

Te Waipapa Diamond Harbour



The community at **Te Waipapa-Diamond Harbour** is significantly elevated and generally out of reach of coastal hazard impacts. However, the base of the cliff-side will experience increased coastal hazard impacts as sea levels rise. The Diamond Harbour jetty and associated ferry service will be impacted as will low-lying embayments, such as Church and Hays Bay.

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

The colours in this table* show how exposed this area is to each of the coastal hazards and are indicative only. Yellow refers to low exposure to the hazard and orange to moderate exposure.

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.

Environmental setting

Located on the southern side of Whakaraupō-Lyttelton Harbour, Te Waipapa-Diamond Harbour is elevated, at the top of near-vertical cliffs. The lower slopes are made up of gravel, cobble and boulder-sized material that has eroded from the cliff. The upper-slopes are vegetated and include large areas of public reserve.

* 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.

In terms of the future, 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, the ground surface at Te Waipapa-Diamond Harbour has been subsiding. Subsidence accelerates the relative rate of sea level rise because the land and sea are effectively moving towards one another. This means that coastal hazard impacts will arrive sooner.

Te Waipapa-Diamond Harbour has experienced subsidence of around 1.5mm/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 20 percent, from around 7mm/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 flooding extent and depths with 40cm of sea level rise during a rare (1 in 100 year) storm event – sourced from Coastal Hazard Assessment 2021 (Tonkin & Taylor).

Coastal hazards in Te Waipapa-Diamond Harbour – today

The shorefront at Te Waipapa-Diamond Harbour can be affected by storm surge, which is a temporary rising of water levels that results from a low-pressure weather system. The conditions most likely to cause erosion of cliffs are when spring or king tides occur at the same time as storm surge. These same conditions are the most likely to result in flooding of low-lying areas at the base of the cliff, such as the jetty.

Swell waves that enter through the harbour can impact the coast here, but these waves lose a lot of energy as they travel into shallower water in the harbour. Waves generated by wind in the harbour generally lack the energy to cause any significant erosion of the cliff-side, but will also contribute to gradual erosion.

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 Te Waipapa-Diamond Harbour – the future

Coastal flooding & rising groundwater

In Te Waipapa-Diamond Harbour rising sea levels are unlikely to increase the extent of coastal flooding or rising groundwater by large amounts because of the elevation of land. Rising sea levels will however increase the frequency and severity of flooding events that occur in any low-lying areas at the base of the cliff, such as the jetty, Church Bay and Hays Bay. Such flooding will be most significant when storm surge and spring/king tides occur at the same time.

Coastal erosion

As sea levels rise, slightly larger waves will reach the shorefront of Te Waipapa-Diamond Harbour. Although it is likely that cliff erosion could be increased, the risk of erosion is relatively low due to the lack of development at the cliff-top. Erosion of this shorefront will behave differently to other (sandy locations) as cliffs are erosional features and cannot build back up, like a beach. Additionally, sections of cliff can fail and collapse as a result of erosion of their lower slopes.

We don't have a detailed assessment of erosion risk for this area. A high-level assessment of erosion risk shows us the area which may be at risk of slope instability caused by coastal processes. This area of instability is shown to be around 30m wide (dashed line) and is a setback distance based on the cliff-angle and other contributing factors. This is not a site-specific projection of erosion. *See image on the next page.*



The dashed orange lines represent areas of cliff prone to future instability – sourced from Coastal Hazard Assessment 2021 (Tonkin & Taylor).

What is at risk?

Coastal hazard impacts will increase as sea levels rise. In the near-term (next few decades) coastal hazard impacts are likely to be minor and isolated to small areas at the base of the cliff. The public asset most likely to be impacted by coastal hazards in the future is the Diamond Harbour jetty and the associated ferry service.

Residential property in Te Waipapa-Diamond Harbour is out of reach of direct coastal hazard impacts, although nearby areas such as Church and Hays Bay are not.

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/