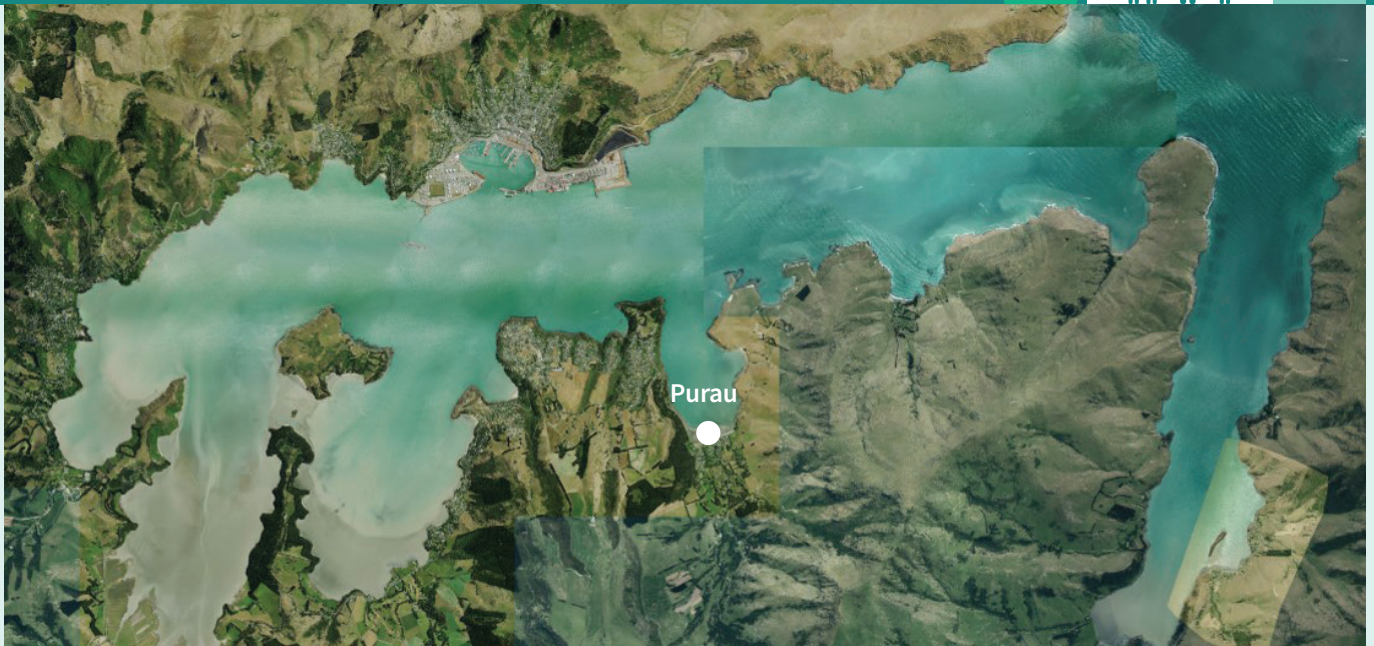


Purau



Purau is subject to impacts from coastal erosion, coastal flooding and rising groundwater. Impacts from these hazards will increase as sea levels rise and the shorefront is eroded.

The extent and depth of coastal flooding is expected to increase, particularly in areas near Purau Stream. The condition of the beach and dune will affect the extent and severity of future coastal hazard impacts because these landforms act as natural barriers. Over time the beach and dune will be eroded and their ability to reduce hazard impacts will therefore be reduced.

A range of public assets are at risk of coastal hazards, including: the Purau Foreshore, Purau Reserve, and main roads such as Purau Ave, Camp Bay Road and Purau Port Levy Road. These assets and places of value will be impacted by coastal erosion, coastal flooding and rising groundwater.

Te Hapū o Ngāti Wheke Inc is the Papatipu Rūnanga legal entity that represents Ngāti Wheke, the hapū with manawhenua status over the Whakaraupō basin and surrounding areas as outlined in the Port Cooper Deed. This entire area is culturally significant to Ngāti Wheke and sustains the hapū. Te Hapū o Ngāti Wheke has a strategic plan, a key part of which is the protection and enhancement of the whenua, moana and awa. Ngāti Wheke hopes to be a part of the leadership in climate action for future generations.

Mō tātou, ā, mō kā uri ā muri ake nei.
For us and our children after us.

Christchurch City Council recognises the rangatiratanga of Ngāti Wheke over its whenua and is working in partnership to plan for impacts on public assets and places of value.

	Short-term	Long-term
Coastal flooding	Orange	Red
Coastal erosion	Orange	Red
Rising groundwater	Red	Red

The colours in this table* show how exposed this area is to each of the coastal hazards and are indicative only. Orange refers to moderate exposure to the hazard, and red to high exposure.

