



Green and Blue Space Conceptual Framework

 Planning Department
HKSARG

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Preface

Hong Kong is well endowed with green spaces and blue water resources such as country parks, public parks, the harbour, beaches, rivers and streams, wetlands, reservoirs, etc. These green and blue assets have been incrementally enhanced through deliberate government initiatives.

Green and blue assets are considered as invaluable and multi-functional components for sustainable city development. They perform various tangible and intangible functions. In a compact city like Hong Kong, the green and blue assets should be leveraged for promoting a liveable high density city. It is therefore important to establish a coherent conceptual framework to guide the planning of green and blue spaces.

This research paper is undertaken for the Hong Kong 2030+ Study, which aims to recommend a territorial spatial development strategy with a planning horizon spanning beyond 2030. It forms part of the building block of “Planning for a Liveable High-density City” for Hong Kong. Together with the two other building blocks of “Enhancing Economic Competitiveness” and “Creating Capacity for Sustainable Growth”, they aim to achieve the vision of strengthening Hong Kong as “Asia’s World City” with sustainable development as the overarching goal.

This topical paper constitutes part of the research series under “Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030” (Hong Kong 2030+). The findings and proposals of the paper form the basis of the draft updated territorial development strategy which is set out in the Public Engagement Booklet of Hong Kong 2030+.

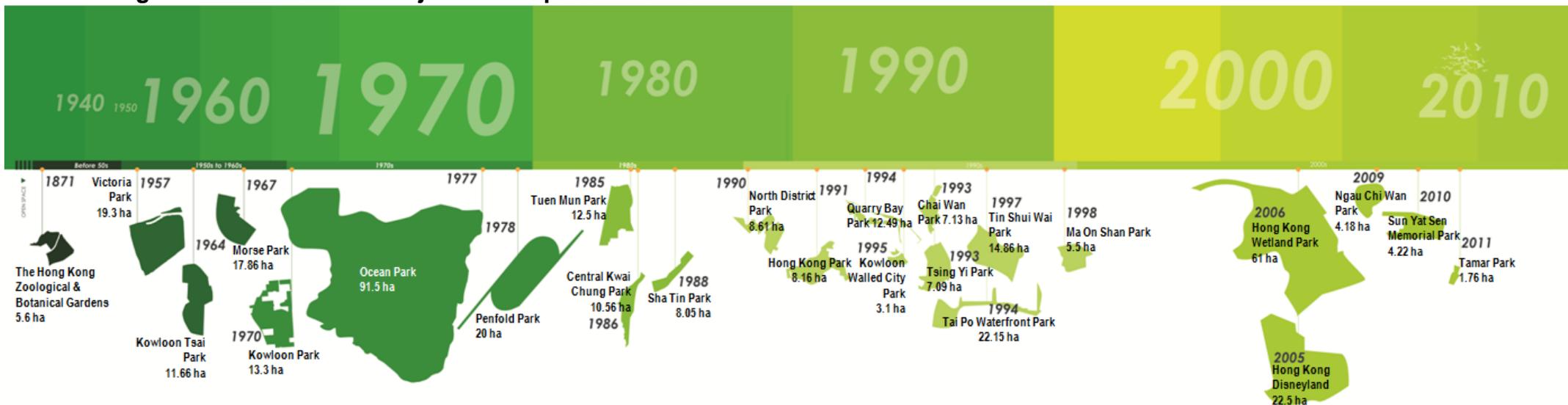
1 Evolution of Green and Blue Spaces

- 1.1 It is generally perceived that most green and blue spaces, apart from urban parks and artificial channels, are “naturalistic” elements and gifts from nature. For Hong Kong, the richness and diversity of green and blue spaces is, to a large extent, a combination of natural endowment and accumulation of long years of planning and development.
- 1.2 The evolution has demonstrated the strenuous and collaborative efforts of conservation of the natural environment, afforestation in the countryside and slopes, creation of public parks, public spaces and amenity areas, and planting of street trees in the city for enriching green spaces. **Figure 1** provides a broad diagrammatic timeline highlighting the major initiatives in enhancing our green spaces. Harbourfront resources, fishponds, wetlands, reservoirs, waterways, manmade channels, etc constitute the blue spaces, some of which are transformed from early human activities. While human intervention in the past was basically functional in nature, in recent years there has been an increasing emphasis on biodiversity and habitat conservation/recreation, enhancing connectivity, accessibility and public spaces, and contributing to climatic resilience. An integrated and holistic planning of the green and blue spaces would contribute to a liveable and sustainable Hong Kong.



The Waterfront Promenade at the West Kowloon Cultural District

Figure 1 Timeline of Major Green Space Initiatives



1.3 The recent evolution of landscape strategy in Hong Kong is highlighted below:

1990s Metroplan Landscape Strategy for the Urban Fringe and Coastal Areas

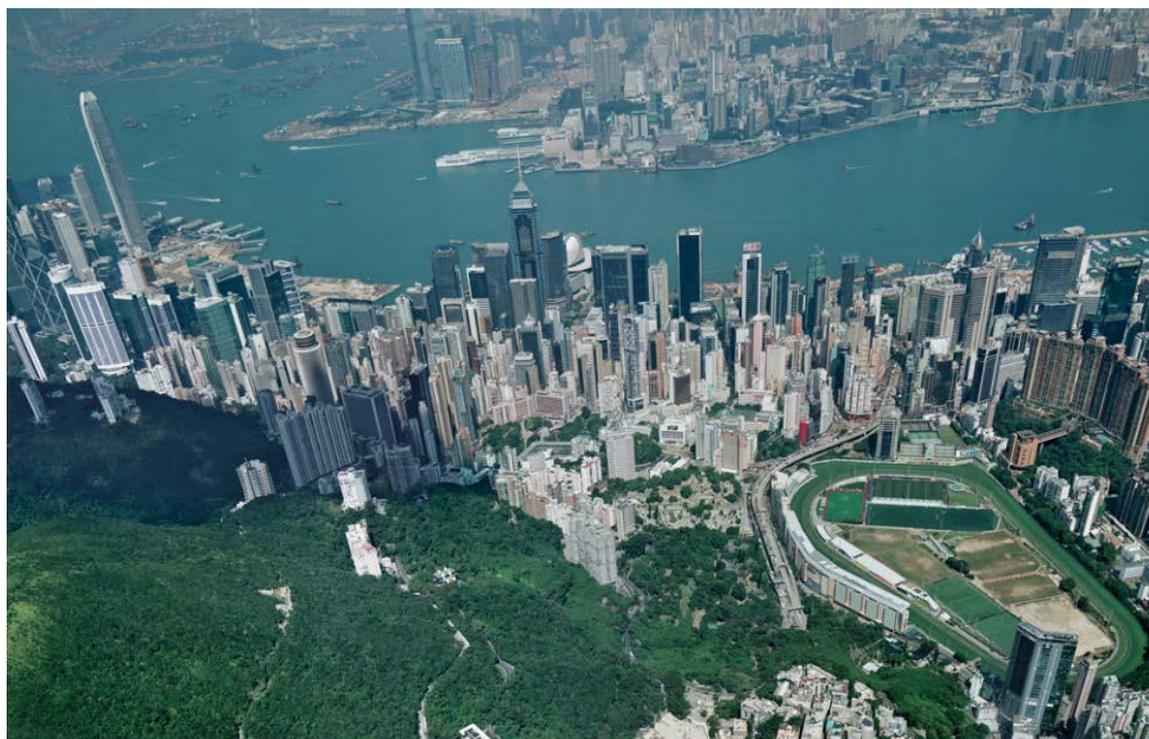
The Metroplan Landscape Strategy for the Urban Fringe and Coastal Areas (MLS) (1989) (Figure 2) was prepared as a component of the Metroplan, the strategic planning document for Hong Kong, Kowloon and Tsuen Wan. The objective of the MLS was “to provide a comprehensive framework for landscape conservation

and enhancement of the Metropolitan urban fringe and coastal areas”.

MLS began with a landscape appraisal of the physical and visual landscape features. It also provided an analysis of the urban context of Hong Kong (Figure 3).

The major elements included Urban Fabric, Scenic Backdrop, Inner Harbour Area, Major Visual Landmarks, Principal Ridgelines, Structural Open Space, Amenity Waterfront and City Gateways (land and sea).

It also provided an open space framework for recreation (**Figure 4**) with the objectives of proposing an integrated open space framework within the city, providing comprehensive recreation proposals for the Metro Area; and outlining a long-term plan for the development of open space and recreation facilities within the overall context of Metroplan. The proposed framework comprised the existing, programmed and planned open spaces as core elements, supplemented by potential new areas and links. The proposed framework was developed into a concept of interlinked open spaces extending from the heart of the urban area to the countryside and fringe and to waterfront promenades. The Strategy also dealt with recreation potential within the study area and the rehabilitation details of a number of key degraded and recreational sites.



