



Kāpiti Island viewed from Ōtaki Beach

# Ōtaki Beach coastal hazards

## SUMMARY

### Key findings

- The Ōtaki Beach coastline has a good sediment supply that has historically resulted in shoreline growth.
- If this trend continues, only a small amount of erosion associated with extremely large storms is projected to occur under low relative sea level rise (RSLR) scenarios. However, the shoreline is projected to erode under higher RSLR scenarios over the next 30–100 years.
- For coastal flooding, the Ōtaki Beach settlement is generally well protected by sand dunes and the Rangiora floodgates but is susceptible to flooding through pathways up the Waitohu and Rangiora Streams.
- Under higher RSLR scenarios, Ōtaki Beach land parcels become progressively more susceptible to flooding and for the highest RSLR scenario the main evacuation route becomes vulnerable to flooding.

### Ōtaki Beach coastal environment

The open coast at Ōtaki Beach is mostly sandy beach (photo A) backed by sand dunes. It also has gravels from the Ōtaki River (D). Sand is supplied to this area by the persistent southward longshore transport of sediments from the four large rivers to the north (Whanganui, Whangaehu, Rangitikei and Manawatu Rivers). The supply rate is greater than the transport losses to the south, resulting in long-term shoreline growth. The dunes provide protection to the Ōtaki Beach settlement, acting as a 30–80 m wide buffer between the beach and Marine Parade. The almost continuous dunes and stopbanks provide good protection from coastal flooding, but there are low areas around accessways where water can run up into the dunes in large events.

# Coastal hazards

## Present-day erosion and flood hazards

The present-day erosion hazard is what could occur in an extremely large storm (which has a 1% chance of occurring each year in the immediate/near future). At Ōtaki Beach this is 'most likely' be 12 to 13 m of erosion, with erosion 'unlikely' to be more than 19 m.

The areas most susceptible to flooding in this size event are around the lower Waitohu Stream and Rangiuuru Stream. The Rangiuuru floodgates provide protection from coastal flooding but there is a residual risk of flooding if they fail to close.

The present-day storm tide level in an extremely large storm is approximately 0.2 m below the lowest ground around the intersection of Marine Parade, Kāpiti Lane, and Atkinson Avenue.

The most seaward beach ridge here is susceptible to wave run-up and overtopping. A small area of low-lying land in Caughley Place also lies below the storm tide level.



A. Ōtaki Surf Life Saving Club.



B. Looking upstream of Waitohu Stream into farmland and the back of Ōtaki Beach settlement.



C. Steep sand dunes next to Waitohu Stream.

## Future coastal erosion hazard

The shoreline at Ōtaki Beach has good sediment supply, which is projected to continue. As a result, it is projected that under the lower RSLR scenarios for each timeframe erosion is likely to be limited to small distances, similar to the present-day hazard in an extremely large storm. However, under higher RSLR scenarios at 30, 50 and 100 years, the shoreline is projected to erode.

