

An aerial photograph of a modern urban landscape. In the foreground, a multi-lane road curves through a green median. To the right, a multi-level highway interchange is visible. The middle ground features several large, modern buildings with glass facades and flat roofs. Some buildings have green roofs or vertical gardens. The background shows more dense urban development with various building styles and green spaces. The overall scene is bright and clear, suggesting a sunny day.

Enhancing Climate Resilience of Road Infrastructure

Land Transport Authority of Singapore

Singapore Green Plan 2030

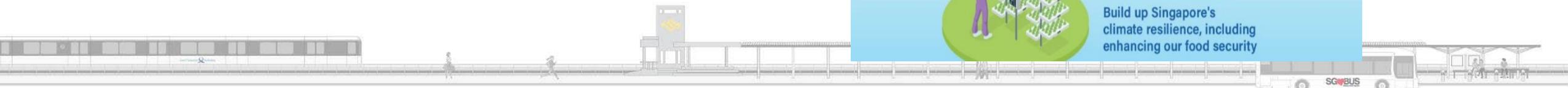
Land transport is the **third largest emitter (15%)** in Singapore

We have pledged to reduce land transport emissions since peaking in 2016 and achieve **net zero by 2050**

By encouraging greener modes of transport such as mass public transport, and active mobility



By encouraging the adoption of electric vehicles



Drainage Standards for Infrastructure Design

CODE OF PRACTICE
ON
SURFACE WATER DRAINAGE

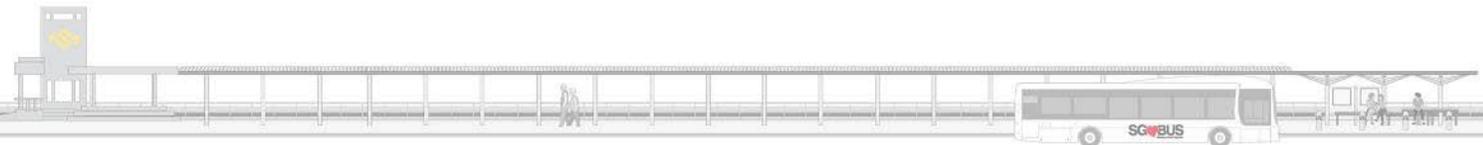


Sixth Edition – Dec 2011

Singapore incorporates **climate resilience** into design of roads.

All existing transport infrastructure are required to conform to **PUB's Code of Practice (COP) on Surface Water Drainage**

COP is reviewed regularly, with drainage design standards last raised in 2011; currently conducting another round of review to account for new climate patterns



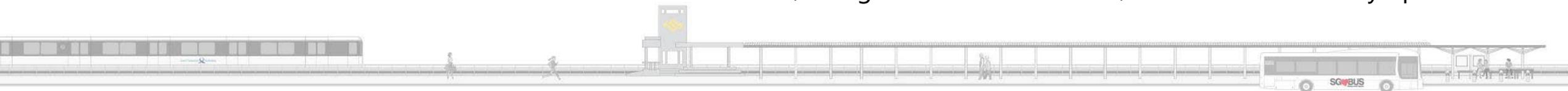
Elevated Roads

Elevated roads are constructed in **areas vulnerable to flooding**

Minimises risk of roads becoming impassable due to floods



Nicoll Drive, along the eastern shoreline, was raised in 2016 by up to 80cm



Coastal Protection

PUB SINGAPORE'S NATIONAL WATER AGENCY

AREAS MOST VULNERABLE TO SEA-LEVEL RISE

Low-lying areas less than 4m above sea level

PROTECTING OUR COASTLINES

By 2100, sea levels are expected to rise by more than **1 metre**, due to melting glaciers, warmer weather, storm surges and land subsidence. Without timely action, low-lying coastal areas and landmarks could be flooded, affecting our homes and livelihoods.

3 KEY AREAS OF STUDY

- Over 52.8km of our coastlines
- 212.2km² of our homeland

To protect our island nation, PUB has divided our coastlines into different segments and will be conducting in-depth studies while developing measures for the various segments progressively.

We will start with the City-East Coast stretch, which has been prioritised as it is more vulnerable and critical. The stretch covers the Greater Southern Waterfront, East Coast-Marina and Changi.

We will develop coastal protection measures that will complement the land use plan for the City-East Coast areas, and co-locate our amenities and recreational spaces for the community to enhance our living environment.

AREA B East Coast-Marina

- Defending our residential, commercial and recreational sites

AREA A Greater Southern Waterfront

- Safeguarding our residential and recreational areas

AREA C Changi

- Protecting our aviation, industry, industrial estates and military base

Greater Southern Waterfront

Landmark Park, VivoCity

East Coast-Marina

Singapore Sports Hub, East Coast Beach, Marina Bay Cruise Centre, East Coast Parkway, South Beach Ferry Terminal

Changi

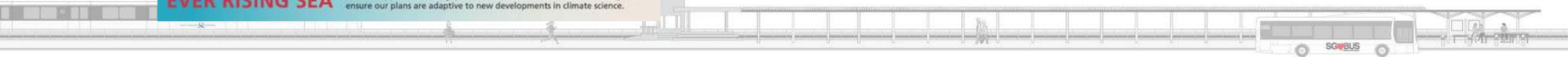
Changi Beach Park, Changi Exhibition Centre, Changi Airport, Changi Naval Base, Changi Water Reclamation Plant

AGAINST THE EVER RISING SEA

Climate science and projections of sea level rise are constantly evolving. PUB will take a flexible approach by exploring technologies and solutions that are applicable to Singapore's context. We will also consult widely, and ensure our plans are adaptive to new developments in climate science.