Aerial photo from Lands Department © The Government of the Hong Kong SAR Reference no. G25/2015

Figure 2 The Metroplan: Landscape Strategy for Urban Fringe and Coastal Areas (extracted from the Metroplan)

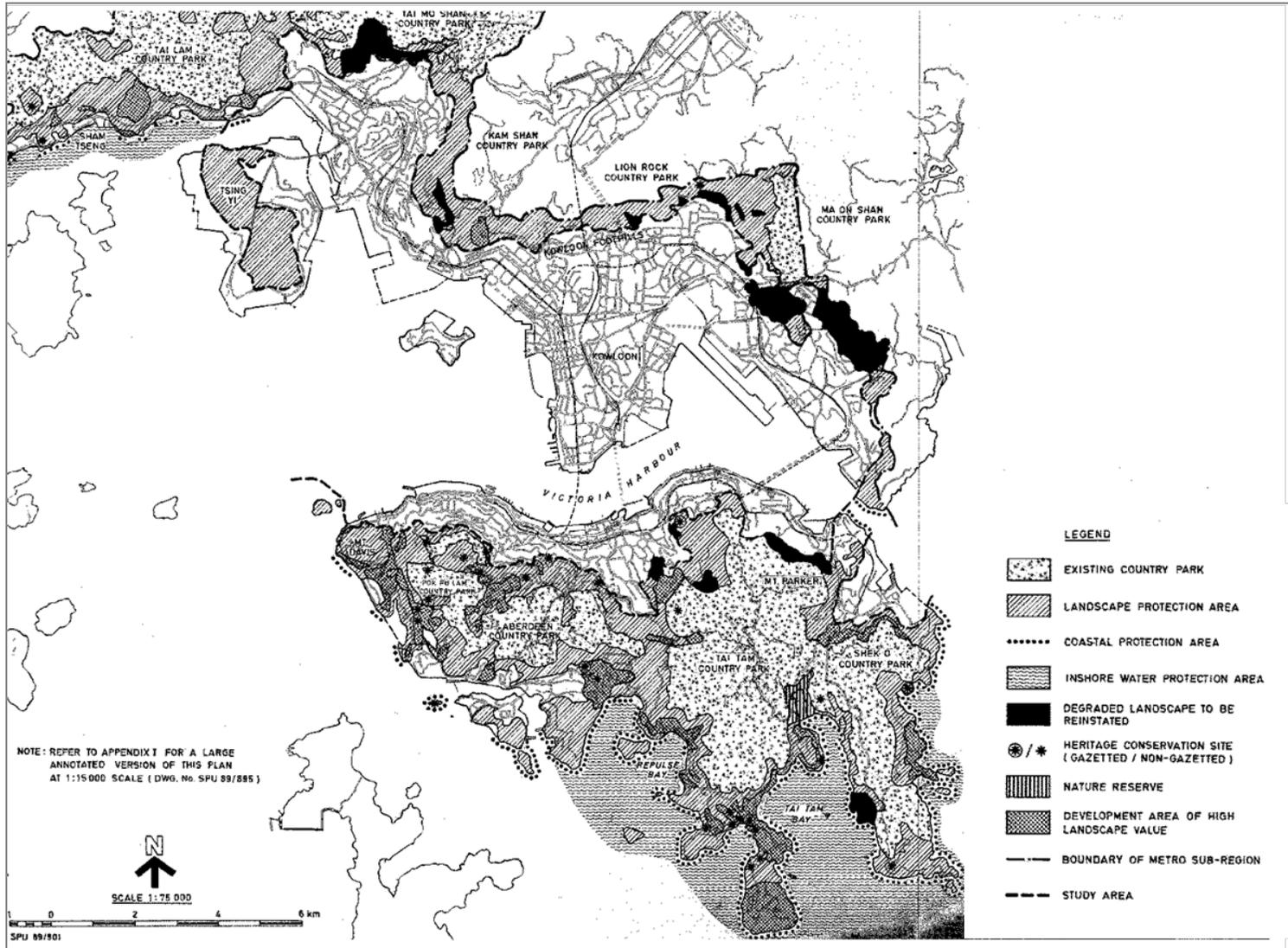


Figure 3 The Metroplan: Metro Design Context (extracted from the Metroplan)

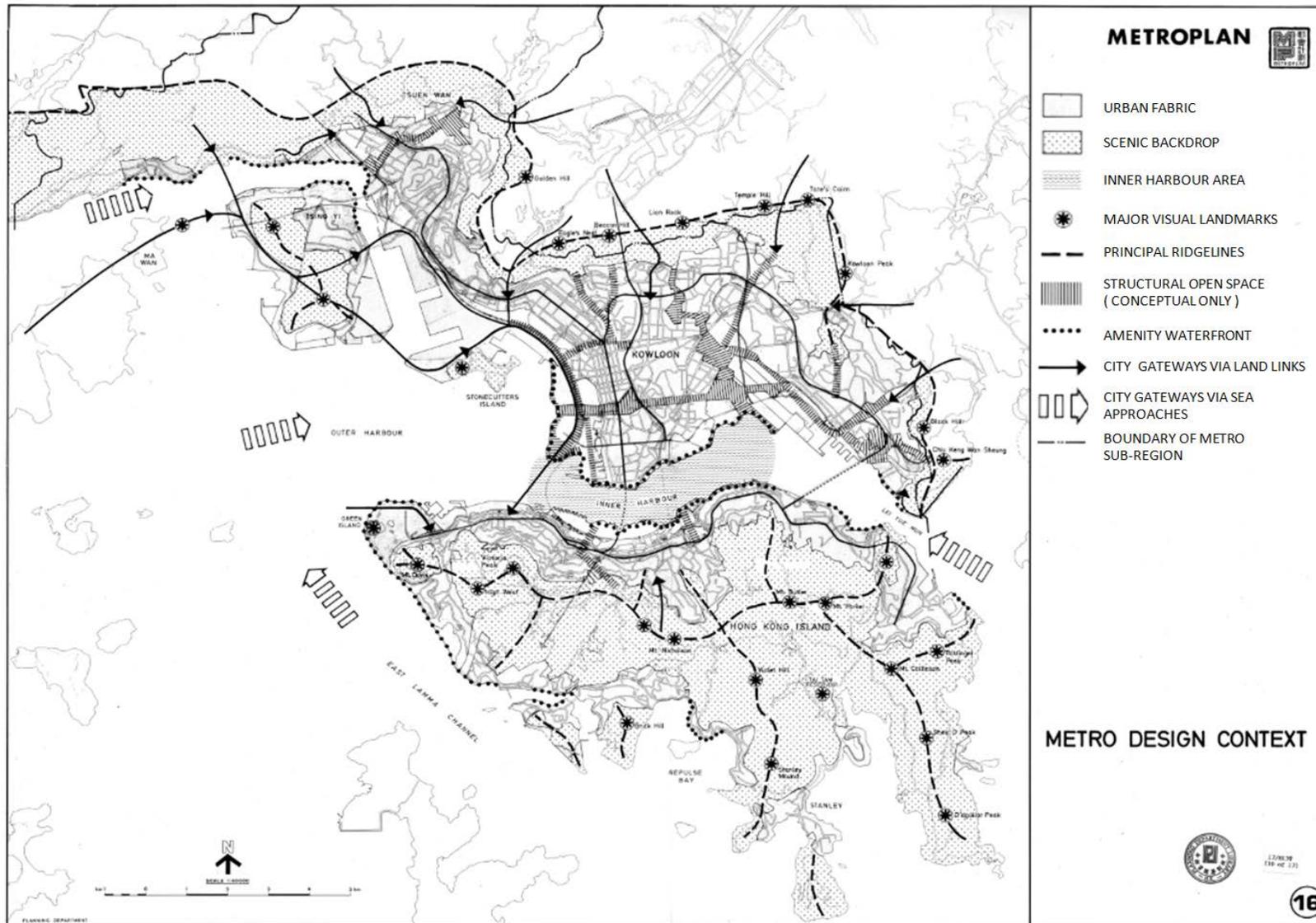
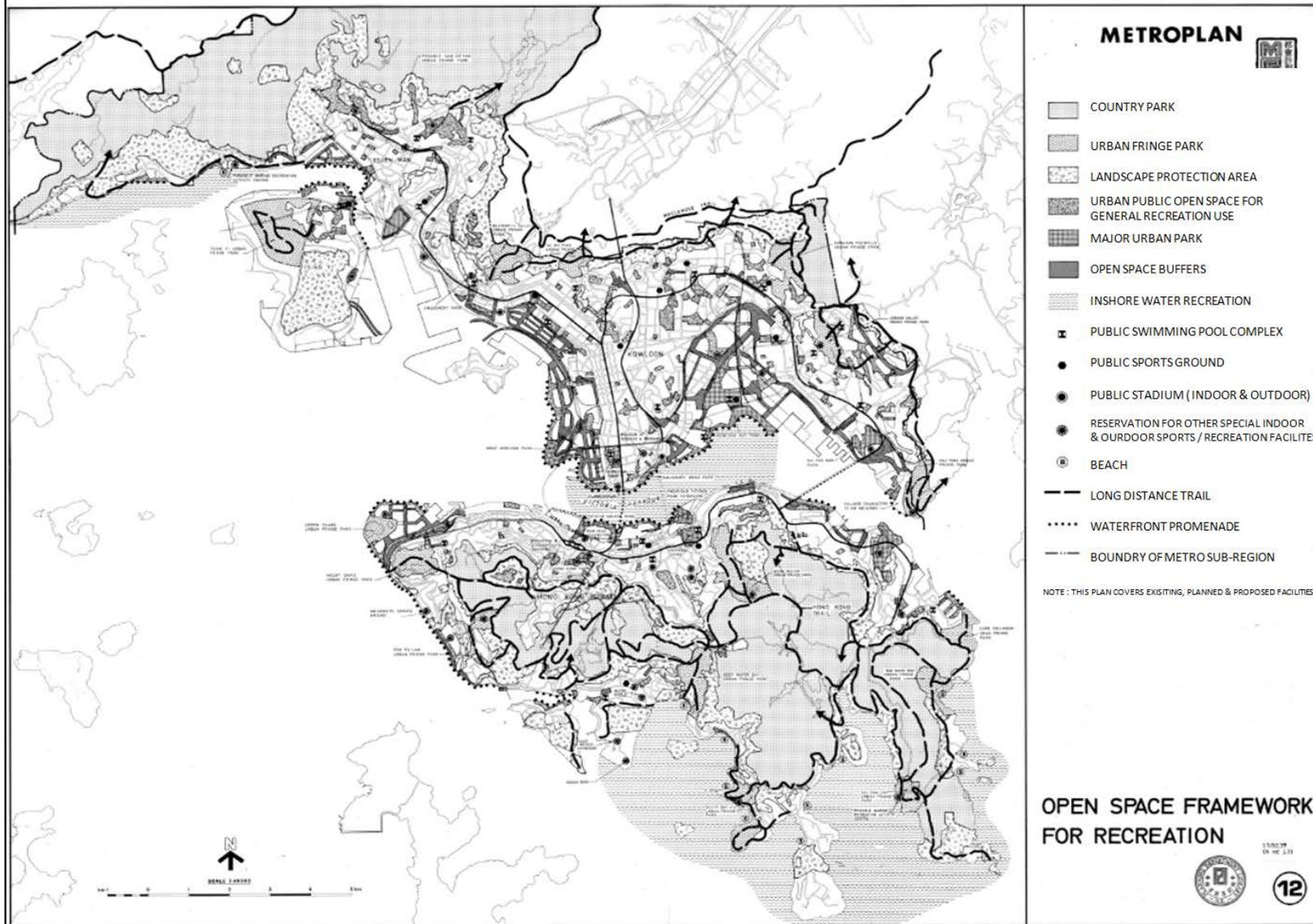


Figure 4 The Metroplan: Open Space Framework for Recreation (extracted from the Metroplan)



2000s “Landscape Value Mapping of Hong Kong”

The purpose of the study was to fulfil a positive objective by collecting and analysing the baseline conditions of the landscape resources and identify landscape character types in the territory in order to establish a database of the landscape covering the whole of Hong Kong.

