Lyttelton Port of Christchurch

Environmental effects of selected Port rebuild & development plans

TE WAI / THE WATER

With its striking aquamarine tones, the water of Whakaraupō/ Lyttelton Harbour provides a place for recreation, a kaimoana storehouse and a hub for industry and transport. The ongoing quality of the water, wave height and speed of its waters are central to a continued healthy future for the Harbour and its inhabitants.

In 2014, Lyttelton Port of Christchurch (LPC) commissioned assessments of possible effects of the Port Lyttelton Plan (PLP) on waves, tidal currents, sedimentation, and mahinga kai. These assessments help us understand the potential impacts so we can develop methods to minimise environmental impacts of the PLP projects on the Harbour. A selection of these findings are summarised in this brochure.

Neil McLennan

WATER QUALITY

Water quality can effect the health of humans and marine life alike. People are affected through recreational contact (i.e., swimming, boating) and through the food chain when fishing or food gathering. Marine life is affected through the quality of their habitat and food sources. Maintaining good quality water health is important for all.

Water quality influencers

Water quality in the Harbour is complex and dynamic. It is influenced by many factors – both land and marine based, as well as weather conditions. These complex interactions result in natural changes and fluctuations in the water quality over short or long periods of time.

Man-made changes to the Harbour and its surrounds can alter these changes by speeding them up, slowing them down or introducing new variations.

Key factors that influence water quality in Lyttelton Harbour include:

- Streams and stormwater flowing into the Harbour transporting pollutants e.g., sediment containing heavy metals from roads, *E. coli*, or chemicals from industry, urban areas and farming.
- Changing land use in the Harbour basin and coastal development can alter the contaminants going into the Harbour and the way water circulates.
- Local and offshore wind conditions produce waves that stir up sediment from the Harbour bottom changing how clear the water looks.
- Wastewater discharges into the harbour can adversely affect water quality by introducing nutrients, metals, bacteria and other contaminants. Currently there are three wastewater discharges into the Harbour.

