

South Dunedin Future Programme

Councillor Presentation: 3 Proposed Adaptation Futures (11 March 2026)



South Dunedin Future Programme

Councillor Presentation / Workshop - Agenda

1. South Dunedin Future Programme - Overview
2. South Dunedin - History, hazards, risks and climate impacts
3. Stages of SDF programme
4. Developing a climate adaptation masterplan for South Dunedin
5. Summary of key outputs and findings
6. Conclusions and key messages
7. Next steps
8. Q and A

South Dunedin Future Programme

South Dunedin Future – Background and Overview

- The potential impact of climate change on South Dunedin has been the subject of specific investigation by the DCC and ORC since the late 2000s.
- In 2021, DCC and ORC agreed to establish a joint initiative to address the issues facing the area develop a climate adaptation plan for South Dunedin. There are five key stages over the period 2022/23 - 2026/27.
- The vision for the SDF programme is a **safer and better** South Dunedin, where sustainable urban regeneration leads to improved community resilience and wellbeing.*

2023



The **Risk Assessment** considers how changing natural hazards will impact on buildings, infrastructure, and communities in South Dunedin.

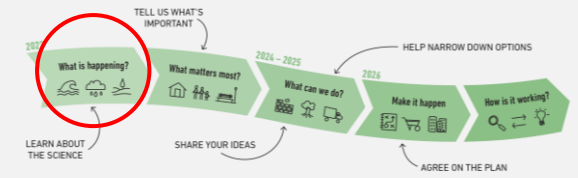
The **Adaptation Futures** explore different ways to manage and mitigate the risks facing South Dunedin.

* The full SDF programme strategy can be accessed [here](#).

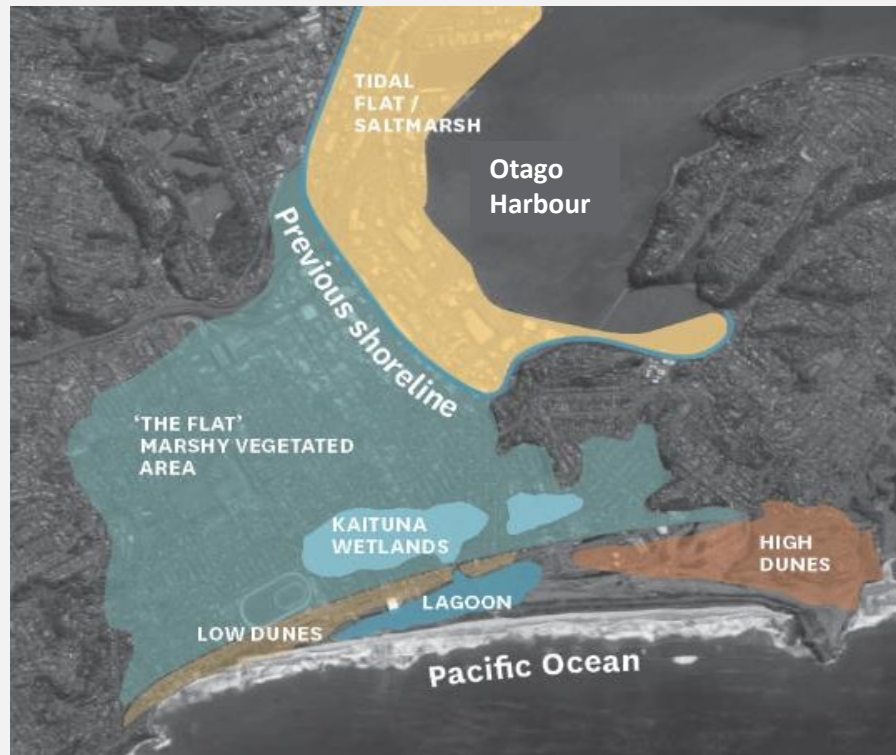
South Dunedin Future Programme

Why are councils undertaking this work?

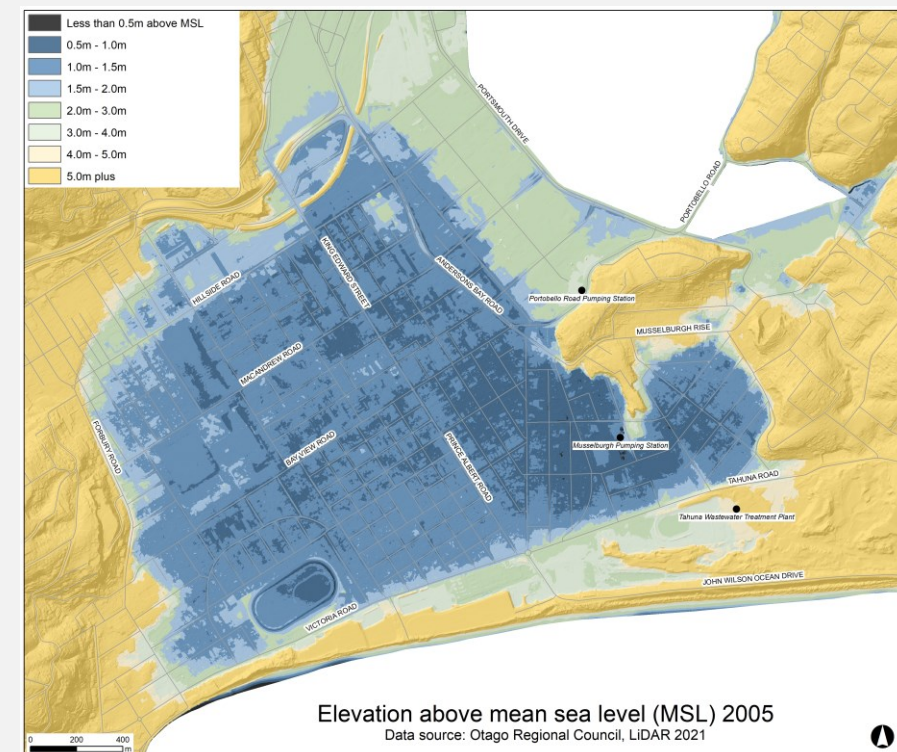
- South Dunedin is a **complex, multi-hazard environment**, linked to its location on a low-lying flat, at the bottom of a large water catchment, adjacent to the harbour and ocean.
- This **area has been highly modified** over the past 180 years, turning marshy vegetated wetlands into a densely populated urban environment and basin with no natural outflow for water.



