

Trialling tidal gates at Swansea

COUNCIL NAME

Lake Macquarie
City

WEB ADDRESS

lakemac.com.au

SIZE

757.2 square
kilometres

POPULATION

207,775

FUNDING PROGRAM

Increasing
Resilience to
Climate Change

Overview

Swansea is a picturesque town perched on the edge of Lake Macquarie, the largest coastal saltwater lake in the Southern Hemisphere. Tidal inundation is already a challenge for the town and predicted sea level rises are expected to increase the impact of high tides.

Lake Macquarie City Council is trialling three tidal gates to determine which would best protect low-lying assets from current and future tidal inundation, storm surges and extreme weather events in the face of a changing climate.

Background

Swansea's central business district, overlooking Black Neds Bay, is often inundated following heavy rainfall or high tides. Roads and cycleways are flooded, drainage systems blocked and businesses prevented from opening their doors.

Council modelling has found the frequency, depth and duration of inundation will increase with climate change including sea level rise and more frequent and intense storms and east coast lows. The consequences could be profound, with new challenges for transport, water and sewerage infrastructure, land use planning, traffic management, emergency responses, community health, business continuity and more.

To find an adaptive solution, three types of tidal gates were installed at four locations known to be frequently inundated by tides and storm surges. These included two types of tidal valves and a tidal flap.



Example of tidal inundation impacts in Swansea CBD

Implementation

The project's genesis was a working group of community volunteers who are helping Council with local adaptation planning. These volunteers raised the idea for the project, advocated its development, and now monitor its progress.

Tidal gates were purchased from three separate manufacturers, each assessed on cost, safety, quality, environmental impact and the time required to manufacture and install.

The tidal valves – one which was sourced from Switzerland and was the first installation in Australia – are made from a flexible plastic membrane which are fitted over stormwater pipes. During heavy rain or high tides, the valves automatically open to allow stormwater to flow out of the pipes. The membrane closes when there is no pressure from stormwater.

Tidal flaps, made from marine grade steel, are fitted into a pipeline or headwall at the outlet of a stormwater network. The flap automatically opens with hydraulic pressure to allow stormwater to flow out and then closes when tidal water rises, forming a seal between the flap and the pipe or headwall. This stops tidal waters from entering the stormwater network.

The experimental tidal gates were installed between March and December 2021. At the same time, several other activities were undertaken, including a headwall upgrade, erosion protection and installation of a gross pollutant trap.

A range of resources, including videos, were produced to share the story of the project the wider community and other councils.

Outcomes

Council staff and community volunteers continue to monitor the tidal gates during storm events and very large tidal events.

So far, the tidal gates have protected low-lying infrastructure in Swansea CBD from impacts of climate change, tidal inundation, and storm surges. The project has also built community resilience by empowering the community to embrace practical climate adaptation.

This project has shown a proof of concept and valuable lessons to build future resilience. Council's asset management staff are aware the tidal gates can solve inundation problems for several low-lying communities. With the knowledge, contacts and capability, Council can now scale-up this project.



Before and after installation of tidal gate: Credit: John Gilbert.

Key Learnings

Council and the community will continue to monitor the gates to determine the long-term advantages, disadvantages and efficacy of the three types of tidal gates.

For instance, the selection of the type of gate is dependent on site-specific conditions.

Council has also found that tidal flaps are cheaper per unit than the tidal valves, but are also less versatile as they can only be installed at the stormwater outlet and work best with upgrades to the stormwater network to ensure suitable sealing.

All tidal gates have operated effectively during minor and major rainfall events. But after some minor pooling of rainwater in an upstream swale, poor sealing was discovered and one gate replaced by the manufacturer.

Stakeholder engagement was a cornerstone of this project. Early cross-departmental engagement ensured stormwater engineers, capital works teams and maintenance crews were on board the project. Council also undertook community engagement initiatives, including a school environmental learning competition, eight briefings to the community working groups, and a guest lecture at the University of Newcastle.

Students from the University of Newcastle are now designing a plan to integrate this project into Council's capital works program.

More information

[Watch a video](#), with insights from local residents, to learn more about the Swansea Tidal Gate Project.

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Funded by the
NSW Government
in association with
LGNSW