



From: 7(2)(a)
Sent: Thursday, July 16, 2026 2:44 PM
Cc: Official Information
Subject: Fw: Follow up request regarding South Dunedin Future

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Kia ora,

I have a request under the Local Government Official Information and Meetings Act 1987.

- All correspondence between elected members and/or council staff regarding the South Dunedin Future programme between June 17-July 1.

Nga mihi nui,

7(2)(a)

7(2)(a) | 7(2)(a) | Otago-Southland reporter, Tourism reporter
RNZ, PO Box 329, Dunedin, New Zealand, 9054

Mobile: 7(2)(a)

www.rnz.co.nz



From: 7(2)(a)
Sent: Wednesday, 17 June 2026 10:18 am
Cc: 'official.information@orc.govt.nz' <official.information@orc.govt.nz>
Subject: RNZ - Request regarding South Dunedin Future

Good morning,

I have a request under the Local Government Official Information and Meetings Act 1987.

- All correspondence between elected members and/or council staff regarding the South Dunedin Future programme in June.

Nga mihi nui,

7(2)(a)

7(2)(a) | 7(2)(a) | Otago-Southland reporter, Tourism reporter
RNZ, PO Box 329, Dunedin, New Zealand, 9054

Mobile: 7(2)(a)

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LGOIMA SR.31780 - All correspondence between elected members and/or council staff regarding the South Dunedin Future programme between June 17-July 1 – Decision

From Customer Services <customerservices@orc.govt.nz>

Date Fri 7/08/2026 2:07 PM

To 7(2)(a)

📎 1 attachment (9 MB)

LGOIMA SR.31780 Release - REDACTED.zip;

Kia ora 7(2)(a)

Your official information request received by us 16 July 2026 for "All correspondence between elected members and/or council staff regarding the South Dunedin Future programme between June 17-July 1" has been granted.

The information you have requested is attached, in 15 parts.

Information has been withheld in order to protect the privacy of natural persons in accordance with section 7(2)(a) of the Local Government Official Information and Meetings Act 1987.

Proactive Release

Council has published this LGOIMA.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

If you wish to discuss this decision with us, please feel free to contact us by return email.

Kā mihi,

7(2)(a)



Legal

legal@orc.govt.nz



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From: 7(2)(a)
Sent: Thursday, 18 June 2026 11:40 a.m.
To: Cr Chanel Gardner
Subject: November 2023 SDF paper
Attachments: 2023 11 22 - 10.7 SDF Programme Strategy Update.pdf

Hi Chanel
Here is the paper - I am printing a copy for you also.
Kind regards,



Otago
Regional
Council



7(2)(a)

Team Leader Governance
Governance Support

7(2)(a) | 7(2)(a)

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pests be managed?**

Have your
say!



Feedback closes 8 July

10.7. SDF Programme Strategy Update

Prepared for: Council

Report No. HAZ2302

Activity: South Dunedin Future

Author: Jonathan Rowe, Programme Manager – South Dunedin Future

Endorsed by: Gavin Palmer, General Manager Operations and
Anita Dawe, General Manager Policy and Science

Date: 22 November 2023

PURPOSE

- [1] The purpose of this report is to seek Council approval of the revised strategy for the South Dunedin Future programme.

EXECUTIVE SUMMARY

- [2] The South Dunedin Future (SDF) programme is a joint initiative between the Dunedin City Council (DCC) and Otago Regional Council (ORC) to develop a climate change adaptation strategy for South Dunedin.
- [3] A strategic intent for the SDF programme was approved by Council Committees in July 2022 and has guided implementation over the past 18 months. As foreshadowed at the time of approval, the evolving nature of the SDF programme and external factors – including interactions across central government, local government, with mana whenua, and affected communities - have informed further development and revision of the programme strategy.
- [4] This paper summarises the programme context and problems that it is trying to resolve. It canvasses a range of factors relevant to the programme strategy, proposes several revisions and provides justifications, and signals the impact that the strategy may have on both the delivery and anticipated outcomes of the programme. Finally, the paper recommends a revised SDF programme strategy.

RECOMMENDATION

That the Council:

- 1) **Notes** this report.
- 2) **Notes** the South Dunedin Future programme has been operating in accordance with the strategic intent approved by both Councils in July 2022 (included at Attachment A).
- 3) **Notes** the work undertaken to develop a revised South Dunedin Future programme strategy.
- 4) **Approves** the revised South Dunedin Future programme strategy (included as Attachment B).

- 5) **Notes** the strategy will guide the South Dunedin Future programme, including programme communications and engagement, risk assessment, and development of adaptation options.

BACKGROUND

- [5] The South Dunedin Future (SDF) programme is a joint initiative between the Dunedin City Council (DCC) and Otago Regional Council (ORC) to develop a climate change adaptation strategy for South Dunedin.
- [6] A programme plan, which outlined the high-level approach for developing the adaptation strategy and delivering the SDF programme was approved by DCC and ORC Council Committees in July 2022 (refer report OPS2223, Strategy and Planning Committee, 13 July 2022). The programme plan included a strategic intent, which described a programme vision, purpose, and set of strategic and operational objectives. A diagram of this strategic intent is included as **Attachment A**.
- [7] The programme plan also noted the evolving nature of the programme vision, purpose, and objectives. This included that the strategic intent for the programme would be further developed and revised as the programme progressed, and this would involve collaboration with central government, local government, iwi/Māori, private sector and communities.
- [8] Since approval of the strategic intent in July 2022, the SDF programme has progressed to implementation and a range of work has been undertaken to further develop and revise the programme strategy. A number of events have also occurred outside the programme that have relevance for this work. This includes developments at central government level, within local government, with mana whenua partners, and with affected communities.

DISCUSSION

Strategic Context

- [9] South Dunedin is built on the flat area between Otago Harbour, the southern coastline and surrounding hill suburbs. It is home to about 13,500 people, 1,500 businesses and a range of critical city infrastructure and public amenities. This former coastal wetland has been developed, filled in and reclaimed over time, creating an area that has become a basin with no natural outflows.
- [10] Over time, coastal erosion and high groundwater have impacted the community and the sea-level is estimated to have already risen about 20 centimetres during the past 120 years. In 2015, heavy rainfall exceeded the operating capacity of stormwater systems, which led to extensive flooding across South Dunedin. These heavy rainfall events are expected to increase in intensity and frequency in the future, as rising sea-levels and high groundwater also reduce the capacity of the ground to absorb water, the flood risk will increase. The impacts of climate change are expected to intensify these hazards presenting increasing risk to the people, assets, and places of value in South Dunedin.
- [11] The DCC and ORC support initiatives to minimise the negative impacts arising from climate change, to identify opportunities to enhance wellbeing through adaptation, and to future-proof our natural and built environments. Adaptation means adjusting to the actual or expected climate and its effects, to reduce harm and take advantage of new

opportunities. This includes the need for local adaptation planning, particularly where historic land use planning has not foreseen, or not taken account of, changes in weather patterns or landforms, and the natural hazard risks are or will become too high. South Dunedin one such example.

Case for change

- [12] There are a range of challenges facing South Dunedin. Many of these are complex and interlinked, without simple or quick resolutions, and with historical origins – the implications of which endure to present day. Overcoming old challenges will likely require new ideas and approaches, and this is a key focus of the SDF programme. Part of this includes laying out the case for change and describing the current trajectory to highlight why change is needed.
- [13] South Dunedin is subject to flooding and other natural hazards, which present risk to people, places and infrastructure. Some of these risks are expected to increase due to climate change, though uncertainty remains about timing and severity of impacts, which makes planning more difficult for councils, affected communities, and other stakeholders.
- [14] This uncertainty means that current investment by public and private sectors is likely not adequately accounting for current or future flood risk. The consequences could include maladaptation and potentially higher costs for communities, councils and central government in the long term, including through disaster response, recovery and rebuild or a reduction in the expected operational life of assets and critical infrastructure.
- [15] Downstream risks of systemic shocks and market failures are increasing (e.g. major flood event, finance or insurance withdrawal, property market decline), potentially leading to sudden and significant disruption or damage to social and economic wellbeing, particularly for affected communities in South Dunedin.

Revised SDF Programme Strategy

- [16] The SDF programme seeks to rise to these challenges, and to enable any changes in thinking and approach necessary to place South Dunedin on a safer, and better trajectory.
- [17] Specifically, the SDF Programme will do this through: (i) detailed scientific and technical work to better understand natural hazards and the impacts of climate change; (ii) community engagement work to determine the views, values and aspirations of partners and stakeholders; (iii) risk assessment work to quantify and assess the threats posed to people, places and assets; and (iv) adaptation options work to determine appropriate responses and mitigations.
- [18] These initiatives will be guided by the programme strategy, which articulates the vision, purpose and objectives of the SDF programme, shapes how the programme will respond to the problems noted above, and describes the outcomes sought from that process.
- [19] The sections below describe work that has been undertaken to further develop the existing programme strategic intent into a revised programme strategy. This is broken into four sections and describes key considerations and proposed changes to the strategy at central government level, within local government, with mana whenua partners, and with directly affected communities.

Central Government

- [20] Central government is a key stakeholder and will play an important role in climate change adaptation in South Dunedin. Central government sets some of the legislative, regulatory, and policy context within which the SDF programme will be delivered, provides funding for a range of services and infrastructure of relevance to the programme, owns and operates community infrastructure and facilities (e.g. schools), and may play a key role in funding implementation of the climate change adaptation strategy being developed for South Dunedin.
- [21] There have been several developments at a central government level since July 2022 that are material for the SDF programme strategy. These include:
- Release of the first National Adaptation Plan (NAP), which sets out Aotearoa New Zealand's long-term strategy and maps out the Government's approach to climate change adaptation. The NAP includes a range of national goals, principles, and focus areas of relevance to the SDF programme.
 - Central government is undertaking an inquiry into climate change adaptation, including funding models and managed retreat. The Ministry for the Environment has also released an Issues & Options paper on Community-led Retreat and released updated climate change data and guidance, which includes direction for local government on adaptation planning.
 - The ongoing reform of the Resource Management Act, Local Government sector reform, and Three Waters reform, and draft National Policy Statement on Natural Hazards, are areas of the legislative, regulatory and policy context that will have a material impact on the delivery and outcomes of the SDF programme. The incoming government has already signalled changes in direction of some reform programmes, though details are yet to be confirmed.
- [22] The following changes are proposed to the SDF programme strategy based on central government developments since July 2022:
- Reframe some of the strategic objectives to better align with the objectives of the NAP, and seek to reflect the NAP's 10 principles for climate action, thereby strengthening strategic coherence between national and local approaches, and edit some of the language to make it more consistent with national terminology, enabling clearer communication.

Local Government

- [23] Climate change adaptation is a global issue, though one that must be tackled locally, given the specific impacts of climate change are generally unique to each location and therefore felt at a local level. This factor places regional and district councils in a central role with an increasing responsibility to develop adaptation strategies, plans and actions that will strengthen resilience and promote the wellbeing of local communities.
- [24] Central government is working to develop a national adaptation framework in which roles, responsibilities and resources are more clearly outlined. Once in place, national direction and coherence will support more effective adaptation responses, but these will always require locally led decision-making and delivery. It is therefore important to ensure climate change adaptation and resilience is embedded across local government, and that adaptation plans are fit-for-purpose and can be implemented by councils.

[25] There have been several developments at a local government level since July 2022 that are material for the SDF programme strategy. These include:

- DCC and ORC are collaborating to produce a Future Development Strategy (FDS), which focuses on ensuring Dunedin is a well-functioning urban environment, including having sufficient land and infrastructure for future growth. The FDS focus is similar to the SDF programme, though timeframes differ, so staff have sought to collaborate to ensure strategic coherence, noting South Dunedin specific issues will be explored in much greater detail by the SDF programme over the period 2023-26, and that this information will inform subsequent strategic spatial planning processes.
- The Proposed Otago Regional Policy Statement 2021 (Proposed RPS 21) was notified in June 2021 and sets the direction for future management of Otago's natural and physical resources. The Proposed RPS 21 informed the SDF programme strategic intent and strategy revision, and its policies and objectives will influence programme implementation, including through the District Plan.
- The cross-cutting nature of climate change adaptation means that many local government strategies, policies and plans have relevance to the SDF programme. For example, recent approval of the DCC Zero Carbon Plan, DCC's 3 Waters Integrated System Planning (ISP) project, and DCC work to scope development of a city-wide climate adaptation plan, and ORC work to develop a regional climate change strategy, have influenced the strategy revision process and will likely impact programme delivery.

[26] The following changes are proposed to the SDF programme strategy based on local government developments since July 2022:

- Adopting a more holistic vision and purpose, where there is a dual focus on resilience and wider wellbeing, acknowledging the opportunities and potential co-benefits that can come with change, and placing more prominence on a community-centred approach, following feedback from Councillors.
- Weaving climate adaptation principles from the NAP into updated operational objectives of the SDF programme, where these are assessed at aligning with local direction and priorities set by Councils.

Mana whenua

[27] The Local Government Act (LGA) 2002 recognises and respects the Crown's obligations under the Treaty of Waitangi by placing some specific obligations on local authorities. These obligations are intended to facilitate participation by Māori in local authorities' decision-making processes. The LGA (2002) charges local authorities with a clear responsibility to take an informed approach to how decision-making can benefit the social, cultural, economic and environmental well-being of the Māori community.

[28] Māori participation in the climate change adaptation process, including adaptation planning, is of critical importance. There are a range of barriers to Māori adaptation that need to be acknowledged and addressed - adaptation planning must consider the special nature of Māori land, and must account for the potential for climate change to have a disproportionate impact on Māori. Staff are actively considering these factors in SDF programme strategy, design and delivery.

[29] Since July 2022, Council partnerships with mana whenua have evolved and developed, including in ways that are material for the SDF programme strategy. These include:

- Reappointment of mana whenua representatives to Council Committees which oversee the SDF programme, including ORC's Regional Leadership Committee and DCC's Strategy, Policy and Engagement Committee. Importantly, this provides an opportunity to provide periodic strategic updates to mana whenua representatives, receive direct feedback, and factor this into programme strategy, design and delivery.
- Te Taki Haruru - Māori Strategic Framework (Te Taki Haruru), which was approved by DCC Council in September 2023, provides a framework for operationalising the Treaty of Waitangi partnership between mana whenua and DCC, and establishes te ao Māori aspirations to help guide contributions to Māori wellbeing across Ōtepoti Dunedin. These aspirations have informed revision of the SDF programme strategy. (Note: the SDF programme is also guided by He Mahi Rau Rika, ORC's Significance, Engagement and Māori Participation Policy).
- Operational level hui commenced with Aukaha in May 2023 and have occurred regularly since. These hui enable ongoing dialogue about SDF programme-related issues of relevance to mana whenua and Māori communities, and support work to integrate these into programme strategy, design and delivery.

[30] The following changes are proposed to the SDF programme strategy based on developments in Council partnerships with mana whenua since July 2022:

- Directly incorporating elements of Te Taki Haruru into the revised SDF strategy, including the principles, values and key intent. In addition, SDF programme partnership commitments have been developed based on an interpretation of Te Taki Haruru through a South Dunedin Future lens, which seek to give effect to Te Taki Haruru in an SDF programme context. These elements are positioned at the top of the strategy framework, reflecting the primacy of the Treaty partnership, with arrows signalling that the specified commitments will contribute to the overall vision, purpose and strategic objectives of the SDF programme.
- More broadly, general revisions have been made to the strategic and operational objectives, to reflect the spirit and intent of Te Taki Haruru – particularly where these also align closely with central government, local government and community-derived changes.

[31] It is important to note that SDF programme partnership conversations with mana whenua are at a relatively early stage. While these have been positive, and reflect good faith dialogue over several months, further work is required to develop and strengthen the partnership. This includes more fully exploring how mana whenua would like to engage with the SDF programme, how the Te Taki Haruru might be operationalised in an SDF programme context, and specific aspirations mana whenua may have for this mahi.

Community Engagement

[32] A key element of the SDF programme is community-centred engagement, working on the basis that affected communities should be fully involved in discussion about, and decisions on, their future – including in relation to adaptation planning. Understanding what matters most to the community, including their values, objectives and aspirations,

is important for developing adaptation plans that are not only technically robust, but also widely understood and supported.

- [33] The SDF programme has undertaken extensive community engagement over the past four years, which has included meetings, surveys, presentations, workshops, newsletters and a series of face-to-face interactions. A wide range of data and insights have been collected during that period on community views, values and aspirations. This information has been analysed and, during the recent engagement round, was played back to the community to calibrate how closely it reflected public sentiment.
- [34] There have been several developments at community level since July 2022 that are material for the SDF programme strategy. These include:
- The Auckland Anniversary floods and events surrounding Cyclone Gabrielle in early 2023 had an observable impact on public awareness of potential climate change impacts and attitudes towards adaptation. These changes appear to have occurred nationally, but locally have materialised as a growing interest in adaptation work, questioning of business-as-usual practices, and reduced resistance to using climate-related risk to better inform development planning.
 - An extensive community engagement round in 2023 saw the SDF programme distribute 14,000 flyers (two flyers, 7,000 copies each) to households in the focus area; write a letter to 1,700 non-resident property owners; host 25 engagement meetings and eight major engagement events with an estimated 1,000 people reached face-to-face; receive over 2,000 unique webpage visitors, 400 individual pieces of feedback, and 75 survey responses.
- [35] The following changes are proposed to the SDF programme strategy based on community engagement since July 2022:
- Introduce a more positive framing, which recognises the opportunities that can come with change. This includes the notion of not only making South Dunedin a safer place, by reducing climate change impacts and associated risk, but also a better place to live, work and play through sustainable urban development and regeneration. This reframing has been well received by the community. These sentiments have been incorporated in the SDF programme vision and purpose and reflected in several of the strategic objectives.
 - Strengthen the references in the operational objectives to a community-centred programme to underscore the importance of community participation, understanding, and support.
 - Amend references to developing an ‘...adaptation strategy’ to developing a ‘...adaptation plan’, which reflects efforts towards using plain language, is consistent with programme communications material (“Let’s make a plan”), and would be more easily understood by the community.

