

# Future 5 – Reshape

**Future 5 – Reshape** focuses on creating space for water and people through a combination of open waterways, green infrastructure and raised land development.

It aims to manage flooding and groundwater risks while enabling resilient urban transformation, high-density housing, and long-term community viability while allowing space for water. This space for water provides a town-belt style amenity along the waterways.



## KEY PROJECT FEATURES

<b>TOTAL REPURPOSED LAND</b> <b>102 ha</b>	<b>1738 PROPERTIES ACQUIRED</b>	<b>34 km OF PIPING NETWORKS</b>
<b>16 ha FOR STORAGE &amp; WETLANDS</b>	<b>44.5 ha OF RAISED LAND</b>	<b>1.5 km SEAWALL</b>
<b>16 km OF GW PIPE NETWORKS</b>	<b>7 NEW PUMP STATIONS</b>	<b>3 NEW OUTFALLS</b>
<b>3.5 km OF OPEN CHANNELS</b>	<b>1 NEW GW PUMP STATIONS</b>	

## What we heard about Future 5 – Reshape

In 2025, Council asked for feedback from Aukaha (representing Kāi Tahu mana whenua) and the local community. We've used this feedback to inform development of our futures.

### KĀI TAHU RŪNAKA

Engagement with Aukaha indicated that Kāi Tahu mana whenua considers **Future 5 – Reshape** to have moderate to high alignment with Te Mana o Te Wai and a ki uta ki tai approach. Additionally, it was noted that lower levels of flooding would result in improved community Hauora (health), with wider community benefits related to wellbeing.

However, Aukaha stress that these benefits are offset by high levels of disruption to communities and businesses, with risks to a just and equitable transition.

While **Future 5 – Reshape** represents a strategic adaptation response, the views of Kāi Tahu mana whenua were that it is heavily reliant on hard infrastructure and disruptive land-use changes, making cultural and social outcomes dependent on strong equity measures and careful planning.

### COMMUNITY ENGAGEMENT

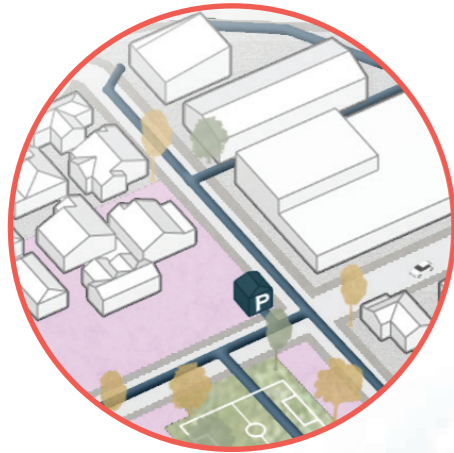
The community expressed mixed views on **Future 5 – Reshape**. Around 35% of respondents agreed it was taking South Dunedin in the right direction, but opinions were divided on whether it offered real choice about where people could live. Many appreciated the option's focus on enhancing natural aspects and creating safer living environments, seeing it as a proactive response to climate risks. However, concerns were significant, with respondents wanting clearer information on how land would be raised, the timeframe for implementation, and what support would be available for affected residents.

While some believed quality of life would remain the same or improve slightly, others worried about social and mental health impacts from displacement and disruption. The perceived cost and loss of community and commercial areas were major drawbacks.

Overall, **Future 5 – Reshape** was seen as promising but challenging, requiring strong planning and equity measures.

