



Planning Department
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Environmental Protection and Nature Conservation for Sustainable Growth



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1. Preface

- 1.1 Three building blocks are proposed under “Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030” (Hong Kong 2030+) to underpin the draft updated territorial development strategy with a view to achieving the vision of a liveable, competitive and sustainable Asia’s World City. They are planning for a liveable high-density city, embracing new economic challenges and opportunities and creating capacity for sustainable growth. Under the building block of creating capacity for sustainable growth, we seek to create development capacity, and at the same time creating, enhancing and regenerating environmental capacity.
- 1.2 As part of Hong Kong 2030+, the Planning Department (PlanD) has commissioned a consultancy study entitled “Strategic Environmental Assessment for Hong Kong 2030+” (SEA) to identify any environmental concerns early in the planning process, to systematically evaluate in broad terms the cumulative environmental impacts of the preferred development option(s), to recommend appropriate environmental action plan so as to avoid unacceptable adverse impacts, maximise environmental gain and enhance environmental quality in future.¹
- 1.3 Taking into account the initial findings of the SEA Study, a set of guiding environmental principles and a two-pronged planning framework of environmental protection and nature conservation are proposed to guide the formulation of the updated territorial development strategy. The two-pronged framework seeks to create environmental capacity by integrating conservation and biodiversity considerations into planning and decision making and improving our environment.
- 1.4 Creating, enhancing and regenerating environmental capacity is important in promoting sustainable development. Environmental capacity refers to the ability of the physical environment to sustain human activities and biodiversity. Given that future resources are finite, it is important not only to ensure that developments will not bring any unacceptable impact on the environment but also to consider how environmental capacity can be enhanced. Besides, we should identify opportunities for “proactive” improvement, not just “reactive” mitigation of loss or negative impact.

¹ Environmental impacts of individual projects, would be duly assessed by statutory Environmental Impact Assessment (EIA) under the Environmental Impact Assessment Ordinance (EIAO), where appropriate.

1.5 Benefits provided by the natural environment and biodiversity are crucial to our well-being and health. They are known as ecosystem services, i.e. provisioning services including food supply and water supply, regulating services including microclimate regulation and water purification, cultural services including natural scenes and education and supporting services including provision of habitats, nutrient cycling (**Figure 1**).

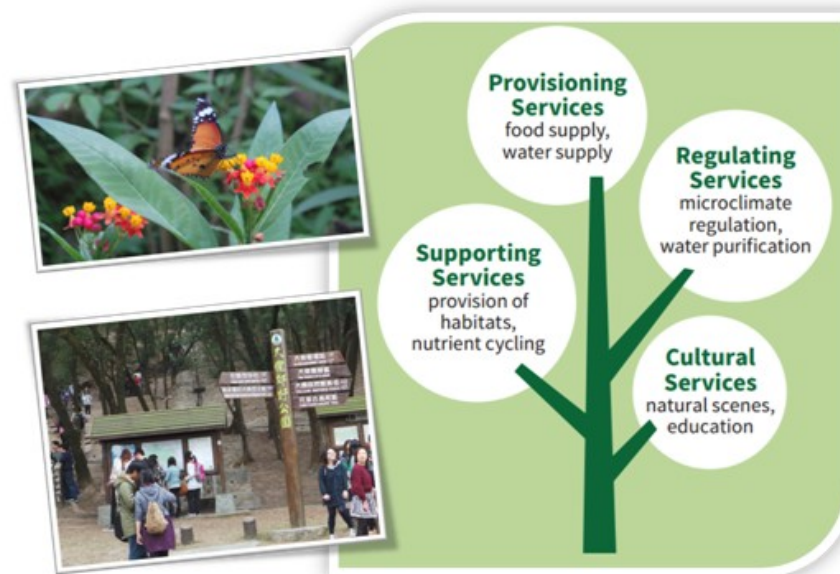


Figure 1 Ecosystem Services

Sources: Planning Department and Agriculture, Fisheries and Conservation Department

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+.

2. Baseline Conditions and the Key Environmental Issues

2.1 This part summarises the initial findings of the SEA Study on baseline environmental conditions of and key environmental issues faced in Hong Kong. The issues spread over the global environmental issues of carbon emissions and climate change, conservation issues in cultural heritage, landscape, ecology and fisheries, and physical environmental issues in air quality, water quality, noise, waste and resources management, and hazard.

AIR QUALITY

Air Quality Objectives (AQOs)

2.2 The Air Pollution Control (Amendment) Ordinance 2013 was enacted in July 2013 to set out the new AQOs and to provide for the review of the AQOs at least once every five years after the commencement of the new AQOs. The current Air Quality Objectives (AQOs) took effect on 1 January 2014 and comprise seven key air pollutants, including sulphur dioxide (SO₂), nitrogen dioxide (NO₂), respirable suspended Particulates (RSP or PM₁₀), fine suspended particulates (FSP or PM_{2.5}), carbon monoxide (CO), ozone (O₃) and lead (Pb) (**Figure 2**).

2.3 In Hong Kong, road transport, navigation and public electricity generation are the major air pollution sources (**Figure 3**). In 2014², they accounted for 97%, 85%, 67% and 69% of emissions of SO₂, NO_x, RSP and FSP respectively.

2.4 SO₂, NO_x, RSP and FSP shall be regarded as the main emission reduction targets for better air quality and be further examined for new scope for emission control in the AQO review. The Environment Bureau has embarked on the AQO review in mid 2016.

² The Hong Kong emission inventory for 2014 is the latest emission inventory available.

Pollutant	Averaging time ⁽ⁱⁱ⁾	Concentration in microgrammes per cubic metre ($\mu\text{g}/\text{m}^3$) ⁽ⁱ⁾	No. of exceedances allowed per calendar year	Health effects of pollutant at elevated ambient levels
Sulphur dioxide (SO_2)	10-minute	500	3	Respiratory illness; reduced lung function; morbidity and mortality rates increase at higher levels.
	24-hour	125	3	
Respirable suspended particulates (PM_{10}) ⁽ⁱⁱⁱ⁾	24-hour	100	9	Respiratory illness; reduced lung function; cancer risk for certain particles; morbidity and mortality rates increase at higher levels..
	Annual	50	NA	
Fine suspended particulates ($\text{PM}_{2.5}$) ^(iv)	24-hour	75	9	
	Annual	35	NA	
Nitrogen dioxide (NO_2)	1-hour	200	18	Respiratory irritation; increased susceptibility to respiratory infection; lung development impairment.
	Annual	40	NA	
Ozone (O_3)	8-hour	160	9	Eye irritation; cough; reduced athletic performance; possible chromosome damage.
Carbon monoxide (CO)	1-hour	30,000	0	Impairment of co-ordination; deleterious to pregnant women and those with heart and circulatory conditions.
	8-hour	10,000	0	
Lead (Pb)	Annual	0.5	NA	Affects cell and body processes; likely neuropsychological effects, particularly in children; likely effects on rates of incidence of heart attacks, strokes and hypertension.

Notes:

- (i) Gaseous air pollutants are measured at 293K (20°C) and 101.325 kPa (one atmosphere).
- (ii) Refer to Air Pollution Control (Amendment) Ordinance 2013.
- (iii) Respirable suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 10 μm or less.
- (iv) Fine suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 2.5 μm or less.
- (v) 'NA' stands for Not Applicable.

Figure 2 Hong Kong Air Quality Objectives (AQOs)

Source: Hong Kong Planning Standards and Guidelines, Planning Department

Pollutants in the atmosphere and their Transport over Hong Kong

- 2.5 From the regional perspective, the Pollutants in the Atmosphere and their Transport over Hong Kong (“PATH”) model simulates the background air quality over the whole Pearl River Delta (PRD) region including Hong Kong. Limited by the smallest modelling grid size of 1km, the PATH model cannot cover the near-field local road emission impact. The annual average NO₂ concentrations at areas near heavy road traffic and port (such as Tsing Yi South, Kwai Chung Container Terminals, West Kowloon, and Western District on Hong Kong Island) would exceed the AQOs before control measures to further reduce vehicular and marine emissions are in place (**Figure 4**).
- 2.6 Whilst the background air quality concentration in the territory is influenced by the trans-boundary pollution from regional sources, air quality of Hong Kong is also largely affected by near-field local sources, mainly from road traffic, marine vessels, airport and power plants. Measures to step up air pollution control and management plan, such as stricter vehicle emission and ship emission standards, further tightening emission cap on power plants, early implementation of Euro VI vehicles, and adoption of complementary technologies and transport management measures, etc, are required.
- 2.7 EPD has launched the new PATH for air quality assessment in January 2016. The new PATH model will be adopted for air quality assessment in Hong Kong.

Clean Air Plan for Hong Kong

- 2.8 We have indeed been making good progress in implementing the air quality improvement measures targeting at major pollution sources as set out in the “Clean Air Plan for Hong Kong” published in March 2013 (**Figure 3**). From 2011 to 2015, the ambient concentration of RSP, FSP, NO₂ and SO₂ has reduced by 19%, 24%, 8% and 23% respectively.
- 2.9 According to the Clean Air Plan, high density development has often occurred without adequate consideration for air ventilation corridors, creating ‘street canyon’ effects, trapping vehicular emissions. This affects not only those on the roadside and in the vehicles but also all those living or working indoor near the congested roadways. Effective ways to improve roadside air quality is to reduce tail-pipe emissions of vehicles that ply the busiest roads. Focusing should be placed on cleaning-up franchised buses, taxis and public light buses, as well as diesel

commercial vehicles and creating low emission zones in order to improve roadside air quality.

2.10 Over the longer-term, the Clean Air Plan further suggests that there are opportunities to adopt land use planning and urban design solutions together with transport management in new districts and areas targeted for regeneration for better air quality in addition to improving overall functionality and community well-being. The urban planning and design solutions include land use planning to reduce vehicular-based traffic, reserving space for breezeways and looking for opportunities to enhance air ventilation to prevent or mitigate the effect of 'street canyons' etc.

2.11 Energy efficiency and saving can also help improve the air quality by reducing the air pollution source from power plants. The "Energy Saving Plan for Hong Kong's Built Environment 2015 ~ 2025+" sets a new target of reducing Hong Kong's energy intensity by 40% by 2025, using 2005 as a base. Hong Kong has a strategy to save energy, which focuses on Government taking the lead, for example by improving building energy efficiency for both new and existing buildings because buildings consume 90% of the city's electricity usage; enabling companies, institutions and residents to make energy efficiency choices when they invest in electrical appliances and vehicles; and promoting energy saving practices and lifestyle of the people of Hong Kong.

Regional Cooperation

2.12 Apart from local sources, Hong Kong is influenced by long range transport of air pollutants from the Pearl River Delta (PRD). In 2014, the Guangdong Provincial Government introduced the "Guangdong Air Pollution Control Plan (2014-2017)" which includes emission reduction targets for the Guangdong Province comprising the PRD region. Continuing and further strengthening regional collaboration between Hong Kong and Guangdong Provincial Government is instrumental to controlling the transboundary air pollution.