The study mapped out, characterised and evaluated the entire landscape of Hong Kong, dealing equally with urban landscapes, rural landscapes, countryside landscapes and coastal landscapes (**Figure 5**). It classified Hong Kong's landscapes into six broad “Landscape Character Types” on the basis of different combinations of these features:

- Upland Countryside Landscape - the backbone of Hong Kong's landscape
- Lowland Countryside Landscape - the settled rural landscape
- Rural Fringe Landscape - rural landscapes in transition
- Urban Fringe Landscape - the edges of the city
- Urban Landscape - the landscape of town and city
- Coastal Waters Landscape - the 'seascape'

The Study recommended four ways of assessing landscapes, i.e. on the basis of landscape character, condition, sensitivity to accommodate change, and value.

Landscape value was appraised on the basis of a number of attributes, including a landscape's visual coherence, complexity, rarity, relief and condition, key heritage/natural features and visual attractors / detractors. There were four rankings of landscape values:

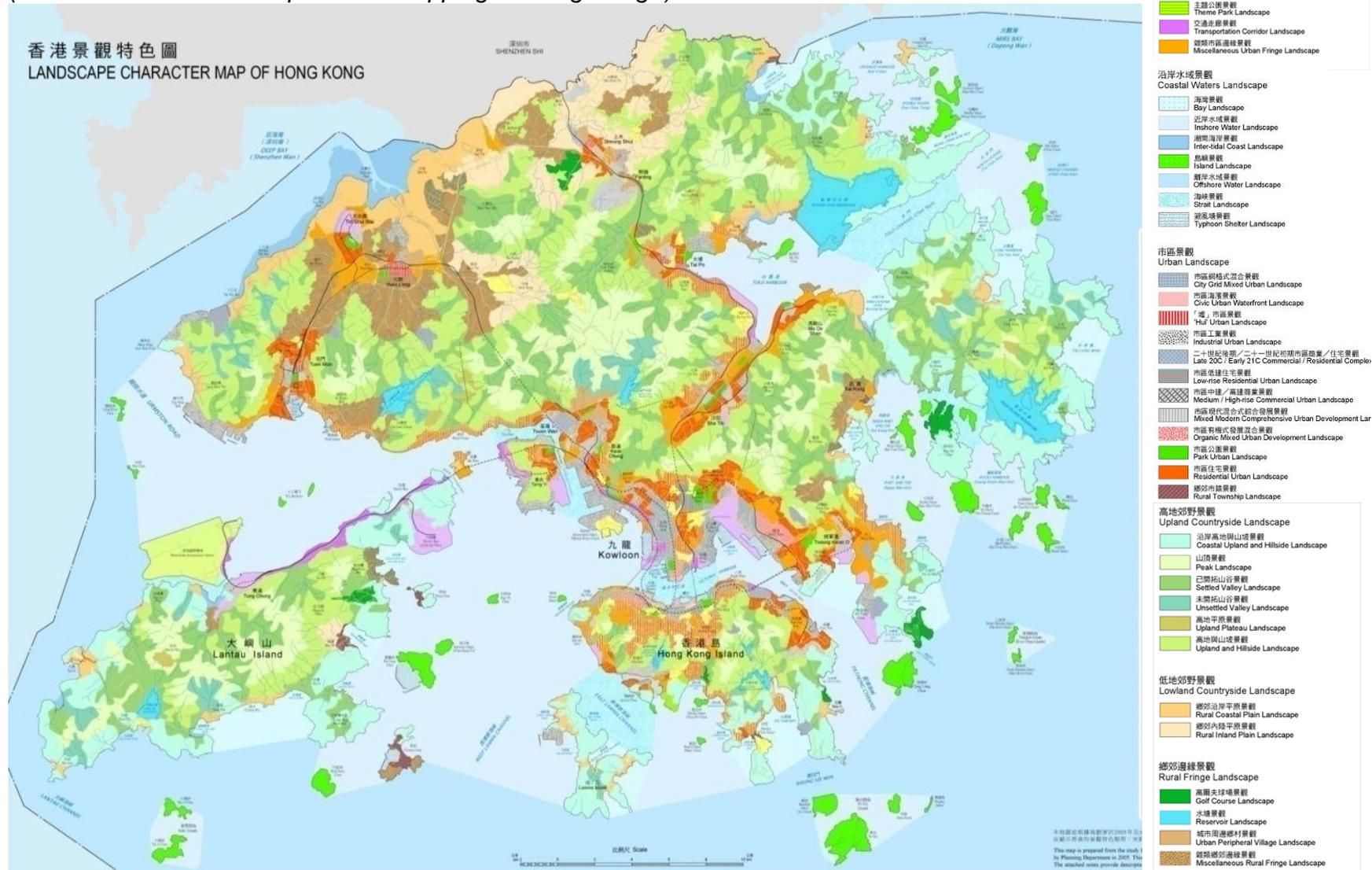
- High Value - the outstanding landscapes
- High (Qualified) Value - the best of the rest
- Moderate Value - the ordinary landscapes
- Low Value - landscape in disrepair

A new indicator of “Significant Landscape Features” recommended under the Study became part of the Government's routine sustainability assessment.



Tai Long Wan

Figure 5 Landscape Character Map of Hong Kong
 (extracted from “Landscape Value Mapping of Hong Kong”)



2000s to 2020s

Since then, major projects with landscape changes are highlighted below:

- Major development – West Kowloon Cultural District, Kai Tak Development, Central-Wanchai reclamation – including new waterfront promenades, parks and public and private buildings
- Expansion of new towns – Tseung Kwan O, Tung Chung
- Major infrastructure – Stonecutters Bridge, Hong Kong-Zhuhai-Macao Bridge, new MTR lines (West Rail, Tseung Kwan O Line, West Island Line, South Island line (east), Kwun Tong Line extension, Shatin-Central Link) and associated development, Express rail link and Central- Wanchai Bypass
- Other development and expansion – Science Park, expansion of universities
- Urban renewal/ revitalisation – Energising Kowloon East Office, Kwun Tong, Wan Chai, Tsuen Wan, etc.
- Major housing sites (private and public) – large scale housing development in Anderson Road quarry, Kai Tak, etc
- Theme parks – Hong Kong Disneyland and developments/ redevelopments at Ocean Park
- Extension of country park – Lantau North Country Park
- Connection of promenades/ new parks e.g. Tamar Park, promenades in Kwun Tong, Tsim Sha

Tsui/Hunghom promenade, Ma On Shan, Quarry Bay, Siu Sai Wan etc. Large parks –Hong Kong Velodrome Park, Jordan Valley Park, Ngau Chi Wan Park, Po Kong Village Road Park

- Expanding cycle track networks
- Revitalisation of sites/buildings with heritage or historic values e.g. PMQ, etc.

Beyond 2020...

- Lantau development
- Future expansion of rail lines – Northern Link, South Island line (west), etc
- New development areas in the New Territories – Kwu Tung North and Fanling North, Hung Shui Kiu, etc
- Third runway system of the Hong Kong International Airport
- Urban renewal projects



*Kai Tak Cruise Terminal
Source: Architectural Services Department*

2 Roles and Benefits of Green and Blue Spaces

- 2.1 Green and blue spaces have played a key role in shaping the fundamental character and identity of our city: from the pre-colonial era of fishing and farming villages to the metropolitan city at present. The green hills and undulating topography form the backbone, and the harbour and waterway shape the supporting framework. The ria coastline, hills, flood plains and valleys basically define the envelope of the early settlements.
- 2.2 The present development concentrating along the coastal reclaimed land and new towns are also defined by verdant hilly backdrops, river valleys, waterways and the harbour. Older new towns such as Tsuen Wan and newer ones including Tseung Kwan O, Ma On Shan, Tung Chung are good examples.
- 2.3 Green and blue spaces are integral parts of a liveable compact city. Green spaces are, and should continue to be, 'lungs' of cities. It is of common knowledge that these 'lungs' play an indispensable role in carbon sequestration, pollution amelioration, noise abatement, storm water management, and also relieving urban heat island effect, improving microclimate, enhancing biodiversity and providing visual relief¹. The blue spaces also contribute significantly in the environmental and ecological, aesthetic and functional

aspects². Both green and blue spaces play a significant role in enhancing the quality of living³, and the well-being of the people and have been perceived as crucial elements in retaining and attracting talents in an increasing competition among cities globally.



*Aerial photo from Lands Department ©
The Government of the Hong Kong SAR Reference no. G25/2015*

- 2.4 In the coming few decades, it is projected that the population of Hong Kong will grow gradually in total number with a significant increase in the proportion of the aged. Based on the projection of Census and Statistics Department's 2014 projection under the baseline scenario, by 2043 over one third of our population would be aged over 65 and by 2064 over 10% would be aged over 85 i.e. five folds of the present percentage.

2.5 There is also a growing number of singleton households. Promoting active aging will be one of the key agenda items for designing the future built development. The population will be older, less mobile and in need of more support and services from their neighbourhood. There are also stress, mental and physical health problems. At the same time, there is a growing aspiration for better quality of living and working environment and a healthy environment conducive to raising families and nurturing the young children. The positive role of green and blue spaces to the health and well-being of our population will be of increasing importance.

2.6 The other benefits green and blue space network are summarised in the following points:

Ecology

2.7 A coherent and interconnected green and blue space system helps enhance biodiversity and essential ecological services because they serve as habitats and ecological corridors that connect habitats for wildlife, conserve the natural environment and increase carbon storage.

Landscape

2.8 Both green and blue spaces are important landscape resources and urban design elements, which provide

landscape setting, landscape features, breathing space and visual relief in a compact urban environment⁴. It is rare for a world city to possess rich and green and blue assets in such a close proximity to the urban core to have urban living close to nature. This special harmonious relationship shall continue to be a fundamental component to the city image of Hong Kong.