Revised SDF Programme Strategy

- [36] A revised SDF Programme strategy has been developed, which seeks to amend the existing strategic intent, based on the points raised above. The revised strategy incorporates the various proposed changes detailed above, as well as the following structural amendments:

- Inclusion of new section containing mana whenua principles, values and key intents, drawn directly from Te Taki Haruru – Māori Strategic Framework, as well as addition of new SDF Programme partnership commitments. This section is located at the top and is shown as contributing to the strategic objectives.
- Various amendments to the strategic and operational objectives sections, including removing selected boxes and editing various text, to reflect a range of data and insights from central government, local government, mana whenua and community interactions.
- Removal of the previous contextual section that summarised cross-council adaptation work, replacing this with a programme actions section that describes the five workstreams of the programme (each of which is more specific, but also cross-council in nature).

[37] The revised programme strategy is not expected to impact the programme scope, budget, or timeframes. The revised strategy will however affect the direction and outcomes of the programme, as it provides the framework within which programme workstreams will operate. For example, the revised strategy will inform communications and community engagement activities by adopting the more positive framing of key issues; it will guide identification, screening and assessment of risks by outlining objectives and values that could be threatened by natural hazards and climate change; and it will shape criteria against which adaptation options will be assessed and scored, by describing the vision, purpose and objectives the options are expected to contribute towards.

OPTIONS

[38] In July 2022, Councillors endorsed the current strategic intent, which has guided the SDF programme for the past 18 months. Three options are therefore available, (i) continuing with the existing strategic intent, (ii) adopting the revised programme strategy (recommended), or (iii) directing staff to undertake further work to develop an amended strategy, based on Councillor feedback. The advantages and disadvantages of each option are explored below.

Option One – Retain existing strategic intent

[39] This option would involve retaining the existing strategic intent (included as **Attachment A**), as previously approved by Council Committees in July 2022, and continue to operate the SDF programme based on the strategic direction contained within.

Advantages

- Achieves a degree of strategic continuity by maintaining current settings, avoiding mid-programme changes, and retaining a strategic direction that is broadly consistent with national direction and community sentiment.

Disadvantages

- Failure to incorporate the views and values of partners and stakeholders could potentially misdirect the programme and its workstreams. For example, risk assessments and adaptation options and pathways could be produced that align with the current strategic intent but are inconsistent with evolving partner and stakeholder priorities. This could negatively impact relationships, potentially jeopardising future engagement work, and the wider success of the programme.

- The existing strategic intent does not contain specific mana whenua content, particularly principles, values and intents, and therefore does not accurately reflect Councils' Treaty of Waitangi partnerships.
- Foregoes an opportunity to recalibrate the programme strategy based on recent interactions with central government, local government, mana whenua partners and affected communities, creating some increased risk of strategic misalignment.

Option Two – Adopt revised programme strategy (recommended)

[40] This option would involve replacing the existing strategic intent with the revised programme strategy, as outlined in this paper and included as **Attachment B**, and advancing the programme on the basis of this strategic direction.

Advantages

- As the strategy will guide the adaptation options process, this stronger alignment is more likely to produce risk assessments and adaption options and pathways that are consistent with partner and stakeholder priorities.
- Incorporating the views and values of partners and stakeholders would likely strengthen relationships, laying a foundation for future engagement work.
- The revised strategy includes specific mana whenua content, particularly principles, values and intents drawn from Te Taki Haruru – Maori Strategic Framework, as well as specific programme partnership commitments, which better reflects Councils' Treaty of Waitangi partnerships.
- The revised strategy is based on recent interactions with central government, local government, mana whenua partners and affected communities, is more current and better strategically aligned to these key partners and stakeholders.

Disadvantages

- A mid-programme change of strategic direction potentially introduces a sense of discontinuity by shifting settings that are already broadly consistent with national direction and community sentiment.

Option Three – Direct staff to undertake further work and/or develop amended strategy

[41] This option would involve undertaking additional work, at the direction of Councils, to amend the strategy further or take it in a different strategic direction.

Advantages

- Undertaking further work could have the benefit of deepening the understanding of the views, values and aspirations of partners and stakeholders as well as more accurately reflecting Council strategic directions. This could lead to a stronger strategy with positive flow on effects for the SDF programme.

Disadvantages

- Undertaking further work could delay programme implementation, as key elements such as the adaptation options process will be guided by the direction contained within the strategy. This could stall the momentum built over the past 12 months, and negatively affect partner and stakeholder views and engagement, many of whom are eager to see the programme progress to the next stages where spatial risks and options are developed for South Dunedin.

[42] Option 2 - Adopt revised programme strategy is recommended because it would incorporate the latest developments and feedback from partners and stakeholders, provide the best available and well calibrated guidance for programme workstreams,

while allowing the programme to move forward as scheduled. Options 1 and 3 are viable, but would be less well-calibrated to partners and stakeholders (in the case of Option 1) and have potentially negative implications for programme schedule and costs (in the case of Option 3).

CONSIDERATIONS

Strategic Framework and Policy Considerations

[39] These are described in the paper and attachments, which build on previous advice on strategy and policy considerations, provided in the following reports:

- HAZ2109, ORC Council, 24 November 2021
- OPS2215, ORC Strategy and Planning Committee, 13 April 2022
- OPS2223, ORC Strategy and Planning Committee, 13 July 2022
- HAZ2302, ORC Safety and Resilience Committee, 10 August 2023

Financial Considerations

[40] ORC's financial contributions to the SDF programme are provided for in the 2023/24 Annual Plan, or will be considered as part of the next Long Term Plan process.

Significance and Engagement Considerations

[41] The SDF programme strategy will shape and inform the approach to community engagement across the SDF programme, as described in the paper.

Legislative and Risk Considerations

[42] These are described in the paper.

Climate Change Considerations

[43] The SDF programme is making a significant contribution to climate change adaptation in Otago, including by building DCC and ORC experience and competency in climate change adaptation planning.

Communications Considerations

[44] These are described in the paper.

NEXT STEPS

[45] These are described in the paper.

ATTACHMENTS

1. Attachment A - SDF Programme Strategic Intent (Current) [10.7.1 - 1 page]
2. Attachment B_-_ SDF Programme Strategy [10.7.2 - 1 page]

Strategic Objectives	Vision: Improved community wellbeing and resilience through sustainable urban regeneration of South Dunedin			
	Purpose: To enable South Dunedin to prepare for and adapt to the impacts of climate change			
	Reduced risk from flooding (and other natural hazards)	Increased social and economic resilience	Environmental and cultural restoration	
	Climate change impacts are fair ('just transition')	Community ownership of process and outcomes	Improved urban form in South Dunedin	

Operational Objectives	Develop a Climate Change Adaptation Strategy for South Dunedin			
	Community buy-in through inclusive engagement	Run a robust, transparent, and inclusive process	Alignment with Council strategies and policies	Integration with business-as-usual functions of Councils

Programme Actions	What is happening?	What matters most?	What can we do?	Make it happen.	How is it working?
	Build our understanding of the physical environmental and natural hazards, the communities affected, and how this might change over time.	Develop our understanding of community values, objectives, vulnerability, and the risk presented by natural hazards. Agree our overall objectives.	Identify our options for managing likely changes to the physical environment, the resulting hazards, and risk. Select options and pathways that will best meet our objectives.	Develop an overall adaptation strategy that balances the risks, objectives, and options. Develop a plan to implement that strategy, integrating this into business as usual.	Monitor, review and adjust the adaptation strategy to ensure it remains fit for purpose and is delivering on our objectives

Cross-Council Adaptation Work	Science & Technical	Planning & Infrastructure	Community Engagement	Strategy & Policy
	Understanding how the changing physical environment affects natural hazards and risk, now and in the future	Managing hazards and risk through land use planning, engineered and nature-based solutions	Partnering with the community to build resilience, identify preferred futures, and determine viable adaptation options	Integrating research and best practice into decision-making, while navigating a changing policy, legislative & regulatory environment

Mana Whenua Priorities	Principles	Autūroa	Auora	Autaketake	Autakata
	Values	Mana	Mauri	Tapu and noa	Whakapapa
	Key Intent	Mana whenua are leaders, influencers and partners.	The Mauri of Ōtepoti is restored and enhanced.	Balance is restored, and the future of our people and resources is protected.	The traditional authority of mana whenua in Ōtepoti is recognised through partnerships based on reciprocity and respect.
South Dunedin Future	Programme Partnership Commitments	Mana whenua can actively participate in the programme, and exercise rakatirataka, including rights to make decisions on issues affecting the wellbeing of South Dunedin.	Mana whenua exercise kaitiakitaka over te taiao and taoka to shape restoration and regeneration of South Dunedin environments. The programme supports the social and economic wellbeing of Māori communities in Ōtepoti Dunedin.	Integration of tikaka and kawa into the programme ensure balance and outcomes that contribute to the wellbeing of te taiao, our whānau and wider community.	The programme will draw on mātauraka Māori and te ao Māori to support a strengthened Māori presence in South Dunedin.

Strategic Objectives	Vision: A safer and better South Dunedin, where sustainable urban regeneration leads to improved community resilience and wellbeing.				
	Purpose: To enable South Dunedin to prepare for, and adapt to, the impacts of climate change, while also realising the opportunities that come with change.				
	Just transition Respond to climate change in ways that empower communities and promote fairness and equity.	Community safety Promote community safety in South Dunedin by reducing flood and other risks, despite increasing natural hazards	Environmental & cultural restoration Restore and regenerate natural environments, renew urban spaces, and re-energise cultural connections to place.	Social & economic resilience Strengthen communities and businesses so they are well-prepared for floods and other hazards, better able to cope and recover.	Sustainable urban development Urban development accounts for the changing environment, providing better spaces for people, water and wildlife.

Operational Objectives	Develop a Climate Change Adaptation Plan for South Dunedin Produce an adaptation plan that is technically feasible, financially affordable, and widely understood and supported by partners, stakeholders and affected communities.		
	Make well-informed decisions Use the best available evidence, including science, data, local knowledge and mātauraka Māori.	Be community-centred Empower the community to actively participate and lead where appropriate, by being inclusive, accessible and transparent.	Mainstream climate adaptation Make plans and recommendations that are fit-for-purpose, can be implemented by councils, and support strengthened resilience.

Programme Actions	Natural Hazards	Communications & Engagement	Risk Assessment	Adaptation Options	Strategy & Programme
	Understanding the natural environment in and around South Dunedin. Predicting how it might change in the future.	Getting a good understanding of what's important to the community. Explain to people what we're doing, why, and how they can get involved.	Understanding how climate change will affect the things we value (people, places, assets) and how this might change over time.	Exploring what options we have for adapting to the impacts of climate change. Looking at the pros and cons, and deciding which work best.	Working out how everything fits together and how the work is best sequenced. Putting it all into a coherent strategy so it can be implemented effectively.

From: Cr Andrew Noone
Sent: Friday, 19 June 2026 8:22 a.m.
To: Richard Saunders
Cc: 7(2)(a); Cr Hilary Calvert (ORC); Cr Kevin Malcolm; 7(2)(a)
Subject: Re: Public Forum Council June 24th

Great thks Richard



Andrew Noone
Councillor

+64274301727 | Andrew.Noone@orc.govt.nz

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From: Richard Saunders <Richard.Saunders@orc.govt.nz>
Sent: Friday, 19 June 2026 08:20:53
To: Cr Andrew Noone <Andrew.Noone@orc.govt.nz>
Cc: 7(2)(a); Cr Hilary Calvert (ORC) <Hilary.Calvert@orc.govt.nz>; Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>; 7(2)(a)
Subject: Re: Public Forum Council June 24th

Thanks Andrew

Hilary had let the team know this had been approved. We will add it to the public forum agenda
 Cheers

Richard Saunders
 Chief Executive
 Otago Regional Council

Sent from my iPhone



Richard Saunders

Chief Executive
 Executive Leadership

7(2)(a) | Richard.Saunders@orc.govt.nz

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On 19 Jun 2026, at 8:16 AM, Cr Andrew Noone <Andrew.Noone@orc.govt.nz> wrote:

Good morning all,

Just advising that representatives of the South Dunedin Stormwater Justice Group would like to speak at Wednesday public forum.

7(2)(a) [REDACTED] and Jo Galer will be the speakers.

I have advised Hilary of their request.

Many thanks

Andrew

[<orc-logo-png-125px_6ba7d464-04aa-4e72-a0b6-65e3bcc6d940.png>](#)

Andrew Noone
Councillor

[+64274301727](#) | Andrew.Noone@orc.govt.nz

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[<youtube-circle-logo-for-signature_cd5605db-dfce-4a18-bca9-cb6ee6f79ea3.png>](#)

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From: Cr Matt Hollyer
Sent: Friday, 19 June 2026 9:47 a.m.
To: Richard Saunders; Tom Dyer
Subject: Fw: South Dunedin flood projections

Gents

In case this hasn't been sent on to you please note the following email us councillors have received.

I do not know of the credibility of the survey school academic referenced in the email but I suspect you will hear more about if you haven't already.

Cheers,

Matt



Matt Hollyer
Councillor

+64272930054 | Matt.Hollyer@orc.govt.nz

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From: 7(2)(a)

Sent: Thursday, June 18, 2026 6:51 AM

To: Cr Matt Hollyer <Matt.Hollyer@orc.govt.nz>; Cr Robbie Byars <Robbie.Byars@orc.govt.nz>; Cr Hilary Calvert (ORC) <Hilary.Calvert@orc.govt.nz>; Cr Michael Laws <Michael.Laws@orc.govt.nz>; Cr Chanel Gardner <Chanel.Gardner@orc.govt.nz>; Cr Neil Gillespie <Neil.Gillespie@orc.govt.nz>; Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>; Cr Andrew Noone <Andrew.Noone@orc.govt.nz>; Cr Alan Somerville <alan.somerville@orc.govt.nz>; Cr Gretchen Robertson <Gretchen.Robertson@orc.govt.nz>; Cr Gary Kelliher <Gary.Kelliher@orc.govt.nz>; Cr Kate Wilson <Kate.Wilson@orc.govt.nz>; doug.hall@dcc.govt.nz <doug.hall@dcc.govt.nz>; cherry.lucas@dcc.govt.nz <cherry.lucas@dcc.govt.nz>; andrew.simms@dcc.govt.nz <andrew.simms@dcc.govt.nz>; mickey.treadwell@dcc.govt.nz <mickey.treadwell@dcc.govt.nz>; marie.laufiso@dcc.govt.nz <marie.laufiso@dcc.govt.nz>; john.chambers@dcc.govt.nz <john.chambers@dcc.govt.nz>; russel.lund@dcc.govt.nz <russel.lund@dcc.govt.nz>; mandy.mayhem@dcc.govt.nz <mandy.mayhem@dcc.govt.nz>; brent.weatherall@dcc.govt.nz <brent.weatherall@dcc.govt.nz>; sophie.barker@dcc.govt.nz <sophie.barker@dcc.govt.nz>; steve.walker@dcc.govt.nz <steve.walker@dcc.govt.nz>; benedict.ong@dcc.govt.nz <benedict.ong@dcc.govt.nz>

Subject: South Dunedin flood projections

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OUT OF SCOPE

From: Richard Saunders
Sent: Tuesday, 23 June 2026 9:08 a.m.
To: Councillors
Subject: FW: Ombudsman complaint workshop illegal

Good morning Councillors

I have included all Councillors in this email noting the email from Cr Galer only went to a selected number of you.

We are aware of the advice from the Office of the Ombudsman concerning Council workshops. We are currently taking part in a review of workshop processes being undertaken by the Ombudsman's office. This is due to the processes that we have implemented to promote transparency. We hold very few workshops or briefings in public excluded. Where we do the reasons for this are clearly stated on our website. In this case there was justification for holding the briefing in non-public. The reasons published on the [website](#) were as follows.

This meeting is to be held in Public Excluded for the following reasons: • s7(2)(d) - avoid prejudice to measures protecting the health or safety of members of the public; • s7(2)(e) - avoid prejudice to measures that prevent or mitigate material loss to members of the public; • s7(2)(g) - maintain legal professional privilege; • s17(d) - information will soon be publicly available;

I can confirm that the paper will remain on the ORC agenda for tomorrow's meeting.

Regards
 Richard



Richard Saunders

Chief Executive
 Executive Leadership

7(2)(a) | Richard.Saunders@orc.govt.nz

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From: Joanne Galer <jo.galer@dcc.govt.nz>
Sent: Tuesday, 23 June 2026 8:30 am
To: Sandy Graham <Sandy.Graham@dcc.govt.nz>
Cc: Office Of The Mayor <Office.Mayor@dcc.govt.nz>; Cherry Lucas <Cherry.Lucas@dcc.govt.nz>; Council Confidential 2025–2028 <Council.Confidential.2025-2028@dcc.govt.nz>; Hilary Calvert <hcalvert@xtra.co.nz>; Richard Saunders <Richard.Saunders@orc.govt.nz>; Cr Michael Laws <Michael.Laws@orc.govt.nz>; Cr Gary Kelliher <Gary.Kelliher@orc.govt.nz>; Cr Andrew Noone <Andrew.Noone@orc.govt.nz>; Cr Alan Somerville <alan.somerville@orc.govt.nz>; Cr Kevin Malcolm

<Kevin.Malcolm@orc.govt.nz>; Cr Kate Wilson <Kate.Wilson@orc.govt.nz>; Grant Miller 7(2)(a); ODT Editor <Editor@odt.co.nz>; Tess Brunton (Radio NZ) 7(2)(a); Hamish McNeilly 7(2)(a)

Subject: Ombudsman complaint workshop illegal

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Dear CEO Sandy,

This email is to raise our very serious concerns about actions including and following a public-excluded South Dunedin Future workshop on June 10 for the delivery of the very important South Dunedin future report to councillors. These actions have directly compromised democratic process on a major public issue and predetermined any resolution the Dunedin City Council may pass on Thursday.

