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Urban System Studies: Green Cities and Sustainability

Michael Koh
Fellow, Centre For Liveable Cities

Urban Issues in the 21st Century

- By 2050, population growth and urbanisation is projected to add 2.5 billion people to cities, 90% of which are concentrated in Asia and Africa.
- Climate change and an increasingly connected world is posing new and unprecedented challenges.

- Most of our current urban models cannot sustain these increases.
- Similarly, current brick-and-motar method of building cities are fast encroaching upon our natural spaces.
- Moving forward, we need a new commitment towards a shared vision.

Agenda

1. Singapore's Liveability Framework
2. City in Nature
3. Going Car Lite
4. Building Resilience

Genesis of CLC

CLC was set up in 2008 by the Ministry of National Development (MND) and the Ministry of the Environment and Water Resources (MEWR) as one of the key strategies in the Sustainable Singapore Blueprint.

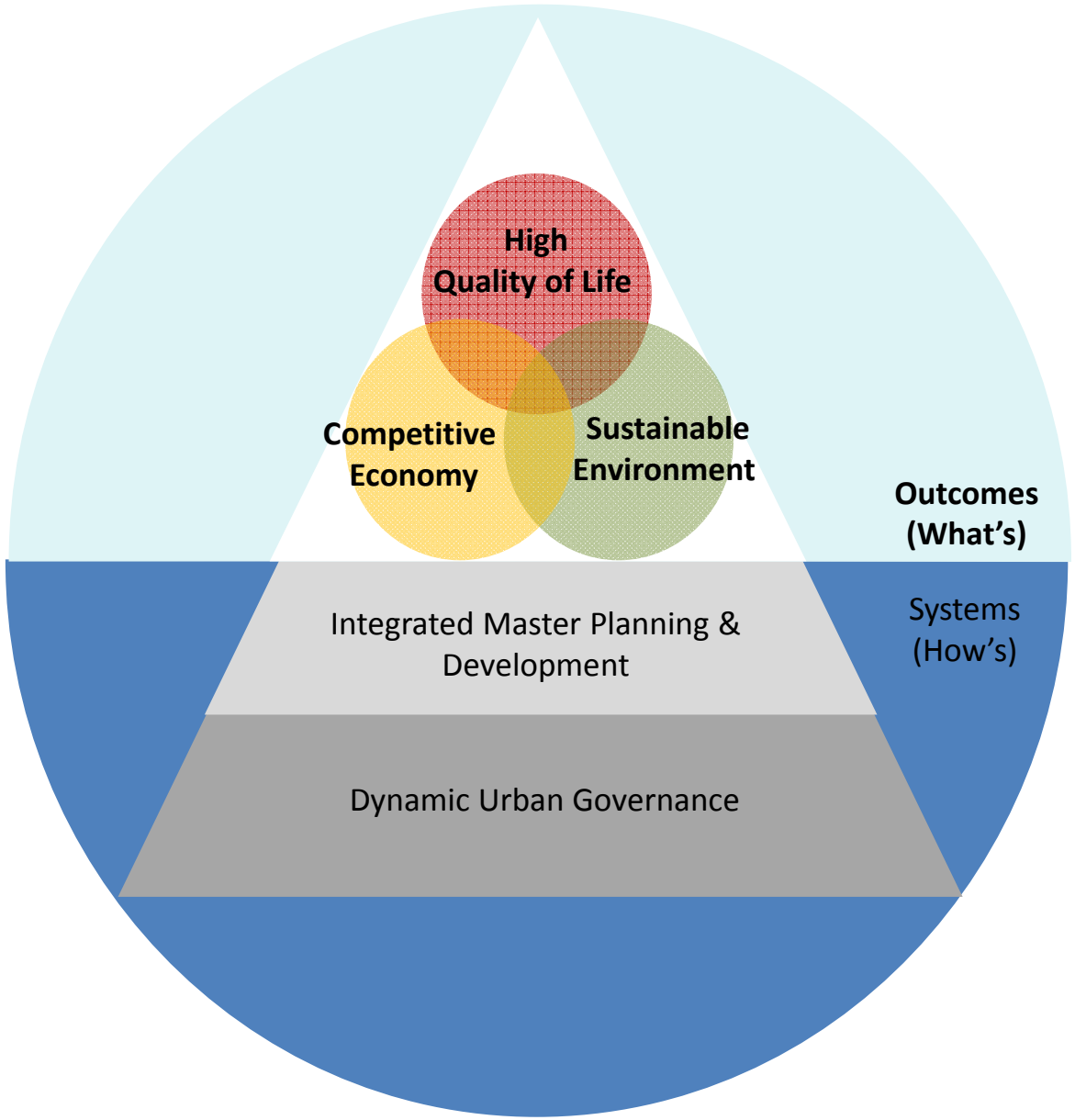
CLC's purpose is to distil and deepen knowledge on Singapore's urban development and facilitate global knowledge exchange on liveable and sustainable cities.

Sustainable Singapore Blueprint

www.sustainablesingapore.gov.sg

Singapore Liveability Framework

Framework for Planning and Developing a Liveable City

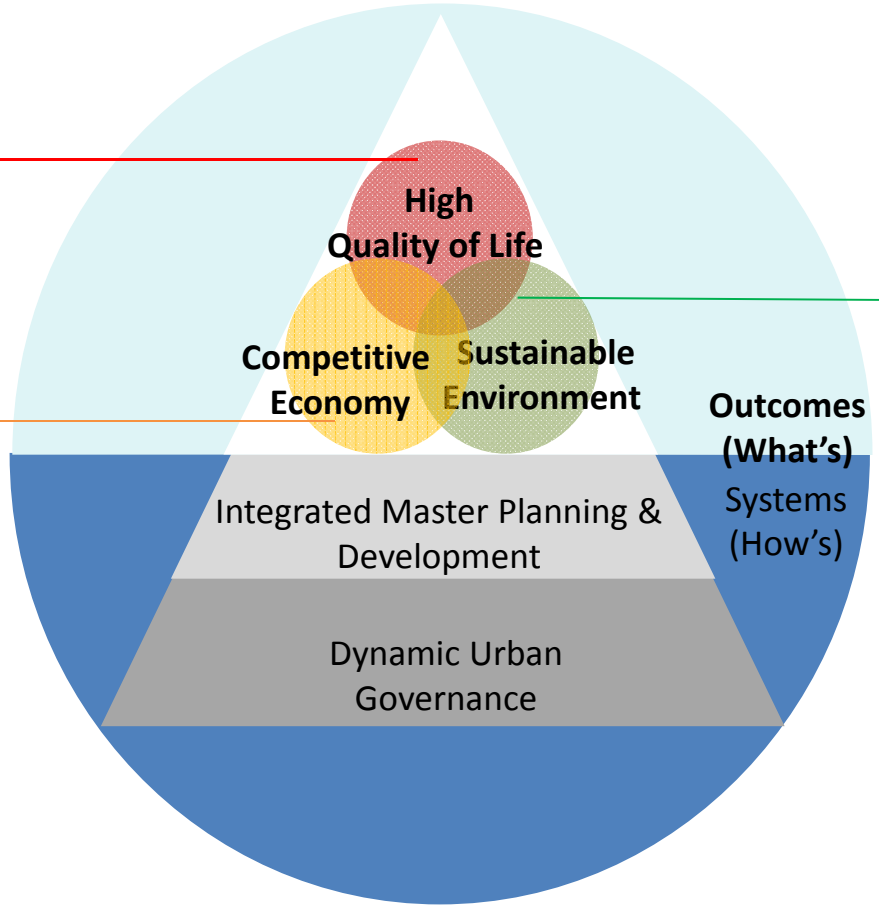


Singapore Liveability Framework

Framework for planning and developing a liveable city

- Safe & Secure environment
- Equitable & Inclusive society
- Accessible & Adequate public goods and services *(transport, water, sanitation, health system)*
- *Affordable & Diverse social, recreational & cultural aspects to meet essential needs*

- Resilient Economy
- Competitive Workforce
- Inclusive Growth

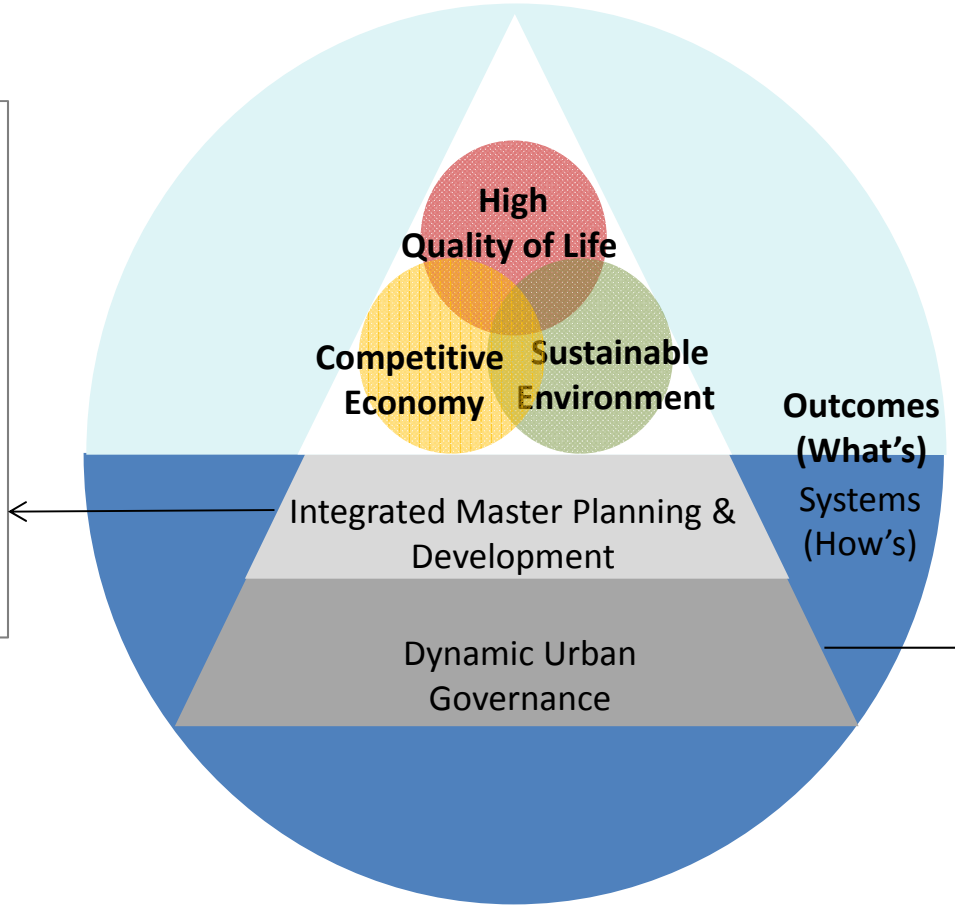


- Adequate land, water and energy to meet long term needs.
- Clean and good quality environment *(air, water, waste management, noise level)*
- Green & Healthy Eco-Systems
- Resilient to Environmental Risks *(Climate change, natural disasters, food security)*

Singapore Liveability Framework

Framework for planning and developing a liveable city

1. Think long term
2. "Fight productively"
3. Build in flexibility
4. Execute effectively
5. Innovate systemically



1. Lead with vision and pragmatism
2. Build a culture of integrity
3. Cultivate sound institutions
4. Involve the community as stakeholders
5. Work with markets

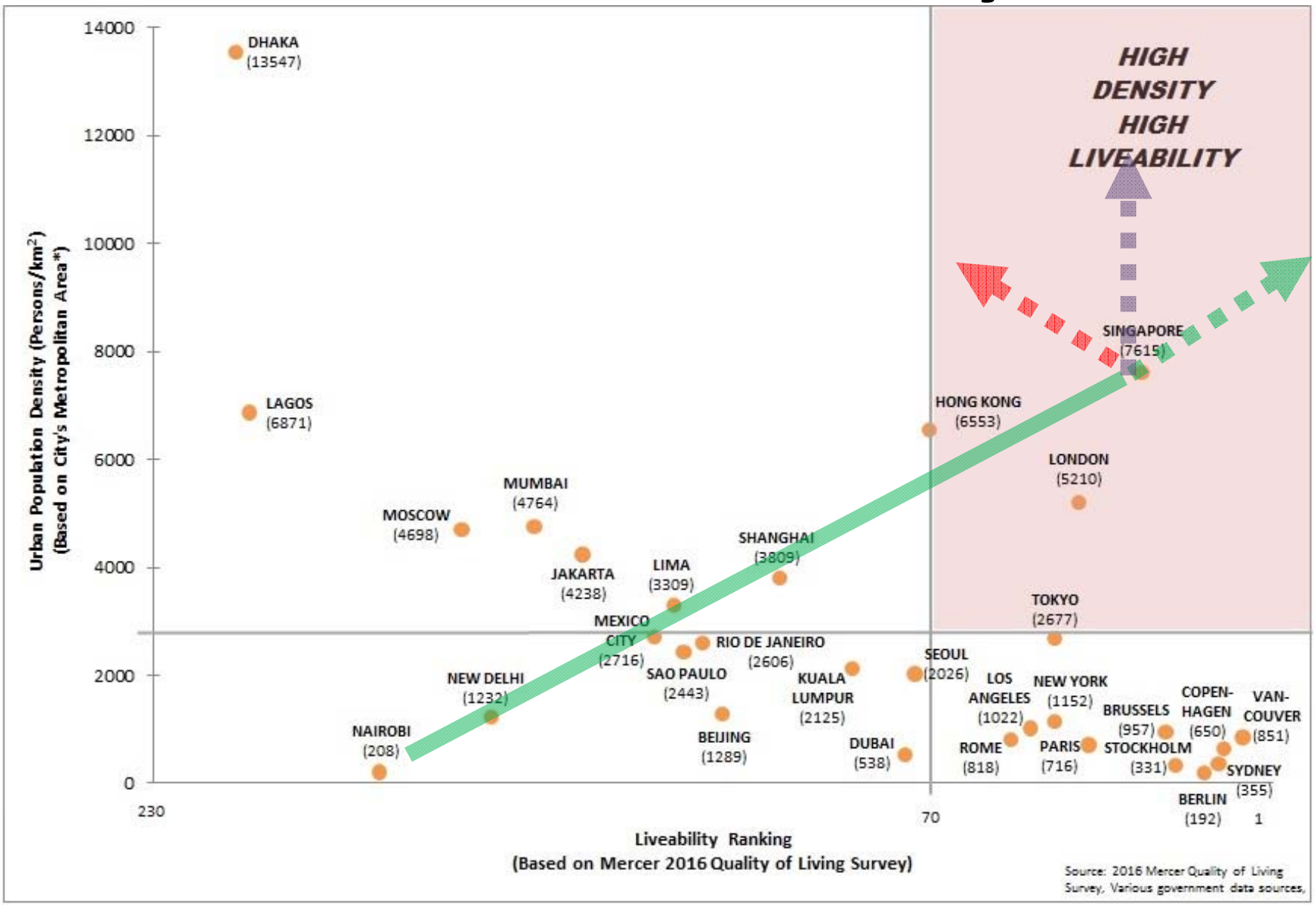
Singapore: A highly liveable & sustainable city

Economic Competitiveness		
SGP's ranking	**2015**	**2016**
Global Power City Index (by MMF)	5	5
Global Competitiveness Report (by WEF)	2	2

Liveability		
SGP's ranking	**2015**	**2016**
Mercer	26; 1st in Asia	26; 1st in Asia
Monocle	13	20

Health & Happiness		
SGP's ranking	**2015**	**2016**
Health-related SDG index (by Lancet)	-	3
World Happiness Report (by SDSN)	24; 1st in Asia	22; 1st in Asia

CLC Liveability Matrix

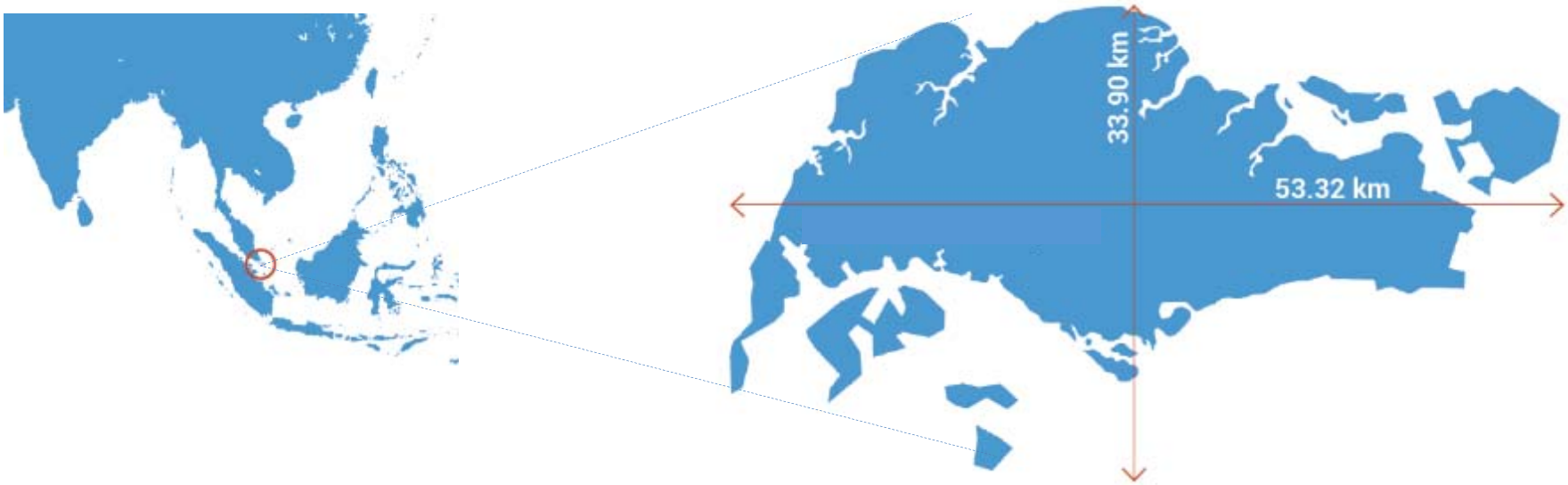


Singapore in the 1950s & 1960s

A country plagued with challenges of urbanisation

Singapore Today

Singapore: A city-state's challenges



- Population of **5.61** mil
- Land area of **719** km^2
- **7,800** persons/km^2 density
- Very **limited** natural resources
- **Essential** needs of a country for defence, accessibility (airport, sea port), basic survival (e.g. water supply and catchment)