Social and recreation

2.9 Green and blue spaces provide recreational areas for residents and visitors. They are important attributes of public realm which encourages social interaction and promotes healthier lifestyles. Local parks can provide a platform for individuals to meet, socialise and interact with one another. With improved water quality and proper planning and management, urban water spaces such as rivers and streams, drainage channels and waterfront areas can also be used for appropriate leisure, sports and recreational purposes.

Urban resilience

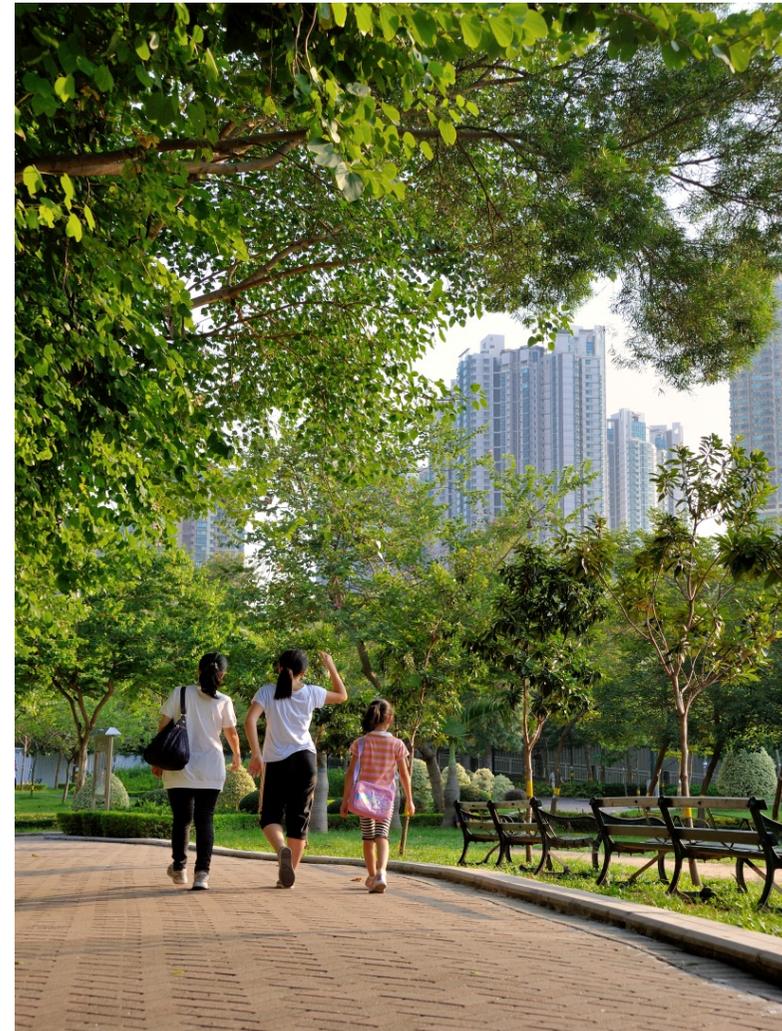
2.10 Climate change impacts our city in many ways because of more frequent heavy precipitation, sea level rise, rising temperatures and extreme heat. It is recognised that green infrastructure (e.g. gardens, parks, green roofs and green walls) and blue infrastructure (e.g. water bodies, drainage channels, rivers, streams) help

constitute a sustainable and cost-effective strategy to strengthen urban resilience by moderating urban temperature, regulating water flow, controlling flooding, enhancing environmental capacity and resilience, mitigating and adapting to climate change and hazards⁵.

Urban climate and environment

- 2.11 Green and blue spaces are beneficial to the urban environment. According to the Planning Department's study on "Urban Climatic Map and Standards for Wind Environment", pockets of green oases and the water bodies (including the harbour, waterfront and river channels) in urban areas are useful in providing localised thermal relief to the urban environment. Vegetation can affect the surrounding air temperature, solar exposure of pedestrians, and the wind speed on the streets. It increases the dynamic potential and helps mitigate thermal load and urban heat island effect. The process of evapotranspiration in plants absorbs large amount of heat from the air which cools the surrounding air temperature (Planning Department, 2012).
- 2.12 It is estimated that for every 100m² of vegetation added to a park, it can effect 1°C decrease in air temperature⁶. Shashua-Bar and Hoffman (2000)⁷ investigated that the green space effect contributes to about 0.5°C cooling of the air temperature comparing to the shading

effect. The cooling effect can extend beyond the subject green space.



Health and well-being

2.13 In a less tangible but more important dimension, the green and blue space network is fundamental to the physical and psychological health and well-being of individuals^{8,9}. It is believed that 'biophilic cities' (see insert) in which design of the cities includes nature and natural elements and green and blue space network as a crucial element can build resilience and benefit various aspects of well-being and health of the population¹⁰. Numerous international research studies confirmed the positive contribution of green spaces to mental health in relieving stress, giving relief and providing recreational spaces and opportunities. There is growing recognition among international communities that mental health is one of the most neglected and pressing development issues. In an increasingly compact Hong Kong, the green and blue space network play an indispensable role in enhancing both physical and mental health of our population.

Biophilic cities are:

Cities that provide close and daily contact with nature and seek to foster an awareness of and caring for nature. They are also sustainable and resilient cities that foster social resilience, in the face of climate change, natural disasters and other uncertainty. Biophilic design holds that good design, at the building, site, city and regional scale, must include nature and natural elements. It is based especially on the concept of biophilia, promoted by Harvard myrmecologist and sociobiologist E.O. Wilson. Wilson considers that humans have co-evolved with nature and that we carry with us our ancient brains and our need to connect with and affiliate with nature, to be happy and healthy. There is now a growing body of evidence of the positive physical and mental health benefits, including happiness, positive mood, lower mortality, enhanced productivity, cognitive performance and creativity associated with greenery and green elements in living and work environments.

3 Existing Green and Blue Assetsⁱⁱ in Hong Kong

3.1 The key green and blue assets (**Figure 6**) covered in the paper, though not exhaustive, are highlighted as follows.

Green Assets

“Green assets” refers to green features including vegetation cover (such as woodlands, shrublands, and grasslands but excludes agricultural land), open space and recreation space, country parks as well as connectors such as hiking trails and waterfront, etc

3.2 Hong Kong ranks high in terms of vegetation cover per capita among Asian cities (**Figure 7**). Around 78% of Hong Kong's total land is vegetated, i.e. covered under woodlands, shrublands and grasslands (Planning Department, 2015). Country parks occupy about 40% of our land and they are generally within reach of residents (**Figure 8**). It is estimated that about 85% of population in Hong Kong are within 3km of the country parks (**Figure 9**). With over 100 m² vegetation cover per person, Hong Kong ranked third among 22 major Asia cities¹¹.

3.3 Public open space (POS) is the key component of the public space and green space at the local and district levels. It plays a pivotal role in building a liveable high-density city. POS is conducive to healthy city and healthy people. In a compact city like Hong Kong, POS

provides valuable points of respite away from the hustle and bustle of the city. At the city level, landscaped POS provides visual/ spatial relief and acts as the all-important “lungs” of our high-density city. As established in the Urban Climatic Maps and Standards for Wind Environment – Feasibility Study, where connected via green connectors and landscape corridors, a network of POS could have enormous therapeutic qualities for the built environment by facilitating wind flow and reducing the thermal load of the city. In recent years, the public and some non-government organisations have called for a higher POS standard for Hong Kong.

Figure 7 Green Space Per Capita



Source: Asian Green City Index (2011), a research project conducted by the Economist Intelligence Unit, sponsored by Siemens

ii The term “assets” cover the green and blue spaces and the connectors such as trails and waterfront.

3.4 According to the “Hong Kong Planning Standards and Guidelines” (HKPSG) (for the urban areas including the Metro Area and the New Towns), the standard for provision of open space is a minimum of 20 ha per 100,000 persons, i.e. 2m² per personⁱⁱⁱ. As in 2012, the average provision of open space per person is about 2.7m² (1.64m² and 1.07m² average Local Open Space (LO) and District Open Space (DO) per person) which is in line with the planning standard. However, 4 and 6 out of 18 districts have provision of LO and DO less than 1m² per person respectively^{iv}.

3.5 In terms of accessibility, according to the HKPSG, local open space should be located within short walking distance from the residents it intends to serve, preferably within a radius of not more than 0.4km.

3.6 It is estimated that about 90% of the population are living within 400m distance from the boundary of the “Open Space” zones designated under statutory land use plans (Figure 10).

iii Apportioned as follows:

- a) A minimum of 10 ha per 100 000 persons (i.e. 1m² per person) for District Open Space; and
- b) A minimum of 10 ha per 100 000 persons (i.e. 1m² per person) for Local Open Space.

iv Please refer to page 25 for details.

3.7 In Hong Kong, green spaces are relatively limited in the densely developed urban areas where most population and development is concentrated. In new towns, they are often comprehensively planned with town parks to provide green spaces.

3.8 Currently, the measurements on greening in Hong Kong are 2D in nature (e.g. without taking into account the difference of big trees and lawns) and without a long-term greening target for development at individual site, district and regional levels. **Table 1** provides an overview of the major documents on their greening standards, guidelines and/or statutory status related to greenery provision and preservation.

