environmental conditions. We will strive to increase the overall site green coverage of our new PRH estates to at least 20%. The greening ratio will be further increased to 30% for new estates with a site area exceeding two hectares. HA will continue to carry out research and development activities on specialty greening technology, e.g. green roof and vertical greening, so as to augment our greening options.

## **RECREATIONAL FACILITIES**

7. We strive to enhance the living environment in the existing PRH estates and have carried out improvement works to provide a wide range of desirable recreational facilities to suit the tenants' needs. To cater for the aging population, the proportion of fitness equipment specifically designed for the elderly such as "Tai Chi" push hands, bicycle stepper, foot massage path and various body stretchers has been substantially increased to 27% of the total amount of playground equipment in the PRH estates in the past ten years. We have also improved the barrier free access for the elderly as well as people with disabilities to assure the accessibility of these recreational facilities.

8. We regularly upgrade and increase the variety of recreational facilities, by taking into account local views and monitoring the usage of existing recreational facilities. We also introduce the concept of communal play areas by integrating recreational facilities for different age groups in an area to encourage interaction and participation of grand-parents, parents and children in the community. For example, we would explore the feasibility to provide elderly fitness equipment, Tai Chi court and pavilions in the recreational area with children's play equipment such as multi-play structures, slides and seesaws so that adults can look after the accompanying children while using the facilities at the same time.

9. We will install 1 700m<sup>2</sup> of additional recreational facilities in the 2010/11 financial year in all PRH estates to respond to the needs of the tenants. These facilities will include elderly fitness corners, landscaped sitting-out areas and open performance venues for dancing and community events. We will decide on the most appropriate type and optimal number of facilities by taking into consideration the usage of the existing facilities, opinion of the local tenants and the advice of the Estate Management Advisory Committees.

## **WAY FORWARD**

10. HA will provide PRH tenants and the community with a greener, healthier and more comfortable living environment. Members are invited to note the measures implemented by HA to increase the greening ratio of new PRH estates and the provision of recreational facilities in existing estates.

**Transport and Housing Bureau**  
**May 2010**

The Housing Authority (HA) has been adopting the following four measures in new public rental housing (PRH) estates:

**1. Provide planting at grade and slope areas as far as possible**

i. *Planting at grade*

Greening at grade provides greater opportunities for planting and preservation of trees, as well as planting of larger size vegetation. Such at grade vegetation mass will bring the highest greening benefits and provide the residents with more direct enjoyment and appreciation of greening. We have a long-established planting target of providing at least one tree for every 15 flats in new PRH estates.



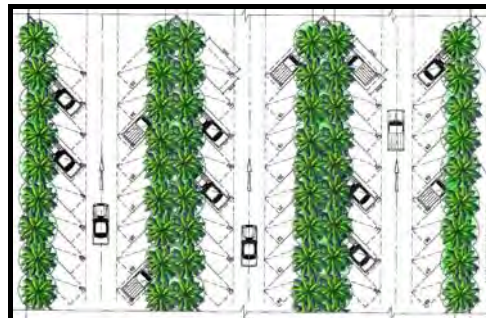
A silk tree in Sau Mau Ping Estate providing shade for residents



A Chinese Banyan tree in Upper Ngau Tau Kok Estate providing shade for residents

In addition, we will maximise greening opportunities in our new developments through the following approaches:

- (a) provide integrated planting to open carpark as a balanced landscape treatment;



(b) make full use of areas around domestic blocks and other buildings/structures for planting;



Planting around a domestic block



Planting around a domestic block



Planting around a small building



Planting around a small building

(c) provide more planting along Emergency Vehicular Access (EVA) and estate roads; and



A line of trees planted along an estate road

(d) integrate planting with covered walkway design.



Greening on columns and roofs in covered walkway design

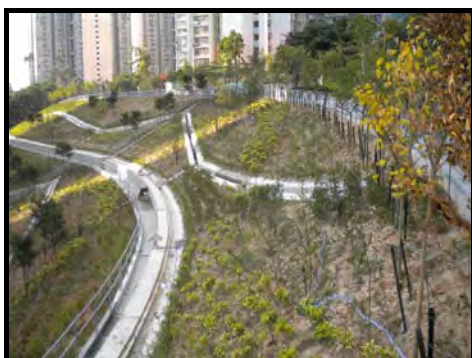


Covered walkway integrated with roof greening



ii. Planting at Slope Areas

For estates with extensive slope areas, we will maximise plantings in slope and slope associated planting area on crest, toe, berms and in adjacent pavement. Man-made slopes would be designed and constructed more with landscape treatment rather than by solely engineering solutions. More native plant species are to be used in slope planting to reinstate the natural habitat and blend in with the surrounding natural environment.