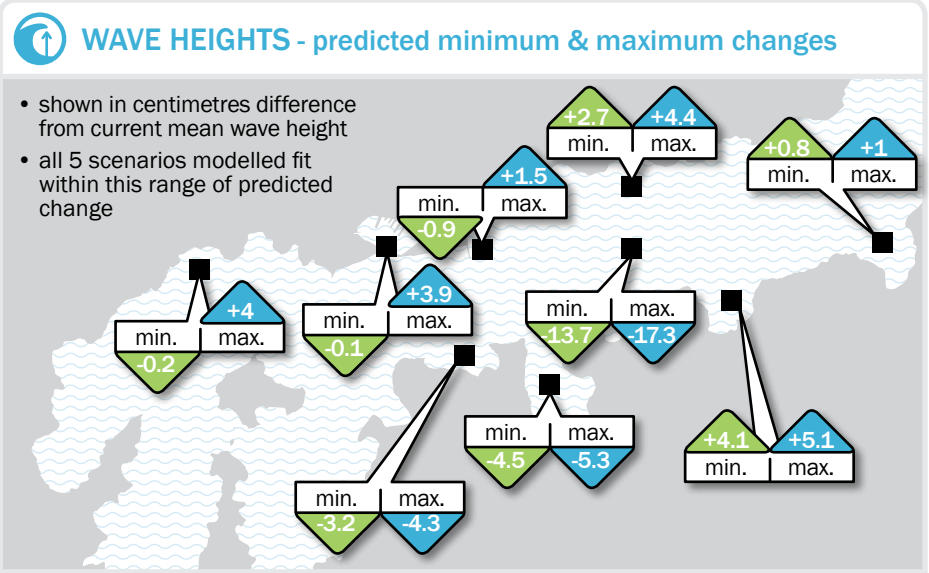
WAVES, TIDES & CURRENTS

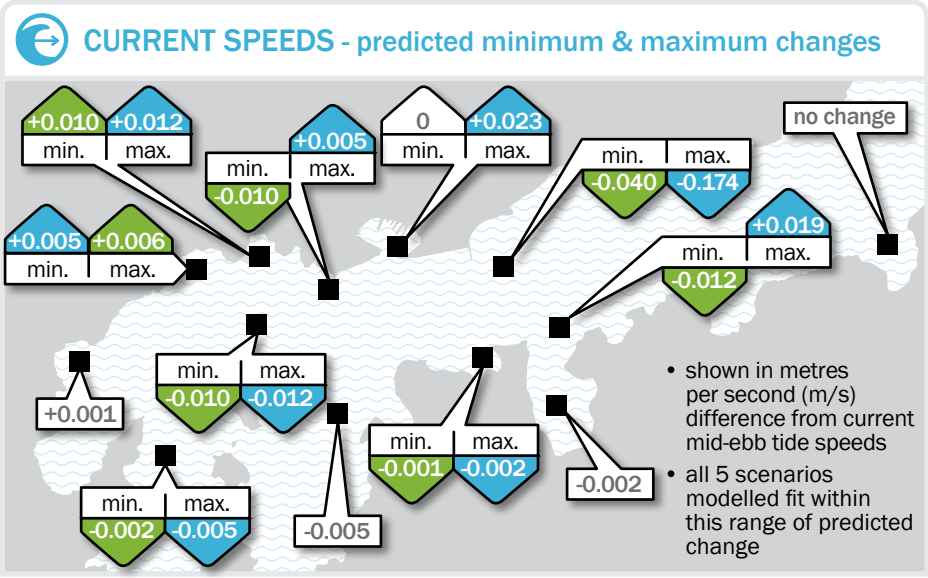
LPC commissioned detailed, robust computer modelling of the Harbours waves and tidal currents using the most accurate techniques available. Five different development scenarios were modelled to examine their varying effects on Whakaraupō/Lyttelton Harbour and Port Levy.

The five scenarios modelled included varying sizes of reclamation (up to 37 ha at Te Awaparahi Bay) and different changes to the width and depth of the navigation channel.

Results showed:

- wave heights and tidal current speeds around the Harbour would experience minimal change
- waters around Diamond Harbour are expected to see an unnoticable decrease in wave height and tidal speed
- it was considered any resulting impact on the environment would be undetectable.





SEDIMENT IN THE WATER

Sediment occurs naturally within all marine systems, and sedimentation (the continuous process of the gain/loss of sediment) is a natural action which changes over time. Due to the fine silt soils in Whakaraupō/Lyttelton Harbour sediment is easily stirred up from the seafloor and takes a long time to resettle. This silty-looking water is what gives the Harbour its striking aquamarine colour.

It appears that since European settlement the Harbour has had an increased rate of sedimentation – resulting in more sediment entering the Harbour. There are a number of reasons for this, but it's considered the main causes are historic large-scale land clearing and change of land use.

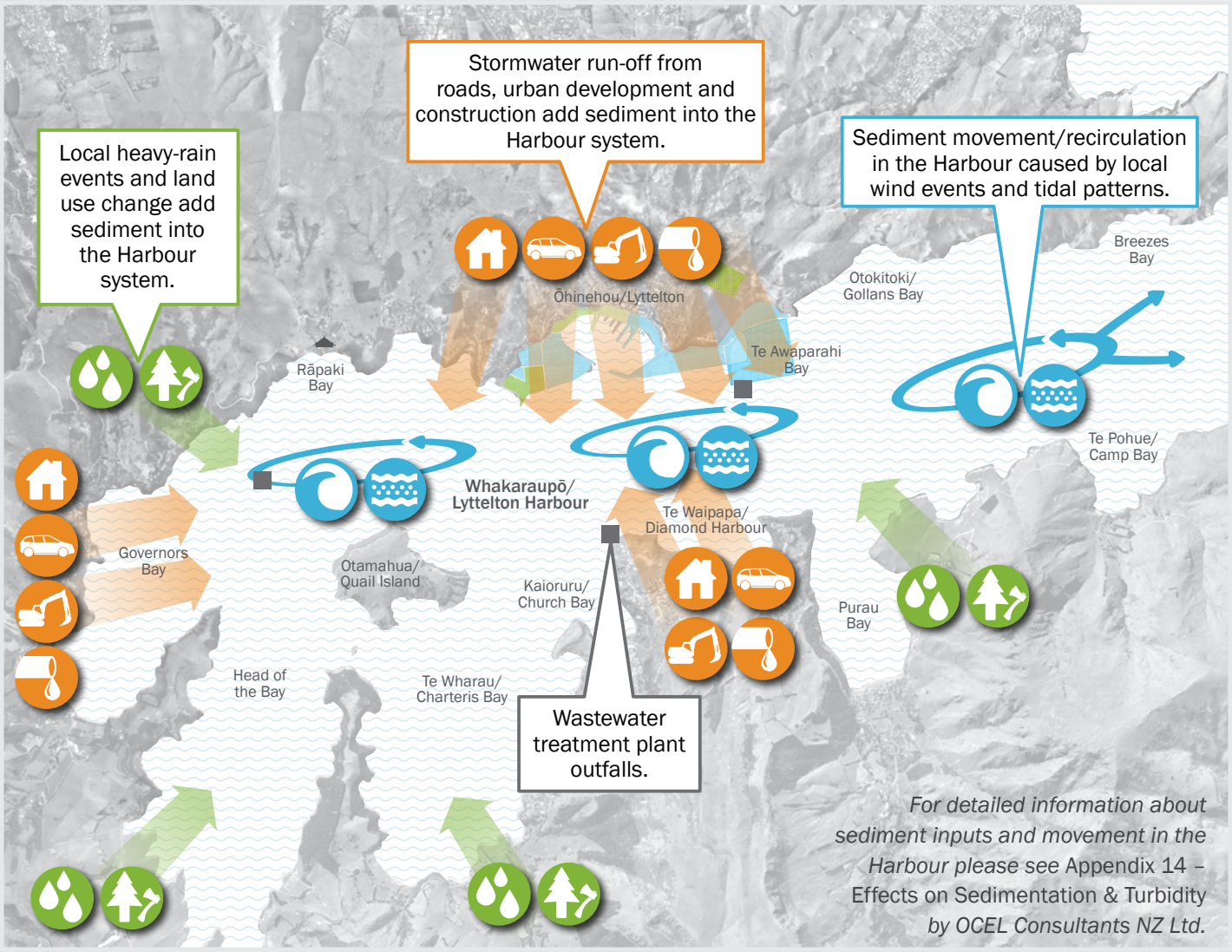
Land use change and coastal development within the Harbour can change the rate at which sediment accumulates. The fine silt sediment builds up in the Upper Harbour as the tidal currents are not strong enough to remove them out to sea.

