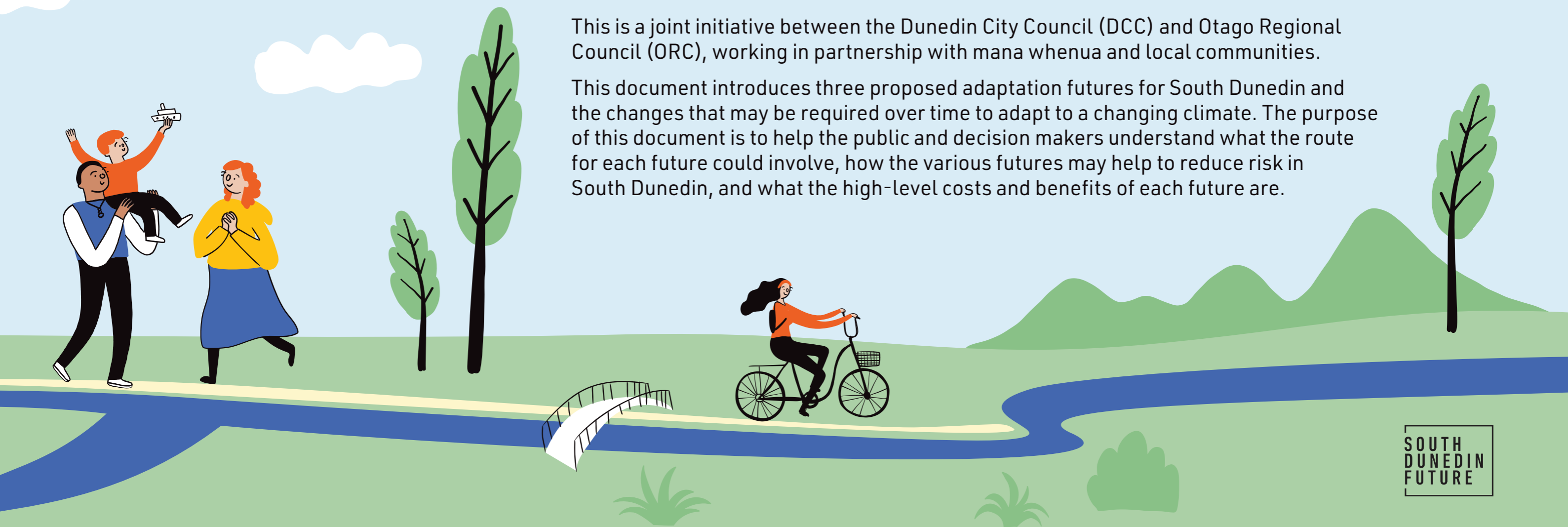


Three proposed adaptation futures for South Dunedin

Adapting to our changing climate is a big challenge. South Dunedin Future (SDF) is a programme aimed at better understanding how the environment is changing, considering how those changes will affect us, and looking at what we can do about it.

This is a joint initiative between the Dunedin City Council (DCC) and Otago Regional Council (ORC), working in partnership with mana whenua and local communities.

This document introduces three proposed adaptation futures for South Dunedin and the changes that may be required over time to adapt to a changing climate. The purpose of this document is to help the public and decision makers understand what the route for each future could involve, how the various futures may help to reduce risk in South Dunedin, and what the high-level costs and benefits of each future are.



Interacting council activities

South Dunedin Future is not occurring in isolation – there are a wide range of other council activities that are complementary to this adaptation planning process and will directly or indirectly influence the development of the adaptation masterplan and its subsequent implementation.

These activities contribute to making South Dunedin 'safer and better', by reducing floods and other risks and by helping regenerate different areas.

SOME KEY ACTIVITIES INCLUDE:

Three waters

- Quick-win stormwater projects (\$29.2 million) – Three projects underway include:
 - Diverting the Bay View Road and New Street stormwater systems
 - Upgrading the size of the Forbury Road stormwater pipe
 - Disconnecting the Hillside Road stormwater main and pumping it to Orari Street outfall.
- Short-term storm water projects (\$15 million) – Funding has been allocated in DCC's current 9-year plan (2025-34) for short-term flood alleviation work in South Dunedin, which will be one of the initial actions to implement the adaptation masterplan.
- Wastewater overflows at Surrey Street – DCC is undertaking renewals work across the three waters network to benefit South Dunedin and Surrey Street, as well as investigating options for addressing network issues contributing to wastewater overflows in and around Surrey Street during heavy rainfall events.

Property

- South Dunedin Library and Community Complex (\$22 million) – Te Whata o Kaituna opened in September 2025 and provides flexible reading, learning, creative and community engagement spaces. Located on King Edward Street, the Library contributes to the ongoing revitalisation of South Dunedin's commercial centre.
- Forbury Park purchase and redevelopment (\$13 million) – Purchased in February 2024, this 11.76 hectare site provides a wide range of options for DCC, including options for stormwater management. Design work is underway to incorporate the site into a green infrastructure network to support flood alleviation in South Dunedin and provide new community and recreational spaces.

St Clair / St Kilda coastline

- The St Clair to St Kilda coastline experiences coastal erosion. A separate project is currently underway to monitor and investigate how current and future coastal hazards may impact the coastline. The project is refining options for the next 50-year period to manage this erosion. DCC is working to align adaptation actions taken at the coast with those planned for inland areas of South Dunedin, so that they are complementary and lead to a coherent overall approach.
- Kettle Park Remediation (\$31-61 million) – DCC is designing a plan for the remediation of the former landfill at Kettle Park. This is expected to involve removing a large amount of contaminated material and changing the profile of the dunes to better protect South Dunedin from coastal erosion.

City development

- Plan evaluation (Natural hazards provisions in South Dunedin) – This project is evaluating the effectiveness of the district plan (2GP) provisions that manage natural hazards in South Dunedin, to determine whether it is necessary to undertake a plan change.

Natural hazards

- Councils continue to actively monitor, investigate, and model natural hazards affecting South Dunedin. This includes monitoring groundwater, sea level rise, and land subsidence, as well as investigating coastal erosion and flooding, and understanding potential changes linked to the anticipated impacts of climate change.

Civil defence and emergency management

- Emergency Management Otago coordinates civil defence readiness, response, and recovery across the Dunedin City area, providing regional hazard information, planning, and support to help communities prepare for and manage emergencies.

Parks and recreation

- Playground upgrades: DCC has been undertaking a range of playground upgrades across South Dunedin, including at Bathgate Park (completed in 2024), St Clair (completed in 2025), and Marlow Park (scheduled for 2026).

What this could mean for different stakeholders

The Council's role is to:

- Coordinate and complete capital works (e.g. stormwater network upgrades, seawall, land raising) and works to enable these (e.g. engagement, changes to planning framework)
- Prepare and implement civil defence and emergency management plans
- Develop and implement plans, policies and regulations for the identification and management of natural hazards
- Facilitate the building of resilience and adaptive capacity within communities
- Where appropriate, work in partnership with communities to identify and manage risks.

While the council, on behalf of the community, is responsible for managing risks posed by natural hazards, **councils do not have an explicit legal obligation to protect privately owned assets from natural hazards.**

Private asset owners (such as individuals, organisations and businesses) are responsible for managing risks to their assets.

