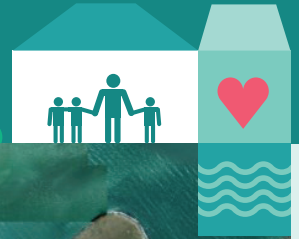


Allandale



Allandale is located in a low-lying valley surrounded by steep hills. As sea levels rise, we should expect that this area becomes increasingly damp as a result of more frequent flooding and a raised groundwater table. Surface flooding will also last for longer due to limited drainage. Flooding will occur more often and will be deeper.

This area contains low-lying sections of the well-used Head to Head Walkway, Allandale Domain and Allandale Reserve which sits on top of a historic landfill. The landfill itself is next to a regionally significant area of mudflats and a location of mahinga kai-food gathering. It is important that the management of this landfill considers the risks to the wider natural environment and harbour ecosystem as a whole.

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	Yellow	Orange
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. Yellow refers to low exposure to the hazard, orange to moderate exposure and red to high exposure.

Environmental setting

Sitting at the head of Whakaraupō-Lyttelton Harbour, Allandale is low-lying and is comprised of mudflats that have been formed by the supply of silt from the surrounding hills. These flats support mahinga kai - areas of food gathering, valued habitats and diverse ecosystems. Several scattered saltmarsh and salt meadow communities are located near the shorefront. Landward areas include the Head to Head Walkway, the Allandale Reserve and Allandale Hall, which sits atop a historic landfill. A small stream flows out near the Allandale Reserve.

It is recognised that the natural environment, including the mudflats, saltmarsh and salt meadow, act to mitigate coastal hazards by reducing wave energy, storing water and stabilising land.

The mudflat areas located at the head of Whakaraupō-Lyttelton Harbour are classed as regionally, nationally and internationally significant as a bird habitat and also support a variety of native mollusc, worms and crustacea species.

* 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, because the land that we stand on can also move.

Vertical land movement

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

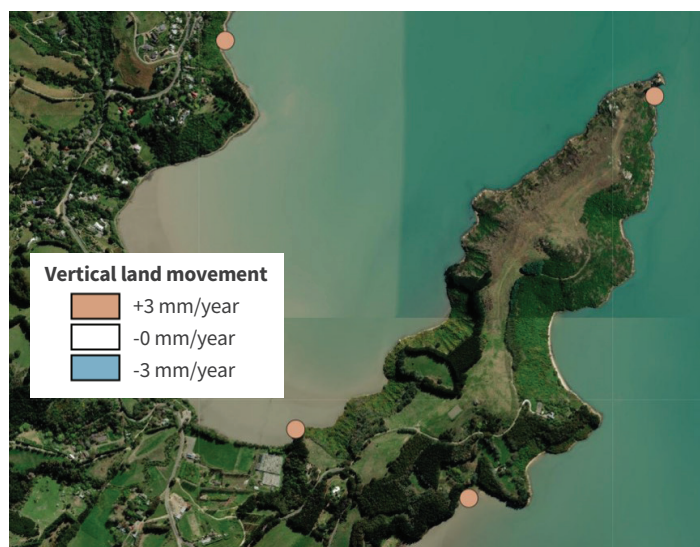
When thinking about how we can adapt, it is useful to understand ‘relative sea level rise’ which includes the effects of local vertical land movement.

Historically, Allandale has experienced minor uplift of around 1.3mm/year which could slow the onset of coastal hazard impacts in this area. If these rates of uplift continue over the next 30 years (to 2050) we would expect to see the rate of sea level rise slow by around 15 percent, from around 6.5mm/year to around 5.2mm/year.



Top: A historic landfill is located beneath the Allandale Reserve, lower-right of the image above.

Bottom: Expansive area of mudflats at Allandale.



All locations near Allandale have some degree of historic uplift (Source: NZ SeaRise). There is uncertainty associated with this data, so this information should be considered indicative only.

Coastal hazards in Allandale – today

Coastal flooding & rising groundwater

Allandale is relatively sheltered due to its position at the head of the harbour. However, this area 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. Because of the flat land, high groundwater levels and poor drainage, water can remain as ponding after a flood event.

Coastal erosion

Because water depths are shallow and there is no direct route from the harbour entrance to Allandale, it is not heavily impacted by swell waves from the open ocean. Waves generated by north-easterly wind within the harbour are most likely to affect this area. Wave energy is limited by the shallow water depths in the bay and therefore the rate of coastal erosion at Allandale is relatively low.