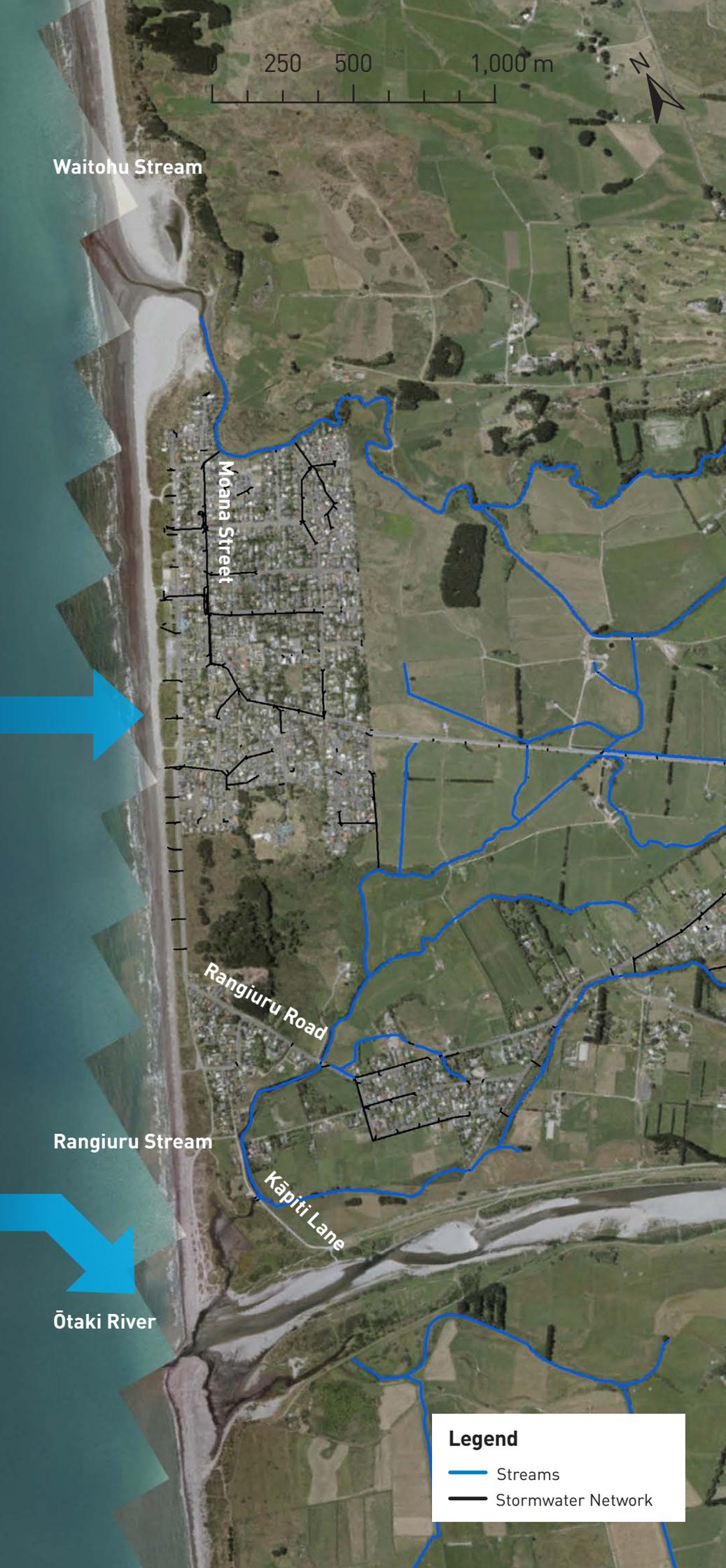
### Ōtaki Beach

#### Projected to erode:

- 13 to 30 m by 2050
- 10 to 43 m by 2070
- 7 to 94 m by 2120



D. Ōtaki River mouth.



## Future coastal flood hazard

The main flooding pathways are the Rangiuuru and Waitohu Streams and a low point in the dunes at the southern end of Marine Parade. While the Ōtaki River (photo D) provides a path for coastal flooding, the stopbanks either side of the river are well above present-day storm tide levels.

### 0.4 m and 0.65 m RSLR

The area susceptible to inundation around the Waitohu and Rangiuuru Streams increases in these scenarios. Largest areas of potential flooding are generally around Rangiuuru Road and Moana Street.

### 1.65 m RSLR

The areas susceptible to flooding around the Waitohu and Rangiuuru Streams both increase in size. The Moana Street area is susceptible to direct flooding from the Waitohu Stream. The Rangiuuru Stream catchment is susceptible to flooding from the sea over low points in the Ōtaki River stopbank at the outfall to the stream over Kāpiti Lane, Rangiuuru Road, and around the back of the Ōtaki Beach settlement.

#### Legend

- Streams
- Stormwater Network



## Vulnerability

Ōtaki Beach has low vulnerability to coastal erosion compared to other areas of the district.

For coastal erosion, Marine Parade is unlikely to be affected over the next 30 years but could be affected over 50–100 years under the highest RSLR scenarios. Up to 10 private land parcels could be affected by erosion under the highest RSLR scenario in 50 years. This increases to 95 private land parcels under the highest RSLR scenario in 100 years.

In terms of flooding, as RSLR increases, the area susceptible to flooding in extremely large storms is projected to increase from being localised around the Ōtaki River to affecting many private land parcels in the Ōtaki Beach settlement. It will also see extensive flooding in the flat farmland behind the settlement. The two main evacuation routes for Ōtaki Beach will also become increasingly susceptible to flooding in extremely large storms with RSLR.



## How these hazards have been assessed for Ōtaki

Coastal science experts from Jacobs assessed the susceptibility and vulnerability of coastal erosion and flooding hazards across the entire Kāpiti District.

Government guidance recommends councils include the high [RCP8.5H+] scenario to stress-test adaptation options, and future-proof 'greenfield' developments (new suburbs and towns) and major infrastructure.

- erosion from dunes restabilizing to their natural stable slope following a large storm.

Jacobs used a 'probabilistic approach' to tie likelihoods to the erosion distances calculated for each scenario of RSLR. The '*most likely*' range of shoreline positions has a 33–66% chance of occurring. The '*unlikely*' shoreline position is where there is a 10% chance that the erosion would reach or be greater than this position.

### Coastal erosion

The components used to calculate a potential coastal erosion distance along the Ōtaki coastline include:

- the natural long-term trend of the shoreline movement (i.e. eroding, growing, or stable)
- the amount of erosion which could occur as a direct result of the rise in sea levels compared to land level (termed the Relative Sea Level Rise [RSLR]) over time frames of 30, 50, and 100 years
- short-term storm erosion from an extremely large storm which has approximately a 1% chance of occurring in each year, based on observations from the September 1976 storm, and

### Coastal flooding

To assess the coastal flood hazard for Ōtaki Beach Jacobs mapped the area which is susceptible to flooding by a large storm tide which has a 1% chance of occurring in any year. The maps show the flooding that could occur at the present time and in the future, for RSLR scenarios of +0.4 m; +0.65 m; +0.85 m; 1.25 m and +1.65 m. Jacobs used a simple 'bathtub' approach, where all land below the storm tide water level is mapped as susceptible to flooding, regardless of connection to the sea. The maps also show areas which could be affected by additional flooding due to wave run-up overtopping the dunes.



Full report at [kapiticoast.govt.nz/coastal-science](https://kapiticoast.govt.nz/coastal-science)