

# LIST OF INTERVIEWS

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The dates of interviews by person and designation, as well as site visits were as follows.

- 6 Feb. 2017** Mr. Harry Seah, Director of Technology, PUB.
- 7 Feb. 2017** Mr. Tan Nguan Sen, Chief Sustainability Officer, PUB.
- 8 Feb. 2017** Mr. Khew Sin Khoon, CEO, CPG Consultants.
- 9 Feb. 2017** Mr. Tan Gee Paw, Chairman, PUB.
- 9 Feb. 2017** Mr. Kenneth Er, CEO, NParks and Dr. Leong Chee Chiew, DCEO, NParks.
- 9 Feb. 2017** Mr. Richard Hassel and Mr. Wong Mun Summ, Co-Founders, WOHA.
- 10 Feb. 2017** Mr. Loh Ah Tuan, Former DCEO, NEA.
- 10 Feb. 2017** Mr. Tobias Baur, Managing Director, Ramboll Studio Dreiseitl Singapore.
- 10 Feb. 2017** Bukit Timah Reserve site visit.
- 10 Feb. 2017** Eco-Link@BKE (Bukit Timah Expressway) site visit.
- 11 Feb. 2017** Alexandra Canal site visit.
- 11 Feb. 2017** Central Catchment Nature Reserve site visit.
- 11 Feb. 2017** Singapore Botanic Gardens (Herbarium and Laboratories) site visit.
- 15 Feb. 2017** Dr. Tan Wee Kiat, CEO, Gardens by the Bay.
- 22 Jun. 2017** Mr. Yong Wei Hin, Director, Deep Tunnel Sewage System, PUB.
- 22 Jun. 2017** Mr. Lim Liang Jim, Director, Industry and Centre for Urban Greenery and Ecology, NParks.
- 22 Jun. 2017** Dr. Lena Chan, Director, National Biodiversity Centre, NParks.

- 22 Jun. 2017** Mr Harry Seah, Chief Technology Officer, PUB
- 22 Jun. 2017** Sinspring Desalination Plant, Tuas, site visit.
- 22 Jun. 2017** Bedok NEWater Plant, site visit.
- 23 Jun. 2017** Mr. Khoo Teng Chye, Executive Director, CLC.
- 15 Aug. 2017** Ms. Olivia Lum, Founder, Hyflux.
- 15 Aug. 2017** Mr. Chionh Chye Khye, CLC Fellow; Former DCEO, HDB and Former CEO, BCA.
- 16 Aug. 2017** Ms. Fun Siew Leng, Assistant Chief Planner, URA.
- 16 Aug. 2017** Ms. Linda De Mello, Deputy Director, 3P Networks, PUB.
- 16 Aug. 2017** Mr. Michael Koh, CLC Fellow.
- 16 Aug. 2017** Gardens by the Bay site visit with Dr. Tan Wee Kiat, CEO, Gardens by the Bay.
- 17 Aug. 2017** Dr. Cheong Koon Hean, CEO, HDB; Former CEO, URA.
- 17 Aug. 2017** Mr. Wong Kai Yeng, Former Group Director, URA.
- 17 Aug. 2017** Prof. Leo Tan, Veteran Marine Biologist; Former Director, Singapore Science Centre.
- 17 Aug. 2017** Dr. Darren Yeo, Fmr. Chair of National Parks Board; Assist. Prof. Biological Sci. Dept., NUS.
- 17 Aug. 2017** Lee Kong Chian Natural History Museum, site visit.
- 18 Aug. 2017** Dr. Liu Thai Ker, Former CEO, HDB and URA; Chairman, CLC.
- 18 Aug. 2017** Mr Yap Kheng Guan, Former Director, PUB.

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# GLOSSARY

## **Active, Beautiful, Clean Waters Program (ABC Waters Program)**

A program that integrates the environment, water bodies, and the community. This is achieved through the transformation of waterways and reservoirs to create clean and beautiful rivers and lakes, and the shaping of these spaces for community recreation and bonding.

## **British colonialism**

The policy and practice of social, economic and political control by the British Empire over other countries. The Straits Settlements formed in 1826 around possessions on the Straits of Malacca, were comprised of the three trade centres of Singapore, Malacca, Penang, and became a crown colony in 1867 followed by the addition of Labuan in 1912. From 1946 to 1963 Singapore was under British control.

## **City in a Garden (Singapore)**

A philosophy towards urban greening. Proposed by the National Parks Board (NParks) in 1996, it reinvented the “Garden City” strategy to find new strategies and spaces to green Singapore. It was described as “when you are outdoors, you feel that you are in a Garden”. This philosophy paved new ways to integrate space, such that the whole was larger than the sum of its parts. Thus, this modified philosophy on Singapore’s greening shifted the direction from a “Garden City” to a “City in a Garden”.

## **City in Nature (Singapore)**

A proposed philosophy in 2017 by the Centre for Liveable Cities and the National Parks Board (NParks) towards urban greening. It advocates a planning approach to integrate nature into the built environment with the aim to bring nature and biodiversity closer to the people.