The private assets owner's role is to:

- Be aware of the risks and their responsibility for managing them
- Comply with regulations that apply to their assets and activities
- Take steps to understand the magnitude and nature of the specific risks
- Develop and implement strategies and actions to manage these risks at an individual property level.

Methodology overview

The five stages of the SDF programme are summarised in the ribbon, to the right, which captures the key questions relating to adaptation planning, as outlined in the Ministry for the Environment's Coastal Hazards and Climate Change Guidance (2024). These are described below.

1 What is happening?

The initial stage of the SDF programme involved work to monitor and analyse a wide range of natural hazards affecting South Dunedin, such as flooding from heavy rain, rising groundwater and sea level rise. The South Dunedin Risk Assessment, released in March 2025, summarised our current understanding of how these hazards are expected to change over time. This information is updated as new data becomes available.

2 What matters most?

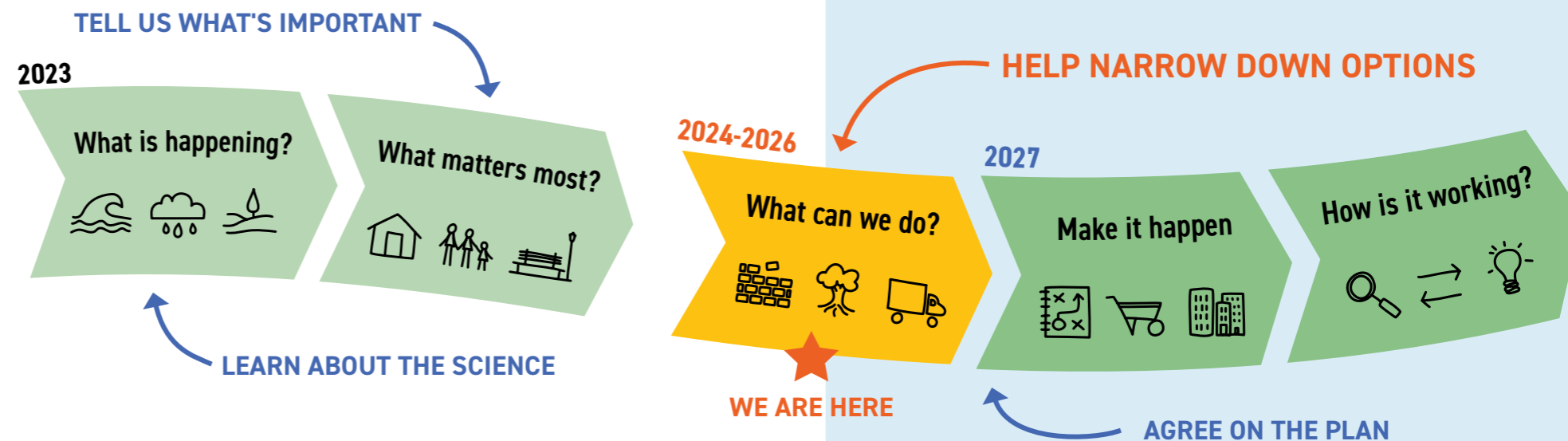
The Risk Assessment considers South Dunedin's exposure to these changing hazards, the vulnerability of things affected, and analyses the resulting risk – now and in the future. Understanding what is important and why allows an assessment of the consequences of risks to people, places and assets in South Dunedin. This work is informed by community engagement and mana whenua values. The Risk Assessment provides a picture of what could happen to the things we value if appropriate action is not taken.

3 What can we do?

There are many ways to adapt, generally grouped into four categories – protect, accommodate, retreat, and avoid. From the seven Potential Adaptation Futures released in 2025, three have been shortlisted. This phase of the SDF programme develops more detailed descriptions over time for these futures, showing possible actions in the short, medium and long-term. Feedback from the 2025 engagement sessions was used to inform the development of the three Proposed Futures.

4 Make it happen.

After a preferred future is selected and an adaptation masterplan is completed, delivery will occur through standard council processes, such as long-term planning, infrastructure strategies and District Plan changes. While the preferred future will provide a more detailed picture of potential changes in South Dunedin, it is important to note that no decisions have been made about major infrastructure or land use changes. Implementation is expected to take time and will depend on funding, consenting and national reforms.



5 Is it working?

A range of activities will also be put in place to monitor progress, to determine how well the adaptation masterplan is working and whether our actions are effectively managing risk. Based on the results, changes can then be made so that the plan remains fit for purpose.

IMMEDIATE NEXT STEPS

The next steps for the SDF programme include:

- Community engagement on the three proposed futures for South Dunedin.
- Further refinement of the three proposed futures into a preferred future, supported by a final round of community engagement.
- Presentation of the preferred adaptation future in an Adaptation Masterplan for South Dunedin, which is expected by early 2027.

Government guidance

In October 2025, central government released a National Adaptation Framework which sets out the approach to addressing climate-driven natural hazards across four pillars: risk and response information sharing, roles and responsibilities, investment in risk reduction, cost-sharing pre- and post-event.

Under the National Adaptation Framework, the first tranche of council adaptation plans will prioritise locations facing flooding and coastal hazards, reflecting the Government's risk-based approach to implementation. In addition, Civil Defence Emergency Management (CDEM) Group Recovery Plans will be required to "give effect to" the relevant adaptation plan and make sure recovery planning aligns with long-term climate adaptation planning.

The futures provide choices for communities of lower and higher risk areas within South Dunedin, enabling individual decision-making. The futures require council to invest early in infrastructure to manage flooding with a long-term (100-year) view in mind while providing opportunities for partnerships with investors to encourage development in the right places. The futures do rely on the ability to acquire property to transition high risk areas to lower risk uses, which is not explicitly addressed in the National Adaptation Framework.

Refining futures

From 16 adaptation approaches, we developed seven potential futures, then refined these to three proposed futures with actions over time. From here, further analysis and engagement will help select a single preferred future to underpin South Dunedin's climate adaptation masterplan. The process is outlined below.

16 GENERIC ADAPTATION APPROACHES

Drawing on best practice approaches from around the world, and ideas crowd-sourced from the community and stakeholders, an initial list of 16 generic approaches for helping South Dunedin adapt to flooding and future climate change was released in December 2023. These 16 approaches were categorised as one of protect, accommodate, retreat, and avoid, and were consulted on with the community in early 2024, with feedback informing further analysis.



7 POTENTIAL ADAPTATION FUTURES

The 16 approaches were then combined in different ways to form seven Potential Adaptation Futures for South Dunedin, which were released in March 2025. The seven futures included a 'Status Quo' future - essentially the path we're currently on if we don't change anything - and six other futures representing a spectrum of responses, with a focus on infrastructure at one end and land use change at the other. Community engagement on the seven futures was during April and May 2025.

A shortlisting process assessed all seven futures in an effort to determine which ones will best manage the risks facing South Dunedin, while also enabling more opportunities. This process involved technical and economic assessments of each future, against a set of strategic objectives and a decision-making framework previously approved by the Councils. It also considered community feedback. The process proposed Futures 3, 4 and 5 for further development - which was reported to councils and announced to the public in September 2025.