City in Nature

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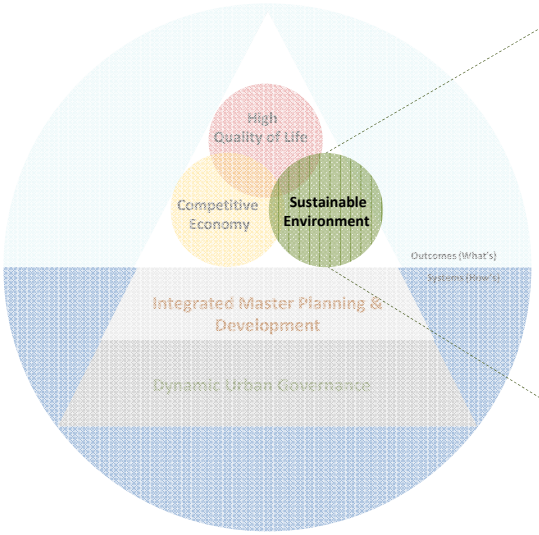
A Clean, Green and Blue Singapore



1. Adequate land, water and energy to meet long term needs.

2. Clean and good quality environment *(air, water, waste management, noise level)*

3. Green & Healthy Eco-Systems

4. Resilient to Environmental Risks *(climate change, natural disasters, food security)*

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A Building is a Microcosm of a City

Biophilic Hotel, Hospital, and Industry

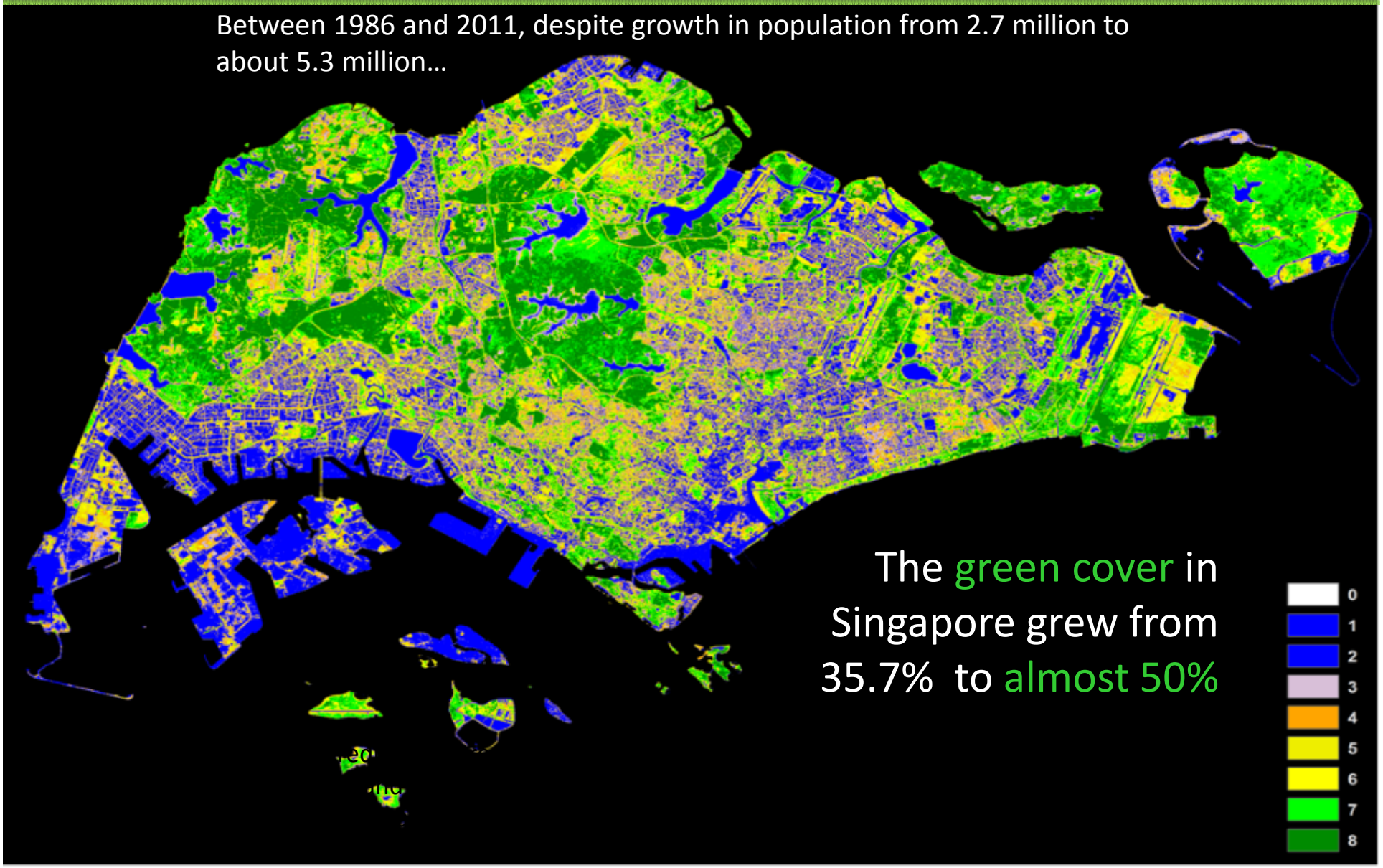
Park Royal @ Pickering

Urban farming at KTPH

Jurong Eco-Garden at CleanTech Park

Sources: WOHA, KTPH, JTC

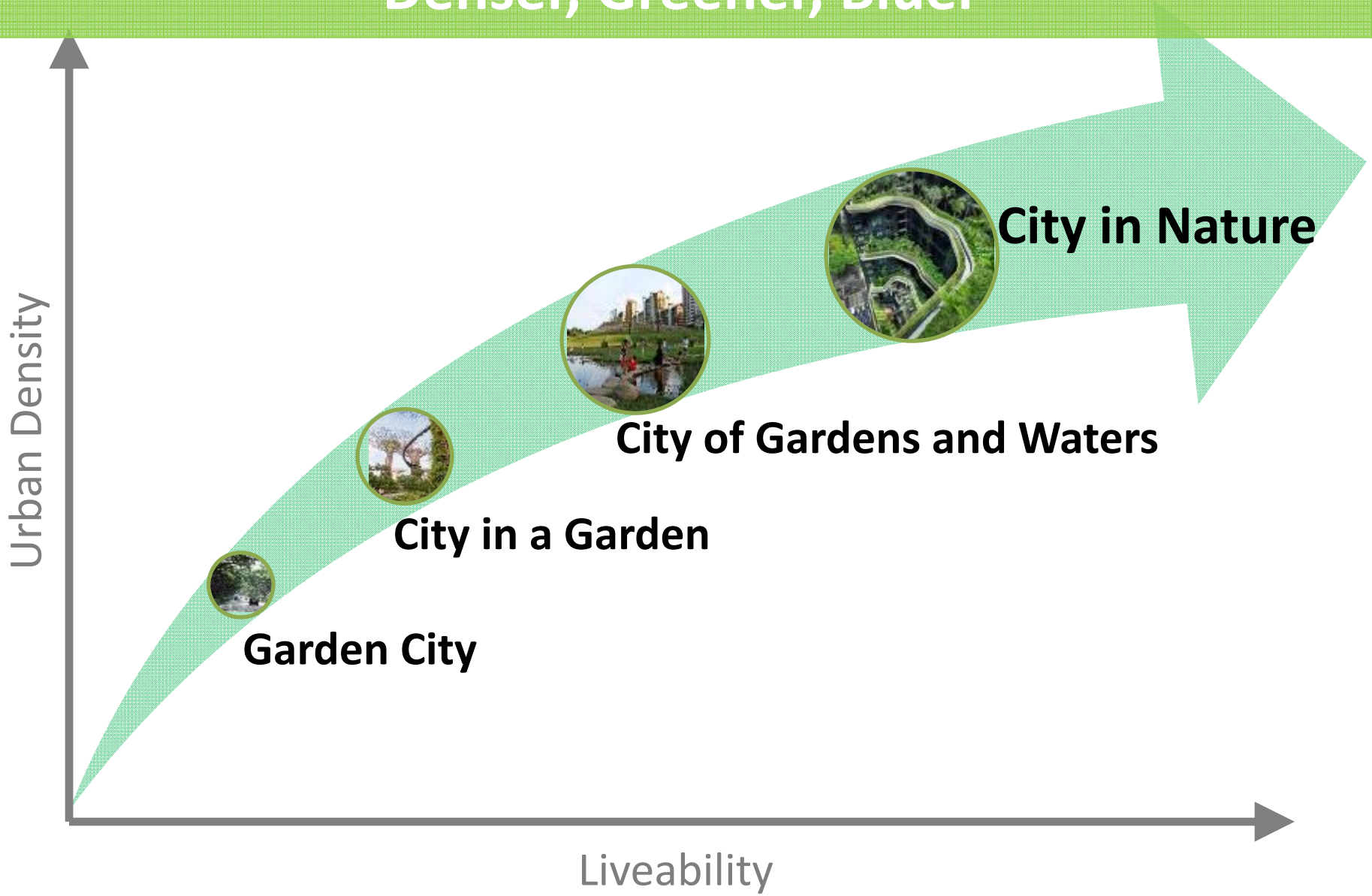
Increasing Green Cover



What is a Biophilic City?

- A biophilic city puts nature at the core of its design and planning, not as an afterthought or an ornament.
- It also works hard to foster those connections and the engagement of people with nature by encouraging urban nature works, spending time outdoors, fostering interest and curiosity about nature.
- Biophilic design creates living environments that brings out the best in **both** human and ecological systems

Singapore's Journey: Denser, Greener, Bluer



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1960s to 2010: Garden City

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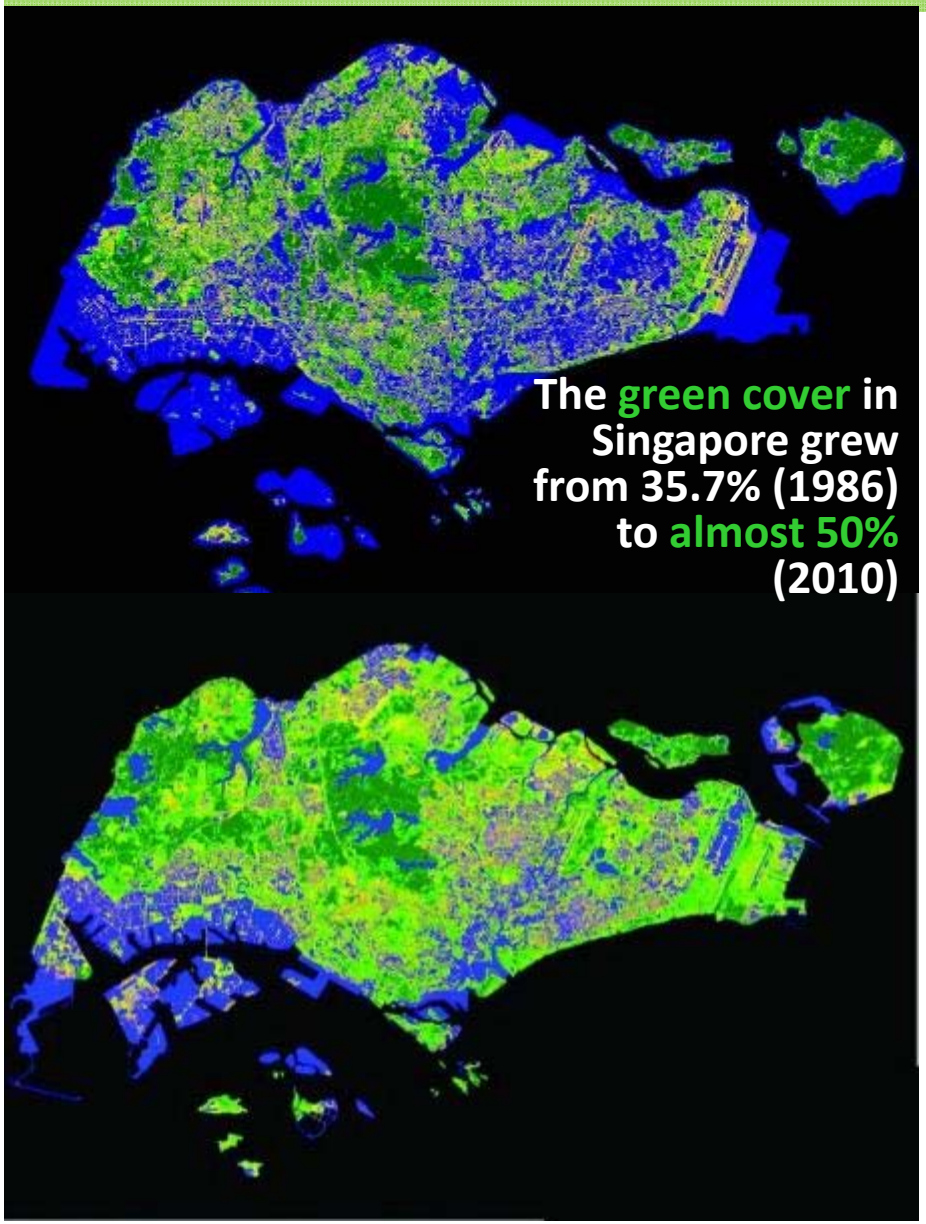
Garden City Vision



- Greening of the city amidst rapid urbanisation
- Motivations behind the vision:
  - To provide Singaporeans with the best possible living environment despite increasing urbanisation
  - To give visitors a good impression of the country and persuade potential investors of the commitment, discipline and efficiency of the government
  - To improve the morale of the citizens and allow them to take pride in their environment
- Over time, these early greening efforts resulted in an infrastructural "green skeleton", over which subsequent biodiversity conservation initiatives could be seamlessly layered

2010 onwards: City in a Garden

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City in a Garden Vision

6 key areas

1. Establish world-class gardens
2. Rejuvenate urban parks and enliven our streetscape
3. Optimise urban spaces for greenery and recreation
4. Enrich biodiversity in our urban environment
5. Enhance competencies of our landscape and horticulture industry
6. Engage and inspire communities to co-create a greener Singapore

Paradigm Shift for our Waterways

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The Blue Map of Singapore

17 reservoirs

32 rivers

7,000 km of waterways and drains

Water Supply Strategy

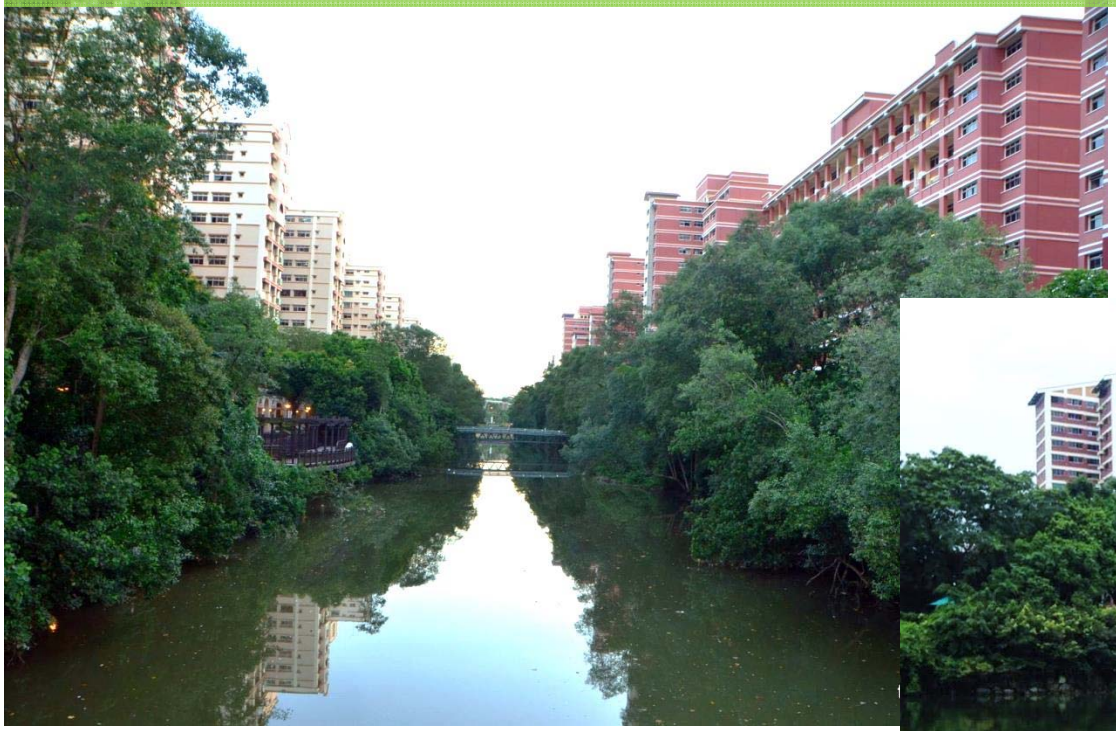
To collect every drop of water that falls on Singapore