## **City of Gardens and Waters (Singapore)**

A vision to integrate water bodies and greenery into Singapore’s landscape. Coined by Prime Minister Lee Hsien Loong in 2007, the vision aims to incorporate water infrastructure and greenery

into a vibrant and biodiverse city landscape. The most prominent strategy to realise this vision is the Active, Beautiful, Clean Waters (ABC Waters) Programme.

## **Clean and Green Singapore**

The principle to preserve and care for the environment by leading an environmentally conscious lifestyle. It formed the basis of the “Keep Singapore Clean and Green Campaign” in 1968, and the “Clean and Green Week” in 1990. The latter was subsequently renamed “Clean and Green Singapore”, and was restructured as a year-long campaign.

## **Community in Bloom Program (Singapore)**

Launched in 2005, this is a nationwide movement aims to foster community spirit by encouraging residents to create and care for their community gardens together.

## **Concept Plan (Singapore)**

One of the two key plans for Singapore’s urban planning. Reviewed every ten years, the Concept Plan is a macro-level blueprint, illustrating the broad directions and strategies of the government’s land allocation and transportation policy over the next 40 to 50 years. Its vision is then translated into detailed guidelines in the Master Plan.

## **Deep Tunnel Sewerage System (DTSS)**

A superhighway for used water in Singapore. The DTSS satisfies Singapore’s long-term water needs in the collection, treatment, reclamation and disposal of used water. It comprises a network of link sewers, which link to two major tunnels that cross Singapore towards three water reclamation plants at the northern (Kranji), eastern (Changi), and western (Tuas) ends of Singapore.

## **Development Guide Plans (Singapore)**

A series of detailed short-term to medium-term future land use plans in a comprehensive review of the Master Plan 1985. Under the Urban Redevelopment Authority (URA), a Development

Guide Plan was drawn for each of the 55 planning areas in Singapore. Together, the 55 Development Guide Plans formed the Master Plan 1998.

#### **Federation of Malaya (described in the book as Malay Federation)**

An organisation of nine Malay states and the Straits Settlements of Malacca and Penang. Inaugurated in 1948, it sought to replace the Malayan Union. In 1963, the Federation was merged with Singapore, Sarawak and North Borneo (modern-day Sabah) to form the Federation of Malaysia. Following a series of clashes between the People's Action Party (PAP) government in Singapore and the Alliance leaders in Kuala Lumpur, Singapore separated from Malaysia in 1963 to become a sovereign nation.

#### **Garden City (Singapore)**

In 1967, then Prime Minister Lee Kuan Yew introduced this movement for transforming Singapore into a Garden City. The idea was to develop a city with lush greenery and a clean environment for a better quality of life for Singaporeans as well as to attract foreign investments into Singapore.

#### **Garden City Action Committee (Singapore)**

A committee set up by then Prime Minister Lee Kuan Yew in 1970 to oversee policies for greening the whole of Singapore and to allow better coordination among government agencies to integrate greenery into the built environment.

#### **Jackson's Plan of Singapore**

Jackson's Plan of Singapore refers to Naval Lieutenant Philip Jackson of the Bengal Regiment Artillery under Stamford Raffles. Sometimes referred to as 'Raffles Town Plan'.

#### **Japanese occupation**

The occupation by military forces of the former Empire of Japan in Singapore during World War II. After the defeat of the former British colony in the Battle of Singapore, the British surrendered Singapore in 1942. This led to the Japanese Occupation in Singapore that lasted until 1945, during which time Singapore was renamed Syanon.

#### **Land Acquisition Act**

Introduced in the 1966, the Land Acquisition Act provides the Singapore government with the legal framework to acquire private land compulsorily at market prices. The primary objective of the act was to make land available readily and inexpensively for

a very wide variety of purposes namely, for any public purpose, for public benefit and/or public utility, and for any residential, commercial or industrial purposes.

#### **Marina Barrage**

A dam built across the mouth of Marina channel to create Marina Reservoir, Singapore's fifteenth reservoir. This contributed to the expansion of Marina catchment to a sixth of Singapore's land area. The multi-purpose barrage was built not only to provide additional source of water supply it also serves as flood control and a popular rooftop for recreation activities.

#### **Master Plan (Singapore)**

One of the two key plans for Singapore's urban planning. The Master Plan is a statutory land use plan that guides Singapore's development over the next 10 to 15 years. Reviewed every five years, this plan translates the vision and long-term strategies of the Concept Plan into detailed zoning and density parameters for land-use and development.

#### **My Waterway at Punggol**

A man-made waterway to transform Punggol into a vibrant Waterfront Town, and is a joint project between the National Parks Board (NParks) and the Housing Development Board (HDB). Together with the Punggol Waterway Park, the 4.2km waterway will traverse Punggol Town, Punggol Promenade, and connect the reservoirs in Sungei Serangoon and Sungei Punggol.

