



UIA Community Architecture and Human Right Committee Webinar 1 : 30 August 2022

Sustainable Housing for Resilient Communities: The Challenges of Affordability

The Hong Kong Housing Authority's Experience

“Smart and Healthy within the 1.5 Degrees”

Ar Prof Ada YS FUNG, BBS, FHKIA, FCIQB

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The Hong Kong Housing Authority's Experience



Ar Prof Ada YS FUNG, BBS, FHKIA, FCIQB

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International Passive & Low Energy Architecture (PLEA) Award 2018

President, Lighthouse Club (HK)

President, Temporary Works Forum

President, Hong Kong Alliance of Built Asset & Environment Information Management Associations

Chairperson, Hong Kong Chapter of buildingSMART International

Chairperson, Committee on BIM, Construction Industry Council

Director, Logistics and Supply Chain Multi-Tech R&D Centre

Member, HKSAR Advisory Council on the Environment

Member, HKSAR Green Tech Fund Assessment Committee

Member, HKSAR Panel of Advisors for Land Sharing Pilot Scheme

Member, Sustainable Development Committee, Hong Kong Green Building Council

Member, HKSAR Occupational Safety and Health Council

Past Chairperson, Architects Registration Board (2011-2012)

Past President, Hong Kong Institute of Architects (2013 & 2014)

Former Director, Hong Kong Green Building Council (2014-2019)

Former Director and Board Secretary, World Green Building Council (2018-2020)

Hong Kong Special Administrative Region: Where are we?



Population **7.5M**

Land **1,100 km²**

Built up area **25%**

High-rise

High density

Compact city

Subtropical climate

Hilly terrain



Let's Build a Collaborative Future for Sustainability.



World Trend for Green Buildings in 2018:

- Affordable housing as an opportunity for sustainability
- Incorporation of green building practices into social housing

(Source : World Green Building Council Member survey 2018.
Findings based on Green Building Council data from Sept 2017 to Sept 2018.)

In making cities safe, sustainable and resilient, citizens need to gain access to sustainable and affordable quality housing. Hong Kong Housing Authority (HKHA) has been creating resilient communities in a high rise, high density compact city in sub-tropical climate.

HKHA has always been striving to make rational use of resources, overcoming challenges, bringing **passive and low carbon design, total quality, safety & health, sustainability** from dreams to fruition. These cover **process, products and people aspects**.

Public Rental Housing in Hong Kong

With a population of around 7.4 million in Hong Kong Special Administrative Region (HKSAR), the Hong Kong Housing Authority (HKHA) as a public sector client / developer has been providing affordable public rental housing to around 30% of the population, and subsidised sale flats to around 16% of the population.

- HKHA has an existing stock of about 804,878 public rental flats in 1,309 PRH blocks.
- HKHA has to build about 100,000 units in the first 5-year period according to Long Term Housing Strategy.

(Source: HKHA, Annual Report 2020/21 & HA Housing Stock Statistics)

Note: According to Hong Kong Census and Statistics Department in 2021, the total number of permanent living quarters is 2,960,000, comprising 842,000 public rental housing units, 435,000 subsidized sale flats, and 1,682,000 private permanent quarters. Total number of domestic households is 2,670,000.



Our Vision

To help low-income families with housing need gain access to affordable housing.

以人為本



Our Mission

- To provide **affordable quality housing**, management, maintenance and other housing related services to meet the needs of our customers in a proactive and caring manner;
- To ensure **cost-effective and rational use of public resources** in service delivery and allocation of housing assistance in an open and equitable manner; and
- To maintain a **competent, dedicated and performance-oriented TEAM.**



History of Public Housing in Hong Kong



The early 50s

Masses of people surged into Hong Kong due to political turmoil on the mainland. This led to a drastic increase in the number of squatters. Fires were common in these unhygienic and cramped make-shift homes.



1953

A tragic fire that broke out on Christmas night devastated the squatter area in Shek Kip Mei, making more than 50 000 people homeless overnight.

Source: Hong Kong Housing Authority >About Us >Public Housing Heritage >Public Housing Development



1954

The government immediately built two-storey bungalows on the site to provide temporary shelter to the victims.

The government set up a fund for constructing multi-storey resettlement buildings and appointed a Commissioner for Resettlement to coordinate the task.

A semi-independent organisation, the former Housing Authority was also set up to provide lower middle income families low-cost housing with self-contained flats.

Eight six-storey Mark I resettlement blocks were completed in Shek Kip Mei to rehouse the fire victims.

The government decided to implement a systematic resettlement programme.



1991

Redevelopment of the Mark I and Mark II buildings and the related rehousing programme were completed.

1992


The first series of **Harmony blocks**, which marked a new generation of public housing, were completed.

Source: Hong Kong Housing Authority >About Us >Public Housing Heritage >Public Housing Development

Twice in a Lifetime

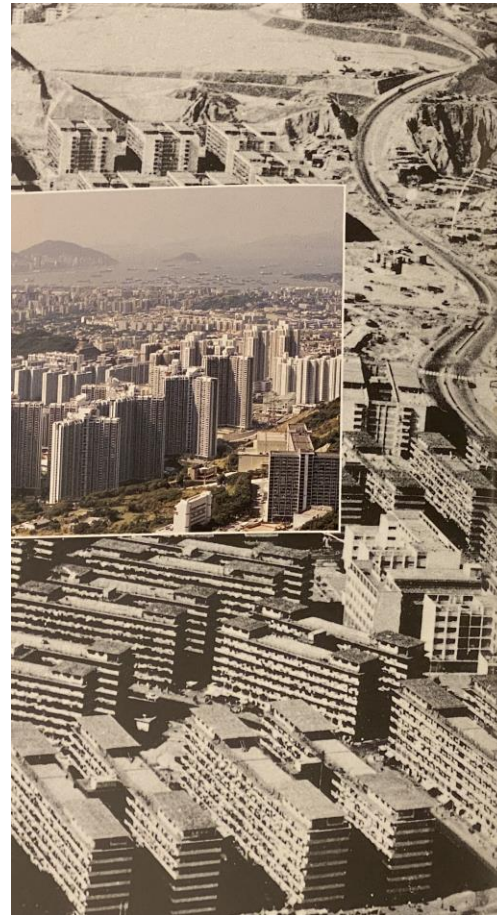
The story of Hong Kong's achievements in improving the quality of life for its people spans less than 40 years. Yet during this time the quality of settlement for a vast number of people has been significantly improved not once but twice. Now some 3 million people, equal to half the population of this vibrant, energetic Territory benefit from a social housing programme which is the envy of the international community.

This achievement started as a response to the population explosion which occurred in Hong Kong following its liberation from Japanese occupation at the end of the Second World War. From a low of 600,000, the population dramatically grew to over three million by the 1950's, a large number of them accommodated in self-built shanty structures on the hill-sides surrounding the urban area. By the mid-1960's, over 1 million people had been provided with permanent but basic accommodation in some 300 resettlement blocks. Not luxurious by today's standards but a far cry from the squatter settlements constantly at risk from fire and flood.


As successful as this response was in bringing social and economic stability to the community, it was recognised that higher quality longer term solutions would need to be found and translated into reality. The Hong Kong Housing Authority was charged with this responsibility, and its Construction Branch would be the implementation agency. 

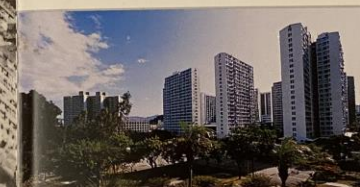


Redevelopment of the Mark I and Mark II buildings and the related rehousing programme were completed.



Renewing Central Kowloon

The largest number of early resettlement blocks were concentrated on 62 hectares of land in the heart of Kowloon squashed between the infamous Kowloon Walled City to the south, and the mountains to the north. Completed in 1965 the four estates were home to 260,000 people accommodated in 102 blocks. Life at a density of 4,000 ppha in non-self-contained accommodation would be much improved by an ambitious redevelopment programme under which a new environment would be created for a much reduced population. Work started in earnest in 1984 and will be completed by 1994. Following a carefully researched and prepared master plan which embodied sensitive local rehousing programmes for the existing inhabitants, a new city form has emerged from the drab serried ranks of the former resettlement blocks. The opportunity has been taken to improve all aspects of life from improved traffic management schemes to much enhanced local facilities, as well as providing new modern self-contained living accommodation. 



Major Achievements




Permanent housing at a low rent, with secure tenure for half the population of Hong Kong, has provided the spring board for the Territory's dramatic economic growth and its pivotal position as a key financial centre within the international market place.

Modern housing estates with educational, recreational, social, and welfare facilities immediately to hand have raised the quality and development of family life to the benefit of the community at large.

Rent arrears in public housing are less than 1% and vandalism and other measures of anti-social behaviour are almost totally absent compared with world standards.

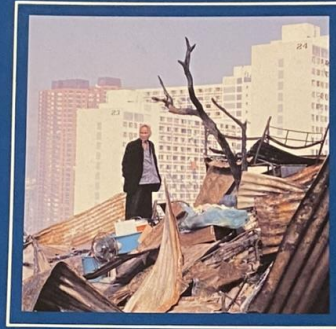
As a result of its integrated developments incorporating commercial facilities such as shops, markets and restaurants, and the selling of flats to qualified applicants, the Housing Authority is able to fund its US\$1,000 million a year capital works programme from its own income. This affords protection from Government budgetary fluctuations.

IMPROVING THE QUALITY OF HUMAN SETTLEMENTS

Upon successful completion of Hong Kong's Long Term Housing Strategy, including the comprehensive redevelopment of older obsolescent dwellings, the Territory will have a modern public housing stock of some 900,000 units, three quarters of which will be 15 or less years old. A remarkable step towards improving the quality of life for the people of Hong Kong. 

1954	53,000 people massive squatt Government in
1962	240 resettleme shelter for ov
1965	Population in resettlement b contained uni
1973	Formation of

UIA Merit Award for Improvement of the Quality of Human Settlements 1993



Twice in a Lifetime



If better is possible, good is not enough



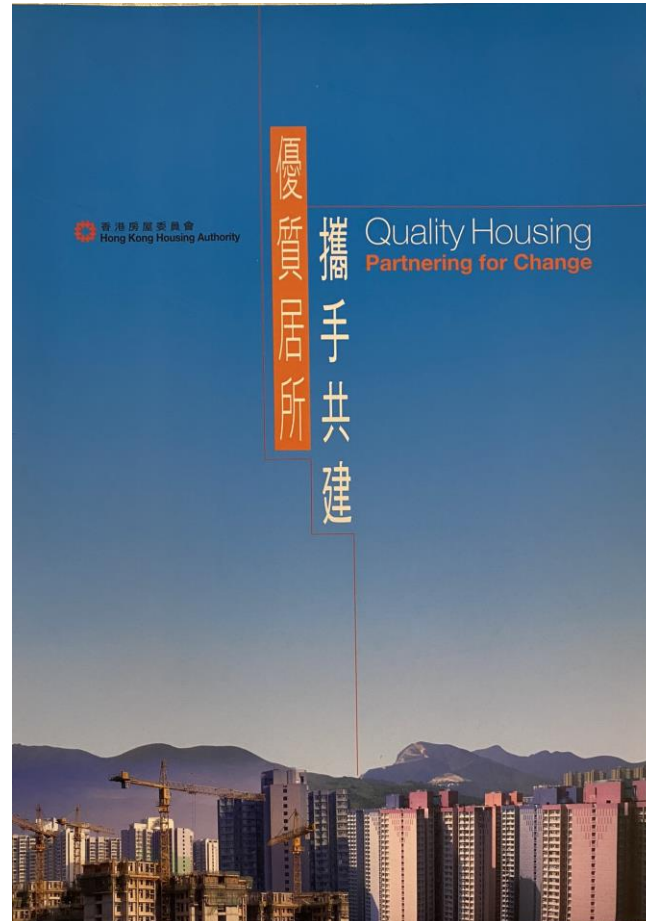
2000

The HA undertook a series of reforms on public housing quality to restore public confidence after the sub-standard piling incidents in 1999/2000.

Source: Hong Kong Housing Authority >About Us >Public Housing Heritage >Public Housing Development

“Quality Housing : Partnering For Change”

After extensive consultation, HKHA launched a Quality Reform in 2000 with 50 Quality Housing Initiatives.



Planning & Design

Since 2000, we adopt “People-centric approach”.