The geography of South Dunedin circa 1850



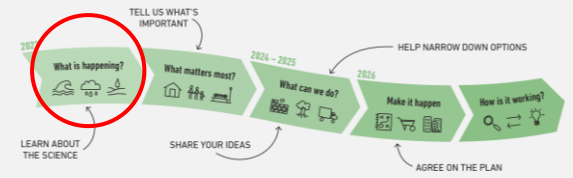
The geography of South Dunedin at present day



South Dunedin Future Programme

Why are councils undertaking this work?

- There is a **history for flooding** in South Dunedin, with records stretching back to the 1920s. A significant flood event in 2015 was the genesis for South Dunedin Future. The last significant flood was in 2024.
- The science is indicating that flood **hazards will worsen**, linked to rising sea levels, rising groundwater, and more frequent and severe rainfall events. This is compounded by urban intensification, increases in impermeable services, as well as ageing three waters infrastructure.

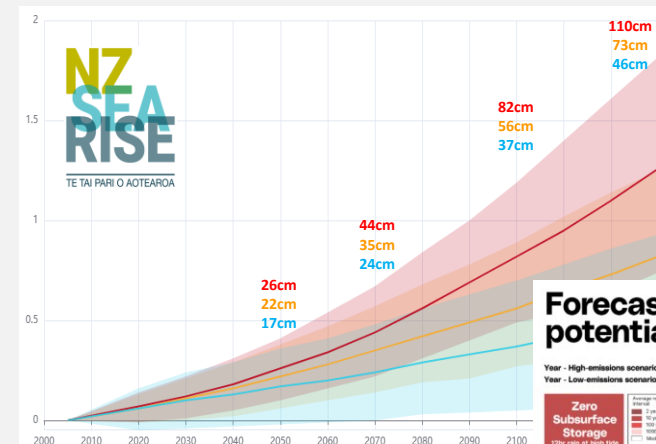


April 1923

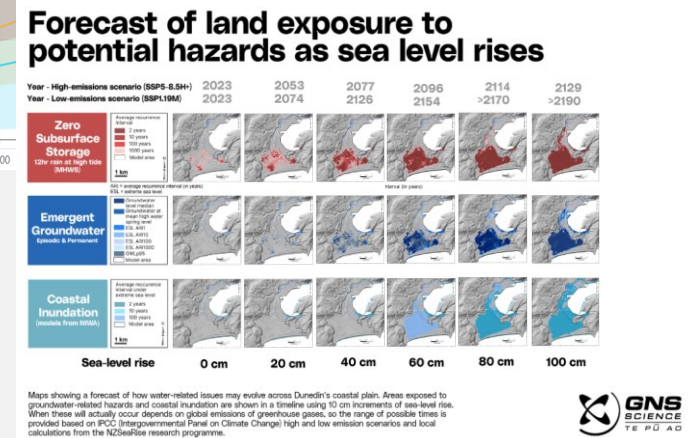


June 2015

October 2024



Source: The NZ SeaRise Project, [link](#).



Source: Dunedin groundwater; Cox, S. et al. (2023) ([link](#))

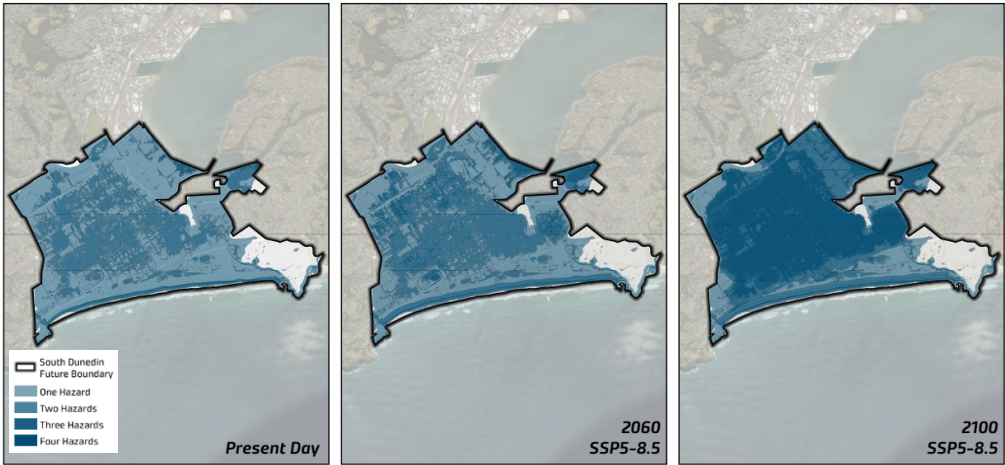
South Dunedin Future Programme

Overview of South Dunedin Risk Assessment.

- South Dunedin is a **complex multi-hazard environment**. Many hazards will increase with the impacts of climate change.
- South Dunedin is also a **high-risk environment**, with increasing hazards expected to materially increase risk to buildings, infrastructure, and communities.
- **Risks are interlinked and cascading**, depending on location, hazard, and element. For example, a building could be low risk but located where risks to services and infrastructure are high.