Environmental setting

Located on the south-side of Whakaraupō-Lyttelton Harbour, Purau is a low-lying area situated in a valley. Purau Stream runs through the community and flows into the harbour at the western end of the beach, which is comprised of sand and gravel. A narrow section of dune and public reserve separates the beach from the main road and residential properties. A Ngāti Wheke urupā (burial site) is located beneath some parts of the reserve.

Mudflats at the head of Purau Bay provide important shorebird habitat as well as broader ecological values.

It is recognised that the natural environment, including the mudflats, beach and dune; act to mitigate coastal hazards by reducing wave energy, limiting overtopping and stabilising land.

* The table is intended to provide a sense of what hazards are most relevant to the location and how severe the impacts might be. The colouring has been informed by Christchurch City Council's 2021 Coastal Hazard Assessment and data held by the Council about risks to assets.

Rising seas

Sea level rise

The long-term record at Lyttelton Port tells us that sea level rose by around 30cm between 1901 and 2018, at a rate of 2.2mm/year. Over this period the rate of sea level rise increased slightly.

Projections from the Intergovernmental Panel on Climate Change (IPCC) indicate that we should expect between 17-23cm of sea level rise to occur by 2050, and 52cm-1m by 2100 depending on how significantly we are able to reduce greenhouse gas emissions.

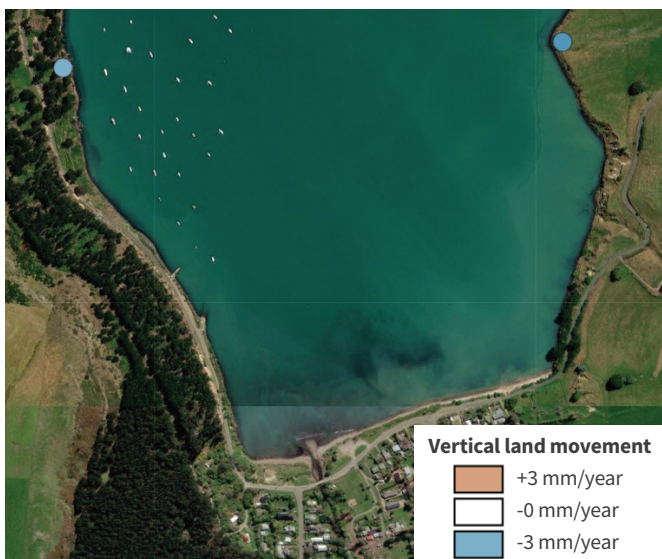
The amount of sea level rise that we experience can depend on where we are located within New Zealand, because the land that we stand on also moves.

Vertical land movement

The NZ SeaRise Programme (www.searise.nz/) has estimated local rates of land movement to help us understand where land is going up (uplift) and where it is going down (subsidence). These changes in the land level, known as vertical land movement, can decelerate local rates of sea level rise in areas experiencing uplift and accelerate sea level rise where land is subsiding.

When thinking about how we can adapt, it is useful to understand 'relative sea level rise' which includes the effects of local vertical land movement.

Historically, the areas around Purau have experienced subsidence of around 2mm/year (shown in image below). If these rates of subsidence continue over the next 30 years (to 2050), we would expect to see the rate of sea level rise accelerated by around 25 percent, from around 6.5mm/year to around 8.5mm/year.



A narrow beach and dune serve as the primary protection from coastal flooding and erosion.

Coastal hazards in Purau – today

Coastal flooding & rising groundwater

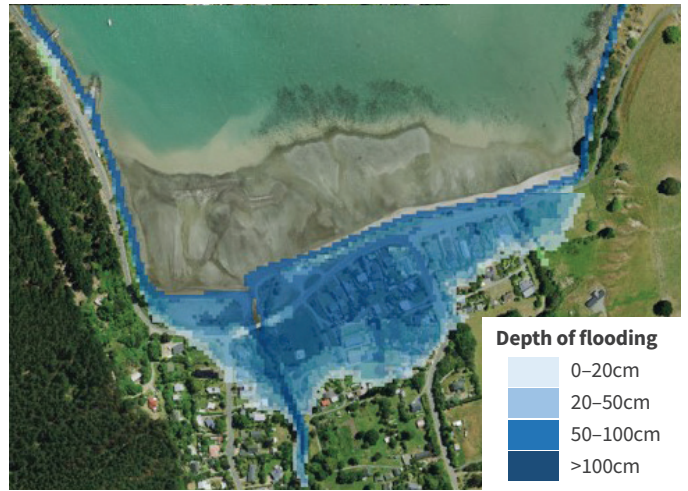
Purau can be affected by storm surge, which is a temporary rising of water levels that results from a low-pressure weather system. Spring and king tides can result in coastal flooding, particularly when these conditions occur at the same time as storm surge and/or heavy rainfall. Purau Stream allows coastal waters to extend inland and flood neighbouring areas. Because the shorefront is so low-lying, groundwater levels are high and likely to be influenced by tides.