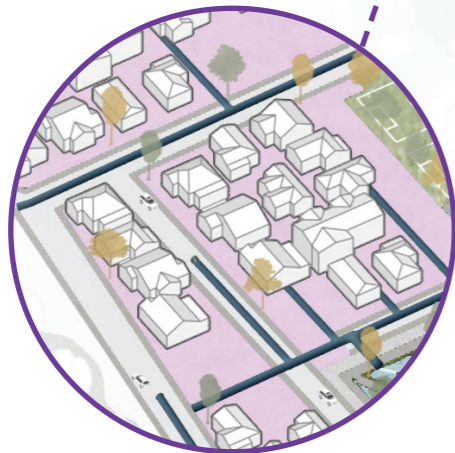
**FUTURE 5 - RESHAPE**

**Short-term  
(next few decades)**



**Pipes, pumps and flow paths**

Council would make substantial investments in pipe and pump infrastructure. New pump stations would lift peak pumping capacity by 137% in larger rainfall events (more than double current volumes). Upsizing existing stormwater pipes and adding new pipelines across 25 km of the network would increase capacity to better manage rainfall and groundwater. Daily pumping would lower groundwater while also providing sufficient capacity to drain stormwater during rain. Roads may still flood at times, but property impacts are generally avoided in events with a 2% annual chance of occurring, with some risk remaining in rarer 1% events.



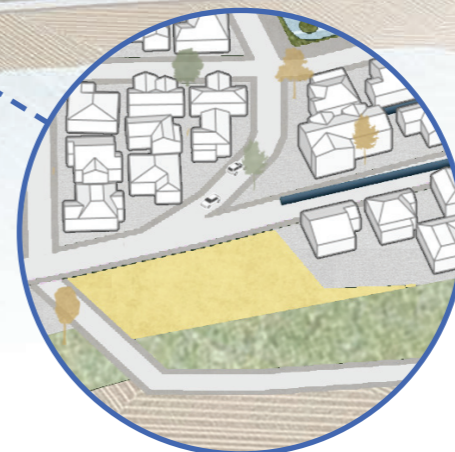
**Property acquisition**

Property acquisition (shown in pink areas) would take place in zones with combined high groundwater and flood risk to prepare for safer development and infrastructure. Rezoning begins in the Flat for changes in development rules to avoid increasing risk.



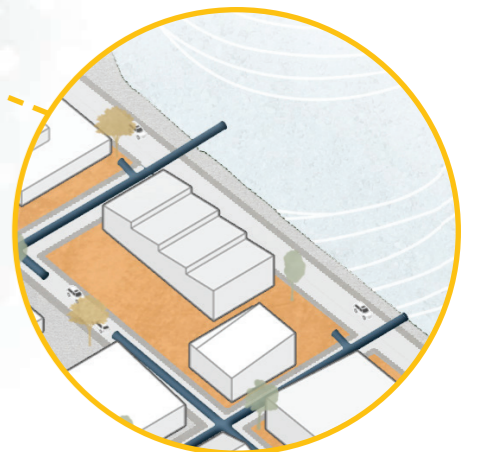
**Storage**

Parts of Forbury, Bathgate and Tonga park are used for stormwater storage balancing space for sports, recreational natural spaces, and water. This storage is connected to a pumped pipe system, which drains the ponds and adds further capacity to the overall system. More blue-green spaces would be needed in the future requiring some land acquisition (shown in pink).



**New development**

Areas shown in yellow near Ocean Beach Domain would be zoned for medium-density development to provide lower-risk spaces for people to shift to over time. This would minimise disruption for people wanting to remain in South Dunedin that currently live in areas that need to be converted to space for water or land raising.



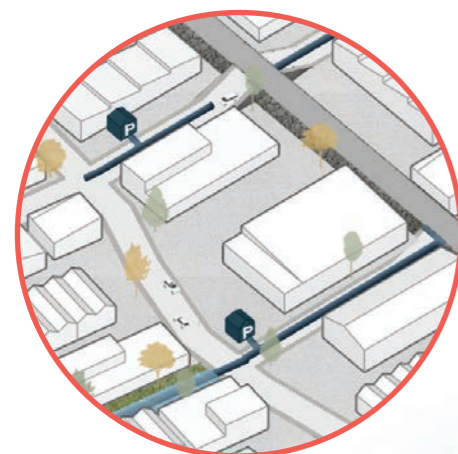
**Coastal protection**

In the coming decades, there are no changes to coastal protection along the harbourside. The area in orange would be zoned for floodable ground floors or other property-level protection to manage future coastal flooding.