Site Specific Design

- *Land supply and site constraints*
- *Optimization of development potentials*
- *Planning for people; enhancing social cohesion*
- *Adaptive to community needs and flexibility*
- *Enhancing quality*
- *Adopting mechanized construction*

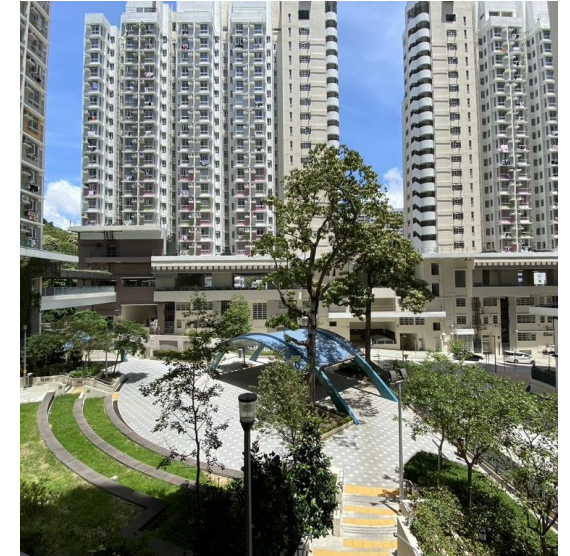


Sustainable Development in Public Housing

- Since 2000, we adopt **People-centric Approach**
- ***We deliver the public housing -***

from ***Macro*** level : City planning and Urban design to ***maximize site potential while designing for people with nature in mind***

to ***Micro*** level : Interior space and furniture layout of the domestic flats bringing care and attention to details for ***quality living space and services***; and applying ***lean design and sustainable construction***



CARING CULTURE

Human x Nature

Caring for People
Caring for Environment



Planning & Design for Sustainability and **Healthy Living in Public Housing in Hong Kong** with a Caring Culture

Green Buildings for Everyone, Everywhere: Smart and Healthy within the 1.5 Degrees

- (1) Bringing Breeze and Daylight : **Passive Design** & Micro-climate Studies
- (2) **Noise Mitigation** to Create Quiet Living Environment
- (3) **Universal Design** for People of All Ages and Abilities
- (4) Improving Habitable Space; **Enhancing Usability** & Buildability
- (5) **Enhancing Healthy Living**, Saving Water & Improving Energy Efficiency
- (6) **Greening** for Healthy Living and Avoiding Urban Heat Island Effect

(a) Planning for People

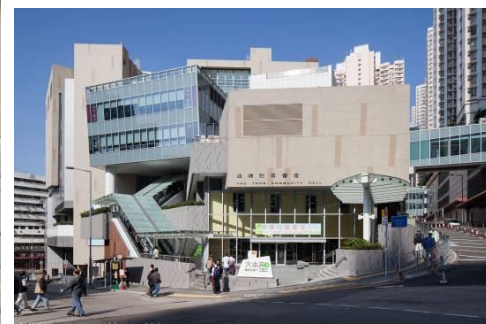
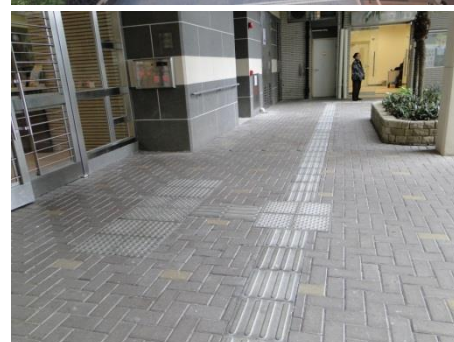
- **Baseline performance** - Hong Kong Planning Standards and Guidelines & Statutory
- **Consult Stakeholders** - other Government Departments, District Councils and Local community
- **Comprehensive approach** – transport, car parking, community centre, social welfare, educational and retail facilities, pedestrian circulation, local open spaces and landscaping etc.



Public transport terminus and pick-up areas linked up with covered walkways and lift towers



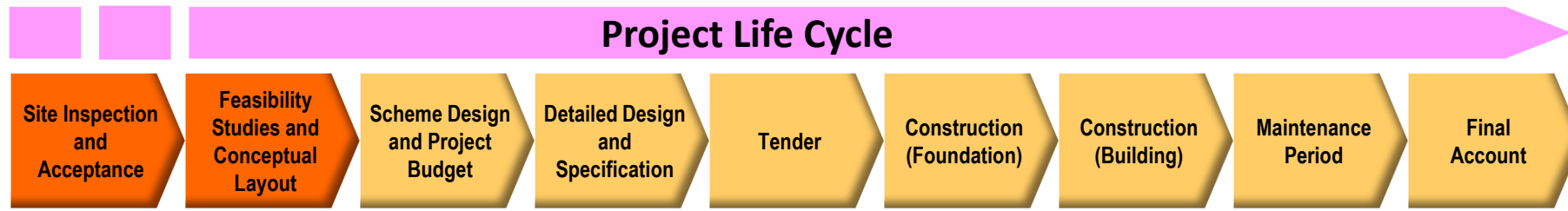
Tactile Guide Path System at strategic locations of housing estates to lead people to domestic blocks



(b) Designing for People with Nature in Mind

1. Ensure **public health and safety**, living in comfort and convenience
2. Host of **Technical studies** helping designers to integrate passive design elements holistically and refine the estate layout and building disposition
3. A balanced design assuring **social, economic and environmental sustainability**, maximizing development potential, fast tracking the delivery of public housing





- **Technical Studies for Potential/New Housing Sites**

1. Air Ventilation Assessment
2. Microclimate Studies
3. Retail Viability Study
4. Project Feasibility Studies
5. Architectural Feasibility Studies
6. Site Potential Studies
7. Visual Impact Assessment
8. Heritage Impact Assessment
9. Ecological Assessment
10. Land Use Studies
11. Planning and Engineering Study
12. Environmental Assessment Study
13. Air Quality Objectives Assessment
14. Odour Assessment
15. Chimney Emission Impact Assessment
16. Traffic Impact Assessment
17. Drainage Impact Assessment
18. Sewerage Impact Assessment
19. Land Decontamination Study
20. Ground Assessment
21. Natural Terrain Hazardous Study
22. Potentially Hazardous Installations Assessment
23. Tree Survey
24. Condition Survey for Existing Building
25. Land Surveying
26. Archeological Study

Noise Mitigation to Create Quiet Living Environment

At Source



Low noise road surfacing

At Propagation Path

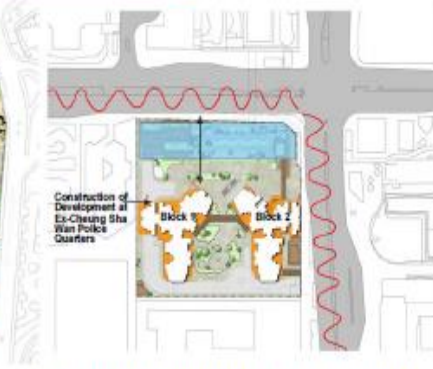


Noise Barrier

At Receiver End



Building setback



Flat configuration & Disposition



Noise Enclosure



Non noise sensitive building



Acoustic Balcony

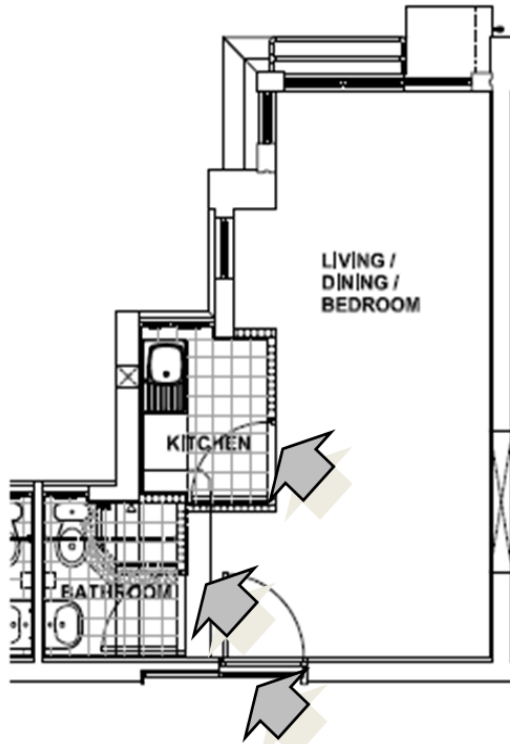


Acoustic Windows

- **Compliance Considerations** — Value for Money
— Site & technical constraints → **A Balanced Solution**
— Urban Design Aspect

(c) Universal Design for People of All Ages and Abilities

Barrier Free Access (Inside Flat)



Widen door width –
800mm (flat entrance)
750mm (kitchen and bathroom)



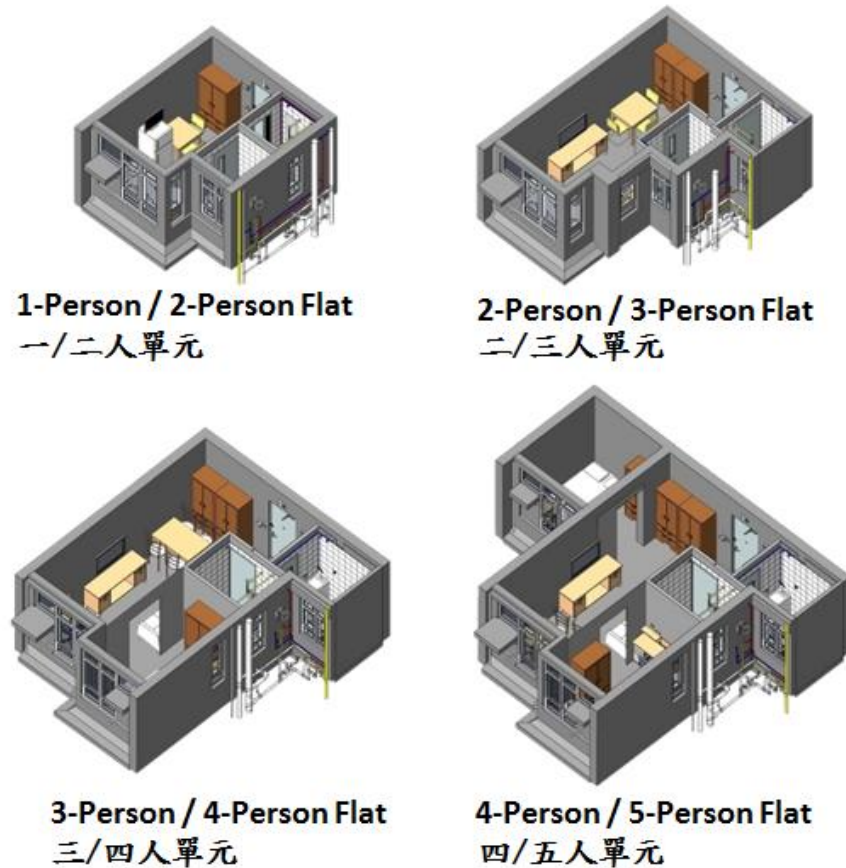
- Power socket at **1m** from ground
- Lever or D-type door handle
- Large lighting switch and door bell



- Appropriate height for lighting switch, door bell and power socket
- Lever type sink mixer
- Leveled entrance

(d) Improving Habitable Space & Enhancing Buildability

Since 2000, due to limited availability of land resources, the topography, size and configuration of housing sites, we **change from Standard Block Design to Site Specific Design with Modular Flat Design.**



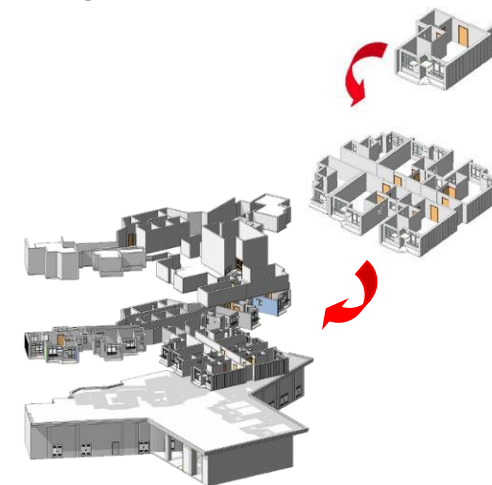
4 Types of Modular Flat Design

developed in 2008 with reference to the allocation standard

Functional & Cost Effective Design

(Quality Housing Initiatives)

- 1 Enhanced **Buildability**, Consistency and Economy of Scale
- 2 Better **Healthy Living**, **Safety** and **Easy Maintenance**
- 3 Focus on Customer Needs & continuous enhancement
- 4 Reinforcing **Universal Design**