Hazard Extents

Coastal Erosion, Coastal Inundation, Emergent Groundwater, Landslide, Liquefaction & Pluvial Flooding



Summary of Risks to South Dunedin

Buildings, Parks & Transport

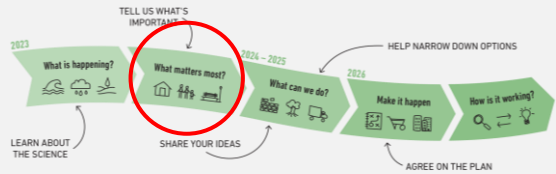
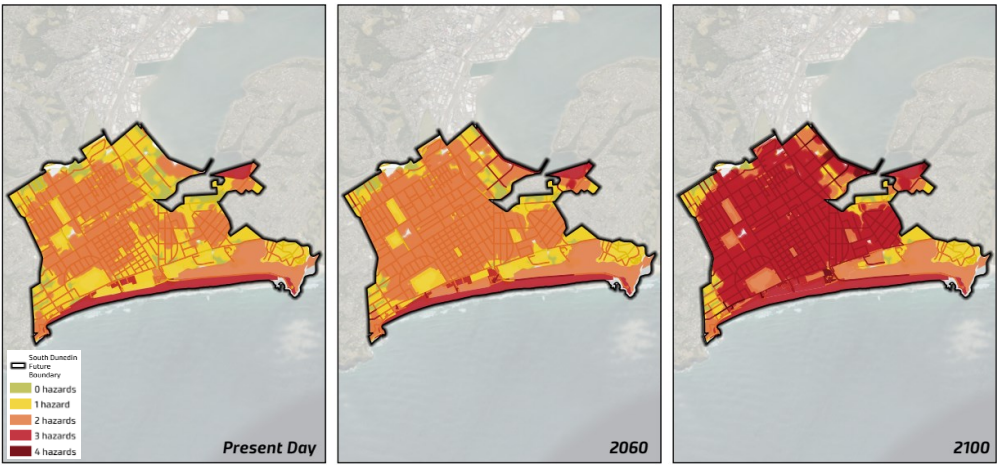


Figure 5.7 Building risk due to pluvial flooding aggregated to SA1 units

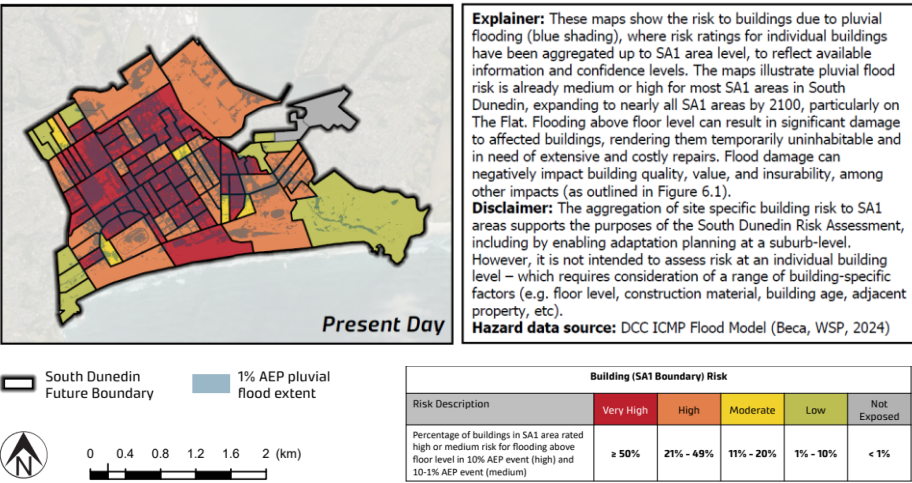
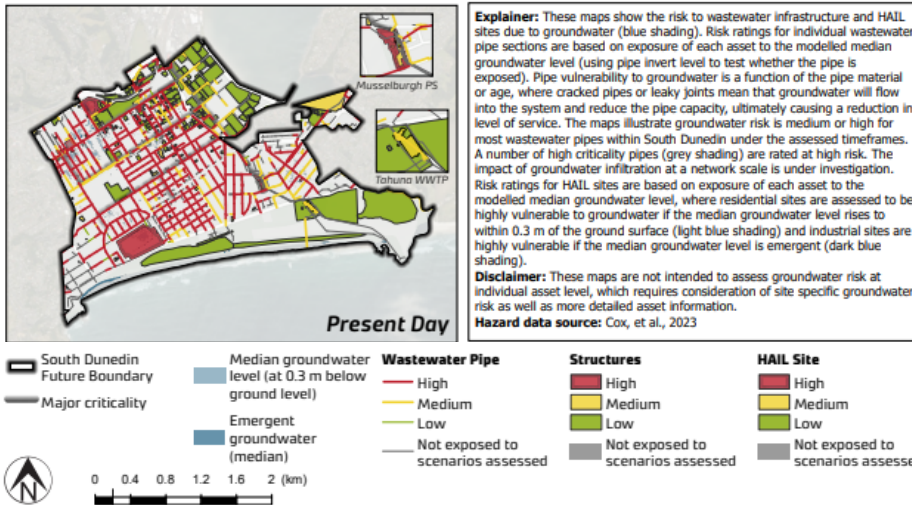
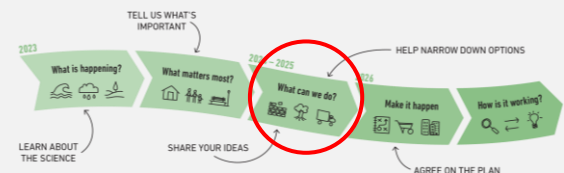


Figure 5.43 Wastewater infrastructure and contaminated land (HAIL sites) risk due to groundwater



South Dunedin Future Programme

Developing a climate adaptation masterplan for South Dunedin



Steps 1 & 2

Best Practice Research & Adaptation Approaches
(16 Generic Adaptation Approaches)

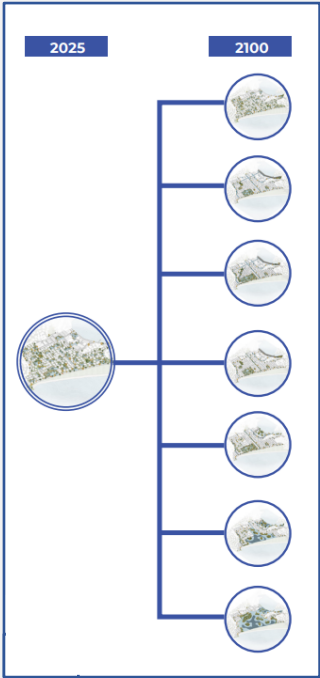


Feb/Mar 2024

Drawing on best practice and crowd sourced ideas, an initial list of 16 generic approaches for helping South Dunedin adapt to flooding and climate change was developed. The approaches were categorised as protect, accommodate, retreat, and avoid. Community engagement occurred in early 2024, with feedback informing further analysis.