**Working together with the St Clair / St Kilda Coastal Plan:** There are a few ways to protect the coast, from hard structures like seawalls and offshore barriers (offshore breakwater) to softer options like adding more sand. Any plan would also deal with the contaminated landfill at Kettle Park. Right now, the quickest and most effective thing to do is protect the area where the St Clair geobags end and the Kettle Park landfill begins. This would mean building an offshore breakwater there, removing some of the landfill, and reshaping the dunes at Middles Beach to help reduce erosion.

**FUTURE 5 - RESHAPE**

# Medium-term (mid-century)



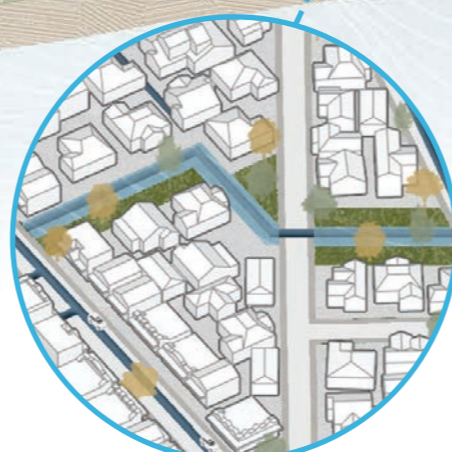
**Pipes, pumps and flow paths**

Once flood depths greater than 150mm occur on residential lots or local roads, Council would invest in a further 9km of pipes and increases pump capacity by an additional 18%. Roads still periodically flood, but impacts to properties are generally avoided during rainfall events with a 2% chance of occurring each year. During extreme events with a 1% chance of occurring each year, there remains some risk of property damage.



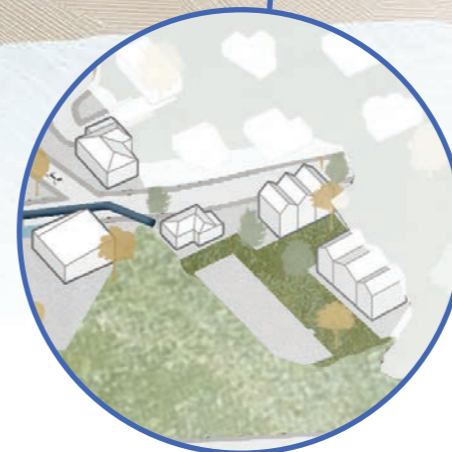
**Land raising and development**

Property acquisition would be complete by this point and would provide more space to manage stormwater and raise land. The area around Forbury Corner would be cleared and built up to prepare for development in a safe elevated area. Land raising would make ground levels higher through placement of fill material to reduce risk to pluvial, groundwater and coastal flooding and would extend the natural terraced area.



**Waterways and storage**

The construction of a network of MacAndrew, Kaituna, Victoria, Coughrey, and West waterways would occur in the medium-term. Some of these align with historic natural systems, and multi-use green spaces for stormwater storage and recreation. Victoria Waterway in particular helps to manage groundwater, capturing tidally influenced groundwater before it moves inland and helping to manage saltwater intrusion. In some places it would still be difficult to manage groundwater though so Council would construct green spaces in areas of persistent groundwater emergence, like in Musselburgh.



**New development**

Medium-density residential space areas would be developed along Victoria Road with on-site stormwater management, set back from expected future shorelines. Any loss of existing park space would be balanced by creation of more parks and green spaces in higher risk areas, such as on the Flat, to enable the best use of land in South Dunedin. Along Forbury Road, new development begins when land raising is completed.



