

Koukourarata Port Levy



Koukourarata is subject to impacts from coastal flooding, rising groundwater and coastal erosion as well as flooding from rainfall. Impacts from these hazards will increase as sea levels rise. The extent and depth of coastal flooding is expected to increase, particularly in southern parts of the community along Pa Road. Groundwater levels are also expected to rise.

A range of public assets, including Pa Road and stormwater infrastructure are at risk, as are residential properties. It is also recognised that coastal hazards could threaten road access to Koukourarata and that these impacts could occur in Koukourarata-Port Levy or via the access road from Purau in Whakaraupō-Lyttelton Harbour.

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

Te Rūnanga o Koukourarata represents the Kāi Tahu hapū of Kāti Huikai. The hapū has a rich history in the area including the landing of our ancestors on the waka Makawhiu. The harbour that cloaks the shore at Koukourarata is known as Te Ara Whānui o Makawhiu. This entire area is culturally significant to us and sustains our hapū.

To ensure this continues, Te Rūnanga o Koukourarata have an aspirational 500 year strategy Te Mahi Tamariki – for our future generations. The embodiment of this strategy is to strengthen our three pou: Tāhua Taiao (Environment), Tuakiri Taketake (Indigenisation), Toiora Takata (Health and Wellbeing). Protecting our environment and our people will always be a significant goal for our hapū. We hope to be a part of the leadership in climate action for our 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 Te Rūnanga o Koukourarata over its whenua and is working in partnership to plan for impacts on public assets and places of value.

* 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.

Environmental setting

Located on the eastern-side of Port Levy Harbour, Koukourarata has both low-lying land and steeper, elevated areas. A number of small streams flow through the community before reaching the coast. The shorefront is comprised of a narrow cobble beach. The intertidal cobble fans around the streams are an important feeding and roosting habitat for coastal birds.

A small island (Horomaka Island) is located nearby and shelters some parts of the Koukourarata shorefront from waves.

The steep hillsides and relatively large catchment areas surrounding Koukourarata mean that heavy rainfall results in overflowing of the small streams near the coast. The largest of these streams (Koukourarata Stream) is capable of transporting large quantities of sediment, creating the cobble fan seen in the image below.

It is recognised that the beach acts to mitigate coastal hazards by reducing wave energy and limiting overtopping (flooding from the sea).



The process of shoaling is shown in the image above. This happens as waves approach the shoreline and are affected by water depth, changing their shape and speed.

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.

The Intergovernmental Panel on Climate Change (IPCC) provides global projections of sea level rise. The New Zealand projections indicate that between 17cm and 23cm of sea level rise will occur by 2050 and between 52cm and 1m will occur by 2100.

The amount of sea level rise that we experience can depend on where we are located in 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, Koukourarata has experienced subsidence at rates of around 1.7mm/year (shown in image to the left). 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 20 percent, from around 6.5mm/year to around 8.5mm/year.



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 hazards in Koukourarata – today

Coastal flooding & rising groundwater

Koukourarata 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. Both coastal flooding and groundwater-related hazards are most common in the southern part of Koukourarata, where the land is most low-lying. Coastal flooding is most intense when large tides or storm surge occur at the same time as heavy rainfall. This is because local streams become swollen with rain water and the elevated sea level blocks the release of water from the streams, causing flooding. When this occurs, a number of properties can be flooded, as can the road.

Coastal erosion

Swell waves are able to enter Port Levy Harbour and approach Koukourarata. These waves lose energy as they travel across shallower water close to the shorefront. Wind can create waves within the harbour that also impact this area. Koukourarata can be impacted by larger waves than locations at the head of the harbour because of the greater water depth close to the shore, whereas other areas are protected by extensive mudflats which reduce wave energy. The shorefront is relatively steep and the beach provides some protection from coastal hazards.