The Ombudsman has strongly advised councils (in 2023) not to use workshops as ways to avoid public scrutiny or open debate and decision-making.

At this workshop, we were unable to make our views known, debate the merits of the 3 Options just put before us, approve, agree or pass resolutions. We were told we could only ask questions, for which there was insufficient time given the large volume of material in the 49-page document you had given councillors less than 18 hours overnight (between 2.15pm and 9am the following day) to digest.

Our complaint, which we are giving you the courtesy of sending to you first, in the hope you will take action, before we send this to the Ombudsman, is that the workshop on June 10 was incorrectly held with the public excluded, and that this has compromised the decision-making process set down for full council this week on Thursday 25 June. Any decision we make on this day could therefore be in breach of the LGA - on different but no less important grounds to those already expressed to you by Cr Lee Vandervis.

This is because:

1. Six days after the workshop on **June 16**, staff acting on your authority called journalists to a national media 'stand up' (press conference) to publicly announce and release and upload to our website new South Dunedin Future concepts that we had been shown at the confidential workshop, with drawings and options. Councillors, contrary to yours and ORC CEO's later claim in an email to me that we 'agreed' a comms approach at the workshop, any minutes you must have will show there was never any councillor agreement to this comms approach, or the 3 options to be publicly released in great detail as they were. Buried within a mountain of information of a very serious nature we received that day, that we could not speak of, was a date for public release of the information - June 17. This was not up for debate. We were afforded no option to disagree if we had wanted to.
2. The June 10 workshop was declared public excluded on the grounds that properties in streets proposed for buyouts were identifiable. But the same information was made public unchanged (with properties identifiable with drawings) to the media on June 16. None of the material was changed to protect confidentiality in between the two dates. There were immediate and predicted concerns from residents at how they learned via the media their properties were in scope. The lead council staff member's media response, approved by you, denied this in the media - saying the drawings were 'indicative only.' In effect, the staff member had just denied the very reason councillors were led to believe the workshop had to be non-public.
3. In the absence of genuine confidentiality for property owners as illustrated above, the reason for holding the workshop in non-public now appears false. The real reason for the confidentiality of the workshop was to

preserve the ability of the SDF team to completely control the communications and deny the voice of elected representatives. The effect of this is to railroad councillors to agree to concepts already publicly announced, given the current public perception these proposals have been approved by council - no matter what the fine print in the media release says. It is the perception that counts. To preserve the ability for staff to make a public announcement has never been a reason under the LGA to exclude public from a meeting or workshop.

4. We are also concerned that Thursday's full DCC meeting, and potentially the ORC meeting also, to supposedly ratify retrospectively everything SDF has already done, is a rubber-stamping exercise only - with full proposals and identification of properties already in the public domain.
5. Their early release and uploading to the DCC website is to all intents an approved report and start of a consultation process. It's highly unorthodox - we understand we didn't take this step without prior council approval for the Aurora consultation, or with any LTP. The full council voted first before any public release of material was permitted - apart from the standard two days prior release of the agenda.
6. The best way to illustrate this point our councillor vote on this issue has been predetermined by this public release is to imagine, if you will, both our councils rejecting these 3 options this Thursday. Which normally, we would have the right to do. We will suffer enormous reputational damage for having released information no longer approved. We will have to call another media conference withdrawing all the concepts. Also, we will have harmed people and their property values by releasing confronting commercial property information (the reason for keeping the workshop private) which could now change.
7. Staff actions have put this council and I believe ORC also, in a bind intended to force endorsement of the 3 SDF options to go forward for public consultation. Our ability to represent our residents faithfully and impartially under Oath has now been denied. Under the LGA, Councillors, not staff, have the ultimate legal responsibility to make such decisions, but the unapproved (by councillors) staff public announcement, which achieved wide coverage, predetermined that.

We have been very public about these concerns, following Cr Galer raising this with the Mayor and Deputy Mayor on June 17. Mayor Sophie and Cr Lucas said at that meeting:

- This was early release of the public agenda, when it isn't - a different agenda came out two days later.
 - That we had considered the communications options at the workshop, when we hadn't had time to. The Mayor and Deputy Lucas (we believe struggling to explain why this happened) also told Cr Galer they had assessed the feeling of councillors in the room during the private and non-recorded workshop and that everyone seemed on board with it. Can you please point to a policy which says 'assessing the feeling in the room' is our process - at a meeting where we were prevented from giving our views?
8. Another point with the 18 hours overnight (and 3 working day hours) we had to assess the information provided, is this would have breached the statutory timeline for release of material to elected councillors. The workshop framing allowed you to avoid this normal requirement also.
 9. In the material for the workshop, there were communications options in the report to choose from, but that Councillors never got to consider. Cr Galer's question and implicit concern about giving affected residents a heads up their property was involved, was ignored. Despite Crs Simms and Lund sharing these concerns homeowners would indeed learn their properties were affected via the media. This nightmare scenario came true.

We won't provide an extensive list of public grievances we have received from bewildered property owners and others following this announcement, suffice to say this approach has been greeted with outrage and dismay by property owners.

The outcome we seek:

- An immediate acknowledgement of these concerns and an action commensurate with the seriousness of these claims. One option is to immediately withdraw these proposals from the public while this and other issues raised by Cr Vandervis, are dealt with.
- A new policy is created giving firm rules for use of workshops and acknowledges it made a mistake here. Similar to the Timaru District Council's policy on non-public workshops (Link below).
- All the SDF material is removed from our website, that we publicly apologise that the material was not ready for public dissemination, and that we provide a timeline for when this work will be reviewed and completed under urgency - including a new option supported by ourselves, Crs Simms and Vandervis.
- We set firm rules in place to ensure this can never happen again for such a vital topic, and elected representatives can perform their role on behalf of ratepayers who expect this.

Thank you

Crs Jo Galer and Russell Lund

Important links:

<https://www.ombudsman.parliament.nz/resources/open-business-report-chief-ombudsmans-investigation-local-council-meetings-and-workshops>

Timaru District Council specifically has a policy on workshops and meetings.

https://www.timaru.govt.nz/_data/assets/pdf_file/0010/861625/Public-Excluded-Meetings-and-Workshops-Policy-adopted-24-February-2026.pdf This says a vote must be held before all workshops to be closed to the public.

Get [Outlook for iOS](#)



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From: Cr Chanel Gardner
Sent: Tuesday, 23 June 2026 8:29 p.m.
To: Richard Saunders
Subject: Fw: Council 25 June 26 Item 7 - SDF
Attachments: - South Dunedin Stormwater Modelling - draft for consult - OPUS - June 2017 (1).pdf; brief for SD drainage OBS - v2.docx

Slightly different point, I was genuine in my offer to front this in Sth D if you can connect me with Jonathan.



Chanel Gardner
Councillor



| Chanel.Gardner@orc.govt.nz

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From: Andrew Simms <andrew.simms@dcc.govt.nz>
Sent: Tuesday, 23 June 2026 20:18:18
To: Cr Chanel Gardner <Chanel.Gardner@orc.govt.nz>; Cr Kate Wilson <Kate.Wilson@orc.govt.nz>; Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>
Subject: FW: Council 25 June 26 Item 7 - SDF

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From: Andrew Simms
Sent: Saturday, 20 June 2026 6:26 pm
To: Sandy Graham <Sandy.Graham@dcc.govt.nz>; Sophie Barker <Sophie.Barker@dcc.govt.nz>
Cc: Council 2025-2028 (Elected Members) <council.2025-2028@dcc.govt.nz>; David Ward <David.Ward@dcc.govt.nz>; Scott MacLean <Scott.MacLean@dcc.govt.nz>; 7(2)(a)
Subject: Council 25 June 26 Item 7 - SDF

Ms Graham and Mayor Sophie

I must add my concern to that of Cr Vandervis about the inclusion in the Supplementary Agenda of Item 7 – South Dunedin Future for the meeting of 25 June 26.

My concerns include:

1. Notwithstanding that much of the material presented has been rolled out to councillors at various workshops (some of it to previous councils), the sheer volume and complexity of the information attached to this agenda make it impossible to read, understand, and cross reference in the time available to councillors. This report encapsulates an enormous and, quite probably, unprecedented body of work completed by staff.
2. The warning attached to **Option 1 – Recommended Option** (page 19) is chilling when considered against the expenditure over two thousand, million dollars of Dunedin Ratepayers money. *“This option therefore requires proceeding with imperfect information and despite a range of information gaps, assumptions, and uncertainties, each of which carries a degree of risk”*. Staff are to be congratulated for their candidness. Any governor charged with making any part of a \$2B decision should pause to consider the implications for them of this warning.
3. **Option 3 – Alternate course as determined by Councils**. I agree fully with Cr Vandervis that this does not meet the requirements of the Local Government Act 2002, nor the precedent set in the well cited *Thorndon Quay Collective v Wellington City Council* Court of Appeal decision. It is for council staff to identify ALL practical options and to bring these to council for a decision along with the advantages and disadvantages of each option. Option 3 appears to suggest that it is up to the council to identify an alternative option for themselves. This option is uncoded and is not accompanied by any analysis of the advantages and disadvantages for Option 3.

In my view, Option 3 should be a baseline engineering solution based on that proposed by Opus in 2017 (attached) . Without a baseline engineering solution neither councillors or the community have anything to measure the proposed SDF options against. The ability to weigh up the solutions proposed by Opus, and others since, against the SDF options on a cost versus benefit is an essential missing piece in our ability to make a good decision. Significantly, the Opus solutions do not require the mass relocation of 1100 or more homes, the cost of which alone will exceed \$1B before any engineering work is done. The extensive modelling work done to produce the SDF options will allow the establishment of a baseline engineering model to be done quickly and inexpensively.

A fully costed engineering solution should be a component of the SDF Statement of Proposal that goes to the public for consultation. A far lower cost, far less invasive, shorter-term solution is a valid option that should presented and considered. If not, then the SDF Consultation risks not being consultation on three options, but instead on three versions of the same option.

The quantum of ratepayers money, alongside the financial and emotional implications of relocating no fewer than 1100 homes ensures that every move the council makes will be intensely scrutinised and the likelihood of future review seems inevitable.

I look forward to your consideration and advice

Andrew

Andrew Simms

Councillor / Co-Lead Economic Development

P 03 477 4000 | **M** 0274 346 394 | **E** andrew@simms.co.nz

Te Kaunihera a Rohe o Ōtepoti - Dunedin City Council

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New Zealand.

www.dunedin.govt.nz



Dunedin City Council

South Dunedin Stormwater Modelling

Stage 3B Modelling Report

LGOIMA SR.31780 RELEASE





Dunedin City Council

South Dunedin

Stormwater Modelling

Stage 3B Modelling Report

Prepared By

7(2)(a)

Senior Environmental Engineer

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Date: June 2017
Reference: 3-81081.00_3
Status: Draft for consultation

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Executive Summary

The significant flooding that occurred during the June 2015 storm event has prompted DCC to evaluate options for system upgrading that would prevent a similar occurrence in future. It is to DCC's credit that wastewater and stormwater models are already available, and these provide the best tool available for assessing the various factors which contributed to the flooding and for developing potential solutions.

From the models we have established the following:

- The June 2015 model simulation resulted in 179ha of predicted flooding, higher than that predicted for a 90 minute duration 1% AEP¹ design storm using the same model. This provides an indication of how significant the flood extent was.
- Under ideal conditions (no screen blockage, tide surge or blocked mudtanks), the pipe network would have still been surcharged with widespread surface flooding. This confirms that the event exceeded the primary network's (stormwater pipes) hydraulic capacity.
- The Portabello Road Pump Station screen restricted flow from approximately 6m³/s to a reported 4m³/s; this further exacerbated the flooding, resulting in increased flood extent and depth across the catchment.
- Manhole overflows from the wastewater network could have contributed further to flooding with somewhere in the range of 27,000m³ overflowing from manholes and gully traps to the Stormwater network during the same event. This was particularly an issue in the Surrey Street and Albert Street areas.
- Overland flow from the St Clair catchment, though probably relatively minor for the June 2015 event, contributed further to flooding in South Dunedin (this assumes all mudtanks were clear in the St Clair catchment).
- Some residential sections are situated below the road making them particularly prone to surface water ponding when the pipe network is surcharged.
- With the above considered together, the results match well with that observed giving confidence in the stormwater model for options testing.
- Mudtanks, even when clear and working, would not have made a significant difference to the flooding in the case of the June 2015 event, as the Stormwater pipe network would have been surcharged to the surface in most areas. There is, however, no doubt that blocked mudtanks would have caused further issues locally where the reticulation was not surcharged, or increased overland flow into the catchment from areas such as the St Clair catchment.
- Modification of the existing screens upstream of Portobello PS is currently being implemented by DCC. This should have a significant benefit in future events, as being able to lift the screen and clear them is critical during flood events.

¹ Storm magnitudes are commonly defined by their annual exceedance probability (AEP), which is the percentage probability of an event of equal or greater magnitude occurring in any given year.

Options to improve the network's Level of Service (LoS) assessed ranged from wholesale network upgrades to hydro-geological solutions. The cost of these options range widely, as does the associated risk and cost-benefit, but several may be considered viable when compared to the economic and community wide benefit.

The most cost effective option is to split the catchment into two with a new gravity main intersecting the west-east trunk mains and conveying the flow to a new 6m³/s terminal pump station behind the coastal dunes at John Wilson Ocean Drive.

Better information on affected properties and their floor levels, as well as the state of their private drainage would benefit the further development of any of the above options, if taken forward for more detailed assessment and scheme development.

We recommend that DCC consider the options assessed and the associated budget cost, and develop an action plan for developing and testing preferred options further, consistent with community affordability and expectations.

Table 1 – Option Summary Table

Option	Budget Cost (\$ millions)	Reduction in flooded area deeper than 100mm (%)	Cost per m ² of reduced flooding deeper than 100mm (\$/m ²)	Option description
1	130	100%	1,550	Upgrade all undersized pipes. Biggest improvement but expensive
2	21	47%	646	Split the catchment into two (piped option). Best all round option
3	<i>Discounted</i>	<i>Discounted</i>	<i>Discounted</i>	Divert flow to the wastewater network
4	Unknown	27%	Unknown	Increase soil storage (artificially draw down ground water)
5	38	30%	1,629	Provide surface flood storage
6	Unknown	0%	Unknown	Raise or purchase properties at risk of habitable floor flooding
7A	1	No reduction	No benefit	Divert 1m ³ /s to Orari St main. No benefit unless a pump station is included.
7B	6	6%	1,253	Divert 1m ³ /s to Orari St main. Includes new pump station on the main to reduce the surcharge levels

Option	Budget Cost (\$ millions)	Reduction in flooded area deeper than 100mm (%)	Cost per m ² of reduced flooding deeper than 100mm (\$/m ²)	Option description
8	22	29%	951	Split the catchment into two (open channel option)
9	6	9%	855	Divert flow from the Tainui PS area around Portobello PS via a new pumping station

1 Background & Report Scope

This report forms the deliverable for Stage 3 of the South Dunedin Stormwater modelling project as requested by DCC. This report summarises the following work:

- Provide model outputs – review connection of high level overflow between catchments; review overland flow between catchments; run combined model for 10%, 2% and 1% design events plus two climate change scenarios (9 model runs in total)²; review the effects of wastewater flooding on the stormwater network capacity (cross connections and overland flow); and assess model suitability for high level design.
- Provide GIS format (.shp) flood-spread maps for each model simulation (9 no.)
- Modelling solutions for the network at a concept level, i.e. large pipe / pumps and inclusion of mudtanks in specific areas to increase intake capacity.
- High level costings of concept options (+/-50%).

The South Dunedin model was developed during Phase 1 of the Dunedin 3Waters Strategy, whilst St Clair and Orari Street were developed during Phase 2 of the Dunedin 3Waters Strategy. During Phase 1 Opus had little input to or involvement with the South Dunedin model, other than on issues of consistency with the Wastewater model. During Stage 2 Opus were responsible for consistency and review of all the Stormwater models including St Clair and Orari Street.

Since then, Opus have been commissioned to convert the model to InfoWorks ICM (Stage 1), combine the South Dunedin, Orari Street and St Clair catchments, incorporate some model improvements and undertake a model validation with the June 2015 event (Stage 2). Refer to the previous Stage 1 and Stage 2 reports for further information on the model updates and their combination.

Whilst no model will be a perfect representation of reality, the combined South Dunedin ICM model represents the best tool available to assess historic rainfall events, look at network performance and develop high level concepts.

Model validation with the June 2015 storm event showed that the model was able to broadly recreate depth and extent of observed flooding for that event, particularly when the pump station screen restriction was accounted for. This confirmed that the model is appropriate for use in Stage 3 for high level assessment and concept development, allowing for any shortcomings it might have.

The model validation confirmed prior reports by DCC and Opus that network capacity was a primary cause of the flooding during the 2015 event. Assuming all flow could enter the system without restriction and that the Portobello Road pump station could run at full capacity, widespread flooding was still predicted due to widespread network surcharging. However, this is expected for an event of this magnitude (estimated to be a 1 in 63 year ARI event); it exceeded the network's Level of Service (LoS) and modern imperviousness and rainfall values are higher than those used at the time of the network's design.

² This was later revised to 14 scenario runs for consistency with the prior Dunedin 3Waters project

Prior simulation of screen blockage limiting flow to $4.5\text{m}^3/\text{s}$ at the pump station improved the models replication of what was observed and indicated that this would further worsen flooding across the catchment.

