



Green Master Planning

Balancing Land Use and Green Infrastructure

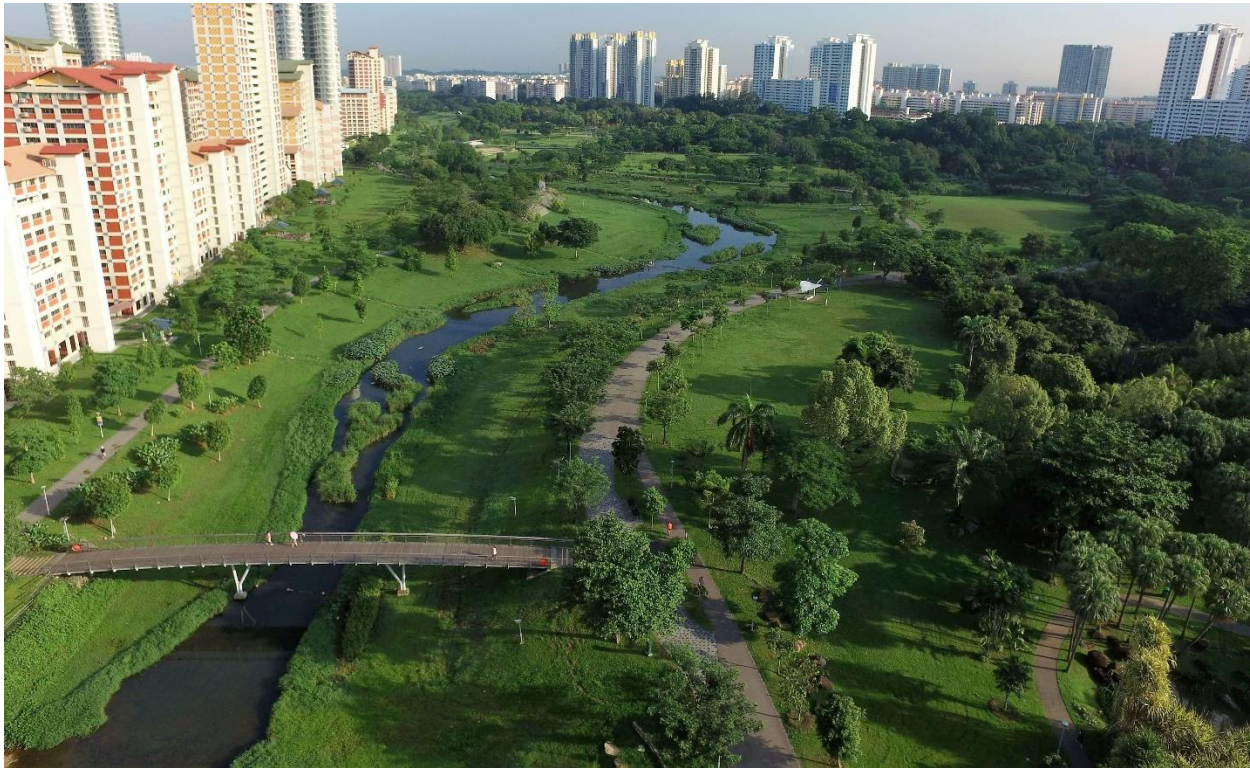


Ms Sherilyn Yum
Director
Policy & Planning Division

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**Lead agency for
greenery management,
biodiversity conservation,
animal health & welfare, and
wildlife management**



6 million trees (*2 million urban trees*)

3,347 ha of nature reserves

>400 parks and gardens

427 km of park connectors

260 km of Nature Ways

...and a multitude of **conservation, animal and wildlife management**, and **community outreach** programmes



- Climate of perpetual summer & high rainfall
- Dominated by tropical rainforest & mangroves
- Home to rich diversity of flora & fauna

Singapore is a small island, city, country with **many different needs** to accommodate



London (2x)



New York City (1.7x)



Hong Kong (1.5x)

LAND NEEDS



SEA NEEDS





Despite rapid urbanisation, Singapore is considered a **green city**

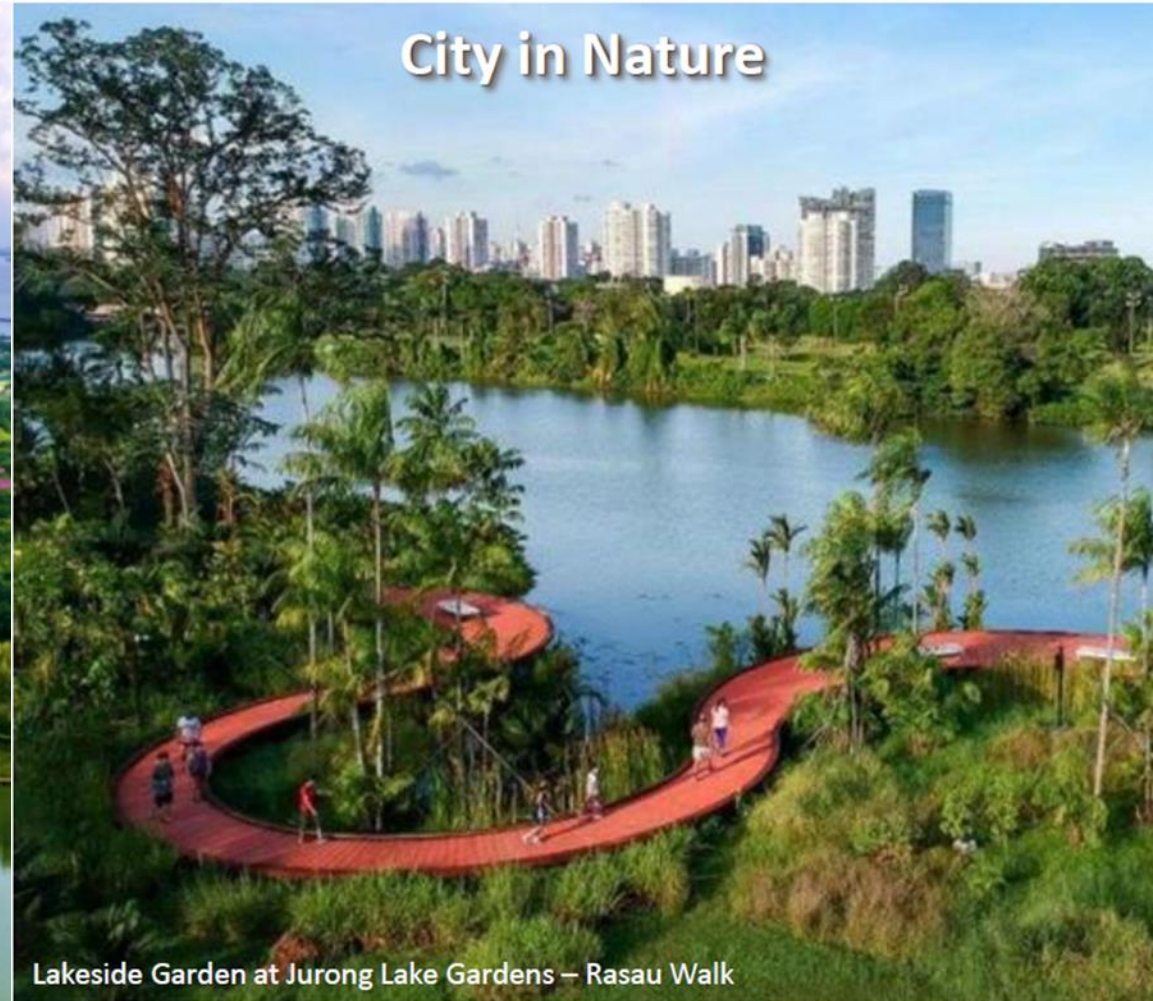
- 2nd highest Green View Index
- 40% of green cover islandwide

No	City	Green View Index (%)	Population Density (/km ²)
1	Tampa	36.1	1,283
2	Singapore	29.3	7,797
3	Breda	29.3	1,459
4	Oslo	28.8	4,421
5	Vancouver	25.9	5,249
6	Sydney	25.9	400
7	Montreal	25.5	3,889
8	Cambridge	25.3	6,586
9	Durban	23.7	2,600
10	Johannesburg	23.6	2,900
11	Sacramento	23.6	1,800
12	Frankfurt	21.5	3,000
13	Geneva	21.4	12,000
14	Amsterdam	20.6	4,908
15	Seattle	20	3,151



How did we get here?