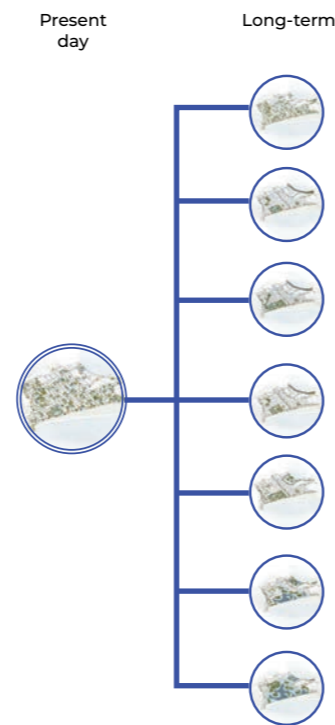
3 PROPOSED ADAPTATION FUTURES

Following the shortlisting process, stormwater and groundwater modelling for each of the three proposed futures was used to determine an appropriate mix of infrastructure, green and blue space, and land use change required to manage risk in different areas of South Dunedin.

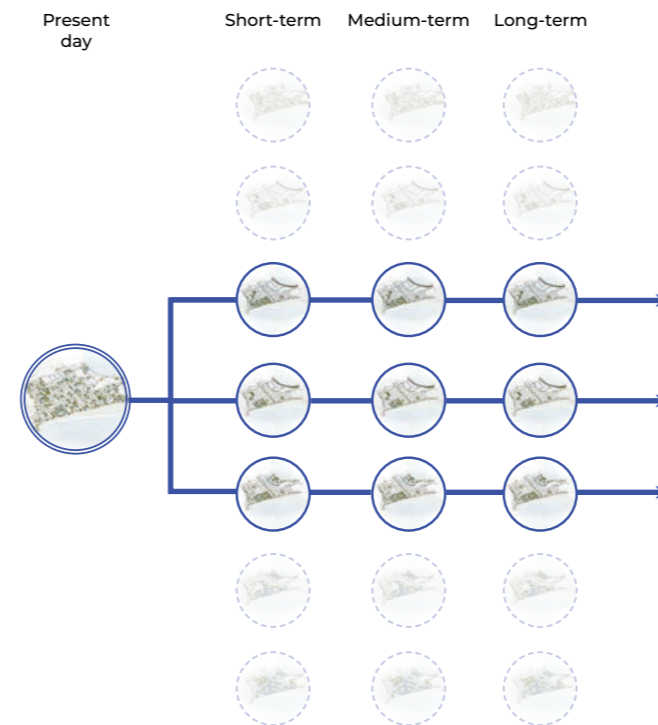
The three proposed futures show what type of action we might take over time, covering short (next few decades), medium (mid-century), and long-term (toward the end of the century and beyond).

- **Future 3 – Protect (Keep the land dry – raise land and pump water)**
Hard infrastructure moves water, supported by wetlands and stormwater reserves. Raised land provides elevated, safer areas for development.

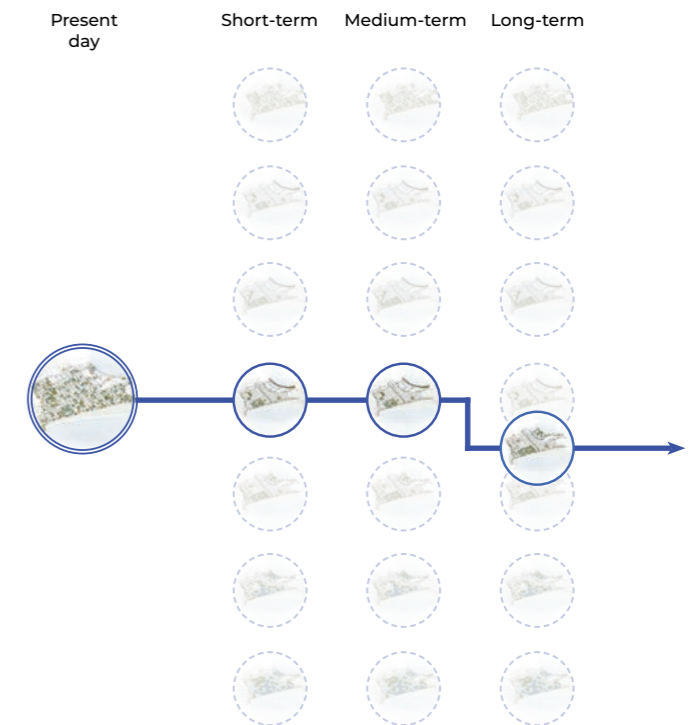
Stage 4: Seven potential adaptation futures



Stage 4: Three proposed futures



Stage 5: Preferred future



- **Future 4 – Restore (Make space for water – waterways and wetlands)**
A network of waterways, wetlands, pipes, pumps and coastal protection balances engineering with nature.
- **Future 5 – Reshape (Move out of harm's way – raised land and green spaces)**
Open waterways, green infrastructure and raised land development combine to manage flooding and groundwater while reshaping a resilient urban form.

REFINING TO A PREFERRED FUTURE

Following community engagement, further assessments, modelling and economic analysis will refine the options and identify a single preferred future that best manages risk while enabling long-term opportunities.

Reader's guide

This document provides an initial assessment of the proposed futures over time. They serve as a tool for informed discussions with the community and decision makers in this phase about how a combination of adaptation actions over time may help reduce risk, as well as what residual risks remain and the high-level costs and benefits.

Visualisations of the three proposed futures are intended to illustrate the potential changes required in South Dunedin to manage flooding and other risks. This provides a sense of what the area could look like in the future and how these changes might play out over the short-, medium- and long-term. The illustrations are based on the best available information and analyses to date and are intended to support further discussions with the community and stakeholders. Further optimisation will be required for exact locations and sizes of infrastructure.

WHAT'S INCLUDED IN THE SUMMARIES?

Future comparisons:

A dashboard summarises costs, social impacts and technical factors, with additional images showing key actions, differences and how risk changes over time.

Future overview:

Each future outlines actions across categories (e.g., pipes/pumps/overland flow paths, managed relocation). The page includes images to show how South Dunedin will look on a 'dry-day' and 'flood-day', where the 'flood-day' is based on a rare event (1% chance of occurring each year).

Objectives assessment:

Subject-matter experts assessed each future over time; these summaries provide the evidence base for decision-making. Communities are welcome to provide feedback if we have missed any key considerations.

Implementation approach:

Technical considerations and potential signals, triggers and adaptation thresholds (STATs) to prompt action are set out as part of the implementation approach.

