

Open-coast erosion and coastal flooding

June 2026

A recent study looks at how erosion and coastal flooding could affect Ōtautahi Christchurch's sandy coastline and inland communities, and what this means for how we manage our open-coast dunes.

Purpose of the study

Ōtautahi Christchurch's open-coast dune system – from Waimakariri River to Southshore, as well as Sumner and Taylors Mistake – plays a critical role in protecting coastal and inland communities by acting as a natural barrier against coastal erosion and coastal flooding.

In the past, these hazards have been assessed separately; however, this study recognises that coastal erosion could create new pathways for flooding from the sea, especially with sea-level rise.

The study looks at:

- How and where storm-driven coastal erosion and long-term coastal erosion (from ongoing sea-level rise) could reduce the height and width of the dunes.
- How these changes may increase the likelihood of seawater overtopping the lowered dunes.
- Better ways to manage dunes to maintain or improve the protection they provide for communities.

Importantly, the study also acknowledges that communities inland of the district's dune system are also exposed to other hazards and flood sources, like the estuary and Ōtākaro Avon River.



Key findings

Present day

While Ōtautahi Christchurch's dunes have largely been stable, they can experience rapid and significant erosion from coastal storms, as past events have shown us. Generally, the dunes have then recovered over months or years.

Large storms, and sequences of smaller storms, can erode the dune face within a single event, and cumulatively over multiple events. Erosion can reach several metres in one storm, and tens of metres across repeated events.

For example:

- The July 2001 storm caused up to 10 metres of erosion along the New Brighton coast.
- The 1992 storm resulted in up to 16 metres of erosion.

While many parts of the coastline have wide dunes capable of absorbing storm impacts and recovering over time, other areas are more vulnerable due to low, narrow, or modified dunes.

Areas of highest current concern include:

- Brooklands Lagoon, particularly the area roughly halfway between Heyders Road and the Waimakariri River mouth, where the dune is heavily scarped
- North New Brighton, between the surf club and community centre
- The stretch between New Brighton Surf Club and New Brighton Pier
- Southshore Spit, toward the end
- Sumner
- Taylors Mistake

With sea-level rise

As sea levels rise, the open-coast dunes will be exposed to higher water levels and more frequent wave impacts. Over time, this means:

- **More frequent erosion:** Dunes are expected to erode more often, with less time to recover between storm events.
- **Shrinking dunes:** Dune widths will decrease and heights will lower. In some areas, this process is likely to be temporarily slowed by sand supply and by dune management work.
- **Increased overtopping and flooding:** In places where the dune is eroded and lowered, coastal flooding (overtopping) will happen more frequently.

Eventually, in some locations, dunes are expected to lose their ability to act as an effective natural barrier, being squeezed between rising seas and landward development:

- **With 60 centimetres of sea-level rise (potentially by around 2080 or later, depending on the rate of sea-level rise):** The length of coastline vulnerable to storm-driven erosion and overtopping more than doubles (relative to current conditions).
- **With 1.2 metres of sea-level rise:** The vast majority of the open coast becomes vulnerable.





Current dune management

Christchurch City Council currently manages the open-coast dunes mainly through dune plantings, supported by monitoring programmes, including Environment Canterbury's.

Key management practices

- **Planting spinifex** (a native sand-binding plant) along the seaward edge of dunes.
- **Fencing in selected areas** to protect vegetation, dune structure, and to manage public accessways.
- **Coastal monitoring** by Environment Canterbury (with more than 30 years of data) and the Council's own, more recent programme.

Benefits of spinifex planting

Spinifex plays a central role in dune management because it:

- Acts as a sacrificial buffer, helping to protect the underlying marram grass dune from erosion.
- Recovers quickly after storms, supporting dune resilience.
- Spreads naturally, allowing ongoing dune stabilisation.
- Is locally sourced and low cost, making it a practical long-term option.

This approach has been widely implemented across the open coast, including Sumner and Taylors Mistake, and has been effective in promoting dune growth and reducing storm-driven erosion; however, its long-term effectiveness is likely limited by sea-level rise.

Future challenges

Sea-level rise introduces significant challenges that will limit the effectiveness of current dune management approaches:

- **Rising sea levels are expected to narrow the dry-sand beach** – the area between the ocean and the dune. This area is critical because it supplies wind-blown sand needed for dune growth and recovery. When the beach becomes too narrow (roughly less than 10 metres), there may not be enough sand to sustain dunes and enable their recovery after erosion events. The dry-sand beach is projected to become too narrow to sustain dunes between 2060 and 2090, varying by location.
- **Spinifex planting will remain effective in the short to medium term**, but its effectiveness will decline over time as sand supply decreases.
- **More frequent storm erosion, combined with rising sea levels**, will place increasing pressure on dune recovery processes and potentially exceed the natural regeneration capacity of dunes.

Other challenges:

- The availability of spinifex seed may become a limiting factor, as demand for replanting increases following more frequent storm damage.
- In some areas, dunes may become increasingly difficult to maintain, even with active management.

Priority areas and next steps

Several sections of the coast are already vulnerable to overtopping and dune erosion. Without active management, dunes in these areas will be the first to lose their ability to protect homes, infrastructure, and public spaces.

The key areas of focus are:

North New Brighton (north of the North Beach Surf Lifesaving Club)

This area is planted and well looked after, but it's considered vulnerable to breaching and overtopping as sea levels rise. After large or repeat storms, the dunes here need fast recovery to ensure they can continue to protect landward areas.

Low-lying dunes backed by walls, between North Beach Surf Lifesaving Club and the community centre

The dunes here are low or entirely absent. Large storms could wash through access points and eventually overtop the wall, as well as undermine and damage it. Adding a planted dune in front of the wall would help to absorb wave energy and delay the need for more costly intervention and maintenance.

Low-lying dunes backed by walls, in New Brighton (near the pier)

Much like the previous area, this area has low dunes, with no dunes to the south of the pier. While some sections are planted, ongoing work is needed to build enough dune height and width to provide an effective buffer, reducing wave energy reaching the wall and helping to

protect landward areas and assets.

Low-lying dunes at Sumner and Taylors Mistake

These beaches have naturally low and narrow dunes. They're exposed to strong waves and likely to lose sand quickly during future storms. Strengthening and rebuilding these dunes will help to delay damage and reduce the impacts on landward communities.

Brooklands Lagoon / Spit

A breach of the spit could change how the lagoon floods and functions, including ecological implications.

You can download the full study report

ccc.govt.nz/assets/Documents/Environment/Coast/Open-Coast-Erosion-and-Flooding-Assessment-2026.pdf