**Coastal protection**

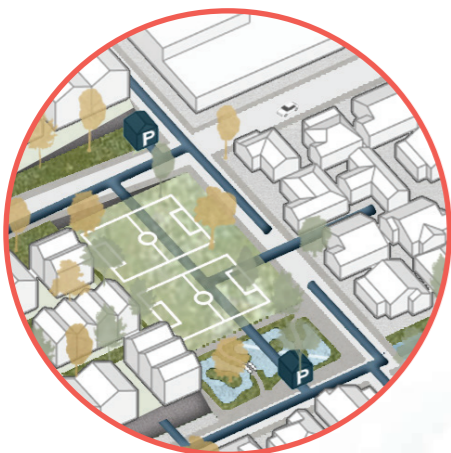
To prevent overtopping-related structural failure, road damage, and safety risks, Council would add harbourside protection by building an inland coastal bund near Otaki Road and raising road levels to maintain emergency and community access. By then, Portsmouth properties would have property level adaptation in place.

**Working Together with the St Clair / St Kilda Coastal Plan:** Rising sea levels and more storms would weaken and undermine the south coast seawall over time. To stop it from failing and to help keep sand on the beach, the seawall would need to be upgraded, shifted, and possibly supported with extra sand. The contaminated landfill at Kettle Park may also need ongoing remediation to prevent pollution. In future, buffer zones might be needed along the coast to allow room to move things back if erosion or flooding gets worse.



**FUTURE 5 - RESHAPE**

# Long-term (towards the end of the century and beyond)



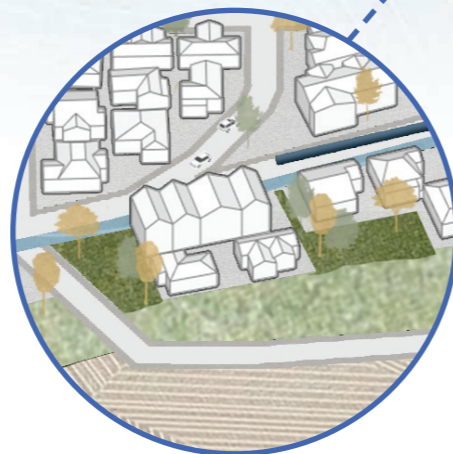
**Pipes, pumps and flow paths**

In order to keep land dry, no additional pipes or pumps are needed, provided good maintenance and periodic replacement occurs. Roads still periodically flood, but impacts to properties are generally avoided during rainfall events with a 10% chance of occurring each year. During extreme events with a 1% chance of occurring each year, there remains some risk of property damage.



**Waterways and storage**

The scale of storage in green space increases, providing further space for water on low-lying land as groundwater becomes more difficult to manage and rainfall is projected to increase. Water is stored in ponds then discharged when the network has capacity (e.g. after a storm passes). While groundwater is reasonably well managed with up to 1.1m sea level rise with daily pumping, it becomes more challenging beyond 2125.



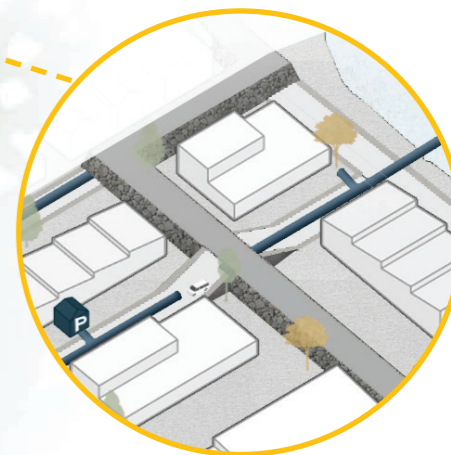
**New development**

Medium-density residential space along Tahuna, Victoria, and Forbury Roads would be complete by this stage.



**Green space creation**

To limit intolerable flooding of property, acquired land would either be raised and developed or converted to green space for stormwater and groundwater management, reflecting the area's high long-term risk. As the Portsmouth Drive seawall is not extended in this future, the area near Bayfield High School would likely become open space. Green space would include a mix of natural reserves, sports fields, and parks. Council would retain flexibility to adapt to other futures; if risks become unmanageable, a gradual shift to raised land (Future 6) remains a very long-term option.