Economic measures:

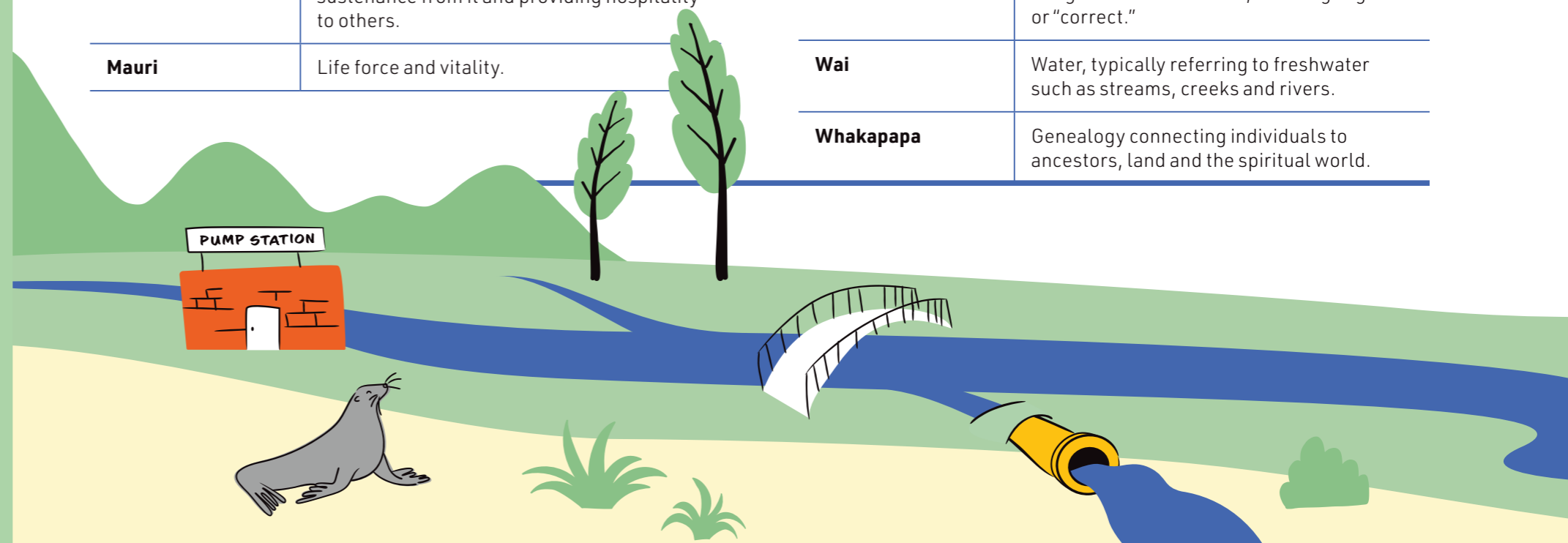
Present-value costs and benefits (in \$ billions) inform the estimated benefit to cost ratios (BCRs). A BCR of zero is not viable, and ~1 or higher suggests more positive outcomes. Costs are Council-only and are indicative and have a high uncertainty, based on similar projects. They exclude potential offsets.

Risk assessment:

Maps show residual risk for the present (current level without any intervention), and the short-, medium- and long-term. Residual risk can persist or re-emerge when design levels are exceeded, infrastructure fails, or operations falter (e.g., power outages, inadequate maintenance).

Glossary

Annual Average Damages (AAD)	The annualised expected value of flood damage across all probability events, weighted by their likelihood. AAD is the primary benefit metric in the economic evaluation. It captures both the frequency and severity of flood events and is directly linked to the flood modelling outputs and DCC Flood Damage Assessment methodology.	Moana	Sea, ocean or a large lake.
Benefit Cost Ratio (BCR)	The ratio of present-value benefits to costs; a BCR above 1 indicates benefits outweigh costs, helping compare options.	Present risk	The current level of risk before any new interventions, based on existing hazards, exposure and vulnerability.
Challenge of implementation	The practical difficulty of delivering an option, such as technical complexity, consenting, funding, timeframes, land access, and stakeholder alignment.	Properties acquired	The number and type of properties that must be purchased (voluntary or compulsory) to enable an intervention.
Hauora	Health and wellbeing.	Properties added	The number of new properties added through development or redevelopment (e.g., relocation to raised land).
Kaitiakitaka	Exercise of guardianship by mana whenua. Stewardship and guardianship, typically relating to the care and protection of an environmental area or natural resource.	Rakatirataka	Māori sovereignty, leadership, and self-determination.
Ki uta ki tai	"From the mountains to the sea." Describes a holistic, inter-connected and or catchment-wide approach to natural resource environmental management that recognises the interconnectedness of all parts of an ecosystem.	Residual risk	The risk that remains after interventions, e.g., when events exceed design levels, assets fail, or operations falter.
Mana Whenua	Authority and power derived from the land. Refers to Māori who have occupied and cared for a place over generations, drawing sustenance from it and providing hospitality to others.	Social impact	The effects of an option on people and communities, wellbeing, equity, cultural values, access to services, displacement, and disruption.
Mauri	Life force and vitality.	Te Mana o Te Wai	A foundational concept in Aotearoa New Zealand's freshwater management that protecting prioritises the health and mauri wellbeing of water bodies is paramount to the health of the wider natural ecosystem environment and the health of people above other uses.
		Tikaka	Māori customs and correct ways of doing things. Derived from tika, meaning "right" or "correct."
		Wai	Water, typically referring to freshwater such as streams, creeks and rivers.
		Whakapapa	Genealogy connecting individuals to ancestors, land and the spiritual world.



Understanding futures

Each of the proposed futures shows the bundling and sequencing of interventions over time, covering short (next few decades), medium (mid-century), and long-term (toward the end of the century and beyond). The timing of adaptation interventions is based on dynamic signals (early warning), triggers (decision points), and thresholds (unacceptable outcomes). The summaries include more detailed information on the useful life of adaptation actions, linking together different actions such as infrastructure investment and creating green space.

An underlying principle of this type of dynamic approach is that interventions are only implemented when and where required. These respond to pre-agreed signals and triggers, so change occurs only if or when necessary to manage risk. The timing of these signals, triggers and associated interventions is indicative only, and in reality, may occur earlier or later depending on the rate of change in climate conditions.

For example, we might start to prepare for changes when we see certain signals (like worse or more frequent flooding), then implement agreed interventions when we hit certain triggers (like a certain number or severity of flood events), so we can make the changes before we hit certain thresholds (like insurance retreat).

For South Dunedin, we've already met some of the signals and triggers, and we'll need to start taking action soon to build more resilient communities.

Signals and triggers identified for the proposed futures are high-level at this stage. Measurable signals and triggers will be developed for the preferred future.