Step 3

7 Potential Adaptation Futures
(Longlist)

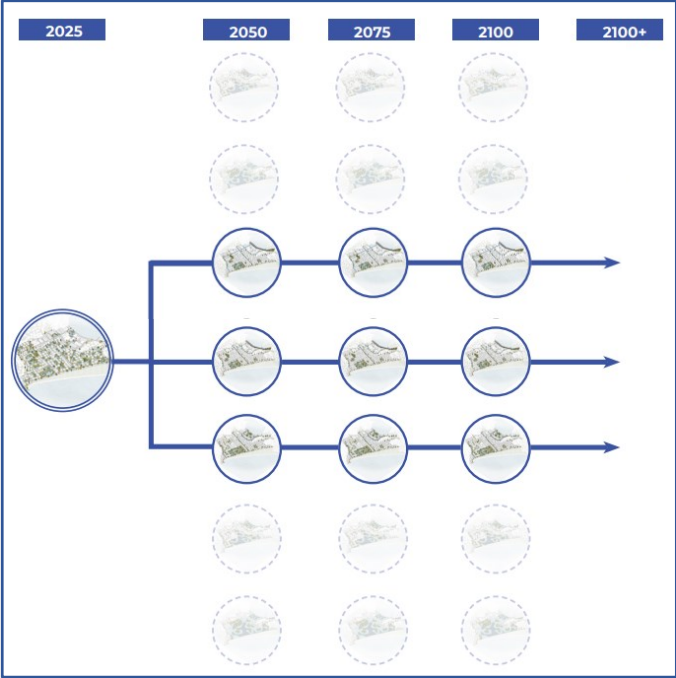


Apr/May 2025

The 16 approaches were combined in different ways to form 7 Potential Adaptation Futures for South Dunedin. The 7 futures represented a spectrum of potential responses. Community engagement occurred in April/May 2025.

Step 4

3 Proposed Adaptation Futures
(Shortlist)

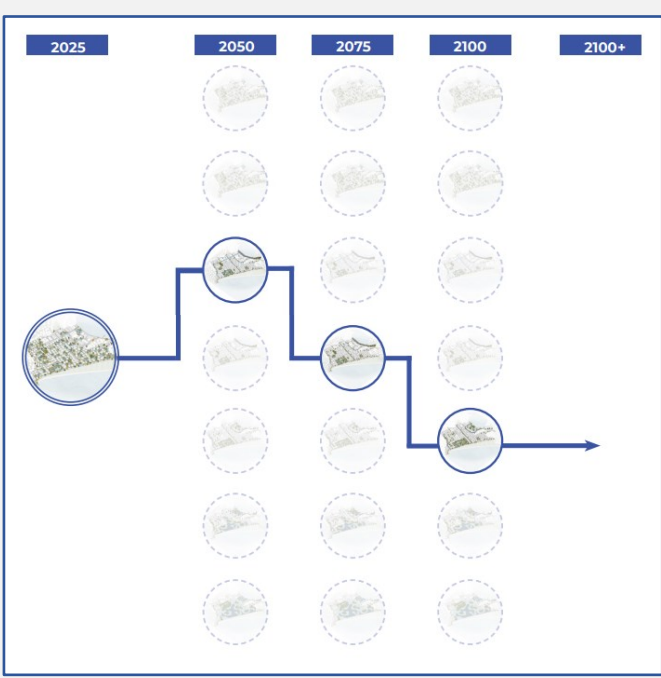


Early 2026

Following a shortlisting process, stormwater and groundwater modelling was undertaken for 3 futures 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. Community engagement is planned for May/June 2026.

Step 5

Preferred Adaptation Future
(Climate Adaptation Masterplan for South Dunedin)



Late 2026 / early 2027

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. This future will form the basis of the Climate Adaptation Masterplan for South Dunedin.

South Dunedin Future Programme

How were the 3 Proposed Adaptation Futures developed?



- The 7 Potential Adaptation Futures were **shortlisted to three** based on community feedback, technical assessments, and analysis against strategic objectives previously approved by Councils.
- Key **performance standards** and levels of service (LoS) were developed for the futures based on SDF programme strategic objectives, as well as community and other stakeholder feedback:
 - Pipes and pumps designed to 10% AEP event.
 - Storage and open channels designed to 2% AEP event, allowing for flooding on roads up to 150mm.
 - 1% AEP event modelled to determine residual risk.
 - Groundwater maintained at a level below 0.7m, except during heavy rainfall events.
- **Stormwater and groundwater modelling** 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 over the next 100 years.