(e) Improving Energy Efficiency, Saving Water & Enhancing Healthy Living

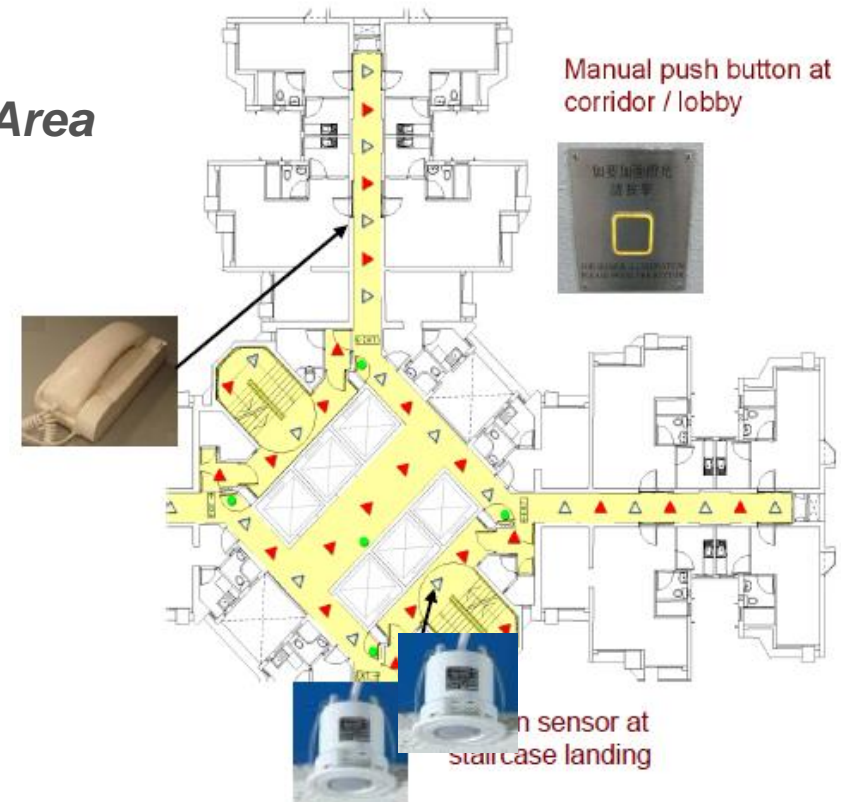
□ Renewable Energy Installation – Grid Connected Photovoltaic System

- Where feasible, we install at the upper roof and roof on lift machine room floor, **generating about 2.5% energy for the communal areas.**



□ Energy Saving Initiative – Two level lighting design in Common Area

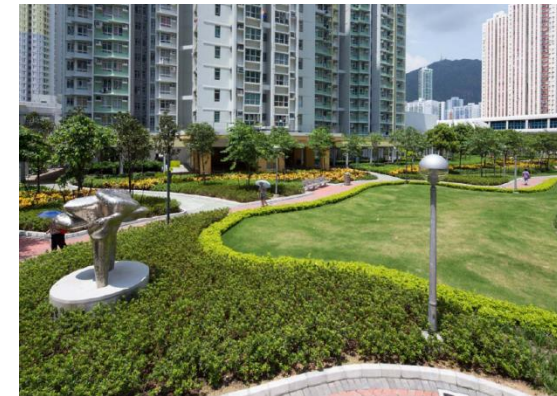
- Enable high efficiency lighting and saving in electricity
- Implemented since 2008, we maintain a **minimum lighting level for safety and security**; while the manual switch integrated with the door phone handset in each domestic flat and the provision at strategic positions at the lift lobby and corridors **enable the required illumination level up to 85 lux**



(f) Greening for Healthy Living and Avoid Urban Heat Island Effect

Greening offers **better air quality** and avoids **urban heat island effect**, aside from ecological and amenity value. We -

- **maximize** greening in new estates
- **planting at least one tree for every 15 flats**
- **greening ratio: at least 20% (up to 30% for larger sites)**
- **providing “Community Farm” in every new estate**



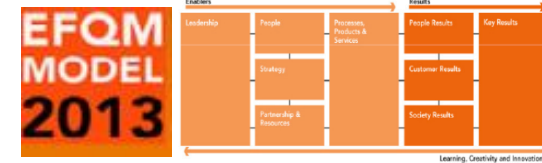
The Kai Tak Development in Kowloon City has adopted the green and healthy environment as one of the key features in the design theme of “Homes in the Park” with an overall greening ratio over 30%.

ACHIEVE SUSTAINABILITY...THINK LONG-TERM!

A Sustainable Community & Management Systems

To meet present social, economical and environmental needs but **NOT** at the expense of future generations.

Through the **European Foundation for Quality Management (EFQM) Model**, we seamlessly integrate various management principles and practices into our daily operations (deployed since 2008).



ISO 9001
(Quality)



ISO 31000
(Risk)



ISO 45001
(Health & Safety)



- Implementing **carbon emission estimation** (CEE) for buildings with life cycle of 100 years

ISO 14001
(Environmental)



ISO 50001
(Energy)



- Annual **Sustainability Reporting** according to Global Reporting Initiative (GRI)



ISO 26000
(Social Responsibility)

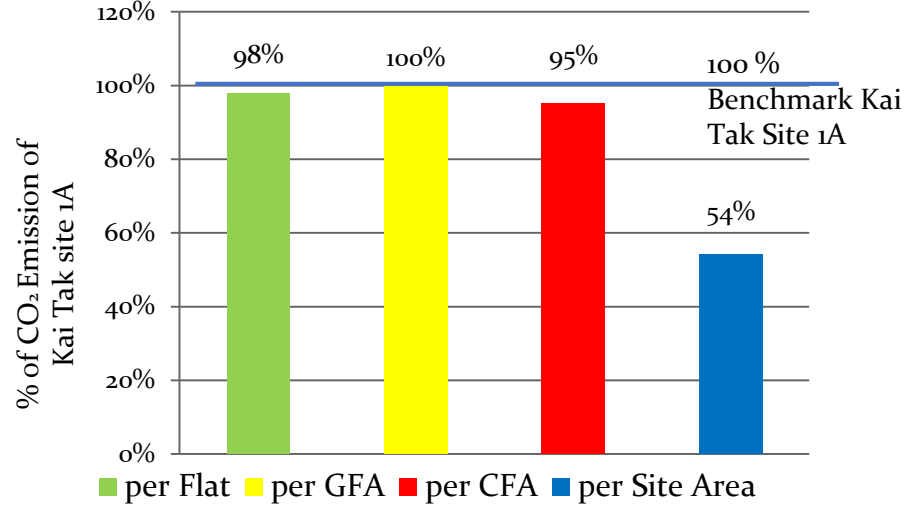


REDUCE CO₂ AND INCREASE O₂



Carbon Emission

HKHA has developed Carbon Emission Estimation tool. In estimating CO₂ emission of buildings, we focus on the CO₂ emission associated with major construction materials and building operations for a **building life of 100 years.**



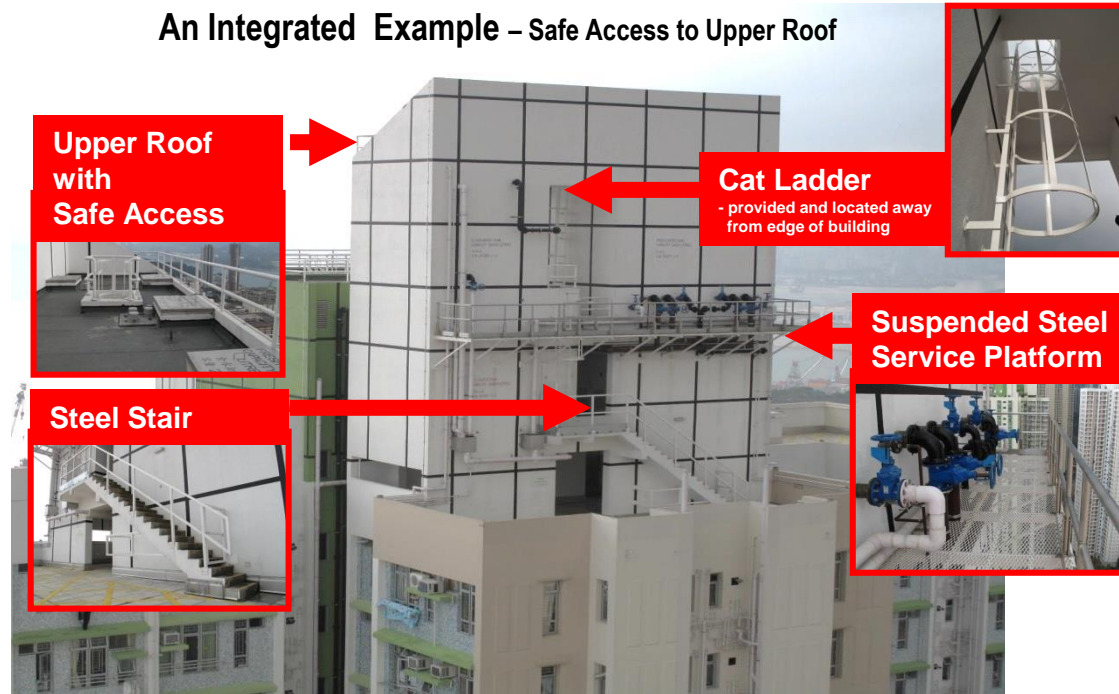
CO₂ emission of Hung Fuk Estate is compared against a BEAM Platinum Benchmark Estate (Kai Tak Site 1A), none of the aspects are exceeded.

Aspect	Embracing
I : Materials Consumed During Construction	<ul style="list-style-type: none"> ✓ Timber formwork for substructure & superstructure ✓ Steel formwork for superstructure
II : Materials for Building Structure	<ul style="list-style-type: none"> ✓ Concrete for substructure & superstructure ✓ Steel for substructure & superstructure
III : Communal Building Services Installations	<ul style="list-style-type: none"> ✓ Lighting, Lift, Water Supply, Security, CABD, A/C & Ventilation, Fire Services, Electrical Distribution System
IV : Renewable Energy	<ul style="list-style-type: none"> ✓ Solar and/or wind powered system
V : Trees Planting	<ul style="list-style-type: none"> ✓ Trees taller than 5m
VI : Demolition	<ul style="list-style-type: none"> ✓ Dismantling of building ✓ Transportation of building debris from site to landfill

SUSTAINABLE USE & MAINTENANCE

Design for Safety : Caring for Workers & End Users

An Integrated Example – Safe Access to Upper Roof



Permanent anchorage to access lift pit



Strengthened Parapets to fix gondola



Easy maintenance for A/C



Provide railing to all roof



Space for BS maintenance

ASSURE HEALTHY LIVING, EASY TO BUILD & MAINTAIN

Healthy Living for People, Easy to Build & Easy to Maintain

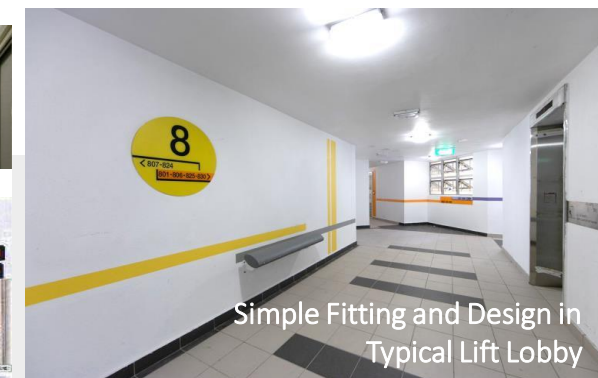
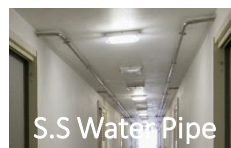
Precast Fabrication

- **30% by volume of concrete is precast components** including volumetric bathroom, façade, staircase, semi-precast slab and additional precast elements proposed by Contractor

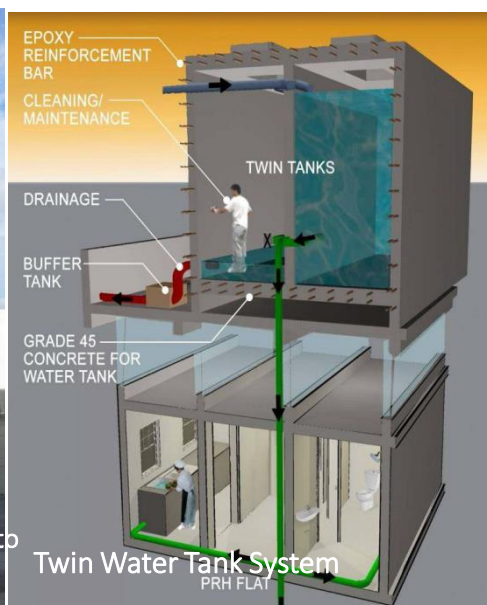


Standard Fittings and Design for Easy Maintenance

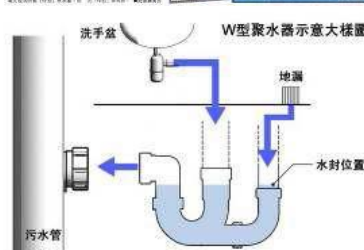
- **Concrete Staircase** to provide safe access to upper roof
- **Twin Water Tank System** to provide uninterrupted water supply to tenants when one of the compartments is being cleaned
- **W-Trap System** to avoid drying up water seal to prevent the spread of disease, waste water from wash basin/ shower is directed to replenish the common W-trap connected to the floor drain
- **Stainless Steel Water Pipes** are used in common areas



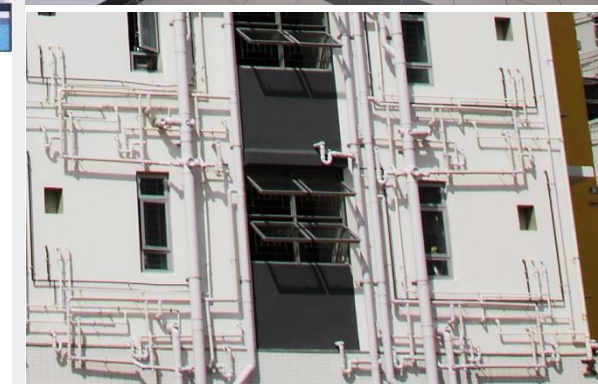
Concrete stair for maintenance access to upper roof



Twin Water Tank System



W-Trap System for Healthy Living



SAVING RESOURCES

Smart Use of Materials



Transfer of C&D Waste Materials

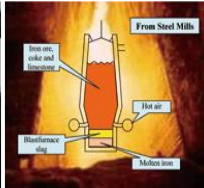
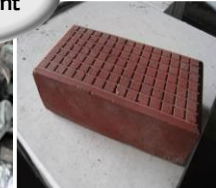
- Established an inventory on quantities of C&D materials available from each site.
- Facilitate bulk transfer between HA's contracts.
- Over **80,000** tonnes of C&D waste have since been reduced.