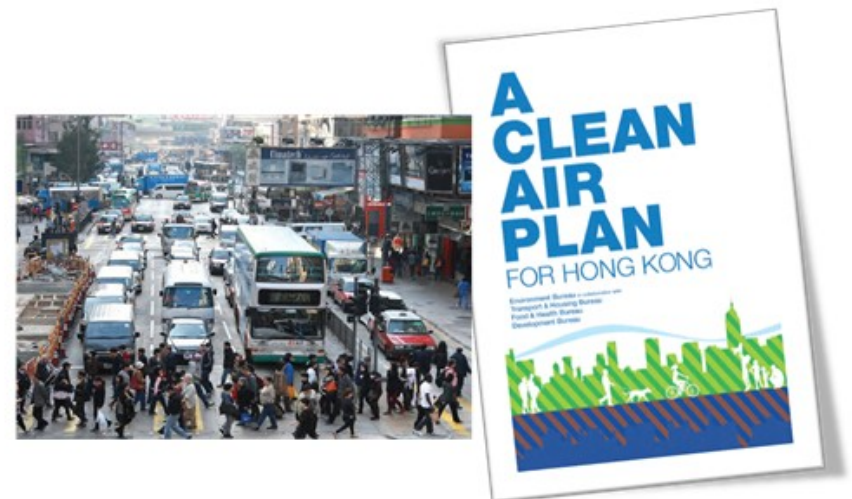


Figure 3 Typical Hong Kong Roadside Conditions and A Clean Air Plan for Hong Kong

Source: Environment Bureau

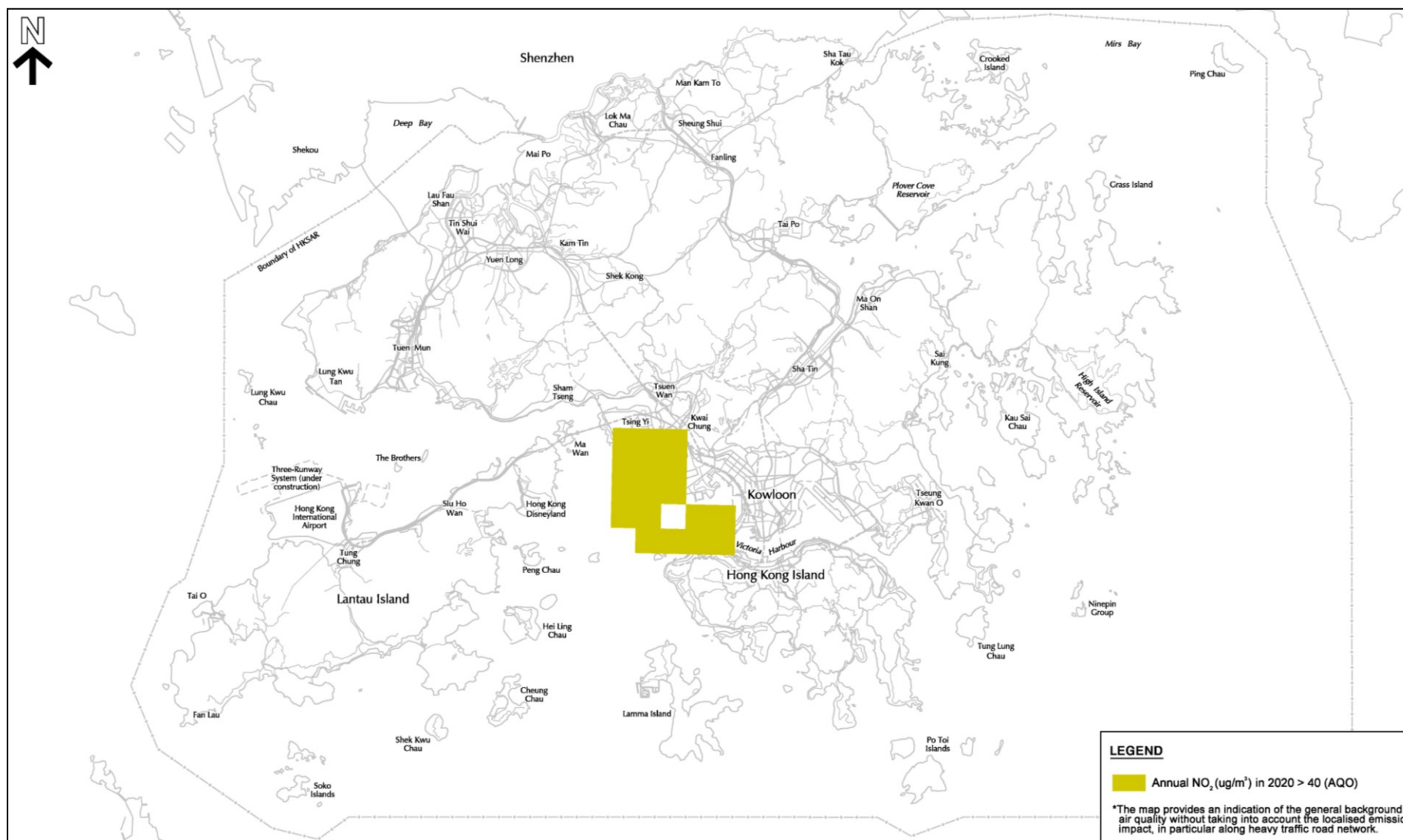


Figure 4 Predicted Air Quality (Nitrogen Dioxide) of Hong Kong

WATER QUALITY

- 2.13 The entire Hong Kong waters are mainly divided into ten Water Control Zones (WCZs). Each WCZ has a designated set of Water Quality Objectives (WQOs).
- 2.14 The marine water quality in the Deep Bay WCZ is less favourable in terms of compliance with the Water Quality Objectives (WQOs). While the North Western WCZ and Southern WCZ in the vicinity of Lantau are better than Deep Bay, the nutrient level (Total Inorganic Nitrogen level) in these WCZs is still high and influenced by the discharges to the Pearl River estuary (**Figure 5**). Major development proposals with further discharges in these WCZs will generate spillover to neighbouring WCZs. Besides, there is a need to ensure the quality of water control zones (WCZs) will not be deteriorated, especially WCZs with lower compliance rate, e.g. Deep Bay. Advanced or alternative measures on sewage treatment and disposal need to be introduced for tackling the discharge problem arising from both existing and major proposed developments.
- 2.15 It is also worth noting that about one-third of the land area in Hong Kong is designated as Water Gathering Grounds (WGGs) (**Figure 5**). Discharges of effluent within these WGGs should comply with the Water Pollution Control Ordinance (WPCO). In order to protect the local raw water source at WGGs, the Government has been controlling development and activities within WGGs. A majority of the WGGs fall within Country Park areas and hence are protected under the Country Parks Ordinance.
- 2.16 The Guangdong Provincial Government and HKSARG have been collaborating closely on cross-boundary water quality protection in PRD. With the initiatives under the National 13-5 Plan, including construction of urban sewage treatment and supporting facilities etc, the coastal waters of Guangdong Province with severe pollution have been improved in the past few years.

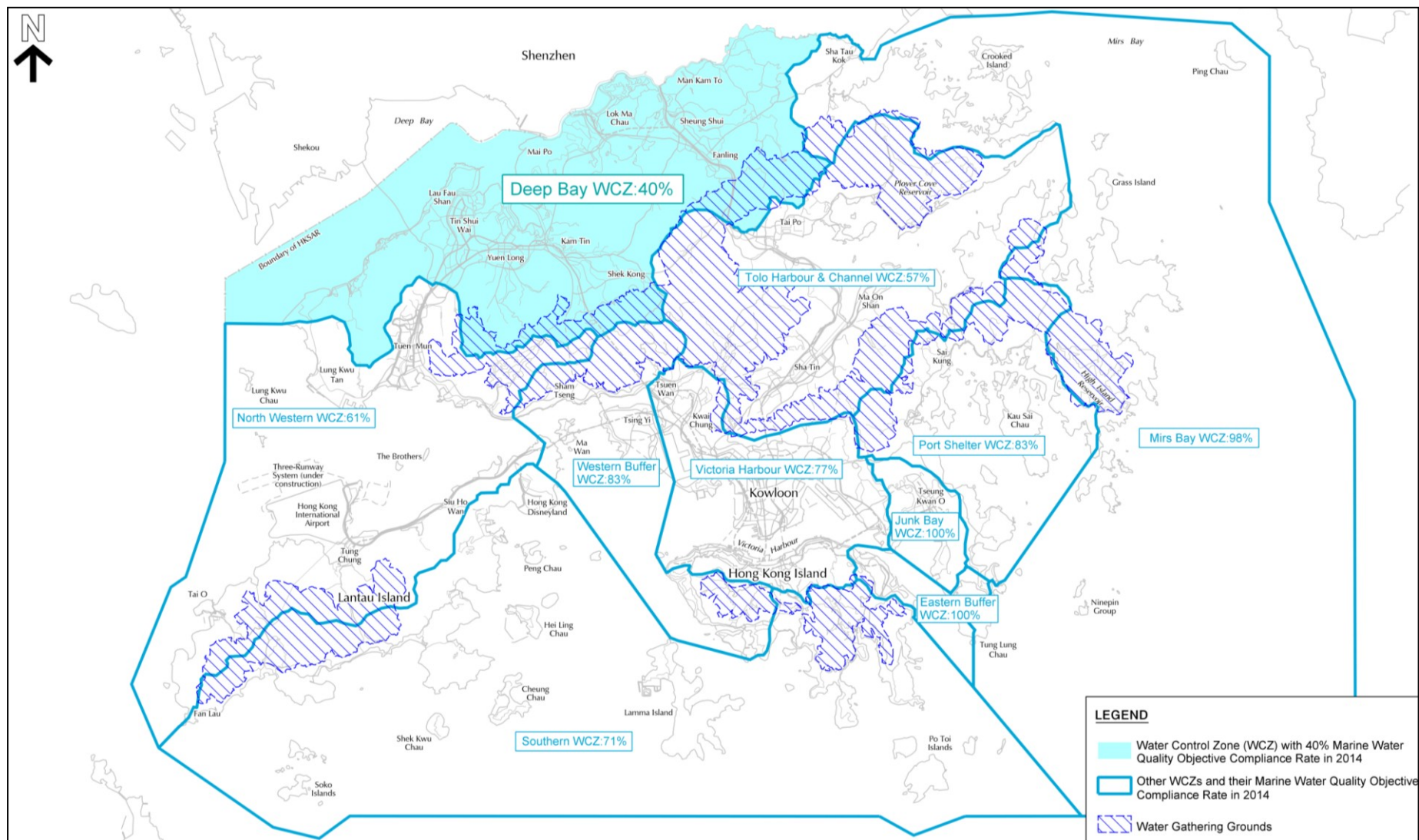


Figure 5 Marine Water Quality Objective Compliance Rate in 2014 and Water Gathering Grounds in Hong Kong

NOISE

- 2.17 Noise pollution is a common issue in the densely populated urban area of Hong Kong. People in the urban areas are exposed to various environmental noise sources including traffic noise (i.e. road traffic, rail, aircraft and helicopters) and noise from industrial uses etc.
- 2.18 For road traffic noise which is considered the most severe environmental noise problem in Hong Kong, the Government has established policies and institutional arrangements to mitigate it for new and existing roads. For aircraft noise, the Noise Exposure Forecast (NEF) 25 contour of the Hong Kong International Airport (HKIA) is the planning standard adopted for evaluating the noise impact on noise sensitive uses such as residential development (**Figure 6**). According to the EIA Report of the Three-Runway System (3RS) approved in November 2014, a number of aircraft noise mitigation measures will be introduced, such as putting the existing South Runway on standby mode during night-time whenever practical in the future 3RS operation. As a result, the NEF 25 contour of HKIA would shift to the north towards the sea upon the commissioning of 3RS. The aircraft noise impact will be improved in general, especially at North Lantau upon full operation of the 3RS.
- 2.19 Railway that runs above ground is another source of noise pollution, if not properly mitigated. The general separation distances from the rail track and the mitigation measures proposed for each rail line have been detailed in relevant approved EIAs. If the noise levels of the train operations are found to exceed the standards under the Noise Control Ordinance, the railway operator will be required to make improvements.
- 2.20 For the future development of Hong Kong, one of the overall directions is to improve and preserve the acoustic environments. In doing so, reference can be made to the latest technological development and planning experience in major overseas cities for planning a less noisy environment.

