Northern Adaptation Area High-level Menu of Pathway Options

Status Quo

1. Status Quo
Continue maintaining existing dunes and infrastructure to its present-day level of service – i.e. do nothing new.

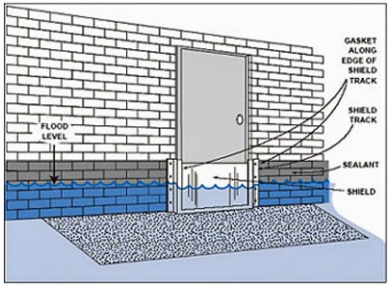
Enhance

2. Enhance Existing Inundation Protection (stopbanks)
Increase existing stopbanks to provide greater protection. Incorporate sea level rise and higher intensity events into the design of stormwater management when it is being upgraded.

3. Dune Resilience 'Package'
Increase dune enhancement by building wind trap fences, vegetation planting, and managing access across the dunes through creating walkways and vehicle access. Includes managing coastal wetlands and riparian planting.

4. Education and Emergency Management
Increasing community understanding and awareness of the hazard; continue emergency management, and increase environmental monitoring of the hazard and responses.

Accommodate



5. Floodproof Buildings and Infrastructure
Wet proofing – allowing water to enter the structure but minimizing the structural damage through using flood resistant materials or elevating structures.
Dry proofing – making buildings water-tight so that water cannot enter.

6. Adaptable and Relocatable Buildings
New builds can be relocatable to move away from the hazard, which can lower the cost of retreating in the longer term.

7. Elevate Floor Levels of Buildings
Raising the floor levels of existing properties which are at risk from inundation.

Retreat

8. Retreat
Proactively moving properties or infrastructure away from the hazard. This could be done through land acquisitions, buy outs, land swaps, lease backs, future interests.

Protect – Soft Engineering

9. Beach Renourishment (soft engineering)
Adding sediment to the beach system, either onshore or in the nearshore.

10 Beach Scraping/ Dune Reconstruction (soft engineering)
Redistribution of sediment across a beach profile to increase the dune/crest elevation on the beach.

Protect – Hard Engineering

11. Sea Walls (hard engineering)
Vertical, buried, or sloping (i.e. rock revetment) sea walls which prevents the passing of water and sediment between the hinterland and the sea. Material could include: concrete, rock, gabion baskets, timber.

12. Stopbanks (hard engineering)
Engineered stopbanks (earth bunds) along the settlement or river prevent flood water from enter into the settlement

Protect – Hard Engineering

13. Culverts and Flood Gates (hard Engineering)
Culvert outfalls with flap gate valve at the entrance of a small inlet which would allow water to flow out of the culvert, but not in from the sea/river. Flood gates are larger adjustable gate structures used to prevent storm tides from entering existing waterways, in turn preventing up-stream overtopping and flooding.

14. Detached Breakwaters (hard engineering)
Offshore structure placed in the nearshore close to the shore to reduce the wave energy that is reaching the shore. This creates a low-energy environment in the lee of the structure that encourages the deposition of sediment and the localised build-up of a wider beach. These breakwaters could be exposed (as shown), or submerged in the form of a nearshore reef.

15. Pump stations
Stations and infrastructure to pump water away from an area and back out to the water source.

Avoid

16. Zoning and Setback Controls
Limiting future land uses in areas exposed to hazards to reduce or avoid increasing the future hazard risks in these areas.

17. Trigger-based or Time Limited Land Use Controls
Including conditions on consents linked to hazards such as sea level rise, flood depths, or erosion rates that create a finite term for a particular land use.

18. Building Design
Planning provisions in place for potentially susceptible areas to ensure floor levels are above design flood levels for new builds. Can also include planning provisions on the need for relocatable buildings.

19. Reducing Further Intensification or Development
Planning restrictions to reduce further development or intensification within existing settlements that are likely to be affected by hazards in the future.

Image Sources:

1. Jacobs (2020)
2. https://www.waiotahi.co.nz/project/edgecumbe-stopbank-breach/
3. KCDC (2022)
4. KCDC (2019)
5. https://www.wbdg.org/resources/flood-resistance-building-envelope
6. https://www.stuff.co.nz/business/103777031/relocatable-houses-give-instant-equity
7. https://homeguide.com/costs/house-lifting-cost
8. https://newsline.ccc.govt.nz/news/story/want-to-help-transform-christchurchs-red-zones
9. https://www.sibfl.net/beach-re-nourishment-project-moving-forward/
10. https://www.nbnnews.com.au/2020/06/04/council-looking-into-another-sand-scraping-program-at-old-bar/
11. Jacobs, 2020
12. Paul Taylor - https://www.nzherald.co.nz/hawkes-bay-today/news/cyclone-gabrielle-one-in-500-year-flood-prevention-system-on-its-way/PF57ZTX7OFG4TKS4YNNTEX22DA/
13. https://www.agassizharrisonobserver.com/news/new-floodgate-policy-in-kent-to-help-prevent-flooding-year-round/
14. https://www.dreamstime.com/stock-photo-breakwater-entrance-to-cowes-harbour-isle-wight-uk-rock-armouring-layers-provide-prtection-famous-englash-image74048785
15. https://romtecutilities.com/stormwater-pump-stations/
16. https://www.researchgate.net/figure/Shoreline-setback-on-a-peninsula_fig3_268599306
17. https://www.nrdc.org/bio/rob-moore/ipcc-report-sea-level-rise-present-and-future-danger
18. https://housing.com/news/5-advantages-of-elevated-house-design/
19. https://talkwellington.org.nz/2018/what-the-heck-is-residential-intensification/