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 Allandale – the future

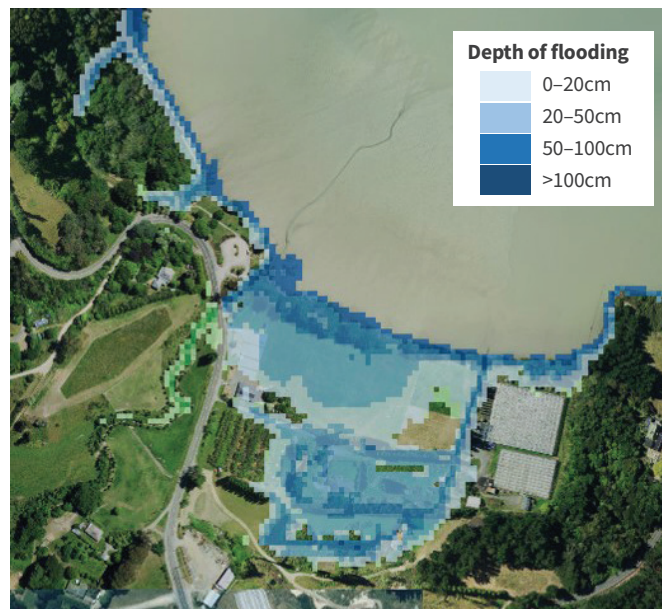
Coastal flooding & rising groundwater

Coastal flooding and rising groundwater are expected to remain the primary hazards affecting Allandale. As sea levels rise, coastal flooding will extend further inland. 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 images to the right show the projected flooding extents and depths with 40cm of sea level rise (top) and 1m of sea level rise (bottom).

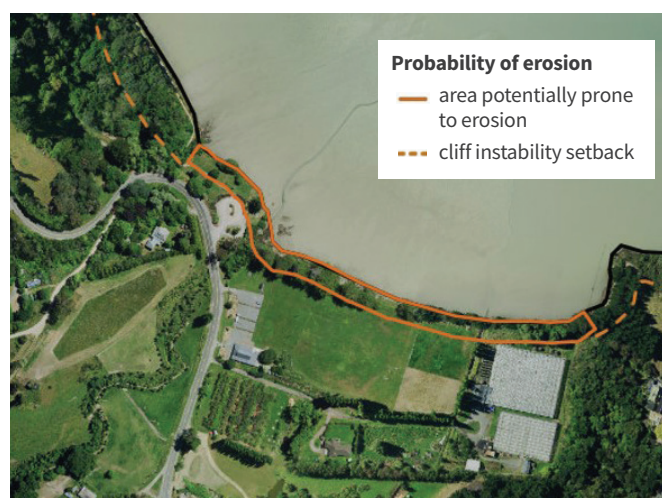
Both the flooding extent and depths are shown to change, with increasing sea level. For the most part, flood extent is limited by the surrounding steep hills, so the extent of flooding does not change significantly between 40cm and 1m of sea level rise. However, flood depths are expected to increase considerably, as shown by the darker blue colour in the bottom image.

Coastal erosion

With higher sea levels in the future, waves will impact the Allandale shorefront more often and to a greater extent. The intertidal mudflats help to lower this wave energy and so there is only a low risk of erosion. The image to the right shows the erosion distances we can expect with 40cm of sea level rise. The maximum erosion distances are around 30m, meaning that this much land could be lost to coastal erosion.



Coastal flooding extent and depths with 40cm (top) and 1m (bottom) 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 erosion distances sourced from Coastal Hazard Assessment 2021 (Tonkin & Taylor). The image shows storm erosion distances with 40cm of sea level rise. The dashed orange lines represent the area of bank/cliff prone to future instability. The solid orange lines show the area potentially exposed to erosion.



What is at risk?

A range of public assets will be impacted by coastal hazards and sea level rise in Allandale. In particular, the coastal landfill will be impacted, with erosion and rising groundwater being the two primary causes for concern.

The Allandale Reserve, the Allendale Hall, and the Head to Head Walkway will also be impacted here, along with storm and wastewater infrastructure. The Governors Bay – Teddington Road which services a range of communities around Whakaraupō-Lyttelton Harbour and to Koukourarata-Port Levy will be impacted by coastal hazards.

The Allandale mudflats and saltmarsh areas are places of significant ecological and cultural significance. With rising seas, we expect these environments to be placed under increased pressure as they become squeezed between the sea and inland infrastructure (i.e. the road). The ability of these environments to adapt to rising seas and migrate landward will depend, in part, on whether space is provided.

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/