A total of 22 native tree species and 14 native shrub species were planted in the Sau Mau Ping South Estate slopes

**2. Arrange green roof or green decking to low-rise structures, covered walkways, carparks and vehicular access where possible**

Since 2004, for new housing developments design, HA has been committed to providing green roofs in low-rise structures with extensive planting, such as covered walkway or vehicular access, commercial centres, carparks and refuse collection compounds wherever feasible. We will provide green roofs with irrigation system and suitable safety barriers for long term maintenance. We have completed 420 square meters of green roof in two new estates in 2007/08, 3 500 square meters of green roof in six new estates in 2008/09 and about 3 000 square meters of green roof in ten new estates in 2009/10 using different types of vegetation.

Three types of vegetation have been adopted in extensive green roof installation.

(a) Grass

Grass can effectively reduce the glare reflected from hard surface, such as the grassed commercial centre roofs in Choi Ying Estate and Tin Ching Estate. The capital installation cost for grass is low but it requires more subsequent maintenance, such as the provision of easy access for grass maintenance machinery.



Grassed roof for commercial centre in Choi Ying Estate



Grassed roof for commercial centre in Tin Ching Estate.

(b) Sedum plant

We have planted drought tolerant sedums on the roofs of the refuse collection compounds in Ching Ho Estate. The capital installation cost for sedum plants is high but it requires less subsequent maintenance, although there is only limited choice of sedum plants for selection, in which *Sedum mexicanum* and *Sedum kamtschaticum* show excellent performance in draught resistance.



Green roofs of a refuse collection compound in Ching Ho Estate



Sedum mexicanum



Sedum kamtschaticum

(c) A combination of small shrubs and groundcovers

More varieties of plants can be selected for roof greening on soil-based substrate by a combination of small shrubs and groundcovers, but require adequate maintenance to keep the spreading of weed plants under control. The examples include the green roofs of covered walkways and a small building in Upper Ngau Tau Kok Estate.



Covered walkway with roof greening in Upper Ngau Tau Kok Estate



The green roof of a youth centre in Upper Ngau Tau Kok Estate

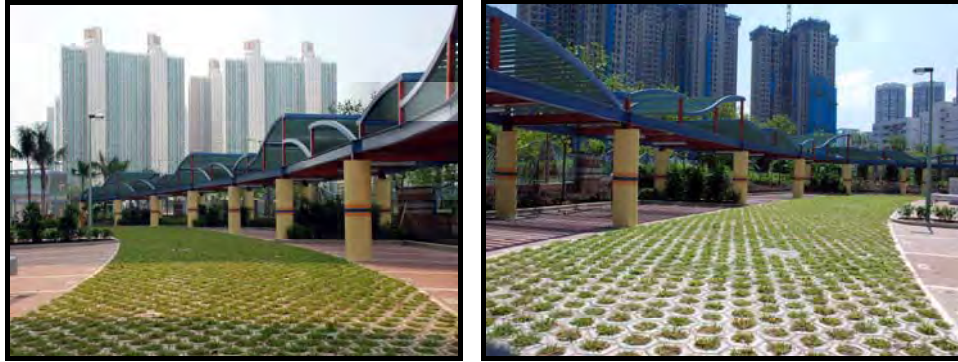
The required depth of growing substrate for green roof is critical as it affects the roof slab structural design. Comparing with other vegetation types, roof greening by sedums has the advantage of thinner growing substrate requirement of around 100mm or less.

**3. Install grass-paving system to open carparks, loading and unloading bays, emergency vehicular access and areas with less traffic**

Provided that there is sufficient sunlight for grass growth, grass-paving system is an alternative to hard paving surfaces for open carparks, loading and unloading bays, EVA and other areas with less traffic. The main observations on the grass-paving system installed in Hin Yiu Estate, Ching Ho Estate and Tin Ching Estate are as follows:



- (a) successful establishment of grass-paved access route with limited vehicle use in Tin Ching Estate.



