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
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.
RESPOND TO ENVIRONMENT
All Round Noise Mitigation - 99% Noise Compliance

- Noise screening structures
- Gable end walls facing main road
- Existing Noise Barrier
- Set-back

Single Aspect Block with noise screening building form
- Noise Barrier Fin

Truncated building height

Noise Screening Structure with 3 m high Noise Barrier

Noise Screening PTI Cover
Let’s play with the Sun

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.
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.

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
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

Passing the street shops and the Public Transport Interchange, arriving at the entrance courtyard, here is the doorway to Hung Fuk Estate.
**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.
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 kicks noise for future development.

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

30% of the parking spaces are equipped with elec. charging facilities, conduit is allowed for 100% elec. charging parking space in the future.
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
A Nearby Modern Market for the Fresh

Hung Shui Kiu Temporary Market in dilapidated condition

New wet market with 42 nos. stalls supporting daily necessities with varieties

- **Open**, flexible & unified layout
- **Modern** & convenient
- **Clean**, bright & welcoming
- **Create comfortable shopping atmosphere** for the residents and the neighbourhood.
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

• 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)
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
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
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 reduces the need for frequent maintenance.
Building Contracts are specified and implemented with the following environmental initiatives:

- Specifying requirements for environmental management plan and monitoring requirements for air, noise, water pollution during construction (SA 10, SA 11, SA 12, SA 13).
- Specifying requirements for waste management plan (MA P3, MA 10, MA11).
- Not using virgin forest product for temporary works during construction (MA P1).
- Using timber from sustainable source for permanent works (MA 6).
- Specifying requirements for water quality (WU P1).
- Using Water Efficiency Labelling Scheme water efficient shower head (Grade 1) and mixers (Grade 2) to achieve water saving of 20% (WU P2, WU 1).
- Using WC suite of 6 lit. to achieve reduction in annual sewage volumes by 20% (WU 6).
Renewable Energy

[1] 213 PV panels installed at roof of domestic blocks, covering 346m², saving 1.5% energy. Solar power is transmitted to the smart metering central control console at EMO of estate for processing and display onto the screen at guard counter of domestic block.

[2] Solar poles in landscape garden convert solar power into electricity for nearby external lightings, saving 0.9% energy.

[3] Light emitting tiles are used in landscape garden.

[4] A total of 34 Nos. Solar tubes are installed (at Carpark, G/F activity area and Integrated Vocational & Rehabilitation Services Centre).
Commit to Save

Energy Saving in Domestic Blocks

- **Two-level lighting system** installed at common lobbies & corridors (save about 30% energy)
- **Motion sensor** installed at stair and RS&MRR (save about 16% energy)
- **Photo sensors and time switches** at typical floors and external area to fully utilize daylight (save about 6% energy)
- Electronic ballasts (save about 20 - 30% energy as compared with electromagnetic ballast) and T-5 fluorescent tubes (save about 20% energy as compared with T-8 tubes)

Energy Saving in Wet Market

- Market ACMV system with “free-cooling operation mode” (save about 83% energy) and “heat wheel energy recovery system” (save about 13% energy)

Energy Saving in External Area

- **LED lights** are used (save about 1.7% energy)
Reuse Demolished Materials

[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.

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

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.

---

Warm reminder in every flat.
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.

Reduction of 37,376 kg CO₂ emission by site batching plant
Pilot Program to Recycle Felled Tree at Construction Stage

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.

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

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

Reduction of 157.5 kg CO₂ emission by Tree Recycle
Waste Management in Operation

**Refuse Collection Chamber equipped with**
- Odour removal system
- Central Compactor System
- Mechanical ventilation and filter system

**Refuse Room at Typical Floor**
- Ventilation and filter system
- Ample space for recycling bins and waste separation

**Green Initiatives**
- Compost bins in community farm for garden waste recycling.

**Micro-climate Study**
Outdoor natural wind plays an important role in diluting odour, computer simulation on odour dispersion shows that odour is quickly diluted by ambient wind flows, concentration of odour is low.

Odour level below 1 is undetectable
Odour level below 5 is acceptable
• **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.
Life Cycle ... Easy to Construct & 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
Flexible Domestic Layout

- **Internal layout arrangement**
  - Sofa / bed and TV can be located on either side.
  - 2m Spacing for accommodating bed or wardrobe.

- **Adjustable cooking bench** with 3 different height to suit tenants’ need and to reduce wastage for demolition.

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

Flexible Market Stall

- **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.

Open & Semi-Open Types

1. **Stall Design in wet market**
   - Equipped with storage racks, hangers, light trough and signage plates creating a unified impression and allowing flexibility in the use of space for tenants of different trades.

2. **Adjustable cooking bench** with 3 different heights to suit tenants’ needs and to reduce waste for demolition.

3. **Internal layout arrangement**
   - Sofa, bed, and TV can be located on either side.
   - 2m Spacing for accommodating bed or wardrobe.
Our Environmental Policy is to promote healthy living in a green environment

- 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.

Positive comments are received and reflected in Facebook page which is established by local residents.
HKHA has developed Carbon Emission Estimation tool. In estimating CO$_2$ emission of buildings, we focus on the CO$_2$ emission associated with major construction materials and building operations for a building life of 100 years.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Embracing</th>
</tr>
</thead>
<tbody>
<tr>
<td>I: Materials Consumed During Construction</td>
<td>Timber formwork for substructure &amp; superstructure&lt;br&gt;Steel formwork for superstructure</td>
</tr>
<tr>
<td>II: Materials for Building Structure</td>
<td>Concrete for substructure &amp; superstructure&lt;br&gt;Steel for substructure &amp; superstructure</td>
</tr>
<tr>
<td>IV: Renewable Energy</td>
<td>Solar and/or wind powered system</td>
</tr>
<tr>
<td>V: Trees Planting</td>
<td>Trees taller than 5m</td>
</tr>
<tr>
<td>VI: Demolition</td>
<td>Dismantling of building&lt;br&gt;Transportation of building debris from site to landfill</td>
</tr>
</tbody>
</table>

CO$_2$ emission of Hung Fuk Estate is compared against a BEAM Platinum Benchmark Estate (Kai Tak Site 1A), none of the aspects are exceeded.

- **Total green planting area** over 14,000 m$^2$ 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.
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
5. Moving Forward
Green Buildings for Everyone, Everywhere

Moving Forward as global citizens, we should act with concerted efforts in the global green building movement, extending our influence with greater impact everywhere, aiming high with more ambitious targets, strong leadership and authority in the world.
Contact us:
Website: www.worldgbc.org
Twitter: @WorldGBC
Facebook: World Green Building Council
Email: office@worldgbc.org