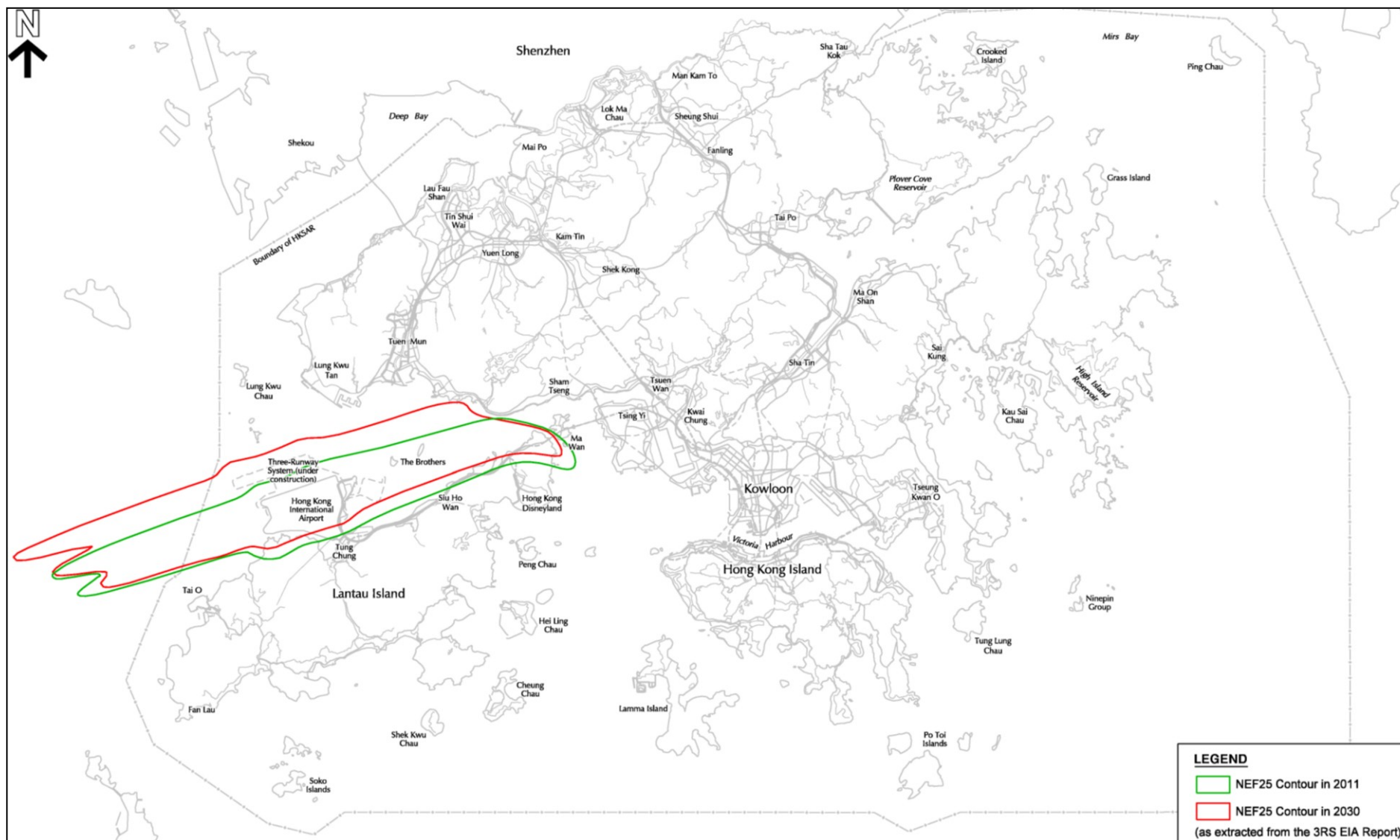


Figure 6 NEF25 Contour in 2011 and 2030 for Hong Kong International Airport

WASTE AND RESOURCES MANAGEMENT

- 2.21 Landfilling is currently the major disposal method for solid waste in Hong Kong. The municipal solid waste (MSW) and construction waste account for over 90% of the total quantity of waste disposed of at the three strategic landfills, i.e. South East New Territories (SENT) Landfill, North East New Territories (NENT) Landfill and West New Territories (WENT) Landfill. With funding approval by the LegCo on the SENT and NENT Landfill extension projects in December 2014, it is anticipated that these strategic landfills could cope with the disposal needs of the territory until mid or late 2020s. Yet, the sole reliance on landfills for disposal of solid waste is not sustainable because of limited landfill space.
- 2.22 To address the imminent waste management problem and to develop a sustainable waste management regime, the Environment Bureau promulgated the “Hong Kong Blueprint for Sustainable Use of Resources 2013-2022” (Action Blueprint) in May 2013 and the “A Food Waste & Yard Waste Plan for Hong Kong 2014 – 2022” (Food Waste Plan) in February 2014 to map out a comprehensive resource management strategy with targets, policies and action plans for the coming years up to 2022 with a view to promoting “Use Less, Waste Less” mode of living. Aggressive targets have been set to reduce both the per capita disposal rate of municipal solid waste (MSW) and landfill disposal of food waste by 40% by 2022.
- 2.23 To achieve the MSW and food waste reduction targets, the Action Blueprint and Food Waste Plan have proposed and formulated policies and actions, including undertaking of multiple and concurrent actions to drive behavioural change for waste reduction at source; rolling out of territory-wide campaigns to raise awareness and provide support for targeted waste reduction; implementation of a basket of initiatives to support the local recycling industry and investment of waste-related infrastructures comprising recovery infrastructures namely Sludge Treatment Facility, a network of regional Organic Waste Treatment Facilities and Integrated Waste Management Facilities. Furthermore, other waste disposal infrastructure, namely extension of the 3 strategic landfills, is in progress.
- 2.24 With the implementation of the Construction Waste Disposal Charging Scheme in 2006, construction waste disposal at the landfills has declined substantially. Reusable inert part of construction and demolition (C&D) materials are generally referred to as “public fill” which would be temporarily stored in the public fill banks before they are put into beneficial reuse. Two fill banks at Tuen Mun and Tseung Kwan O are close to be fully occupied, enhancement measures to boost the reuse of surplus public fill are required. The two fill banks are temporary

facilities operating on temporary government land allocations. Previous plans to develop permanent C&D Material Handling Facilities in Tuen Mun and Tseung Kwan O as replacement facilities will need to be revisited in due course taking into account the longer term land use planning of the relevant areas.

2.25 As the existing and currently planned waste management facilities will not be able to deal with all the solid waste in a sustainable manner, it is necessary to identify and develop additional waste management facilities to deal with the MSW arising from the future population growth and economic activities. The Environmental Protection Department (EPD) has commenced a study in September 2015 to develop a territory-wide plan and strategy for environmentally-sustainable waste treatment and bulk waste transfer facilities to meet Hong Kong's long term needs up to 2041. It will identify additional waste facilities required for bulk transfer and treatment of solid waste.

2.26 Many essential environmental infrastructures such as landfills and sewage treatment works are locally unwelcome land uses and causing environmental nuisances, may not be compatible with human settlements and require extensive land-take. It is important to devise an innovative strategy to accommodate such indispensable uses while minimizing their environmental nuisances and their land-take.

2.27 Possibility of relocating sewage treatment works (STW), waste disposal facilities, water supply facilities, etc., to rock cavern/underground space should also be explored to minimize the landuse incompatibility issue and the potential environmental nuisances to sensitive receivers, as well as release the precious surface land for other uses.

2.28 There is scarcity in natural resources such as fresh water supply and non-renewable energy. We have to encourage recycling, minimization, management of the demand for natural resources, and diversification of the sources of supply in a sustainable way.³

³ Waste and resources management issue is also elaborated in another topical paper named "Baseline Review and Proposed Key Strategic Directions for Infrastructure Provision".

HONG KONG BLUEPRINT FOR SUSTAINABLE USE OF RESOURCES

2013 – 2022

Environment Bureau



Figure 7 Hong Kong Blueprint for Sustainable Use of Resources 2013-2022

Source: Environment Bureau



USE LESS, WASTE LESS



Figure 8 Use Less, Waste Less

Source: Environment Bureau

HAZARD

2.29 There are 31 installations in Hong Kong designated as Potentially Hazardous Installations (PHIs) which include Liquefied petroleum gas (LPG)/ oil terminals, LPG stores, gas production plants, explosive depots, chlorine stores at Water Treatment Works, etc (**Figure 17**). The Government's policy is to minimise the potential risks associated with a PHI as far as possible. Firstly, measures shall be explored to remove or minimise the PHI constraints (e.g. reducing the size of Consultation Zone⁴ and Safety Zones⁵) through relocation when opportunities arise or other innovative means. Secondly, developments should avoid encroaching onto the Consultation Zones and Safety Zones of PHIs unless they are considered acceptable after undertaking the necessary risk assessment.

⁴ Consultation Zone (CZ) refers to the delineated areas for every PHI. The extent and the size of the CZs are determined with regard to local variation in topography, the types of PHI and their storage capacities. Sizable developments are normally not approved.

⁵ Safety Zone (SZ) is applicable to explosives factories and depots. Within the SZ for explosives depots, no inhabited buildings or congregation of people will be allowed. The size of the zone will depend upon the quantity of explosives stored.



Figure 9 Chlorine Storage Building of Sha Tin Water Treatment Works

Source: Water Supplies Department

CULTURAL HERITAGE

2.30 As of May 2016, there were 114 declared monuments which are safeguarded under the Antiquities and Monuments Ordinance (Cap 53), 208 Sites of Archaeological Interest that are protected by administrative measures and 1,028 historic buildings which are graded and protected by administrative measures (**Figure 17**). Heritage resources are positive social and cultural assets, and should be duly respected and, where appropriate, enhanced for public appreciation and enjoyment in the updated territorial development strategy⁶.

⁶ The cultural heritage issues will be elaborated in another topical paper named “Planning and Urban Design for a Livable High-Density City”.



Figure 10 Cultural Heritage in Hong Kong

Sources: Antiquities and Monuments Office and
Planning Department

LANDSCAPE

2.31 Hong Kong possesses distinctive landscape features with diverse and unique characteristics ranging from highly urbanised areas to natural landscape resources. Valuable natural landscape resources include coastlines such as cliffs and sandy shores, woodlands, ridgelines; watercourses in inland and upland areas; wetlands and shorelines near coasts and also water bodies, including Victoria Harbour which has become one of the most spectacular urban landscapes as a product of the relationship of sea, landform and built form as stated in the Landscape Value Mapping of Hong Kong completed in 2005. Future development should not only aim to avoid adverse impacts on but also seek to preserve the valued landscape assets as a priority. More proactively, valued landscape assets could be integrated into development

through responsive planning and design so as to enhance its landscape value in addition to avoidance/minimisation of the adverse impact. Important view fans to strategically important landscape should be preserved. The discussion on landscape is found in the topical papers named “Planning and Urban Design for a Liveable High-Density City” and “Green and Blue Space Conceptual Framework”.