Figure 10 Figures on Open Space in Hong Kong



Table 1 Current Greening Standards and Guidelines in Hong Kong

Document	Contents relating to greening
Hong Kong Planning Standards and Guidelines	Sets out the planning standards in Hong Kong including urban design, greening and open space provisions
PNAP 152 – Sustainable Building Design	Sets out the minimum standards on site coverage of greenery for new developments
DEVB Technical Circular (Works) 3/2012: Site Coverage of Greenery for Government Building Projects	Sets out the minimum standards on site coverage of greenery for Government projects
DEVB Technical Circular (Works) 2/2012: Allocation of Space for Quality Greening on Roads	Sets out the requirements for allocation of space on roads for quality greening and landscape works for new at-grade roads projects
DEVB Technical Circular (Works) 2/2013: Greening on Footbridges and Flyovers	Sets out the requirements on greening for new footbridges and flyovers in built-up areas
BEAM Plus	Covers the demolition, planning, design, construction and commissioning of a new building project. It can also be applied to major renovations, alterations and additions. By adopting an affordable range of best practices, it seeks to reduce the environmental impacts of a new building while also improving environmental quality and user satisfaction. Greenery is part of the assessment criteria for the grading of green buildings.
Guiding Principles on Green Coverage for Public Housing Developments	Sets out the minimum standards on site coverage of greenery for new public housing developments

Blue Assets

“Blue assets” refers to water bodies including harbour, rivers and streams, conservation-related water space (such as wetlands, marine parks and marine reserves), water sports centres, beaches, reservoirs, artificial lakes, etc

3.9 Apart from being a public natural asset, the Victoria Harbour provides a venue for tourism, recreation and harbour-based events. The total length of the harbourfront is about 73km. **Figure 11** shows the harbour planning framework. In general, the harbour can be divided into inner harbour core, harbour east, and harbour west. The Victoria Harbour is Hong Kong’s most precious natural resources and is famous for its fabulous view. It is the centre point of Hong Kong's cityscape. It provides the city with a spectacular natural environment to complement its compact urban character. The Government has taken great care in planning the development of the harbourfront areas in order to make it an accessible and enjoyable place for the public.

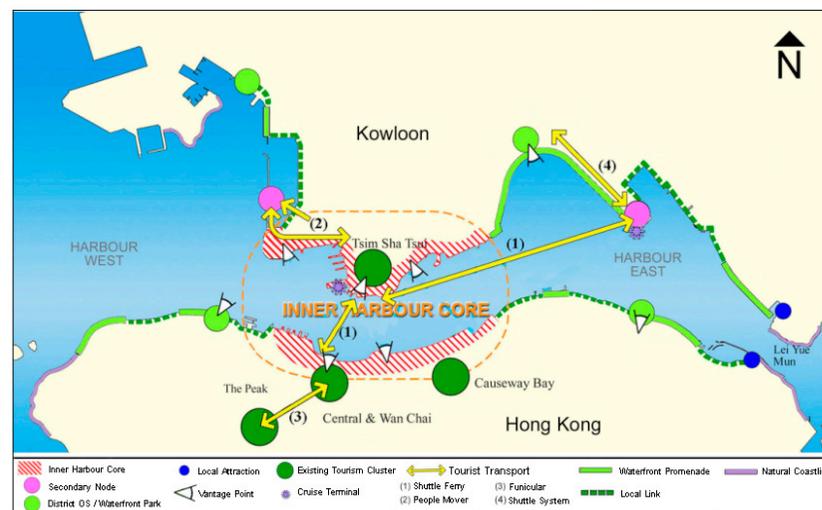


Figure 11 The Harbour Planning Framework
(extracted from “Planning Study on the Harbour and its Waterfront Areas”)

- 3.10 There are a few river catchment areas and over 2,500 km of natural streams and rivers in Hong Kong, mostly located at hillsides. Apart from being parts of the drainage system, many of these natural streams and rivers are good habitats supporting a variety of wildlife. They have ecological functions and aesthetic, landscape and climatic resilience values. However, the natural streams and rivers are subject to various threats such as deterioration of water quality, channelisation of rivers and streams for development, river training, and unauthorised damage/destructions.
- 3.11 In addition, since the last decade, the Drainage Services Department (DSD) has been incorporating more

environmental, ecological and aesthetic features in the design of engineered river channels in both urban and rural areas. Yuen Long Bypass Floodway, Ho Chung River, Upper Lam Tsuen River and Kai Tak River are examples of river improvement projects incorporating environmental, ecological and aesthetic elements. With the success of these projects, more river revitalisation projects are currently under planning, including Tsui Ping River, Tin Shui Wai Channel and Yuen Long Nullah.

- 3.12 Other blue assets include wetlands, marine parks and marine reserve, reservoirs, etc



Aberdeen Reservoirs

Figure 6 Existing Green and Blue Assets in Hong Kong



Figure 8 Country Parks in Hong Kong

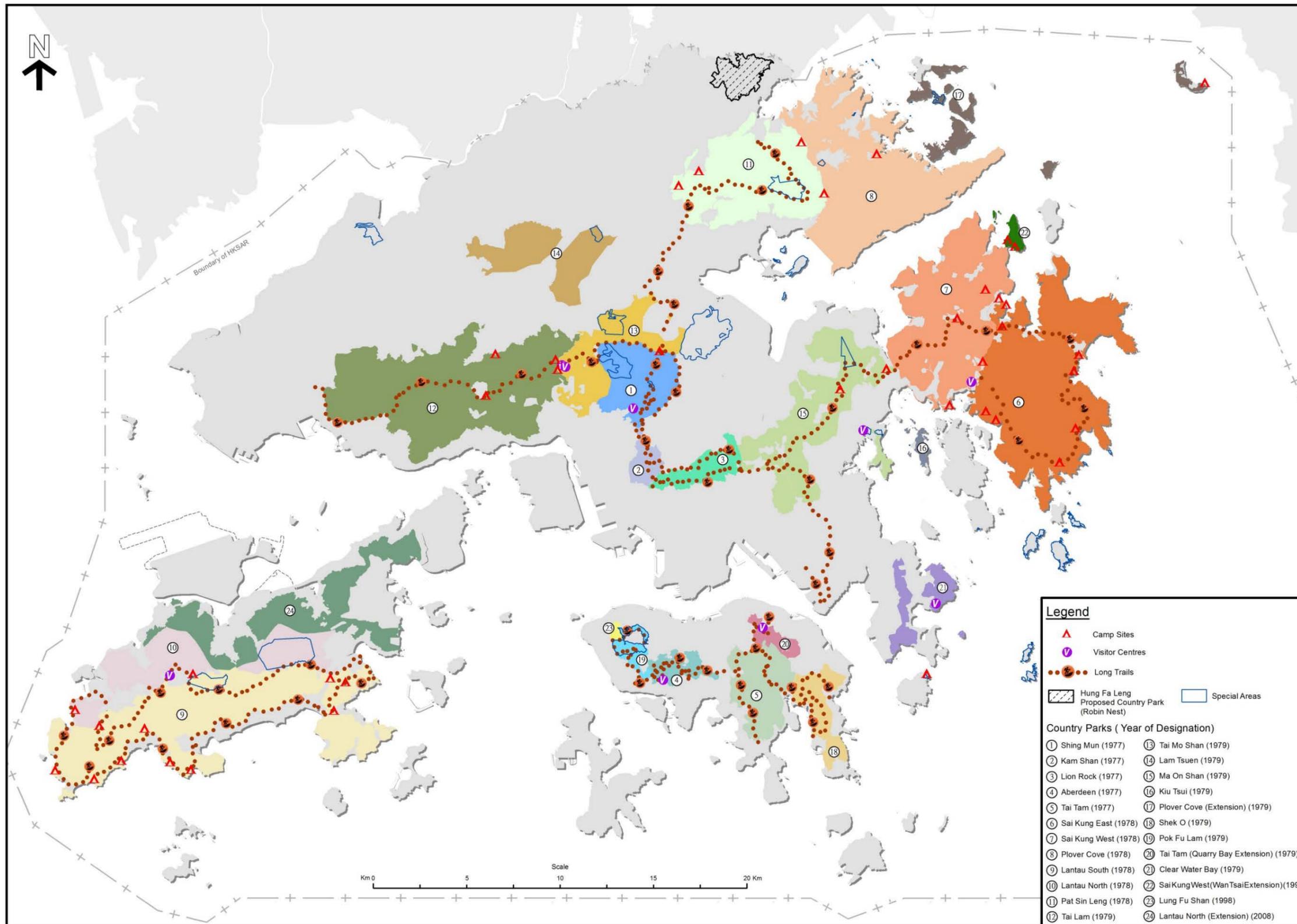
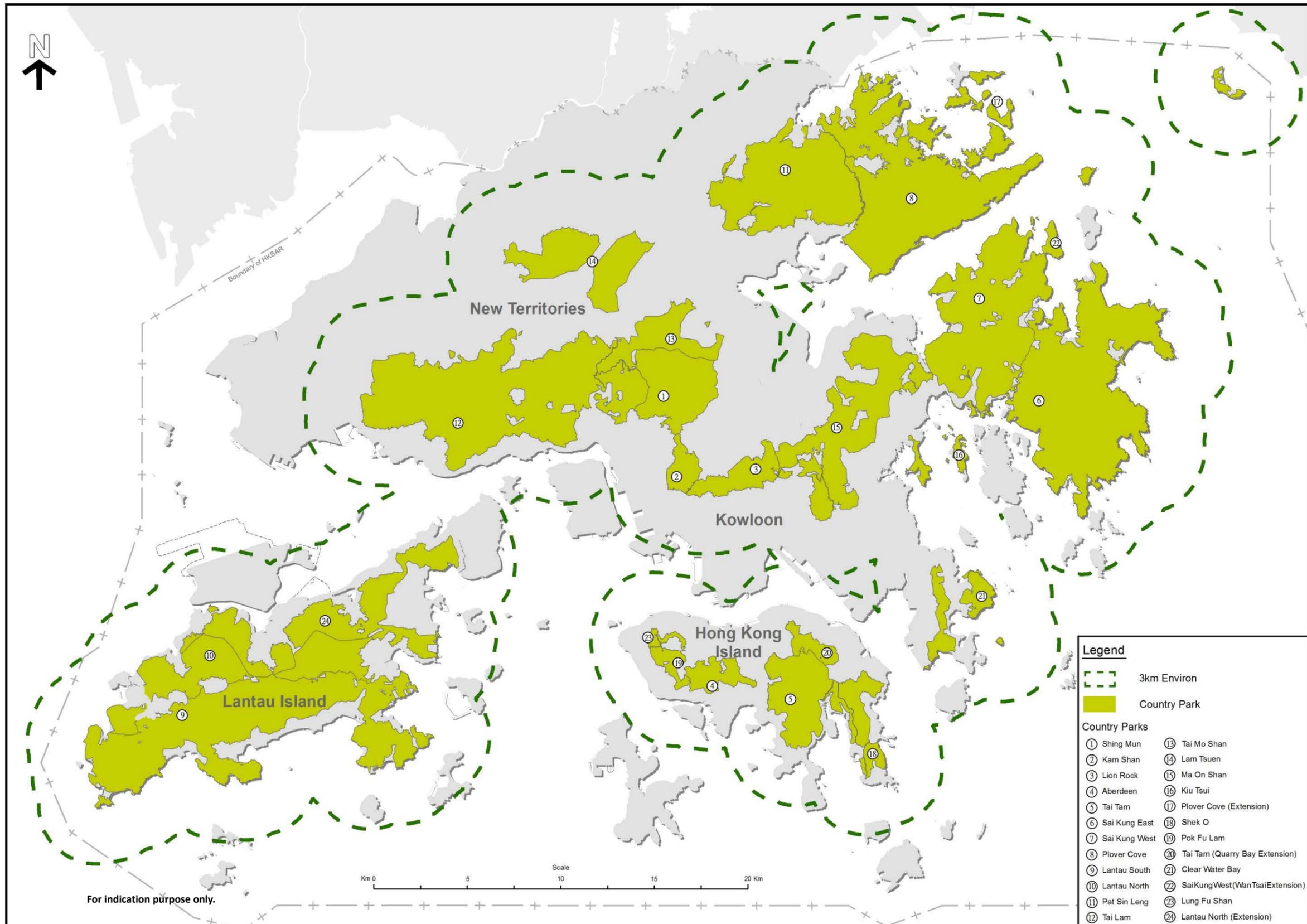