**Coastal protection**

A coastal bund along the commercial area would be installed to reduce recurring overtopping and prevent coastal floodwaters entering the Flat. As coastal storms begin causing periodic seawater inundation in the commercial area, remaining businesses would need property level measures. The proposed bund alignment leaves some critical infrastructure, such as the Transpower substation, outside the protected area; as with the Edgar Centre, property owners would be responsible for their own interventions (for example, site bunds and door floodgates).

**Working Together with the St Clair / St Kilda Coastal Plan:** Rising sea levels and more storms would weaken and undermine the south coast seawall over time. To stop it from failing and to help keep sand on the beach, the seawall would need to be upgraded, shifted, and possibly supported with extra sand. In future, buffer zones might be needed along the coast to allow room to move things back if erosion or flooding gets worse.



## FUTURE 5 - RESHAPE

# Objectives assessment

### SUSTAINABLE URBAN DEVELOPMENT

#### Short-term

Strategic changes to planning rules supports a compact urban form by limiting development in flood-prone areas and enabling higher-density housing. Stormwater capacity upgrades lower emissions from emergency pumping but still require ongoing energy use. Modular, circular infrastructure design minimises waste and supports long-term adaptability.

#### Medium-term

Raised land and an inland coastal bund create future development opportunities while reducing environmental impacts, with reused aggregates lowering emissions. Expanded wetlands and waterways act as carbon sinks and enable more passive stormwater management, reducing reliance on energy-intensive pumping.

#### Long-term

High-density, walkable communities reduce transport emissions, while adaptive reuse, modular design, and nature-based solutions minimise waste, sequester carbon and enhance biodiversity.

### ENVIRONMENTAL AND CULTURAL RESTORATION

#### Short-term

There are limited ecological benefits in the short-term, as infrastructure upgrades focus on engineered solutions to move water.

Opportunities for mana whenua to engage in adaptation responses and re-establish connections through enhancement of rakatirataka and kaitiakitaka.

Short-term ecological gains are limited due to a focus on engineered water-management solutions, while adaptation processes provide opportunities for mana whenua to strengthen rakatirataka and kaitiakiaka through renewed connections to place.

#### Medium-term

New greenways and waterways improve habitat, connectivity, and biodiversity, though construction and land raising may cause temporary environmental impacts without strong erosion control. While interventions begin aligning with Te Mana o Te Wai, some reliance on hard infrastructure remains.

#### Long-term

Expanded green infrastructure improves mauri, ecological connectivity, and cultural ties, while mixed-use green spaces enhance holistic wellbeing and reinstated waterways and wetlands strengthen ki uta ki tai approaches and support cultural and ecological restoration.

### PROMOTE COMMUNITY SAFETY

#### Short-term

Stormwater upgrades greatly reduce flooding from frequent events and contain rarer floods to roads, while strategic changes to planning rules improves long-term safety by reducing exposure, though residual risk remains due to reliance on pumping systems.

#### Medium-term

Coastal protection and raised land reduce pluvial flooding and coastal inundation for most buildings and critical infrastructure, though some key assets still require site specific protection. Residual risk persists at the St Clair / St Kilda dunes.

#### Long-term

Reliable groundwater and stormwater management protects properties, critical infrastructure and access routes, though residual risk from extreme events and coastal hazards still require ongoing monitoring and adaptive management.

### JUST TRANSITION

#### Short-term

Early changes to planning rules and property acquisition increase certainty and protect service access for vulnerable groups, though they may create short-term housing supply constraints and affordability pressures.

#### Medium-term

Key access routes are protected by the inland bund and raised roads despite construction disruptions. Raised land enables higher-quality and more affordable housing though initial costs may challenge low-income households. Vulnerable groups remain protected but may face social and cultural disruption from relocation, and new green spaces improve equitable access to recreation.

#### Long-term

Raised neighbourhoods would ultimately provide high-quality housing for the whole community, including vulnerable groups, while relocating schools to safer areas improves education security, though risks of social fragmentation, affordability pressures and uneven transitions would persist.