Evolution of Singapore's Green Story





Lakeside Garden - Rasau Walk

City in Nature

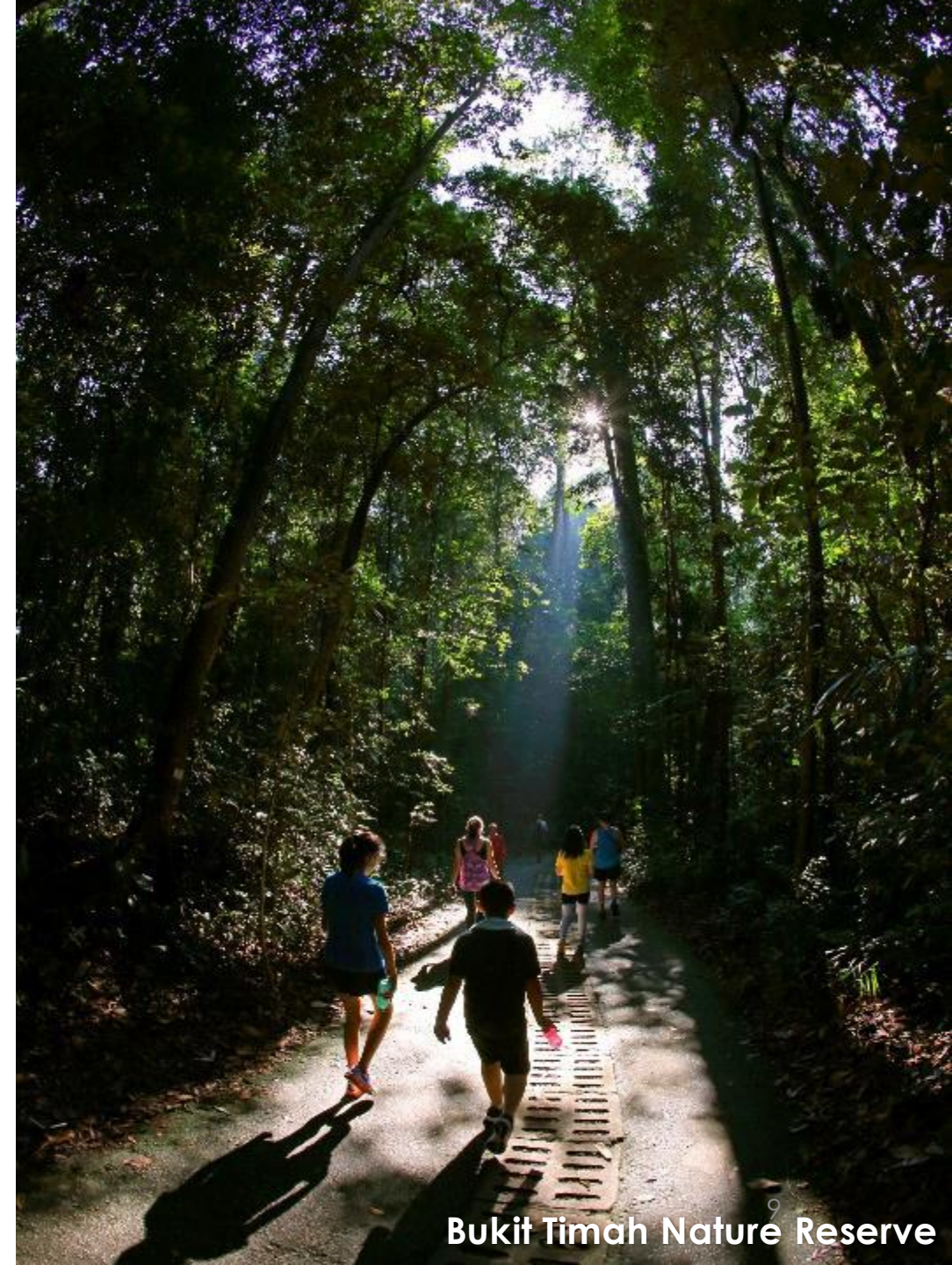
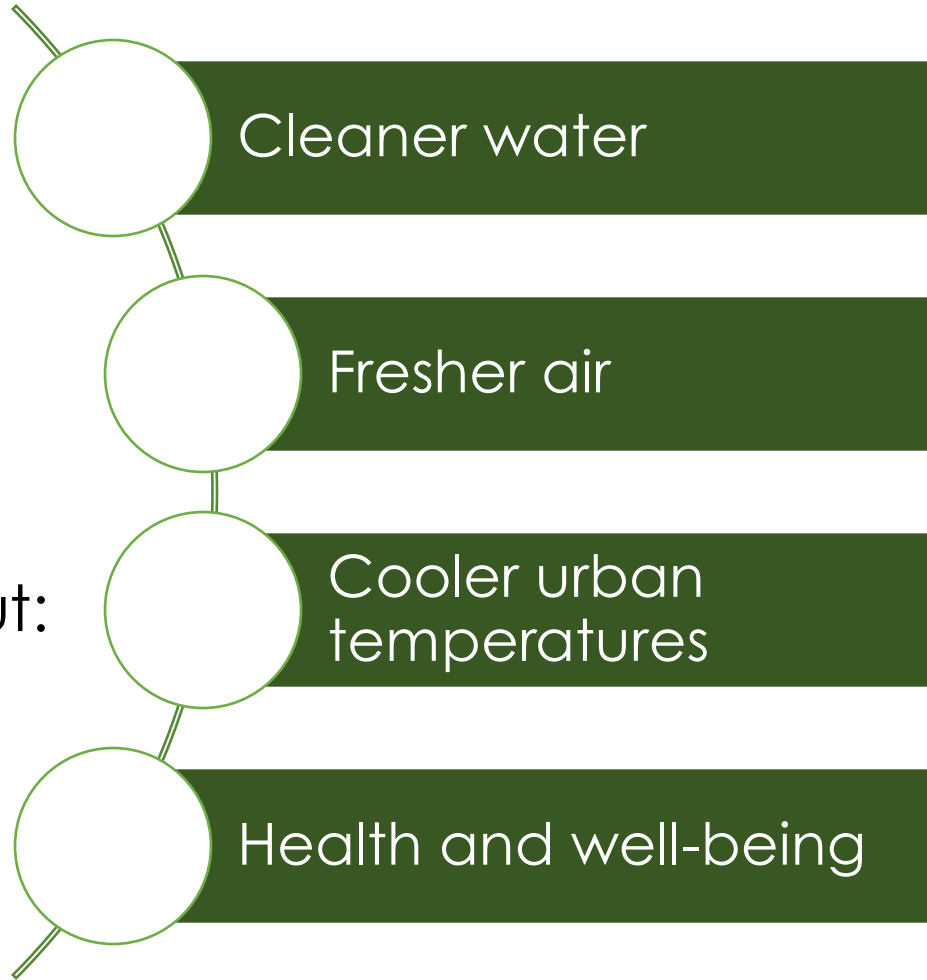
Restoring nature into the city for liveability, sustainability and well-being

Applying nature-based solutions towards achieving:



Ecosystem Services

A healthy natural ecosystem brings about:



Becoming a City in Nature

Key Strategies

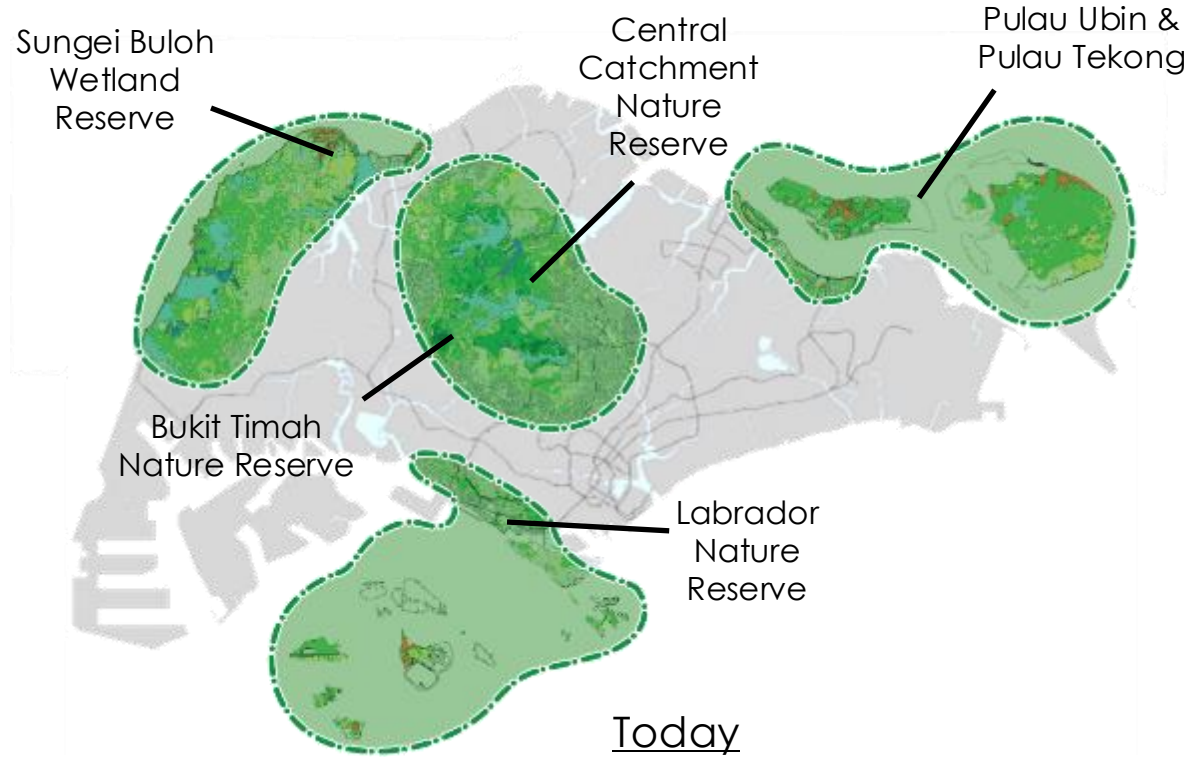
- 1 Conserve and Extend our Natural Capital
- 2 Intensify Nature in our Gardens and Parks
- 3 Restore Nature into the Urban Landscape
- 4 Strengthen Connectivity between our Green Spaces



Strategy ① : Conserving and Extending our Natural Capital

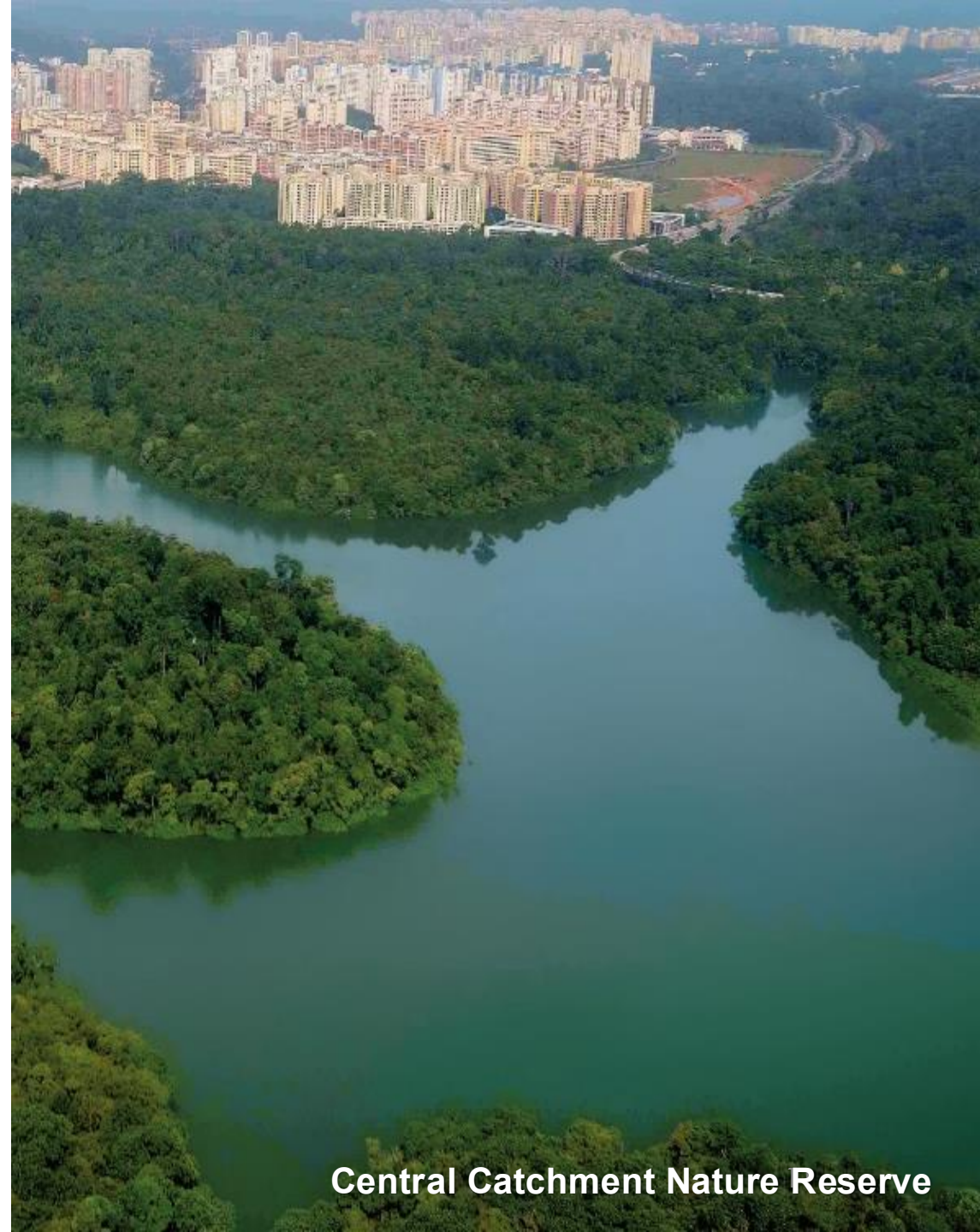
Safeguarding and Strengthening Core Habitats