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

Coastal hazards in Koukourarata – the future

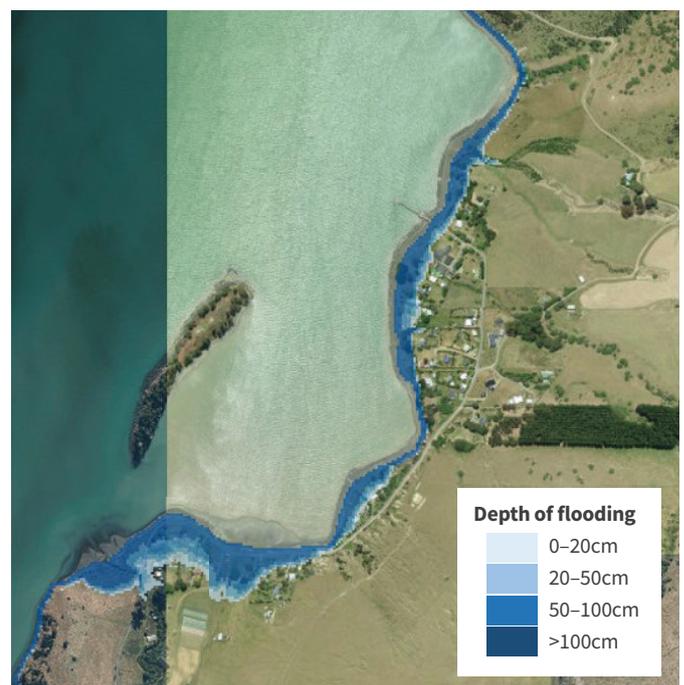
Coastal flooding & rising groundwater

Koukourarata will be increasingly impacted by coastal flooding and rising groundwater. As sea levels rise, coastal flooding events will be able to extend further inland, particularly in the southern part of the community. 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 flooding. As is the case now, coastal flooding is likely to be most severe when it occurs at the same time as heavy rainfall, causing a combination of coastal and rainfall flooding.

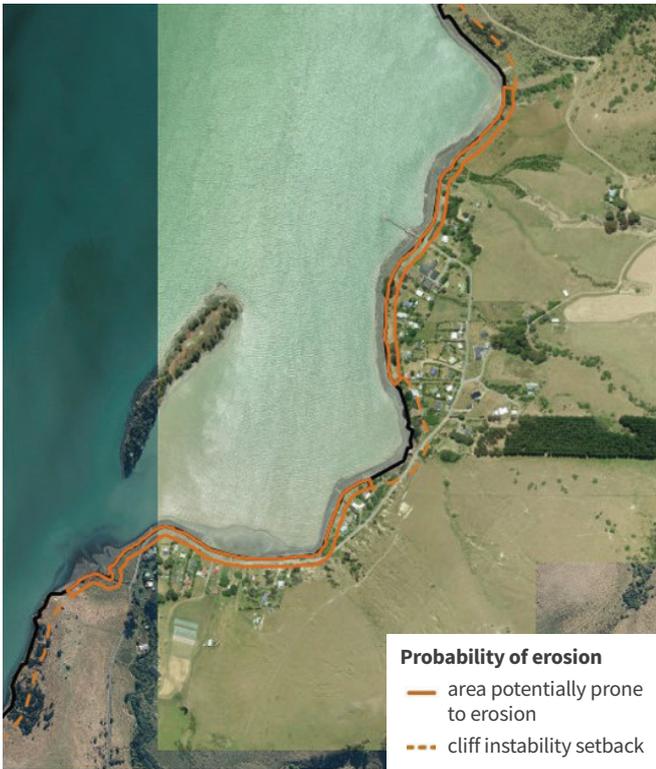
The images below show the projected coastal flooding extent and depths with 40cm of sea level rise (left) and 1m of sea level rise (right). Flood depths are expected to increase as sea levels rise, as shown by the darker blue colour in the image on the right. The extent of flooding will also increase,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

Coastal erosion

With higher sea levels in the future, storms will impact the shorefront more often and to a greater extent. This will mean the beach has less time to recover between storms and is likely to erode as a result. As the beach erodes it will become increasingly squeezed, between the sea and inland development (road and residential properties). The image on the next page shows the erosion distances we can expect with 40cm of sea level rise. The maximum erosion distances are around 25m, meaning that this much land could be lost to coastal erosion.



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).



Coastal storm erosion distances with 40cm of sea level rise, sourced from Coastal Hazard Assessment 2021 (Tonkin + Taylor). The solid orange lines show the areas potentially prone to coastal erosion and the dashed lines show areas susceptible to instability resulting from coastal processes.

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 foreshore, Pa Road, the Pa Road Bridge over Koukourarata Stream, and stormwater infrastructure.

Residential property will also be impacted at Koukourarata. In the near-term, residential property is most likely to be impacted by flooding and raised groundwater, but over time the shorefront is likely to become increasingly impacted by erosion.

Koukourarata 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 hazards could threaten road access to Koukourarata and that these impacts could occur in Port Levy or somewhere else within Lyttelton Harbour. Christchurch City Council will support Te Rūnanga o Koukourarata 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/