To collect every drop of used water

To recycle every drop of water more than once

Parks and Water Bodies Plan

The Predecessor of ABC Waters Programme



Sungei Api Api

Pang Sua Pond

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MacRitchie Reservoir

Active, Beautiful & Clean Waters Programme

ACTIVE
New Recreational Spaces

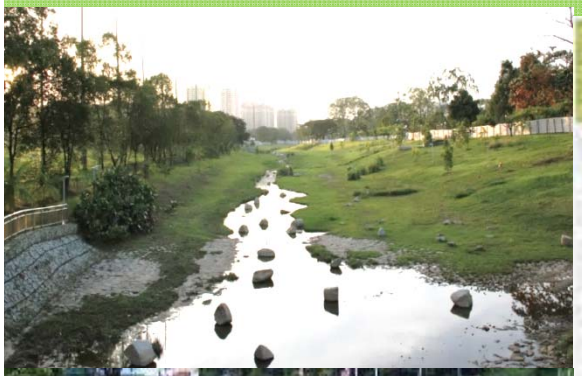
BEAUTIFUL
Integration of waters with urban landscape

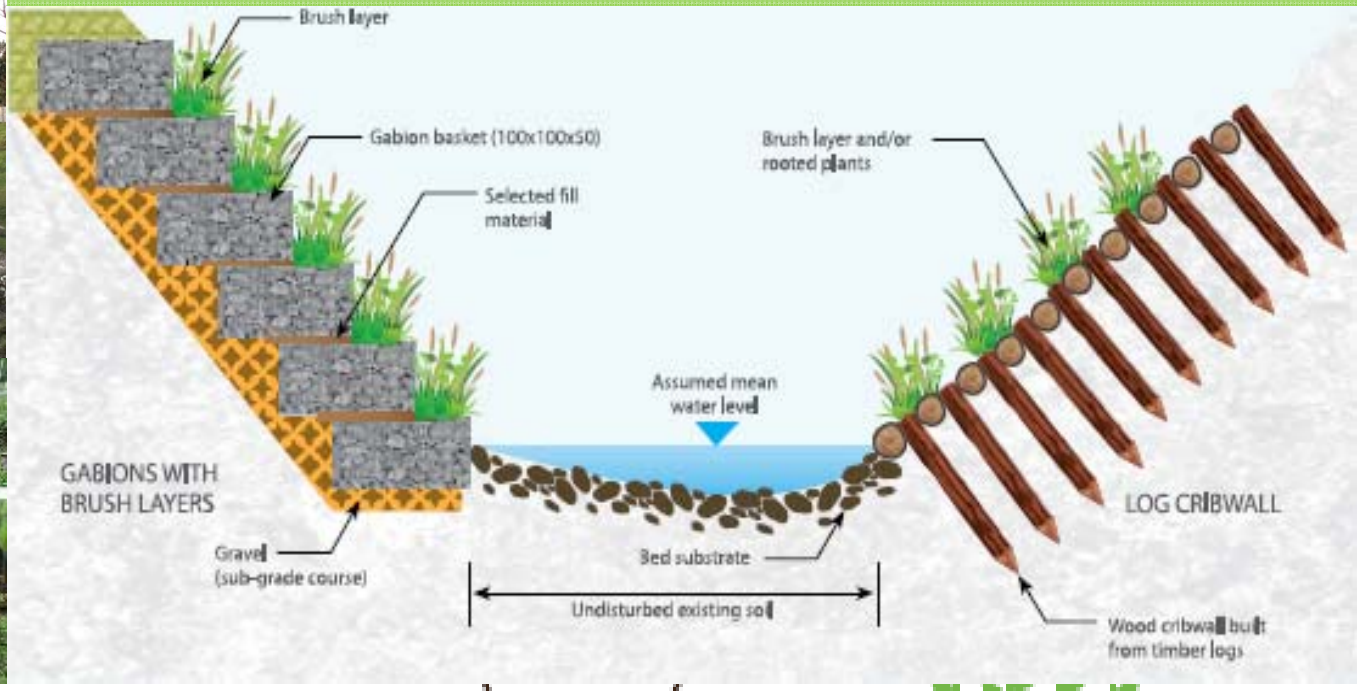
CLEAN
Improved Water Quality

Active, Beautiful, Clean Waters: Kallang River @ Bishan-Ang Mo Kio Park

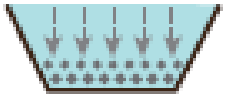
Source: PUB, Singapore's water agency

ABC Waters Design Guidelines

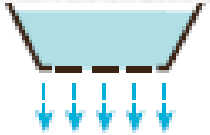




DETENTION ELEMENT



SEDIMENTATION



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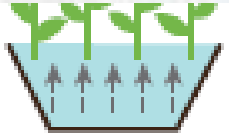


BIOLOGICAL UPTAKE

- ABC Waters design features include: Vegetated swales, Bioretention swales or basins, Sedimentation basins, Constructed wetlands, Cleansing biotopes, Infiltration systems
- Application of water-sensitive urban design features meant for stormwater management

ABC Waters Projects

SUNGEI API API AND SUNGEI TAMPINES – Opened in March 2015

ROCHOR CANAL – Opened in March 2015

SENGKANG FLOATING WETLANDS –Opened in 2010

KALLANG RIVER (POTONG PASIR) – Opened in July 2015

Source: PUB, Singapore's water agency

Mainstreaming ABC Waters

- ABC waters as an integral part of urban planning
  - Providing urban planners and allied partners with more tools to create a city that supports nature and connects with its citizens
  - Planners, developers and project managers will balance trade-offs in solutions
    - e.g. more land required vs straight concrete channels, while maintaining drainage and liveability requirements
- ABC Waters Design Guidelines
  - To help design and operate reliable ABC Waters assets.

ABC Waters: Marina Barrage

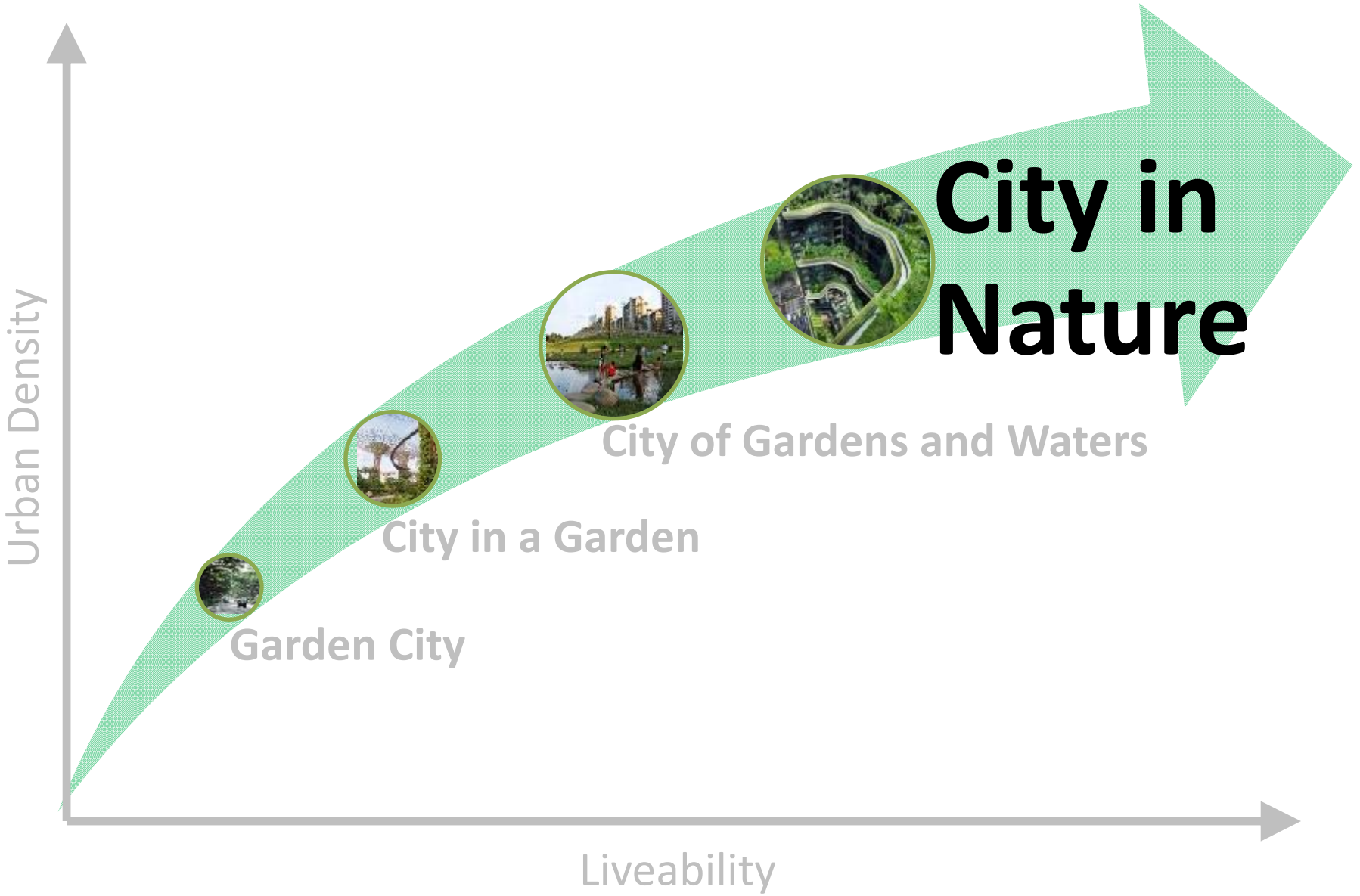
ABC Waters: Marina Barrage

Water Supply
Boosts Singapore's water supply as Singapore's 15th reservoir and its first reservoir in the city

Flood control
Acts as a tidal barrier to keep seawater out and alleviates flooding in the low-lying city areas

Lifestyle Attraction
Hotspot for recreational activities and latest icon in Singapore

Future Directions



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Biophilic HDB Town: Punggol 21+

Biophilic HDB Town: Punggol 21+

Car-lite supporting City in Nature in Punggol Town

1 SUNSET STRIP

2 TOWN CENTRE (U/C)

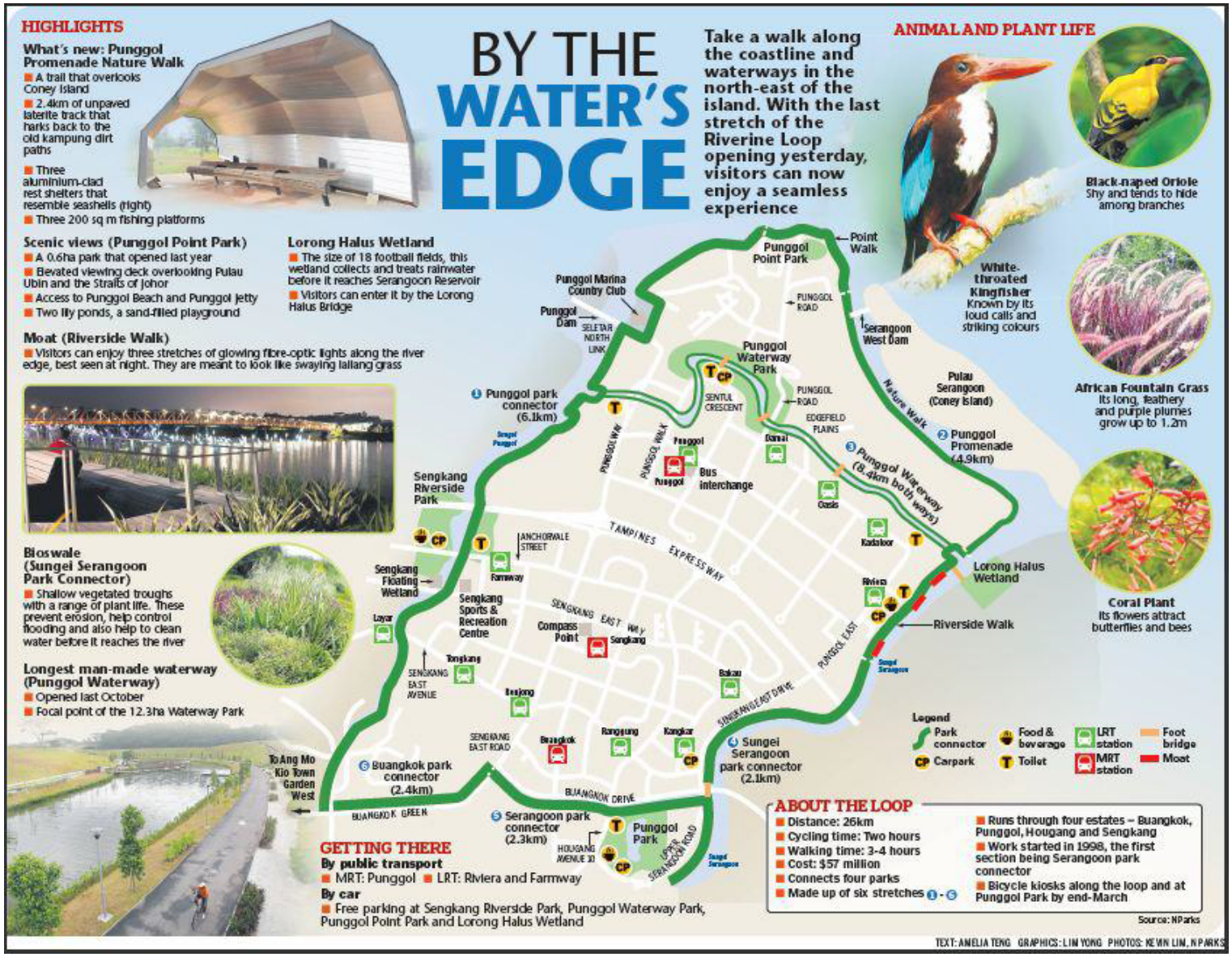
3 HEARTWAVE WALL

4 PUNGGOL WATERWAY PARK

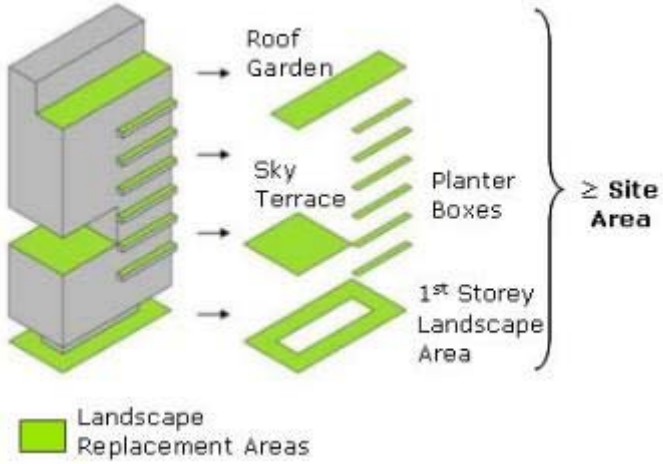
5 WATERSPORTS PROMENADE

6 SUNRISE GATEWAY

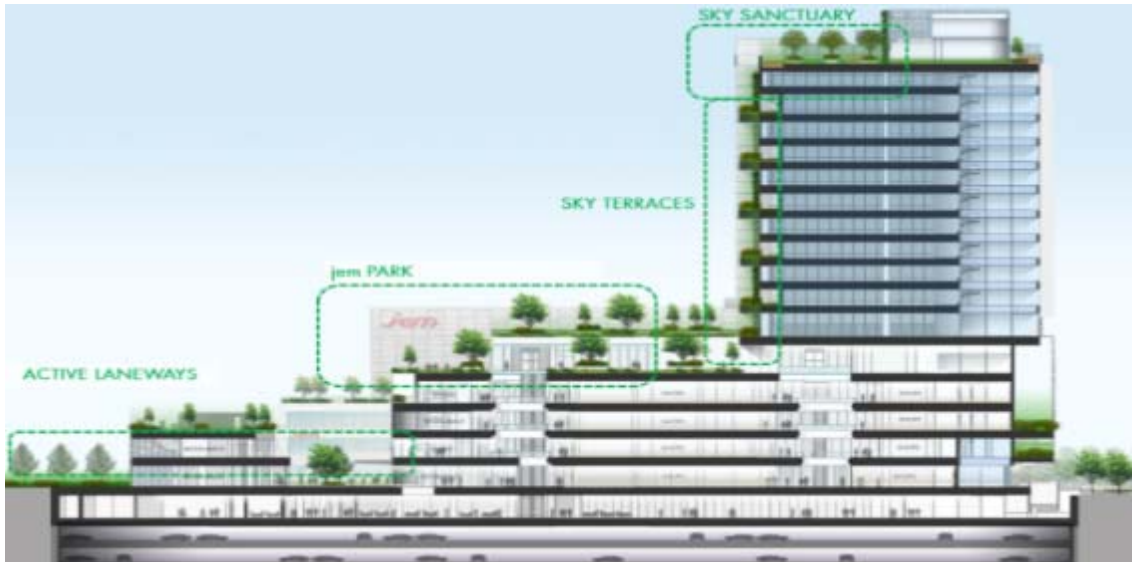
Biodiversity at Punggol Town



Landscape Replacement Policy



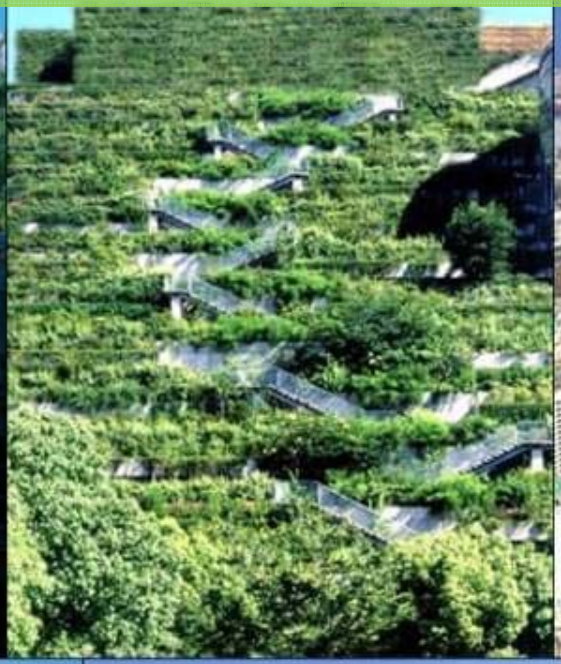
- Developers must replace greenery displaced by buildings and lost from the site.
- Applicable to non-landed private residential and commercial/mixed-use/hotel developments outside strategic areas.
- New and redevelopments must provide communal green spaces.
- More intensive developments are required to provide more communal green spaces.