Use of Recycle Materials

- **Marine mud**
- recycled glass & aggregates
- bore-logs
- **GGBS**
- recycled excavation rock materials

3R Principle



ENGAGE PEOPLE FOR RESULTS

ENGAGE PEOPLE FOR RESULTS

Sharing Knowledge in Community

Community Engagement

- HA Exhibition Centre



- Eco-Expo



香港三個地區的議程方面，其中兩項環境議程均由區議員提出。環境局局長黃錦星表示，世界大部分先進城市的環境議程長達60年，反映香港現時環境議程在20年內內陸議程。他指出，香港不單環境議程「短」，而且議程內容亦不足，約有100名區議員向區議員提出建議，反對當局建議當地議程，有參與的區議員更表示不贊成對計劃的議程報告提出任何建議。

政府上月公布「實地議程」顯示，香港不為環境議程進行議程，將環境議程用於2015年開始，將新北和新北區議程與新北區議程於2015年開始，立法會環境事務委員會將於明日討論2個地區的議程方案：新北區和新北區議程分別為70公頃和200公頃；而新北區議程的議程則為19公頃。預計議程後可將壽命延長4年至5年，為有關區議員與市民關注，未來將與當地區議員或區議員商討。

將環境議程與環境局局長黃錦星表示，環境局局長黃錦星昨日出席一個有關環境議程的會議，與新北區和新北區議程的區議員會面。黃錦星表示，環境局局長黃錦星昨日出席一個有關環境議程的會議，與新北區和新北區議程的區議員會面。黃錦星表示，環境局局長黃錦星昨日出席一個有關環境議程的會議，與新北區和新北區議程的區議員會面。

- Website & publications



- Community educational activities
- Community engagement workshops

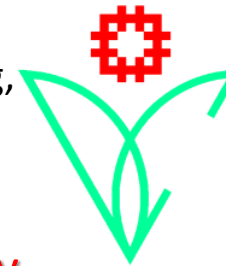
Sharing Knowledge in Office : Corporate Achievement

Staff Training

- We have **>200** BEAM practitioners



- Direct **involvement in community** environmental projects
- **Environmental activities** – organic farming, donate used goods; reduce energy, water, paper consumption, green corner display;
- Environmental training – **DCD Academy** 發展 • 建築



以人為本

Green Building Leadership



Our Core Values: **C**aring, **C**ustomer-focused, **C**reative, **C**ommitted

We Care

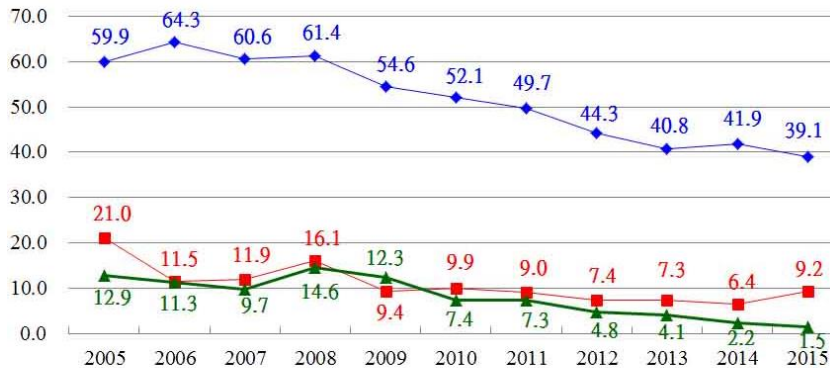
- We care for the **environment**
- We care for the **people**:

Safety	Health	Security
Well-being	Comfort	Convenience

- Together we build a **sustainable and harmonious community**

Key Performance Indices

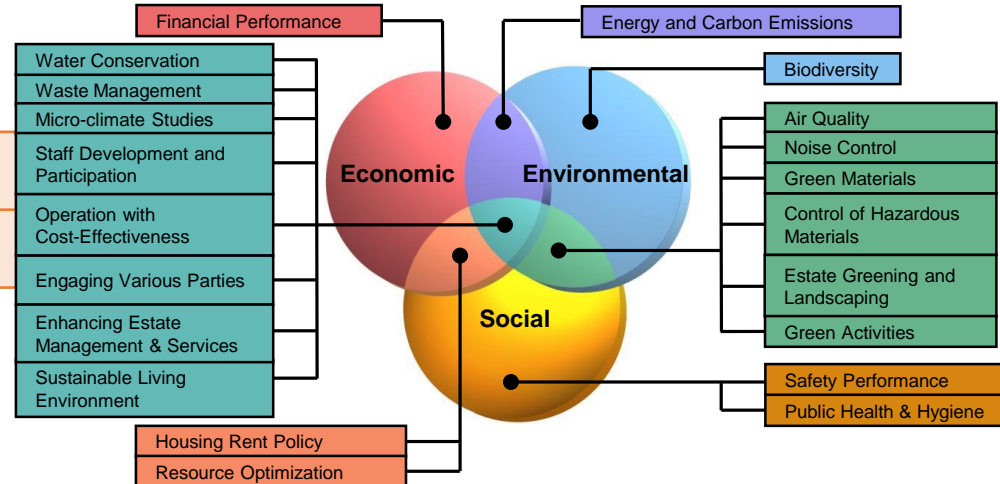
- 34%** less costly than private sector
- 30%** less construction waste
- 75%** lower accident rates



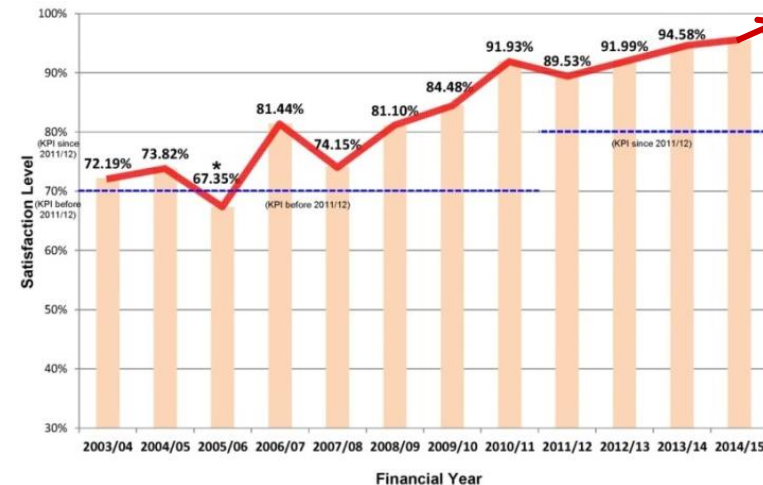
Source of information: Census & Statistics Department and Housing Authority Site Returns

Please read our Sustainability Report

<http://www.housingauthority.gov.hk/mini-site/hasr1415/common/index.html>



- Customer satisfaction index rises, with max. of **98.1%**



Please take a look at our sustainability video

http://www.housingauthority.gov.hk/hdw/video/videoshell_Environmental_corporate_Cant.html

Exemplary Project

Hong Kong Housing Authority's

Hung Fuk Estate

(Quality Building Award 2018; Green Building Award 2016)

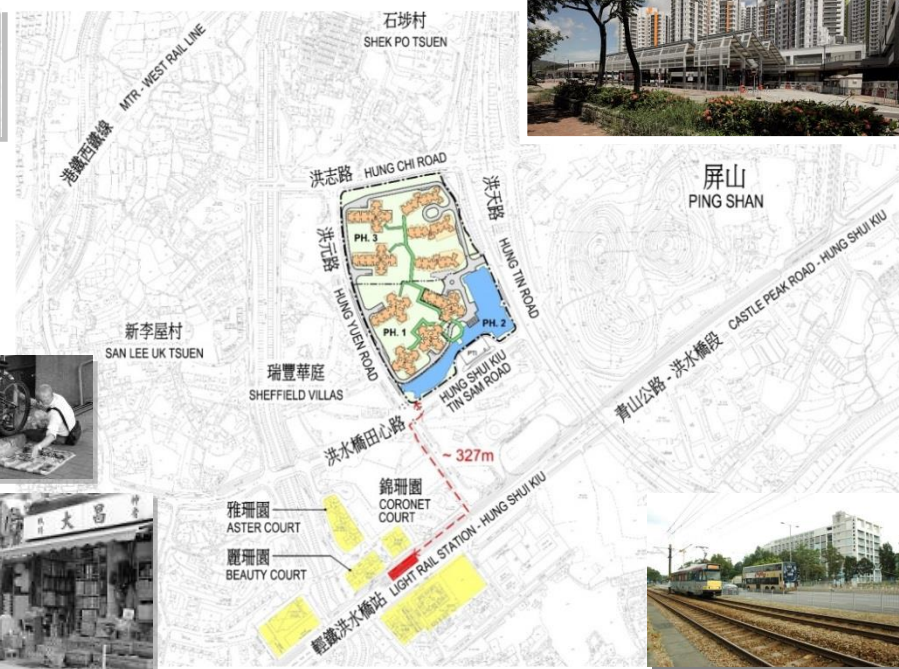


洪福邨

HUNG FUK ESTATE is located in a low density rural area of Yuen Long district. It is about **327m** from Hung Shui Kiu Light Rail Station.

The Site and the Neighbourhood

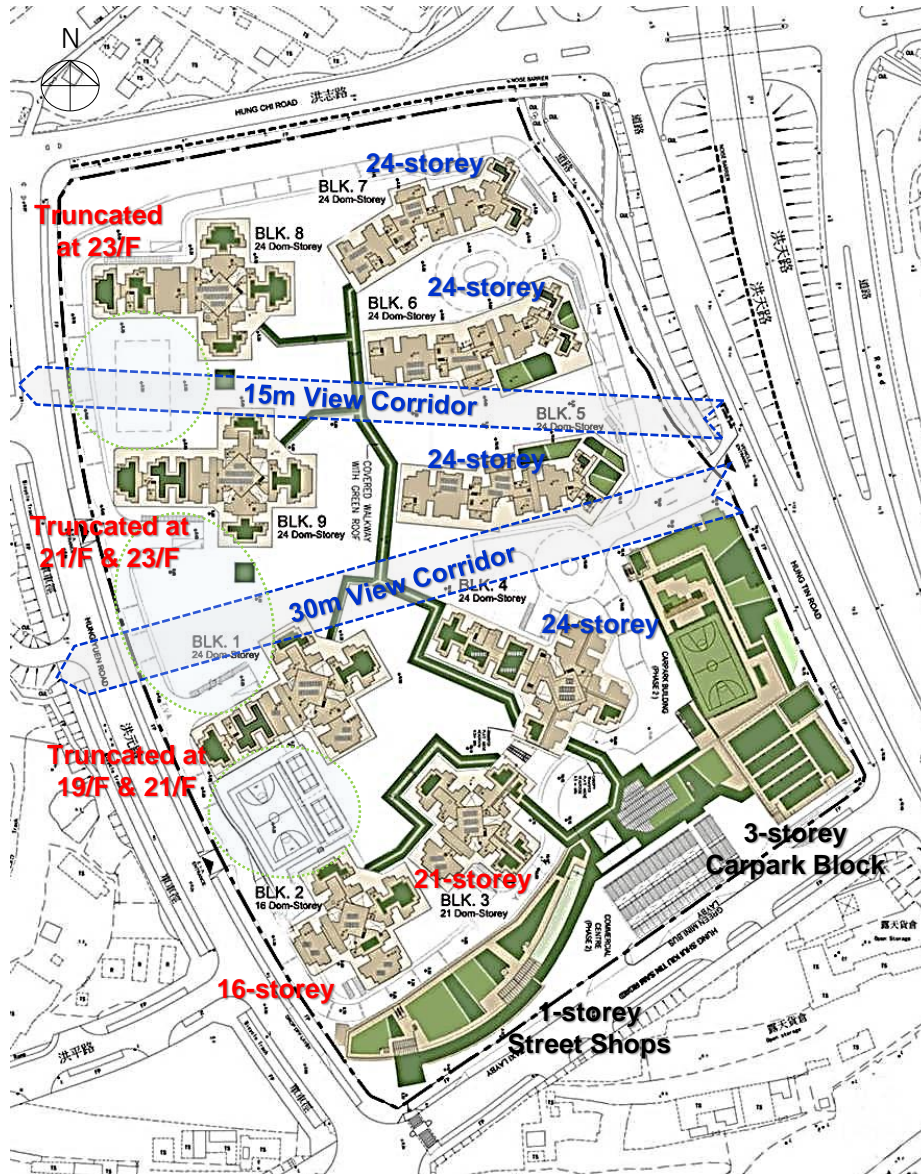
Restaurants, banks, clinic, pharmacy, supermarket, convenience stores, schools, laundry, retail shops, post box, temporary wet market are within 500m walking distance (shown yellow on the location map).