Poor drainage of private properties and/or lack of overland flow paths (those sections that sit below the road) further contributed to flood issues as groundwater levels are likely to have reached the surface.

Blocked mudtanks, overland flow from St Clair hill and wastewater overflows would only have further exacerbated the flooding.

The model does not currently account for all of these additional factors, but these may later be incorporated to look at them in further detail. For the moment however, the model is considered sufficient for high level assessment, given it still broadly replicates the observed flooding.

2 Model Outputs

2.1 Stormwater Catchment Connectivity & Overland Flow

2.1.1 Overland Flow

For 3-waters modelling purposes stormwater catchments are defined by their outfall location. There are four catchments (refer to Figure 1) which could contribute overland flow to South Dunedin. These are St Clair, Orari Street, Shore Street and Kitchener Street.

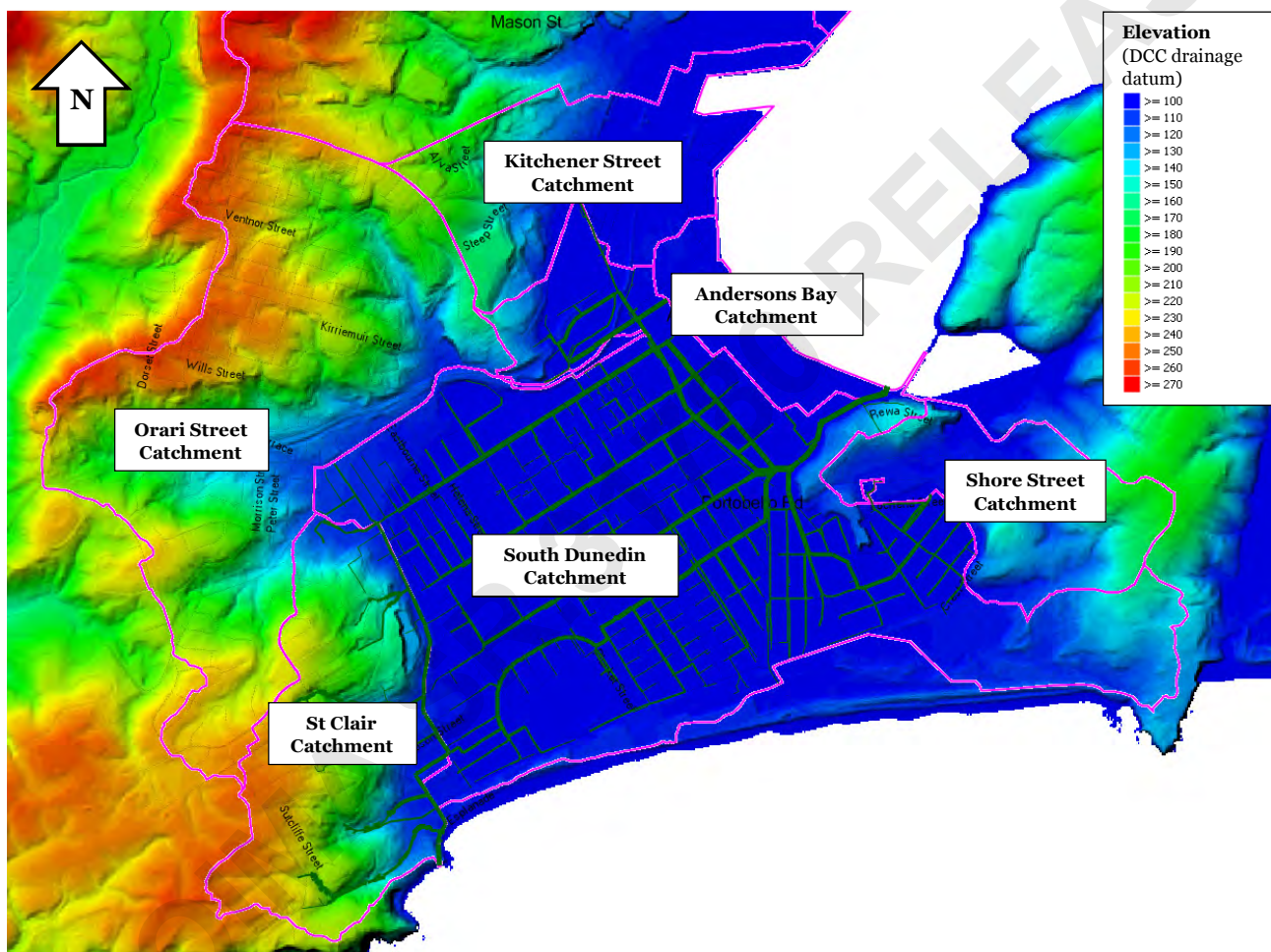


Figure 1 – Overview of local topography and stormwater catchments

Both Orari Street and St Clair include large collector mains along their South Dunedin boundaries; these are intended to intercept flow and divert it away from South Dunedin. Kitchener Street contributes run-off to Princes Street and the Oval; there is potential for some of that flow to enter South Dunedin if the area around the Oval is flooded.

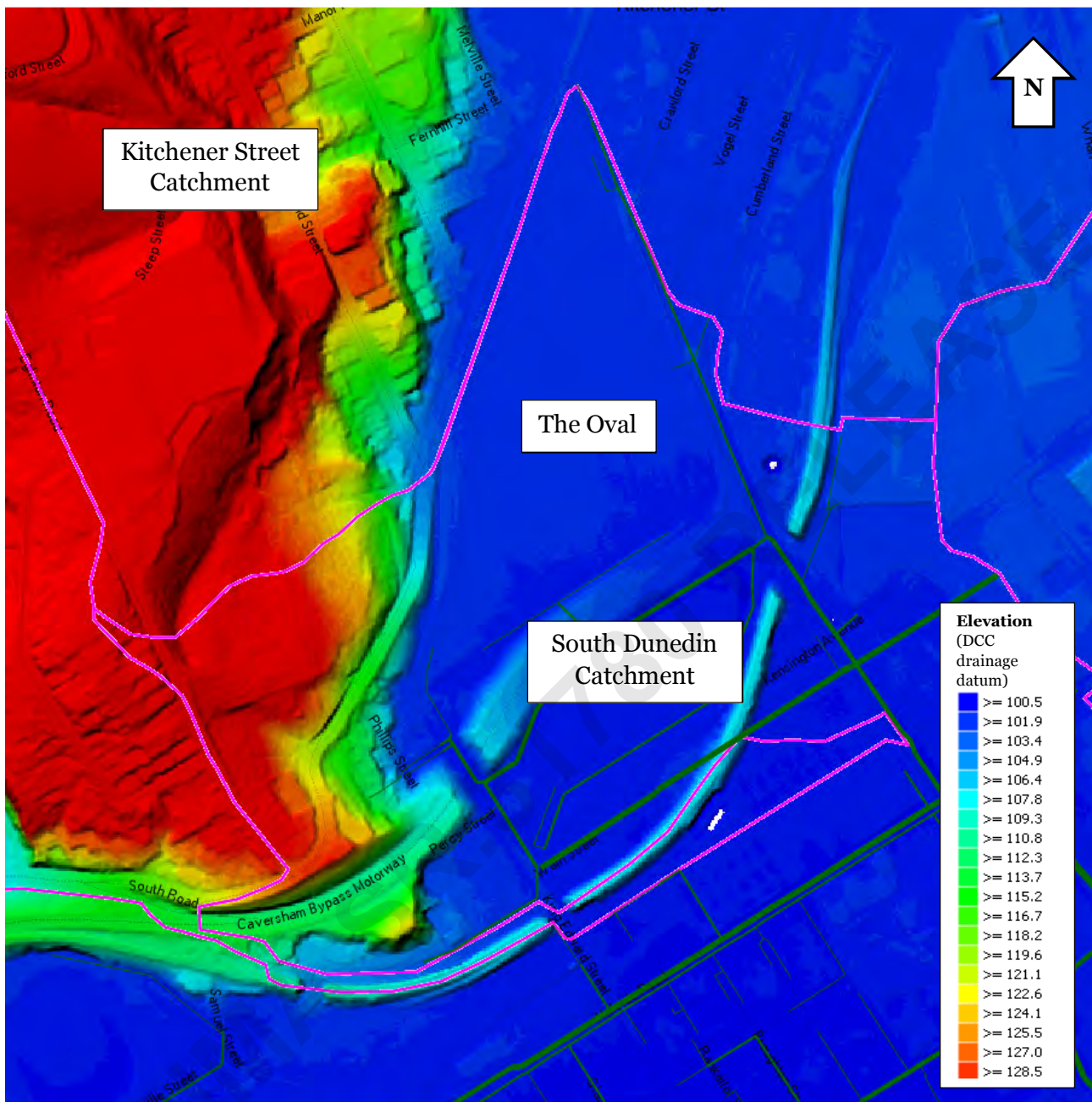


Figure 2 – Topography of the Oval area

There is also scope for overland flow from the Orari Street catchment to enter South Dunedin. Particularly if key mudtanks / inlet grills upstream become blocked. The rail corridor acts as a barrier to some potential flow into South Dunedin, directing flow down to the Glen Road intake (based on LiDAR levels). This, however, would not intercept all overland flow. However, model runs undertaken using the critical duration 10% AEP for South Dunedin did not predict any overland flow into South Dunedin, assuming all mudtanks and screens are clear.

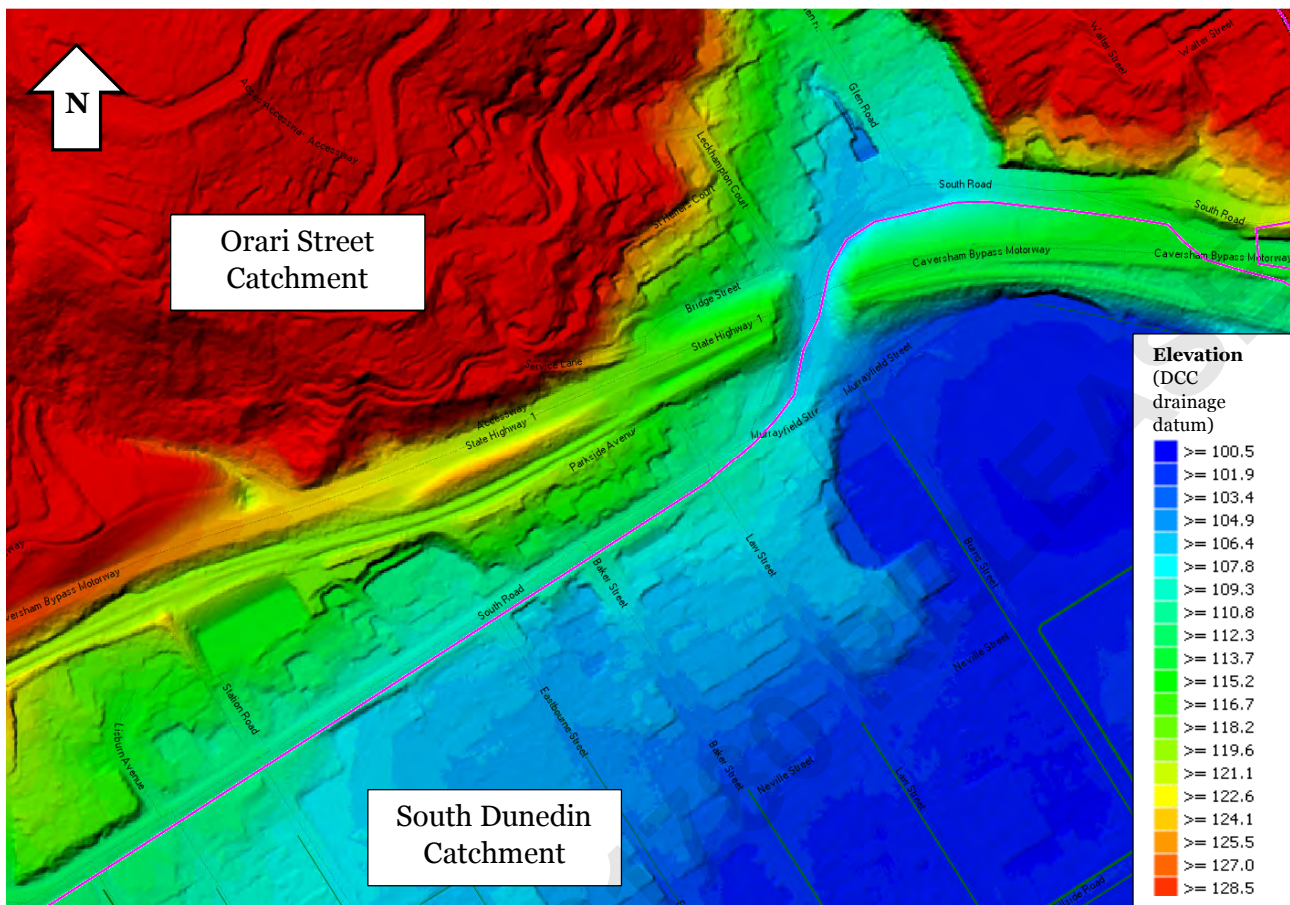


Figure 3 – Topography of the Glen Road Intake area

Overland flow from the St Clair catchment is predicted during certain rainfall events and is a potential source of inflow to South Dunedin. This may occur due to lack of inlet capacity (i.e. mudtanks) on steep grades, or via pipe system capacity limitations. Only this latter effect is modelled in the new combined model.

The primary flow path into South Dunedin associated with pipe capacity limitations appears to be via Wycolla Avenue and down into Surrey Street. The source of the overland flow is surcharging of the Forbury Road Stormwater main. When running surcharged, the hydraulic grade-line intersects a low point in Forbury Road resulting in overflow into Wycolla Avenue.

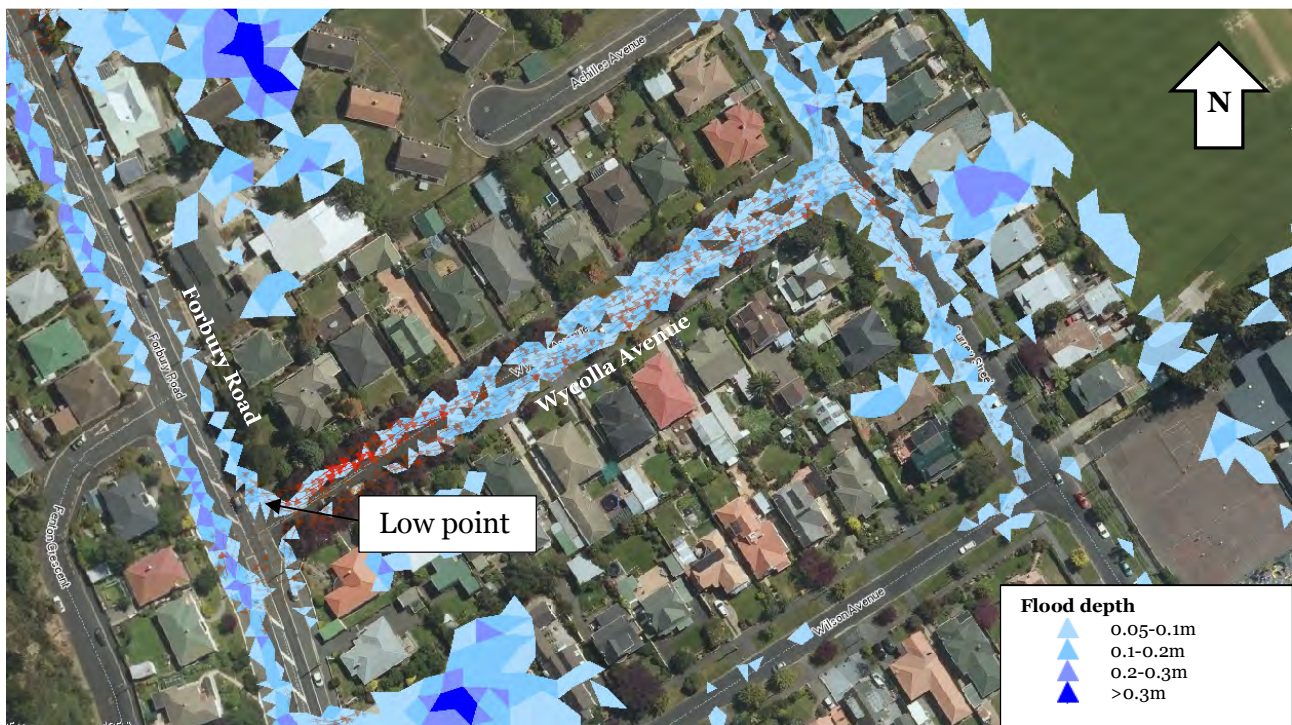


Figure 4 – Predicted overland flow into South Dunedin from the St Clair catchment

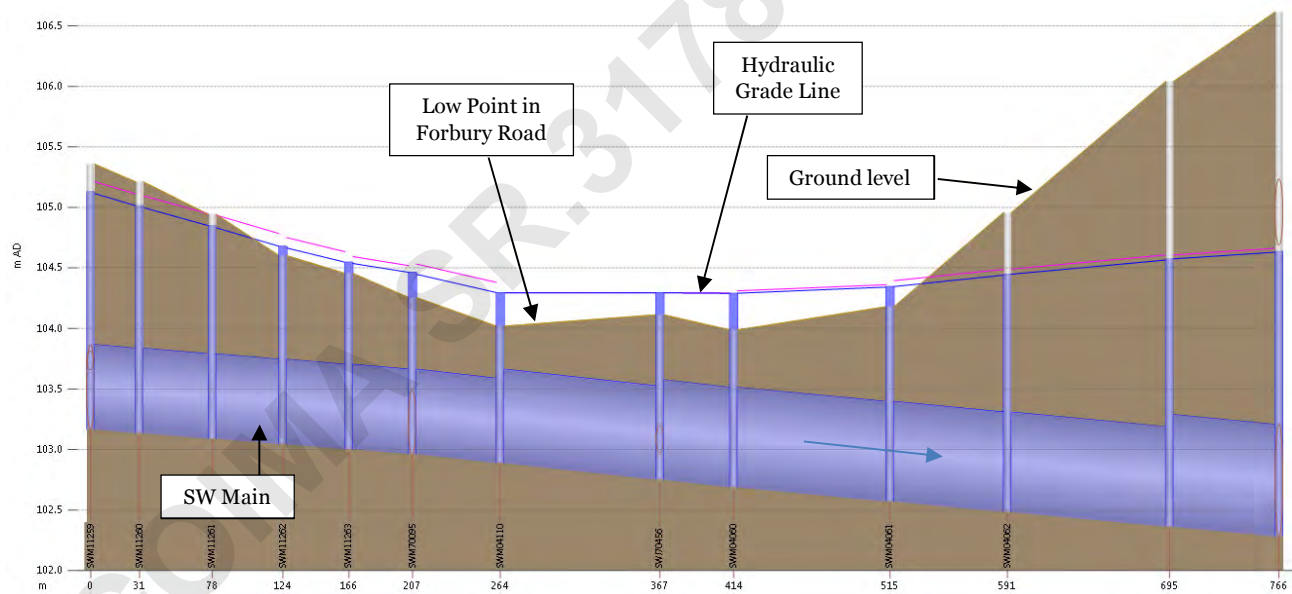


Figure 5 – Predicted hydraulic grade line on Forbury Road intersecting ground level

2.1.2 Pipe connectivity

One pipe cross connection between the South Dunedin and St Clair Stormwater networks is located at the Forbury Road / Hillside Road roundabout. In the model, this cross connection is represented as a 400x200mm rectangular opening 200mm above the upstream pipe invert. It can direct flow in two directions (bi-directional), either acting as an overflow for the Forbury Road stormwater main, or from the Hillside Road main subject to available head.