Vertical Forest: Bosco Verticale, Milan

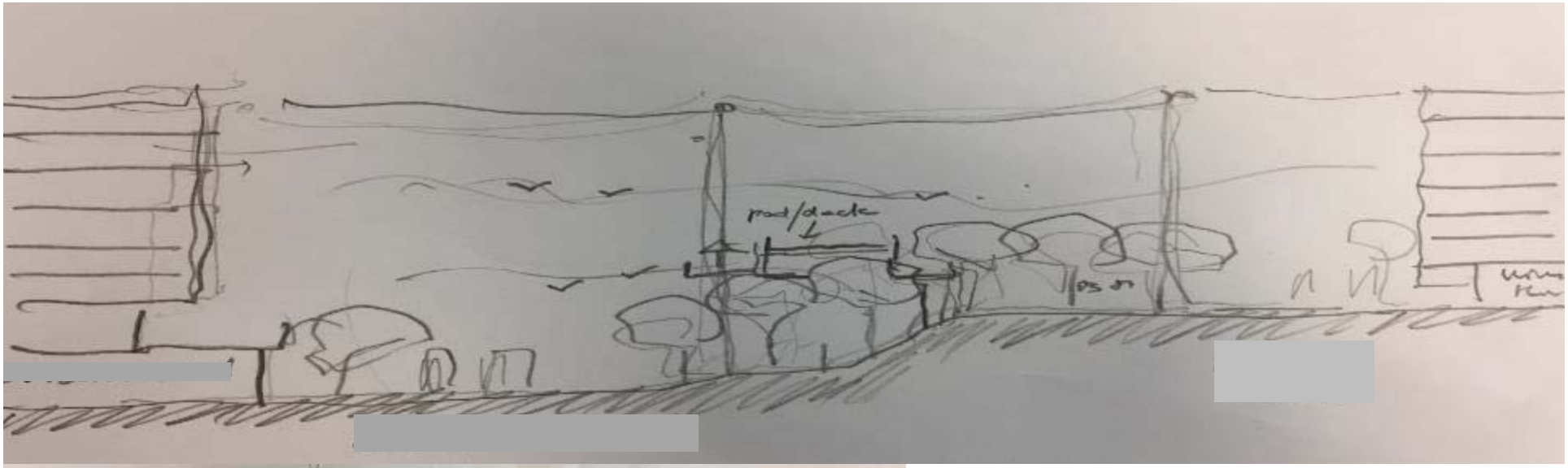
- The 27 storey structure is also the world's first vertical forest
- Diversity of plants produce humidity, absorb CO2 and dust particles, create oxygen and protect the building from radiation and acoustic pollution.
- Plant irrigation supported through the filtering and reuse of grey water produced by the building.

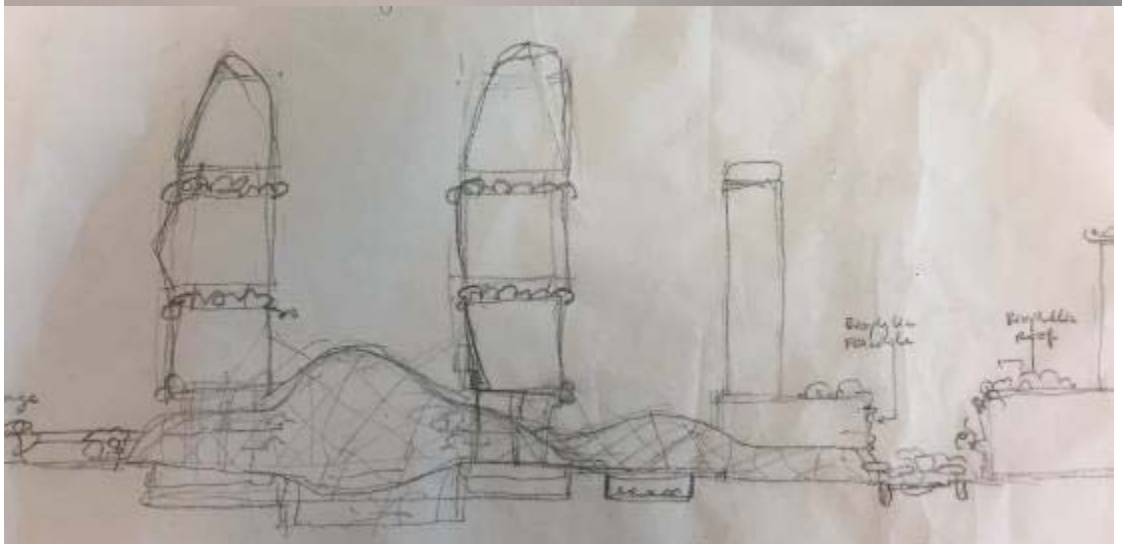
Hillside Forest: Fukuoka Prefectural Hall



Thought Experiment: Community Borne from Nature

Re-imagine urban living





- Can communities organically emerge from being close to nature?
- How do we build cities to co-exist with nature?
- What are the biophilic possibilities for cities?

Thought Experiment: Sponge Cities

- Build with precipitation rather than against it.
- For instance: absorb precipitation through permeable pavements, rain gardens and wetlands. Reuse water for irrigation, parks or drinking to assist with flood prevention

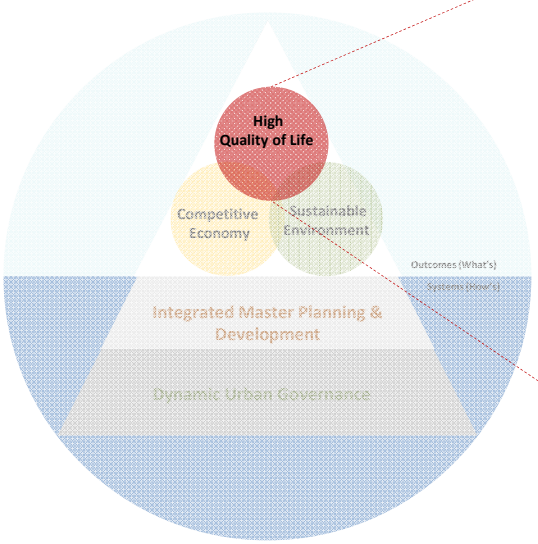
Sponge Technology: Yanweizhou Park

- Yanweizhou park is designed to work alongside annual flooding rather than control it with concrete floodwalls.
- The cut-and-fill strategy of create a water-resilient terraced river embankment that is covered with flood adapted native vegetation. Greenery thrived through this new design.
- Floodable pedestrian paths and pavilions are closed to the public during the short period of flooding. However, the bridge still remains accessible to the public. In non-flood periods, the park is a place for community to flourish.
- Won the world landscape of the year for 2015.

Go Car-lite

WALKING
TAXI
CAR SHARING
PRIVATE VEHICLES
PERSONAL ELECTRIC MOVERS
BIKING
PUBLIC TRANSPORT

High Quality of Life



1. **Safe & Secure environment**
2. **Equitable & Inclusive society**
3. **Accessible & Adequate public goods and services** *(transport, water, sanitation, health system)*
4. **Affordable & Diverse social, recreational & cultural aspects to meet essential needs**

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A Vision for a Car-lite, Actively Mobile Singapore

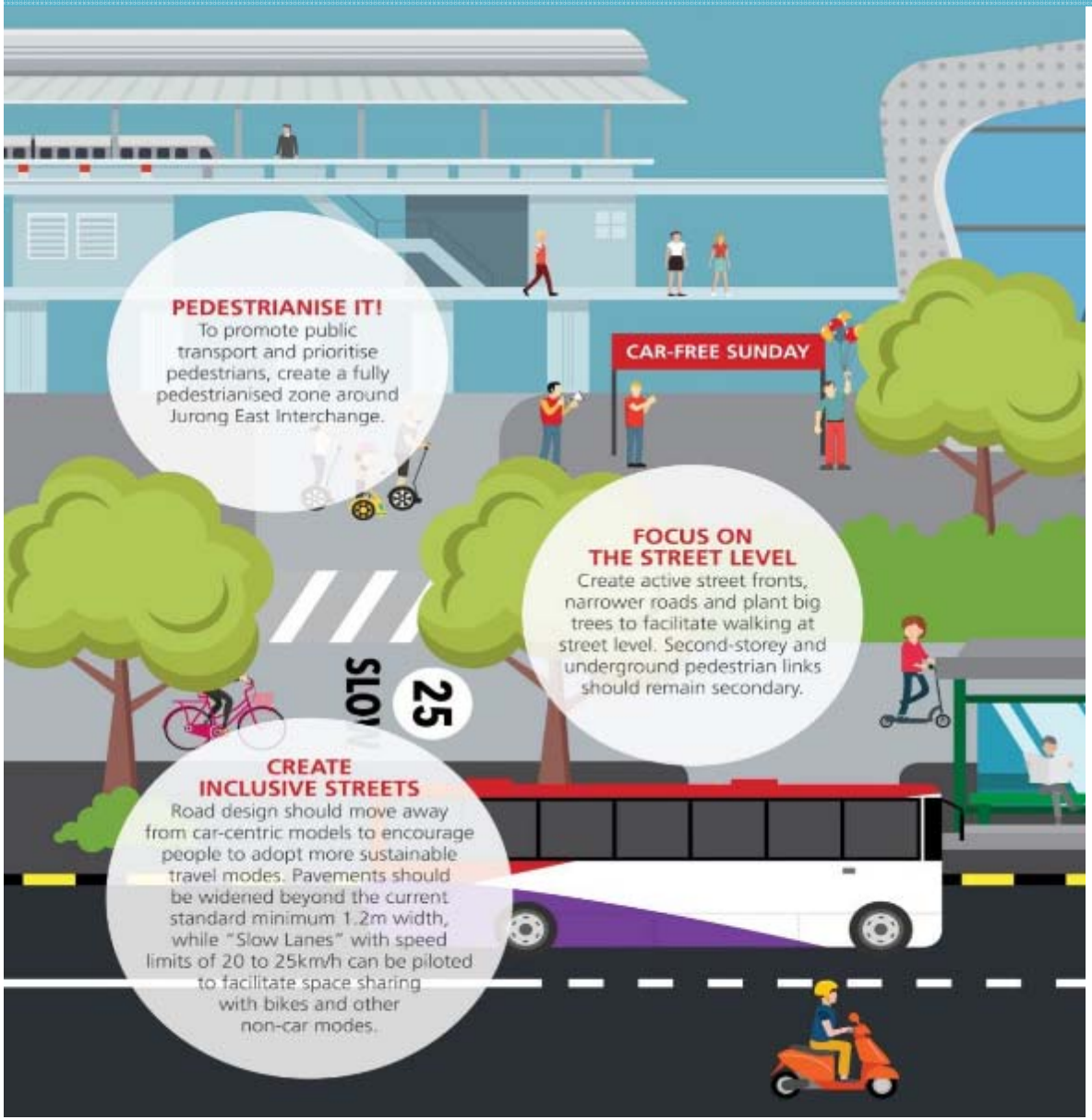
*"Early this year, I outlined our **car-lite vision**, built on **three pillars**. **First, reliable public transport** with our train system as the backbone. **Second**, hassle-free, comfortable and convenient **first-and-last-mile connectivity** to the nearest train station or bus interchange. And **third**, a strong point-to-point, **shared transport system** made up of taxis, private hire cars and car-sharing."*

Mr. Khaw Boon Wan,
Coordinating Minister for Infrastructure and Minister for Transport,
at the Walk Cycle Ride Singapore Symposium, 20 Jul 2016

Why go Car-Lite?

- Environment: Car-centric cities are not environmentally sustainable
- Public Health: Car-centric cities promote a sedentary lifestyle
- Social: Car-lite cities are also human-oriented, offering new opportunities

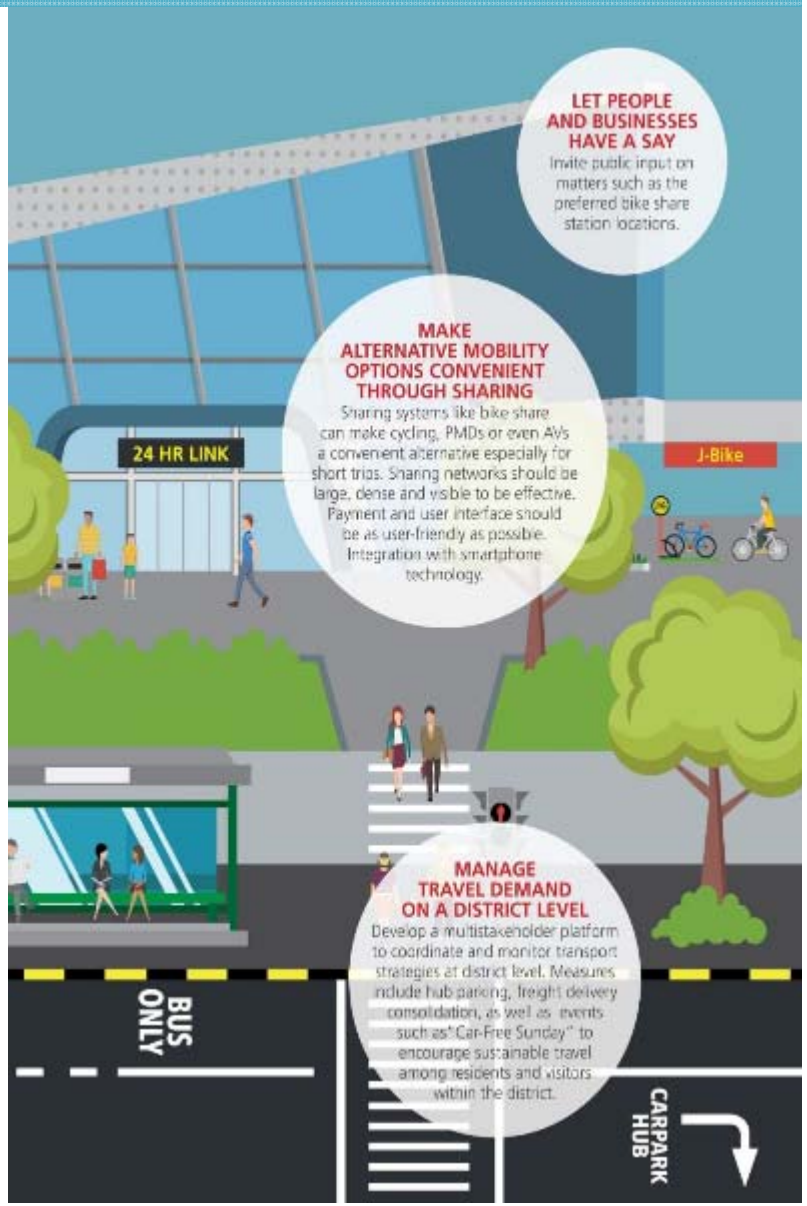
Human-oriented Developments



- Active street fronts
- More greenery and shade
- Shared mobility (e.g. shared bikes, shared PMDs, driverless pod cars) key first/mile mobility modes in largely pedestrianized areas
- Ensure good connectivity and prioritize <u>people's</u> movement at street-level

Travel Demand Management: New Opportunities

- Car-lite compatible parking provision e.g. hub parking
- Freight: Night-time delivery and retail delivery consolidation scheme
- Car-sharing lots, secure cycle parking and shower and locker facilities within individual developments
- Employers to take lead in promoting sustainable travel behaviors amongst employees and visitors e.g. campaign, incentives such as discounted/free bike-share/car-share membership
- Develop a monitoring regime to track district-wide sustainable travel targets



2016 and beyond: Singapore as a car-lite city

Mobility Plans Required for Development Projects

Improving Walkability

Expand radius of sheltered walkways from 200m to 400m from transport nodes

Car-free Zones

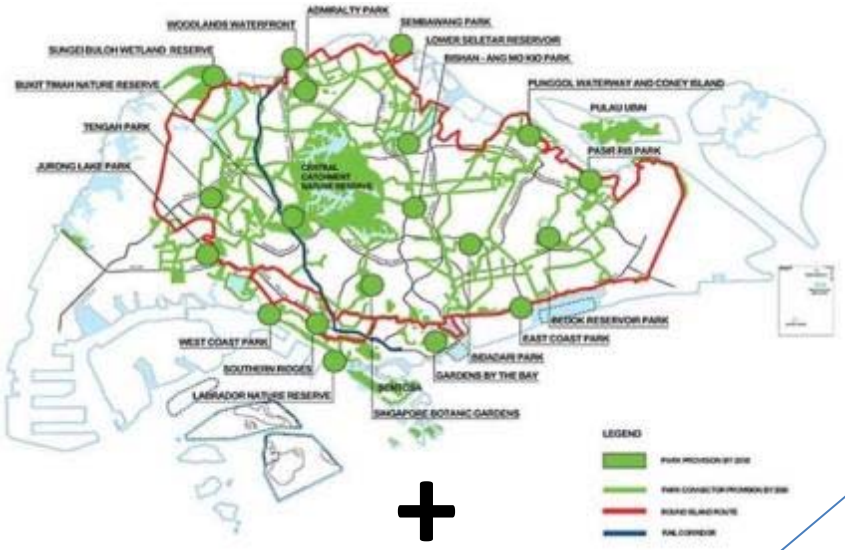
13 zones declared car-free at stipulated timings

