PUB SINGAPORE'S NATIONAL WATER AGENCY

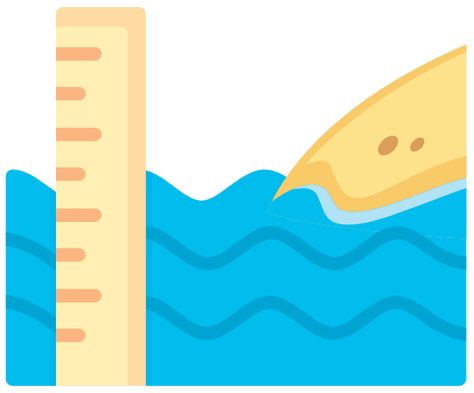
HOW IS SINGAPORE AFFECTED BY CLIMATE CHANGE?

Climate change is causing more extreme weather events, resulting in unpredictable rainfall and rising sea levels that can increase flood risks*.

WHAT MAKES SINGAPORE VULNERABLE TO FLOODING?

Tropical climate with frequent and abundant rainfall

Limited land makes expanding drainage for every extreme weather event challenging



About 30% of the island is less than 5m above sea level

WHAT ARE THE FLOOD RISKS WE NEED TO BE PREPARED FOR?

Flash floods

These may occur when short but intense rainfall temporarily overwhelms localised drainage capacity.

Coastal flooding

This happens when high tides cause seawater to overflow from the drains that lead to the sea.

DID YOU KNOW?

Singapore used to experience frequent and widespread flooding from the 1950s to 1980s. Today, we have reduced flood-prone areas from 3,200 hectares in the 1970s to less than 25 hectares thanks to forward planning, significant investments in drainage infrastructure and raising ground levels.

*Singapore's Third National Climate Change Study (V3) projects higher temperatures, more extreme rainfall events, and sea level rise around Singapore of up to 1.15 metres by 2100 and 2 metres by 2150.

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HOW IS PUB STRENGTHENING SINGAPORE'S FLOOD RESILIENCE?

Flood protection has always been a key focus for Singapore. PUB takes four approaches to strengthen our flood resilience: **Legislation, Infrastructure, Community Resilience, and Flood Response Operations.**

WHAT KIND OF LEGISLATION DOES PUB ENACT?

PUB regulates activities that may obstruct or affect the drainage system. Developments and businesses also play a key role in managing the risk of flooding in their premises.

HERE'S HOW

Developments of 0.2 hectares or larger are required to put in onsite measures to temporarily detain stormwater runoff.

All new drains are designed according to Code of Practice standards.

All developments are required to meet a minimum platform level and provide crest protection for basement or underground facilities.

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WHAT ARE SOME UPGRADES PUB HAS MADE TO OUR DRAINAGE INFRASTRUCTURE?

The Government has made significant investments over the decades to upgrade drainage infrastructure, with about $2.5 billion spent since 2011. This has reduced flood-prone areas in Singapore from over 3,200 hectares in the 1970s to less than 25 hectares today.

NOTABLE INFRASTRUCTURE UPGRADES

ALKAFF LAKE

Integrated within Bidadari Park, Alkaff Lake is a multi-functional drainage infrastructure. During heavy rainfall, it acts as a stormwater retention pond. During dry weather, it is a lake for communal and recreational activities.

SYED ALWI PUMPING STATION

Syed Alwi Pumping Station is both a stormwater storage facility and a pumping station for the low-lying Jalan Besar area and part of Little India. It enhances flood resilience of the many heritage buildings in the area without the need for major redevelopment work.

BUKIT TIMAH FIRST DIVERSION CANAL

PUB progressively upgrades the Bukit Timah drainage system, which has historically faced low-lying topography challenges. Today, the canal's capacity has increased by 30%.

Upgrading of the stretch between Rifle Range Road and Jalan Kampong Chantek is in progress, with plans to progressively upgrade the remaining stretches.