### SOCIAL AND ECONOMIC RESILIENCE

#### Short-term

Strong transport networks help maintain access to education and key community facilities, though property acquisition may create uncertainty for vulnerable households about continued access to those same services.

#### Medium-term

Raised land increases community feelings of safety and wellbeing, though coastal flood risk is rising in the area between Ōtaki Street and Portsmouth Drive.

#### Long-term

More green spaces and relocating schools to safe zones improve wellbeing and long-term educational security, though floodable commercial areas and concentrated high-density housing on raised land may create property value disparities between elevated areas and remaining floodplains.

**FUTURE 5 - RESHAPE**

# Implementation approach

Adapting South Dunedin to a changing climate requires a sequence of interdependent actions, as shown below, which illustrates the indicative timeline for implementation. Actions along **Future 5 - Reshape** are presented with sample signals (▲) and triggers (◆) representing early warning signs and resulting key decisions or enabling actions. Signals, triggers, and adaptation thresholds may be social, economic, ecological, physical, or cultural. The timing shown for signals, triggers, and actions is indicative only.

In the short-term, Council must first coordinate significant upgrades to the pipeline network and pumps to move water efficiently. These upgrades are critical before any stormwater storage areas can be established. Once drainage capacity is improved, Forbury Park and part of Tonga Park can be developed into greenspace designed for stormwater management. This includes waterways to enhance management of groundwater and the stormwater in the medium-term which have been designed to compliment the pipe network.

Early in the short-term, the planning framework must also be amended to regulate development. These changes would restrict development in some low-lying areas to avoid exacerbating existing risks and allow for future land acquisition, while enabling development in other areas. This includes introducing zoning provisions for floodable ground floors along Portsmouth Drive to manage risk.

In the medium-term, land acquisition would continue opportunistically. Properties acquired during this stage could be rented until enough land is consolidated to enable large-scale transformation prior to 2075. An inland coastal bund along Otaki Street constructed by 2060 helps to keep coastal flooding from the harbourside out of the Flat. Each of these steps depends on the successful completion of earlier actions, creating a chain of dependencies that allows South Dunedin to adapt effectively to climate change.