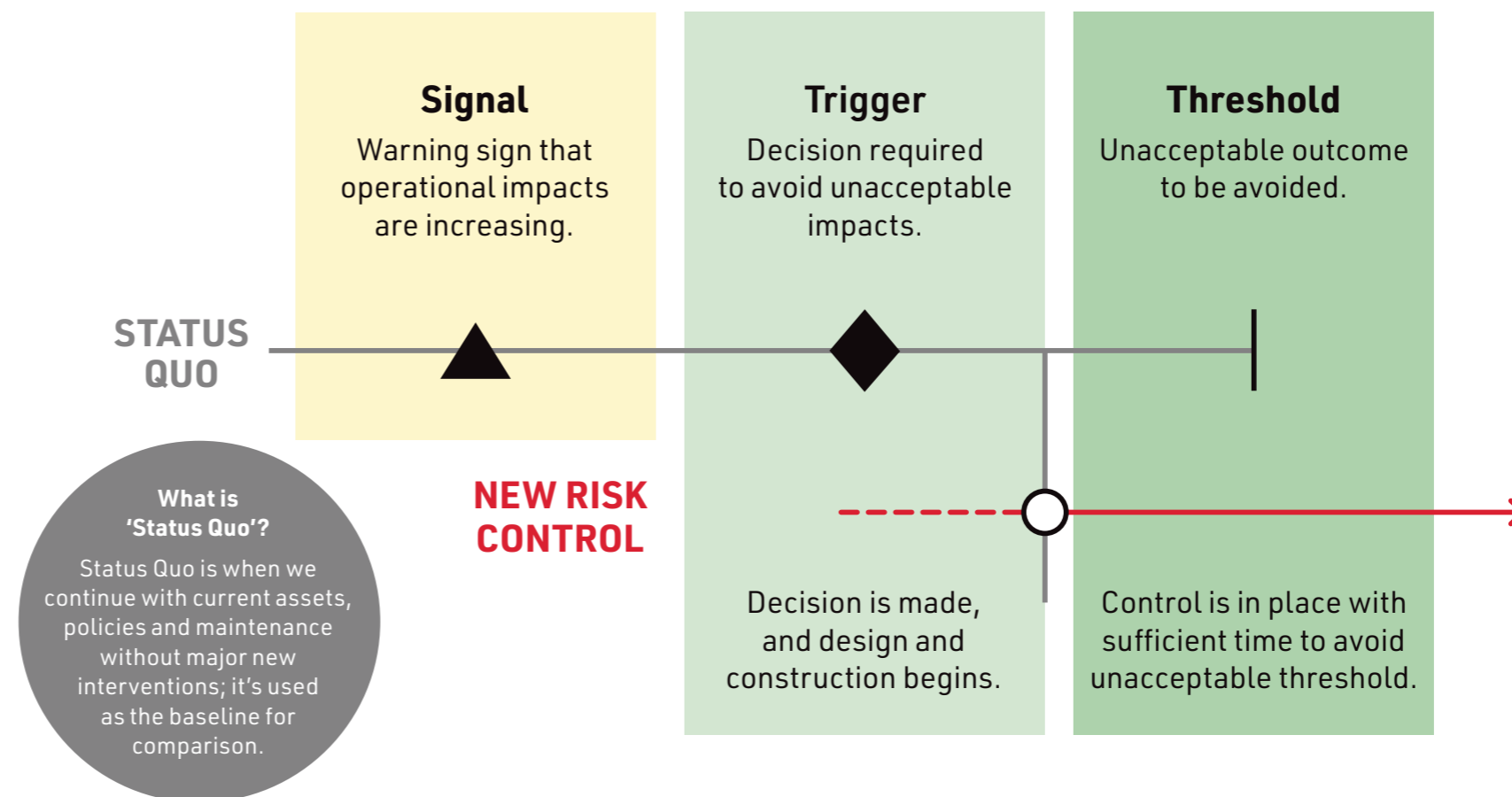
SWITCHING BETWEEN FUTURES

Although we will eventually agree on a preferred future, using this adaptive planning approach means we might switch between futures in a proactive, timely, and transparent way, guided by community objectives and data. After a signal is identified, consideration of whether the planned next step along the future is still the right one begins, with a decision made when the trigger is identified.

THINKING BEYOND 2125

To support long-term planning, we undertook preliminary sensitivity testing to understand how the futures perform beyond 2125. The futures have been developed for a very high emissions future (SSP5-8.5, 50th percentile) and are viable through to 2125 under those conditions. If a more extreme scenario were to eventuate (SSP5-8.5, 83rd percentile), the futures would remain effective but only up to approximately 2095.

On the upside, if we follow a 'middle-of-the-road' climate scenario (SSP2-4.5), the futures remain effective for longer, likely through to about 2150.



In particular, **Future 3 – Protect** and **Future 5 – Reshape** continue to perform well even under events that exceed their design conditions because development is shifted to higher, lower risk areas. **Future 5 – Reshape** is likely to perform better than **Future 3 – Protect** these over-design events because there is additional capacity to hold water in the waterways as compared to the pipe network. Under any of these futures, there remain options to shift communities to safer areas beyond 2125 or if conditions worsen faster than expected.

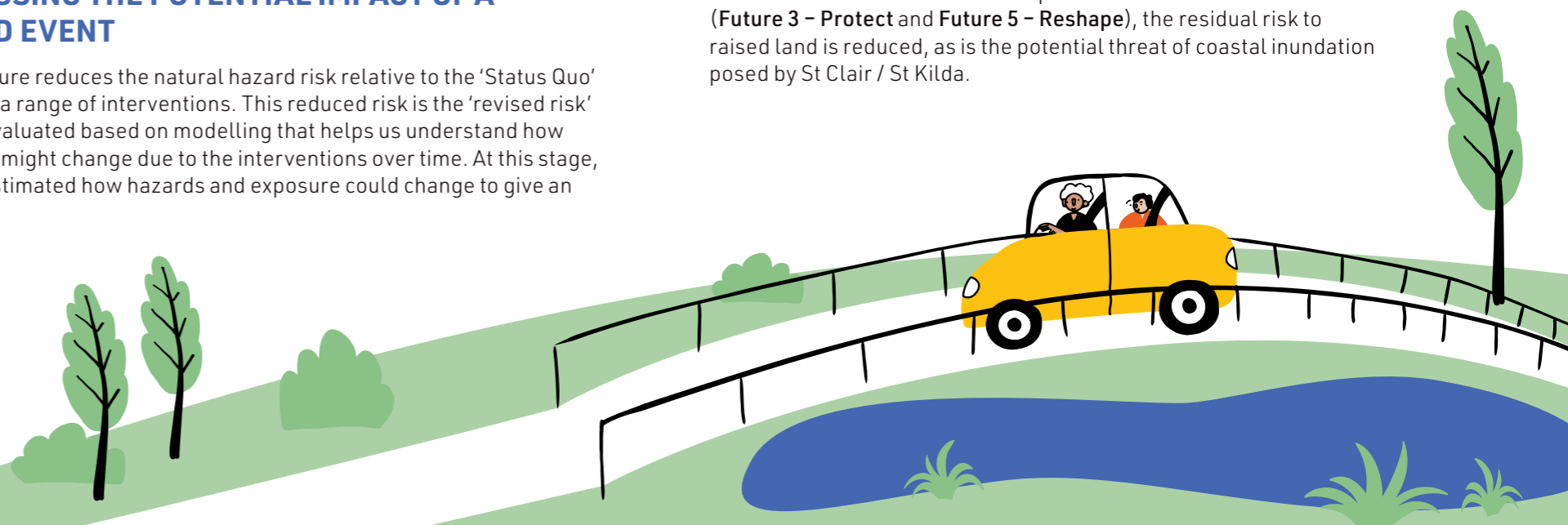
ASSESSING THE POTENTIAL IMPACT OF A FLOOD EVENT

Each future reduces the natural hazard risk relative to the 'Status Quo' through a range of interventions. This reduced risk is the 'revised risk' and is evaluated based on modelling that helps us understand how hazards might change due to the interventions over time. At this stage, we've estimated how hazards and exposure could change to give an

early indication of potential impacts. More detailed modelling and design work will be carried out later as the preferred future is developed further to optimise and minimise cost while maximising the benefits.

In all futures, short and medium-term interventions achieve drastic reductions in 'revised risk', with minimal difference in risk profile between each future. In the long term, high uncertainty remains regarding the long-term management of coastal hazards at St Clair / St Kilda, meaning coastal flooding poses an unknown level of risk.