2.32 Moreover, some landscape assets such as green and blue spaces are considered as important attributes which could be suitably enhanced and planned holistically for promoting liveability. This aspect is covered in the topical paper named “Green and Blue Space Conceptual Framework”.



The Ninepin Group, Sai Kung



Luk Keng



Pak Sin Leng, Tai Po

Figure 11 Natural Landscape Resources of Hong Kong

Source: Planning Department

ECOLOGY AND FISHERIES

2.33 In Hong Kong, there are more than 3,300 species of vascular plants, of which about 2,100 are native; some 50 species of mammals; over 500 species of birds; about 80 species of reptiles and more than 20 amphibian species. Insect diversity is also very high with more than 230 species of butterflies and about 120 species of dragonflies. Country parks and marine parks are important and well protected habitats for some of these species. By September 2016, Hong Kong has 24 Country Parks and 22 Special Areas with a total area of about 44,300 ha, and 4 Marine Parks and 1 Marine Reserve (**Figure 13**). As at April 2015, there are 26 Fish Culture Zones (FCZs) occupying a total sea area of 209 ha with some 968 licensed operators. Some marine waters in Hong Kong were identified as spawning grounds and/or nursery grounds of commercial fisheries resources (**Figure 14**).

2.34 Hong Kong is also under international obligations to conserve the nature. Even prior to the designation of the Ramsar Site, the area has been actively managed by World Wide Fund For Nature Hong Kong (WWF-HK) as a nature reserve to manage the wetland. In September 1995, approximately 1,540 ha of the Deep Bay area, including the Mai Po Marshes Nature Reserve, the surrounding contiguous and continuous fishponds, and the intertidal mudflat at Inner Deep Bay, was formally designated as a Wetland of International Importance (also

called Ramsar Site) under the Convention on Wetlands (i.e. Ramsar Convention). This Convention is an inter-governmental treaty that provides a framework for the conservation and wise use of wetlands and their resources. Besides appropriate zonings have been stipulated in the statutory town plans together with a set of Town Planning Board Guidelines to protect the ecological integrity of the Ramsar Site and the surrounding areas.



Figure 12 Fauna and Flora in Hong Kong

Sources: Agriculture, Fisheries and Conservation Department
and Planning Department

2.35 The Convention on Biological Diversity (CBD) is an international treaty on the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of benefits deriving from the use of genetic resources. The CBD is overarching in that it embraces a wide range of issues relating to human well-being and the conservation of biological diversity. China became a Party to the CBD on 5th January 1993. The Central People's Government extended the CBD to Hong Kong in 2011. While Hong Kong is not a party to the CBD itself, the Government is formulating the first city-level Biodiversity Strategy and Action Plan (BSAP) for Hong Kong to step up conservation efforts and support sustainable development. We have mainstreamed biodiversity conservation into the Hong Kong 2030+, i.e. by taking due consideration of biodiversity conservation in the updating of the territorial development strategy.

2.36 Protection and conservation of ecologically sensitive areas is vital to maintaining a quality environment, conserving biodiversity and supporting sustainable development of Hong Kong. Some of the protections are governed by legislation, such as EIAO, Country Parks Ordinance, Marine Parks Ordinance and Town Planning Ordinance (designating conservation zonings on statutory town plans) etc.



Figure 13 Rich Biodiversity of Hong Kong

Source: Agriculture, Fisheries and Conservation Department

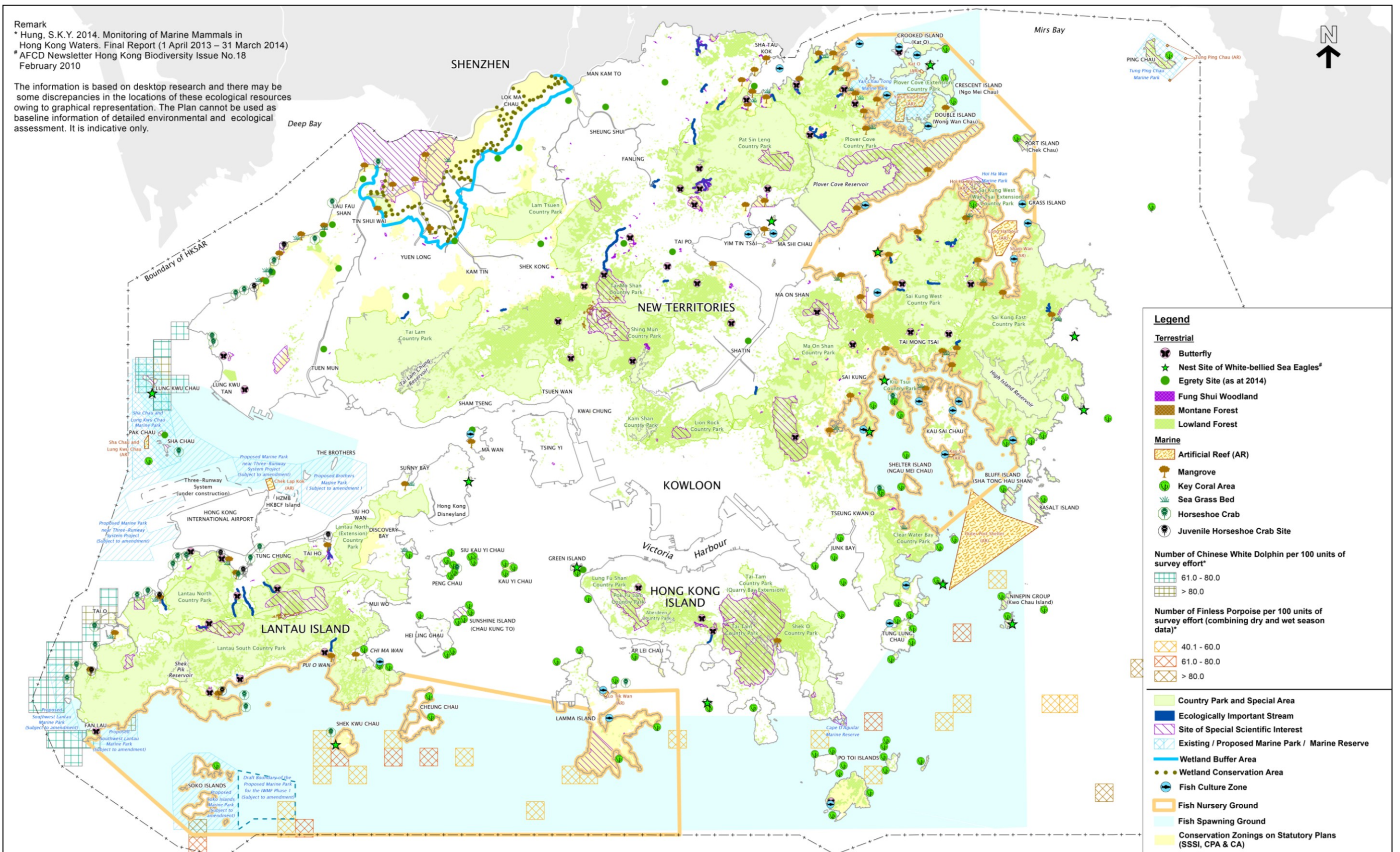


Figure 14 Environmentally and Ecologically Sensitive Areas – Nature Ecology and Fisheries

CARBON EMISSIONS AND CLIMATE CHANGE

2.37 Increasing emission of greenhouse gases (carbon emissions) causes global warming and climate change is now a major global challenge. Climate change will increase the chances of extreme weather events such as heatwaves and severe rainstorms, and there is also an increased risk of sea flooding due to storm surges brought by tropical cyclones as a result of rising sea level.⁷ To combat climate change, Hong Kong, along with other countries, shall embark on a low-carbon path and optimise low-carbon living opportunities.

2.38 In 2010, Hong Kong put forward a target to reduce the carbon intensity⁸ by 50-60% from the 2005 level by 2020. Since 2010, Hong Kong has developed a range of measures to meet the stated target. As at 2013, Hong Kong's carbon intensity had dropped 19% using 2005 as the base. In November 2015, the Environment Bureau released the "Hong Kong Climate Change Report 2015" which outlines the actions through mitigation, adaptation and resilience to deal with the challenge of climate change. Reducing carbon emissions through reducing coal usage in fuel mix for electricity generation, enhancing energy

⁷ Climate change pamphlet published by the Hong Kong Observatory: "Hong Kong in a Warming World"

http://www.weather.gov.hk/climate_change/climate_change_e.pdf

⁸ Carbon intensity is the amount of GHG or carbon emission per unit of gross domestic product.

efficiency and saving and reducing carbon emissions in transport will be some of the mitigation measures.



Figure 15 Hong Kong's Carbon Intensity Target

Source: Environment Bureau

2.39 Apart from global warming, like many other cities in the world with high development densities, Hong Kong suffers from the "urban heat island effect"⁹. Temperature is intensified at the dense urban areas where heat is trapped by buildings and other concrete structures. Besides, with low sky view factor (SVF)¹⁰ and limited urban ventilation, cooling is restricted. This leads to uncomfortable urban living, heat stress and related health problems, and

⁹ It refers to dense urban areas where temperatures are intensified because air ventilation is poor and heat is trapped by buildings. Modification of land surfaces from vegetation to hard/concrete surfaces is one of the main causes of the 'urban heat island' effect.

¹⁰ SVF is defined as the fraction of sky visible from the ground up which is one of the factors indicating the relationship between urban geometry and city wind ventilation as well as temperature.

increase in energy consumption, and overall poor living quality. Further intensifying development in the densely built-up areas, where thermal load is very high and air ventilation is very weak, is not recommended unless with strong justifications and appropriate mitigation measures. There is a need to optimise the planning and design of our city to facilitate more wind penetration through the urban fabric and to reduce thermal load so as to eventually achieve higher quality urban environment and better urban climate.

2.40 The climate change issues are further looked into when formulating the smart, green and resilient city strategy and conducting the SEA under the Hong Kong 2030+, by taking into account the afore-mentioned Hong Kong Climate Change Report 2015 and the national and international dialogues and agreements such as the Paris Agreement reached in December 2015 on dealing with climate change.¹¹

¹¹ The climate change issue has been mentioned in another topical paper named “A Smart, Green and Resilient City Strategy”.