Figure 6 – Location of the cross connection between the South Dunedin and St Clair catchments (Stormwater to Stormwater)

2.1.3 Groundwater

As it is currently configured, the stormwater model does not model groundwater. The model's hydrological module can accommodate assumptions about surface infiltration that can then be substantiated by validation and calibration. Typical model inputs include the rate of infiltration and the stage at which soil storage becomes fully utilised (and the resulting surface flooding). However, the model does not account for additional flooding as a result of the wider groundwater catchment and its hydraulic gradient from the coast, or low areas intersecting groundwater and flooding solely via groundwater. This does represent an additional source of inflow (though probably minor due to the low soil permeability) and surface ponding.

Included in this report is an assessment that highlights low-lying areas captured by the LiDAR that could be vulnerable to either stormwater ponding or groundwater flooding. This is intended to assist DCC with their investigations, for example, highlighting sections where reducing network surcharging is more of a priority, as these areas have no overland flow path to the road corridor.

2.2 Wastewater Cross Connectivity

2.2.1 Background

The wastewater network in Dunedin used to once be a combined stormwater and wastewater system. DCC has since gone through a historic programme of separation so that the wastewater network no longer intentionally takes direct receipt of stormwater. However, today's wastewater network still responds to rainfall, primarily through indirect and unintentional ingress of stormwater. This is via the following conventional paths (though not an exhaustive list):

- Illegal discharge of stormwater into wastewater laterals
- Seepage of groundwater through pipe joints, leaky laterals and manholes into the network
- Seepage of surface water through manhole covers
- Overtopping of gully traps
- Rainfall interception via open gully traps, manhole openings and spa pool overflows
- Poor or defective workmanship i.e. leaky saddle connections

These various paths of stormwater ingress, when combined, can result in significantly increased wastewater flows which can trigger wastewater overflow where the pipe capacity is exceeded. Overflow can be via formal overflow points designed to protect upstream or downstream properties, manholes surcharging and overflowing into the street or gully traps surcharging up into low lying properties.

In South Dunedin this is particularly an issue, due to the poorly drained soils, low-lying properties prone to surface water ponding and high groundwater levels. The nature of the June 2015 event was such that any conventional New Zealand wastewater system of this nature would be overwhelmed. This is particularly the case when surface flooding in private sections occurs. This results in widespread pipe surcharge and network overflows in low-lying areas or formal overflows that intersect the hydraulic grade-line.

2.2.2 Pipe Cross Connections

There is one formal wastewater overflow located in South Dunedin on Surrey Street. This is via a small high level pipe fitted with a flap gate (to prevent stormwater entering the wastewater network). This was predicted to discharge a peak flow of 72L/s for a prolonged period into the South Dunedin Stormwater network.

2.2.3 Surface Interactions

Surface interactions are two-way. They can occur via the following:

- Surface flooding enters the wastewater network via manhole covers and gully traps
- Wastewater flows can overflow at manholes or gully traps (much of which will come from outside of the catchment) contributing to or causing surface flooding which can then enter the stormwater network via mud-tanks

The Dunedin Wastewater Model predicted manhole overflows at the locations shown in Figure 7 based on the June 2015 rainfall event. Areas of note are Surrey Street (4433m³), Eastbourne Street (2763m³), Burns Street (1974m³) and a number of smaller overflows in the St Clair and Albert Street area. The cumulative predicted wastewater overflow volume within the combined St Clair and South Dunedin catchment is 26,911m³ and would be additional to the flooding modelled. Relative to the predicted flood volume for the South Dunedin combined ICM Stormwater model (131,511m³ with the screen limited to 4.5m³/s); this is a significant contribution to a stormwater network which was already overwhelmed.



Figure 7 – Predicted wastewater manhole overflow volumes for the South Dunedin area (June 2015)

2.2.4 Sub-surface Interactions

The wastewater system in South Dunedin is prone to wet weather induced infiltration as well as some groundwater infiltration. Some level of infiltration is present in most wastewater systems, particularly systems like South Dunedin or that of Eastern Christchurch where groundwater is high

³ Note that 4.5m³/s was the peak value assessed for the event validation. The observed peak flow during the event was reported at 4.0m³/s as a time averaged flow rate.

relative to ground level. In the case of South Dunedin, leakage into the wastewater network may actually be helping to artificially draw down ground water and increase the available soil storage. As a result, infiltration/inflow (I&I) reduction in the wastewater system could adversely affect drainage in South Dunedin if not mitigated through improved sub-surface drainage.

2.3 Design Events

2.3.1 Critical Duration

Due to changes to the model sub-catchments and how flow is routed from them to the reticulation, the critical storm duration has been reassessed. The new assessment places greater emphasis on peak volume rather than peak flows. This is more appropriate for South Dunedin, as flood depth and extent are the primary concern. The previous study only considered durations up to 120 minutes, so additional 360, 720 and 1440 minute events were also modelled. The assessment was carried out based on events with an AEP of 10%.

Based on maximum flooded extent, the 360 minute (6 hour) event was found to be the worst case duration at 106.87ha for the existing network. The 120 minute (2 hour) event resulted in the largest peak flow, though the flow rate from the 90 minute to the 720 minute duration were all reasonably similar (6.38-6.80m³/s). This based on the network with no screen restriction using the combined South Dunedin ICM Stormwater model.

For the flood mapping, the 360 minute duration event has been used as this yields the greatest flood extent for the existing network.

For options testing the 120 minute event has been selected, as this results in the highest peak flow and the highest rate of overflow which is the worst case for design. This is also consistent with the approach previously taken for the Dunedin 3Waters project which considered peak flow as well as flood extent.

2.3.2 Ponding Risk Areas

The way the model is set up is as follows:

- Sub-catchments represent topographical areas of land draining to the reticulation.
- These employ a 1-dimensional run-off volume and routing model (known as a lumped Rainfall Run-off model).
- Flow from the sub-catchments is directed straight into the pipe system.
- If the pipe system cannot accept all of this flow, the excess spills out of the manhole and is directed to the 2-D surface⁴.
- Flow onto the 2D surface is routed using a 2-dimensional hydraulic simulation engine to calculate flow path, speed, depth and area.

⁴ Pipe network capacity governs the inflow to the network; mudtank inlet capacity is not modelled.

This approach however will not capture all ponding of stormwater on private parcels, as all flow is assumed to be able to enter the model directly. This means in areas where parcels lie below road level, the potential for them to pond (due to surcharging of their lateral) is not represented.

To identify these locations, an alternative model was developed as a scenario (named 'RoG'). In this model scenario rainfall is applied directly to the 2D surface for the entire catchment. A rainfall event is then simulated and the network given sufficient time to drain surface flooding. Any remaining areas at the end of the simulation still flooded then represent areas at risk of ponding as they have no natural overland flow path. These also represent areas that could flood due to elevated groundwater, as there is no flow path.

Identification of these areas is important for the following reasons:

- It highlights properties that may be flooded via their lateral surcharging from the reticulation or via road flooding (overland flow).
- It highlights properties where good private drainage is required and a higher network LOS might be necessary to protect them.
- It highlights potential sources of gully trap overtopping which can be a major source of inflow to the wastewater networking during storm events.
- It highlights properties that are more sensitive to surcharging of the wastewater network.
- It highlights areas that, if flooded, could remain flooded for a significant amount of time, particularly if they lack adequate private drainage to the stormwater network.
- It highlights areas that could be flooded due to high groundwater

The results of the analysis are presented below in Figure 8.



Figure 8 – Low areas at risk of surface ponding 100mm deep or greater based on the LiDAR (South Dunedin Catchment only)

2.3.3 Scenarios

The scenarios that have been run for flood map generation are as per the previous Dunedin 3Waters project. Refer, for example, to the Dunedin 3Waters St Clair System Performance Report for the table of scenarios and the various climate change allowances. Results are provided as raw .shp file for DCC's use. Opus cannot accept liability for how the raw model outputs are used.

2.3.4 Combined Flood Risk

It should be noted that the flood results provided are for a single duration event only (the worst case of the durations assessed). However, this event may not capture all flood risk, as for example, a shorter duration event may result in greater overland flow in St Clair or more widespread flooding in the upper reaches. This can be covered by running additional duration events and creating a combined flood hazard map taking the maximum flood result from all of the events simulated. In the case of South Dunedin this is not expected to make a significant difference due to the flat topography.

The approach used here is that of the worst case duration (based on flooded area) to keep results generally consistent with the previous work undertaken as part of the Dunedin 3Waters project.

2.4 Model Suitability for Design

Given the good model validation discussed in the prior Stage 2 report, the model is considered to be appropriate for high level options assessment. However, if any of the options considered at this stage are taken forwards, more careful analysis will be needed. This would for example include:

- Consideration of private drainage at low lying properties
- Consideration of mudtank capacity
- Assessment of flood risk during 2% AEP events in terms of habitable floor levels and freeboard
- Assessment of critical infrastructure within the catchment and what, if any, specific LoS requirements should be placed on them. This might for example include lifeline services, such as police, pump station transformers, major roads and vulnerable community members
- Inclusion of the predicted wastewater manhole overflows into the combined South Dunedin ICM stormwater model as an inflow

The model as it currently stands would need to be updated to include mudtank locations and leads, with sub-catchment entry points re-allocated appropriately. Also, low-lying sections, flood prone properties and key infrastructure could be included to aid with assessment of the scheme outcomes.

DCC should consider collating the following information to aid with robust design:

- Address or spatial data on flooded properties during the June 2015 event
- Identify key infrastructure within the catchment that may require a higher LoS

- Level information for flood prone floor levels and any other key level information for key infrastructure
- Review their roading asset data on mudtanks and their associated leads in terms of the required data for hydraulic modelling (grate number, side entry lintel present, lead diameter, and correct matching of upstream / downstream asset ID).

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3 Stormwater Improvements

3.1 Options

The following options have been identified and assessed:

Table 2 – Options Summary

Option Name	Description
Option 1 – Upsize undersized pipes	Intended to provide a baseline cost for pipe upgrade to the required size. This includes upgrade of Portobello Road and Musselburgh (Tainui) Stormwater pump stations
Option 2 – Split the catchment	Construct a new deep main that splits the catchment into two. Flows from the new pipe are directed to a new pump station located close to the coastal dunes in South Dunedin
Option 3 – Discharge to the wastewater network	Provide additional overflows to the wastewater network to help relieve the Stormwater network
Option 4 – Improve soil storage	Artificially draw down groundwater to increase soil storage
Option 5 – Storage	Lower several open spaces to create intentional flood storage zones
Option 6 – Protect properties	Focus instead on identifying the at risk properties and consider options to protect them through purchase or house raising for example
Option 7A – Discharge flow to the Orari Stormwater main	Utilise spare capacity in the Orari Stormwater main to help relieve the South Dunedin catchment
Option 7B – Discharge flow to a pumped Orari Stormwater main	Utilise spare capacity in the Orari Stormwater main to help relieve the South Dunedin catchment. This option incorporates a pump station to draw down the hydraulic grade-line along the Orari Street main to provide additional capacity
Option 8 – Open channel collector	Similar to Option 2, but utilising an open channel with a greater storage element
Option 9 – Divert Tainui flow	Divert flows from Tainui PS catchment away from Portobello PS

In agreement with DCC, the aim of the options is to try and achieve a 10% AEP LoS⁵ with no predicted ponding greater than 100mm (with the exception of green spaces and intentionally flooded areas). Potential impacts of climate change are not included at this point.

⁵ This level of service is lower than what is typically applied to catchments with no adequate overland flow path (i.e. 1% AEP), but is higher than the existing LOS.

3.1.1 Option 1 – Upsize undersized pipes

To calculate the required network upgrade to prevent all but minor surface flooding during a 10% AEP event⁶, all conduits and pumps in the model were significantly upsized so the network could operate without surcharge. This then allows the required flow rate for each pipe to be estimated, and then compared with the network's current predicted capacity.

This can be themed spatially to look for patterns in the network results. As can be seen in Figure 9, the pipes that act as the greatest restriction to flow are generally the larger trunk mains, whilst more of the smaller feeder pipes have, or are close to having, sufficient capacity. The results of this analysis show it is the trunk mains that form the main restriction to network capacity, particularly the approach to the Portobello Road Pump Station screens. However, some of the smaller reticulation is also undersized so addressing mains capacity alone would not be sufficient to resolve all issues.

Using this data, we can identify all pipes that are undersized, and then calculate the required replacement diameter based on diameter and gradient. This can then be converted to a cost estimate to form a baseline cost for comparison with other alternative options.

It can also form a basis for future renewals, with the aim of increasing network capacity over time as part of the on-going renewal programme.

For the 10% AEP event, 78% of the network would need to be upsized to convey the predicted flows without anything but minor surface ponding (assuming all mudtanks and their leads are operational and appropriately sized for the catchment area).

⁶ As stated earlier, potential impacts of climate change are not included at this point.

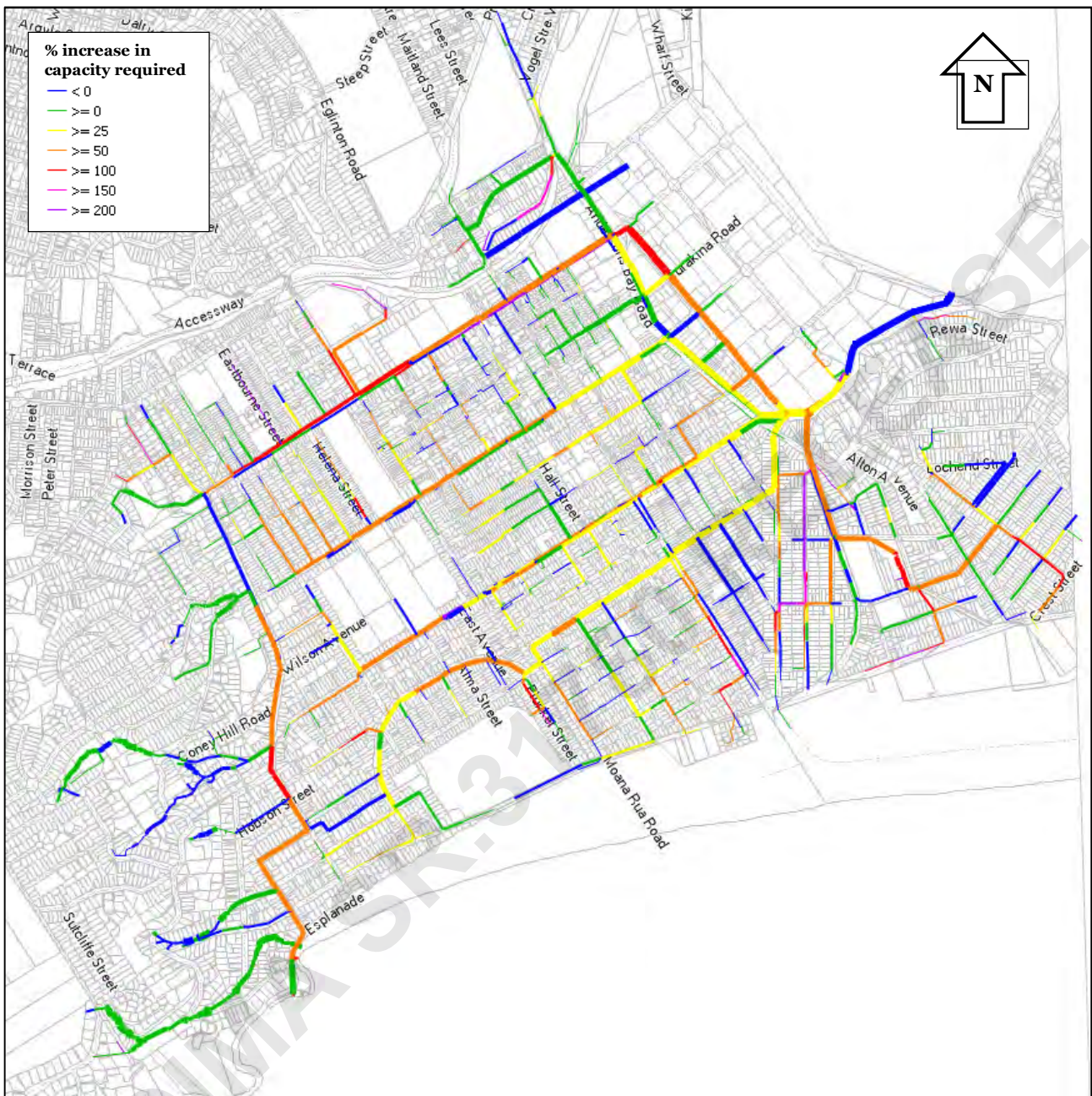


Figure 9 – Calculated increase in flow capacity required for 10% AEP

Pipes in blue are those that are correctly sized. Pipes in green are just under-sized (up to 25% under) whilst yellow, orange and purples represent those that are well below their required capacity.