In all futures there remains a 'residual risk'. This is the risk that remains after interventions are implemented. Where land is raised (**Future 3 – Protect** and **Future 5 – Reshape**), the residual risk to raised land is reduced, as is the potential threat of coastal inundation posed by St Clair / St Kilda.



Economic approach

This economic evaluation exists to answer a specific question: Does the evidence support investment in adaptation, and if so, which adaptation future delivers the most value for the public dollar? The answer requires holding two things in view simultaneously: what it will cost the community to act, and what it will cost the community not to.

The evaluation covers 100 years from 2027. Infrastructure investment of the kind contemplated in each future has a design life measured in decades. The consequences of under-investing in the past and continuing this through the 2020s will be felt in damage, in lost property value, in deteriorating liveability well into the 2070s and beyond. A 100-year lens is the minimum needed to capture the likely costs and benefits felt across the community.

The primary metric used throughout this evaluation is Annual Average Damage, or AAD. AAD is the annualised expected cost of flood damage across the events with a 10%, 2% and 1% chance of occurrence weighted by their likelihood. Put simply, it represents what the community would pay each year, on average, if it were fully insured against all pluvial flood events at their expected frequency and severity.

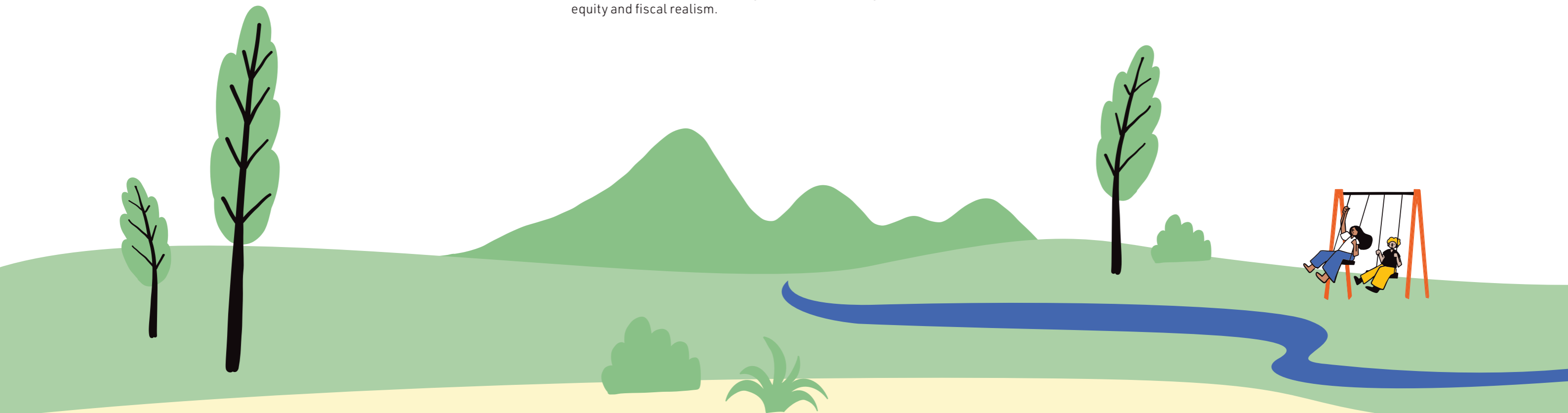
The economic evaluation follows a standard adaptation appraisal framework drawing on national and international guidance for long-term climate investment. The analysis assesses each proposed future by comparing its whole of life costs with the avoided damages and co-benefits achieved relative to the Status Quo baseline. This baseline represents a market driven reactive response to the increasing exposure to hazards and associated increasing AAD over time. By framing benefits as “avoided losses,” the evaluation enables a direct and transparent link between the hazard modelling, residual risk results, and the economic outcomes.

The BCR is calculated as the net present value of all the monetised benefits divided by the net present value of all the monetised costs. A BCR of 1 is where the net present value of the monetised benefits equals the monetised costs. If the BCR is less than 1, the costs outweigh the benefits (and vice versa).

The economic evaluation has assessed and compared the expected and indicative whole-of-life costs and benefits of each shortlisted future, relative to the counterfactual of not investing in future adaptation in the existing community. The key driver of this economic evaluation is to provide comparable evidence to DCC and does not represent all costs and benefits from ongoing and future activity in this area.

We relied on the outputs from other models for this work (see Economic Evaluation Report for more details).

Benefit-Cost Ratios are calculated using a central real discount rate of 6% and some sensitivity testing. This range reflects common practice for long-living public infrastructure and climate adaptation investments, where discounting must balance intergenerational equity and fiscal realism.

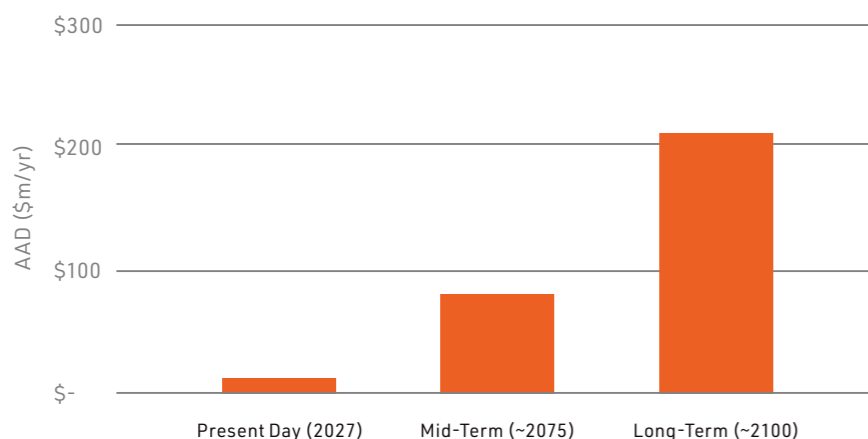


The cost of inaction – Status Quo

The Status Quo trajectory is not a hypothetical. South Dunedin already experiences flooding. The 2015 and 2024 events demonstrated the scale of disruption that moderate events can cause. The modelling underpinning this evaluation projects that the frequency of events of that severity, and worse, will increase substantially over the coming decades, driven by sea level rise, more intense rainfall, and groundwater pressures that are already detectable.

The economic evaluation quantifies this trajectory, enabling decision-makers to consistently compare the costs of acting and not acting. The central finding is clear: the cost of inaction is high and growing, spread across many years as damages to property are increasingly incurred, with its most severe consequences borne by the most vulnerable households. The question is not whether to act, but which action will retain the current community of approximately 13,500 in South Dunedin.

Cost of Inaction: Property-Level Annual Average Damage - Status Quo (\$m/yr)



The \$11 million to \$212 million AAD trajectory captures direct property and building damage from rainfall events and coastal inundation. **It does not capture the full economic and social cost of inaction, which is substantially larger and more complex.** The true cost of doing nothing includes a set of cascading consequences that compound the primary damage figures over time beyond what is shown here.

Annual Average Damage by Time Period – Status Quo Scenario

Building Level Property Damages - Status Quo	AAD 2025 QV (\$m)		
	Pluvial Flood Damages	Coastal Flood Damages	Combined Damages
Short-term (present day)	\$11m	\$0m	\$11m
Medium-term	\$43m	\$35m	\$78m
Long-term	\$60m	\$152m	\$212m

The \$1.4 billion and likely \$2 billion figure in context

Over the full 100-year assessment period, the present value cost of the Status Quo scenario exceeds \$1.4b plus (2025 NPV at a 6% central real discount rate). This includes property damage, fatality and injury costs, emergency services, trauma, income loss from displacement, and environmental costs.