Figure 9 The 3 km Environs of Country Parks (covering a majority of the population)



4 Key Principles and Strategic Directions

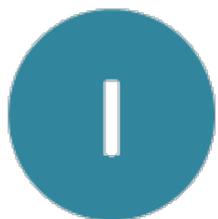
- 4.1 Having considered the intrinsic quality of green and blue spaces in Hong Kong and in view of our challenges, namely changing demographic composition, exponential growth in the demand for health care, growing aspiration for enhanced quality of living environment, keen competition for land and other resources, and climate change, the main principles of planning for green and blue spaces are to:
- enhance and manage the valuable green and blue assets;
 - link and reinvent spaces to promote public use synergy and imaginability;
 - connect people to nature and cultivate community green assets system; and
 - engage in a green and sustainable use of resources in planning the city infrastructure.
- 4.2 Under the principles, five strategic directions are recommended as follows:
- enriching existing green-blue assets;
 - reinventing the “green and blue system” networks;
 - cultivating community greenery networks;
 - developing an urban forestry strategy; and
 - promoting a sustainable built environment.

We propose to formulate a conceptual spatial framework for green and blue space planning^v for Hong Kong (Figure 12).



Hiking Trail at Devil 's Peak

^v The proposed conceptual spatial framework for green and blue space planning generally does not cover agricultural land, but includes land under active farming in view of its environmental and ecological benefits.



Enriching Existing Green-Blue Assets

- 4.3 Hong Kong is endowed with rich green and blue assets, and an integrated approach should be adopted in planning them to bring out more benefits and synergy. There are opportunities to better utilise our existing assets as well as to enhance and synergise them together with open spaces at various levels. We can also further enrich the landscape values of our urban fabric by enhancing the green spaces in the built-up areas, especially areas with relatively small vegetation cover.



Ma On Shan Country Park

Enhancing the country parks

- 4.4 Country parks are valuable green assets of our city. They contribute significantly to biodiversity and our green spaces in Hong Kong and make us stand high in overall vegetation cover among international cities. They serve as carbon sinks, lungs of our city and the essential buffer against climate change and urban heat island effect. They provide green spaces, countryside and recreation venues for our people to relax and rejuvenate. They make major contributions to our physical and mental health and well being. They play an indispensable role environmentally and ecologically. Opportunities for enhancement are identified as follows:
- (i) **Developing better access and facilities:** While enhancing the biodiversity and protecting the core of the country parks from disturbance, the amenity and recreation potential of the less ecologically sensitive part of the country park should be enhanced. Our country parks are provided with various long trails and family trails. We can further facilitate public access to recreation sites and trail heads of country parks and to provide a greater variety of compatible countryside recreation facilities (e.g. mountain bike facilities and overnight accommodations such as camp sites) so as to allow people of all ages to connect with and appreciate nature. Consideration should be given to further improving the design of facilities in some popular country parks in order to

cater for the needs of the elderly and people with disabilities.

- (ii) **Creating ecological corridors:** We shall seek to providing a conducive environment for biodiversity to thrive by creating green amenities and ecological corridors through greening and landscape initiatives so as to better connect the natural habitats.

Enriching the landscape values and greenery of our urban fabric

4.5 Efforts should be stepped up to provide more soft landscape and greenery in the densely built-up areas, which are usually suffering from urban heat island effect, air and noise pollution as well as limited public amenities.

- (i) **Designate and upgrade flagship parks:** Existing regional/district parks such as Victoria Park, Hong Kong Park, Kowloon Park are attractive flagship parks patronised by both local residents and tourists. Some embrace urban forests forming part of our urban ecology, e.g. Kowloon Park. Consideration could be given to upgrading these existing parks such as providing better connectivity and improved landscapes more greenery. With the launching of such mega projects as West Kowloon Cultural District and Kai Tak Development, planned with ample green spaces, additional passive landscaped

spaces would be provided to serve as green lungs, scenic oases and urban forests. Flagship or regional parks should be provided in new development areas in future as far as possible.



Kowloon Park

- (ii) **Priority areas for improvement.** Considerations should be given to improve districts with relatively low vegetation cover such as Sham Shui Po, Kwun Tong, Kowloon City and Yau Tsim Mong.
- (iii) **Review the provision standards of open space:** A preliminary review of the provision of open space in Hong Kong has been undertaken by Planning Department in 2012. The scope of this open space review includes POS on Government land and those provided within large private developments for public use, open spaces managed by the Housing Authority (HA), areas zoned "Open Space" on the Outline Zoning Plans and Development Permission Area Plans, areas zoned "LO" and "DO" on the Outline Development Plans and Layout Plans, as well as private open space within large private developments.

As at 2012, the open space per capita of Hong Kong was about 2.7m²/person. If private open space within large private developments was excluded, the open space per capita of Hong Kong would be reduced to about 2.46m²/person. Details of this review are summarised as follows.

Table 2 Open Space Provision Scenarios

	Scenario 1 Existing Provision	Scenario 2 Existing Provision (Exclude open space within large private developments)
DO	1.07m ² /person	1.05 m ² /person
LO	1.64 m ² /person	1.41 m ² /person
Total	2.7 m ² /person	2.46 m ² /person

Based on Scenario 1, it was found that the LO per capita of four districts (i.e. Central and Western, Wanchai, Yau Tsim Mong and Kowloon City districts) were below 1m²/person and DO per capita of six districts (i.e. Kwun Tong, Kwai Tsing, Tsuen Wan, North, Yuen Long and Sai Kung districts) were below 1m²/person.

To reflect the aspirations for enhanced open space provision and the objective of building an age-friendly, green and resilient city, we propose to adopt a higher ratio of 2.5 m² per person for the purpose of planning for land requirement for open space use under Hong Kong 2030+, i.e. the territorial average open space provision target that we can achieve. The split between LO and DO is to be considered further. Under the prevailing standards in HKPSG, the provisions of open space in large private developments and public housing developments, as

required in the approved planning briefs, lease conditions and/or conditions of planning permission, would normally be counted towards general provisions of open space, but POS in private residential development should be disregarded^{vi}. For the purpose of forward strategic planning under Hong Kong 2030+, the proposed ratio of 2.5 m² per person does not include POS provisions in private residential developments. We should consider applying a higher standard in new development areas, and seize opportunities to improve the open space provision standards of the existing built-up areas as far as practicable. The Government will make good use of the land resources and provide more open space wherever possible to improve our living environment.

- (iv) **Re-imagining our local open spaces:** Some older public parks require revamping to accommodate more plantings (especially trees) and converting hard-paved areas to planting beds or lawns for multiple uses if situations are warranted.
- (v) **Greening at various levels of the development:** There are a lot of potential for new developments to provide engaging landscapes at various levels to increase foliage coverage in the high density city environment with limited new land. In a broad sense, it encompasses all soft landscaping at the buildings

or other structures beyond the ground level, including roof-top landscapes, vertical gardens, sky gardens, terrace planting, etc. It provides environmental benefits as well as enhancing the social qualities of our urban environment. For implementation, there are two main approaches: rooftop landscapes and vertical gardens.

- vi According to the HKPSG:
- (1) provision of POS on private land and/or adjoining Government land as part of the private development will not be accepted or required unless there is a current or forecast shortfall of open space in the district having regard to HKPSG or there are special circumstances justifying the provision following a critical appraisal in the overall planning and urban design context;
 - (2) even the provision of POS on private land and/or adjoining government land as part of the private development may be justified on the basis of (1) above, for private development governed by an unrestricted lease or the provision of POS cannot practically be imposed in the lease, the provision of POS within the private development will not be accepted or required as the proposed planning gains may not be capable of being realised; and
 - (3) for private residential development where such development will likely fall into multiple ownership and thus result in individual owners being made responsible for the management and maintenance of the POS, the provision of POS within the private residential development will not be accepted or required.

Overseas Example: Singapore

In Singapore, developments in specific districts are required to provide greenery of at least 100% of the plot area and thereby encouraging greenery at various levels. Exemplary projects such as PARKROYAL on Pickering and Solaris provide not only over 100% greenery on the plot but also innovative green building design.



Source: <https://www.nccs.gov.sg/climatechallenge/issue06/hotel-in-a-garden-parkroyal-on-pickering.html>

Enriching the blue spaces

(i) Energising the harbourfront

- ***Providing a continuously accessible harbourfront along Victoria Harbour***

Victoria Harbour is a major blue space and public asset at the dense core of the city. Opportunities should be seized to improve the continuity of the harbourfront by relocating undesirable public utilities whenever possible and construct new, desirable and attractive facilities with a quality ambience for enjoyment and relaxation.

- ***Activating the harbourfront***

Variety and vitality are critical to the success of any waterfront and there is a need to consider different ways to attract people to go to different destinations along Hong Kong's harbour. A mix of commercial, retail, recreational, civic and tourism uses and different anchoring public spaces are provided to create different harbour experiences. Organising various events, in particular mega functions such as exhibitions, marathon/triathlon races, and water-related activities can bring more people to the waterfront.