This option results in no flooding greater than 100mm depth in the model during a 10%AEP event, as all pipes have been optimised to provide the required network conveyance.

3.1.2 Option 2 – Split the Catchment in Two

To relieve capacity of the trunk mains, which form the main network restriction, a new deep large diameter main was modelled splitting the catchment in two.

The proposed main intersects all the existing mains running south west to north east and directs their flow to a new 6m³/s pump station on the South Dunedin coastline near Moana Rua Road.

The new main also has the benefit of allowing reverse flow from the downstream surcharged mains into the pipeline (if the downstream mains surcharge, the hydraulic grade line will permit reverse flow into the new main so long as head is available). Further upgrades were also included in this option to optimise the benefit. This included a number of new cross connections to help direct more flow to the new main, upgrading of the existing main along Bay View Road and Surrey Street to manage overflow from St Clair, and a couple of local reticulation upgrades along Hillside Road.

The new main, as modelled, significantly reduces the predicted flood extent for a 10% AEP event; though some areas of flooding do still remain (a lot of which is located within green space).



Figure 10 – Option 2 proposed upgrades and 10%AEP predicted flood extent

Upgrade of the St Clair main along Forbury Road would further compliment this option by preventing overland flow into the catchment. This has not been investigated at this point.

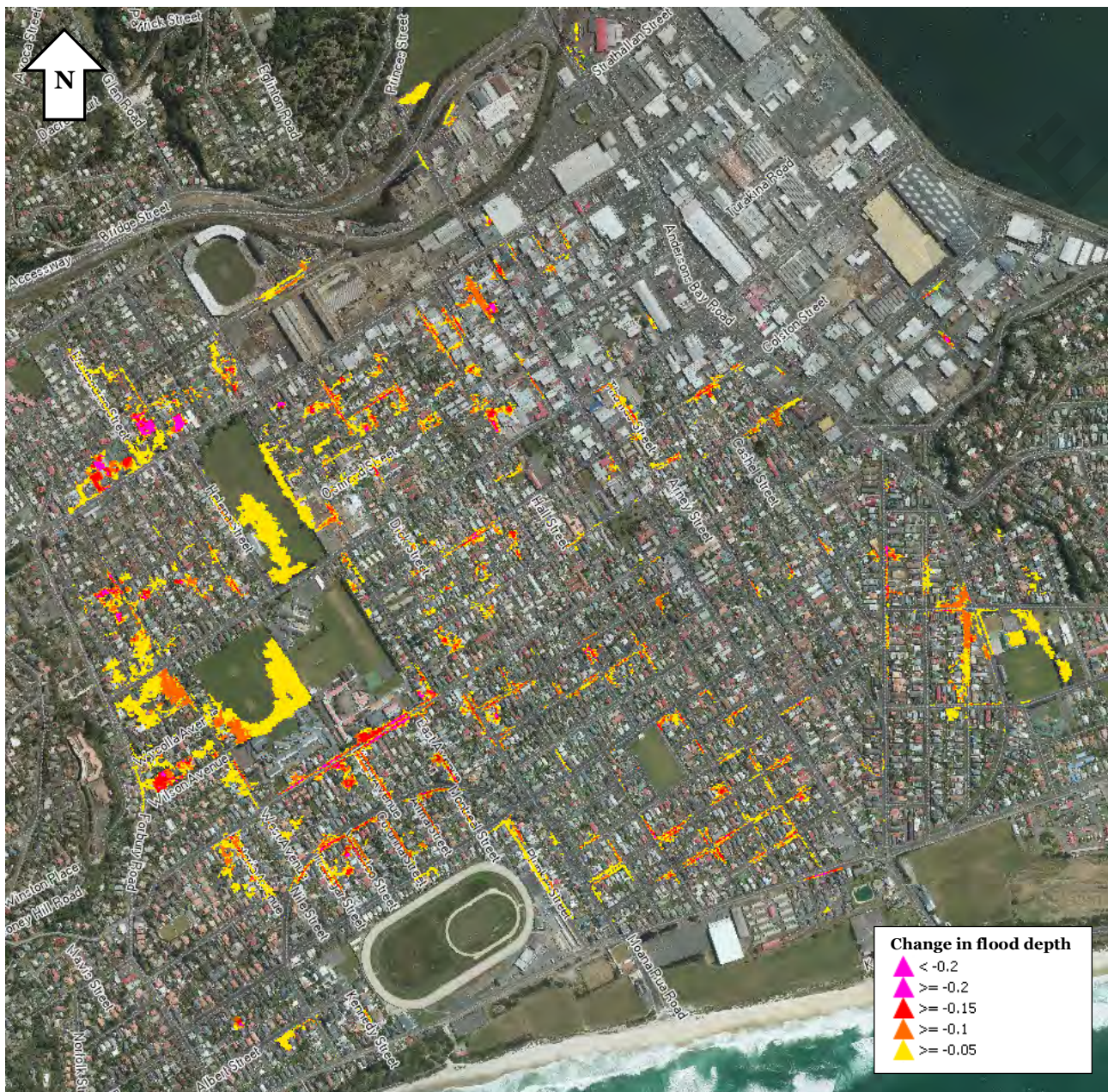


Figure 11 – Option 2 predicted reduction in 10% AEP flood extent versus existing

3.1.3 Option 3 – Divert flow to the wastewater network

This option was considered, but it was quickly dismissed. There are known capacity issues with the wastewater network including manhole overflows which contribute to flooding in South Dunedin. It would also increase treatment costs at the Wastewater Treatment Plant (WwTP)

The wastewater network as it currently stands simply does not have any spare capacity to take additional flow from South Dunedin. Ironically, it may already be surcharged due to floodwaters in South Dunedin overtopping private gully traps.

3.1.4 Option 4 – Improve soil storage

This option is difficult to assess using the hydraulic model and currently available information. The concept is to artificially draw down groundwater prior to rainfall to increase soil storage and facilitate increased surface infiltration. This in turn reduces run-off rates and volume, reducing surface flooding.

To provide an indication of the potential benefit, the terminal infiltration rates used in the hydraulic model's hydrology were increased from 0-2.5mm/hr to 10mm/hr with an initial infiltration rate of 20mm/hr.

Results from the model indicate increased surface infiltration would have some widespread improvement on flooding. However, there is still a large contribution of flow from impervious areas, so the benefit is limited.

This option would also need careful assessment before being taken further. The potential implications of drawing down groundwater would need to be carefully considered in terms of real and perceived⁷ land settlement. Also the geotechnical feasibility would need to be considered carefully due to the area's poorly drained soils. Estimating the cost of doing this is outside the scope of this report. Figure 12 shows that the benefit would be widespread.

⁷ Land settlement is an on-going issue in South Dunedin. Drawing groundwater down further may open the Council to accusations of foundation or land damage which they may not actually be responsible for.

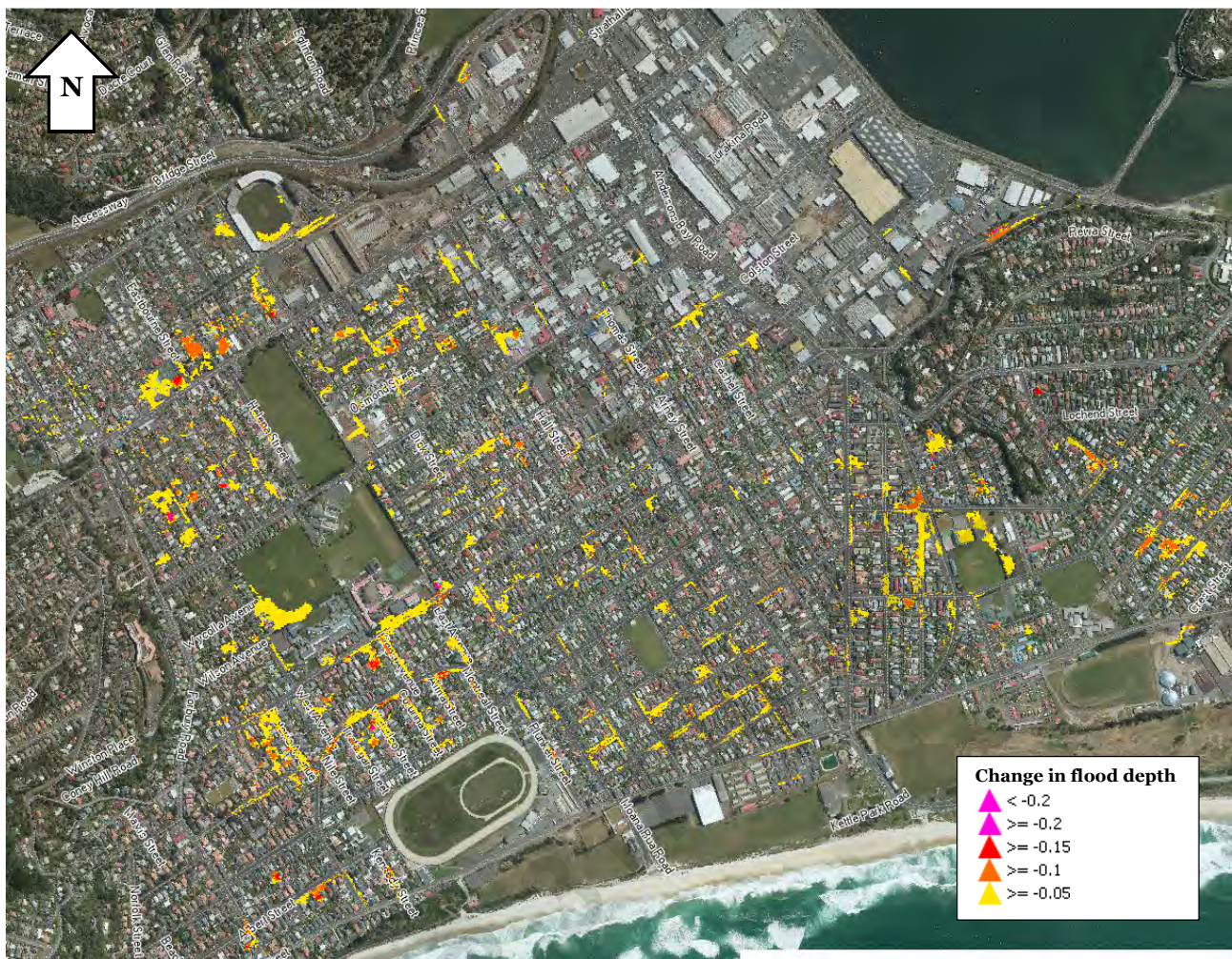


Figure 12 – Option 4 indicative potential reduction in 10% AEP flood extent versus existing

3.1.5 Option 5 – Flood Storage

This option takes existing green space within South Dunedin and converts it into formalised areas of flood storage.

The areas (Kings / Queens High School playing fields, Tonga Park and Forbury Park) were modelled as being lowered by 1m with a series of outfalls discharging into them from adjacent stormwater trunk mains.

The outfalls were set above the invert of the mains so that they would only operate during larger rainfall events. Some additional reticulation changes (new cross connections between Stormwater networks and some upsizing) were also included to optimise the option, by allowing additional flow into the storage areas. This was assessed using the model for a 10% AEP event. Predicted flood extent and reduction in flood risk are shown in Figure 13 and Figure 14.

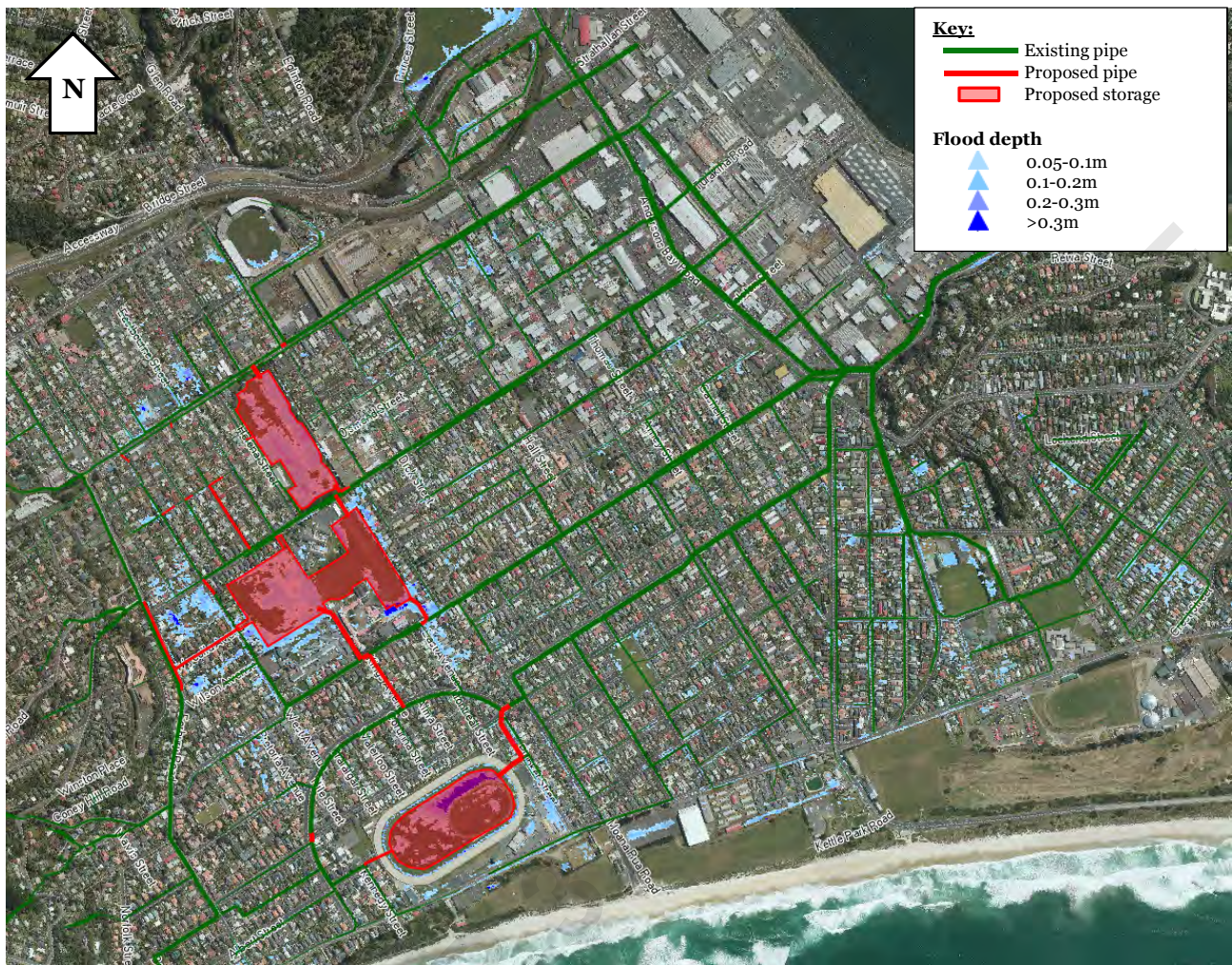


Figure 13 – Option 5 proposed upgrade and 10%AEP predicted flood extent

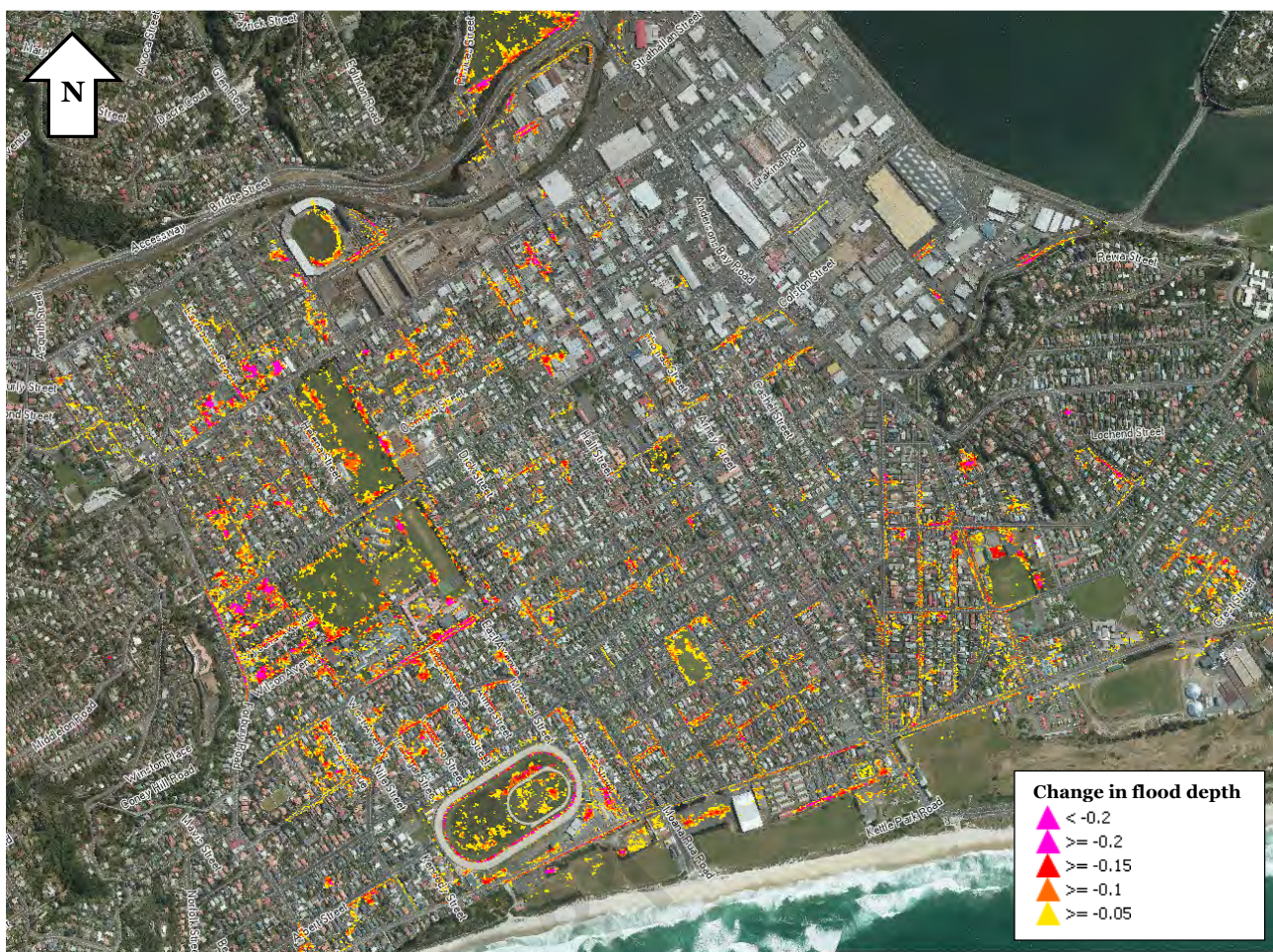


Figure 14 – Option 5 predicted reduction in 10% AEP flood extent versus existing

As can be seen, the option has widespread benefit to the area and could be an effective solution. However, the feasibility of this option would rely heavily on the agreement of the affected land owners.