- Nature Reserves
- Other Nature Areas



Today

- 3,347ha of nature reserves

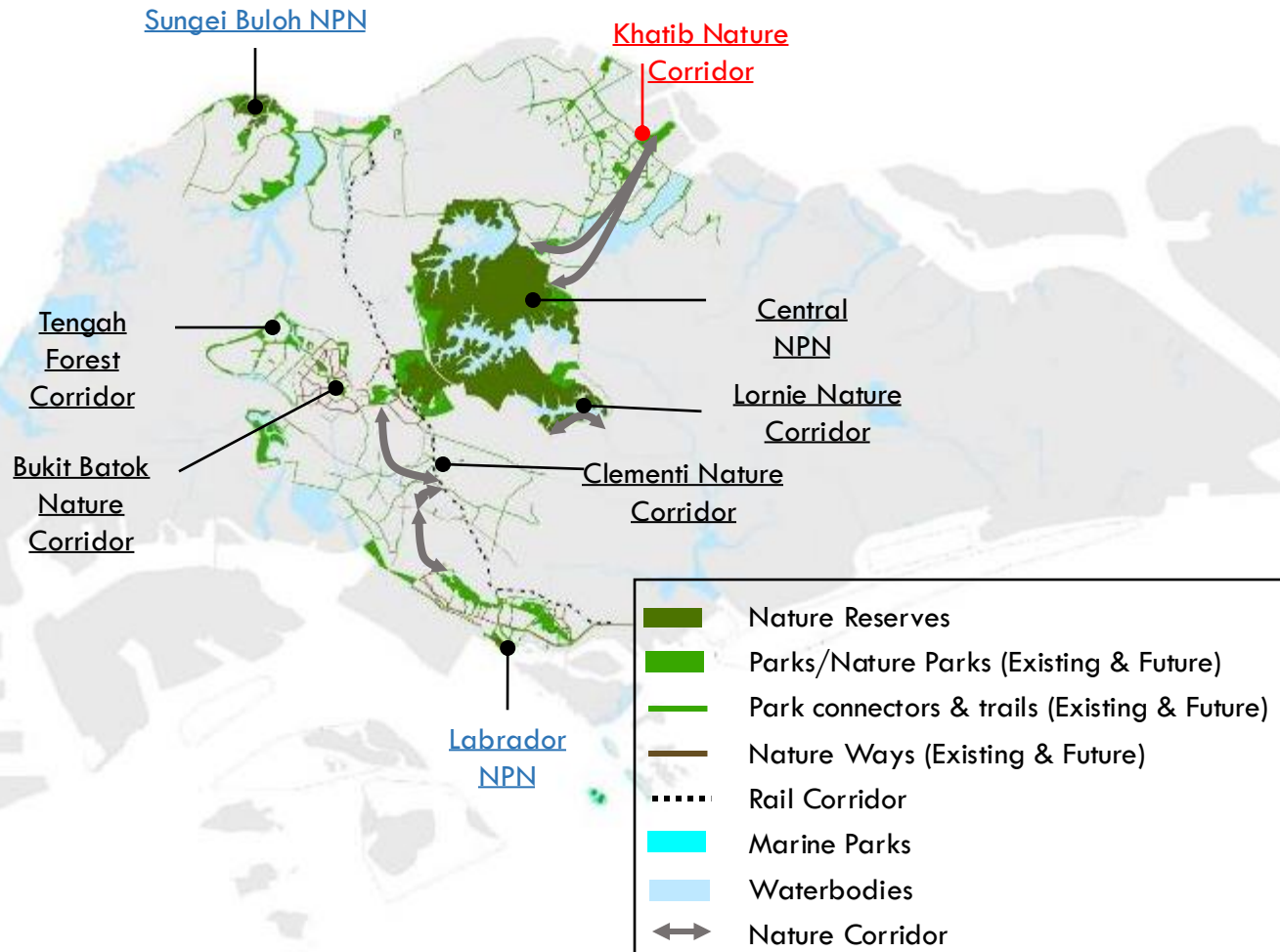


Central Catchment Nature Reserve

1 : Conserving and Extending our Natural Capital

Growing our Nature Park Network

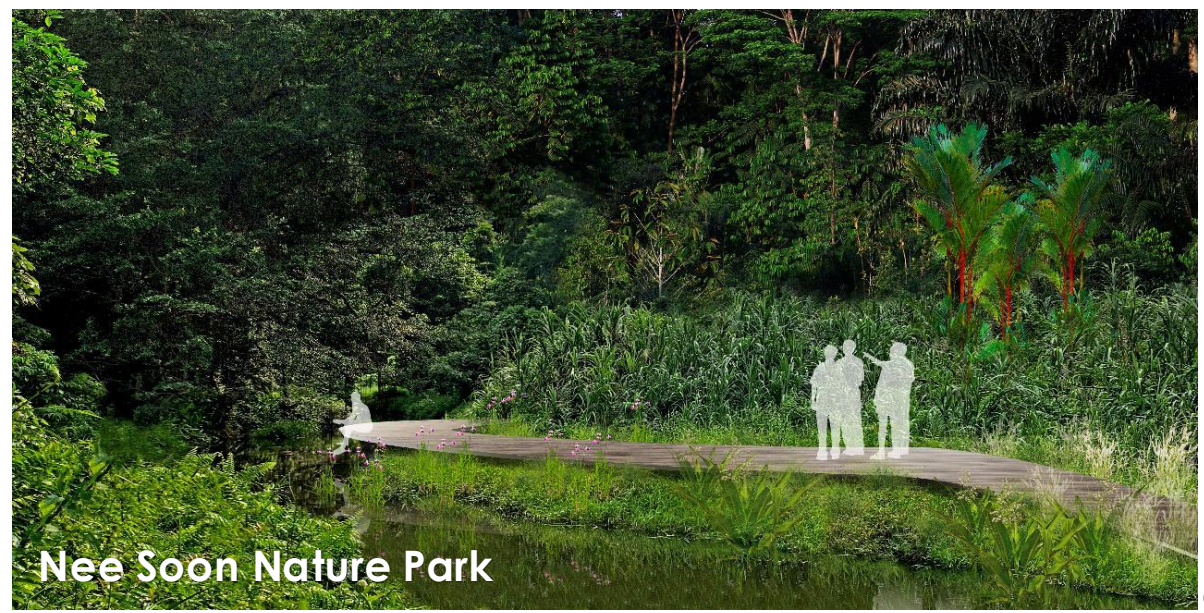
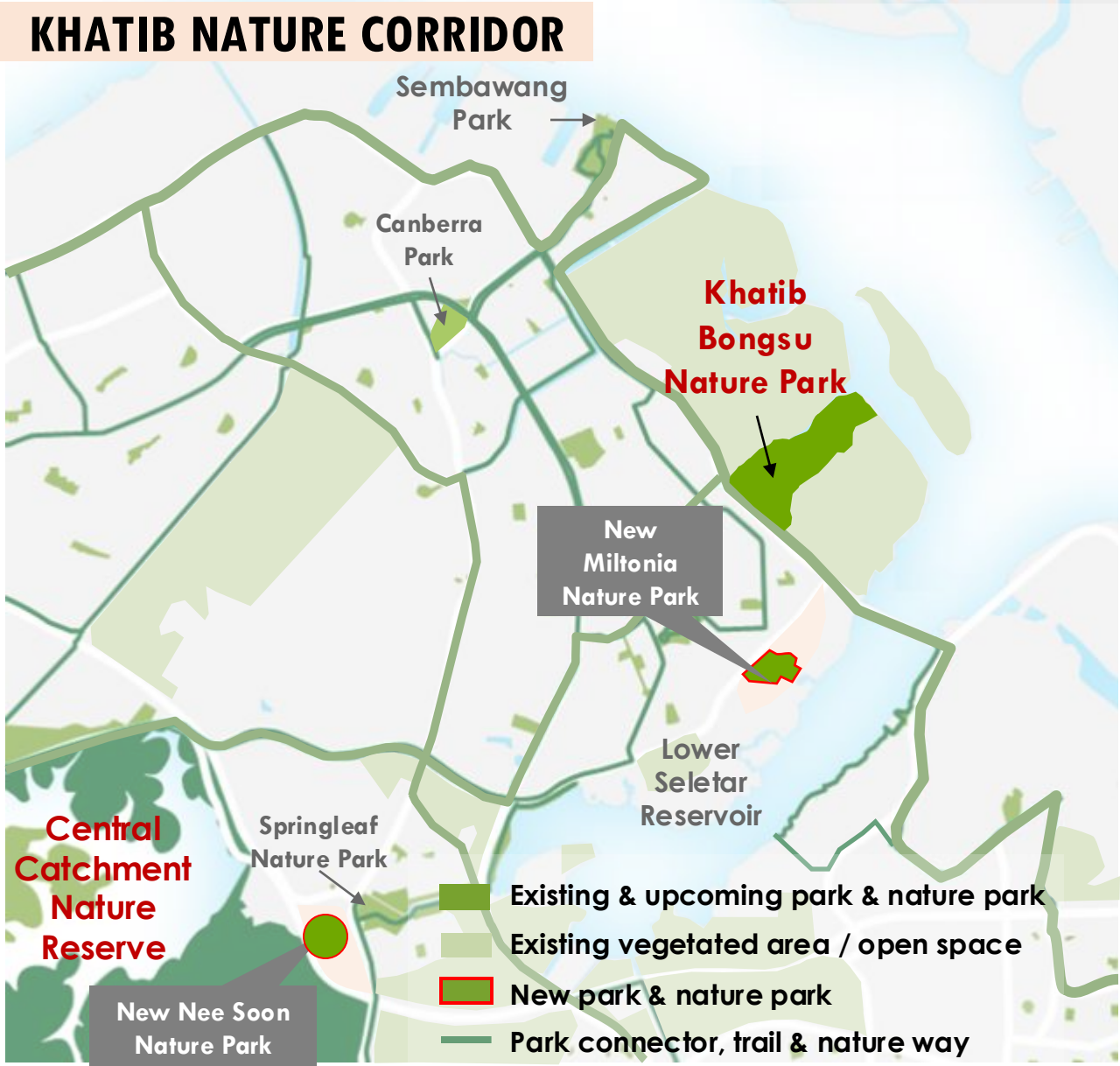
- Network of nature parks which are forested parks which buffer Nature Reserves
- Provide complementary habitats for flora and fauna from Nature Reserves



1: Conserving and Extending our Natural Capital

Developing ecological corridors and Nature Corridor

KHATIB NATURE CORRIDOR



ORE

Only

Strategy 2: Intensifying Nature in our Gardens and Parks

More Naturalistic Gardens and Parks



Singapore Botanic Gardens: Learning Forest

2 Intensifying Nature in our Gardens and Parks

Naturalising Waterways and Waterbodies



Before: Concrete Canal



Before Rain



After Rain

Bishan-Ang Mo Kio Park

Riverine and coastal parks designed to enhance flood resilience

Strategy 2: Intensifying Nature in our Gardens and Parks

Multi-functional: Park and stormwater retention pond



Bidadari Park: Alkaff Lake

Credit: Finbarr Fallon

2 Intensifying Nature in our Gardens and Parks

Habitat Restoration and Species Recovery Programmes



Straw-headed Bulbul
(*Pycnonotus zeylanicus*)