FORE-RUNNER OF A NEW TOWN

Smart Site Planning

An Identity for a New Vibrant Community



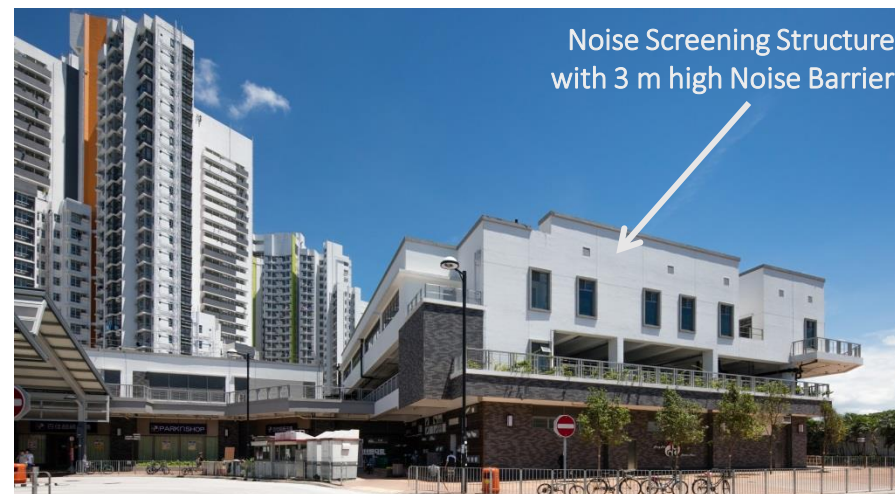
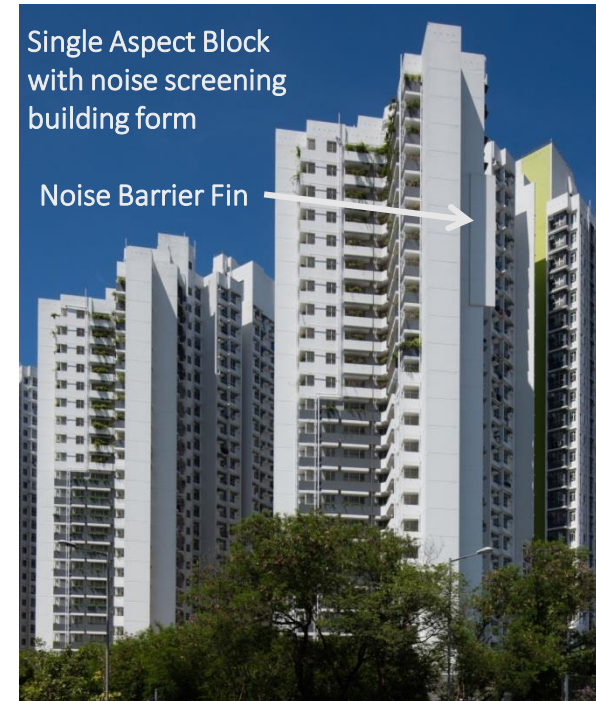
With Considerations on

- Complicated Geotechnical Ground Profiles
- Visual Impacts to the surrounding
- Wind Direction and Sun Path
- Noise Mitigation Measures
- Pedestrian Circulation and Traffic Connection



RESPOND TO ENVIRONMENT

All Round Noise Mitigation - 99% Noise Compliance



BRING BREEZE & LIGHT

Corridors for the WIND



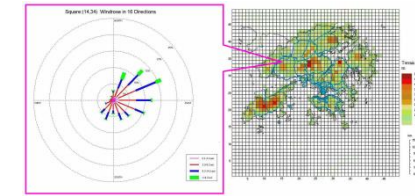
To Enhance Wind :

- Two wind corridors
- Large building separation
- Orientation of blocks in parallel with prevailing wind direction
- Ground floor empty bays

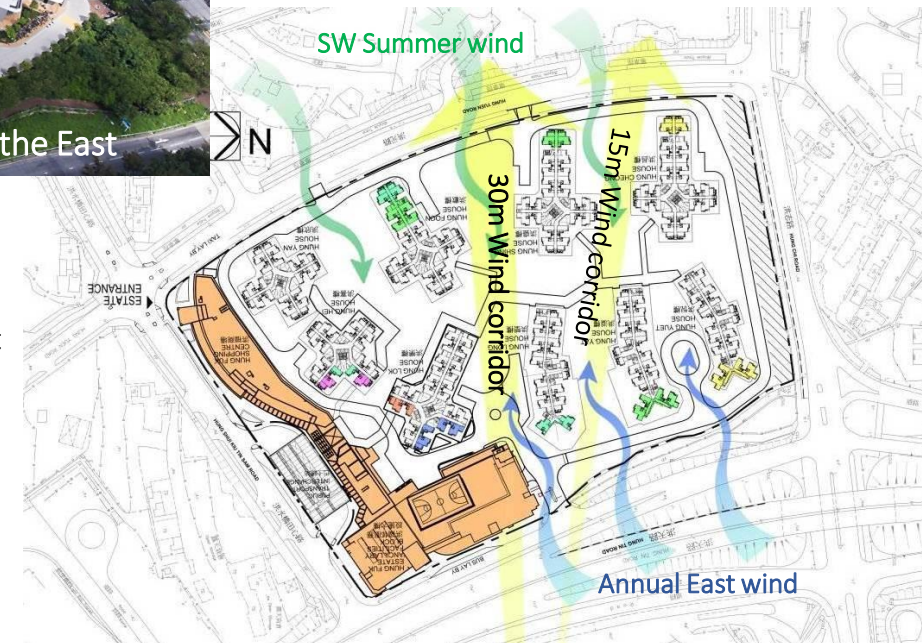
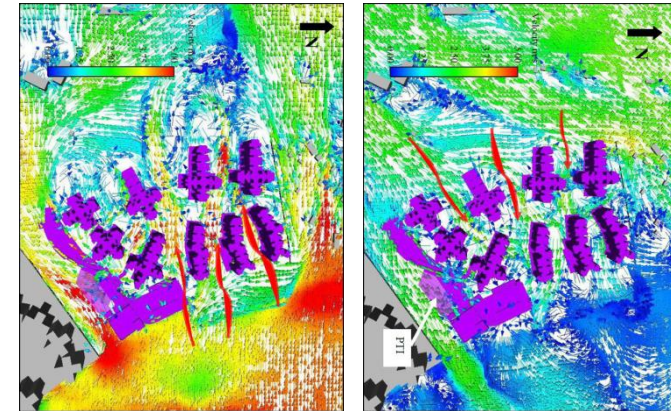
Average wind speed at pedestrian level

- ranges from 1.2 to 3.1 m/s under summer South-west wind.
- around 2.5 m/s under annual East wind.

Comparing with a baseline scheme, the design results **37.8% improvement** in wind velocity ratio within the development.



Computer Simulation on Wind Performance



RESPOND TO ENVIRONMENT

Let's play with the Sun

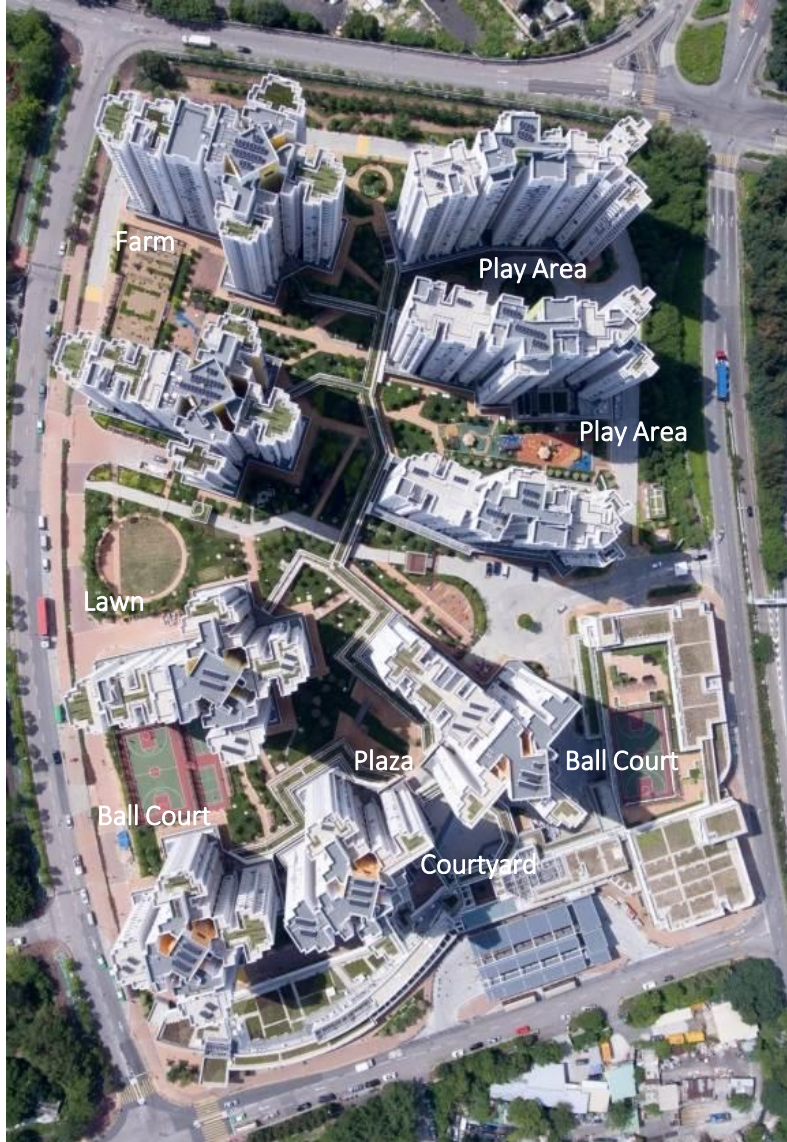
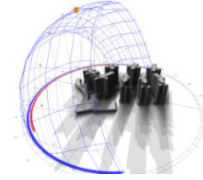
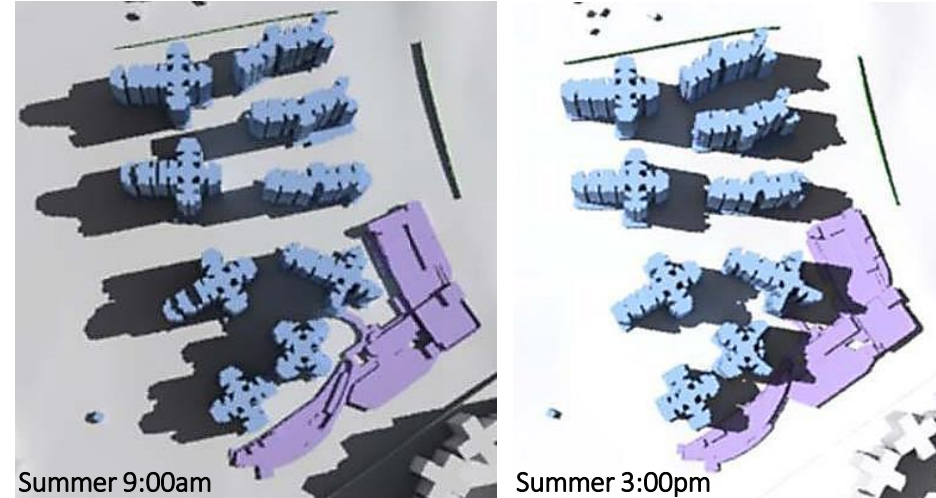


Photo taken at 3:30pm in Summer

Analysis on Sun Path and Shadowing Pattern



Planning of Activity Space

- One basketball court is on the East and the other one on the West, both are orientated along North-south axis to minimize glare effect.
- Children Play Areas are planned on the East, as most kids play in the afternoon.
- Community Lawn Area are Community Farm planned on the West, as plants enjoy strong sunshine.
- Entrance Plaza and Courtyard are planned in the middle where community activities are always under shade most of the day.

