

Find out more about climate change

What causes climate change

Climate change is caused by increased concentrations of greenhouse gases in the planet's atmosphere.

The amount of carbon dioxide, methane and other greenhouse gases is increasing due to human activities, and they are now at their highest level in at least 800,000 years.

This is causing global warming – earth is now 1.1°C warmer than it was at the start of the industrial revolution in the 18th century. We are already experiencing more extreme weather, rising sea-levels and melting ice.

Environmental changes that have already occurred include:

- A massive retreat of mountain glaciers
- Severe coral bleaching on the Great Barrier Reef
- Major drought in parts of Africa and Australia
- Marine heatwaves affecting New Zealand and many parts of the world's oceans.

Find out more about climate change, as explained by NIWA [here](#)

How climate change impacts Lower Hutt

Lower Hutt is vulnerable to a number of natural hazards:

- Earthquakes
- Flooding
- Slips and erosion.

Climate change will exacerbate many existing threats to the city. The city will experience more frequent and more extreme weather events. There will be increased heavy rainfall and more dry days –more floods and droughts. As a coastal city, Lower Hutt will be exposed to sea-level rise.

Flooding

Lower Hutt has a history of flooding, and climate change increases the risk of more frequent and more extreme flooding events. The city is located on the most densely populated flood plain in New Zealand. To manage the risk of flooding, stop-banks were developed on both banks of the Hutt River – Te Awa Kairangi, extending through the city. Many parts of Lower Hutt are low-lying and located along the coast, such as Eastbourne and Petone. Stokes Valley and Wainuiomata are also built on floodplains. Along with the river, streams flowing into Te Awa Kairangi such as Waiwhetū and Korokoro also pose flooding risks.

Climate change is predicted to generate more intense storms (with large waves and tides), heavier rainfall and flooding from sea-level rise.

Flooding can pose a serious risk to human life, affect essential services such as drinking water and power and cause billions of dollars in damage to infrastructure and buildings.

Sea-level rise

The earth's sea-level is rising from the melting of polar icecaps and expansion of ocean water as it warms. While it is clear that the sea-level is rising, it is uncertain how quickly it will rise and how high the sea-level will rise to (which is dependent on global emission reductions and global warming). NASA scientists predict between a 30cm and 1.3 metre increase by 2100, and NIWA estimates between 40cm and 1 metre. Sea levels will keep rising for centuries beyond 2100, but at a slow rate if we can reduce emissions quickly.

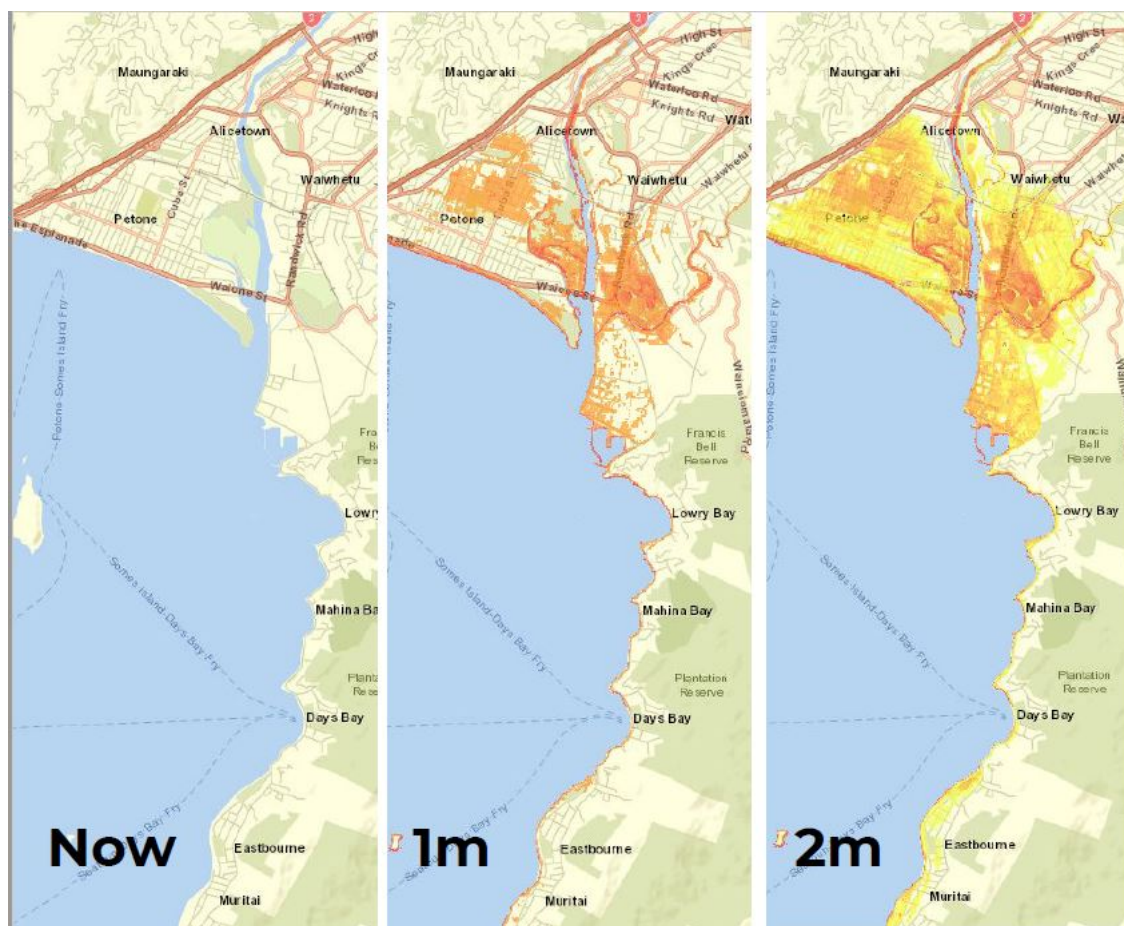
Sea-level rise will cause:

- more frequent coastal flooding
- rising groundwater levels
- more saltwater in rivers and streams
- coastal erosion.

Lower Hutt's low-lying coastal communities are vulnerable to sea-level rise.

Look at Greater Wellington Regional Council (GWRC) Sea Level Rise Models [here](#)

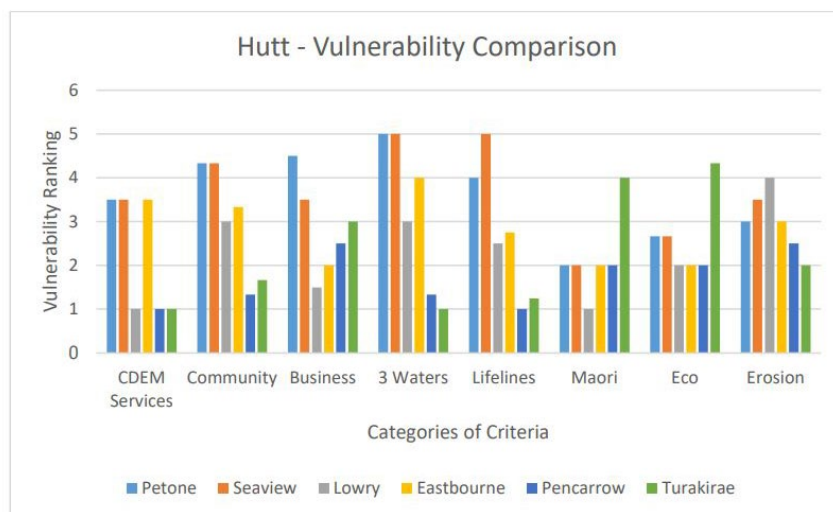
Lower Hutt Sea Level Rise Modelling



2019 report by Mitchell Daysh assessed Greater Wellington's coastal vulnerability to climate change, sea-level rise and natural hazards. The assessment considered a mix of social, economic, cultural and environmental datasets, and looked at six geographic areas in Lower Hutt – Petone, Seaview, Lowry, Eastbourne, Pencarrow and Turakirae.

Read the report [here](#)

Figure 3: Lower Hutt Coastal Vulnerability Comparison



Source: Mitchell Daysh, *Greater Wellington – Preparing Coastal Communities for Climate Change*

The report concluded that Seaview was the most vulnerable coastal area, followed closely by Petone. They had a significant area which would be captured within a 1 metre sea-level rise, with a 100-year storm event. Both have a large population, with infrastructure, housing and businesses located there. Seaview also has regional fuel storage tanks which serve as lifelines infrastructure. Eastbourne was assessed as the third most vulnerable area, as a low-lying settlement reliant on a single road. This resulted in high vulnerability in terms of services, infrastructure and high risk of coastal erosion.

Storm surge

Storm surge inundation (flooding by the sea during storms) is a major hazard, and will be exacerbated by sea-level rise.