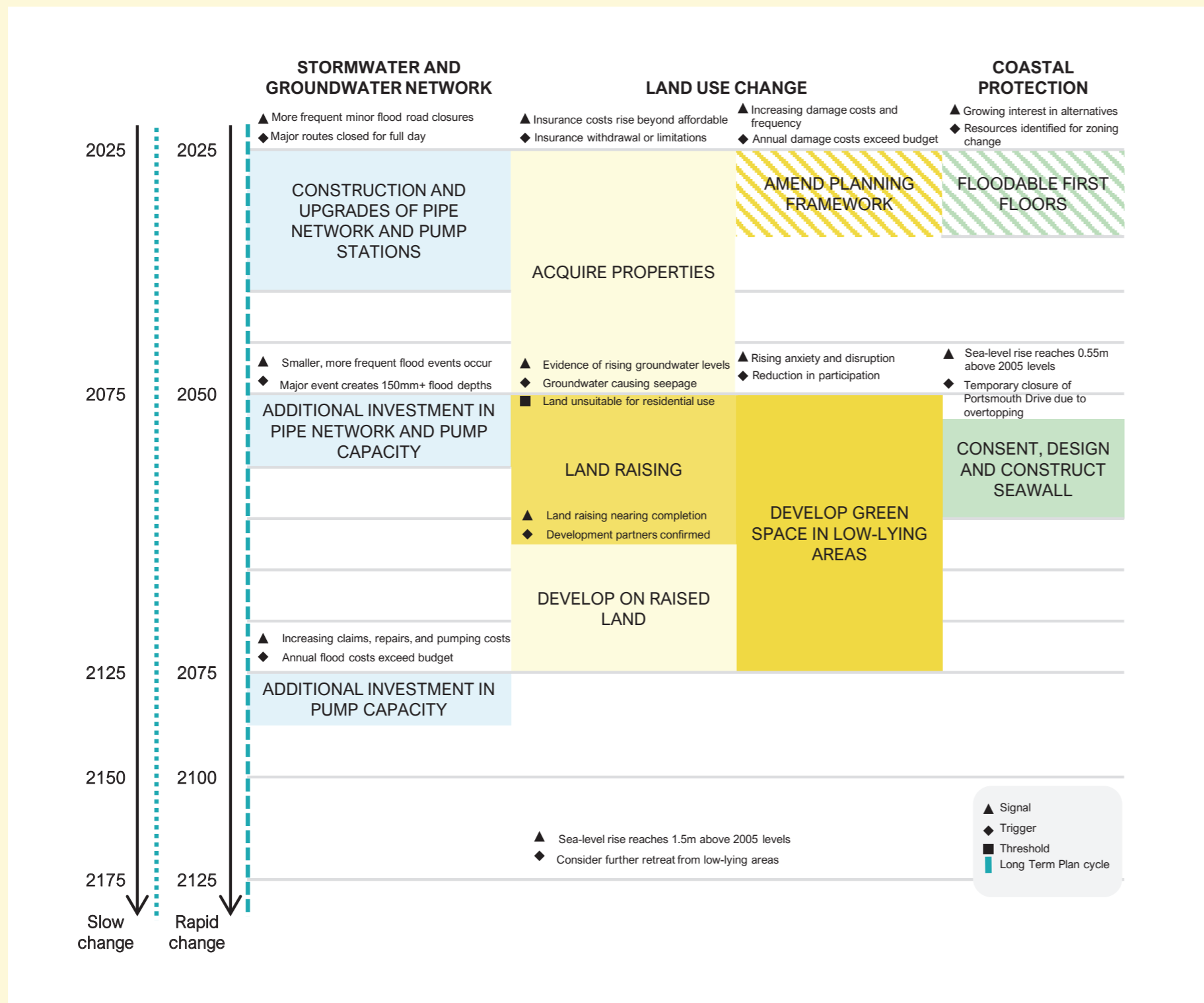
## WHAT ELSE DO WE NEED TO ACTION IT?

**Changes in land use regulations:** Council would need to make changes for development in the Flat and enable works related to upgrading infrastructure and raising land. This is a critical first step.

**Property acquisition (buyouts):** Land would need to be acquired to make space for pipes, pump stations and green infrastructure (e.g. stormwater management wetlands) which are “public works” because of their flood mitigation and public safety functions. Simultaneously, acquisition across Forbury Corner and Musselburgh would be required to enable safer development. Areas identified for acquisition are where risk may be too challenging to manage in the long-term or where locations are required to manage risk for the wider area.

**Financial incentives or penalties:** Financial incentives can positively influence land use change and relocation required. Some potential financial incentives could include Council providing land swaps, grants or low-interest loans for households relocating to raised land and development incentives in safer areas.

**Funding mechanisms:** Funding mechanisms are crucial for both the development of infrastructure and property acquisition. Further work is needed on funding mechanisms, but public-private partnerships or development contributions could be used for infrastructure upgrades.



**FUTURE 5 - RESHAPE**

# Economic measures

The Cost Benefit Assessment work seeks to compare the implications of proposed futures for South Dunedin. Costs and benefits are indicative and intended for comparison at this step of the South Dunedin Future (SDF) Programme.

Time period	Benefits (\$m)	Costs (\$m)	BCR
Short-term (0 - 25 years)	\$450	\$1,938	0.23
Medium-term (26 - 50 years)	\$378	\$475	0.80
Long-term (51 - 100 years)	\$507	\$35	14.58
<b>Overall</b>	<b>\$1,336</b>	<b>\$2,448</b>	<b>0.55 (0.46 - 0.64)</b>

**Cost estimation approach**

Based on spatial mapping of potential scenarios and typical unit rates from similar NZ projects. Calculated at 2025 present values, assuming staged implementation across the three time periods identified with Construction spread over the first 10 years of each period. Includes:

- \* Construction (capital, preliminaries, demolition, utilities)
- \* O&M costs
- \* Professional fees
- \* Contingency and optimism bias (+66% per Treasury guidance)
- \* Property acquisition – 1,738 properties (residential, commercial, social).