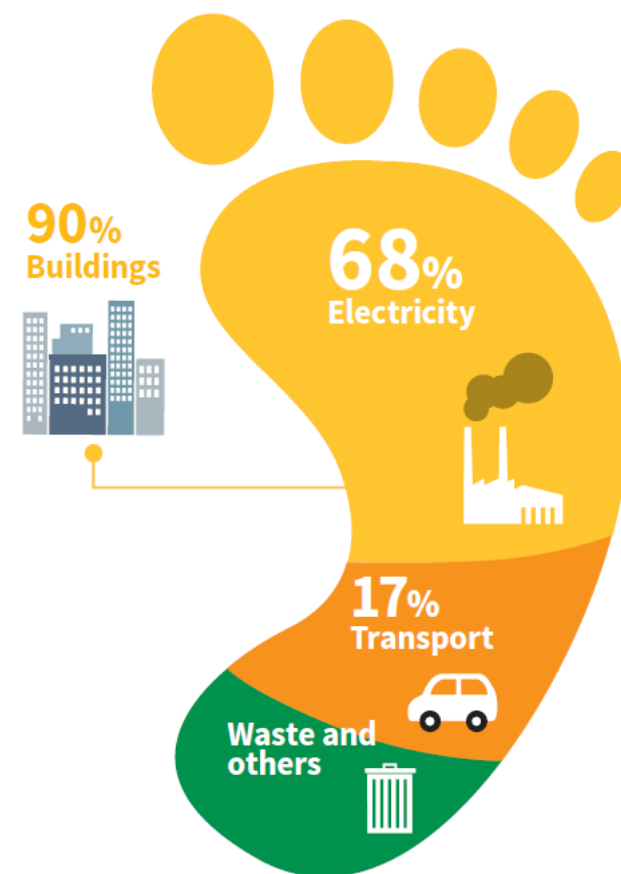


Figure 16 Hong Kong's GHG emissions in 2013

Source: Environment Bureau

3. Guiding Environmental Principles

3.1 Taking into account the above findings, the environmentally and ecologically sensitive areas (EESAs) have been identified. **Figure 17** shows the potential AQOs exceedance zone, updated NEF 25 contour for aircraft noise and WCZs not in full compliance with the WQOs. **Figure 14** shows the significant ecological areas in Hong Kong, covering both terrestrial and marine ecologically sensitive areas. The following guiding environmental principles are proposed for formulating the updated territorial development strategy alongside planning considerations, and the proposed planning framework of environmental protection and nature conservation for sustainable growth:

- (i) We shall continue to protect and conserve protected areas and areas of high ecological importance (**Figure 14**). In planning for new strategic growth areas, due regard should be paid to avoid encroachment of development onto such areas.
- (ii) Conservation and proactive enhancement measures should be pursued with a view to enhancing our environmental capacity and enriching our biodiversity.
- (iii) We shall seek to improve our environmental quality including bringing improvements to air quality, water quality, acoustic environment, waste management and landscape.
- (iv) In planning for new strategic growth areas, due regard should be paid to the environmentally sensitive areas as shown in **Figure 17**. At the same time, any potential impacts on air quality, water quality and supply, noise and waste management etc., should be properly addressed.
- (v) Given the scarcity in natural resources such as fresh water supply and the likely impact of climate change, we shall minimize the demand for and use of natural resources (including freshwater and non renewable energy sources) while planning to enhance our resilience.
- (vi) In the face of climate change, we shall plan for low carbon city development and low carbon ways of living, work and play and low carbon economy. Low-carbon ideas should be incorporated at the early planning stage. For instance, we shall plan for a land use pattern that is transit oriented as railway is an efficient and environmentally friendly mass carrier, promote walking and cycling and minimize vehicular-based traffic especially private car use.

- (vii) Subject to relevant policy support, green infrastructure should be vigorously pursued, including district cooling system, environmentally friendly transport system, electric vehicle charging infrastructure to promote green mode of transport, waste to energy and effluent reuse, to improve environmental quality and to enhance energy and resource efficiency.



Sources: Environment Bureau, Agriculture, Fisheries and Conservation Department and Environmental Protection Department

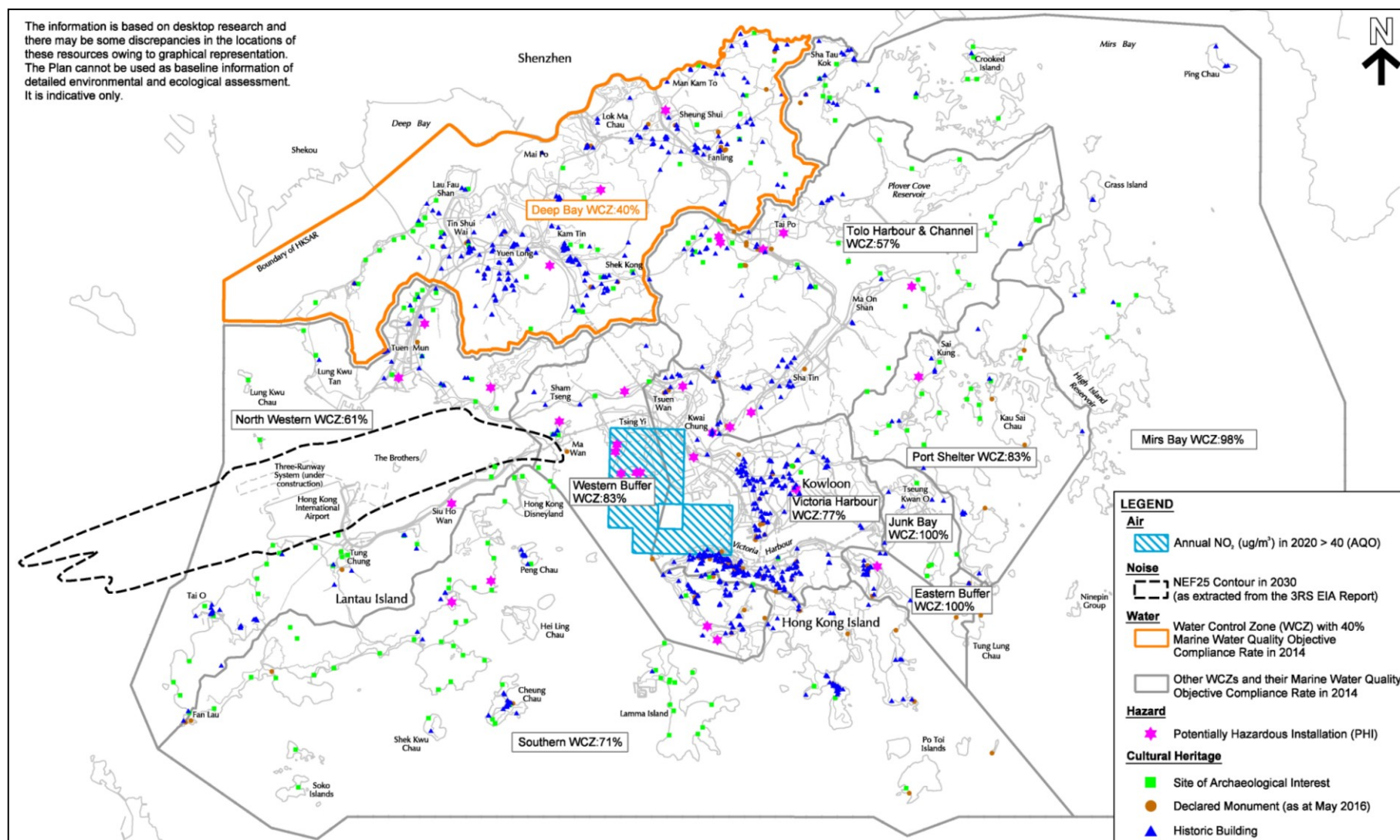


Figure 17 Environmentally and Ecologically Sensitive Areas – Environmental Aspect

4. Conceptual Planning Framework for Environmental Protection and Nature Conservation

Creating, enhancing and regenerating environmental capacity is important in promoting sustainable development. Environmental capacity refers to the ability of the physical environment to sustain human activities and biodiversity. Given that resources are finite, it is important not only to ensure that developments will not bring any unacceptable impact on the environment but also to consider how environmental capacity can be enhanced in general. It is equally important to enhance the environmental capacity by “proactive” improvement and not just “reactive” mitigation of loss or negative impacts.

enhancing or regenerating environmental capacity through active conservation, appropriate management of resources, responsive planning and design, minimising pollution, etc., are worthy of further examination. The proposed planning framework of biodiversity enhancement and environmental improvement (**Figure 18**) is as follows:

4.1 With due regard to the above guiding principles, a two-pronged planning framework of environmental protection and nature conservation is proposed, i.e. creating environmental capacity by integrating conservation and biodiversity considerations into planning and decision making; and improving our environment. This echoes the Government’s initiatives to develop a city-level BSAP.

4.2 Creating environmental capacity is rarely discussed explicitly in Hong Kong. Some potential aspects/areas for creating,

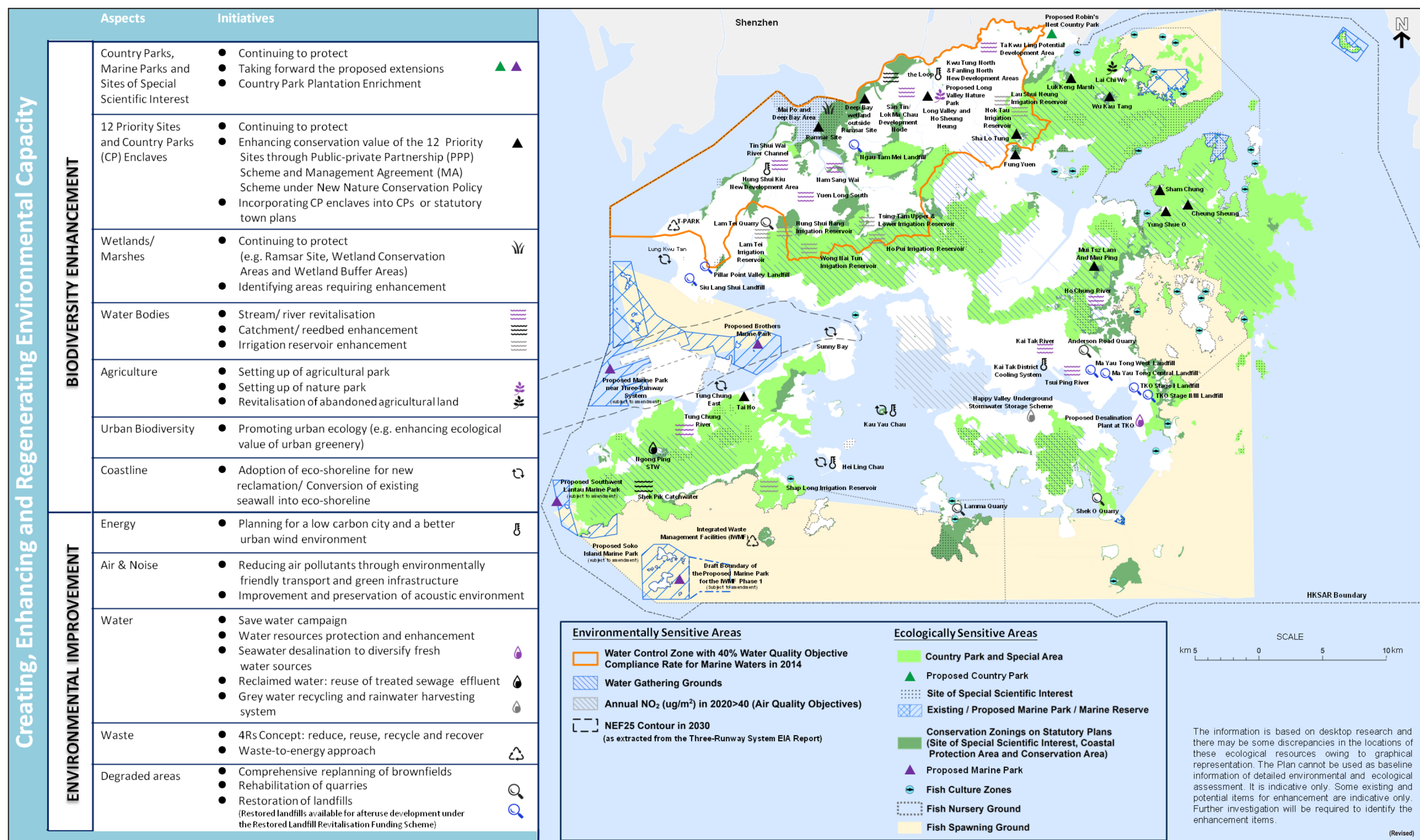


Figure 18 Conceptual Planning Framework for Environmental Protection and Nature Conservation

Biodiversity Enhancement

4.3 There are lots of opportunities for biodiversity enhancement, ranging from protection of terrestrial and marine habitats to enhancement and creation of habitats as well as active management of habitats. In addition to individual habitats, we should take heed of maintaining and improving ecological connectivity. The above considerations should be duly integrated in land use and infrastructure planning and development, and urban and rural land management.