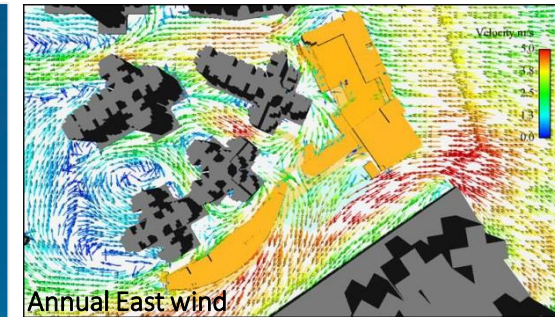
RESPOND TO ENVIRONMENT

Comfortable Shopping under Verandah with Natural Light and Breeze



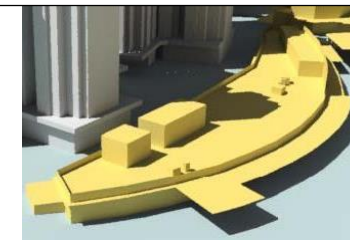
Retail Facilities:

- 3 Restaurants
- 10 Retail Shops
- Clinic
- Supermarket
- Wet Market



Gap between buildings and street helps to make the leeward side of the area **adequately ventilated** at ground level.

Shading
Pattern of
Shopping
Centre at
3:00pm in
summer



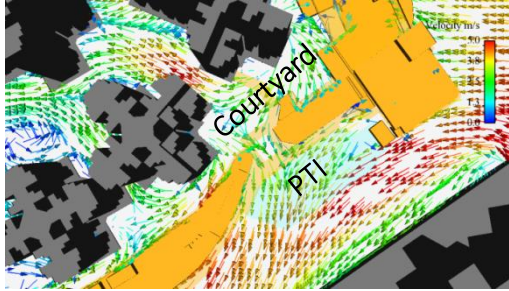
Large canopy along the street

- No air-conditioning required for public area
- No direct sunlight exposure to the shop fronts
- **Comfortable shopping experience along the STREET**



BRING BREEZE AND AIR

Interactive Plaza Connects People with Comfort and Convenience



Passing the street shops and the Public Transport Interchange, arriving at the entrance courtyard, here is the doorway to Hung Fuk Estate.

- The courtyard & plaza are cleverly created by linking up the covered walkway and the shopping verandah.
- It brings breeze (wind speed of 3.8m/s)
- It brings a sense of arrival
- It brings an identity to the estate



PASSIVE DESIGN : BRING BREEZE & LIGHT

A Weather-proof Open Air Public Transport Interchange

Courtyard design not only brings breeze effectively, it also enhances air movement downstream helping the dispersal of pollutant from buses by natural means.

Roof cover design allows natural ventilation, penetration of natural lighting and provides shelter in wet weather



A ✓ TO KICK NOISE INNOVATION

Pilot Public Transport Interchange Cover Design

Design of the PTI cover effectively kicks off noise impact to sensitive receivers. The solid and transparent roof pieces are **cleverly** tilted at an angle, and each them is not more than 230m², such that

- No installation of mechanical ventilation system is required.
- No installation of sprinkler system or any other fire services system is required.
- No artificial lighting is required in the day time.
- No energy is required for the operation of the PTI (except for lighting at night).



The cover also kick noise for future development .



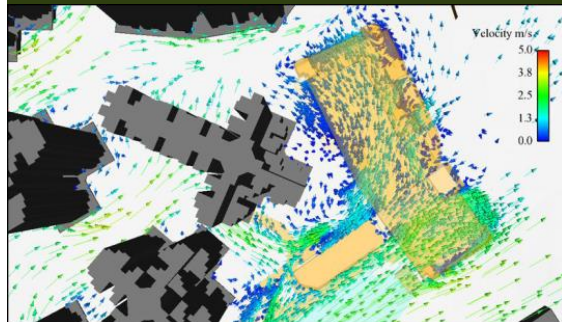
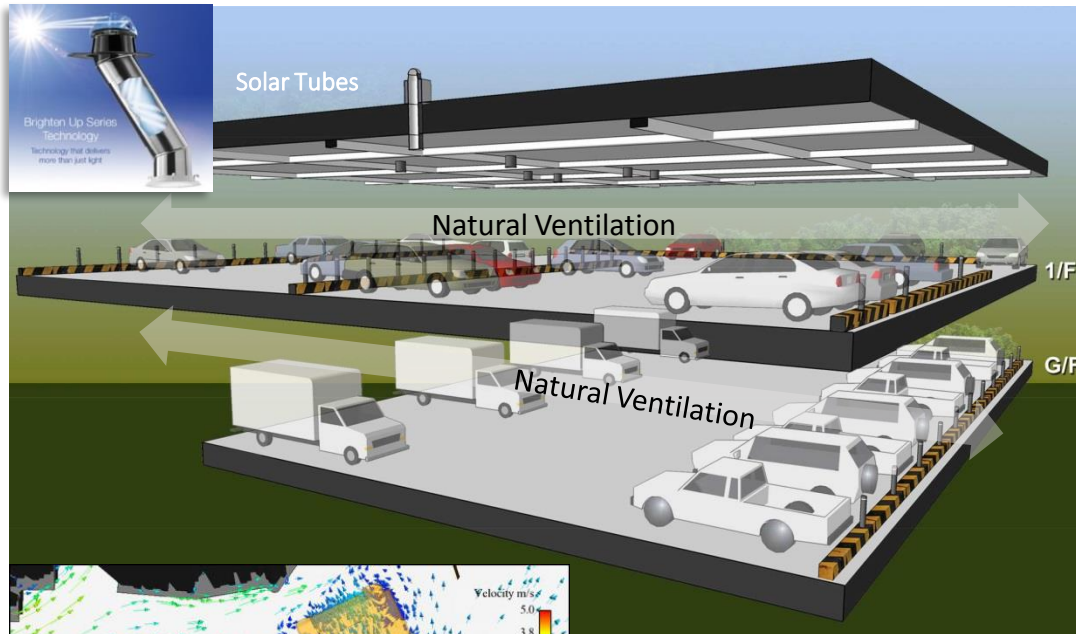
Upon completion, noise performance was verified by on-site measurement and the result was satisfactory

PASSIVE DESIGN : BRING BREEZE & LIGHT
*...AND ASSURING **SAFE ACCESS** FOR MAINTENANCE!*



BRING BREEZE AND SUNLIGHT

A Breathing Carpark with Green Initiatives



Natural ventilation performance in carpark



電動車充電站用戶指南
ELECTRIC VEHICLE (EV)
CHARGING STATION USER GUIDE

30% of the parking spaces are equipped with elec. charging facilities, conduit is allowed for **100% elec. charging parking space in the future**

- **80%** of the carpark perimeter wall is **open parapet**, allows for natural cross ventilation which is sufficient to remove pollutant, without any mechanical means.
- **8 Nos. of Solar tubes** are installed at soffit of carpark to bring in natural sunlight. Photo sensors to control operation of artificial lightings are provided.

A NEW COMMUNITY

Comprehensive Social Welfare and Recreational Facilities

- Integrated Children and Youth Services Centre
- Neighbourhood Elderly Centre
- Hostel for the Moderate Mentally Handicapped
- Integrated Vocational Rehabilitation Services Centre
- Kindergarten.

Active Recreation Facilities

- Basketball Courts
- Badminton Courts
- Table Tennis
- Community Play Areas

Passive Recreation Facilities

- Community Farm & Lawn
- Mini-woodland
- Recycle garden
- Leisure & Cultural Activity Areas

Transport Facilities

- Public Transport Interchange
- Carpark
- Taxi & bus Lay-bys
- Signalized junction for pedestrian crossing



BRING BREEZE AND LIGHT

Passive Design Performance



Typical Lift Lobbies & Common Corridors

- Minimum air change rate at typical lift lobby under annual wind is 44.6 ACH
- Minimum air change rate at G/F entrance lobby under annual wind is 22ACH

Domestic Flats

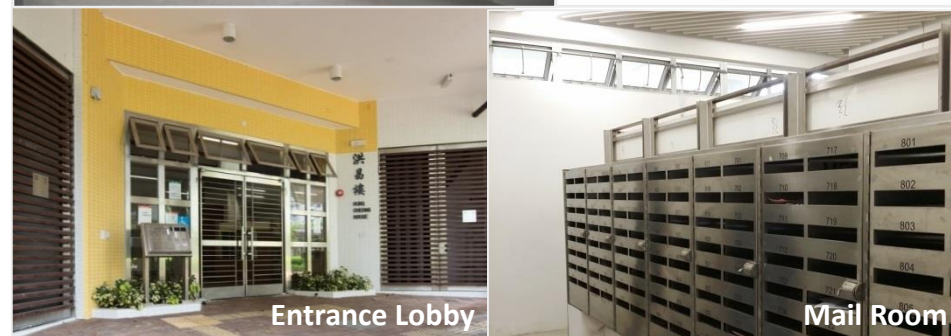
- Ventilation performance of every domestic flat and all common areas are carefully analyzed by computational fluid dynamic simulations
- The ventilation rates of habitable rooms and kitchens, range from 10 to 150 ACH which is well above the min. statutory requirement of 1.5 ACH



Common lift lobby and corridor



Unit



Entrance Lobby

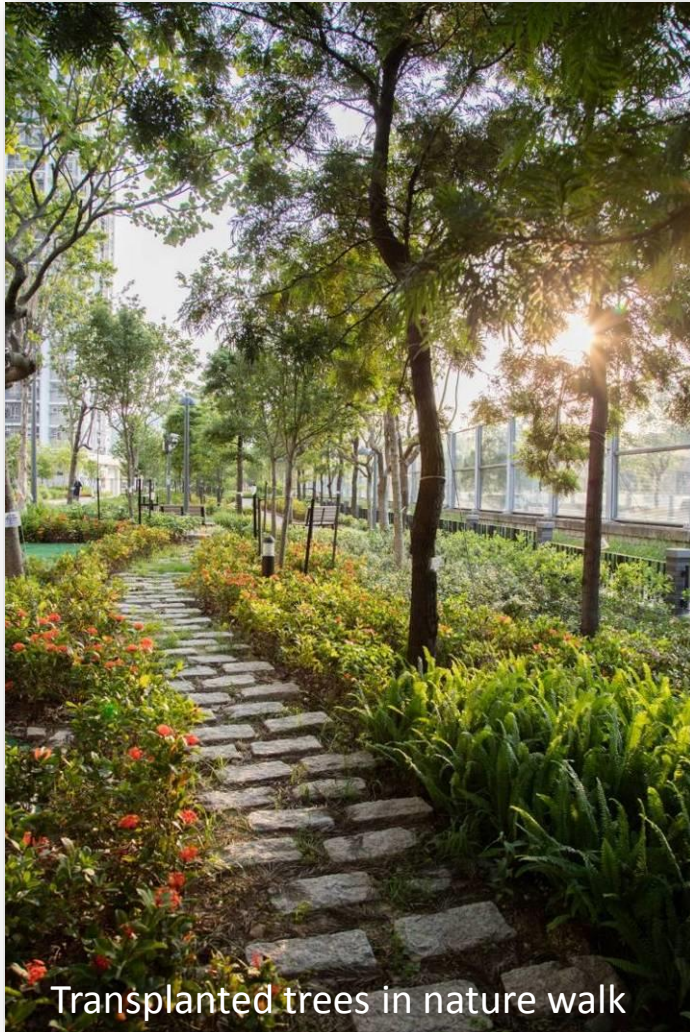
Mail Room

- Vertical Daylight Factor of each habitable room and kitchen for each domestic flat are in average ~50% & ~40% respectively which are well beyond requirements in APP-130 (i.e. 8% for habitable room and 4% for kitchen)

ENJOY THE COUNTRYSIDE

Enhanced Ecological Value

Number and varieties of wildlife species..... butterflies, birds and insects are attracted by fruits and nectars of the native trees and shrubs in the area



Total Green Coverage Area **31%**



Constraints

- Low diversity of wildlife
- Limited suitable habitats around to support diverse wildlife
- High disturbance by traffic

Opportunities

- Planting of native trees and vegetation to enhance ecological value
- **675 Nos. trees, 54% natives**
- **182,708 Nos. shrubs, 34% natives**
- Green roof to provide habitats for wildlife.
- Landscape design to incorporate conservation and education elements.
- Provision of Mini-Woodland, Nature Walk & Butterfly Garden

LIVING IN THE GREEN

Greening Opportunities & Low Maintenance



- **Total Green Roof areas** ~5,000m², with native species of ground cover
- **Total Vertical Greening** ~400m² provided at trellis over sitting areas and basketball fencing.
- **Automated dripline irrigation system** is provided for green roofs, planters along building perimeter

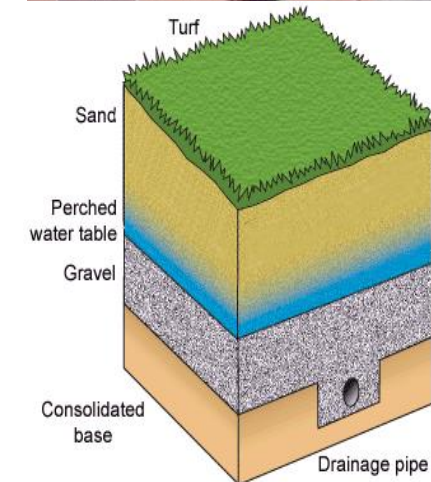


PLAYING IN THE GREEN

“All-sand” Rootzone Profile Design for Lawn

Advanced Method

全沙根質種植方法設計



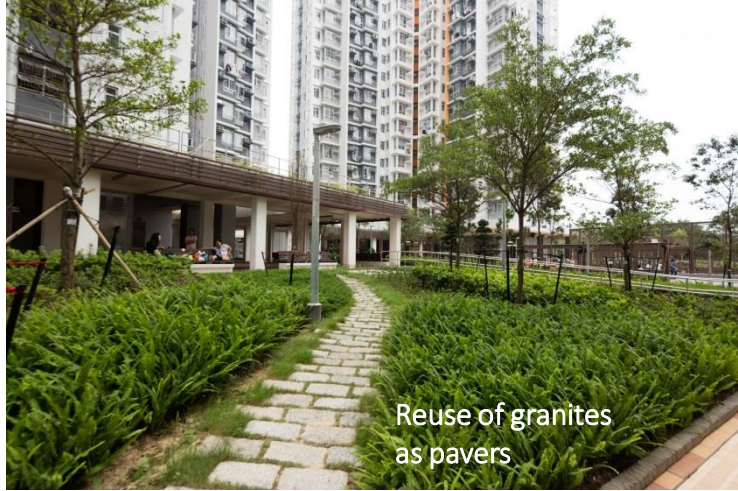
- The sand layer provides **excellent drainage** and is resistant to compaction.
- The perched water table created at the interface of the sand/aggregate layers can **retain water** in the rootzone.
- This design facilitates the establishment of grass
- It improves the durability of lawn and reduce the need for frequent maintenance.