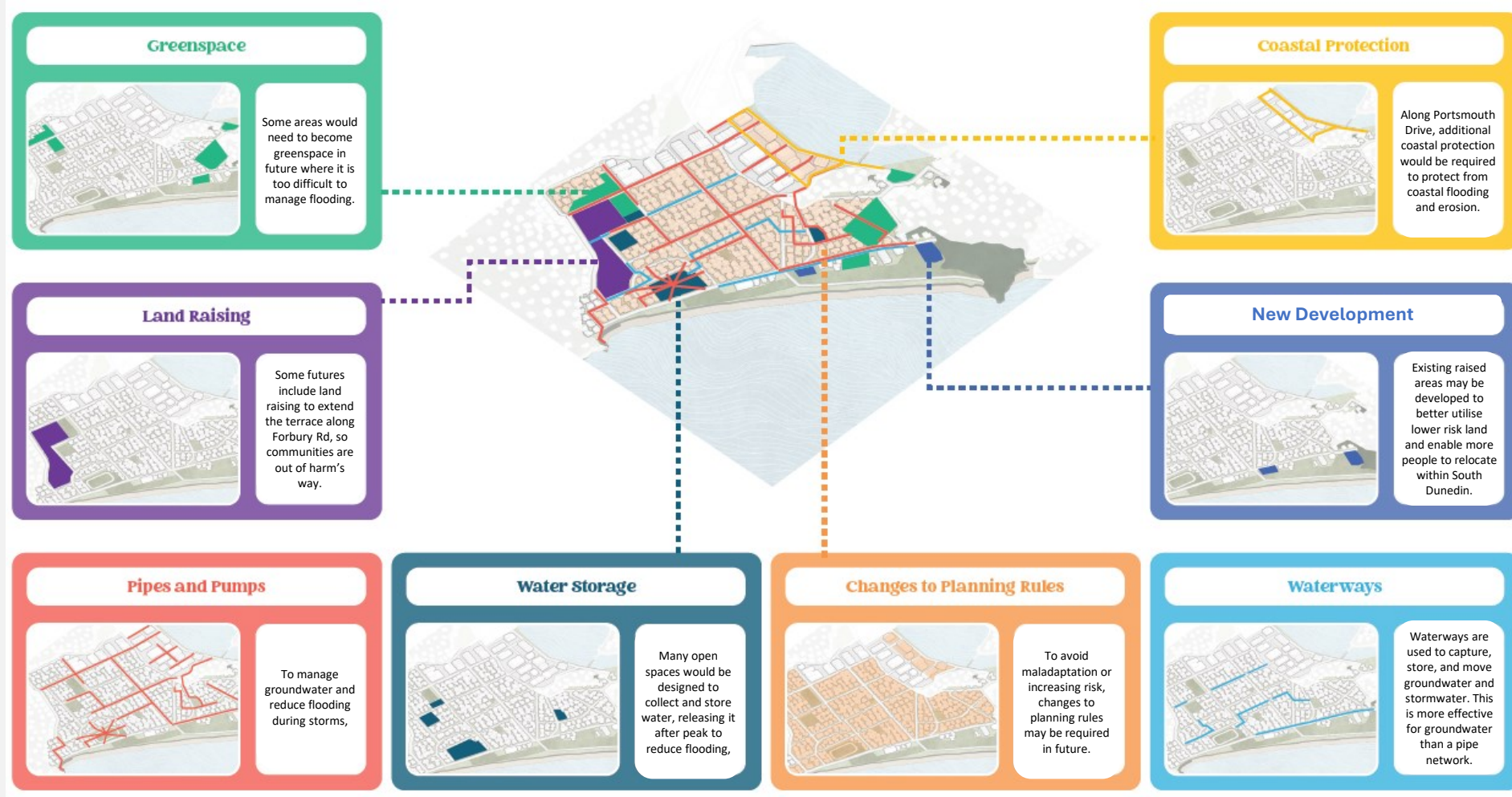
Key **design principles** that guided the modelling included:

- Use the key features of each of the shortlisted futures to achieve desired LoS and align with strategic objectives.
- Maximise alignment across the three futures, particularly in the short term.
- Seek to sustain a similar population as at present day (~12,000)
- Minimise cost (secondary)

South Dunedin Future Programme

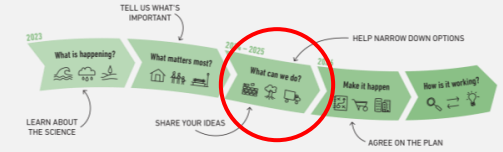
How were the 3 Proposed Adaptation Futures developed?

- Guided by performance standards and design principles, **each future uses a different mix** of infrastructure, green and blue space, and land use change to manage risk in different areas over the next 100 years. Key actions include:



South Dunedin Future Programme

How were the 3 Proposed Adaptation Futures developed?

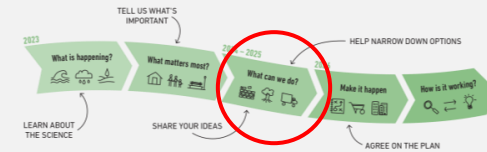


Summary of key actions for each future:

- **Future 3 (Protect)** – Utilise an upgraded network of pipes and pumps, increase resilience by raising and redeveloping land in the west of the catchment. New development areas in the east with additional green space to provide infiltration and reduce runoff. Storage facilities would provide flow attenuation and reduce the required scale of infrastructure. Seawall on Portsmouth Drive to prevent coastal flooding.
- **Future 4 (Restore)** – Utilise waterways to provide large drainage and conveyance capacity with storage facilities providing flow attenuation and increasing overall system capacity. Pump stations and network upgrades required to support green infrastructure. New development areas in the east, additional green space to provide infiltration and reduce runoff. Seawall on Portsmouth Drive to prevent coastal flooding.
- **Future 5 (Reshape)** – Utilise waterways to provide large drainage and conveyance capacity with storage facilities providing flow attenuation and increasing overall system capacity. Increase resilience by raising and redeveloping land in the west of the catchment. Pump stations and network upgrades required to support this infrastructure. New development areas in the east with additional green space to provide infiltration and reduce runoff. Seawall on Otaki Street to prevent coastal flooding, with harbourside floodable or becoming green space.

South Dunedin Future Programme

3 Proposed Adaptation Futures for South Dunedin



Future 3 - Protect

Future 3 – Protect, seeks to keep the land dry through a focus on engineered systems — pipes and pumps — with some land raising and coastal protection.



TOTAL RETREATED LAND 80.7 ha	1226 BUILDINGS DEMOLISHED	31 km OF PIPING NETWORKS
14 ha FOR STORAGE & WETLANDS	38 ha OF RAISED LAND	2.1 km SEAWALL
16 km OF GW PIPE NETWORKS	9 NEW PUMP STATIONS	1 NEW OUTFALL
0 km OF OPEN CHANNELS	1 NEW GW PUMP STATIONS	

Future 4 - Restore

Future 4 – Restore, seeks to make space for water, by reintroducing open waterways, wetlands, and other green spaces to complement the pipes and pumps.



TOTAL RETREATED LAND 69 ha	1205 BUILDINGS DEMOLISHED	2.1 km SEAWALL
16 ha FOR STORAGE & WETLANDS	10 NEW PUMP STATIONS	1 NEW OUTFALL
16 km OF GW PIPE NETWORKS	1 NEW GW PUMP STATIONS	
3.5 km OF OPEN CHANNELS	32.5 km OF PIPING NETWORKS	

Future 5 - Reshape

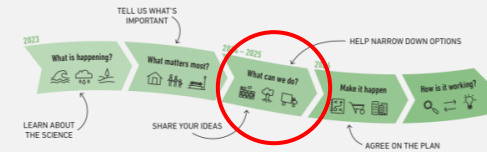
Future 5 – Reshape, is the most transformative, moving people out of harm's way using land raising and infrastructure alongside green and blue networks.