Whole-of-life costs: 25-year maintenance cycles + annual O&M. Pump stations include an allowance for annual electricity charges.

Exclusions: GST, escalation, downtime.

Costs do not account for potential offsets (e.g., land resale) or private owner contributions.

Cost range: \$2.45b (\$2.1b – \$2.7b), influenced by scale and uncertainty (especially land raising).

**Monitised benefits include:**

- \* Avoided fatalities & injuries
- \* Avoided residential, industrial & commercial property damages
- \* Avoided infrastructure damage
- \* Avoided trauma and social cohesion costs
- \* Avoided water quality impairment
- \* Avoided income loss and emergency services costs.

**Benefits excluded due to data unavailability at this stage:**












- \* Redevelopment potential / Gains in property value
- \* Avoided loss of open spaces and ecosystem services
- \* Avoided heritage building damage
- \* Value of insurability.

Range: \$1.34b (\$1.2b – \$1.5b), influenced by scale and uncertainty.

**Key assumptions used at this stage:**

- Annualised Average Damages taken from Efficacy Modelling work across three return periods and assumed coastal damages as outlined in Economic Evaluation Report
- Project horizon: 100 years.

**KEY PROJECT FEATURES**

-  **TOTAL REPURPOSED LAND**  
**102 ha**
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**FUTURE 5 - RESHAPE**

# Risk assessment

Future 5 – Reshape provides significant reduction in pluvial flooding and groundwater risk in the short-term relative to the Status Quo (present day, unmitigated) risk.

This risk profile would further reduce over the medium-term despite increasing natural hazards. In the long-term, risk associated with most hazards is managed, however high uncertainty remains regarding the long-term management of coastal hazards at St Clair / St Kilda and further investigations are underway. In all timeframes, residual risk remains, which is associated with the consequences of hazard events that exceed as-built design limits, and structural failures (e.g. seawall, groundwater pumping systems). It can also be associated with operational risks (e.g. power failures, lack of maintenance).

Overall, the Future 5 – Reshape risk profile is largely similar to the other futures, but has a slightly lower long-term risk than Future 4 – Restore due to the raising of land that provides additional flood risk reduction benefits and minimizes residual risk.

## HOW IT WOULD REDUCE RISK

In the short-term, stormwater infrastructure upgrades are likely to remove flood risk associated with frequent events (10% chance of occurring each year) and drive significant reduction of flooding associated with infrequent (1% chance of occurring each year) events across all buildings, lifelines, and critical infrastructure. Up to 33% of buildings may be exposed to infrequent flooding, with 11% of those likely to experience flooding above floor level. Otherwise, flooding would be generally contained within roads posing a low risk. Improved drainage and pumping also lowers groundwater levels so that buildings, parks, and roads are unlikely to be at risk.

In the medium-term, additional measures such as strategic acquisition of land for conversion to green space or raised land, and continued stormwater infrastructure improvements, coastal protection, and management of groundwater means pluvial flood risk, coastal flooding risk, and groundwater risk further. The percentage of buildings exposed to infrequent flooding above floor level drops to 6%, and 5% in the long-term.

The Otaki Street coastal protection means coastal flooding exposure remains around the harbourside. This risk to buildings is managed through raised floors or intentional design of floodable ground floors. Although risk to buildings, roads and parks is generally low, coastal flooding at the harbourside may impact other activities that are carried out within this area and further consideration of safe access and egress may be required.

In the long-term, high-density residential areas located on raised land provides further risk reduction benefits, including reduced residual risk associated with pluvial flooding, groundwater, and coastal flooding.

## HOTSPOT SUMMARY OF RISKS TO SOUTH DUNEDIN FUTURE 5 - RESHAPE: EXPOSURE OF BUILDINGS AND ROADS TO FLOODING AND GROUNDWATER