Look at GWRC storm surge modelling [here](#)

NIWA has assessed Wellington Region's (including Lower Hutt's) exposure to inundation by storm-tides, modelling for sea-level rise of 0.5m, 1.0m and 1.5m.

At 0.5m rise, Marchbank St and Port Rd in Seaview near the mouth of the Hutt River is flooded by the storm surge.

At 1.0m rise, much of Seaview near the mouth of the Hutt River is flooded. Storm surge flooding also occurs in Moera near the Hutt Valley Golf Centre and Raceway. On the Western side of the Hutt River, the Shandon Golf Course is inundated, and flooding extends in Petone around the North Park area.

At 1.5m rise, large areas of Seaview, Moera, Waiwhetu, Petone and Alicetown are predicted to be inundated.

Look at NIWA's report [here](#)

The impacts of climate change

Our changing climate will continue to impact on our city, with an increase in catastrophic risks in the future for people and the environment. This will affect our ecosystems, health, property, infrastructure and urban planning, with a significant economic impact.

Māori communities may be particularly affected in Lower Hutt, with sites of cultural significant situated on areas at risk of sea-level rise. Historically, the pa Hikoikoi was situated at the eastern side of Pito-one beach. At the other end of the beach was Pito-one pa and an older pa, Tatau-o-te-po. Most of the pā and kainga up the valley were located close to the river, Te Awa Kairangi.

Carbon emissions produced in Lower Hutt

Emission reduction targets are net greenhouse emissions rather than gross emissions. Gross emissions refer to the total amount of GHG emissions produced, while net emissions refer to the total amount of GHG emissions produced minus emissions that have been absorbed (often through carbon offsetting – forestry). Net zero means that we are not adding new emissions to the atmosphere.

- Lower Hutt's total gross emissions (excluding forestry): 532,339 tCO₂e (2019)
- Lower Hutt's total net emissions (including forestry): 480,834 tCO₂e (2019)

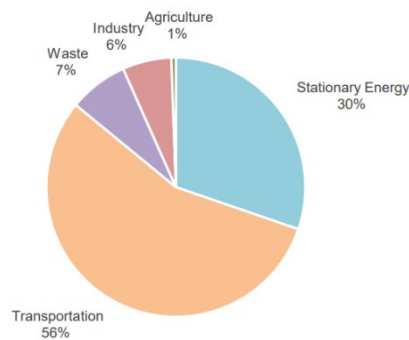
To achieve net zero emissions by 2050, Lower Hutt needs to reduce net emissions by an average of 16,580 tCO₂e per year – which is around 3.4 per cent of current emissions.

Lower Hutt's emissions are heading in the right direction. Net emissions reduced by 9 per cent between 2001 and 2019, despite a 10 per cent growth in population over the same period. This is a reduction of 2,668 tCO₂e net emissions per year – which is around 0.5 per cent.

However, Lower Hutt needs to reduce emissions at a much higher rate – lifting the current level of 0.5 per cent to around 3.4 per cent in net emission reductions per year, which is around seven times more than the current level of reductions.

Lower Hutt's main source of greenhouse gas emissions are transport (56 per cent of total emissions in 2018/19), followed by stationary energy (30.5 per cent). Waste, industry and agriculture are minor sources of emissions.

Figure 4: Lower Hutt City Sources of GHG Emissions



Source: AECOM, Lower Hutt City Greenhouse Gas Inventory, May 2020

Road transport is the highest emitting activity in the transport sector - including petrol (24 per cent of Lower Hutt's total emissions) and diesel (15 per cent of emissions). Petrol emissions reduced by 17 per cent between 2001 and 2019, primarily due to a 19 per cent drop in vehicle kilometres travelled in the city, and improved emissions performance of engines. However, diesel emissions rose by 41 per cent.

Stationary energy accounts for around a third of total emissions. Most of these emissions are from electricity consumption and natural gas. 16 per cent of total emissions are from industrial energy, 6 per cent are from residential energy, and 5 per cent are from commercial energy. Overall, emissions from stationary energy fell 3 per cent between 2001 and 2019. This is largely due to changes in New Zealand's electricity generation – greater use of renewable energy rather than fossil fuels.

As trees absorb carbon, they help to reduce the level of greenhouse gas emissions – creating a 'carbon credit'. In 2019, 74,496 tCO₂e were sequestered by forests in Lower Hutt. This included 65,151 tCO₂e sequestered from native forests and 9,345 tCO₂e sequestered from exotic forests. However, harvesting of forestry produced 22,991 tCO₂e – reducing this 'carbon credit' by 31 per cent.