Initial investment of S\$5 billion in 2020 into **coastal protection measures**, e.g. sea walls and embankments

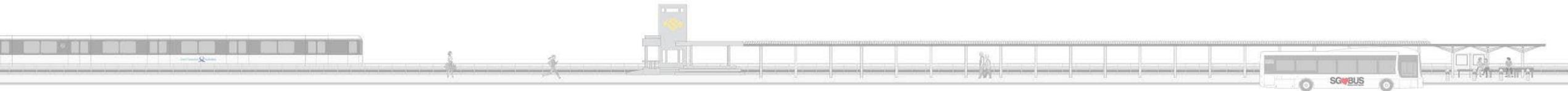
Defend coastal roads **against rising sea levels and coastal erosion**



Urban Greening

Promotion of urban greening efforts including development of green corridors and roadside vegetation

Helps to **manage stormwater and reduce heat island effects**



Research and Innovation for Resilient Infrastructure

Research, Innovation and Enterprise 2025 Plan



Making investments into research and innovation to **develop advanced materials and technologies for climate-resilient infrastructure**

Includes **studying sustainable construction materials and improved drainage systems**

The Research, Innovation and Enterprise Plan supports research to tackle national needs, including climate resilience

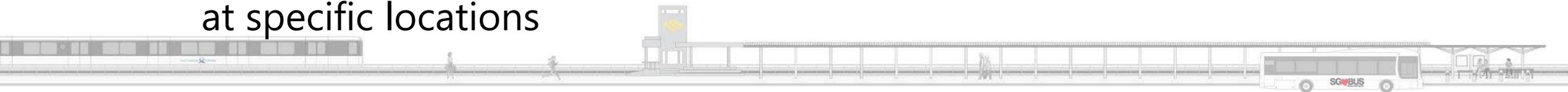


Real-Time Monitoring and Update of Road Situation



Real-time monitoring systems **assess road conditions and respond to weather-related challenges promptly**

Includes **monitoring rainfall, water levels, and traffic conditions** at specific locations

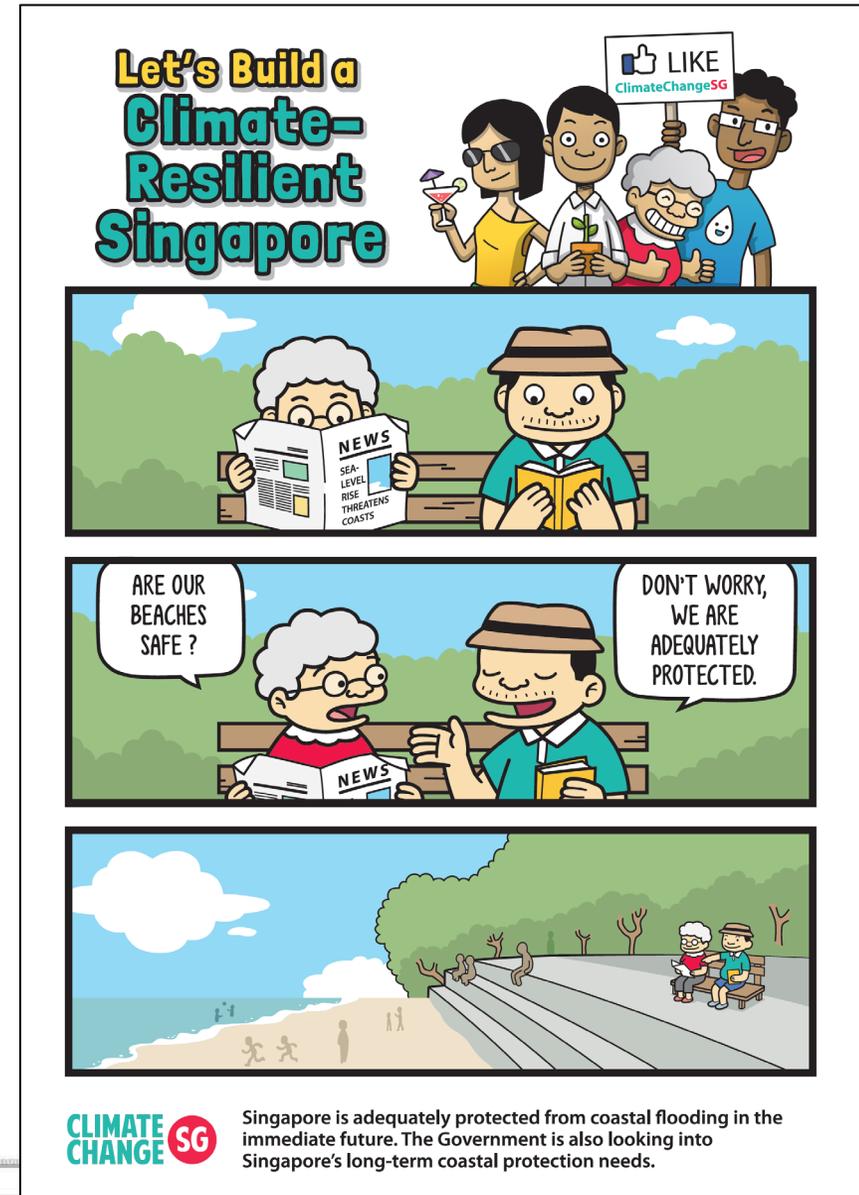


Raising Public Awareness on Climate Change

Active engagement of the public in climate change awareness and preparedness

Helps to engender public support for investments into climate resilience and promote civic responsibility towards climate protection

Poster to raise awareness on potential impact of climate change in Singapore



Thank You



www.lta.gov.sg



WeKeepYourWorldMoving



LTAsg



LTAsg



LTAsingapore



LTA Singapore