PLP effects

The expert assessments commissioned by LPC showed that the PLP will not increase the rate of sediment accumulation in the Harbour. Neither will it significantly change the way sediment is moved around the Harbour.

During the construction phase of the PLP it's predicted there will be localised sediment plumes visible in the immediate vicinity of the disturbance (e.g., piling). The plume will return to the existing level of turbidity (cloudiness of water caused by suspended sediment) in the surrounding Harbour at the time.

Inputs & movement of sediment in the Harbour



OPPORTUNITIES FOR IMPROVEMENT

The understanding of environmental effects of Port operations has advanced significantly since the majority of the Port was built in the 1900's. LPC's and the communities value of the harbour environment (water, air and land) has also changed since those times, and much higher environmental standards are expected.

The recovery of the Port provides a unique opportunity to incorporate best-practice environmental protection features into the design and construction of rebuilt Port facilities.

This will be a combination of pollution prevention/treatment devices (e.g., stormwater treatment systems), and modern purpose-built facilities which allow for better environmental management. These systems are already being installed in the rebuilt Cashin Quay 2 wharf and the extended container yard and Norwich Quay log yard.

Overall, the pollution prevention devices and purpose-built wharves will reduce contaminants entering the Harbour, and improve water quality around the Port and wider Harbour.

"While it was considered that any ecological effects resulting from construction turbidity plumes would be limited to Te Awaparahi Bay itself and its immediately adjacent waters, subsequent monitoring...did not show any effects clearly attributable to the activity."

Sneddon & Dunmore 2014

MORE DETAIL

The content of this document has been summarised from a number of comprehensive studies commissioned by LPC. For detailed data you are encouraged to access the complete reports at www.portlytteltonplan.co.nz.

The following reports are relevant to Te Wai/The Water:

APPENDIX 13 – EFFECTS ON WAVES & TIDAL CURRENTS, Mulgor Consulting Ltd

APPENDIX 14 – EFFECTS ON SEDIMENTATION & TURBIDITY, OCEL Consultants NZ Ltd

APPENDIX 15 – EFFECTS ON MARINE ECOLOGY, Cawthron Institute

Port Talk

If you want to have a chat with us, we are at Port Talk on the corner of Oxford and London Streets every Friday, 11am–1pm, or you can email us at communications@lpc.co.nz.

Website www.portlytteltonplan.co.nz

We have established a website that has lots of information and answers to common questions about our plans, and their effects on the local community and environment.

Other communication

Updates will be available in our quarterly newsletter in hardcopy or digital form. Pick up a hardcopy at Port Talk, or go to www.lpc.co.nz to download a pdf.