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HOW IS PUB SUPPORTING THE COMMUNITY TO BE FLOOD-READY?

While PUB continues to enhance our drainage infrastructure, Singapore's land constraints mean it is not possible to cater for all extreme storm events and prevent floods entirely. This is why we need to build our flood resilience as a nation.

PUBLIC OUTREACH AND RESOURCE DISTRIBUTION

Annually, before the Northeast Monsoon season, PUB conducts door-to-door visits to engage residents and shop owners about flood-proofing and safety measures during floods.

To date, PUB has distributed more than 16,000 flood protection devices to premise owners in flood-sensitive areas.

ENGAGING BUILDING OWNERS

Over the years, PUB has raised drainage design standards, requiring developers and building owners to maintain drainage systems and implement flood protection measures.

PUB also conducts regular inspections and educates stakeholders about these responsibilities.

FLOOD RESPONSE EXERCISES AND JOINT INSPECTIONS

Every year, PUB joins forces with train operators to ensure that our MRT stations, which are critical infrastructure, are flood-ready. All stations are visited in turns.

These visits ensure flood protection measures are in place and functioning well.

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HOW IS PUB RESPONDING TO FLOODS?

FLOOD RESPONSE

RAPID DEPLOYMENT TEAMS ON STANDBY

PUB's Quick Response Teams (QRTs) are deployed islandwide to respond swiftly to flash floods and keep the public safe. Our QRT vehicles are equipped with GPS trackers and pan-tilt-zoom cameras to stream real-time location and flood conditions to our Joint Operations Centre (JOC).

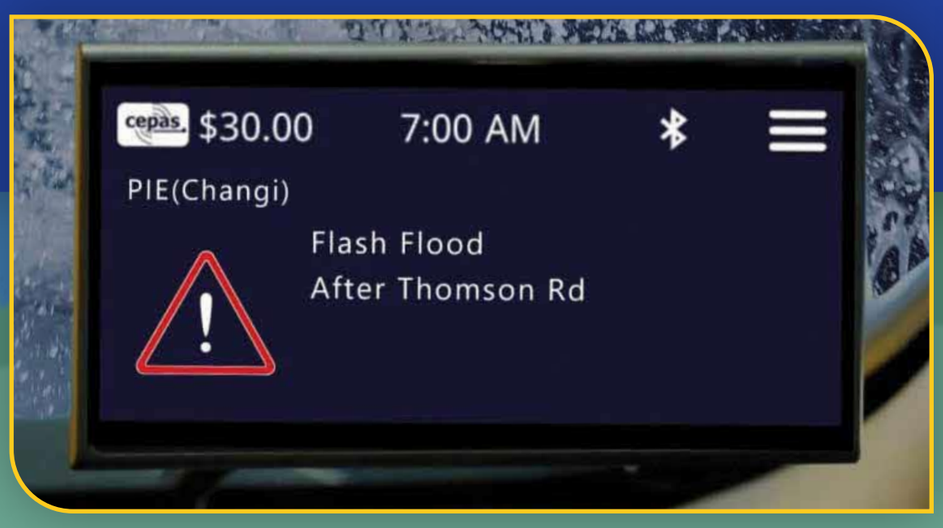
ADVANCED FLOOD-FIGHTING TECHNOLOGY

Mounted with LED signs and blinker lights, the vehicles can drive through floodwaters up to 700mm high to close flooded roads and divert traffic. Portable flood barriers and inflatable flood bags stored in the vehicles can also be deployed quickly to protect roads and homes.

FLOOD MONITORING AND EARLY WARNING

PUB's JOC monitors floods in real time using over 1,000 water level sensors, 500 CCTV cameras and weather radars islandwide.

PUB then issues flood alerts through myENV app, Telegram, X and ERP 2.0 on-board units to keep the public informed.