TREASURE OUR RESOURCES

Reuse Demolished Materials



Demolished
Roadside Planters



Reuse of granites
as pavers



Reuse of granites
as planters

[1] All of the granites (1565 nos.) from demolished street planters were reused as finishes material for planter wall, fence wall and landscape paving, reducing landfill burden



Reuse Materials from Construction Site



Reuse of
tiles in
Recycle
Garden



Reuse of precast
components in Rec
Garden

[2] Building materials such as concrete tiles, steel frames, precast volumetric bathroom & precast façade mock-up were reused as educational displays in Recycle Garden

TREASURE OUR RESOURCES

Save Every Drop of Water.....



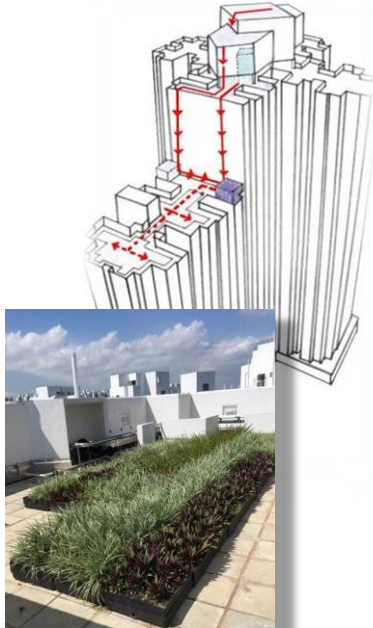
• Study on Irrigation Systems :

- ① Zero Irrigation System (ZIS),
- ② Modular ZIS,
- ③ Rootzone Irrigation System,
- ④ Dripline Irrigation System were carried out

Modular ZIS

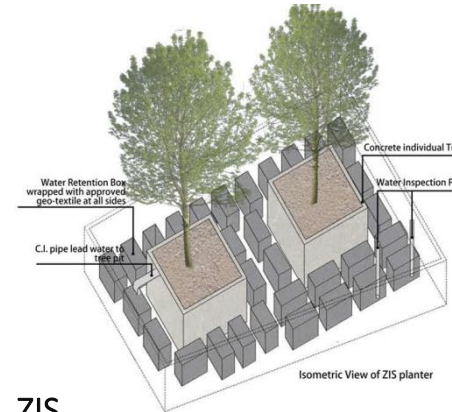


Warm reminder in every flat.

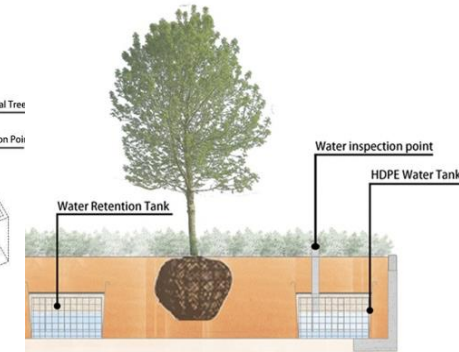


Green Roofs

- Rain Water Harvesting System is adopted at roofs of domestic blocks 5 to 7.
- AC Condensation Water recycling for irrigation for green roof.
- Automatic irrigation with timer for plants at height.



ZIS



Modular ZIS



GREEN AND LEAN CONSTRUCTION

Reduce Construction Wastes

1. **Pay for environmental and site hygiene scheme** was allowed in the Main Contract encouraging the implementation of environmental protection measures.
2. Use of precast concrete components, mechanized construction, steel hoarding to reduce construction waste.
3. **Site offices** were built by reusable components.
4. **5,365m² precast concrete slab** was reused as haul road hard paving in construction sites.
5. **Concrete batching plant** was installed on site for supplying concrete
6. The use of metal formworks was maximized and timber formworks were reused as far as possible.
7. Existing plants from demolished street planters were transplanted to site office and hoarding for greening purpose.



Haul Road



Metal Formwork



Sorting Inert Waste



Recycle Waste Water



Recycling Bins



Solar tubes in Site Office



Green Hoarding



Solar tubes in Site Office



Wheel Washing



Green Site Office

Reduction of
37,376 kg CO₂
emission by site
batching plant



On-site Batching Plant

TREE RECYCLE INNOVATION

Pilot Program to Recycle Felled Tree at Construction Stage

Reduction of
157.5 kg CO₂
emission by
Tree Recycle



1. 200 no. existing trees were felled



2. Felled trees were cut and shredded into wood chips



3. Building contractor worked in collaboration with neighboring school, to promote environmental awareness on recycling food waste and garden waste.



5. 2,623 kg of compost was produced for community farming and soil conditioner



4. Wood chips were used as bulking agent to mix with food/garden waste and decomposed into soil conditioner



LEAN & GREEN DESIGN BY BIM

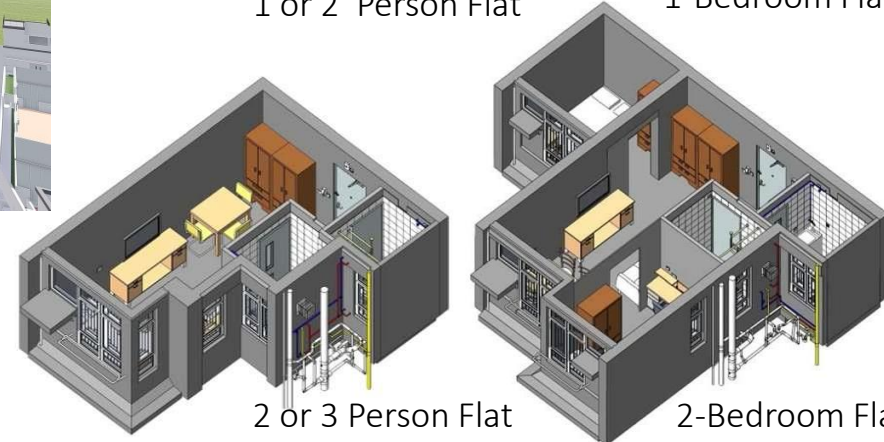
BIM as Design Tool

BIM coordination



1 or 2 Person Flat

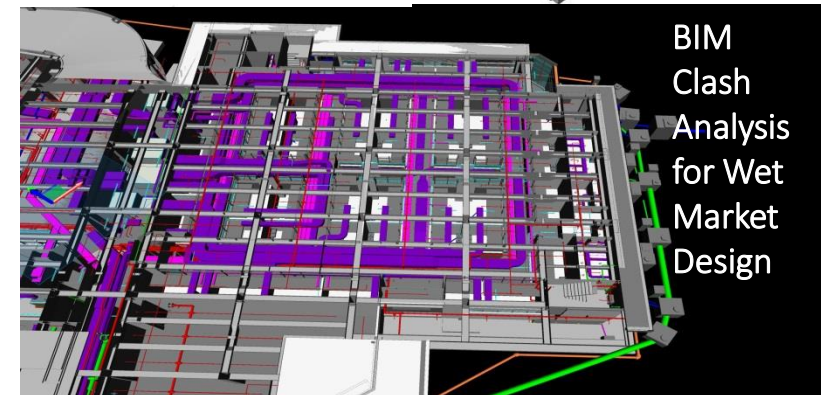
1-Bedroom Flat



2 or 3 Person Flat

2-Bedroom Flat

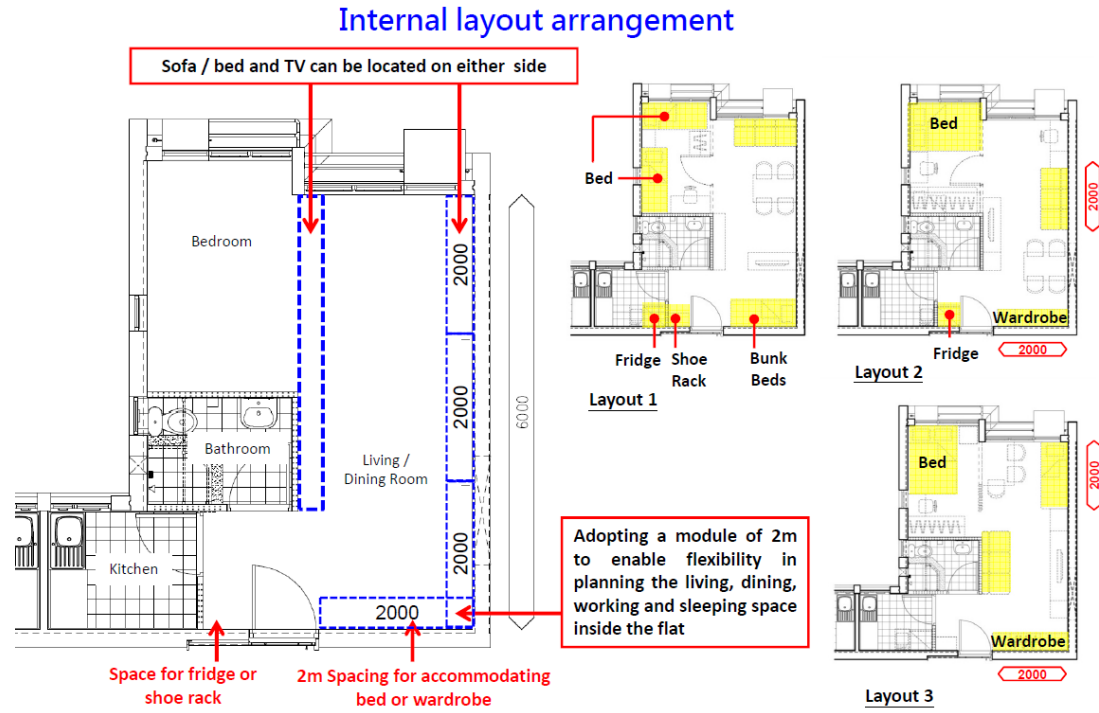
- **Standard flat modules** were adopted in the block design facilitating pre-fabricated products, reducing construction waste and pollution.
- **Rotational symmetry** in the layout of typical domestic floors was adopted for easier construction.
- **BIM** was used for clash detection prior to construction for minimizing abortive works and maximizing accuracy in material ordering.
- **Fair face off-form finishes** with paint to exterior and with tile/paint to interior.
- **Minimize wet trades** on site by prefabrication.



BIM
Clash
Analysis
for Wet
Market
Design

TO ACHIEVE SUSTAINABILITY

Flexible Domestic Flat Layout



Flexible Market Stall



Open Plan Design in domestic unit allowing flexibility to suit tenant's need



Adjustable cooking bench with 3 different height to suit tenants' need and to reduce wastage for demolition



Open & Semi-Open Types Stall Design in wet market equipped with storage racks, hangers, light trough and signage plates creating unified impression and allowing flexibility use of space for tenants of different trades

LIVABILITY & SUSTAINABILITY

Green Facilities for Green Living



Our Environmental Policy is to promote healthy living in a green environment



4.3 ★★★★★ 24小時營業
房地產 · Hung Shui, Hong Kong

主頁 評論 關於 帖子 相片 讚好 網



Moon Wong — 5★ 派左向南單位，非常滿意！村內綠化做得好好，環境優美，設施齊備，一應俱全！
2016年4月9日 · 16 則評論
讚好 3 · 回應

Simon Yip — 5★ 這裡的空氣特別清新...！
2016年8月21日 · 1 則評論
讚好 1 · 回應



Positive comments are received and reflected in Facebook page which is established by local residents

- **Educational and publicity programmes** to raise PRH tenants' and estate management staff's environmental awareness and encourage them to join hands in building a green community are to be organized.
- **Resident Satisfaction Survey (RSS)** will be conducted to gauge the users' satisfaction level and enhance the design of future estates.