Country Parks, Special Areas, Marine Parks, Marine Reserves and SSSIs

Continuing to protect

4.4 Protecting specific geographical areas is a well-recognised method for safeguarding biodiversity, and it has been successfully used in Hong Kong. **Figure 14** indicates that the majority of high ecological value areas are protected by Country Parks, Special Areas, Marine Parks, Marine Reserve, Sites of Special Scientific Interest (SSSIs), Conservation Areas (CAs) and Coastal Protection Areas (CPAs). This protected area network should be maintained or even extended to ensure that the ecological integrity and

function of ecologically sensitive areas are not compromised by the impacts from developments.



Figure 19 Plover Cove (Extension) Country Park (Upper Left), Lam Tsuen Country Park (Upper Right), Sha Chau, Lung Kwu Chau Marine Park (Bottom Left), Mau Ping SSSI (Bottom Right)

Sources: Agriculture, Fisheries and Conservation Department
and Planning Department

Taking forward the proposed extensions

4.5 While protecting and conserving existing protected areas, the Government is planning to pursue a new country park at Robin's Nest, new marine parks including those waters near at the Brothers, Soko Islands and Southwest Lantau, as well as a nature park at Long Valley. AFCD will continue to enhance the management of country parks and marine parks for conservation, recreation and education purposes.

Country Park Plantation Enrichment Project

4.6 Former plantation schemes in the country parks involved mainly trees of exotic species. Some of the existing plantation areas are faced with problems such as aging, withering, lack of growing space, etc. To enhance the ecological value of country park woodlands and to tackle the problems faced by the plantation areas, AFCD has, in recent years, started to increase the number and species of native trees planted in its plantation areas. At present, more than half of the tree seedlings planted annually by AFCD are native species.



Figure 20 Tree Planting in Country Parks

Source: Agriculture, Fisheries and Conservation Department

12 Priority Sites and Country Park Enclaves

Continuing to protect and enhancing conservation value of the 12 Priority Sites

4.7 Under New Nature Conservation Policy (NNCP), 12 Priority Sites have been identified for enhanced conservation, consisting of Tai Ho, the Ramsar Site, Deep Bay Wetland outside Ramsar Site, Long Valley and Ho Sheung Heung, Luk Keng Marsh, Fung Yuen, Wu Kau Tang, Sha Lo Tung, Mui Tsz Lam and Mau Ping, Yung Shue O, Sham Chung and Cheung Sheung. The objective is to better achieve nature conservation, in particular to enhance the conservation of ecologically important sites which are in private ownership via the Public-Private Partnership (PPP) and Management Agreements (MA) schemes. The Government will continue to take forward the PPP and MA schemes to conserve the Priority Sites.

Incorporating Country Park Enclaves into Country Parks or Statutory Town Plans

4.8 As stated in the 2010-11 Policy Address, the Government undertook to either incorporate the remaining enclaves into country parks or determine their proper uses through statutory planning to meet conservation and social

development needs. Steps have been taken to give protection to the enclaves progressively.

4.9 PlanD has completed the preparation of Development Permission Area (DPA) plans for country park enclaves where appropriate, and has been taking steps to prepare Outline Zoning Plans to replace the DPA plans according to the statutory procedures. AFCD has invoked the statutory procedures under the Country Parks Ordinance. In October 2015, the Chief Executive in Council referred the approved maps of relevant country parks to the Country and Marine Parks Authority for replacement by new maps to incorporate three country park enclaves (namely Fan Kei Tok, Sai Lau Kong and the site near Nam Shan) into the respective country parks. Such work needs to continue to ensure suitable protection of these areas.

4.10 Other than statutory control, measures to encourage conservation or sustainable uses within country parks and surrounding areas, especially private land, are also important. In this regard, the Environment and Conservation Fund Committee in June 2011 supported the extension of the MA scheme to cover Country Park enclaves as well as private land within country parks.



Figure 21 Tai Long Sai Wan, Sai Kung

Source: Planning Department

Wetlands/ Marshes

Continuing to protect

- 4.11 Wetland is a habitat of high ecological value and some wetlands are subject to development pressure and degradation. In the Deep Bay area, a two-pronged approach has been adopted for land use planning control through the designation of Wetland Conservation Area (WCA) for all existing continuous and adjoining active/abandoned fish ponds; and the designation of Wetland Buffer Area (WBA) to protect the ecological integrity of WCA. Within the WBA, development proposals to restore lost fish ponds or to replace existing undesirable uses by wetland habitats are encouraged. The two-pronged approach is to avoid the irreversible adverse impact of development on the wetlands, as well as to provide opportunities for restoring the degraded wetlands in the WBA.

Identifying areas requiring enhancement

- 4.12 In addition, when undertaking infrastructure works, the Government has taken opportunity to enhance the ecological value of wetland. For example, the Yuen Long Bypass Floodway project includes the construction of a 7 ha engineered wetland at the downstream areas, which

was formerly three abandoned fishponds. The dry weather flow of the bypass floodway is fed into the engineered wetland to offer an ecologically enhanced habitat for wild birds, amphibians and dragonflies. More of such opportunities could be identified in future major public works projects.



Figure 22 Yuen Long Bypass Floodway

Source: Drainage Services Department

Water Bodies

Stream/ river revitalisation

- 4.13 In recent years, Drainage Services Department (DSD) has taken the lead to actively investigate the increased use of “Blue-Green Infrastructure” in revitalising water bodies to further improve flood resilience. Blue-green infrastructure includes flood retention lakes, river revitalisation and other sustainable drainage systems, such as porous pavements, bio-swales, rainwater harvesting systems, etc. Revitalising water bodies would integrate water bodies with urban landscapes to reduce heat island effect, improve urban living environment, and provide opportunities for enhancing urban biodiversity. Proper maintenance of the blue-green infrastructure is needed to prevent accumulation of pollutant/refuse, bacterial proliferation or other water quality impact.
- 4.14 A notable example for biodiversity consideration in the revitalisation of water bodies is the incorporation of new ecological features in the Ho Chung River improvement works (**Figure 23**). The design of the fish ladder has been revamped by converting the concrete ramp embedded with a regular array of stones to randomly placed cobbles and boulders so as to enhance the ecological utility of the fish ladder. The new design

provides ripples and pools, as well as irregular flow patterns simulating a natural stream flow environment.



Figure 23 Fish Ladder, Ho Chung River

Source: Drainage Services Department

4.15 Another example is the Kai Tak River drainage improvement works in which ecological and environmental features will be incorporated to enhance the ecological value of the river and boost the living environment in the proximity.

4.16 Shan Pui River and Kam Tin River underwent major drainage works during the Yuen Long New Town Development in the 1970s. The works have not only improved both rivers' flood prevention capacity but also improved the area's environment and ecology. DSD collaborated with non-governmental organisation, Green Power, to open the Nam Sang Wai River Education Trail in 2014 for promoting the functions and values of major rivers and for enhancing public awareness of conserving Hong Kong's rivers (**Figure 24**).

4.17 To enhance the ecology of Tung Chung Stream, it is proposed to rehabilitate a concrete section of Tung Chung Stream to resemble its natural state, and develop that section and its natural upstream section into a river park. Through careful planning and design with least

disturbance to the existing habitat and environment, the river park could serve multiple functions of preserving existing biodiversity, creating green space for recreational and educational purposes and satisfying flood control requirements (**Figure 25**).



Figure 24 Nam Sang Wai River Education Trail

Source: Drainage Services Department

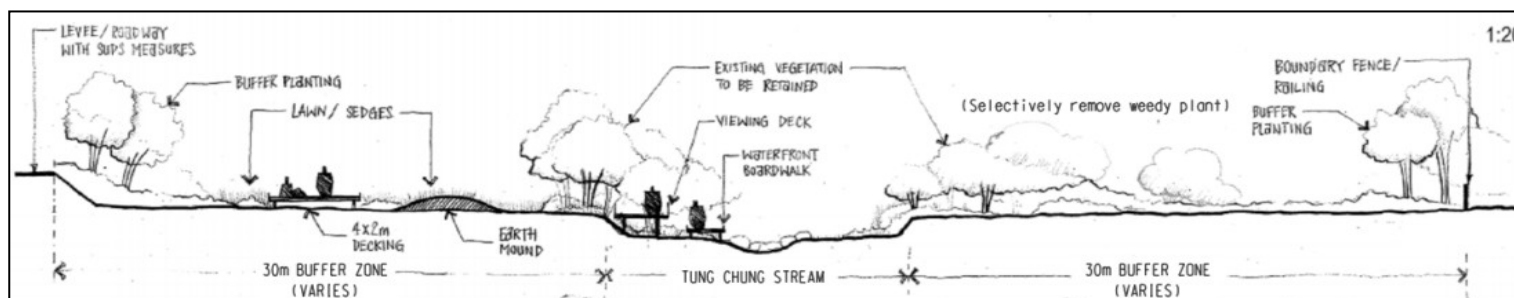


Figure 25 Schematic Plan of the Proposed River Park at Tung Chung

Source: [http://www.epd.gov.hk/eia/register/report/eiareport/eia_2332015/html/ES%20\(Eng\)/REP-145-02_EIA_Executive%20Summary_20151125.pdf](http://www.epd.gov.hk/eia/register/report/eiareport/eia_2332015/html/ES%20(Eng)/REP-145-02_EIA_Executive%20Summary_20151125.pdf)

Ecolink@BKE, Singapore

Eco-Link@BKE is an ecological bridge established in 2013 that spans the Bukit Timah Expressway, connecting Bukit Timah Nature Reserve and Central Catchment Nature Reserve. The main purpose is to restore the ecological connection between two nature reserves, allowing wildlife to expand their habitat, genetic pool and survival chances.