For example, the Central Harbourfront Event Space offers open-air space for various outdoor

events including concerts, exhibitions, sports events, etc. Also, in order to establish an attractive, connected, vibrant and sustainable new harbourfront for public enjoyment, following the completion of the Urban Design Study for New Central Harbourfront in 2010, the Government commissioned the “Urban Design Study for the Wan Chai North and North Point Harbourfront Areas” (the Study) in January 2015, to guide the detailed planning and design for this area. The two-stage Public Engagement was completed in August 2016 and the harbourfront enhancement proposals are being developed in greater details.

- ***Improving waterfront connectivity***
The harbourfront areas should be connected with the hinterland and other waterfront locations through a systematic network including multi-level pedestrian links, road/railway connections and water transport opportunities to bring people to the waterfront.

(ii) ***Revitalisation of nullahs and river channels***

Engineered river channels in Hong Kong are previously subject to such problems as odour, water quality, etc. Opportunities should be taken to revitalise water bodies such as nullahs and river channels in order to promote greening, biodiversity, beautification and water friendliness in addition to

achieving efficient drainage. Drainage Services Department (DSD) and Civil Engineering and Development Department (CEDD) are proactively working on revitalising the river channels in the territory. Planning Department has been advocating revitalising river channels in the NDAs and other developments. Examples are Kai Tak River, Tsui Ping Nullah, Tin Shui Wai Channel in Hung Shui Kiu NDA, Ng Tung River and Sheung Yue River in Fanling North and Kwu Tung North NDAs as well as Yuen Long Nullah in Yuen Long South development. Similar opportunities should be explored.



Artist's impression on future Kai Tak Development
Source: Civil Engineering and Development Department

Harbourfront Flagship Projects

East Kowloon

- A waterfront promenade of 11km
- Pedestrian connections, environmentally friendly linkage system, green spines and green links



Wan Chai North & North Point

- A waterfront promenade of about 3.2km
- Pedestrian connections through at-grade, elevated and underground connections



West Kowloon Cultural District

- A continuous waterfront promenade of about 2.4km with a width of not less than 20m
- Six possible connections between WKCD and the surrounding areas



New Central Harbourfront

- A waterfront promenade of about 1.3km with an area of 9.9ha
- Three-tier walking system: pedestrian footbridges, elevated internal pedestrian links through a building/landscape deck of a building, and at-grade pedestrian links through a building/park/waterfront



Sources: West Kowloon Cultural District Authority (bottom left), EKEO (top left), Development Bureau (bottom right), and Planning Department (top right)

(iii) Exploring recreational use of coastal waters

Hong Kong enjoys a wealth of coastal areas and outlying islands which have latent potential for recreational uses. Some suggestions are:

- Promoting recreational and green tourism clusters in locations where water sports and recreational facilities are found, e.g. South Lantau, Sai Kung; and
- Boosting eco-tourism opportunities and facilitating inter-island trips by providing supporting facilities and services e.g. island hopping.



Reinventing the “Green and Blue System” Networks

- 4.6 An integrated approach should be adopted in planning for green and blue space and forming a “green and blue system” networking spaces and corridors that synergise with the existing green and blue assets. It brings multiple benefits. It helps provide a quality living environment, optimise the social, urban design, environmental and ecological benefits and bring about a sustainable drainage system and conservation of water resources. The “Green and Blue System” networks are also important to build up a climatic resilient green and blue infrastructure for the city.

Integrating green and blue space planning

- 4.7 In general, there is a substantial untapped potential of green and blue assets that can be synergised by proper integration. To facilitate effective implementation, the management responsibility of the proposed integrated facilities should be agreed among various parties at an early stage.

- (i) **Integrate open space projects with waterways:** In Hong Kong, conventionally open spaces and

waterways are designed and maintained separately. Notwithstanding that there is a trend of opening and linking up harbourfront for public use and access in recent years, some prominent waterfront locations are still occupied and blocked off by utility plant rooms and associated facilities. In general, they can be synergised by integrating them physically, functionally and visually. For instance:

- by developing open spaces, promenades and trails and recreational spaces along harbourfront, waterfront, channels, beaches. A good example is Tsui Ping River project that connects the green and blue spaces of the channel and the adjacent parks and promenades. This example can be further applied to other waterfront/riverfront locations.



Artist's impression of Tsui Ping River after improvement (Source: https://www.ekeo.gov.hk/filemanager/content/public/en/TFKT_20150430_ppt_item3a.pdf)

- by revitalising water bodies to improve resilience and enhancing natural and constructed system/regenerating lost or damaged ecosystems/ restoring disturbed ecosystems. For instance, DSD has implemented the revitalisation of water bodies in Yuen Long Bypass Floodway in which the river channel is landscaped instead of constructing a traditional concrete channel. The ponds, wetland and plants create habitats for wildlife and enhance biodiversity.
- by enhancing visual and physical connection of people and water using soft waterfront edge, and bringing people close to water instead of using straight concrete edge and high railings that segregate people from water.



Yuen Long Bypass Floodway

Overseas Example: South Korea

Cheonggyecheon Stream, restored in 2005, is a 10.9 km long modern public recreation space in downtown Seoul, South Korea. It is a world famous successful example of reverting an overpass to a stream for recreation use.



Cheonggyecheon Stream (photo taken in March 2016)

(ii) ***Enhance accessibility***

Though many waterfront locations and beaches can be accessed by the public, some of the access points are indirect and there is a need to enhance the connection, approach and facilities to these locations to facilitate the easy access by the public for tapping the rich potential of the green and blue spaces. For instance, through enhanced signage, way finders, entrances and connecting paths.

(iii) ***Integrate multiple functions***

The integration of green and blue spaces can provide multiple functions. For example, the Inspiration Lake in Penny's Bay is for recreation and at the same time provides water for irrigation of the landscaped areas. At present, the use of water channels, lakes or large water features in Hong Kong is basically for a single purpose. There may be opportunities for improving the riverine habitats, introducing reed beds or other marshland plants for filtration purpose, or allowing recreational uses of these blue spaces. Examples include Tung Chung Ecological Park, the retention lake in the Quarry Park of Anderson Road Quarry development and in the Hung Shui Kiu NDA development.



Viewed from Hong Kong Wetland Park

Overseas Example: Punggol, Singapore

The “waterfront housing estate” in Punggol is a good example to illustrate the integration of residential, recreational, water supply and stormwater management in the design of public housing, waterway, reservoir, parks and promenades.

Source: <https://www.nparks.gov.sg/gardens-parks-and-nature/parks-and-nature-reserves/punggol-waterway-park>



Configuring the “Green and Blue System” Network with Eco-corridors

- 4.8 The network is in the form of parks, countryside, riverfronts, waterfronts, wetlands, green and blue infrastructure, and other water bodies as the core, supplemented by eco-corridors.
- 4.9 Eco-corridors can be configured as spaces that link patches of greenery and facilitate interpenetration of greenery in the city, urban fringe and that of the countryside; and connect major urban parks, promenades, trails, country parks, areas/ routes of cultural / historical/ environmental significance.
- 4.10 Eco-corridors form a network so that spaces in form of parks, street trees, countryside, waterfronts are linked up physically and visually to facilitate public access. These are vital to cities such as Hong Kong as spaces in urban areas are limited, the effective connectivity and accessibility are therefore essential to ensure public access. Tree planting along carriageways and pavements in the urban areas of Hong Kong forms an effective landscaped connector. There are also ecological corridors that can enhance biodiversity.

Figure 13 The Integrated Green and Blue Network in Hung Shui Kiu NDA





Cultivating Community Green Networks

- 4.11 Both the quantity and quality of green and blue spaces are essential in providing the necessary venues for developing and enriching social cohesion and interaction which are fundamentals to a quality living environment¹². Providing green spaces close to living spaces and making them accessible also helps provide restorative environments. As such, there is a strong case to promote communal green spaces in neighbourhoods at multiple levels and scales, and to facilitate recreational and community farming for leisure and landscape functions.



Pacific Place, Admiralty

Promoting communal green spaces

- 4.12 The quantity and quality of green and blue spaces are fundamental to a quality living environment¹³. It has to be noted that the proximity of urban landscapes are of decisive importance. Such accessible spaces, for example, private spaces or one immediately adjacent to home are important¹⁴.
- 4.13 Communal green spaces in neighbourhoods at multiple levels and scales should be promoted. We shall seek to promote community gardens, gardens in homes/ offices/ schools to encourage communal open spaces in developments at multiple scales and levels. The design components may include:
- balconies in residential building and offices – “greening within reach”- planting spaces for enlivening compact living spaces and providing therapeutic benefit of horticultural practices
 - elevated green spaces and small pocket parks where communal spaces are provided close to homes in various levels of the development for people to gather and mingle.
- 4.14 In schools, roof and vertical greening provide opportunities for outdoor education through hands-on planting where students experience “grow–learn–play”. In building design e.g. offices/hospitals/communal halls,

gathering spaces and pocket green spaces form integrated parts of buildings.

Facilitating recreational and community opportunities

- 4.15 Urban farming is the practice of cultivating, processing, and distributing food in or around a town or city. In the context of Hong Kong, urban farming, mainly in the form of recreational and community farming, is pursued for community gardening, greening, recreational and educational purposes, and not for commercial food production. It is mainly practised in parks, community gardens, rooftops, vacant government sites, public rental housing (PRH) estates and peri-urban areas. Recreational and community farming is also an integral part of the urban economic, ecological and green infrastructure system.

We shall seek to explore recreational and community farming opportunities and to review the provision and guidelines for recreational and community farming.



Urban Oasis, Kowloon Bay

IV

Developing an Urban Forestry Strategy

- 4.16 Urban trees provide a wide range of environmental, economic and social benefits to those that live and work in cities. Urban forests^{vii} are integral parts of urban ecosystems and important means to bring about urban ecology in our densely developed city. They provide a broad range of environmental and ecological benefits. The quality of trees in urban forests in the aspects of health, age, size affects the cost effectiveness of the urban forests in terms of carbon sequestration and carbon emissions avoidance¹⁵.