Singapore Freshwater Crab (*Johora singaporensis*)



Singapore Kopsia
(*Kopsia singaporensis*)

2 Intensifying Nature in our Gardens and Parks

More Therapeutic Landscapes in Gardens and Parks

Therapeutic Gardens (TG)

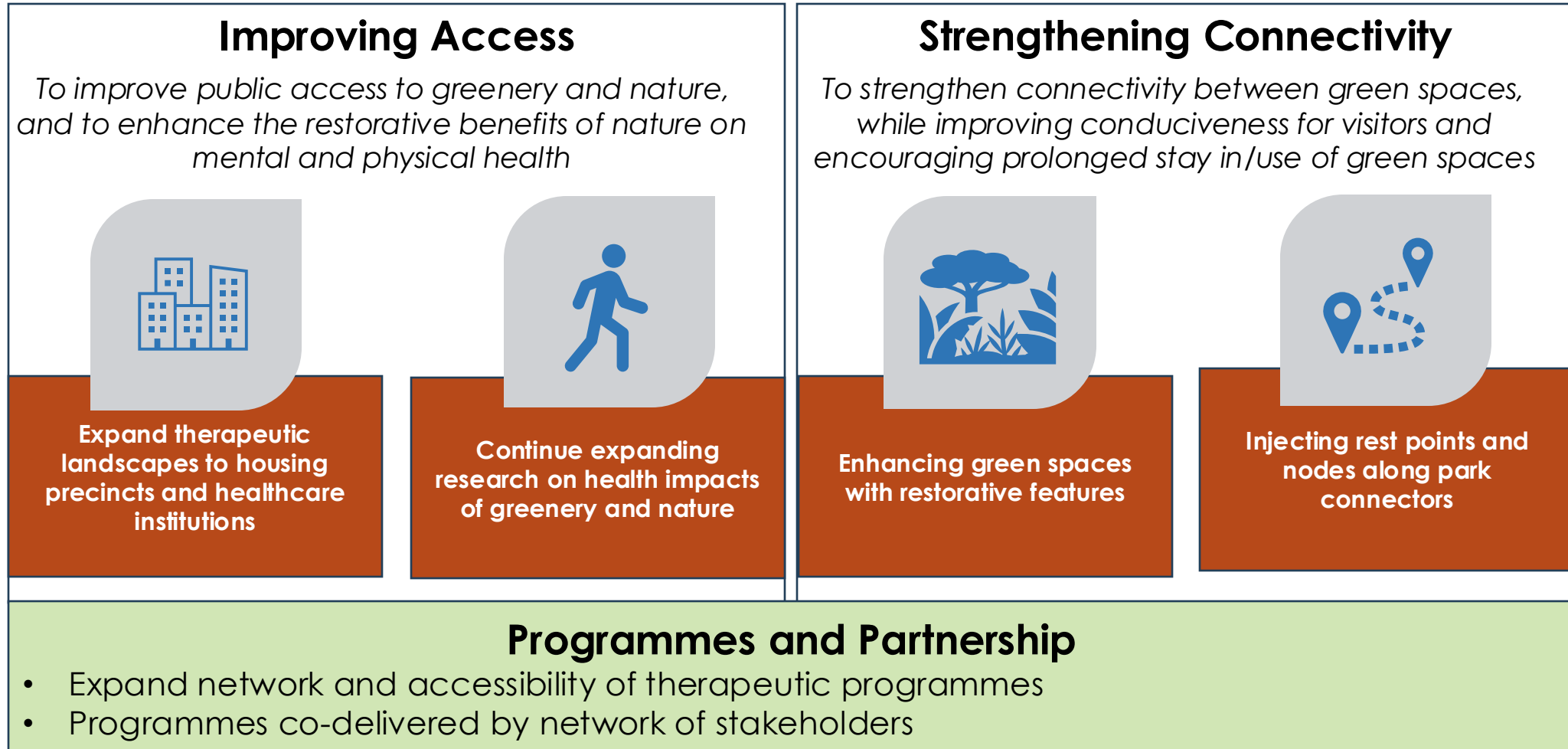
- Therapeutic horticulture shown to improve well being of elderly in Singapore
- Customised design and programming for seniors, children and those with dementia, autism, ADHD



2 Intensifying Nature in our Gardens and Parks

Parks for Health Framework

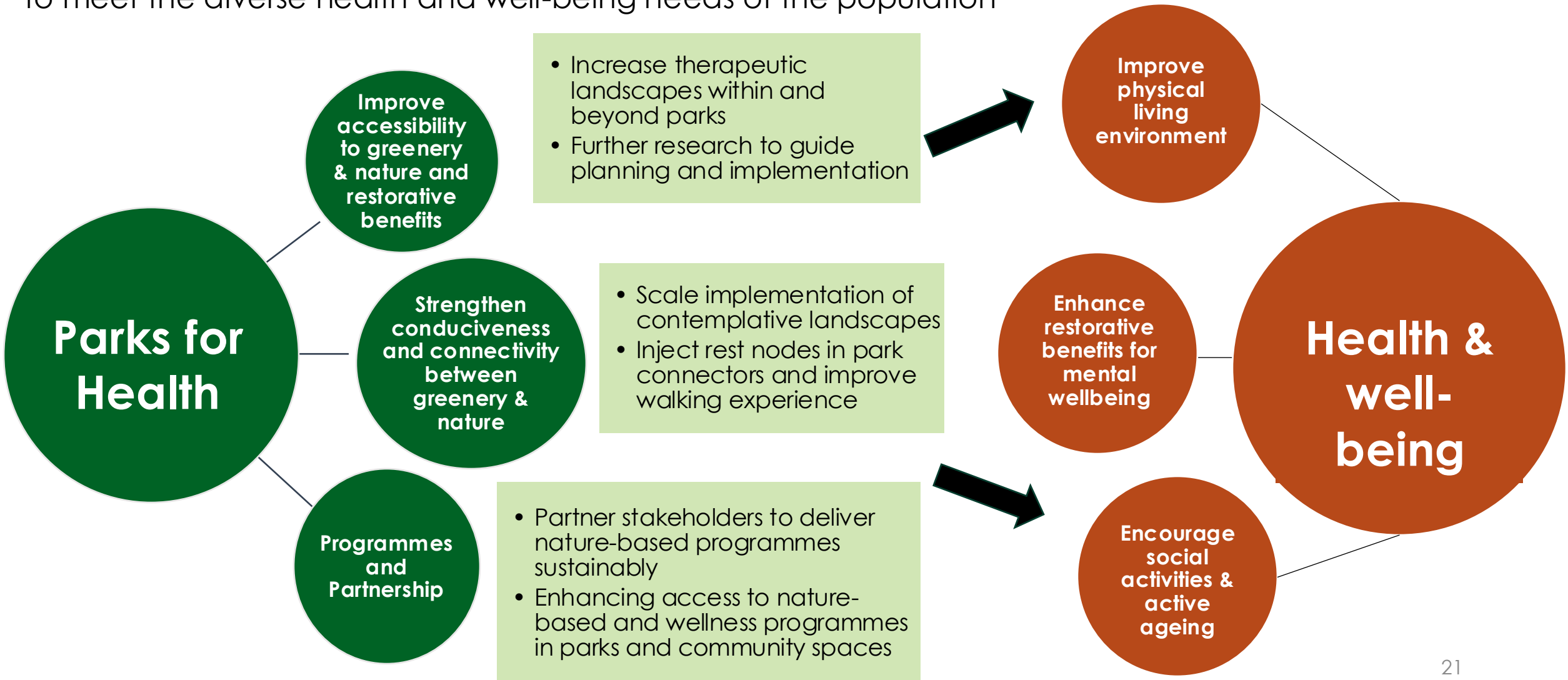
Parks for Health Framework enhances citizens' access to greenery and its restorative benefits on physical and mental health.