For the Forbury Park race track, only the grass areas would be lowered with the tracks left unmodified. This might actually aid drainage of the track surfaces.

For the sport pitches, the areas would need to be over excavated and built back up with a drainage blanket and pumped dewatering system in conjunction with a high performance turf to keep the pitch useable in winter or following flooding.

3.1.6 Option 6 – Protect properties

An alternative option, not assessed further in this report, would be to establish the most flood prone properties and then investigate options to raise or defend the properties or, failing that, buy them out and retire the land or re-develop them with a suitably elevated floor level.

This option has not been investigated further at this stage due to limited information on property level flood risk and construction type. Our experience suggests that it should be cost-effective to raise conventional piled dwellings, however most of the piled housing stock is in the later stage of life. Conversely, most slab-on-ground building stock is more modern, but is substantially more

complex and expensive to protect. Thus, the housing stock with the greatest potential benefit in terms of future life expectancy is also the most difficult to protect. Moreover, protection of individual dwellings doesn't reduce surface nuisance flooding, which still disrupts and distresses a community, for example, by preventing access to their homes or for their children to school, or flooding underneath houses, which leads to health concerns.

Outright purchase of flood-prone properties could create an expensive precedent, and is normally reserved for specific situations where Council has some existing or potential future liability, or where the land is required as part of a wider scheme.

Whilst this report doesn't look at this any further, it is documented as an option should DCC wish to pursue it.

3.1.7 Option 7A – Discharge to the Orari Street stormwater main

This option is a localised solution to ease pressure on two stormwater mains by cross-connecting them to the Orari Street main. The Orari Street main runs as a pressure main during large rainfall events and could have spare capacity to take additional flow from South Dunedin.

The model was modified to include two large diameter connections to a free outfall. This was to assess the potential benefit (and flow rate) to the catchment.

Results from the model indicate that the Orari Street gravity pressure main, as currently configured, runs surcharged preventing inflow at the peak of the event. It does, however, allow flow in once the Orari Street main has peaked.

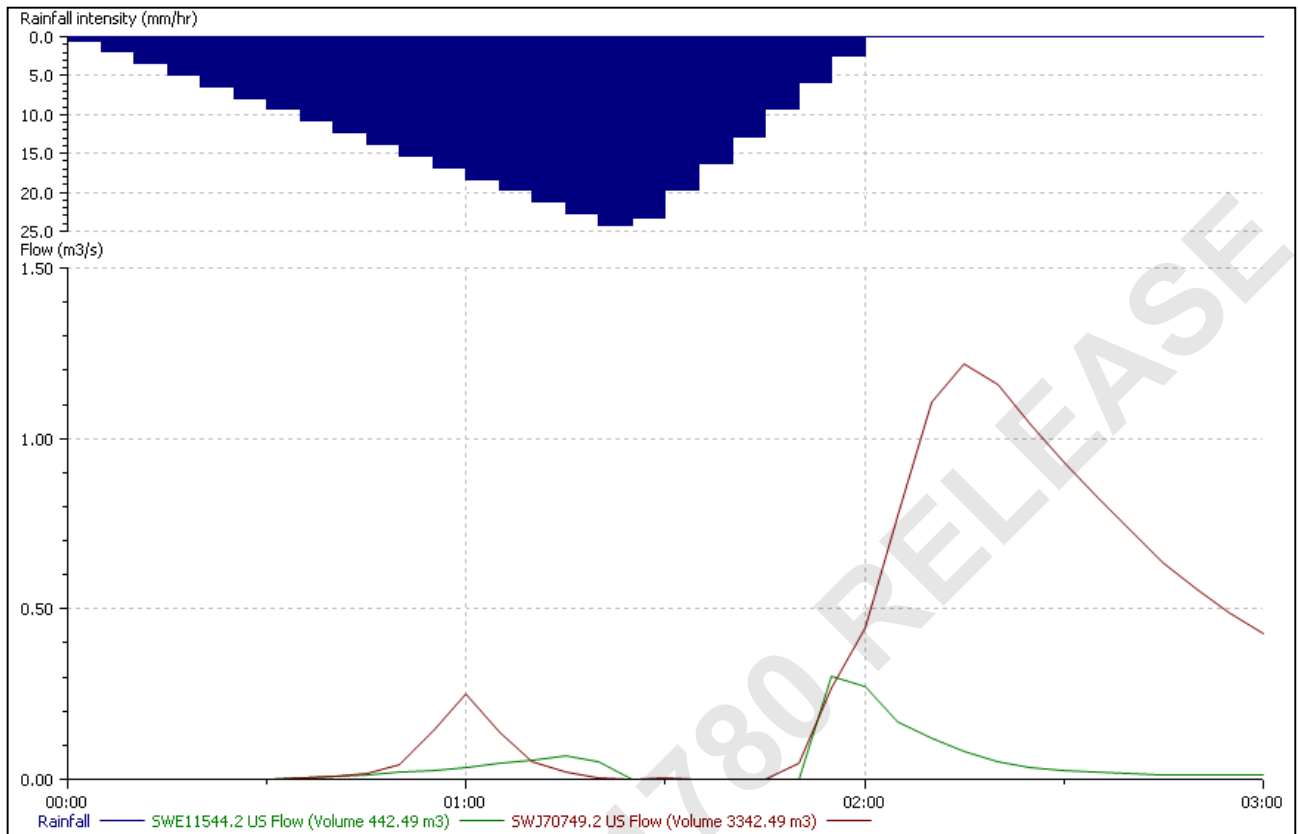


Figure 15 – Predicted flow into the Orari Street catchment (no pump station)



Figure 16 - Option 7A proposed upgrade and 10%AEP predicted flood extent



Figure 17 – Option 7A predicted reduction in 10% AEP flood extent versus existing (showing the full extent of improvements)

As demonstrated above, this option results in no benefit.

A further variant of this option (Option 7B below) involves artificially steepening the HGL in the Orari Street system by installation of a new Stormwater pump station in the lower catchment. This would make discharge under gravity feasible, but would add significant additional cost to the scheme.

3.1.8 Option 7B – Discharge to the Orari Street stormwater main

This option is a localised solution to ease pressure on two stormwater mains by cross-connecting them to the Orari Street main. However, a Stormwater pump station is included on the Orari Street Stormwater main to lower the hydraulic grade line. For simplicity all flow from the Orari Street model was assumed pumped. This would require a pump station capacity in the range of 10m³/s at significant cost. However, with further iteration, the flow rate could be optimised to accommodate the 1m³/s flow from South Dunedin with the lowest feasible reduction in HGL. This optimisation exercise has not been undertaken at this point but could reduce the pumped flow rate and therefore improve the cost-benefit to some extent.

The pump station was modelled in the vicinity of King George Street. The model was also modified to include two large diameter connections to the pump station chamber. This was to assess the potential benefit (and flow rate) to the catchment if the downstream main was pressurised or a combination of pressure gravity and separate pressure main.

The model predicts that a combined flow of up to $1\text{ m}^3/\text{s}$ could be removed from the South Dunedin system if it were pumped.

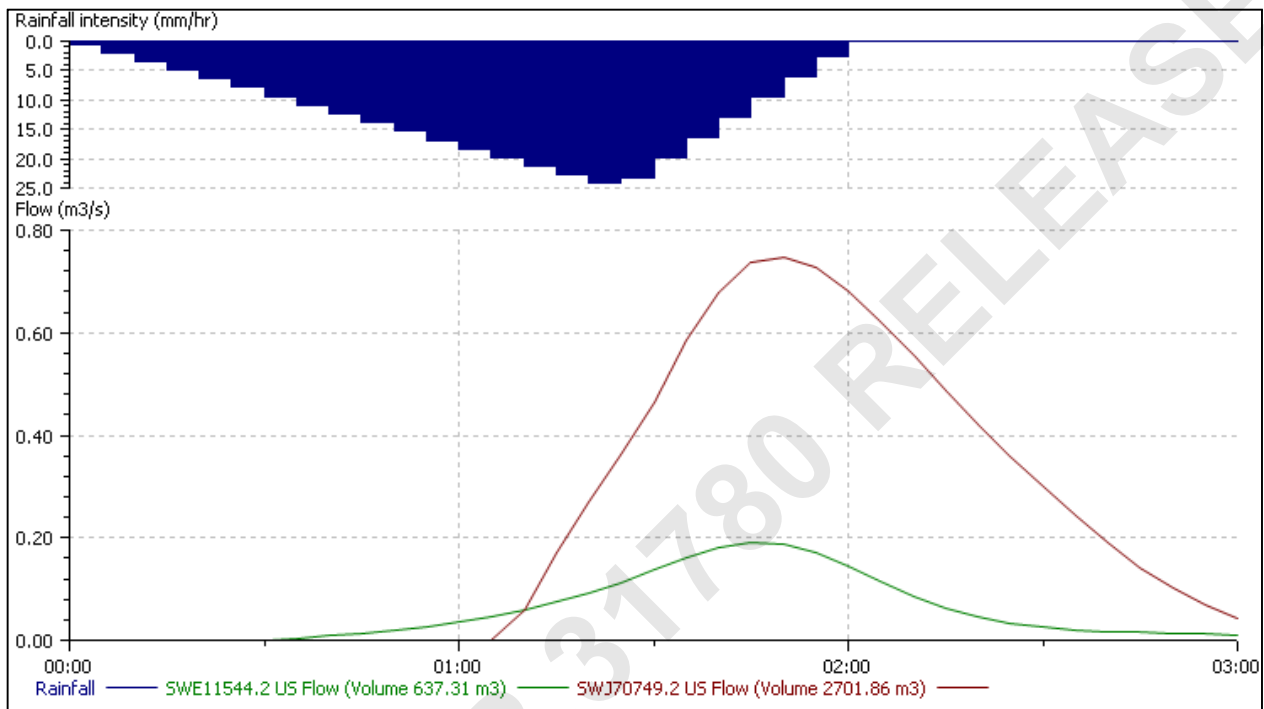


Figure 18 – Predicted flow into the Orari Street catchment (with a free discharge)



Figure 19 – Option 7B proposed upgrade and 10% AEP predicted flood extent



Figure 20 – Option 7B predicted reduction in 10% AEP flood extent versus existing (showing the full extent of improvements)

3.1.9 Option 8 – Open channel collector

This option is similar to Option 2, in that the catchment is split in two via a new open channel connecting all of the trunk mains running south west to north east and conveys the flow to a new terminal pump station at the rear of the coastal dunes. Where this option differs, is that greater channel storage provides some buffering of peak flows to reduce the size of the pump station required (reduced to 2m³/s from 6m³/s for the 2 hr 10% AEP event).

An open channel could also offer added community benefits, such as an incorporated combined cycle / walkway, as well as cultural and ecological value through native landscaping. This option however would require land purchase in order to be feasible. Note the sections crossing through roads have been represented as pipes / culverts.



Figure 21 – Option 8 proposed upgrade and 10% AEP predicted flood extent



Figure 22 – Option 8 predicted reduction in 10% AEP flood extent versus existing

Construction of an open channel through South Dunedin would need careful geotechnical assessment as it could create a lateral spread risk for nearby properties. To mitigate this additional measures could be needed such as continuous sheet piling, which could add significant cost to the scheme (not currently costed). This needs to be considered when weighing up the benefits of this option versus a below ground pipeline. However, it could have the benefit of lowering groundwater at least locally.

3.2 Option 9 – Divert Tainui flow

This option involves the diversion of flows from the Tainui SWPS catchment away from the Portobello SWPS via a new pipeline along Portobello Road to outfall into the harbour at the start of the causeway.

Due to the level of the upstream catchment and the tidal range and level in the harbour a pump station was included to lift the water and prevent reverse flow into the catchment (the PS would include check valves).

The benefit of this option is limited spatially, with the greatest benefit being in the around Tainui PS. Due to the need for a pump station



Figure 23 – Option 9 proposed upgrade and 10%AEP predicted flood extent



Figure 24- Option 9 predicted reduction in 10% AEP flood extent versus existing

3.3 Summary of Results

Results for the modelled options are summarised below.

Table 3 – Predicted flood extent and manhole overflows

Scenario	Node Flood Depth			2D Flood Area (ha)				Total >0.05 m
	>150mm freeboard	<150mm freeboard ¹⁰	Above ground ¹¹	0.05- 0.1 m	0.1- 0.2 m	0.20- 0.3 m	> 0.30 m	
Baseline – existing	877	321	511	14.15	6.96	0.75	0.09	21.95
Option 2 – Split	1271	182	265	9.29	3.76	0.36	0.04	13.45
Option 4 – Soil Storage	989	304	416	11.17	5.09	0.53	0.07	16.86
Option 5 – Storage	1083	252	392	9.26	4.74	0.59	0.15	14.74
Option 7A – Orari	879	311	518	14.04	6.94	0.79	0.17	21.94
Option 7B - Orari	909	314	487	13.64	6.58	0.68	0.08	20.98
Option 8 – Open channel collector	1095	243	385	10.65	4.94	0.55	0.08	16.22
Option 9 – Divert Tainui	912	315	482	13.33	6.34	0.69	0.08	20.44

This can be summarised in terms of the following benefits:

Table 4 – Predicted benefits for options modelled

Scenario	Reduction in manhole overflows (no.)	Reduction in flooding >100mm (ha)
Option 1 – Upgrade all pipes	511	7.80
Option 2 – Split	246	3.65
Option 4 – Soil Storage	95	2.12
Option 5 – Storage	119	2.33
Option 7A – Orari	-7	-0.09
Option 7B - Orari	24	0.47
Option 8- Open channel collector	126	2.23
Option 9 – Divert Tainui	29	0.69

3.4 Costs

3.4.1 General

Costs have been generated based on the following pipe installation and manhole rates:

¹⁰ i.e. number of manholes surcharged close to ground level

¹¹ i.e. number of manholes where surcharge exceeds ground level (spilling)

Table 5 – Rates used for cost estimation

Diameter (ID)	Depth			
	<1m	1-2m	2-3m	>3m
225	\$445	\$713	\$1,830	\$1,866
300	\$514	\$783	\$1,903	\$1,942
375	\$599	\$870	\$1,992	\$2,035
450		\$962	\$2,085	\$2,665
525		\$1,047	\$2,172	\$2,779
600		\$1,138	\$2,265	\$2,899
750		\$1,323	\$2,453	\$3,144
900		\$1,527	\$2,662	\$3,414
1050		\$1,693	\$2,832	\$3,635
1200		\$1,888	\$3,030	\$3,893
1350		\$2,098	\$3,244	\$4,169
1600			\$3,579	\$4,604
2100			\$4,283	\$5,515
Manhole	\$4,000	\$7,000	\$12,000	\$15,000

These are intended to provide an all-up, relative assessment of costs for option comparison and may not directly reflect tendered rates. They are, however, considered to be representative of typical pipe installation costs excluding other cost items such as traffic management, establishment etc. They are bottom up rates based on pipe supply rate, excavation rate, backfill, disposal rate and reinstatement rate.

For pipes 1-2m depth, a \$250/m premium is added within the table to allow for basic dewatering. For pipes 2m-3m depth, a \$1350/m premium is added within the table to allow for sheet piling and well pointing. A \$50/m premium is added to all pipe installation rates in the table to allow for crossing services. For pipes >3m depth, a further 25% cost is added within the table to allow for additional cost due to construction at depth.

Pump stations are costed using the following equation:

$$[(Qgh)/0.75] \times \$15,000$$

Where:

Q = flow

g = acceleration of gravity (9.81m/s²)

h = pump head

Additional to the baseline construction cost, the following additional factors are added on to provide an indicative budget cost for construction:

- 8% allowance for design and consenting on top of the base cost

- 20% allowance for preliminary and general items (i.e. documentation, fencing, establishment, traffic management, environmental compliance, service stand-overs) on top of the base cost
- 10% contractors profit and overheads, additional to the base cost
- 30% contingency to the overall cost to allow for additional construction costs or unforeseen cost which at this early stage cannot be costed into the estimate

Note that required upgrades of mud-tanks and their associated leads are not included at this stage. These are assumed to be covered under the contingency.