TOTAL RETREATED LAND 102 ha	1179 BUILDINGS DEMOLISHED	
16 ha FOR STORAGE & WETLANDS	44.5 ha OF RAISED LAND	35 km OF PIPING NETWORKS
16 km OF GW PIPE NETWORKS	10 NEW PUMP STATIONS	1.5km SEAWALL
3.5 km OF OPEN CHANNELS	1 NEW GW PUMP STATIONS	1 NEW OUTFALL

South Dunedin Future Programme

3 Proposed Adaptation Futures for South Dunedin



	SHORT TERM	MEDIUM TERM	LONG TERM
FUTURE 3 - Protect	WHAT'S NEW? Property acquisition to support intervention 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? Property acquisition to support intervention 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? Property acquisition to support intervention 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? Pipes and Pumps Greenspace Relocated Housing (MD)

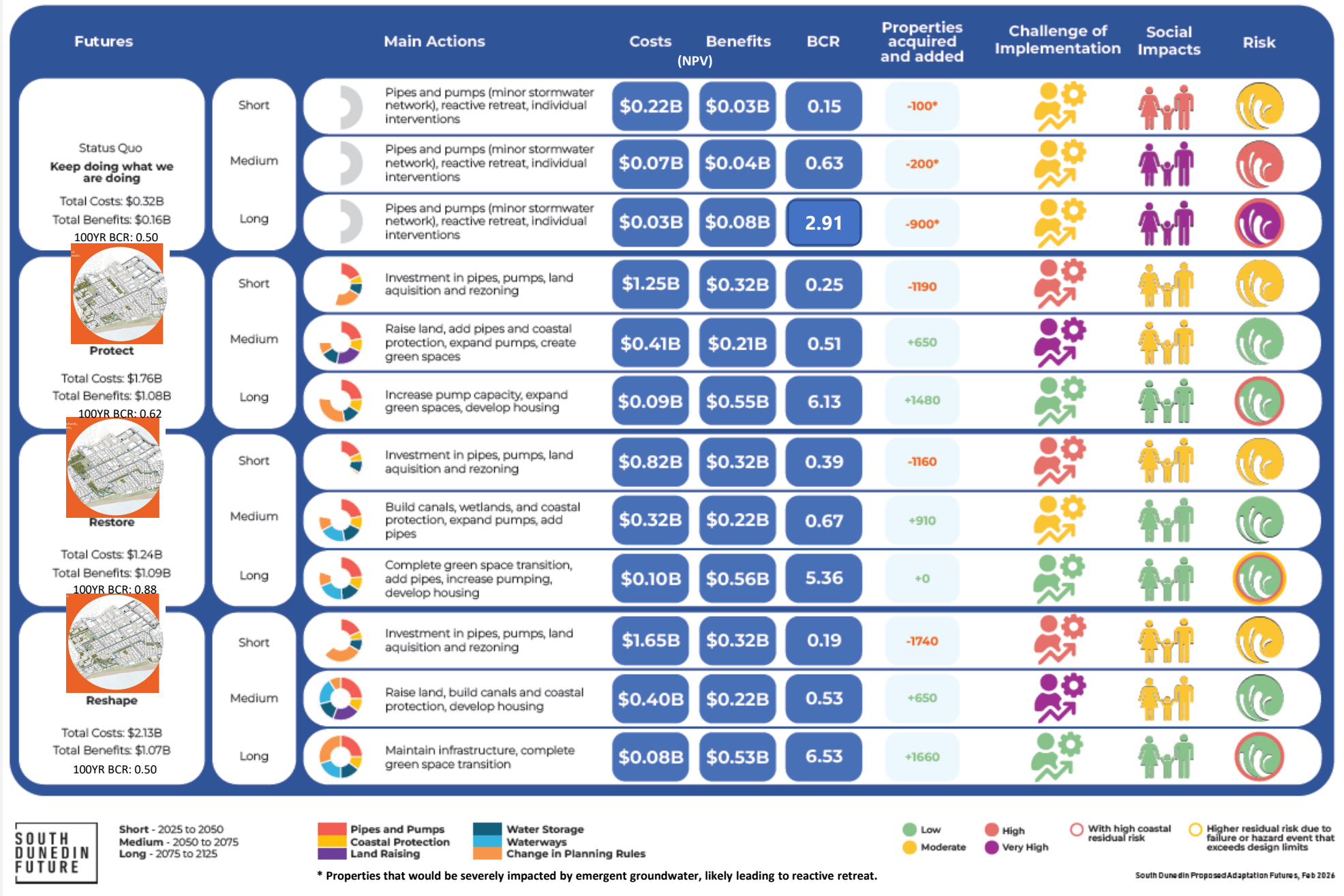
South Dunedin Future

What can we do?



The figures included in this stage of the SDF programme are materially lower than previous estimates due to:

- assumptions used for discount rates and growth rates;
- modelling has enabled increased accuracy;
- excluding some losses (e.g. \$1.3B reactive retreat now privatised);
- refined focus on council-only costs (95%);
- less infrastructure, land raising, and acquisition.



South Dunedin Future

Revised risk over time



- **All 3 futures significantly reduce risk** when compared to the status quo, and by mid-century have reduced flood risk below present day (despite increasing hazards).
- **Residual risk** (if the system breaks or a flood event exceeds operating capacity) **remains high**. This is due a reliance on constant dewatering, coastal erosion and inundation risk, and most of South Dunedin being below sea level.



The image below shows how the risk changes over time across different futures.

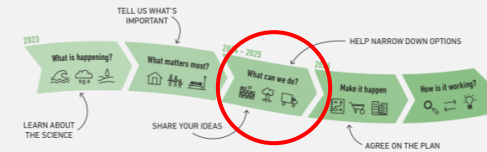
It compares present day risk with short-, medium-, and long-term projections, highlighting building and roads that remaining exposed to flooding even after proposed interventions are implemented. The maps illustrate the varying levels of risk that persist under each future, highlighting where vulnerabilities continue and where adaptation efforts reduce exposure over time.