2 Intensifying Nature in our Gardens and Parks

Parks for Health Framework

Parks for Health framework brings the restorative benefits of greenery and nature closer to communities, to meet the diverse health and well-being needs of the population



Strategy ③ : Restoring Nature into the Urban Landscape

Cooling our City with Skyrise Greenery



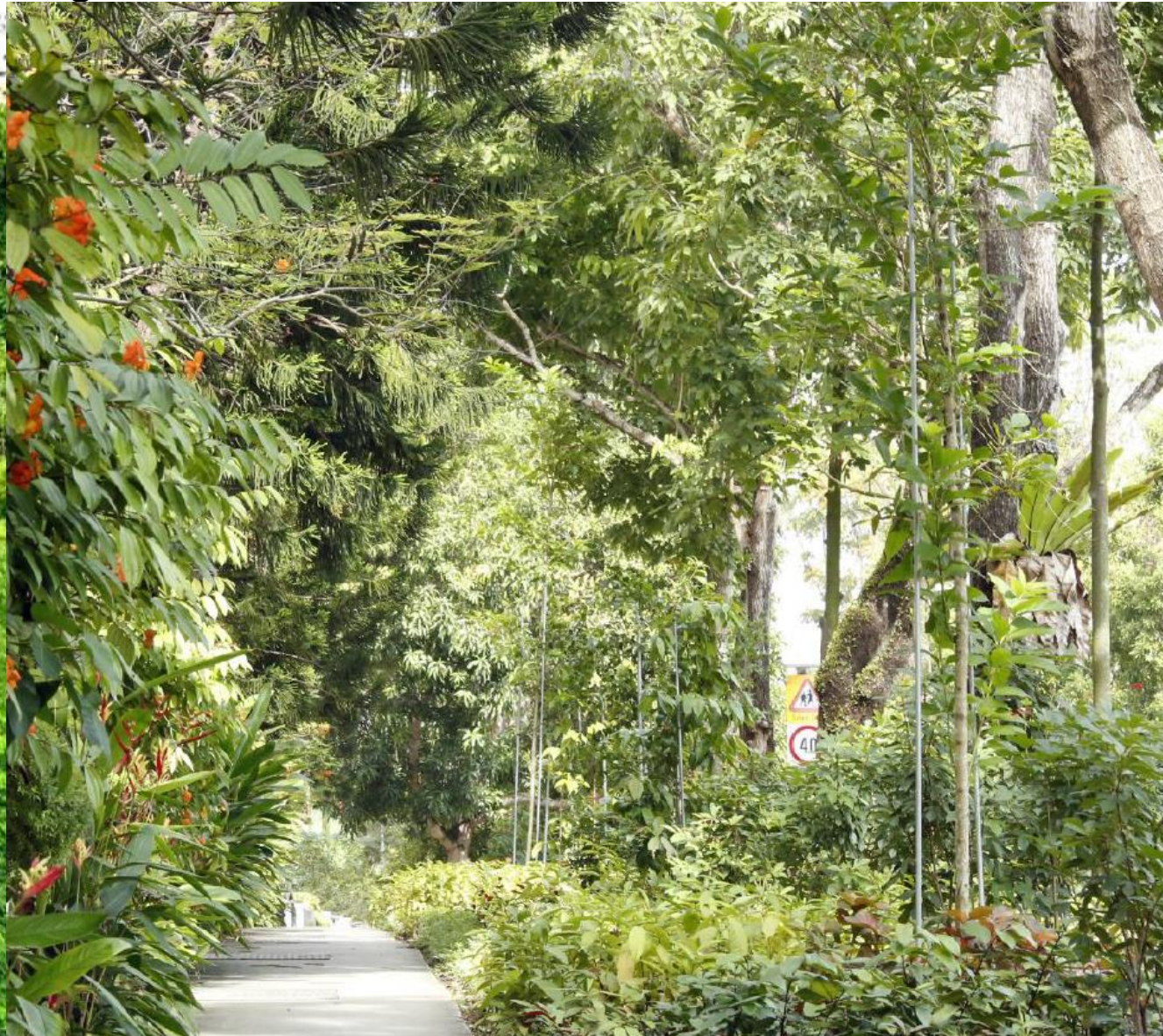
Kampung Admiralty



Heartbeat @ Bedok

3 Restoring Nature into the Urban Landscape

Cooling our City with Multi-Tiered Forest-Like Planting



Enhancing streetscapes to mitigate heat and improve air quality

3 Restoring Nature into the Urban Landscape

Retaining and implementing greenery at different scales



Skyrise greenery

Tree conservation

Park

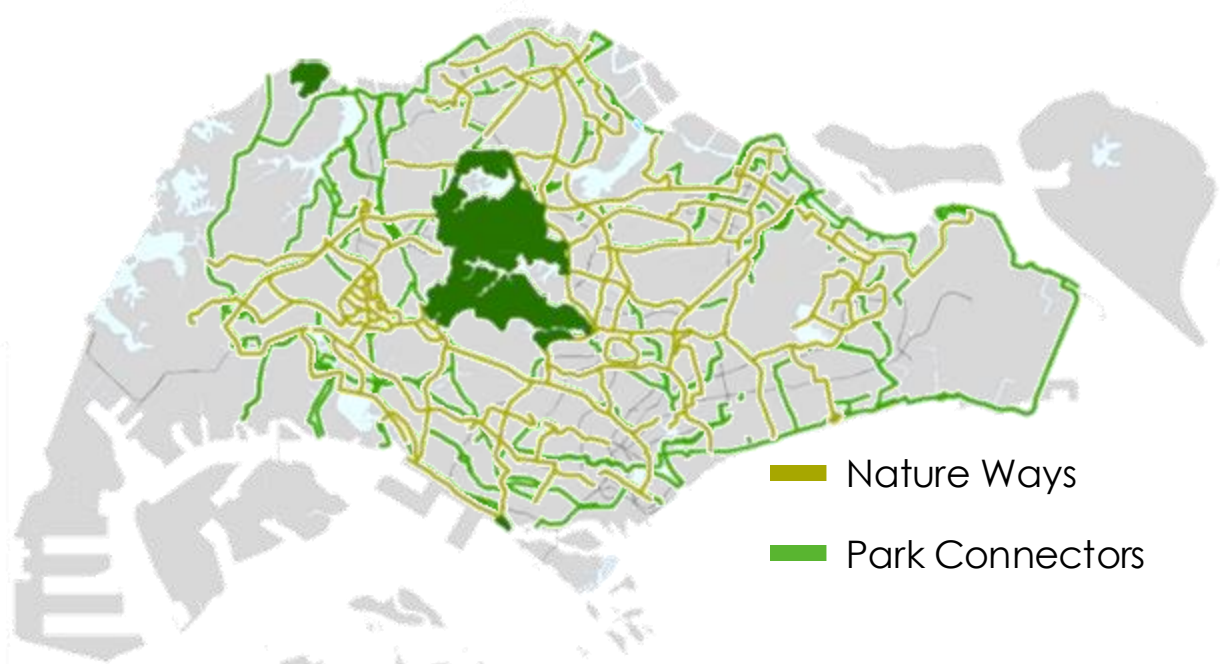
Roadside greenery

Planting within development

Credit: Surbana Jurong

Strategy 4 : Strengthening Connectivity between our Green Spaces

Growing our Network of Nature Ways and Park Connectors



■ Nature Ways
■ Park Connectors



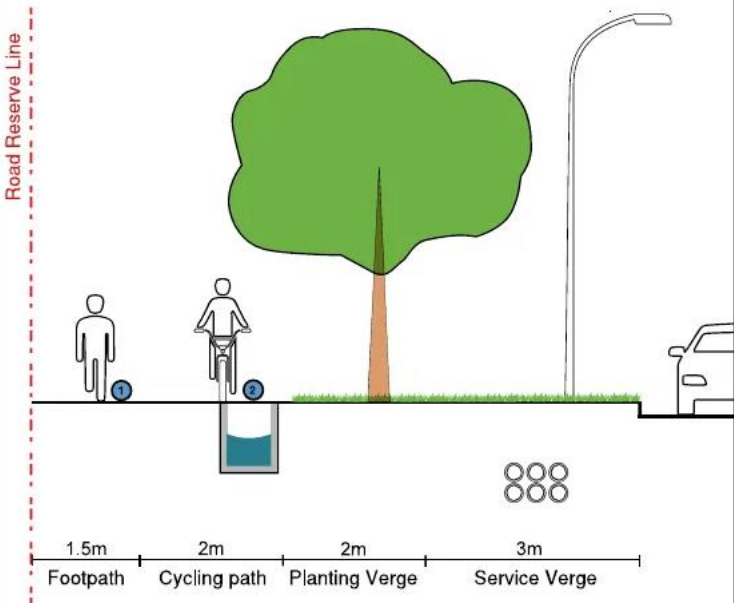
Bukit Timah Park Connector

Nature Ways

- Routes planted with native trees and plants, to mimic rainforests and facilitate movement of birds and butterflies