WE ARE CARING, COMMITTED, CREATIVE, CUSTOMER-FOCUSED



Forerunner of the future Hung Shui Kiu new town



Building green for healthy community



Provide all the convenience of modern community living



Environmental advances and sustainable initiatives for lively estate

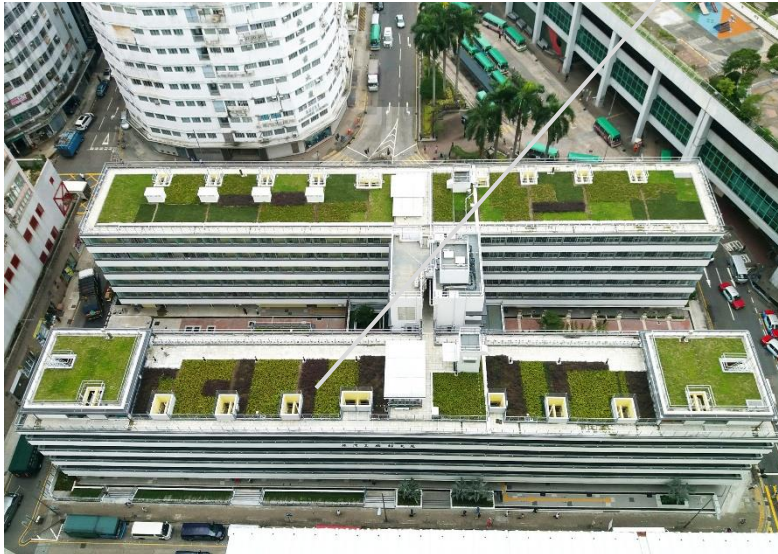


Wah Ha Estate



Enhanced social value from **revitalising the last H-shape factory** into a residential development

Eco-wells: to enhance natural ventilation and introduce daylight into residential units
Greenery: Over **40%** soft landscaping coverage



Two-level lighting control in common corridors and lift lobbies – reduce energy consumption

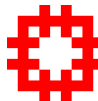


Fire resistance test for existing concrete slabs – to retain the original H-shape appearance, and reduce the demolition and re-construction of floor slabs



Outcome : Happy, Healthy, Satisfied Residents

A balanced design assuring social, economic and environmental sustainability of public housing



CARING CULTURE

Human x Nature x Technology

Caring for People

Caring for Environment

Building a **Collaborative Future**

Sustainable, Affordable, Quality Housing
for Resilient Communities

THANK YOU!



Webinar Description

Sustainable Housing for Resilient Communities: The Challenges of Affordability

UIA's Working Programme on Community Architecture and Human Rights (CA + HR) focuses on the 11th UN SDG, namely the one aiming at "Sustainable Cities". CA + HR, more specifically targets the objectives of providing safe and affordable housing, caring for an inclusive and sustainable urbanization, protecting the world's cultural and natural heritage and ensuring access to safe and inclusive green and public spaces. At the same time, the issue of resilience has been, somehow operating as a great contemporary global concern, when faced with the great challenges presented by a period of continuous crises, such as the fiscal, the environmental (climate change), COVID-19 pandemic and, energy, migration et.al. It seems that the overall positive agenda of sustainability may even be compromised by the sense of urgency presented by our communities' struggle for survival. This condition may not necessarily ameliorate without collective work on a new set of principles, methods and tools.

Considering the above, CA + HR, focuses on the issue of affordable housing, as a key to addressing this holistic agenda, and invites a set of 9 prominent speakers to share their regional and local experience in defining the current challenges and sharing innovative out-of-the-box ideas and projects.

A series of three webinars will host a lively, and much needed, dialogue mapping the field and balancing the need for tactical immediate action with the planning of future strategies. This forum is designed in order to channel proved professional knowledge to young architects and students of architecture.

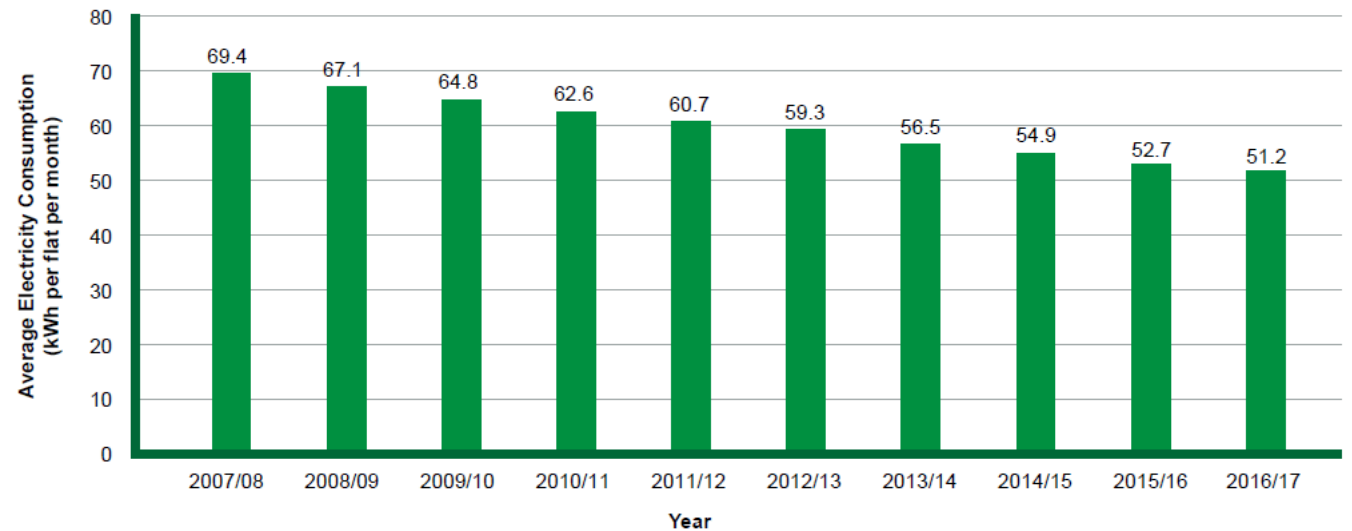
Beyond presenting an array of successful case studies, the intention is to stimulate an inclusive and future-proof channel of communication on local action on global priorities and risks.

HIGH PERFORMANCE IN ENERGY CONSUMPTION

Average energy consumption of building services installations in communal areas designed within the year (i.e. energy estimation). These figures are:

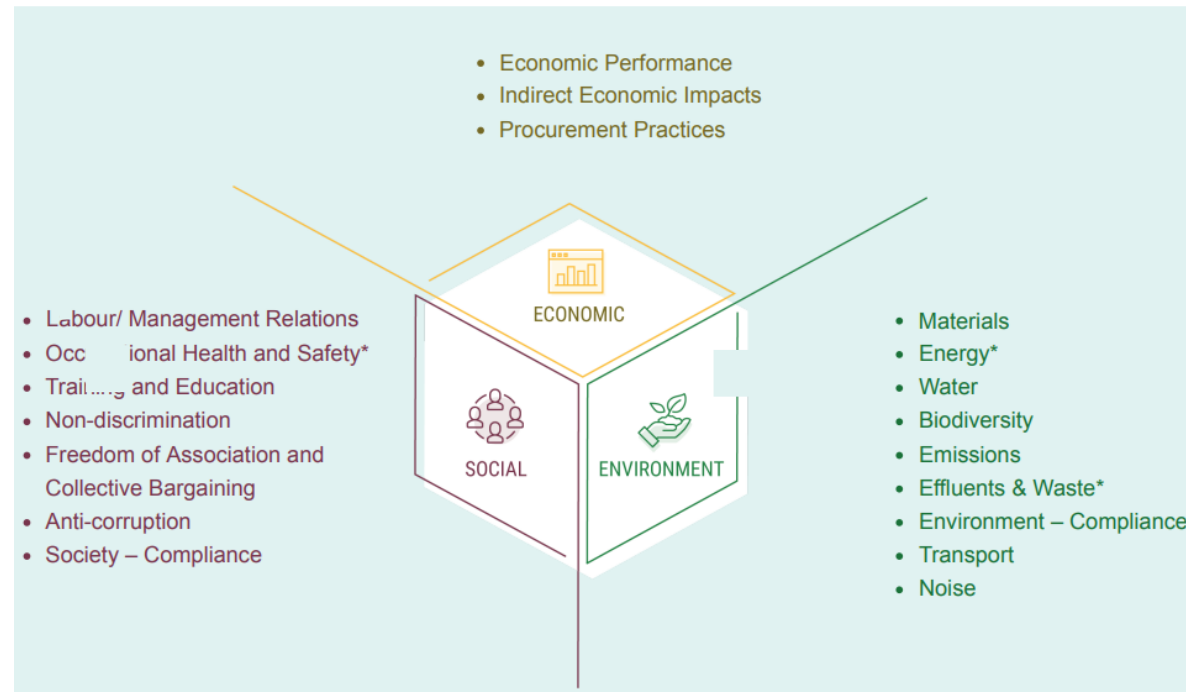
2013/14	25.1 kWh/m ² /Annum (target: 30)
2014/15	24.3 kWh/m ² /Annum (target: 27)
2015/16	24.1 kWh/m ² /Annum (target: 27)
2016/17	22.8 kWh/m ² /Annum (target: 24)
2017/18	22.04 kWh/m ² /Annum (target: 24)

Electricity Consumption in the Public Areas of Estates



Sustainable Development in Public Housing

- HKHA has introduced a series of initiatives to achieve sustainability in terms of environmental, social and economic aspects
- We have been taking an active role in improving our environmental performance with regards to energy conservation, resource conservation, air quality, and green estate and office operations



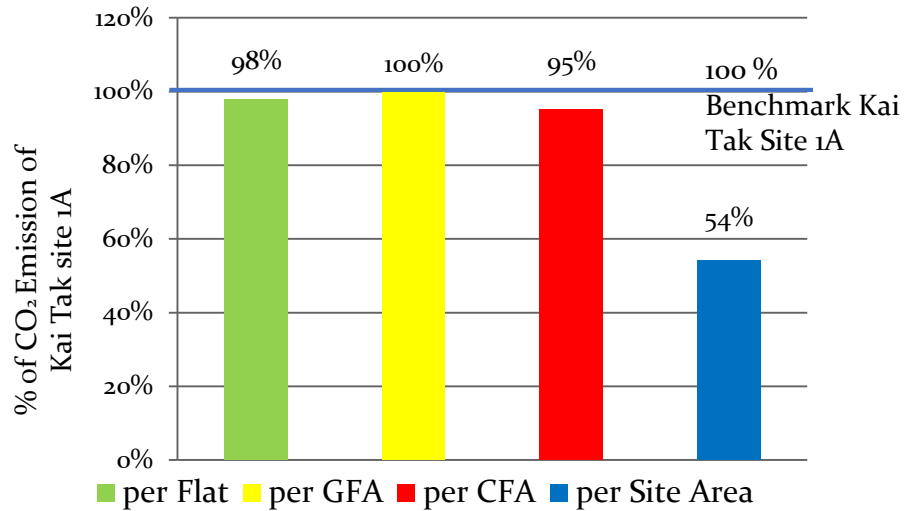
(Source: HKHA, Sustainability Report 2019/20)

REDUCE CO₂ AND INCREASE O₂



Carbon Emission

HKHA has developed Carbon Emission Estimation tool. In estimating CO₂ emission of buildings, we focus on the CO₂ emission associated with major construction materials and building operations for a **building life of 100 years**.



CO₂ emission of Hung Fuk Estate is compared against a BEAM Platinum Benchmark Estate (Kai Tak Site 1A), none of the aspects are exceeded.

Aspect	Embracing
I : Materials Consumed During Construction	<ul style="list-style-type: none"> ✓ Timber formwork for substructure & superstructure ✓ Steel formwork for superstructure
II : Materials for Building Structure	<ul style="list-style-type: none"> ✓ Concrete for substructure & superstructure ✓ Steel for substructure & superstructure
III : Communal Building Services Installations	<ul style="list-style-type: none"> ✓ Lighting, Lift, Water Supply, Security, CABD, A/C & Ventilation, Fire Services, Electrical Distribution System
IV : Renewable Energy	<ul style="list-style-type: none"> ✓ Solar and/or wind powered system
V : Trees Planting	<ul style="list-style-type: none"> ✓ Trees taller than 5m
VI : Demolition	<ul style="list-style-type: none"> ✓ Dismantling of building ✓ Transportation of building debris from site to landfill



Green Initiatives



- **Total green planting area over 14,000 m²** to reduce heat island effect.
- **327 bicycle parking** spaces are provided in the estate to encourage green living.
- **Green Corners** are provided at G/F Entrance Lobby of every domestic block and Estate Management Office.