- (b) the overall result in Hin Yiu Estate is satisfactory. Excessive heat under the engine of parked cars caused wilted patches and requires regular maintenance to control weeding.



- (c) to facilitate pedestrian traffic, some parts of grass paved area were filled with concrete to form path for wheelchairs and trolleys in Ching Ho Estate.



In implementing the grass-paving system, we are mindful that:

- (a) suitable environmental condition is essential, i.e. adequate sunlight, less traffic flow and sufficient maintenance such as watering and weeding; and

- (b) grass-paving system is less suitable for frequent pedestrian traffic areas, but more suitable for EVA and estate road with lower traffic volume.

#### **4. Implement pilot vertical greening while exploring the inclusion of vertical greening in the greening ratio**

We make use of (I) traditional climber planting methods as well as (II) non-conventional planting on vertically placed growing substrate such as proprietary mulching system and vertical green panels for the greening of vertical surfaces.

##### **(I) Traditional climber planting methods**

Introducing green cover to vertical or inclined surfaces by climbing vegetation has been a traditional low cost greening method. Vertical greening is formed by planting climbing vegetation at toe of hard surfaced slopes or fence walls for gradual extending and ascending the surface by way of (a) climbers direct on slope or wall surface, or (b) creepers on climbing frame. Both methods have the advantages of low installation cost and easy maintenance.

##### **(a) Vertical greening by climbers**

Climbers with suckers such as ivy and creeping fig can form a relative homogeneous green foliage layer completely covering the hard surface after a period of time as demonstrated in the case of a noise barrier wall in Kwai Chung Estate Phase 1. Climbers perform better on rough surface, such as concrete and granite walls than smooth tile finished walls.



Greening by planting of climbers on a noise barrier wall in Kwai Chung Estate Phase 1

(b) Vertical greening by creepers on climbing frame

Creepers can wind themselves around a climbing frame, trellis, pergola or wire net installed and attached to a vertical surface, with wider varieties. Furthermore, creepers with flowers can be selected to add visual interest to greening works, e.g. Oi Tung Estate. Most of the creepers are fast growers and can achieve quick vertical greening effect, such as the creeper planting in Choi Ying Estate and Ching Ho Estate.



Creepers on climbing frame in Choi Ying Estate



Creepers with flowers in Oi Tung Estate

(II) Non-conventional Planting on Vertically Placed Growing Substrate

Non-conventional vertical greening by direct planting on vertically placed substrate could be divided into (a) proprietary mulching method; and (b) vertical green panel method.

(a) Proprietary Mulching Method

Under this system, a thin layer of proprietary growing substrate, pre-mixed with seeds of grass or small vegetation, is applied onto the inclined surfaces which require greening. A vegetation cover is developed with the support of nutrients released from the growing substrate. This method is particularly suitable for rough and irregular non-soil or rock slope surface greening, but the vegetation growth is constrained by the limited nutrient and moisture reserves in the thin growing substrate layer. Irrigation to the vegetated surface in dry season may be required to maintain a satisfactory condition. We have applied this system to a man-made slope in Yau Lai Estate Phase 1 as a trial.





Proprietary mulching method trial at the man-made slope in Yau Lai Estate Phase 1

(b) Vertical Green Panel

Vertical green panel adopts the pre-fabrication and cladding installation concept. It could be divided into (i) large size fixed type panel; and (ii) modular type panel.

(i) Large Size Fixed Type Green Panel

The large size fixed type green panels are often free-standing and could be used as visual or noise barriers, as in the cases of Sau Ming Road Park (visual barrier) and Sau Mau Ping South Estate (noise barrier). Small size vegetation could be planted on one side or both sides of the panels, supported by the vertically placed growing substrate and connected to an irrigation system.



Sau Ming Road Park - Vertical Green Panels as Visual Barrier



Sau Mau Ping South Estate - Vertical Green Panels as Noise Barrier

(ii) Modular Type Green Panel

Modular type green panels with infill growing substrate are pre-fabricated off-site and planted with selected small size vegetation before delivery to site. The pre-grown green panels are then installed on site like claddings to vertical surface and connected to an irrigation system. The greening effect by vertical green panels can be achieved within a short period of time and replacement of individual failed panels is possible with modular design. Examples include Kwai Chung Estate and Yau Lai Estate Phase 4.



Kwai Chung Estate - Modular Type Vertical Green Panels



Yau Lai Estate Phase 4 - Modular Type Vertical Green Panels