Park Connector Network

- Space optimized Island-wide network that connects parks, nature areas and open spaces



4 Strengthening Connectivity between our Green Spaces

Wildlife crossing aids – Rope bridges, colugo poles, culvert



4 Strengthening Connectivity between our Green Spaces

Road bridges and Eco-pedestrian bridges



Ecolink@BKE (for wildlife)

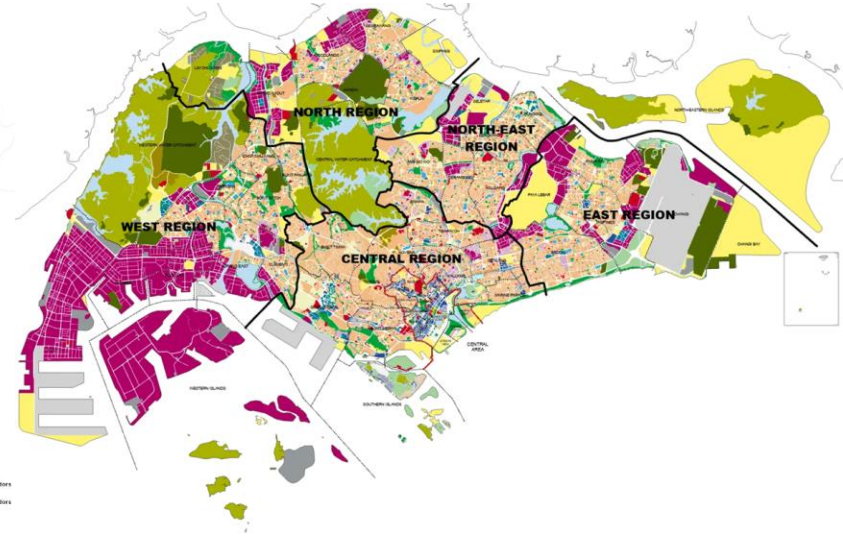
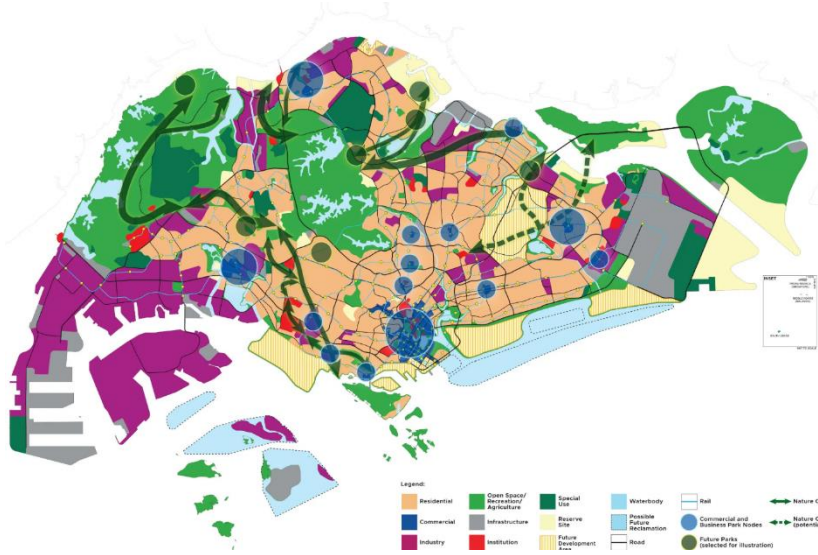


Ecobridge@Bidadari Estate (for human & wildlife)



How do we realise the vision?

Systematic & Robust Land Use Planning Process



Long Term Plan



Master Plan



Control Plans

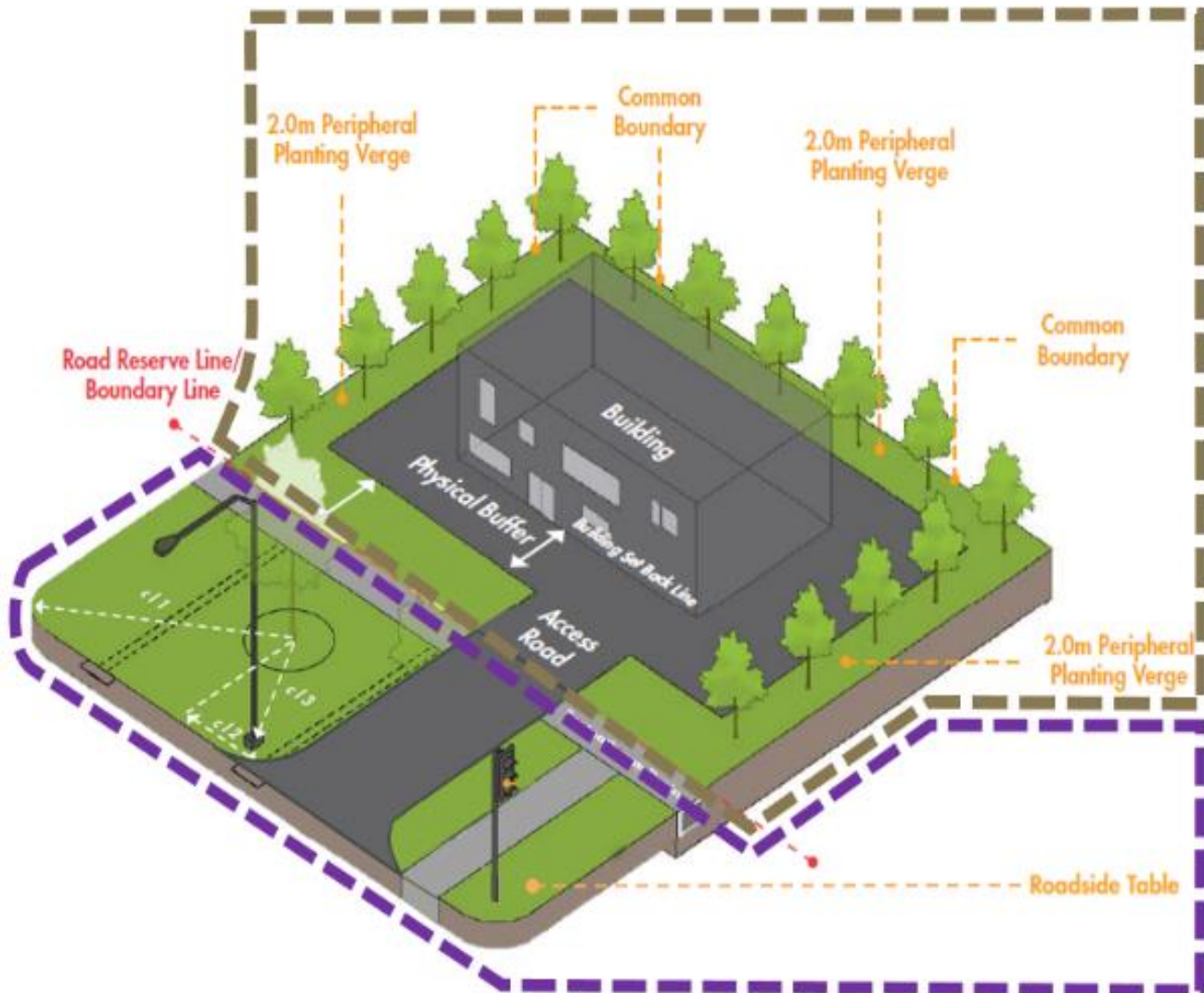
- Planning for 50-years & beyond
- Broad land use & transport strategies
- 10-yearly review
- Journeyed on a year long public engagement

- 10 to 15-year plan
- Statutory land-use zoning plan
- Translates Long Term Plan strategies into implementation
- Permissible use & densities
- 5-yearly review
- Multi-agency committee

- Special & detailed control plans
- Includes green & blue plan, public spaces
- Conservation areas
- Urban design areas

Development Control

- Macro compliance with the Master Plan
- Micro planning parameters and controls



INTERNAL GREENERY PROVISION

- Planting areas, i.e. green buffer and peripheral planting verges
- Tree conservation / cutting within development boundary
- Greenery provision at open air parking area at street level
- Safeguarding of interests in Parks / Park Connectors
- Planting scheme within development boundary (for selected development types)