Encouraging Cycling

Foldable bicycles (1.1m x 0.6m) allowed on MRTs

Cycling: Improving the Infrastructure

Park Connector Plan – 360 km by 2020



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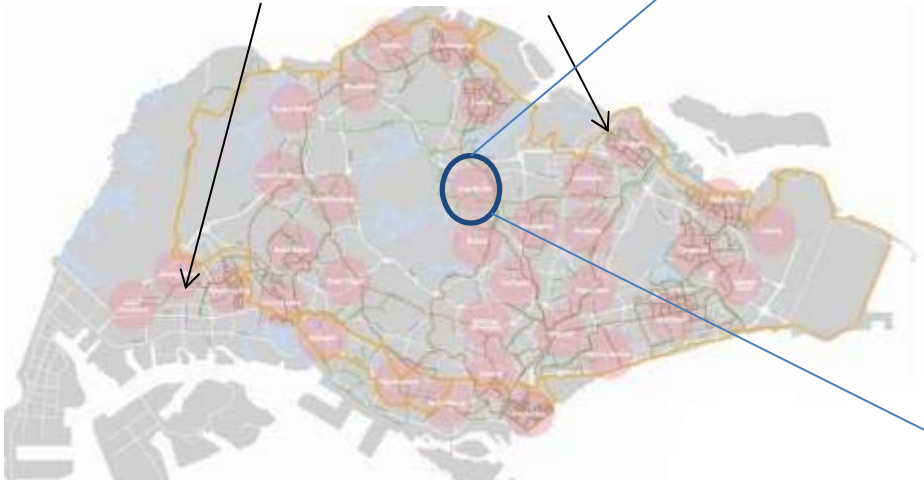
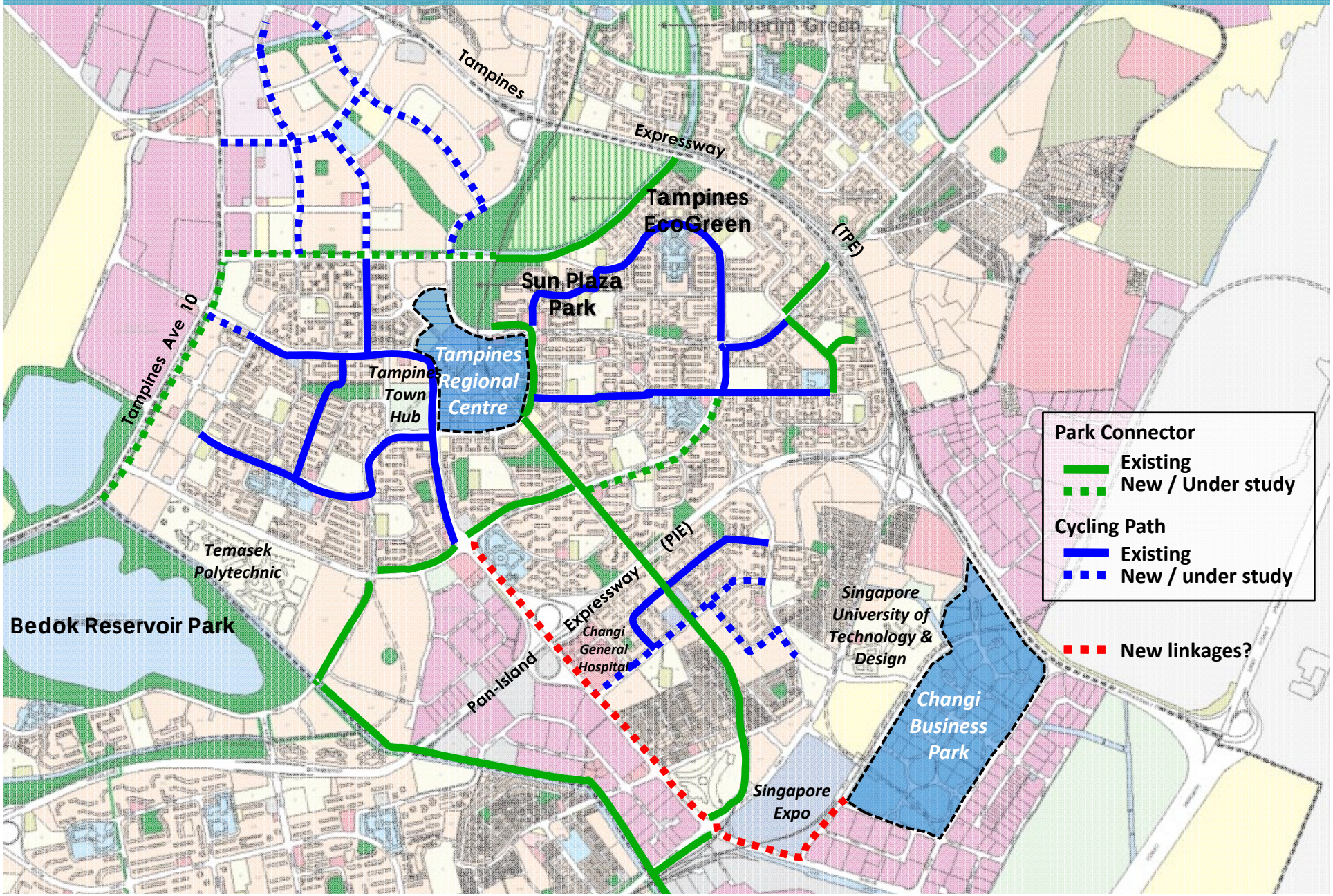
National Cycling Plan – >700km by 2030, Intra town cycling networks



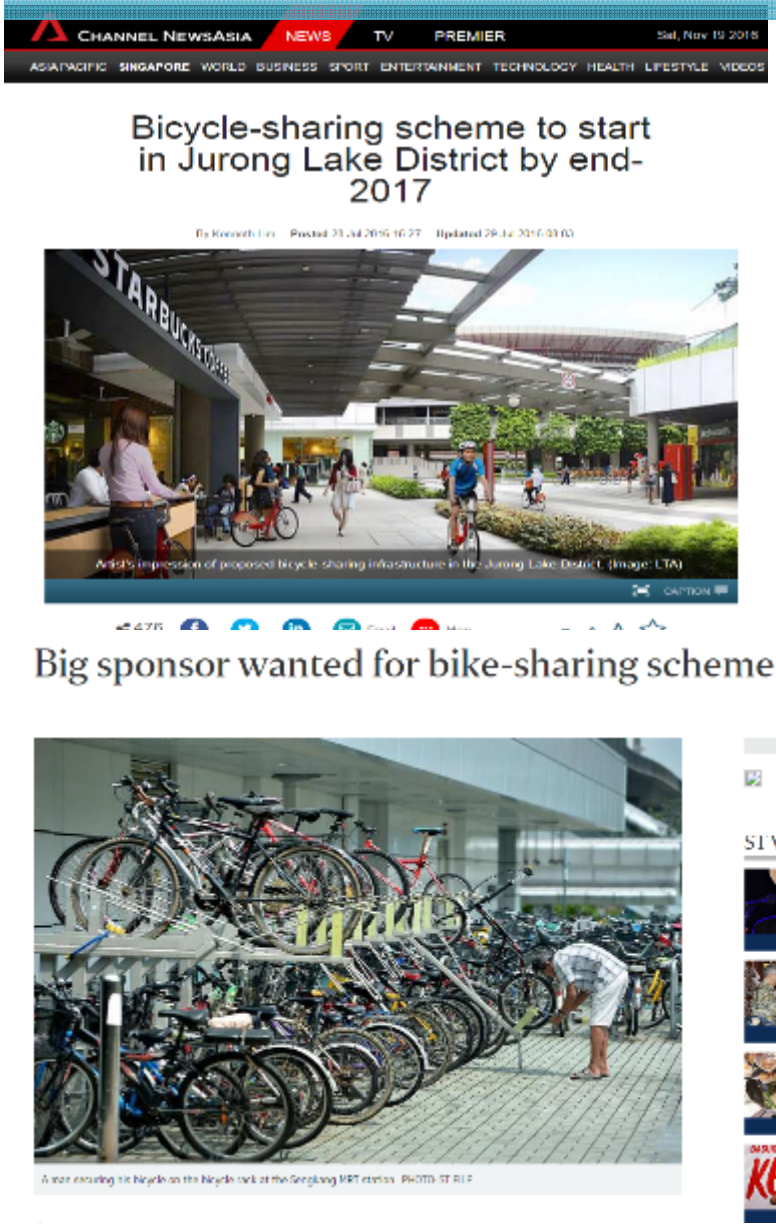
Ang Mo Kio Cycling Town

- Singapore's first walking and cycling town
- Cycling paths connecting key amenities
- Unused space under MRT viaduct transformed into sheltered cycling paths

Tampines Cycling Path & Park Connector Network



Cycling: New Opportunities



Service providers (e.g. PT and bike-share operators) collaborate to provide a suite of mobility services and facilities to complete trip eco-system

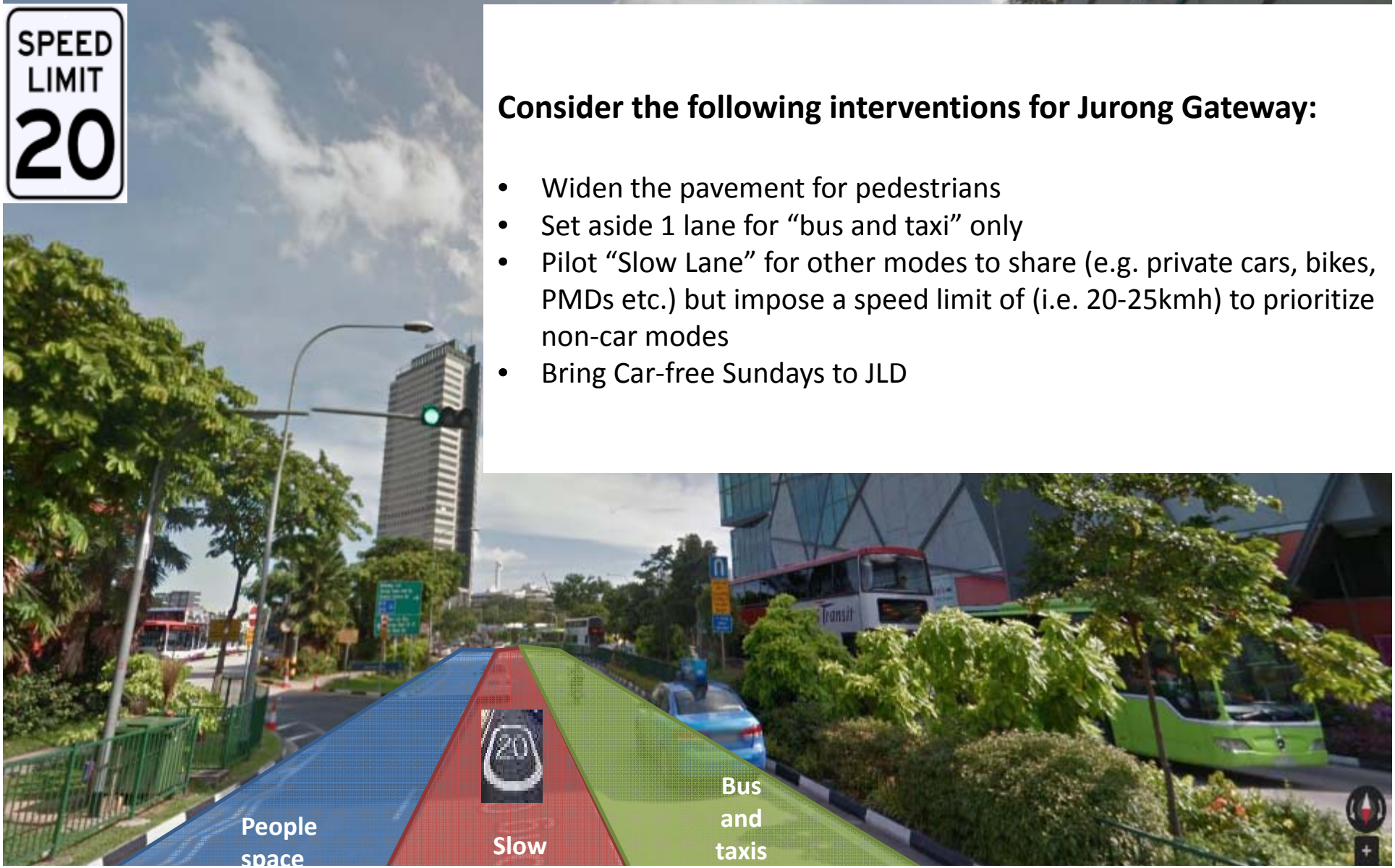
- Integrated bike-share payment system with public transport
- Network: Build in the scope to expand beyond JLD
- Make bike-share stations visible and accessible
- Bike-share and on-street bike lanes go hand in hand – consider low budget on-street bike lane trial @ JLD to boost attractiveness and profitability of bike sharing scheme
- Invite public inputs
- Encourage private entities to take over the bike share market for greater efficiency.

Pedestrianisation: Bringing back Bustling Streets

Eco-mobility World Festival

- The EcoMobility World festival was initiated to show that an EcoMobile lifestyle can be promoted in cities all over the world.
- The Festival transforms a neighbourhood into a pedestrian zone for an entire month to demonstrate the possibilities of an innovative and forward-thinking urban transportation culture
- Past festivals were held in Suwon, S.Korea and Johannesburg, S.Africa

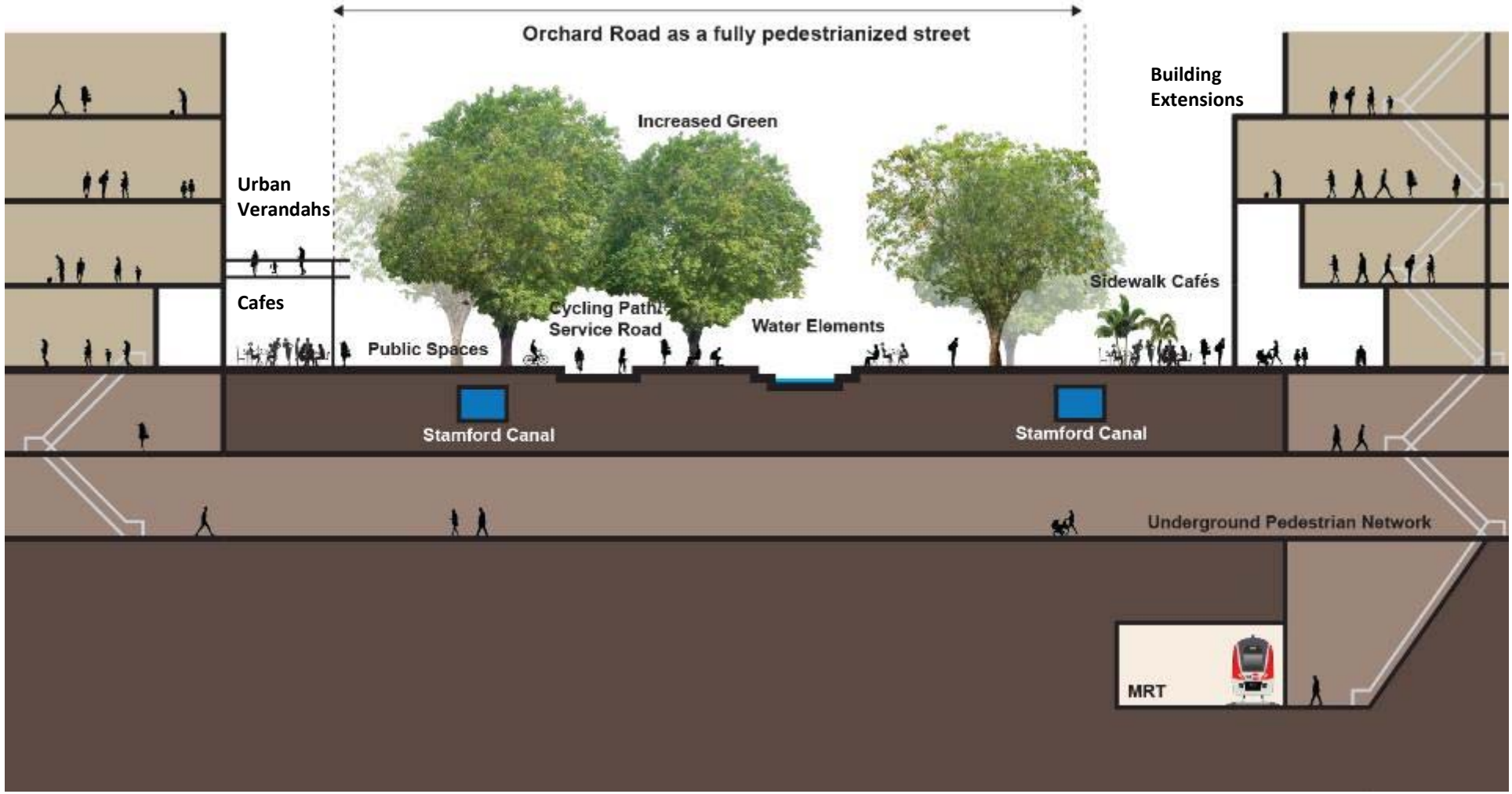
Thought Experiment: Jurong Gateway



Consider the following interventions for Jurong Gateway:

- Widen the pavement for pedestrians
- Set aside 1 lane for “bus and taxi” only
- Pilot “Slow Lane” for other modes to share (e.g. private cars, bikes, PMDs etc.) but impose a speed limit of (i.e. 20-25kmh) to prioritize non-car modes
- Bring Car-free Sundays to JLD

Thought Experiment: Orchard Road



Thought Experiment: Orchard Road

Collaboration between CLC/WOHA/NUS Studio

Thought leaders: Oxford Street, London

Before

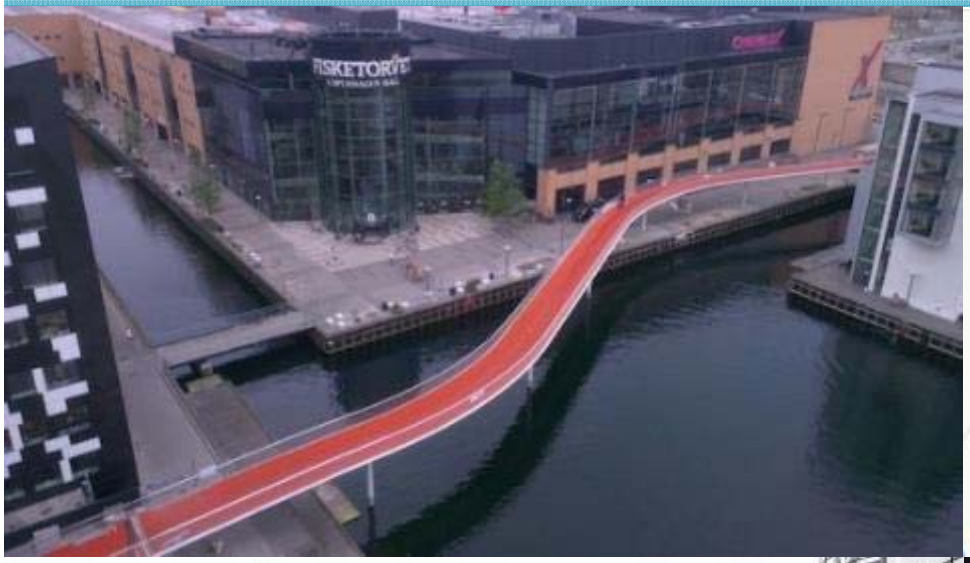
After

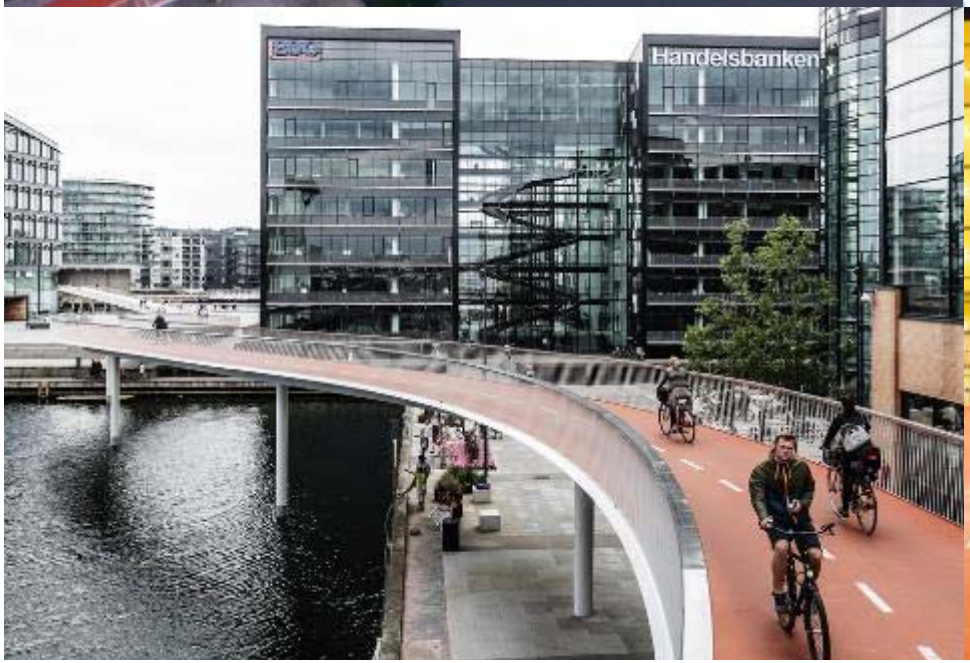
Thought leaders: George Street, Sydney

Before

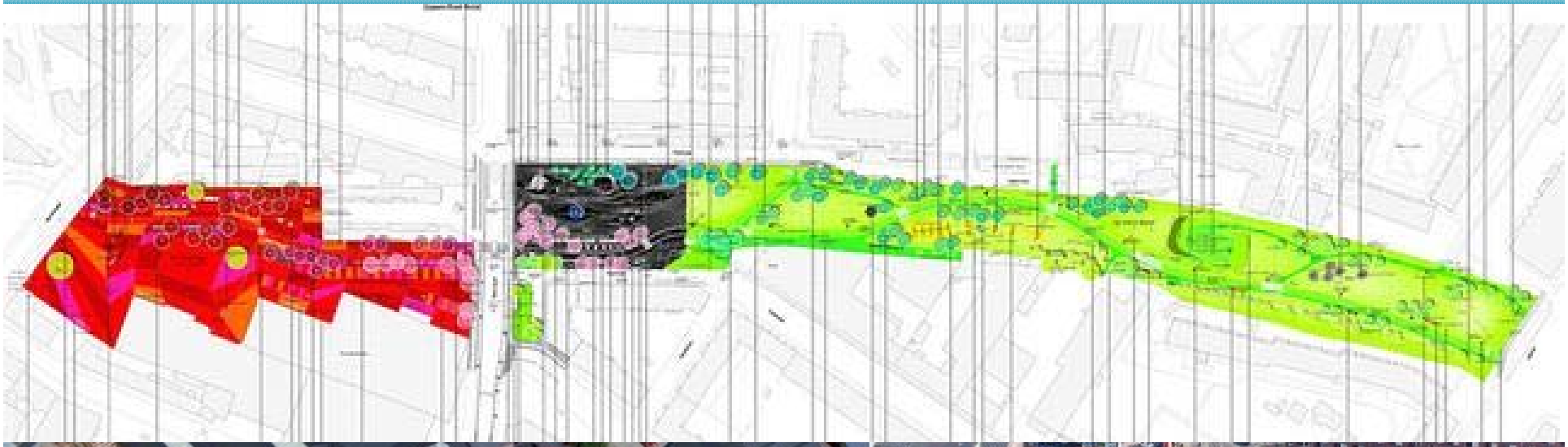
After

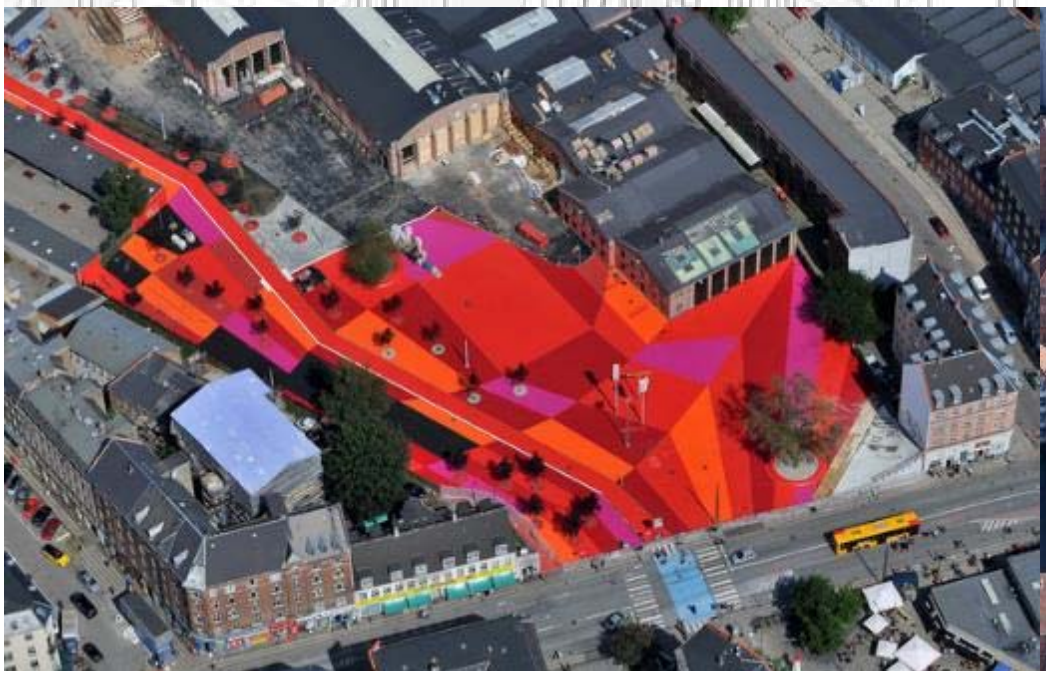
Copenhagen Bicycle bridge





Copenhagen Super Kilen Park

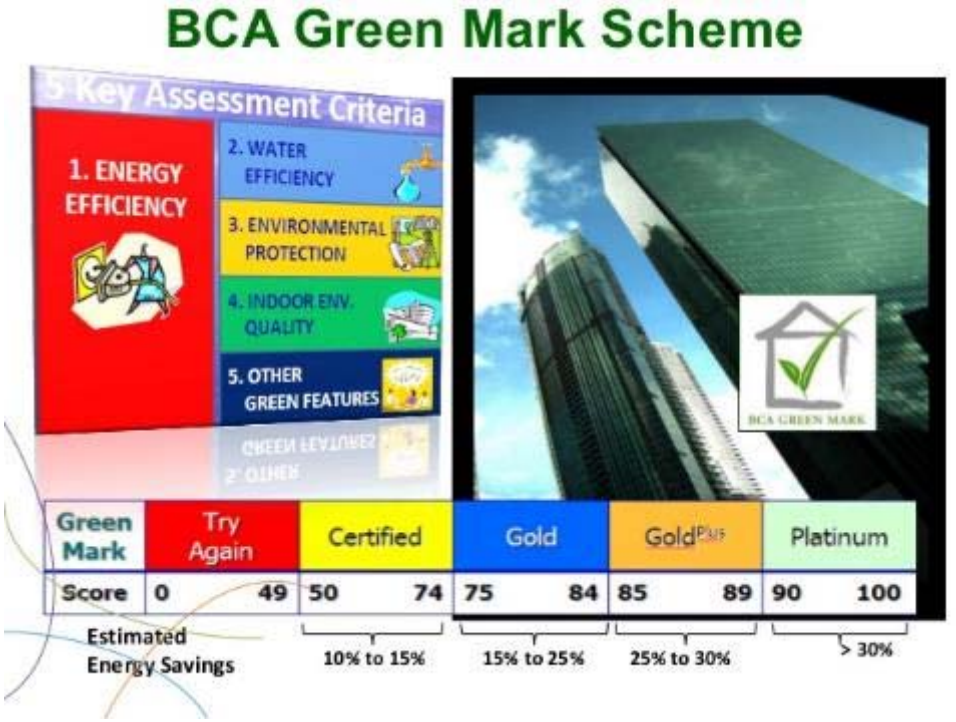




10 ideas for car-lite

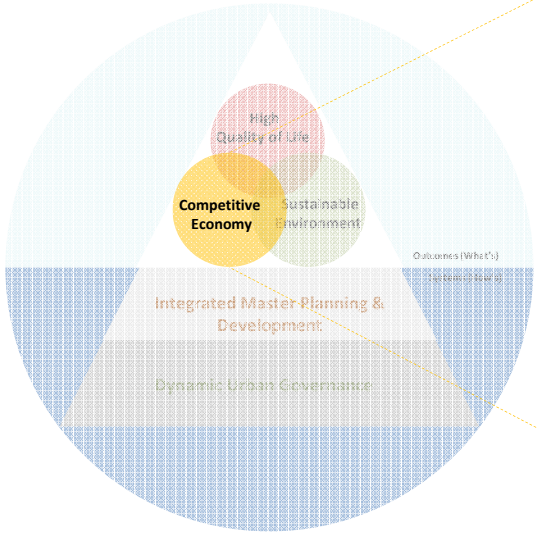
Green Mark Scheme

- There are 1500 Green Mark Building projects in Singapore today.
- 80% of all buildings in Singapore will be 'green' by 2030.
- There are 4 key assessment criteria: Energy efficiency, water efficiency, environmental protection, indoor environment quality and other green features.



Building Resilience

Competitive Economy



1. Resilient Economy

2. Competitive Workforce

3. Inclusive Growth

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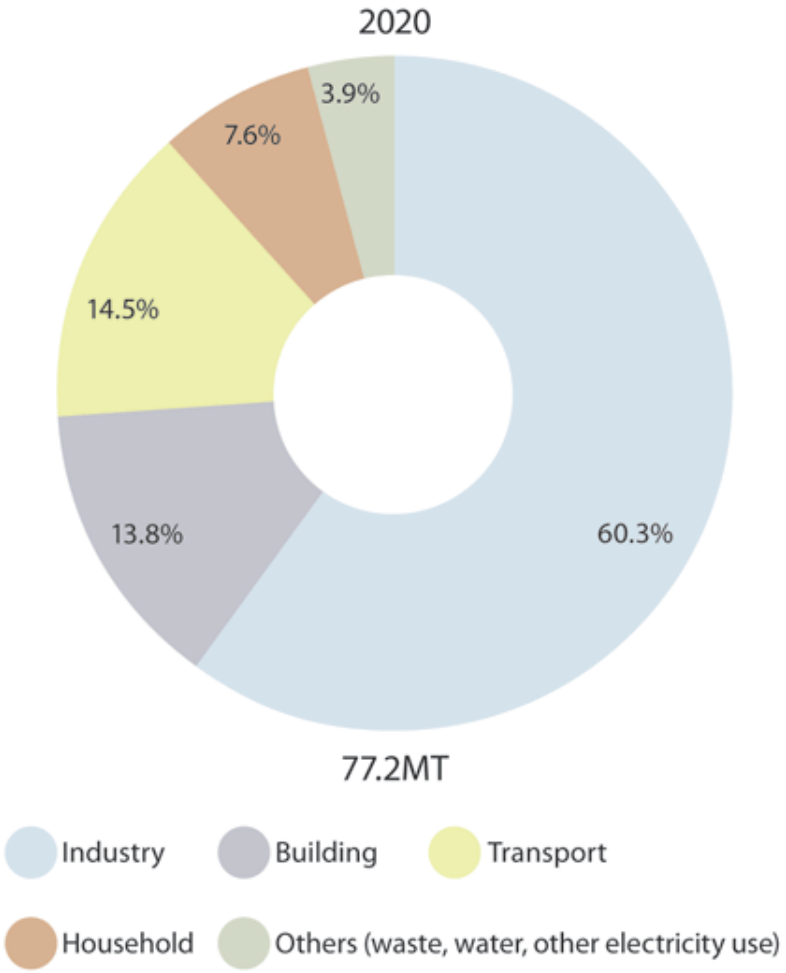
Resilience

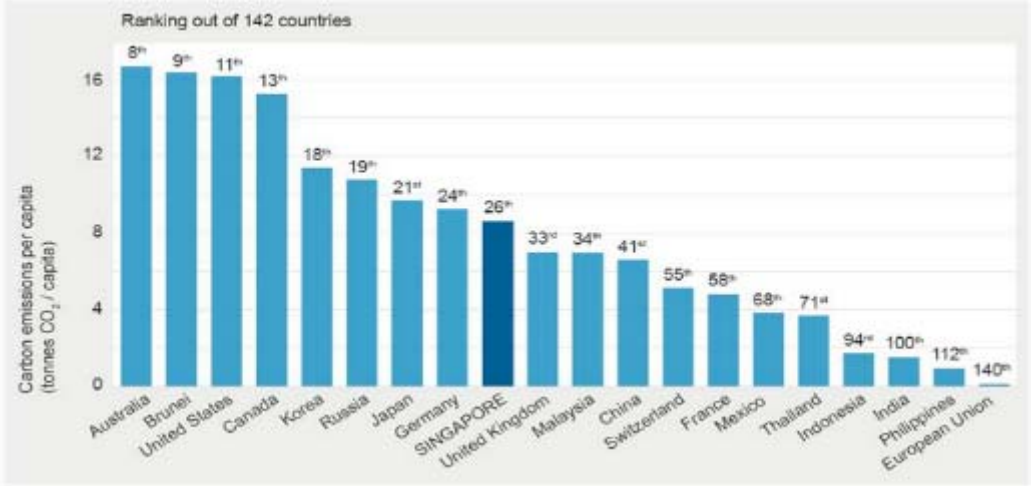
- The Paris Agreement at COP 21 is the first international climate agreement (195 countries and applicable to all)
- Aims to limit temperature rise to 1.5 to 2 degrees Celsius
- Flexible plan that takes into account the needs and capacities of each country
- Balanced adaptation and mitigation