Urban Forestry

Urban forestry provides a strategic framework for sustainable long-term management of our urban vegetation in a holistic manner. It utilises the asset life-cycles of trees in a city environment to regulate, regenerate and replenish our urban tree stock; maximise vegetation diversity from tree to herbaceous species; improve ecological health within our urban forestry assets, and foster a deeper understanding on the life-cycle of trees and vegetation in a city environment toward a more sustainable and resilient future.

vii While natural vegetation in our country parks cover a very large part of Hong Kong, we can also create 'forests' in our cities. These 'urban forests' can enrich our city landscapes and improve the local urban environments; contributing to a wide range of environmental and socio-economic benefits. Urban forests can also serve as ecological linkages to our countryside.

- 4.17 Although Hong Kong has a long history of tree planting in form of afforestation in countryside, slopes, parks, and street tree planting, the introduction of tree management in the context of urban forestry is still at its infancy. Tree planting is generally project-based and there is a need for an overall strategy to encompass urban trees in an integrated and comprehensive manner.
- 4.18 In face of the challenges of city densification, there is an increasing importance to formulate relevant policies, develop an urban forest strategy and systematic implementation of a management plan for developing and safeguarding the vegetation assets in a sustainable manner. Unlike other infrastructure, urban forest as a living ecosystem is dynamic. It changes over time and is affected by both internal and external factors. Trees as the main component also experience the life cycle of growth and decline. There is a need to enrich urban biodiversity of the vegetation communities.
- 4.19 The long-term sustainability depends significantly on the strategic plan and proactive management through government policy and implementation. Committed joint departmental effort is required for implementation.

Formulating an urban forestry strategy

- 4.20 A well planned, systematic and integrated approach in urban forestry is crucial to ensure the quality and quantity of green spaces in Hong Kong and to enhance its urban ecology. Urban forestry should encompass our green assets in our city including country parks, urban parks, slope planting, street tree planting, amenity area planting, etc. In view of the ageing tree population and the large quantity of trees in Hong Kong with a range of conditions, there is a strong need for the development and implementation of an urban forest strategy and management plan that includes tree stock analysis, guidance to tree selection, maintenance and systematic replacement, with an emphasis on biodiversity and public engagement.

Developing a street planting improvement plan

- 4.21 Currently, apart from some specially designed districts, the streetscape in Hong Kong is dominated by “utilitarian design” where there is lack of identity with abundance of concrete and metal work giving a sterile environment. The design is infrastructure or maintenance-led. In contrast, a “people-oriented” approach aims to provide a pleasant walking experience, in which streets are lined with trees, and provided with adequate space and shelter, railing/ barriers/ hard surfaces are minimised, street furnishings/signage and paving are coordinated; thus encouraging users to enjoy street life instead of merely

passing by with the shortest time. To implement streetscape improvement initiatives such as dedication of space, removal of unnecessary barriers, and coordinating and upgrading of street furnishing will be necessary.

- 4.22 Walkability of the environment should form an integral part of the green and blue space planning framework, and is a key element for sustainable cities. A comprehensive development of an integrated walkway system can help reduce reliance on road-based transport, which in turn alleviates the demands put on the transport system and lessens the impact on the environment. Providing meticulously planned integrated walkway systems, particularly in new development areas, can reduce the number of short motorised trips and the conflict between pedestrians and vehicles. This will increase mobility, enhance road safety and improve local air quality.
- 4.23 It is desirable to promote walkability and applying a “pedestrian-oriented” approach in streetscape design that encourages community interaction and street life to replace that of “car-based” planning in suitable areas in particular in streetscape improvement in the existing CBD, heritage trails and new development areas/ redevelopment areas.



Source: Civil Engineering and Development Department



Promoting a Sustainable Built Environment

- 4.24 Opportunities should be taken to enrich urban biodiversity by pursuing sustainable landscape planning and design. Consideration should be given to exploring the feasibility of introducing a green index; promoting green infrastructure and green building design.



Hong Kong Park, Admiralty

Promoting green infrastructure and green building design

- 4.25 Green Infrastructure^{viii} or blue-green infrastructure is a network providing the ingredients for solving urban and climatic challenges by building with nature. The blue-green infrastructure concept is similar to such concept as “water sensitive planning and design”, “sustainable drainage system”, “low impact development” and “sponge city”. There is an urgent need to develop new design and management solutions for our built environments so as to increase their capacity to adapt and respond to change. Integrated green infrastructure planning strategies can enhance overall urban ecosystem functionality¹⁶.
- 4.26 Benefits of green infrastructure or blue-green infrastructure include:
- reducing the volume of runoff and prevent flooding as it promotes infiltration, local storage and consumption of rain water;
 - reusing storm water and restore natural hydrology;
 - enhancing green coverage and providing green spaces;
 - mitigating urban heat island effects; and
 - enhancing connectivity to green space and sustaining biodiversity.

- 4.27 Green infrastructure or blue-green infrastructure should be promoted in all major new development areas. Green building design should be adopted for all new government projects and encouraged for private projects. Such requirements can be stipulated in the lease of sale sites and planning brief of public housing developments as basic requirements.



*Heliotrope: The World's First Energy Positive Solar Home
Freiburg, Germany*

Exploring the feasibility of introducing a green index

- 4.28 Green index is a guideline, standard or planning control mechanism on sustainable development and planning framework that includes quantifiable environmental and greening data for green measures. The objectives are mainly to achieve long-term environmental and greening target for development at individual sites as well as district and regional levels. Projects are required to achieve a required amount of green space according to the index and design and construct in a sustainable manner.
- 4.29 Instead of using conventional two-dimensional parameters in measuring green space, green index usually adopts multiple elements, e.g. biomass of vegetation, leaf area index, amount of carbon storage and sequestration, coverage of water bodies and permeability of surfaces. □
- 4.30 “Green index” could be explored for application to development, such that planting at grade, green roof, sky gardens and other green measures will form an integral part of the development.

viii It seems that there is no single recognised definition of green infrastructure internationally. We refer to the European Commission's description of green infrastructure that adopts an all-embracing version of the concept. European Environment Agency (2011). Green infrastructure and territorial cohesion - The concept of green infrastructure and its integration into policies using monitoring systems. Copenhagen, 2011.).

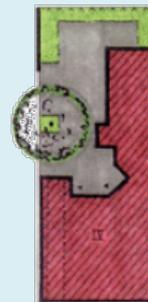
The biotope area factor of Berlin, Germany

In Berlin, plans for the development of new buildings now fall under a regulation that requires a certain proportion of the development area to be left as a green space. The proportion of green space to the entire development area is referred to as the Biotope Area Factor (BAF or BFF for Biotop Flächenfaktor). It encourages more green space areas to be developed in densely built-up urban locations. The developer may decide what green space measures are applied, and where, as long as the required green space ratio is achieved. BAF has generated a significant international interest.

The BAF strategy aims to retain high densities of development, whilst also developing the city's green infrastructure. All potential green areas, such as courtyards, roofs, walls, and fire walls, are included in BAF. However, different types of green spaces are weighted differently according to their evapotranspiring qualities, permeability, possibility to store rain water, relationship to soil functioning and provision of habitat for plants and animals.

$$\text{BAF} = \frac{\text{Ecologically-effective surface areas}}{\text{total land area}}$$

Examples of different methods of achieving BAF of 0.3:



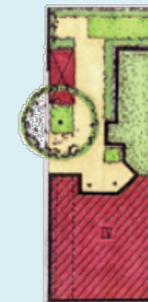
Current situation
BAF = 0.06

Sealed surface = 140m²
Semi-open surface = 59m²
Open soil = 1 m²



Planning variant A
BAF = 0.3

Vegetation = 115 m²
Mosaic paving = 25.5m²



Planning variant B
BAF = 0.3

Concrete surface = 21 m²
Vegetation = 79 m²
Mosaic paving = 100 m²
Green walls = 10 m²
Green roofs = 41 m²

Source: Kazmierczak, A. and Carter, J. (2010) Adaptation to climate change using green and blue infrastructure. A database of case studies.

Figure 12 Conceptual Spatial Framework for Green and Blue Asset Planning



5 Summary of Key Strategic Directions and Key Actions

Key Strategic Directions	Key Actions
 <p data-bbox="360 459 792 544">Enriching Existing Green-Blue Assets</p>	<ul data-bbox="902 443 1966 708" style="list-style-type: none"> • To develop better country park access and facilities and to promote greater use and appreciation as appropriate • To designate/ upgrade -agship parks, open spaces and public spaces • To activate the harbourfront, to revitalise nullahs/river channels, and to explore the recreational eco-use and climatic-resilient use of coastal waters and non-drinking water reservoirs • To integrate land development with blue spaces and enhance the land-water interface
 <p data-bbox="360 786 837 871">Reinventing the “Green and Blue System” Networks</p>	<ul data-bbox="902 786 1966 884" style="list-style-type: none"> • To form a “Green and Blue System” network in the form of parks, countryside, riverfronts, waterfronts, wetland, green and blue infrastructure, and other water bodies as the core and to be supplemented by eco-corridors

5 Summary of Key Strategic Directions and Key Actions (Cont'd)

Key Strategic Directions	Key Actions
 <p>Cultivating Community Green Networks</p>	<ul style="list-style-type: none"> • To identify projects for community gardens, gardens in home/ office/ schools and recreational and community farms, and encourage communal open spaces in developments at multiple scales and levels • To identify urban farming opportunities and to review the provision and guidelines for urban farming
 <p>Developing an Urban Forestry Strategy</p>	<ul style="list-style-type: none"> • To develop and implement an urban forestry strategy and management plan • To develop a street planting improvement plan
 <p>Promoting a Sustainable Built Environment</p>	<ul style="list-style-type: none"> • To consider green or blue-green infrastructure for new development areas, and green building design and greening as integral part of the structures of all new government projects • To explore the feasibility of introducing a “green index”

6 Conclusion

- 6.1 The invaluable green and blue assets are multi-functional components of a sustainable city.
- 6.2 Hong Kong is well endowed with green assets and blue water resources such as country parks, public parks, Victoria Harbour, beaches, rivers, streams, wetlands, reservoirs, etc. These green and blue assets should be enhanced and harnessed.
- 6.3 In a compact city such as Hong Kong, natural assets of green and blue spaces should be leveraged in planning the city to enhance liveability. We propose to establish a coherent conceptual framework for a territory-wide green and water space plan with associated key strategic directions and actions. These will help achieve a sustainable living environment for public enjoyment and well-being.



*Hong Kong Wetland Park
Source: Agriculture, Fisheries and Conservation Department*

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