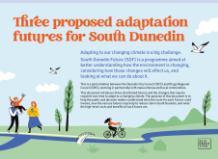


South Dunedin Future Programme

Summary of key outputs and findings

Four key outputs from this stage of the SDF programme include an overview of the 3 proposed adaptation futures for South Dunedin, and background technical reports on stormwater, groundwater, and economic assessments.



Report	Title	Purpose	Audience
	Three Proposed Adaptation Futures or South Dunedin	To provide a technical, but plain language overview of the key features of each of the 3 Proposed Futures . This includes key features, stages of development, performance, costs and benefits. The report includes visualisations of each future in the short, medium, and long term. The report draws on content from the stormwater, groundwater, and economic reports (see below).	Primary audience is Councillors and council staff, though much of the content will be used or adapted for community engagement. The content is technical, but at a summary level and written in plain language, aligned to most council reports and products.
	South Dunedin Stormwater Modelling Report	This report includes technical assessments of feasibility of a range of potential interventions to mitigate flood and other risks affecting South Dunedin. This includes through 'grey' infrastructure like pumps and pipes, and green infrastructure such as open water ways and water detention areas, as well and land use change. Modelling has enabled testing of the technical performance of potential interventions, preliminary configurations, sizing, and costing to support comparison and community engagement.	Primary audience is Councillors and council staff. The content is written in plain language (where possible) or technical language accessible to those with skillsets and experience in stormwater, groundwater, and finance and economics.
	South Dunedin Groundwater Assessment Report	This report describes early-stage technical assessments to determine the feasibility of groundwater drainage systems aimed at managing risks from shallow and rising groundwater across South Dunedin. Building on research by Earth Science New Zealand (formerly GNS) it uses modelling to scope the technical performance of potential interventions, preliminary configurations, sizing, and costing to support further analysis. Potential adverse effects of drainage, such as subsidence and saline intrusion, as well as mitigations for these effects are also explored.	The content provides more detailed information to support the conclusions presented in the overview report, includes additional information for interested stakeholders, and will inform future more detailed assessments and design work.
	Economic Assessment of the 3 Proposed Adaptation Futures for South Dunedin	This report evaluates the economic performance of each of the three proposed adaptation futures for South Dunedin , comparing these to a status quo counterfactual scenario in which no substantive adaptations occur. Standard cost-benefit methodologies are used to analyse anticipated costs, benefits (including avoided costs), and to calculate these over a 100-year period to 2125.	

South Dunedin Future Programme

Summary of key outputs and findings

The four key outputs from this stage of the programme sit within a wider body of SDF programme work:

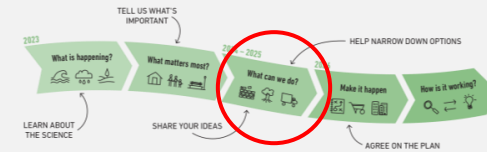


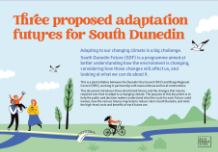
	Report	Title/Subject	Author(s)	Description
Communications and Community Engagement		Communications (15-30 April)	SDF Team; DCC + ORC Comms	Media and communications activities associated with public release of the technical reports (e.g. flyer, letter drop, media releases, etc)
		Engagement (1 May-14 June)	SDF Team; various DCC + ORC	Community engagement activities (e.g. public workshops and drop-ins, targeted stakeholder sessions, youth activities, etc.)
		Reporting (Late-July/early-August)	WSP (Kia Rōpine) / SDF Team	Analysis and reporting on community engagement results and covering Council papers.
Technical Summary		Council papers (15 April, for meetings 23 and 29 April)	SDF Team	Covering Council papers for Proposed Adaptation Futures for South Dunedin and six supporting technical reports.
		Three Proposed Adaptation Futures for South Dunedin	BECA (Kia Rōpine)	Technical but plain language overview describing the key features of each of the 3 Proposed Adaptation Futures for South Dunedin.
Background Technical Reports		Stormwater Modelling Report	BECA (Kia Rōpine)	Technical feasibility assessment of stormwater network systems and approaches (grey and green infrastructure) in South Dunedin.
		Groundwater Assessment Report	WSP (Kia Rōpine)	Technical feasibility assessment of groundwater drainage systems and risk management in South Dunedin.
		Economic Assessment Report	WSP (Kia Rōpine)	Evaluation of the economic performance of each of the three proposed adaptation futures for South Dunedin against a status quo.
		Health & Equity Assessment Report	University of Otago	Research into the health and equity implications of flooding, the potential impacts of the 3 Futures, and community engagement.
		Property Development Assessment Report	PWC	Advice on potential property market implications, commercial insights, potential market responses, and financing tools or models.
		Ocean Beach Domain Due Diligence Report	Stantec	Preliminary assessment of natural hazards, HAIL, and geotech at potential future development sites in Ocean Beach Domain.

South Dunedin Future Programme

Summary of key outputs and findings

Four key outputs from this stage of the SDF programme include an overview of the 3 proposed adaptation futures for South Dunedin, and background technical reports on stormwater, groundwater, and economic assessments.