It excludes infrastructure repair, loss of activity/productivity, event clean-up costs, private property interventions (both proactive and reactive), and the economic consequences of insurance withdrawal. Including these would raise the total materially above \$2b.

IAG noted that from the 2015 flood event with over 1,200 homes and businesses damaged by water, resulted in insurance payouts being about \$28m. They estimated the combined economic cost of \$138m (made up of \$64m economic damage and \$18m social damage).









































The \$1.4b figure is therefore conservative. It represents the floor of the cost of inaction, not the ceiling.

The table below summarises the broader categories of economic harm that accompany and, in many cases, amplify the direct damage trajectory.

Each of these consequences interacts with the others: insurance withdrawal reduces property values, undermining the mortgage market and accelerating economic decline in the most exposed areas, which in turn makes recovery from flood events slower and more expensive.

Cost category	How it develops (with the Status Quo)	Trajectory
Infrastructure failure	Roads affected by deep flooding increase. Stormwater (pluvial flood events) covering the centreline of the road to a depth over 300mm increases from approximately twenty today to approximately 135 by 2120 for the 10% AEP event. Each failure disrupts access, supply chains, and emergency response. Park areas with 'unplanned' significant inundation increase from 0.5 hectares to approximately 4 hectares. Groundwater and coastal inundation further challenge the future efficacy of infrastructure, with approximately 1,200 properties becoming exposed to emergent groundwater through to 2120.	Rapidly worsening
Business and industrial disruption	Industrial areas face Annual Average Damages rising from \$30 million (current) to approximately 90 million per major event in the long term. Loss of trading days, supply chain disruption, and reduced investor confidence follow each significant flood.	Rapidly worsening
Insurance affordability and availability	As flood frequency and severity increase, alongside and increasing impact of groundwater, insurers will raise premiums, impose exclusions (particularly for groundwater, which is already commonly excluded), and in the most exposed areas, withdraw cover entirely. This mirrors patterns seen following recent major flooding events across New Zealand.	Trigger approaching
Mortgage viability and property values	Without insurability, lenders are unwilling to extend mortgages against flood-affected properties. Property values decline, eroding the household wealth that many lower-income homeowners have built over a lifetime.	Worsening
Fatality and injury costs	The frequency of dangerous flood events increases significantly. Fatality and injury costs, valued using Treasury-recommended value of statistical life (VoSL) and injury-cost parameters, constitute a material component of total avoided damages under each adaptation future.	Worsening
Intergenerational equity	Under the Status Quo, residual risk is increasingly privatised: households and businesses in the most exposed areas bear the full cost of flood damage, insurance withdrawal, and asset depreciation. This concentrates harm on those least able to absorb it and transfers the consequences of today's decisions onto future generations.	Growing concern
Coastal exposure	The risk assessment highlights the rising likelihood of coastal inundation occurring from the Medium term onwards. Furthermore, exceedances of the 1% AEP extreme sea level event is identified to be occurring with an almost yearly frequency with 40cm of sea level rise (PCE, 2015).	Rapidly worsening

South Dunedin proposed futures – dashboard

Futures		Main Actions	Costs	Properties acquired and added	Challenge of Implementation	Social Impacts	Residual Risk	Average Annual Damages
 <p>Status Quo Keep doing what we are doing Total Costs: \$0.41B Total Damages: \$1.45B</p>	Short	Pipes and pumps (minor stormwater network), reactive retreat, individual interventions	\$254M	-57*				\$11M
	Medium	Pipes and pumps (minor stormwater network), reactive retreat, individual interventions	\$115M	-103*				\$78M
	Long	Pipes and pumps (minor stormwater network), reactive retreat, individual interventions	\$43M	-678*				\$212M
 <p>Future 3 Protect Total Costs: \$2.1B Total Benefits: \$1.34B</p>	Short	Investment in pipes, pumps, land aquisition and rezoning	\$1,598M	-736				\$0.6M
	Medium	Raise land, add pipes and coastal protection, expand pumps, create green spaces	\$452M	-456/+336				\$2.3M
	Long	Increase pump capacity, expand green spaces, develop housing	\$48M	+1520				\$1.0M
 <p>Future 4 Restore Total Costs: \$1.63B Total Benefits: \$1.35B</p>	Short	Investment in pipes, pumps, land aquisition and rezoning	\$1,284M	-1162				\$0.6M
	Medium	Build canals, wetlands, and coastal protection, expand pumps, add pipes	\$287M	+840				\$1.6M
	Long	Complete green space transition, add pipes, increase pumping, develop housing	\$58M	0				\$0.7M
 <p>Future 5 Reshape Total Costs: \$2.45B Total Benefits: \$1.34B</p>	Short	Investment in pipes, pumps, land aquisition and rezoning	\$1,938M	-1144				\$0.6M
	Medium	Raise land, build canals and coastal protection, develop housing	\$475M	-594/+336				\$2.5M
	Long	Maintain infrastructure, complete green space transition	\$35M	+1780				\$3.3M



Short - 2025 to 2050
Medium - 2050 to 2075
Long - 2075 to 2125

 Pipes and Pumps
 Coastal Protection
 Land Raising
 Water Storage
 Waterways
 Change in Planning Rules

 Low
 Moderate
 High
 Very High
 With high coastal residual risk
 Higher residual risk due to failure or hazard event that exceeds design limits

*Properties that would be impacted by emergent groundwater

Key actions

The image below depicts key actions that would be taken across all proposed futures. Some actions - including upgraded pipes and pumps and coastal protection - are shared across multiple futures.

Each key action is shown on the central map, illustrating how different parts of South Dunedin would be supported to manage flooding, adapt to climate change and build long-term resilience. Locations and size have been informed by community feedback on what level of flooding is acceptable.

Greenspace




Some areas would need to become greenspace in the future where it is too difficult to manage flooding to keep communities safe. This includes places around the western end of Hillside Road where water naturally flows and areas near King Edward Street or in Musselburgh that are very low-lying.