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EVERYONE CAN GET FLOOD-READY IN A

F L A S H

FOLLOW PUB FLOOD ALERTS

LEARN HOW TO BE FLOOD READY

AVOID FLOODED AREAS

SHARE PUB FLOOD UPDATES

HELP OTHERS WHERE POSSIBLE

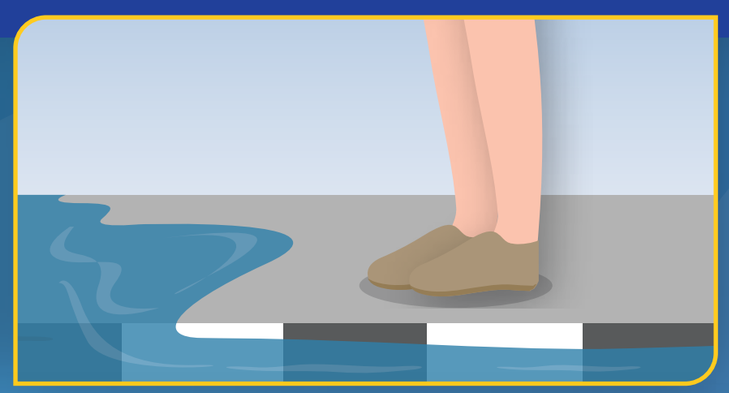
Be prepared for flash floods with F.L.A.S.H. and these handy tips to help you stay safe.

PEDESTRIANS/COMMUTERS

Avoid flooded areas and stay on higher ground.

Avoid alighting at flooded bus stops.

Do not walk through water above ankle height.



MOTORISTS

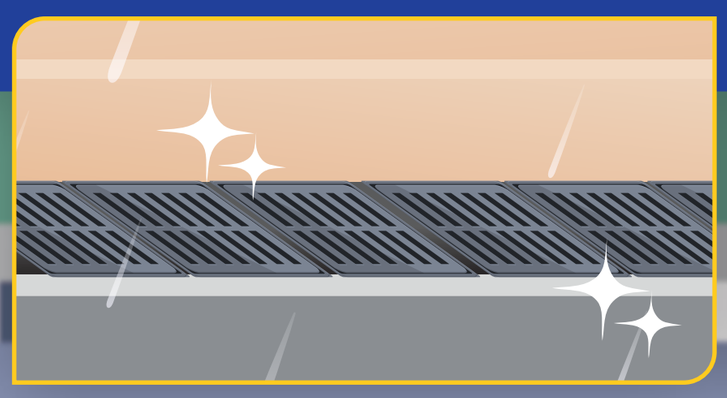
Do not drive through water above kerb height or when road markings are not visible.

Stay close to the middle lane as water tends to accumulate on the side lanes.

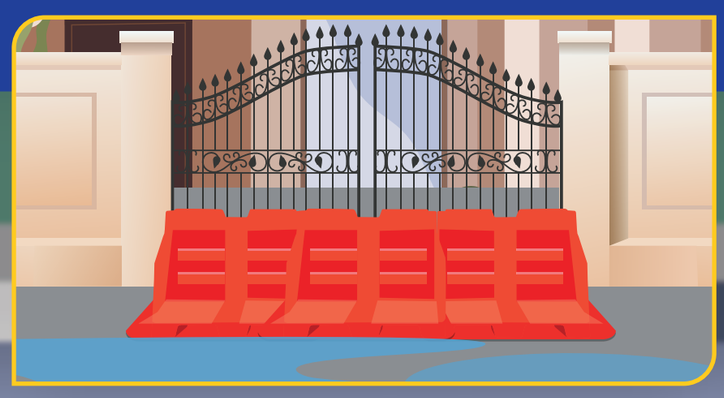
If unavoidable, drive slowly and steadily without braking.

HOME, BUILDING OR BUSINESS OWNERS IN LOW-LYING AREAS

Keep drains clear and maintain flood barriers.



Install flood barriers early when there is a risk of flood.



Move essential items to higher ground.