Carbon Footprint Singapore



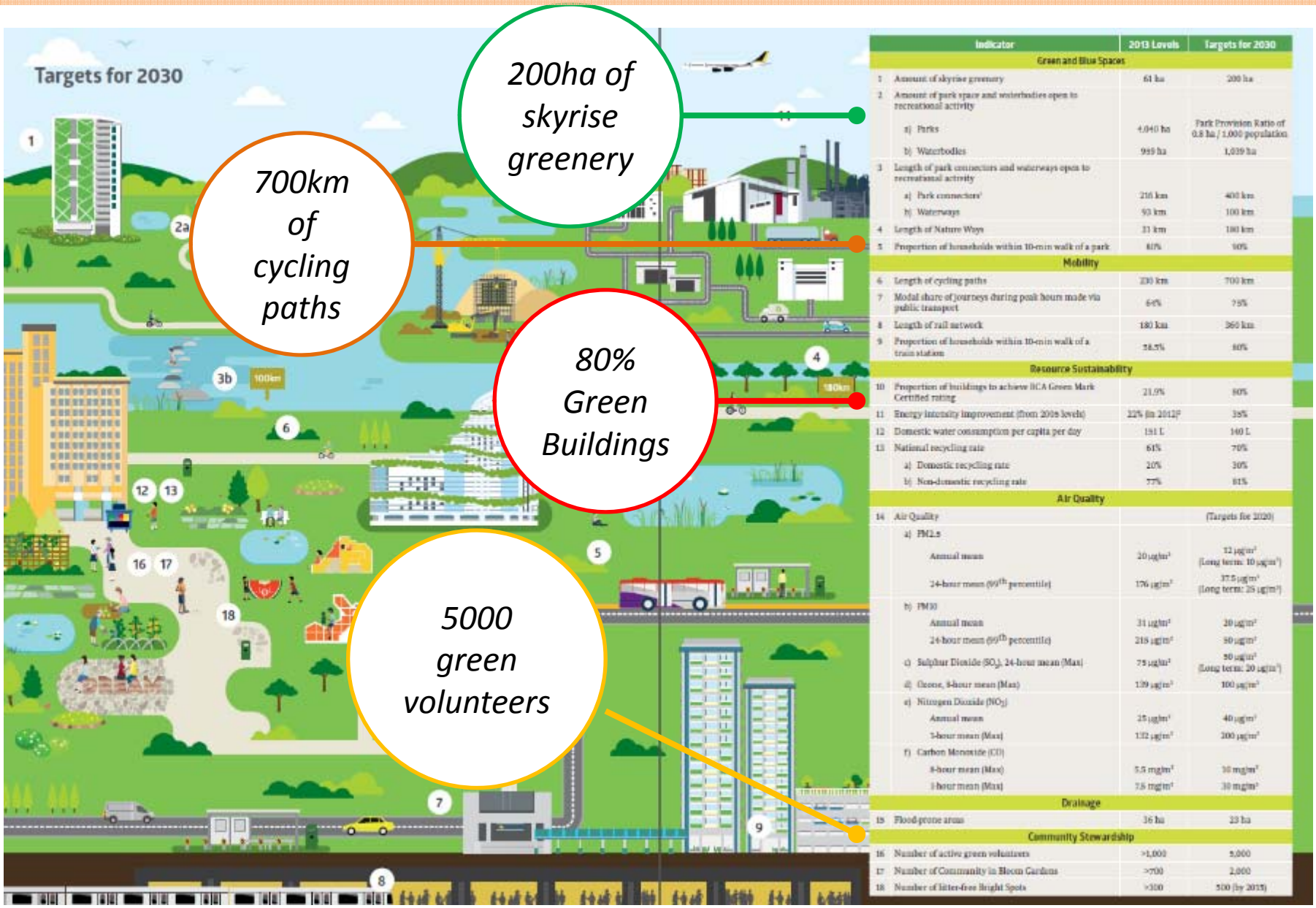
Note: Figure refers to total greenhouse gas emissions. Greenhouse gases other than carbon dioxide (CO_2) are converted to their CO_2-equivalent. The sectoral contributions do not add up to 100% due to rounding of the respective percentages to one decimal place.

- Singapore contributes around 0.11% of global emissions, or approximately 8.8 tonnes per capita, while Hong Kong has a carbon footprint of about 6.3 tonnes per capita.
- Singapore's strategic roll as a oil storage and refining facilities location is a large source of our carbon emissions.
- Singapore has pledged in 2010 to reduce our greenhouse gas emissions by 16% below Business-as-usual levels in 2020. We have also ratified the UN Framework Convention on climate change in 1997 and acceded to the Kyoto Protocol in 2006.
- Singapore has switched from fuel oil to more natural gas.
- Established the Efficiency Programme Office to drive energy efficiency across many different activities.



Sustainable Singapore Blueprint

Targets for 2030



Indicator	2013 Levels	Targets for 2030
Green and Blue Spaces		
1 Amount of skyrise greenery	61 ha	200 ha
2 Amount of park space and waterbodies open to recreational activity		
a) Parks	4,040 ha	Park Provision Ratio of 0.8 ha / 1,000 population
b) Waterbodies	969 ha	1,039 ha
3 Length of park connectors and waterways open to recreational activity		
a) Park connectors[1]	216 km	400 km
b) Waterways	93 km	100 km
4 Length of Nature Ways	33 km	180 km
5 Proportion of households within 10-min walk of a park	80%	90%
Mobility		
6 Length of cycling paths	230 km	700 km
7 Modal share of journeys during peak hours made via public transport	64%	75%
8 Length of rail network	180 km	360 km
9 Proportion of households within 10-min walk of a train station	58.5%	80%
Resource Sustainability		
10 Proportion of buildings to achieve BCA Green Mark Certified rating	21.9%	80%
11 Energy intensity improvement (from 2005 levels)	22% (in 2012)[2]	35%
12 Domestic water consumption per capita per day	151 L	140 L
13 National recycling rate	61%	70%
a) Domestic recycling rate	20%	30%
b) Non-domestic recycling rate	77%	81%
Air Quality		
14 Air Quality		(Targets for 2020)
a) $PM_{2.5}$		
Annual mean	20 $\mu g/m^3$	12 $\mu g/m^3$ (Long term: 10 $\mu g/m^3$)
24-hour mean (99^{th} percentile)	176 $\mu g/m^3$	37.5 $\mu g/m^3$ (Long term: 25 $\mu g/m^3$)
b) PM_{10}		
Annual mean	31 $\mu g/m^3$	20 $\mu g/m^3$
24-hour mean (99^{th} percentile)	218 $\mu g/m^3$	50 $\mu g/m^3$
c) Sulphur Dioxide (SO_2), 24-hour mean (Max)	75 $\mu g/m^3$	50 $\mu g/m^3$ (Long term: 20 $\mu g/m^3$)
d) Ozone, 8-hour mean (Max)	139 $\mu g/m^3$	100 $\mu g/m^3$
e) Nitrogen Dioxide (NO_2)		
Annual mean	25 $\mu g/m^3$	40 $\mu g/m^3$
1-hour mean (Max)	132 $\mu g/m^3$	200 $\mu g/m^3$
f) Carbon Monoxide (CO)		
8-hour mean (Max)	5.5 mg/m^3	10 mg/m^3
1-hour mean (Max)	7.5 mg/m^3	10 mg/m^3
Drainage		
15 Flood-prone areas	36 ha	23 ha
Community Stewardship		
16 Number of active green volunteers	>1,000	5,000
17 Number of Community in Bloom Gardens	>700	2,000
18 Number of litter-free Bright Spots	>100	500 (by 2015)

Resilience

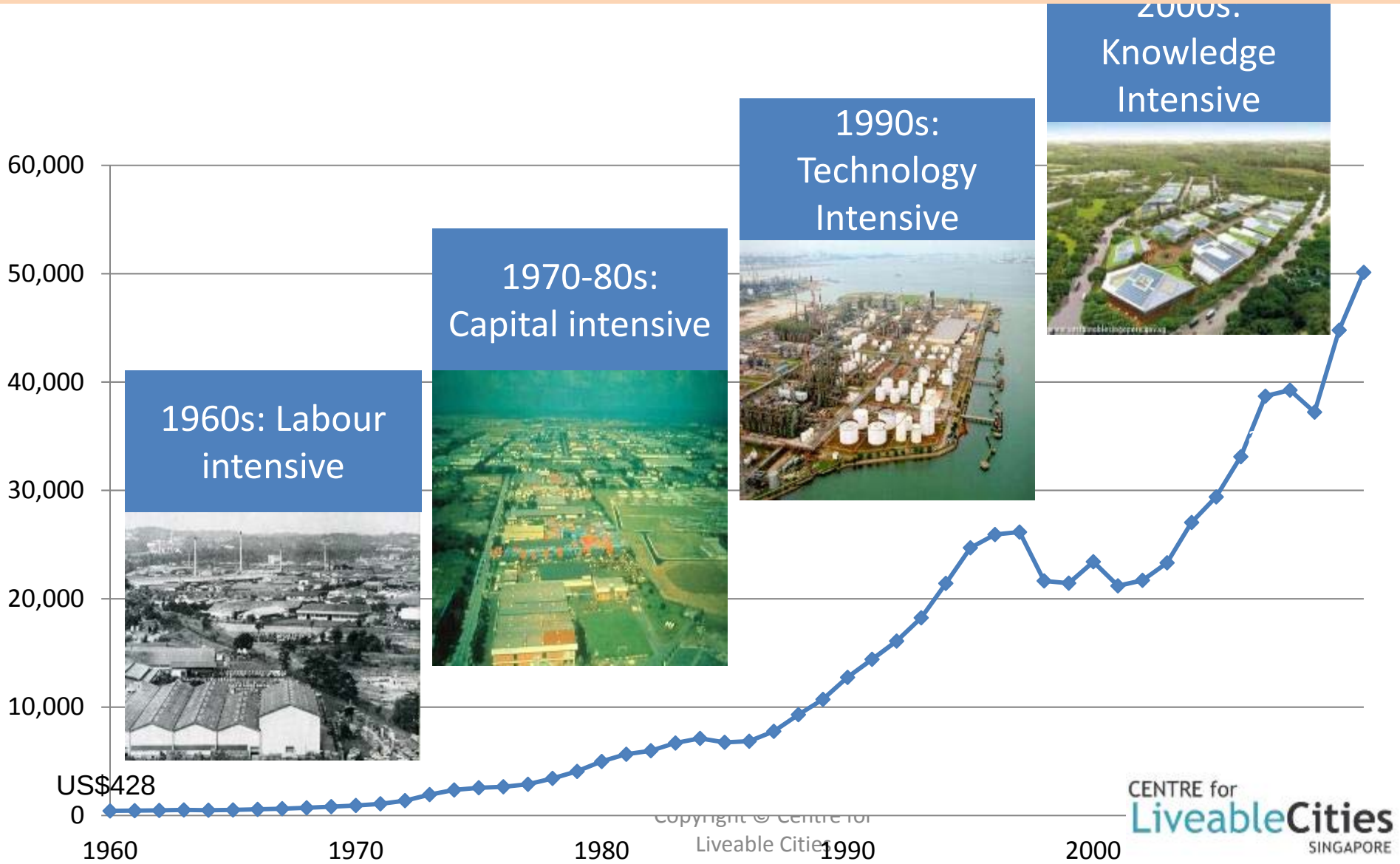
- **Survive** – We needed to build resilience right from the beginning as we are an island with no resources, with land constraints and the only resource we have is our people.
- **Secure** - Again, given our limited resources, we have to keep our country and economy open but in turn we are susceptible global economic uncertainties and terrorism

Safe - The importance of safety in our small island – from safe streets to food safety
Space - As a highly dense city, how do we plan for sustainable physical and social spaces that would weather crises?

Survive - Creating Jobs for Everyone

Survive: Building a Nation

Survive: Ensuring A Competitive Economy



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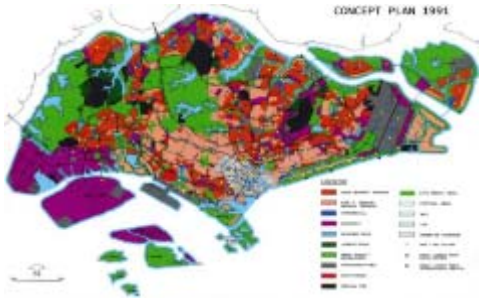
CENTRE for LiveableCities SINGAPORE

Singapore's Urban Planning System

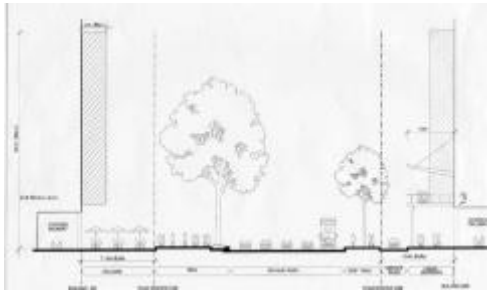
CENTRE for LiveableCities SINGAPORE

CONCEPT PLAN
Maps out strategic vision over the next 40-50 years
Reviewed every 10 years



MASTER PLAN
Guides development over the next 10-15 years
Reviewed every 5 years

URBAN DESIGN GUIDE PLANS



LAND SALES & DEVELOPMENT COORDINATION

DEVELOPMENT CONTROL

Secure: Fostering Cohesion

- **Home Ownership**
  - 82% of our resident population lives in public housing

- **Integrated towns, Shared Spaces**
  - Mixture of housing types in a neighbourhood
  - Shared spaces e.g. Void Decks
  - Ethnic Integration Policy

Secure: Building Communities

- **Community Spaces**
  - Upcoming first-ever integrated community and lifestyle hub
  - Offers a range of services and facilities e.g. Medical Clinic, Community Library
- **Community building programmes**
  - Community in Bloom Programme

Secure: Engaging Community

SGSECURE
STAY ALERT. STAY UNITED. STAY STRONG.

Nation-wide programme

A national programme to sensitise, train and mobilise our citizens in the event of a crisis

Community Engagment Efforts

Engaging citizens through dialogue and discussion sessions

People's Association

IRCC

Grassroots Organisations

Foster community cohesion and build networks of trust across different racial and religious groups

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Secure: Singapore Heritage Festival

- The Singapore HeritageFest is an annual event aiming to raise awareness and appreciation of Singapore's rich heritage through specially-curated exhibitions, heritage trails, competitions, cultural performances, community activities and more.
- One key drive is to nurture a generation of heritage champions to play active roles in promoting Singapore's heritage.

Secure: Singapore Heritage Festival

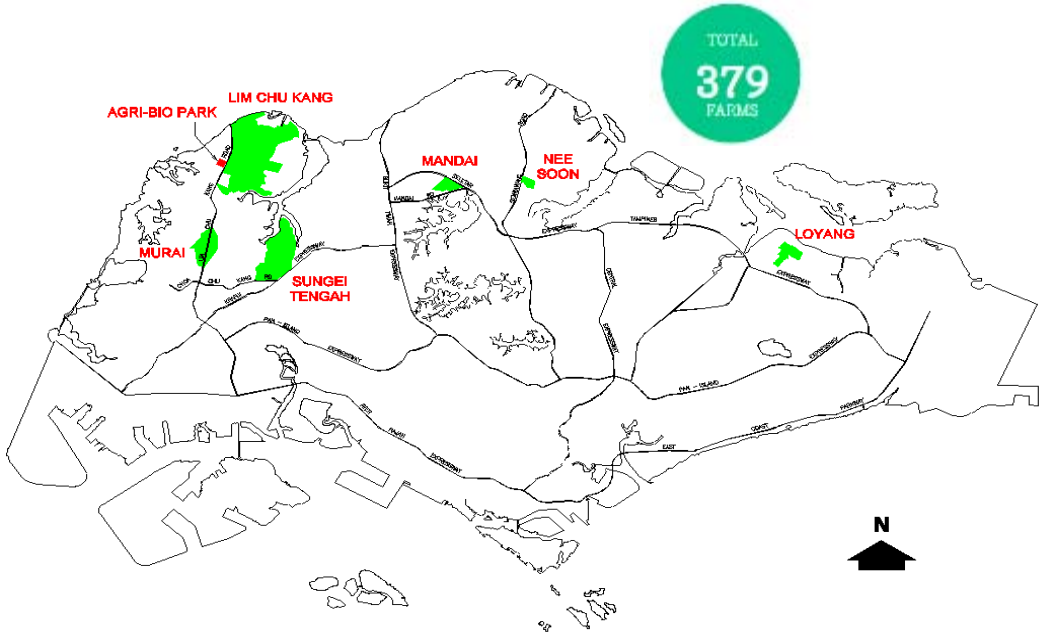
- Heritage trails enable participants to deep dive into Singapore's rich historical and social memory.
- Schools, in particular are roped into document their community's heritage for posterity, allowing students to participate in the recording of their stories within the Singapore story.

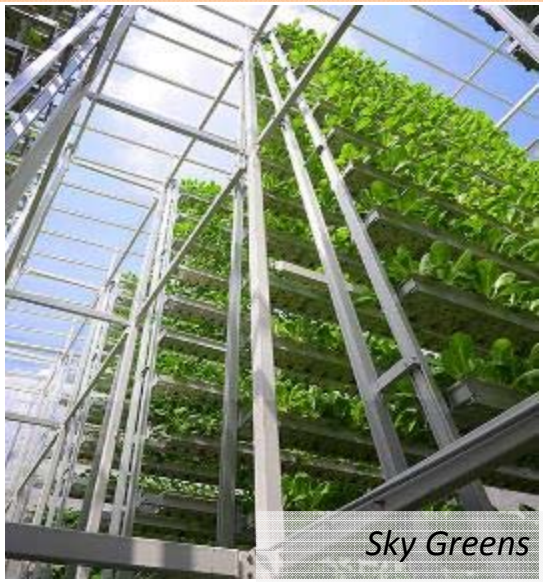
Secure: Singapore Heritage Festival

- Actors roam the Singapore river and portray characters who once lived and worked along the river, such as tradesmen, coolies, samsui women, a snake charmer and a letter writer.
- Actors also portray living culture such as weddings for an intercultural experience.