Land Raising

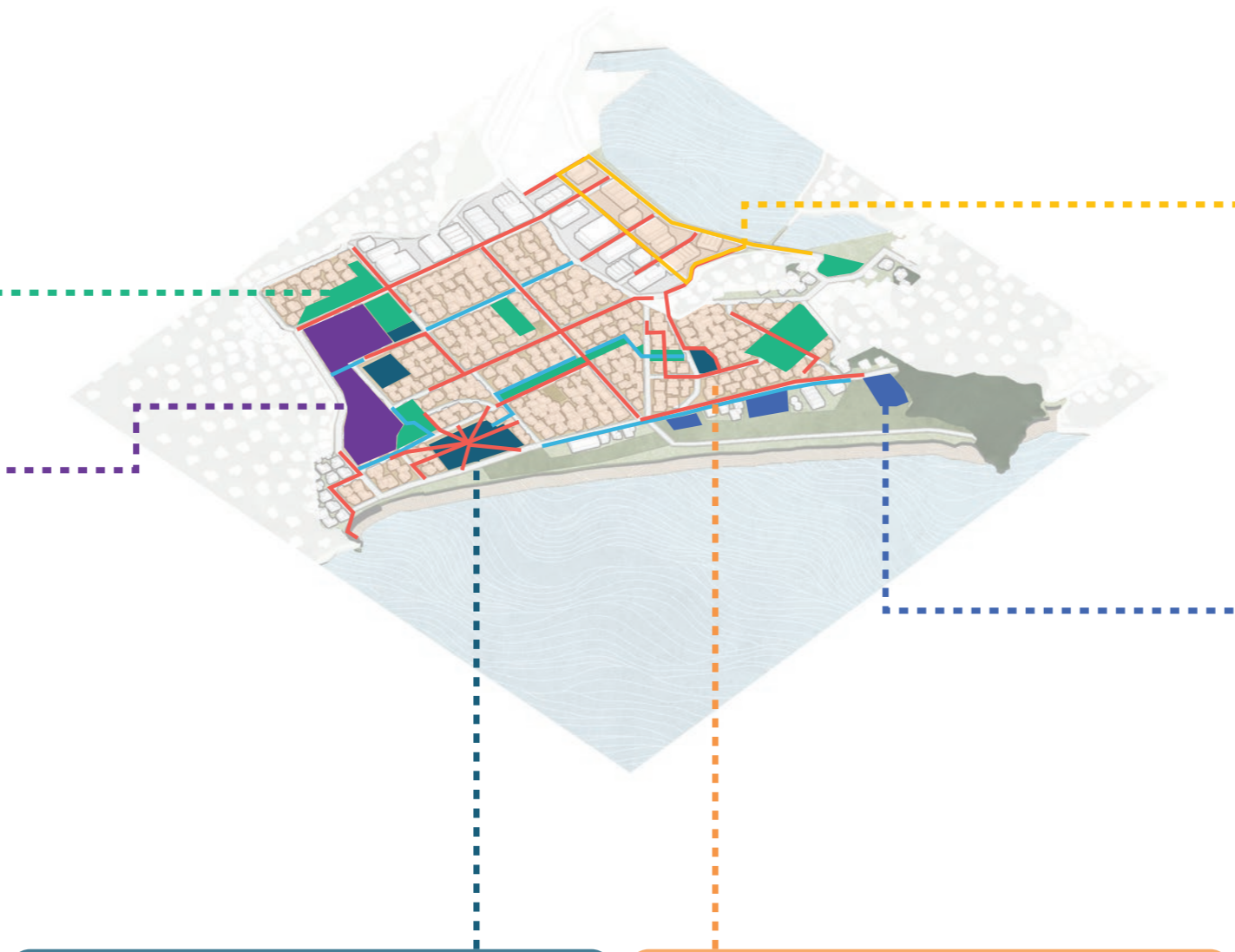


Some futures include land raising to extend the terrace along Forbury Road, building up land so that communities can live in places out of harm's way. This raised land extends areas that are already elevated and near the shops and town centres retaining a compact urban form. This builds up some low-lying areas that would be not otherwise suitable for housing.


Pipes and Pumps



To manage groundwater and reduce flooding when it rains, pipe upgrades within the road corridors and new pump stations would be required. This location of pumps and pipes uses the existing network as much as possible to reduce disruption and enhance cost-effectiveness. The overall strategy was to divide the catchment into smaller sub-catchments with their own outfalls to the harbour to avoid the need for a large ocean outfall.



Coastal Protection




Along Portsmouth Drive, additional coastal protection would likely be required around mid-century to protect from coastal flooding and erosion. This could be via increasing the height of the seawall or constructing an inland bund along Otaki Street. This coastal protection would be designed to protect against a coastal flood from the harbourside with a 1% chance of occurring in 2130.

New Development




Existing elevated areas may be developed to make space for people in South Dunedin in areas where there is lower risk. These locations are set back from the coast to reduce erosion risk and are presently green spaces to minimise the need for disruption and redevelopment.

Water Storage




Many open spaces would be designed to collect and hold water when it rains and then slowly release it after the peak passes to reduce flooding. These storage areas were located in existing parks and green spaces to minimise the amount of land acquisition required.

Changes to Planning Rules



To avoid increasing the risk, there may be changes to planning rules required in the future. This could include floodable ground floors near the coast, increased floor level requirements or existing use only in the Flat.

Waterways



Some futures include waterways to capture, temporarily store and move groundwater and stormwater. The waterways are set along existing roads, and alignments were selected to integrate with the existing network where there were low-lying shallow pipes to reduce construction costs and disturbance. These waterways manage groundwater more effectively than a pipe network.

Key differences over time

The image below shows how each future evolves over the short-, medium- and long-term. For each future, the three timeframes show which new actions are added over time.

- Pipes and Pumps
- Coastal Protection
- Land Raising
- MD (Medium Density)
- HD (High Density)
- Water Storage
- Waterways
- Changes to Planning Rules
- Acquisition Underway

*FGF (Floodable Ground Floors)

SHORT TERM

MEDIUM TERM

LONG TERM

FUTURE 3 - Protect



WHAT'S NEW?

- Pipes and Pumps
- Water Storage
- Greenspace
- Land Raising



WHAT'S NEW?

- Pipes and Pumps
- Coastal Protection
- Water Storage
- Greenspace
- Relocated Housing (MD)
- Land Raising



WHAT'S NEW?

- Pipes and Pumps
- Greenspace
- Relocated Housing (MD)

FUTURE 4 - Restore



WHAT'S NEW?

- Pipes and Pumps
- Water Storage
- Greenspace
- Waterways



WHAT'S NEW?

- Pipes and Pumps
- Coastal Protection
- Water Storage
- Greenspace
- Relocated Housing (HD)
- Waterways



WHAT'S NEW?

- Pipes and Pumps
- Greenspace

FUTURE 5 - Reshape



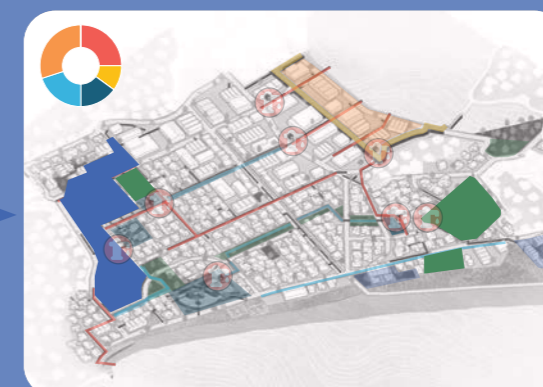
WHAT'S NEW?

- Pipes and Pumps
- Planning Changes (*FGF)
- Water Storage
- Greenspace
- Waterways
- Land Raising



WHAT'S NEW?

- Pipes and Pumps
- Coastal Protection
- Floodable Ground Floors
- Water Storage
- Greenspace
- Relocated Housing (MD)
- Waterways
- Land Raising



WHAT'S NEW?

- Greenspace
- Relocated Housing (MD)

Residual risk over time

The image below shows how residual risk changes over time across the proposed futures. It compares present day risk with short-, medium- and long-term projections, highlighting the buildings that remain exposed to flooding even after planned actions are implemented.

The maps illustrate the varying levels of risk that persist under each future, highlighting where vulnerabilities continue and where adaptation efforts reduce exposure over time.