Report	Title	Key findings
	Three Proposed Adaptation Futures or South Dunedin	• The futures illustrate it is technically feasible to manage flood risks facing South Dunedin (up to events with 2% AEP) over the next 50-100 years. • Though this would require extensive and ongoing investment, disruption, and change over that period (and potentially beyond). • The futures all have a lower level of flood risk compared to present day, despite increasing hazards. • Each future adopts a different approach to managing risk and therefore has a different set of costs, benefits, and trade-offs. • If implemented, each future would commit current and future generations to a particular set of ongoing actions, costs, and risks.
	South Dunedin Stormwater Modelling Report	• All futures require extensive investment in the stormwater network (pipes and pumps) to achieve performance standards over the next 50-100 years. • Stormwater network requires complementary investment in green infrastructure (conveyance, storage, infiltration, run-off). • Stormwater investment is similar across all three futures in the short term and designed to remain viable in each over the long-term. • It is not practicable to manage flood risk in all locations in South Dunedin. Some managed retreat is necessary in the highest risk areas.
	South Dunedin Groundwater Assessment Report	• Continued habitation of the 'Flat' in South Dunedin requires ongoing groundwater drainage to mitigate chronic dampness over the next 50-100 years. • Investment in groundwater drainage requires complementary investment in green infrastructure (conveyance, storage, infiltration, run-off). • All proposed short-term groundwater investment is designed to remain viable in each of the three futures over the long-term. • It is not practicable to manage groundwater in all locations in South Dunedin. Some managed retreat is necessary in the highest risk areas.
	Economic Assessment of the 3 Proposed Adaptation Futures for South Dunedin	• In the status quo, inaction leads to escalating annualised losses, privatised costs of \$1.3B, reduced liveability, and limited strategic flexibility. In comparison, the Futures generate substantial long-term value. • Avoided Annual Damages (AAD), form the core of this value, reflecting the scale of current and future risk facing South Dunedin (e.g. average annual damage to buildings reduces from \$14m-\$82m (status quo) to \$1-\$10m (across the 3 futures). • Estimated whole-of-life costs of the 3 futures range from \$1.24B - \$2.13B, with benefits estimated at between \$1.07B-\$1.09B.

South Dunedin Future Programme

Conclusions and key messages



- **Feasibility** – The futures illustrate it is *feasible* to significantly reduce flood risks facing South Dunedin (up to events with 2% AEP) over the next 50-100 years. Though this would require extensive and ongoing investment, disruption, and change over that period (and potentially beyond).
- **Trade-offs** – Each of the futures adopts a particular approach to managing risk and therefore has a different set of *costs, benefits, and trade-offs*. Each future would require difficult planning decisions, land-use change, and careful stewardship of future generations' exposure.
- **Uncertainty** – Although grounded in extensive analysis, the futures rely on assumptions and simplified representations of *complex social, economic, and environmental systems* over a 100-year period. There remains a degree of uncertainty, which adaptation planning can help manage, but not eliminate.
- **Proposals** - The futures are *just proposals at this stage*. There is more work to do, more opportunities for community feedback, and for Councillors to make decisions. Any proposed re-zoning, plan changes, or infrastructure investment would also be subject to standard council processes.
- **Process** - The SDF programme is designed to assess risks, identify responses, and facilitate a dialogue about the best way forward. While that involves detailed analysis, the discussion is fundamentally about what kind of *community we collectively chose to build in South Dunedin*.

South Dunedin Future Programme

Next steps



- **Technical reports and Council papers** – Subject to Councillor and other feedback, technical reports will be finalised by mid-April. The reports and a covering Council paper will be presented to Councils (and public) on 23 April (DCC) and 29 April (ORC).
- **Community Engagement** – Subject to Council approvals, community engagement would run from 1 May – 14 June and include a range of public communications (media releases, flyers, collateral) and a mix of public and targeted stakeholder engagement sessions.
- **Climate adaptation masterplan** – Community engagement results will be combined with further technical and economic assessments to develop a single, preferred adaptation future. This becomes the basis of the climate adaptation masterplan for South Dunedin. This final stage should be completed by late-2026 and presented to Councils for approval in early-2027.
- **Implementation** – Implementation of the masterplan would occur through normal council processes, including by informing the LTP (2027-36), with approved activities commencing from 1 July 2027. A 'launch package' of projects is currently in development to complement release of the masterplan.

South Dunedin Future Programme

Previous reporting to Councils



Report title	DCC report details	ORC report details	Key update(s) or decision(s)
SDF – Programme Update	Item 8, DCC Council, 23 November 2021	HAZ2109, ORC Council, 24 November 2021	Note current state assessment and planned activities during programme definition stage.
SDF – Interim Update	Item 8, Planning & Environment Committee, 4 April 2022	OPS2215, ORC Strategy and Planning Committee, 13 April 2022	Note key activities undertaken and pending workshop with Councillors.
SDF – Programme Plan	Item 9, Planning & Environment Committee, 6 July 2022	OPS2223, ORC Strategy and Planning Committee, 13 July 2022	Note and endorse scope, governance, management, collaboration, and approve the SDF Programme Plan.
SDF – Programme Update	Item 9, Strategy, Planning & Engagement Committee, 14 August 2023	HAZ2302, ORC Safety and Resilience Committee, 10 August 2023	Note key activities undertaken.
SDF – Programme Strategy Update	Item 10, DCC Council, 28 November 2023	HAZ2302, ORC Council, 22 November 2023	Note activity update and approve revised SDF Programme Strategy.
SDF – Risk Assessment & Adaptation Approaches	Item 6, DCC Council, 5 December 2023	GOV2343, ORC Council, 6 December 2023	Note South Dunedin Risk Identification Report and 16 Adaptation Approaches, endorse reports for community engagement, and approval for staff to engage.
SDF – Programme Update (July 2024)	Item 9, DCC Council Meeting, 31 July 2024	GOV2419, ORC Council, 24 July 2024	Note key activities undertaken.
SDF – Risk Assessment Update and Programme Changes	Item 10, DCC Council Meeting, 24 September 2024	GOV2430, ORC Council, 25 September 2024	Note information and data gaps causing delay to South Dunedin Risk Assessment.
SDF – Risk Assessment and Potential Adaptation Futures	Item 7, DCC Council Meeting, 18 March 2025	GOV2531, ORC Council, 19 March 2025	Note South Dunedin Risk Assessment and 7 Potential Adaptation Futures, endorse reports for community engagement, and approve staff to engage.
SDF – Community Engagement Results and Programme Update	Item 9, DCC Council Meeting, 30 July 2025	HAZ2504, ORC Council, 23 July 2025	Note the results of the community engagement and SDF work plan.
SDF – Shortlist of Potential Adaptation Futures	Item 10, DCC Council Meeting, 23 September 2025	HAZ2509, ORC Council, 24 September 2025	Note the process and outcome of shortlisting, note Futures 3, 4, and 5 will be advanced, and note work plan.

South Dunedin Future Programme

Councillor Presentation: 3 Proposed Adaptation Futures (11 March 2026)



Q&A