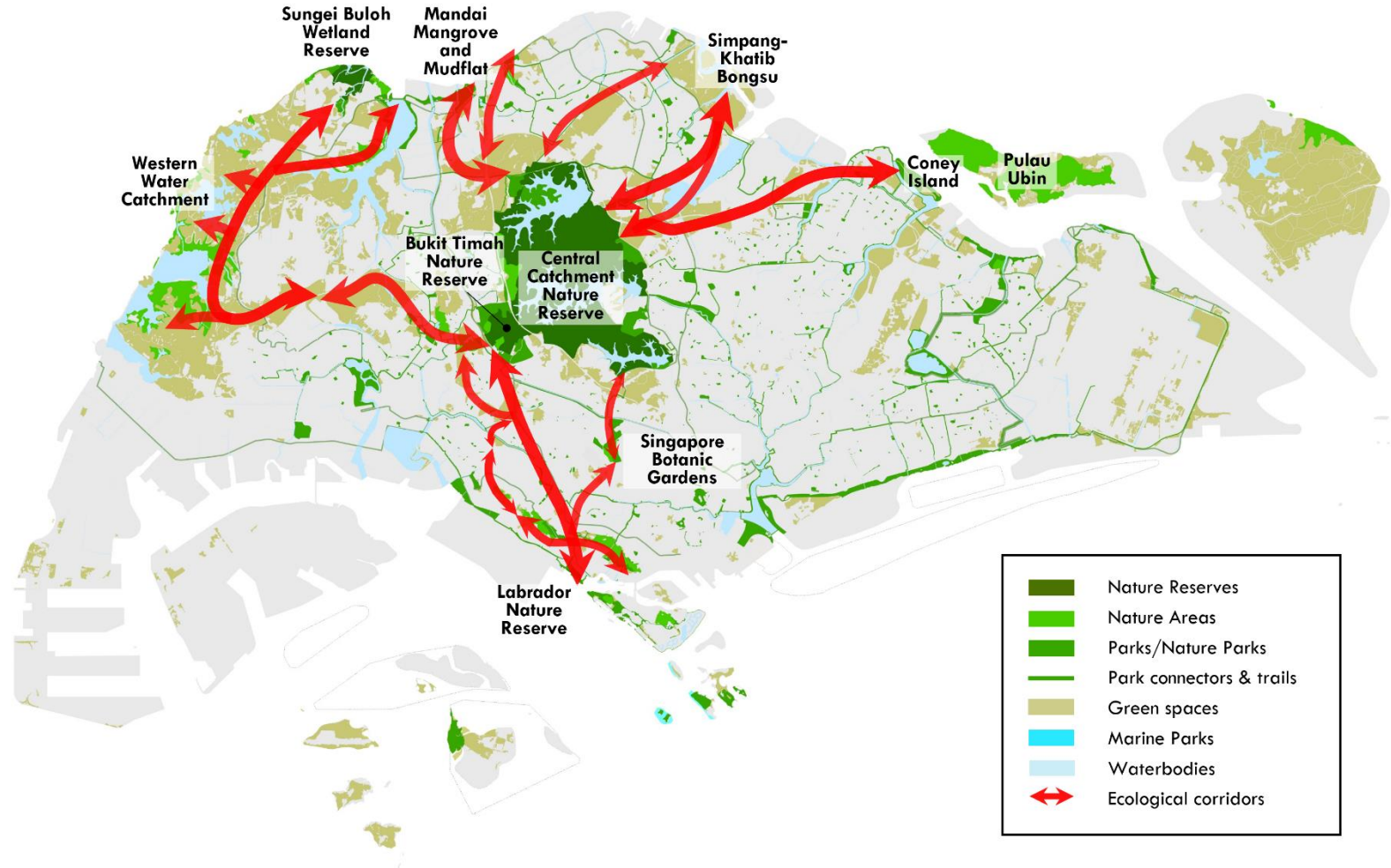
EXTERNAL GREENERY PROVISION

- Greenery provision within road reserve
- Tree conservation / cutting within road reserve
- Reinstatement requirements within road reserve

Science and Technology

- Ecological Profiling Exercise

The **Ecological Profiling Exercise** (EPE) conducted in 2022 helps us understand the ecological profile of Singapore's green & blue spaces, and their roles in strengthening ecological connectivity between our core biodiversity areas



Science and Technology

- Ecological Profiling Exercise

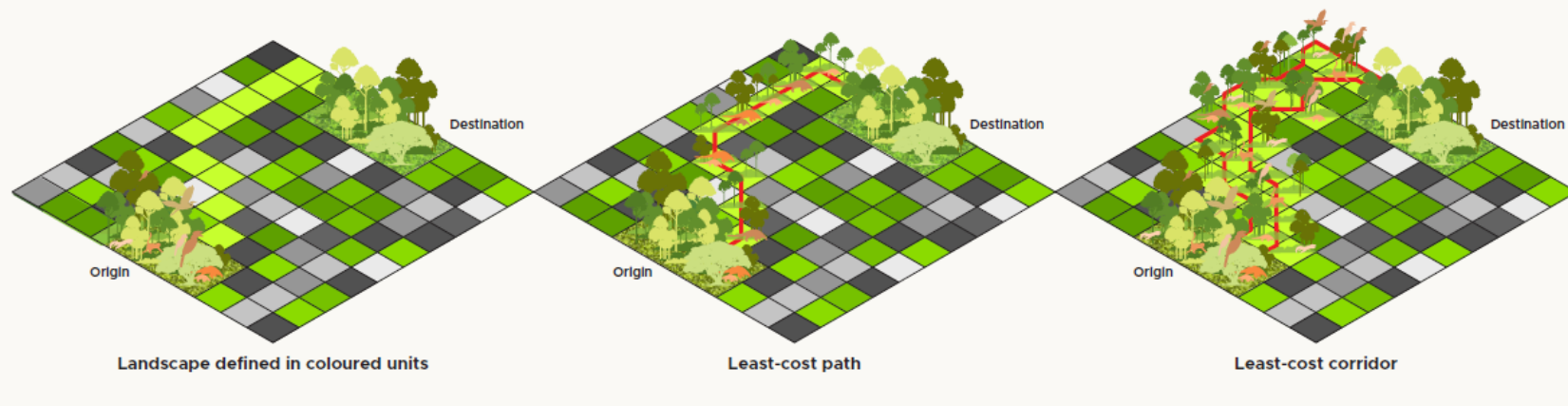
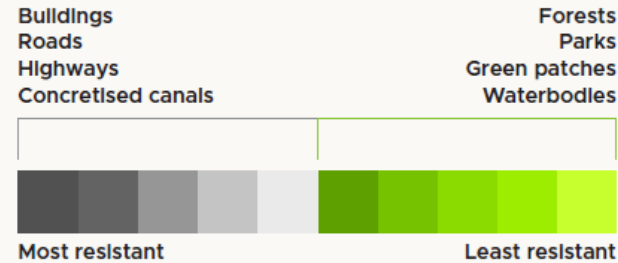
Least-Resistance Pathway Model

Least-Resistance Pathway Model for Terrestrial Habitats

This model identifies the surface structures (e.g. roads, forests, buildings) between core (source) habitats and assigns a numerical value to each one. A lower value indicates a surface structure that is conducive for an animal.

The movement pathway is then plotted out by selecting a route comprising pixels of the lowest value.

Examples of surface structures:



Source: Development of Ecological Network in Singapore (DENS) project

- Singapore's remaining habitats are fragmented
- Findings from studies will help planners
 - Understand how greenfield and brownfield sites contribute to ecological connectivity, and
 - Include ecological considerations upfront in the land-use planning process, to better balance development with nature conservation.

Science and Technology

- Camera & video traps for biodiversity monitoring



Raffles' Banded Langur crossing rope bridge
at Thomson Nature Park



Sunda Slow Loris crossing Eco-Link@BKE

Stakeholder Engagement & Community Stewardship



OneMillionTrees Movement led by Community

Lessons from Singapore's Greening Story

- Review strategies with changing needs
- Strong governance and effective partnership across agencies
- Nature as integral part of urban infrastructure
- Leveraging science and technology
- Stakeholder engagement and cultivating community stewardship



Bishan-Ang Mo Kio Park: Collaboration with Public Utilities Board

City in Nature

Creating a green, liveable
and sustainable home