Coastal erosion

There is no direct route from the harbour entrance to Purau, so this area is not heavily impacted by swell waves from the open coast. However, waves generated locally by wind do affect this area, particularly from the north. The water depths in Purau Bay allow waves to reach the shorefront and cause erosion and overtopping (flooding). This is different from many parts of the harbour, where shallow water depths limit wave energy.

You might have photos or stories about previous storms in this area. If you would like to share these with us then please get in touch at coastalcommunities@ccc.govt.nz

Land is shown to be subsiding, as per blue-coloured dots (Source: NZ SeaRise). There is uncertainty associated with this data, so this information should be considered indicative only.



Coastal flooding extent and depths with 40cm (left) and 1m (right) of sea level rise during a rare (1 in 100 year) storm event – sourced from Coastal Hazard Assessment 2021 (Tonkin & Taylor). Indirect flooding is shown in green.

Coastal hazards in Purau – the future

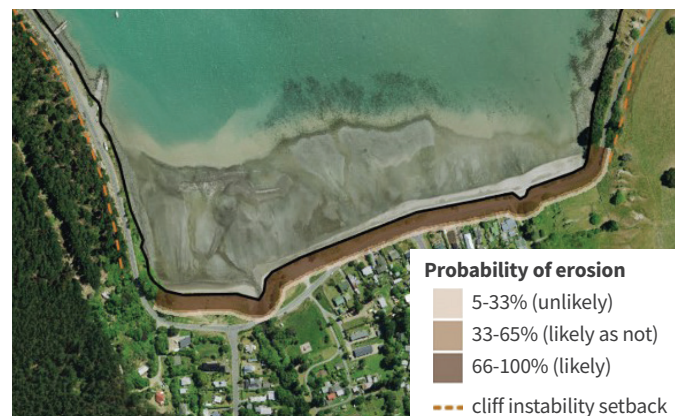
Coastal flooding & rising groundwater

Purau will be increasingly impacted by coastal flooding and rising groundwater. As sea levels rise, flooding events will be able to extend further inland, particularly near Purau Stream. This will result in increased flood depths and will mean that day-to-day water levels will be higher, drainage will be slowed and surface water (ponding) will remain in place for longer. The condition of the beach will also influence flooding in the future because the beach is a barrier to overtopping and therefore flooding. If the beach and dune can be maintained then hazards impacts could be delayed.

The images above show the projected coastal flooding extent and depths with 40cm of sea level rise (left) and 1m of sea level rise (right). Both the flooding extent and depths are shown to change, with increasing sea level. Flood depths are expected to increase considerably as sea levels rise, as shown by the darker blue colour in the image on the right.

Coastal erosion

With higher sea levels in the future, storms will impact the Purau shorefront more often and to a greater extent. This will mean the beach will have less time to recover between storms and is likely to erode as a result. As the beach and dune erode they will become increasingly squeezed, between the sea and inland development (road and residential properties). The images to the right show the storm erosion distances we can expect with 40cm (top) and 1.5m of sea level rise (bottom). As you can see, erosion could reach the road in a number of locations.



Coastal storm erosion distances sourced from Coastal Hazard Assessment 2021 (Tonkin & Taylor). The top image shows storm erosion distances with 40cm of sea level rise and the lower image with 1.5m of sea level rise. The dashed orange line shows the area of bank/cliff prone to future instability. The brown areas show the probability of short-term storm erosion.



What is at risk?

Coastal hazard impacts will increase as sea levels rise. A range of public assets and places of value are likely to be impacted, including the Purau Foreshore, Purau Reserve, the Head to Head Walkway, the main roads (Purau Ave, Camp Bay Road and Purau Port Levy Road) and stormwater infrastructure near the shorefront.

Residential property will also be impacted at Purau. In the next 10-20 years these impacts will most likely be from flooding, but overtime the shorefront will become increasingly impacted by erosion.

Purau is a culturally significant area and the loss of land (from coastal hazards) is not only about the risk to physical assets and spaces, but also the social, cultural and spiritual connections to place. In particular, it is recognised that coastal erosion threatens the urupā located near the shorefront. Christchurch City Council will support Te Hapū o Ngāti Wheke to plan for such risks.

Where to find out more:

- Christchurch City Council webpage on coastal hazards and adaptation planning
ccc.govt.nz/adapting-to-coastal-hazards/
- Christchurch City Council coastal hazards portal
gis.ccc.govt.nz/hazard-viewer/
- NZ SeaRise webpage, for information on sea level rise and vertical land movement
www.searise.nz/