Safe: Maintaining Self-Sufficiency

Ensuring a resilient supply of safe food




Sky Greens

Apollo Aquarium

Future Goals

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Safe: Building for Resilience

Minimum Platform Levels & Flood Barriers

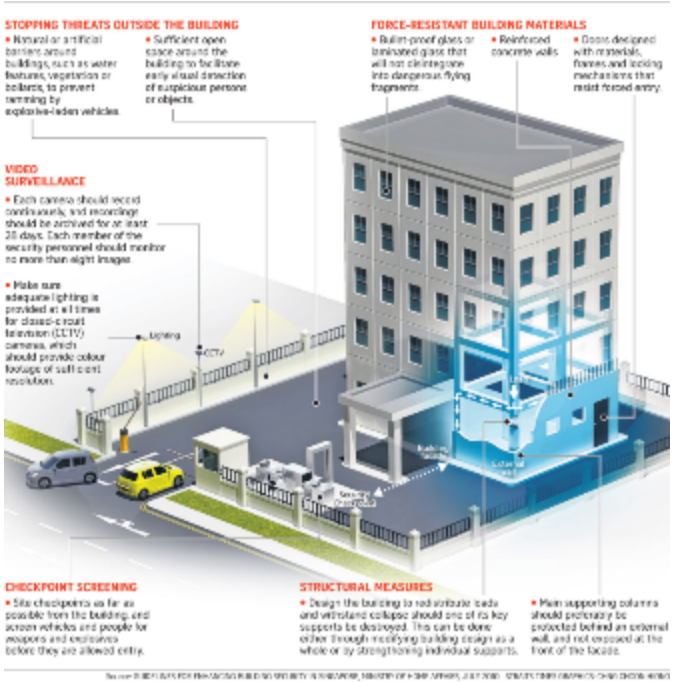
- The minimum platform level for important underground facilities e.g. Transit stations cannot be lower than 1 metre above the adjacent road / ground level or 1 metre above the highest recorded flood level

- Watertight barriers to protect underground stations and tunnels

Guidelines for Enhancing Building Security

- Structural measures designed to within pressure and redistribute loads and use of force-resistant building materials

- Surveillance measures and natural artificial measures



Space: Conserving Heritage

Singapore's Historic Districts : Chinatown, Little India, Kampong Glam

Cultural and Civic District Plan, Museums and Heritage Centers

Space:
Qianhai Harbour, “Water City”, Shenzhen

- Five coastal corridors are created, which lead from inland to the Qianhai Harbour.
- These ‘water fingers’ also serve as storm water treatment infrastructure and create inter-connected waterfront neighbourhoods.

Space:
DakPark, Rotterdam

- 1km long and 85m wide park on top of the roof of a shopping boulevard
- Also a storm water defense structure
- Co-created with residents, who were concerned with usability, leading to an innovative use of ‘stacking’ different functions such as shopping, parking, a playground, a resident’s garden and a greenhouse.

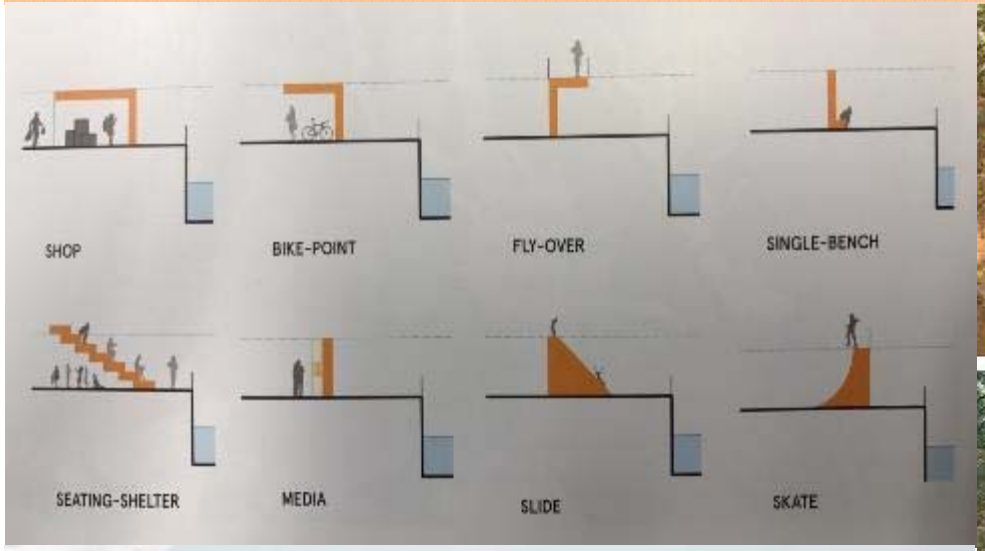
Space:
Olympic Sculpture Park, Seattle

- The design of the Olympic Sculpture Park allows 3 separate sites to be connected through a ‘Z-shaped’ green platform, making the waterfront accessible.
- Landforms and plantings direct, collect, and cleanse storm water before it is discharged into Elliot bay.

Space:
The Big U, New York City

- 10-mile protective system that encircles Manhattan, protecting the city from floods and storm water, and to provide public realms for the city's diver communities.
- Three regions, termed compartments, are created as a separate flood-protection zone, isolated from flooding in other zones.
- The compartments are designed to reflect the diversity of the local community.

Space:
The Big U, New York City



Reimagining Liveability

1. Singapore's Liveability Framework

2. Go Car-lite

3. City with Nature

4. Building in Resilience

Our Shared Responsibility

- We inherited many of the problems of the 20th century, but we can and must do better for the 21st century.
- We are all part of an ecosystem that is striving towards the vision of a sustainable and liveable world.
- It is a realizable vision, if we continue to pursue passionately in our belief of a better future.

Reimagining Liveability

- Can we build a neighbourhood within a school?
- Can an incineration plant also serve as a ski slope?
- Can rooftops become an open communal space?

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A Resilient Singapore

Current and Future Challenges

Limited land area
720km^2 in 2015 to
766km^2 in 2030

Population Growth
5.5mil in 2015 to
~6.9mil by 2030

Global challenges
Climate change, global economic uncertainties

Changing Demographics
Ageing population & increasing diversity from immigration

Secure: Night Festival Singapore

- Singapore night festival was part of the Renaissance City Plan III by the National Arts Council
- It aims to re-invent Singapore as a vibrant magnet for international talent and the best home to an inclusive and cohesive population.

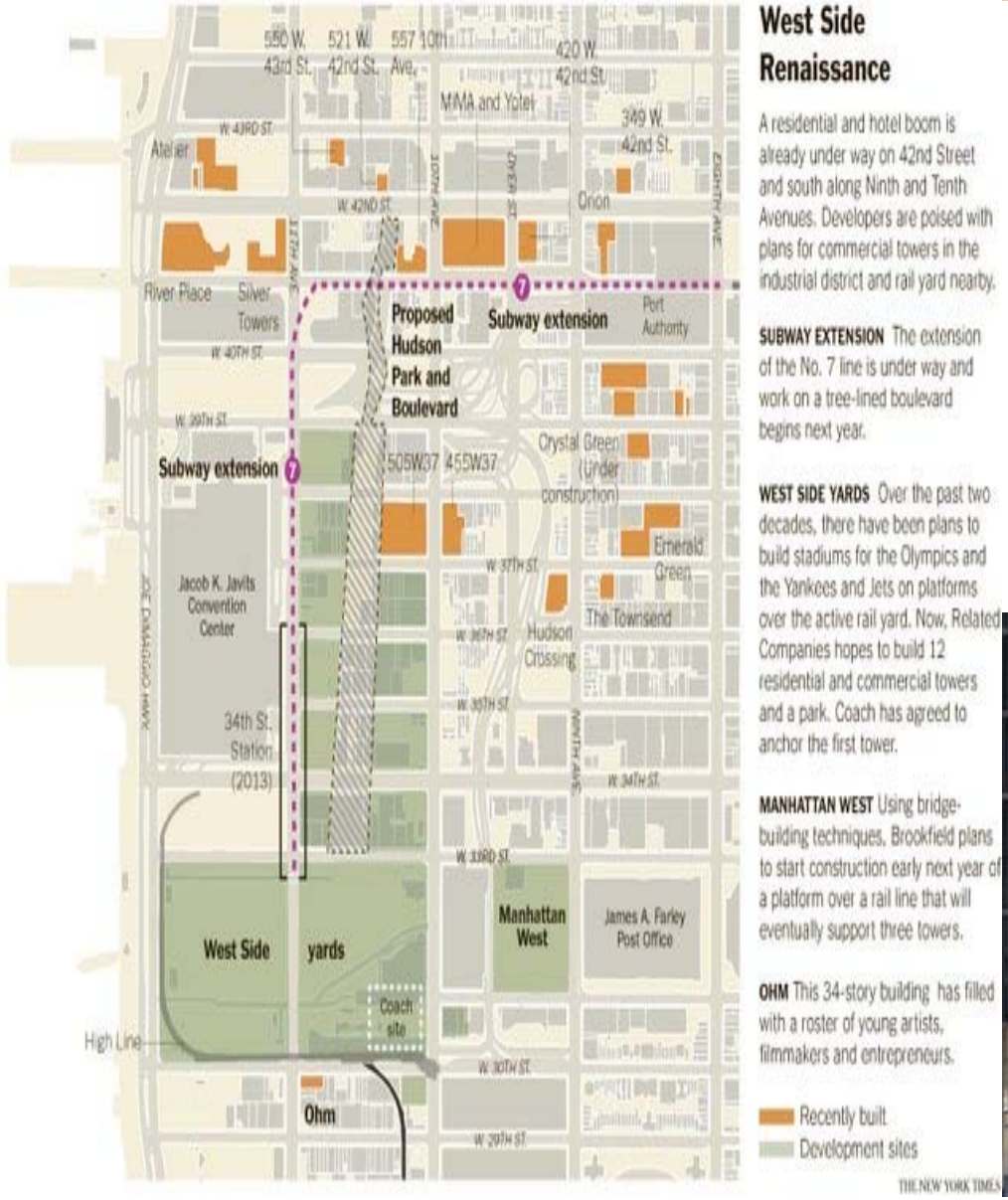
Space: The Offices with Terraces Project

- Combination of flexible working spaces with greenery suited for the project's mediterranean climate.
- Offices open onto outdoor terrace areas, allowing meetings to be held outside.
- Includes a rainwater collection system that irrigates greenery.

Survive: Vision Zero Singapore

"[W]e need to have Vision Zero embedded… as part of the DNA and the organization's culture. We must believe that we should prevent all injuries and be healthy at work. Not just we should, but we can and I think we must." – Minister of Manpower and Minister for Social and Family Development, Tan Chuan-Jin

Hudson Yards

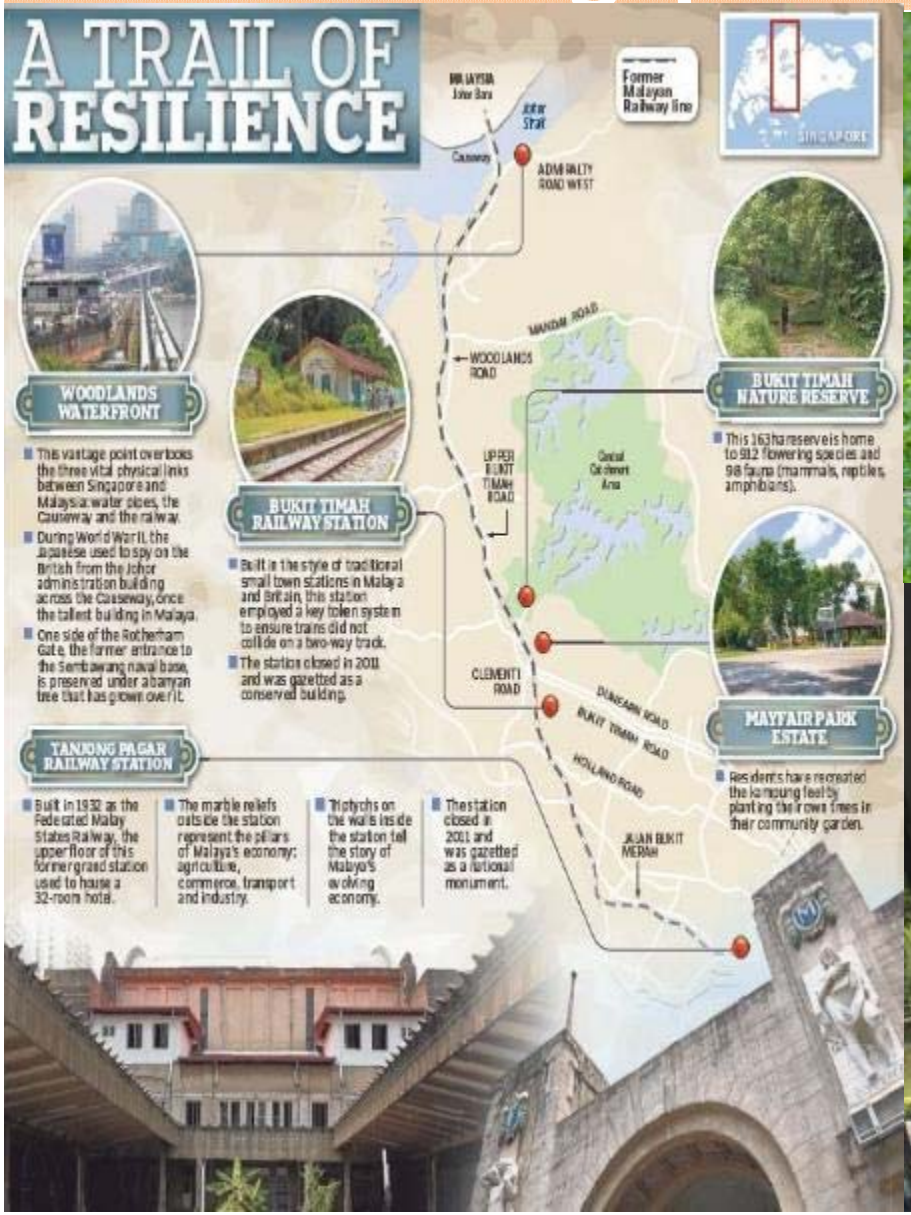


- Hudson Yards is a large development spanning 14 buildings, across 28 acres covering 17 million square feet of residential and commercial space with a community of about 125,000 people under a single developer.
- This gave it opportunity to unify the residential, commercial and retail structures and also link to the Hudson river waterfront, high line district and the future Hudson boulevard park.

Bringing it together: Singapore's Rail Corridor

- Previously part of the Keretapi Tanah Melayu railway, the rail corridor became a site for development when the railway station was relocated to Woodlands in 2011.
- Spanning 25.3km, and covering an area of 170 hectares, the area was co-created with civil society and the general public.
- Through various engagement exercises, URA identified 9 key points for the request for proposal exercise, such as:
  - The rail corridor should retain its identity as a green corridor
  - The seamless connectivity of the rail corridor should be reestablished for pedestrians and cyclists to use and enjoy
  - The corridor should maintain its biodiversity so that it remains as an ecological corridor
  - The rail corridor's sense of place and memory should be captured in its development.

Bringing it together: Singapore's Rail Corridor



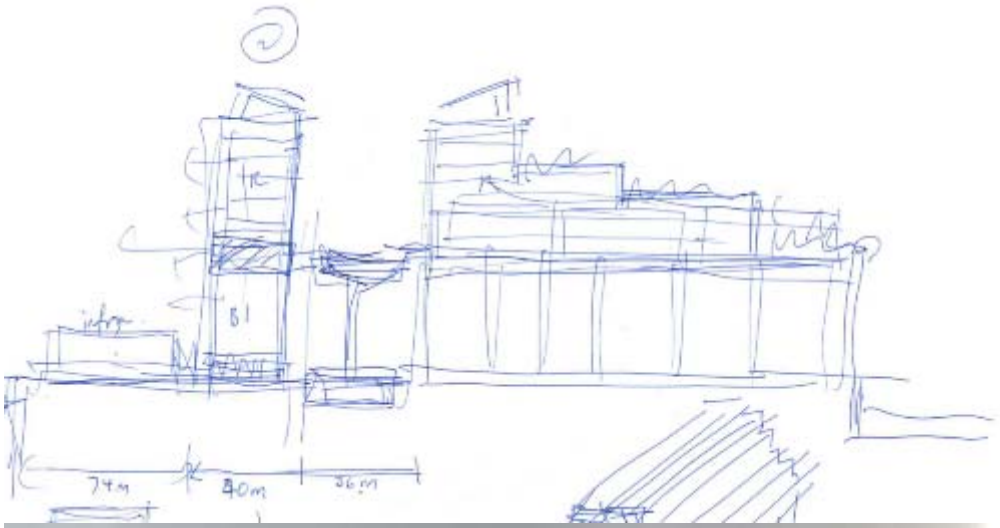
Bringing it together: Singapore's Rail Corridor

Bringing it together:
Reimagining Tampines

Survive:
Arab Street and Haji Lane, Singapore

- Kampong Glam was gazetted as a conservation area by URA in 1989 and Arab Street was one of URA's pilot conservation project.
- Arab street houses Singapore's first generation shophouses of squat two-storey buidlings with one or two windows on the upper floor façade.
- Haji lane, a conservation area, that re-invented itself into Singapore's little bohemia.

Space:
US Pavilion designs for Detroit at the Venice Biennale



- Detroit was chosen as a site for ‘The Architectural Imagination’, where 12 architects present plans for 4 underutilized areas in Detroit.
- One example is the former packard automobile plant, which was reimagined as a new-age factory that manufactures robots and autonomous vehicle technology.