#### **National Parks Board (NParks)**

The National Parks Board was derived from the Parks and Recreation Department which was set up under the Ministry of National Development in 1975 after the merger of Singapore Botanic Gardens and Parks & Trees Unit. In 1996, the department was renamed as the National Parks Board where Singapore Botanic Gardens and Singapore's nature reserves came under its custody. It later became the government agency responsible for providing and enhancing greenery for Singapore.

#### **Nature Reserve (Singapore)**

A green space which is managed for purposes, including the protection and conservation of its biodiversity, and the researching and dissemination of its aesthetic, historical and scientific significance and knowledge. Conserved under the Parks and Trees Act 2006, Singapore's four Nature Reserves are Bukit Timah Nature Reserve, Central Catchment Nature Reserve, Sungei Buloh Wetland Reserve and Labrador Nature Reserve.

**Nature Reserves Ordinance (Singapore)**

A law which sets aside nature reserves to preserve the indigenous biodiversity in Singapore, as well as objects and places of aesthetic, historical or scientific interest. It also ensures the conditions and controls for the study of Singapore's biodiversity. Enacted in 1951, the Ordinance legally protected Bukit Timah, Kranji, Pandan, Labrador Cliff, and the Municipal Water Catchment area. It was later replaced by the current National Parks Board Act.

**Nature Ways**

Routes planted with selected trees and shrubs to encourage movement of fauna between two biodiverse green areas.

**Park Connector Network**

A network of trail interlinking parks, rivers, canals and residential areas created for people to indulge in various recreational activities such as jogging and cycling. The Park Connector Network started with the intention to use underutilised space along canals and open spaces in residential areas to connect with major parks. Today, it is recognised as an approach to optimise existing space and better integration of green elements as part of the overall garden city strategy.

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**Parks and Trees Act**

An act to provide for the planting, maintenance and conservation of trees and plants within national parks, nature reserves, tree conservation areas, and other green spaces in Singapore. Introduced in 1975, the Act was revised in 2017 to grant the National Parks Board (NParks) more regulatory and enforcement power to protect and conserve nature in Singapore. This includes allowing NParks officers to enter homes if the greenery on their premises is a danger to public safety.

**Public Utilities Board (PUB), later renamed as the PUB, Singapore's National Water Agency**

The national water agency which manages the water supply, water catchment and used water in Singapore. Formed in 1963,

it initially served to coordinate the supply of electricity, piped gas and water in Singapore. It was later reconstituted in 2001 as Singapore's national water authority and became a statutory board under the Ministry of Environment and Water Resources (MEWR).

**Ring City Concept**

An urban planning strategy of a circle of high-density development in Singapore, which flanks the central water catchment area, and a southern development belt from Jurong to Changi. Endorsed by the United Nations (UN) Consultative Review Panel, the strategy was incorporated into the 1971 Concept Plan with technical assistance from the UN.

**Sengkang Floating Wetland**

A man-made wetland in Punggol Reservoir under the Active, Beautiful, Clean (ABC) Waters Programme of PUB, Singapore's National Water Agency. Constructed on the design theme to "Discover Nature", the wetland improves the water quality and provides a natural habitat for birds and fishes. It comprises of a fixed bridge which connects the Anchorvale Community Centre and Sports Complex, and floating boardwalk to mangroves on the eastern flank of the river.

**Singapore Green Plan**

It is Singapore's first environmental blueprint which was released in 1992 by then Ministry of Environment to ensure that Singapore could strike a balance between environmental protection and economic growth as it developed. The government later launched the Singapore Green Plan 2012 to include environmental targets which mostly have been met. Instead, the Sustainable Singapore Blueprint was formulated which spells out targets for 2030.

**Source-Pathway-Receptor Approach**

A method to increase flood protection by adopting catchment-wide solutions. Through flexibility and adaptability to Singapore's full drainage system, this holistic approach considers the drains and canals through which stormwater travels (i.e. "Pathway"), areas that generate stormwater runoff (i.e. "Source") and areas of potential flooding (i.e. "Receptor").

**Streetscape Greenery Masterplan (Singapore)**

A blueprint initiated by the National Parks Board to accentuate, enhance and revitalize the Garden City, through intensification of streetscapes to create unique identities for clusters of roads at strategic locations. The blueprint spells out planning and design guidelines to ensure better coordination between various agencies such as the housing and transport authorities.



**Unaccounted for Water (UFW)**

The difference between amount of water delivered to the distribution system and the amount of water sold. UFW mainly consists of water lost through leaks and the under registration of meters. Through comprehensive management of water supply networks, Singapore has ensured its UFW remained at 5%, one of the lowest in the region.

**Used water**

As part of the sustainable water supply strategy, the term 'used water' is adopted in Singapore instead of the commonly known 'wastewater'. In Singapore, used water is collected and channelled to water reclamation plants, and then treated to international standards of the World Health Organisation.

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