Figure 26 Ecolink@BKE, Singapore

Source: Singapore Government

Catchwater/ reedbed enhancement

- 4.18 Catchwater usually stretches across a vast habitat and a few habitats. Wildlife is sometimes trapped in catchwater due to steep and smooth walls along both sides. Together with the Water Supplies Department (WSD), AFCD would explore wildlife-friendly designs with a view to providing easy exit for the wildlife that have fallen into catchwater and thereby restoring ecological connectivity. The wildlife-friendly trail at Shek Pik catchwater is found to be satisfactory in enhancing ecological connectivity.
- 4.19 Reedbed helps maintaining the water quality in the freshwater marshes. To compensate for the habitat loss as a result of the Loop development, as well as to provide an ecological corridor connecting the wetlands in Hoo Hok Wai and Mai Po, an area of about 12.8ha of reedbed is proposed to be constructed and designated as an Ecological Area (EA), which is regarded as a constructed wetland. The proposed EA, together with the adjoining 50m-buffer zone, will provide adequate area to preserve the existing birds' flight path and terrestrial animal passage. While the EA is not intended for active recreation or leisure purpose, it creates a green buffer space for enhancing the living environment of the adjoining areas.

Irrigation reservoirs enhancement

- 4.20 Reservoirs are some of the largest freshwater bodies in Hong Kong. There are present opportunities to make good use of reservoirs to create habitats. Priority could be given to enhancing the ecological value of irrigation reservoirs which are solely for irrigation purposes and outside WGGs. Together with the WSD, AFCD would also explore feasible designs and maintenance measures for irrigation reservoirs and water catchment channels that are more wildlife friendly and would restore ecological habitats and connectivity.

MacRitchie Reservoir Park, Singapore

MacRitchie Reservoir is one of the four reservoirs that bound Singapore's nature reserves. The MacRitchie Reservoir Park is a gateway to Singapore's nature reserves and also a popular spot for nature lovers and exercise enthusiasts.

Under the Active, Beautiful and Clean programme initiated by the Public Utilities Board, a landscape highlight in the park is a near 100-metre vegetated gravel swale, which is complemented by a 40-metre submerged boardwalk. These features are primarily designed to sieve out coarse sediments and pollutants from surface water runoffs, which eventually enhance the nation's water quality in the reservoir. The furnishing of these features with plants and vegetation has further enriched biodiversity.

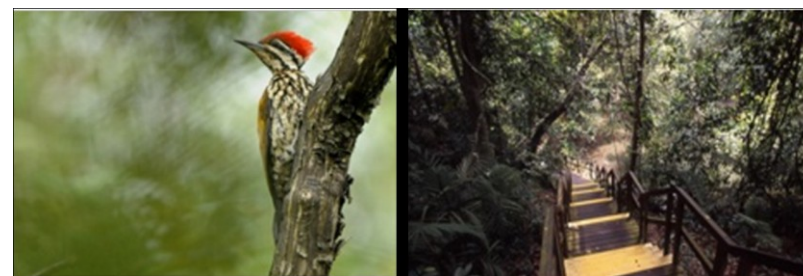


Figure 27 MacRitchie Reservoir Park, Singapore

Source: Singapore Government

Agriculture

Setting up of an Agricultural Park and a Nature Park

4.21 In recent years, we have seen changes in public perception about the future development of local agriculture in Hong Kong and the appreciation of the positive impacts that it would bring. The Government has reviewed the positioning of the agricultural policy in present-day circumstances and proposed to adopt a new policy encompassing more proactive support to modernise the agricultural industry and maximise its contributions to the well-being of society apart from being a source of primary production. After public consultation, the Government in the 2016 Policy Address announced the decision to implement the New Agriculture Policy (NAP). Major measures include establishing an Agricultural Park as a base for experimenting with new agricultural practices, exploring the feasibility of designating “Agriculture Priority Areas”, developing leisure and educational activities related to agriculture, etc. To supplement the Agri-Park, there may be merit to explore the idea of identifying clusters of farmland in the New Territories that have higher value and potential for agricultural activities and revitalizing/preserving for long-term agricultural uses.¹²

¹² Agriculture has been elaborated in other topical papers, namely “Planning for Agricultural Uses in Hong Kong” and “Planning for Recreational and Community Farming in Hong Kong”.

4.22 AFCD has provided support to the local agriculture sector to develop modern and environmental-friendly farming technologies that not only increase production yield, but may also benefit the conservation of natural resources and agricultural ecology. Revitalising agricultural activities on abandoned farmland creates an opportunity to restore degraded land, re-establish connectivity among fragmented habitats and enhance biodiversity. Wet agricultural land is an ecologically-important habitat that supports a suite of freshwater wetland-dependent species, some of which are of conservation importance. The proposed Long Valley Nature Park under the Kwu Tung North and Fanling North New Development Areas project aiming at preserving and making wise use of the wet agricultural land is an example (**Figure 28**).



Figure 28 Existing Conditions of Long Valley

Source: Lands Department

Revitalization of abandoned agricultural land

4.23 Apart from the designation of agricultural park and nature park, revitalisation of abandoned farmland could bring similar ecological benefits. Under the Sustainable Lai Chi Wo, a locally initiated collaborative project¹³, various farming methods such as eco-agriculture, low carbon farming and organic farming are encouraged. It also includes agricultural and habitat management activities, conservation programme to the dilapidated Hakka village houses, eco-tourism and community engagement. Under the Programme, there are active agricultural and habitat management activities covering approximately 5 to 6 ha of private farmland in Lai Chi Wo. Opportunities for replicating the Programme in other parts of Hong Kong could be further explored for biodiversity enhancement, among other benefits.



Figure 29 Lai Chi Wo Farmland Revitalisation

Source: Planning Department

¹³ The programme was originally initiated by the Kadoorie Institute of HKU in 2013. The Programme is now led by the Faculty of Social Sciences of The University of Hong Kong in collaboration with Hong Kong Countryside Foundation, Produce Green Foundation, the Conservancy Association and Lai Chi Wo villagers.

Urban Biodiversity

Promoting urban ecology (i.e. enhancing ecological value of urban greenery)

- 4.24 Sustainable landscape planning and design is an important means to improve the urban environment. We advocate adoption of a holistic approach to our urban landscape assets. Maximisation of complementary vegetation species diversity in urban landscape areas will improve the liveability of the surrounding built environment and contribute towards a range of environmental, social and health and wellbeing aspirations. Developing more urban parks, open space and elevated landscapes with suitable species shall be the directions to enhance the urban ecology.
- 4.25 Urban forests enrich our landscapes and improve the local environment of cities, contributing to a wide range of environmental and socio-economic benefits. Urban forests can also serve as important ecological linkages with our countryside and encourage movement of wildlife among different parts of the territory. Developing an

urban forestry strategy is one of the recommendations of “Green and Blue Space Conceptual Framework”. Furthermore, “Blue-Green Infrastructure” shall also be one of the directions in promoting urban ecology. It is about integrating sustainable landscape architecture into developed areas, for example by creating corridors of water bodies and vegetation within urban areas.

- 4.26 The ‘right-species-at-the-right-place’ principle has been adopted in selecting plant species to make sure the plant characteristics can match with the growing requirements. The values of urban parks could be further enhanced for biodiversity conservation and education. Regulatory and/or administrative control measures to guide the creation of more space for planting and introduction of suitable plant species in existing and/or new developments should also be explored.



Figure 30 Urban Planting

Sources: Environment Bureau, Development Bureau and
Agriculture, Fisheries and Conservation Department

Coastlines

Adoption of eco-shorelines for new reclamation/ Conversion of existing seawalls into eco-shorelines

- 4.27 For coastal development, artificial seawalls are commonly deployed to protect shorelines and reclamations. For quite a long time, the adoption of artificial seawall is based on safety and reliability considerations. Eco-shoreline elements should be integrated in reclamation as far as possible in order to restore the beneficial use and ecological function of the existing natural shoreline. Eco-shorelines could be adopted in the future near-shore reclamations at Tung Chung and Sunny Bay, artificial islands for the East Lantau Metropolis and even the existing seawalls as a longer term vision, subject to detailed investigation and studies. Different types of eco-shoreline systems will be explored to suit the different marine conditions along the shoreline of the proposed reclamations. The feasibility of artificial reefs deployment will also be evaluated so as to provide nursery and breeding grounds for fish to enrich fishery resources.

Eco-shoreline represents a paradigm shift in the fundamental approach to sustainable and environmentally friendly construction, from “minimising impact” to “creating ecological benefit”.



Figure 31 Estuarine Vegetation in front of Seawall in Parramatta River Estuary, Australia

Source:

http://www.epd.gov.hk/eia/register/report/eiareport/eia_2332015/html/EIA/Appendices/9.%20Ecology/Appendix%209.23.pdf

Environmental Improvement

- 4.28 Quality of our physical environment, including greenhouse gases, air quality, acoustic environment, water quality and supply, and landscape are closely related to our daily life. It would affect the habitability of a place for all living beings and liveability of a place for human beings. We should uphold our environmental stewardship to improve the physical environment for the benefit of all. It is acknowledged that some aspects are inter-related e.g. energy consumption and air quality etc. The multi-benefits of some of the initiatives should not be neglected.

Energy

Planning for a low carbon city and a better urban wind environment

- 4.29 Emissions from energy and power generation, especially sulphur dioxide and nitrogen oxides, are major sources of air pollution. We should plan for a low carbon city¹⁴ and a better urban wind environment so as to reduce energy consumption and hence help combat climate change.

¹⁴ Planning for a low carbon city has been elaborated in another topical paper named "A Smart, Green and Resilient City Strategy".

Comprehensive planning for new development areas (NDAs) would present greater scope and flexibility for doing so.

- 4.30 Better air ventilation in addition to other planning and engineering considerations should be reflected in the conscious planning decision for low-carbon developments including the initiatives/measures to maintain and create wind corridors/breezeways, achieve more permeable building layout and design, promote at grade tree planting and greening, adopt environmentally friendly transport mode and integrated green infrastructure system and promote green buildings. These initiatives would be taken forward in NDAs.
- 4.31 The Kai Tak District Cooling System (DCS), for example, saves energy for a large number of buildings so as to create exceptional low-carbon outcomes. The use of DCS for non-domestic developments will also be explored in Kwu Tung North NDA and Hung Shui Kiu NDA. Initial feasibility studies on provision of DCS have been or will be conducted for Tung Chung New Town Extension, topside development at the Hong Kong Boundary Crossing Facilities Island of the Macao-Zhuhai-Hong Kong Bridge, and the Loop.
- 4.32 Since 2006, all major Government projects need to carry out air ventilation assessments so that the impact of the proposed developments on the pedestrian wind environment can be mitigated and improved.

Quasi-government organisations and private sector are encouraged to follow this practice. Moving a step further, the Hong Kong Urban Climatic Planning Recommendation Map and other associated recommended measures provide more information on our urban climatic conditions by identifying urban climatically valuable areas and problematic areas, as well as give strategic and broad practical guidelines to improve the urban thermal comfort and wind environment through optimising the planning and design of our city.

- 4.33 To achieve the new target of reducing energy intensity by 40% by 2025, the community must take collective actions to change our behaviour and to invest in more energy efficient products, technologies and practices. The Government will take the lead in promoting energy saving and green building development by enhancing the green performance of government buildings, public housing and public sector developments, such as setting the target for all major new government buildings and new public housing to achieve at least BEAM Plus¹⁵ Gold and Gold ready respectively.

¹⁵ BEAM Plus is a comprehensive environmental assessment scheme for buildings in Hong Kong. It is a standard for green buildings to emphasize the in-door health and environmental quality and amenities as key performance indicators, with proper consideration of the local, regional and global environment impacts.

The Kowloon City No. 1 Sewage Pumping Station is the first government facility to obtain the BEAM Plus Platinum Rating. It is intended to create an “Oasis for the Soul” to display the Kai Tak Development Area’s features, natural beauty and energy through innovative design which sets the pumping station apart from its conventional counterparts.



Figure 32 The Kowloon City No. 1 Sewage Pumping Station (BEAM Plus Platinum)

Source: Drainage Services Department

Air & Noise

Air: Reducing air pollutants through environmentally friendly transport

- 4.34 Energy production and transport are the major sources of air pollutants. We shall strive for a cleaner Hong Kong through measures to tackle air pollution generated by these two sectors. We shall continue to underscore railway, a more environmentally friendly mass transit carrier, as the backbone of the public transport system, complemented by other public transport modes as well as walking and cycling. A more extensive railway network shall be developed. Measures to curb private vehicle growth, coupled with other transport management measures such as bus route rationalisation, enhanced cycling track and electronic road pricing system, shall be the key initiatives for examination. Green and sustainable modes of transport such as electric vehicles shall be actively promoted, with enhancement of electric vehicles charging infrastructure.
- 4.35 To address the spatial imbalance of jobs and population, the concept of “bringing jobs closer to home” should be promoted so as to reduce home to work journeys and vehicular emission and to improve the sustainability of communities.

- 4.36 As for energy production, the Government plans to increase the share of natural gas electricity generation to around 50% of the total fuel mix in 2020, and is prepared to develop more renewable energy.

Noise: Improvement and Preservation of Acoustic Environments

- 4.37 Acoustic environment affects well-being of individuals. Innovative and comprehensive approach shall be adopted to improve and preserve quiet areas in Hong Kong. Green initiatives to reduce road traffic, use of quieter transport means such as electric vehicles, incorporation of low noise road surfacing materials into road infrastructures and adoption of innovative noise mitigation building designs, etc. shall be pursued to tackle traffic noise. Besides, opportunities shall be seized to improve areas exposed to excessive noise in the course of urban redevelopment.



Figure 33 Solar Noise Barriers

Source: <http://www.seac.cc/projects/solar-noise-barriers-sonob/>

Water Resources

Save water campaign

4.38 About 2.5% of the world's water is fresh water while the rest is seawater. As the majority of this 2.5% of fresh water is frozen in glaciers or exists in soil moisture, there is just less than 1% readily accessible for human use. Fresh water is indeed a precious natural resources; hence the importance of water sustainability. In this regard, WSD has been implementing a host of initiatives, e.g. "Let's Save 10L Water" campaign to raise public awareness of water conservation and the voluntary "Water Efficiency Labelling Scheme" to promote the use of water saving devices and appliances.

Water resources protection and enhancement

4.39 We shall protect and ensure a continuous supply of potable water. It is important to ensure that developments within WGGs should be "permitted development" under the control of WSD.

Figure 34 Advanced Reverse Osmosis Desalination Technology
Source: Planning Department

Seawater desalination to diversify fresh water sources

4.40 Seawater desalination would enhance our resiliency to water supplies. The pilot desalination plant study completed in 2007 concluded that seawater desalination using reverse osmosis technology was technically feasible in Hong Kong. The technology of reverse osmosis (**Figure 34**) has become more mature and the cost of seawater desalination has been reduced over the years, making it a right juncture for Hong Kong to develop seawater desalination.

4.41 The proposed desalination plant in Tseung Kwan O (TKO) Area 137 will be the first of its kind in Hong Kong using advanced reverse osmosis desalination technology. The first and ultimate stages of the desalination plant will meet 5% and 10% of Hong Kong's water demand.



Reuse of treated sewage effluent

- 4.42 Water quality, particularly in sensitive water control zones, can be maintained or even enhanced by the reuse of treated sewage effluent. Take Fanling North and Kwu Tung North NDAs (FLN and KTN NDAs) as example, the project will make use of treated sewage effluent from the Shek Wu Hui Sewage Treatment Works, which will be expanded and upgraded to tertiary level in phases in order to ensure reduce pollution loads to Deep Bay. Sewage effluent after tertiary treatment and further polishing can be re-used for non-potable purposes including toilet flushing. Part of the sewage from Hung Shui Kiu (HSK) NDA will similarly go through tertiary treatment and further polishing for reuse on non-potable purposes including toilet flushing. The remaining will be treated by secondary treatment before disposal. This arrangement can help conserve water and reduce pollution discharge.

Ngong Ping Sewage Treatment Works (STW) in Lantau Island is the first tertiary treatment works with reclaimed water facilities in Hong Kong. Ngong Ping STW receives sewage arising from Ngong Ping and nearby tourist attractions such as the cable car services. Reclaimed water is supplied for flushing in nearby public toilets and the toilets in the Cable Car Terminal. It is also used in controlled irrigation and the fish pond at the plant.



Figure 35 Fish Pond using Reclaimed Water at Ngong Ping Sewage Treatment Works

Source: Drainage Services Department

Grey water recycling and rainwater harvesting system

- 4.43 The Government is also promoting the wider use of grey water recycling and rainwater harvesting systems by installing of such systems in suitable new government projects. WSD has established corresponding technical and water quality standards and provided detailed guidelines on the use of recycled grey water and rainwater in government premises.

The Happy Valley Underground Stormwater Storage Scheme (HVUSSS) being carried out within the Happy Valley Recreation Ground provides an opportunity for installing a Water Harvesting System (WHS) to collect groundwater, excessive irrigation water and rainwater for reuse in irrigation and toilet flushing upon suitable treatment. The WHS will save a considerable amount of fresh water supply.

Figure 36 Happy Valley Underground Stormwater Storage Scheme

Source: Drainage Services Department and Planning Department



Waste

4Rs Concept: reduce, reuse, recycle and recover

- 4.44 Our waste stream contains a treasure trove of useful resources, much of which can be reused, recycled and recovered. At the same time, we must reduce waste at source by cutting down unnecessary consumption and promoting at-source separation especially with respect to food waste. An integrated and land-efficient approach should be adopted in planning the waste disposal and waste treatment facilities.

Waste-to-energy approach

- 4.45 Since the reliance on landfills for disposal of solid waste is not sustainable, environmental infrastructure to convert waste to energy should be pursued. For instance, the introduction of Integrated Waste Management Facilities (IWMF) will recover energy and generate electricity from waste, thereby reducing the use of fossil fuel and contributing to reduction in local greenhouse gas emission. Besides, it is an effective means to lessen the land demand for landfill by greatly reducing the volume of MSW.
- 4.46 Co-digestion of food waste with sewage sludge at sewage treatment works can improve the nutrient balance and

biogas yield in the anaerobic digestion process and thus will generate more renewable energy. It will also provide the basis for the continued growth of anaerobic digestion as a waste management option and as a source for supply of renewable energy. Last but not least, this arrangement can minimize land-intake of such facilities.

T·PARK, located at Tsang Tsui in Tuen Mun, is one of the most technologically advanced facilities of its kind in the world. With a well-designed self-sustaining operational system, T·PARK combines a variety of advanced technologies into a single complex, bringing together sludge incinerators with a treatment capacity of up to 2,000 tonnes of sludge per day, with power generation, desalination, educational and ecological facilities to showcase the benefits of the waste-to-energy approach in waste management.



Figure 37

T·PARK in
Tuen Mun

Source: Environmental
Protection Department
and Planning
Department

Degraded Areas

Comprehensive replanning of brownfields in the rural New Territories

4.47 Brownfield operations such as container yards, container vehicle parking, container vehicle repairing, industrial workshops, cargo handling/ consolidation, open storage, recycling yards, construction machinery and materials storage, etc. are often incompatible with the surrounding rural uses and generate adverse environmental, traffic and drainage impacts. There are opportunities to turn some of these clusters into a new source of land supply through comprehensive and integrated planning with corresponding provision of community facilities and infrastructure upgrading. Indeed, the KTN NDA and Hung Shui Kiu NDA and the Yuen Long South development, all at various stages of advanced planning, involve a total of about 340 ha of brownfield sites. The Government has also carried out the "Preliminary Feasibility Study on Developing the New Territories North" to look into the development potential of NT North which covers a large number of brownfield sites. With a view to facilitating the formulation of appropriate policies and measures for tackling the brownfield issue, the PlanD will carry out a study on the existing profile and operations of brownfield sites in the New Territories in early 2017. The study findings will facilitate the Government to understand

the details of brownfield sites in the territory, which would be useful for devising brownfield policies, and formulating appropriate planning and consolidation strategy for brownfield sites in different areas, so as to achieve the objectives of better land utilisation and improvement of rural environment.

Rehabilitation of quarries

4.48 Local quarries play a significant role in supplying crushed rock products to the local construction industry. CEDD is commissioning consultancy studies to identify new quarries to maintain a steady local supply of crushed rock products. However, quarrying can leave a permanent scar on landscape and ecosystems. To take life cycle planning into consideration, rehabilitation of quarries should be promoted, e.g. restoring an ecological habitat by the time quarrying is finished. Former quarry sites could be set aside for use as parks and the pits in the quarry could be converted to lakes for providing quality habitats for wildlife. For example, the rehabilitation work of Lamma Quarry comprises a 4 ha man-made lake with a natural, non-engineered appearance and gently shelving edges which can support reed beds. Hong Kong's first "flood lake" in the Anderson Road Quarry Development will not only temporarily store the stormwater to alleviate the flood risk to eastern Kowloon, but also harvest rainwater for irrigation and leisure activities, including a children's water play area.

Figure 38 Landscape Rehabilitation at Shek O Quarry

Source: Environment Bureau



Restoration of landfills

4.49 Degraded land, i.e. landfill sites and quarry sites, should be restored and rehabilitated for beneficial after-uses where appropriate. There are 13 closed landfills in Hong Kong which were restored between 1997 and 2006 to minimise their potential adverse impacts on the environment and to render them safe for beneficial use. The Government has started converting these restored landfills into recreational facilities such as recreational ground, sports facility and park. As of today, six restored landfills have already been fully developed for public use. For example, part of the Gin Drinkers Bay Landfill site was developed into the HK Jockey Club International BMX Park in 2009. This successful experience showcases that restored landfills can be turned into gainful and pleasant facilities for enjoyment by the general public.

4.50 To make better use of restored landfill sites which after-uses are not yet in place, the Restored Landfill Revitalisation Funding Scheme (the RLRFS) was announced in Policy Address 2014 to encourage non-profit organisations and national sports associations to develop recreational, environmental or other community facilities on these sites.

4.51 Apart from the six restored landfills for public uses, another seven restored landfills in Kwun Tong, TKO, Yuen Long and Tuen Mun are available for after-use development under the RLRFS. For future landfill sites, after-uses apart from recreational facilities and open space should also be considered and allowed for at the early planning stage, with a view to making more optimal use of such sizeable pieces of land.



Figure 39 Hong Kong Jockey Club International BMX Park at Gin Drinkers Bay Landfill

Source: Environmental Protection Department



Figure 40 Restored Landfill (Tseung Kwan O) Pending Revitalisation

Source: Environmental Protection Department

5. Conclusion

5.1 The value of our natural environment goes beyond the beautiful scenery. It provides a wide range of services from providing water supply, regulating microclimate to providing habitats for a variety of animals and plants. To promote sustainability, the planning framework for creating development capacity will need to go hand in hand with creating, enhancing and regenerating environmental

capacity by integrating conservation and biodiversity considerations into planning and decision making and improving our environment. Successful implementation of this planning framework requires concerted efforts of the public and private sectors, as well as all individuals of our community.

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