Additional cost assumptions around land purchase, property purchase, earthworks and drainage blankets are provided in the Appendices.

3.4.2 Estimated Costs

Cost estimates for each option considered are provided below:

Table 6 – Estimated costs

Option	Rough Order Cost
Option 1 – upsize reticulation	\$120,900,000
Option 2 – split catchment	\$23,500,000
Option 5 – storage	\$37,800,000
Option 7A – Orari Street diversion (no pump station)	\$940,000
Option 7B – Orari Street diversion (pump station)	\$5,845,000
Option 8 – Open channel collector	\$21,200,000
Option 9 – Divert Tainui	\$5,900,000

3.4.3 Cost Benefit

By dividing the scheme cost by the predicted benefit, an indication of the scheme cost benefit can be calculated. This is summarised in Table 7.

Table 7 – Cost benefit comparison

Scenario	\$/manhole overflow	\$/m ² flood reduction (deeper than 100mm)
Option 1 – Upsize network	\$236,595	\$1,550
Option 2 – Split	\$95,528	\$646

Scenario	\$/manhole overflow	\$/m² flood reduction (deeper than 100mm)
Option 5 – Storage	\$317,647	\$1,629
Option 7A – Orari	No benefit	No benefit
Option 7B – Orari	\$243,541	\$1,253
Option 8 – Open channel collector	\$168,254	\$951
Option 9 – Divert Tainui	\$203,448	\$855

3.5 Option Summary

As can be seen in the cost benefit summary, upsizing the entire network and creating storage areas are the least cost effective options. Storage may not be feasible either as it would require acceptance by the affected land owners.

The Orari Street cross connection has limited catchment wide benefit and would only work in conjunction with a pump station which reduces the potential cost benefit of the option.

The option to split the catchment in two with a new terminal pump station is the most cost effective option and has the second widest benefit after upgrading the entire network.

The alternative option to split the catchment with an open channel (Option 8) provides a similar result to Option 2, though at a higher cost per benefit (which could be even higher if sheet piling is required). Option 8 would hinge on agreement from affected land owners to sell and could involve geotechnical issues around lateral spreading which could add significant cost (i.e. sheet piling both sides of the drain). However, it could offer additional community benefits compared to a pipeline.

Discharge to the wastewater network is not considered feasible.

Other options such as house purchase or artificially drawing down ground water need to be considered carefully before being progressed. Increasing soil storage, for example, has limited benefit due to the amount of imperviousness in the catchment, but also poses risks around ground settlement (whether genuine or imagined). Assessing the cost of such a scheme is outside the remit of this study and would require specialist geotechnical investigation and hydro-geological modelling. Raising houses would require additional information to cost and does not actually reduce the flooding of sections or roads.

Appendix A – Cost Estimates

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Option 1 - Upgrade Network

Description	Rate	Unit	Measure	Cost
DN225 pipe <1m deep	\$ 445.00	m	1796.1	\$ 799,264.50
DN300 pipe <1m deep	\$ 514.00	m	1731.4	\$ 889,939.60
DN375 pipe <1m deep	\$ 599.00	m	1681.7	\$ 1,007,338.30
DN450 pipe <1m deep	\$ 689.00	m	1023.1	\$ 704,915.90
DN525 pipe <1m deep	\$ 772.00	m	349.5	\$ 269,814.00
DN600 pipe <1m deep	\$ 861.00	m	371.1	\$ 319,517.10
DN750 pipe <1m deep	\$ 1,042.00	m	310.1	\$ 323,124.20
DN900 pipe <1m deep	\$ 1,243.00	m	83	\$ 103,169.00
DN1050 pipe <1m deep	\$ 1,405.00	m	212.5	\$ 298,562.50
DN1200 pipe <1m deep	\$ 1,596.00	m	139	\$ 221,844.00
DN1350 pipe <1m deep	\$ 1,802.00	m	2	\$ 3,604.00
DN1600 pipe <1m deep	\$ 2,125.00	m	0	\$ -
DN2100 pipe <1m deep	\$ 2,804.00	m	0	\$ -
DN2350 pipe <1m deep	\$ 3,147.00	m	0	\$ -
DN2500 pipe <1m deep	\$ 3,372.00	m	0	\$ -
DN2800 pipe <1m deep	\$ 3,815.00	m	0	\$ -
DN225 pipe 1-2m deep	\$ 713.00	m	1820.6	\$ 1,298,087.80
DN300 pipe 1-2m deep	\$ 783.00	m	2260	\$ 1,769,580.00
DN375 pipe 1-2m deep	\$ 870.00	m	2717.4	\$ 2,364,138.00
DN450 pipe 1-2m deep	\$ 962.00	m	2881.3	\$ 2,771,810.60
DN525 pipe 1-2m deep	\$ 1,047.00	m	2083.7	\$ 2,181,633.90
DN600 pipe 1-2m deep	\$ 1,138.00	m	1754.8	\$ 1,996,962.40
DN750 pipe 1-2m deep	\$ 1,323.00	m	2811.5	\$ 3,719,614.50
DN900 pipe 1-2m deep	\$ 1,527.00	m	1526.9	\$ 2,331,576.30
DN1050 pipe 1-2m deep	\$ 1,693.00	m	728.1	\$ 1,232,673.30
DN1200 pipe 1-2m deep	\$ 1,888.00	m	1331.3	\$ 2,513,494.40
DN1350 pipe 1-2m deep	\$ 2,098.00	m	424.6	\$ 890,810.80
DN1600 pipe 1-2m deep	\$ 2,427.00	m	1281	\$ 3,108,987.00
DN2100 pipe 1-2m deep	\$ 3,118.00	m	0	\$ -
DN2350 pipe 1-2m deep	\$ 3,468.00	m	0	\$ -
DN2500 pipe 1-2m deep	\$ 3,696.00	m	0	\$ -
DN2800 pipe 1-2m deep	\$ 4,147.00	m	0	\$ -
DN225 pipe 2-3m deep	\$ 1,830.00	m	45.1	\$ 82,533.00
DN300 pipe 2-3m deep	\$ 1,903.00	m	40.1	\$ 76,310.30
DN375 pipe 2-3m deep	\$ 1,992.00	m	237.6	\$ 473,299.20
DN450 pipe 2-3m deep	\$ 2,085.00	m	263.8	\$ 550,023.00
DN525 pipe 2-3m deep	\$ 2,172.00	m	230.2	\$ 499,994.40
DN600 pipe 2-3m deep	\$ 2,265.00	m	143.5	\$ 325,027.50
DN750 pipe 2-3m deep	\$ 2,453.00	m	255.5	\$ 626,741.50
DN900 pipe 2-3m deep	\$ 2,662.00	m	683.3	\$ 1,818,944.60
DN1050 pipe 2-3m deep	\$ 2,832.00	m	353.4	\$ 1,000,828.80
DN1200 pipe 2-3m deep	\$ 3,030.00	m	1366.7	\$ 4,141,101.00
DN1350 pipe 2-3m deep	\$ 3,244.00	m	1948	\$ 6,319,312.00
DN1600 pipe 2-3m deep	\$ 3,579.00	m	842	\$ 3,013,518.00
DN2100 pipe 2-3m deep	\$ 4,283.00	m	605.5	\$ 2,593,356.50
DN2350 pipe 2-3m deep	\$ 4,639.00	m	0	\$ -
DN2500 pipe 2-3m deep	\$ 4,871.00	m	0	\$ -
DN2800 pipe 2-3m deep	\$ 5,329.00	m	0	\$ -
DN225 pipe >3m deep	\$ 2,332.50	m	0	\$ -
DN300 pipe >3m deep	\$ 2,427.50	m	64.6	\$ 156,816.50
DN375 pipe >3m deep	\$ 2,543.75	m	0	\$ -
DN450 pipe >3m deep	\$ 2,665.00	m	0	\$ -
DN525 pipe >3m deep	\$ 2,778.75	m	0	\$ -
DN600 pipe >3m deep	\$ 2,898.75	m	0	\$ -
DN750 pipe >3m deep	\$ 3,143.75	m	0	\$ -
DN900 pipe >3m deep	\$ 3,413.75	m	0	\$ -
DN1050 pipe >3m deep	\$ 3,635.00	m	42	\$ 152,670.00
DN1200 pipe >3m deep	\$ 3,892.50	m	143	\$ 556,627.50
DN1350 pipe >3m deep	\$ 4,168.75	m	143.6	\$ 598,632.50
DN1600 pipe >3m deep	\$ 4,603.75	m	391.5	\$ 1,802,368.13
DN2100 pipe >3m deep	\$ 5,515.00	m	298.5	\$ 1,646,227.50
DN2350 pipe >3m deep	\$ 5,975.00	m	66.4	\$ 396,740.00
DN2500 pipe >3m deep	\$ 6,275.00	m	0	\$ -
DN2800 pipe >3m deep	\$ 6,866.25	m	0	\$ -
Manhole <1m deep	\$ 4,000.00	no.	96	\$ 384,000.00
Manhole 1-2m deep	\$ 7,000.00	no.	270	\$ 1,890,000.00
Manhole 2-3m deep	\$ 12,000.00	no.	88	\$ 1,056,000.00
Manhole >3m deep	\$ 15,000.00	no.	14	\$ 210,000.00
Excavate and dispose	\$ 35.00	m3	0	\$ -
Line channel	\$ 100.00	m3	0	\$ -
Plant	\$ 60.00	m2	0	\$ -
Grass	\$ 10.00	m2	0	\$ -
Land purchase	\$ 160.00	m2	0	\$ -
House purchase	\$ 250,000.00	no.	0	\$ -
Sub-soil system	\$ 85.00	m3	0	\$ -
Pitch	\$ 125.00	m3	0	\$ -
Outfalls	\$ 20,000.00	no.	0	\$ -
Misc	\$ -	LS	0	\$ -
Pump Station upgrade (6m3/s to 11m3/s - 890kW)	\$ 5,886,000.00	LS	1	\$ 5886000.00
Base Cost				\$ 67,377,534.03
Design and Consenting	8%			\$ 5,390,202.72
Contractor profit and overheads	10%			\$ 6,737,753.40
P&G	25%			\$ 13,475,506.81
Sub-total				\$ 92,980,996.95
Contingency	30%			\$ 27,894,299.09
Total plus Contingency				\$ 120,875,296.04

Option 2 - Dual Catchment

Description	Rate	Unit	Measure	Cost
DN225 pipe <1m deep	\$ 445.00	m	0	\$ -
DN300 pipe <1m deep	\$ 514.00	m	64	\$ 32,896.00
DN375 pipe <1m deep	\$ 599.00	m	173	\$ 103,627.00
DN450 pipe <1m deep	\$ 689.00	m	38	\$ 26,182.00
DN525 pipe <1m deep	\$ 772.00	m	0	\$ -
DN600 pipe <1m deep	\$ 861.00	m	0	\$ -
DN750 pipe <1m deep	\$ 1,042.00	m	0	\$ -
DN900 pipe <1m deep	\$ 1,243.00	m	0	\$ -
DN1050 pipe <1m deep	\$ 1,405.00	m	0	\$ -
DN1200 pipe <1m deep	\$ 1,596.00	m	0	\$ -
DN1350 pipe <1m deep	\$ 1,802.00	m	0	\$ -
DN1600 pipe <1m deep	\$ 2,125.00	m	0	\$ -
DN2100 pipe <1m deep	\$ 2,804.00	m	0	\$ -
DN2350 pipe <1m deep	\$ 3,147.00	m	0	\$ -
DN2500 pipe <1m deep	\$ 3,372.00	m	0	\$ -
DN2800 pipe <1m deep	\$ 3,815.00	m	0	\$ -
DN225 pipe 1-2m deep	\$ 713.00	m	0	\$ -
DN300 pipe 1-2m deep	\$ 783.00	m	319	\$ 249,777.00
DN375 pipe 1-2m deep	\$ 870.00	m	241	\$ 209,670.00
DN450 pipe 1-2m deep	\$ 962.00	m	180	\$ 173,160.00
DN525 pipe 1-2m deep	\$ 1,047.00	m	112	\$ 117,264.00
DN600 pipe 1-2m deep	\$ 1,138.00	m	283	\$ 322,054.00
DN750 pipe 1-2m deep	\$ 1,323.00	m	93	\$ 123,039.00
DN900 pipe 1-2m deep	\$ 1,527.00	m	504	\$ 769,608.00
DN1050 pipe 1-2m deep	\$ 1,693.00	m	0	\$ -
DN1200 pipe 1-2m deep	\$ 1,888.00	m	428.7	\$ 809,385.60
DN1350 pipe 1-2m deep	\$ 2,098.00	m	0	\$ -
DN1600 pipe 1-2m deep	\$ 2,427.00	m	0	\$ -
DN2100 pipe 1-2m deep	\$ 3,118.00	m	0	\$ -
DN2350 pipe 1-2m deep	\$ 3,468.00	m	0	\$ -
DN2500 pipe 1-2m deep	\$ 3,696.00	m	0	\$ -
DN2800 pipe 1-2m deep	\$ 4,147.00	m	0	\$ -
DN225 pipe 2-3m deep	\$ 1,830.00	m	0	\$ -
DN300 pipe 2-3m deep	\$ 1,903.00	m	0	\$ -
DN375 pipe 2-3m deep	\$ 1,992.00	m	0	\$ -
DN450 pipe 2-3m deep	\$ 2,085.00	m	0	\$ -
DN525 pipe 2-3m deep	\$ 2,172.00	m	0	\$ -
DN600 pipe 2-3m deep	\$ 2,265.00	m	0	\$ -
DN750 pipe 2-3m deep	\$ 2,453.00	m	0	\$ -
DN900 pipe 2-3m deep	\$ 2,662.00	m	0	\$ -
DN1050 pipe 2-3m deep	\$ 2,832.00	m	0	\$ -
DN1200 pipe 2-3m deep	\$ 3,030.00	m	0	\$ -
DN1350 pipe 2-3m deep	\$ 3,244.00	m	413.5	\$ 1,341,394.00
DN1600 pipe 2-3m deep	\$ 3,579.00	m	0	\$ -
DN2100 pipe 2-3m deep	\$ 4,283.00	m	0	\$ -
DN2350 pipe 2-3m deep	\$ 4,639.00	m	0	\$ -
DN2500 pipe 2-3m deep	\$ 4,871.00	m	0	\$ -
DN2800 pipe 2-3m deep	\$ 5,329.00	m	0	\$ -
DN225 pipe >3m deep	\$ 2,332.50	m	0	\$ -
DN300 pipe >3m deep	\$ 2,427.50	m	0	\$ -
DN375 pipe >3m deep	\$ 2,543.75	m	0	\$ -
DN450 pipe >3m deep	\$ 2,665.00	m	0	\$ -
DN525 pipe >3m deep	\$ 2,778.75	m	0	\$ -
DN600 pipe >3m deep	\$ 2,898.75	m	0	\$ -
DN750 pipe >3m deep	\$ 3,143.75	m	0	\$ -
DN900 pipe >3m deep	\$ 3,413.75	m	0	\$ -
DN1050 pipe >3m deep	\$ 3,635.00	m	0	\$ -
DN1200 pipe >3m deep	\$ 3,892.50	m	0	\$ -
DN1350 pipe >3m deep	\$ 4,168.75	m	0	\$ -
DN1600 pipe >3m deep	\$ 4,603.75	m	0	\$ -
DN2100 pipe >3m deep	\$ 5,515.00	m	177.5	\$ 978,912.50
DN2350 pipe >3m deep	\$ 5,975.00	m	0	\$ -
DN2500 pipe >3m deep	\$ 6,275.00	m	0	\$ -
DN2800 pipe >3m deep	\$ 6,866.25	m	0	\$ -
Manhole <1m deep	\$ 4,000.00	no.	3	\$ 12,000.00
Manhole 1-2m deep	\$ 7,000.00	no.	27	\$ 189,000.00
Manhole 2-3m deep	\$ 12,000.00	no.	5	\$ 60,000.00
Manhole >3m deep	\$ 15,000.00	no.	2	\$ 30,000.00
Excavate and dispose	\$ 35.00	m3	0	\$ -
Line channel	\$ 100.00	m3	0	\$ -
Plant	\$ 60.00	m2	0	\$ -
Grass	\$ 10.00	m2	0	\$ -
Land purchase	\$ 160.00	m2	0	\$ -
House purchase	\$ 250,000.00	no.	0	\$ -
Sub-soil system	\$ 85.00	m3	0	\$ -
Pitch	\$ 125.00	m3	0	\$ -
Outfalls	\$ 20,000.00	no.	1	\$ 20,000.00
Misc	\$ -	LS	0	\$ -
Pump Station(5.5m3/s - 510kW)	\$ 7,553,700.00	LS	1	\$ 7,553,700.00
Base Cost				\$ 13,121,669.10
Design and Consenting	8%			\$ 1,049,733.53
Contractor profit and overheads	10%			\$ 1,312,166.91
P&G	25%			\$ 2,624,333.82
Sub-total				\$ 18,107,903.36
Contingency	30%			\$ 5,432,371.01
Total plus Contingency				\$ 23,540,274.37

Option 5 - Storage

Description	Rate	Unit	Measure	Cost
DN225 pipe <1m deep	\$ 445.00	m	179.4	\$ 79,833.00
DN300 pipe <1m deep	\$ 514.00	m	0	\$ -
DN375 pipe <1m deep	\$ 599.00	m	0	\$ -
DN450 pipe <1m deep	\$ 689.00	m	94	\$ 64,766.00
DN525 pipe <1m deep	\$ 772.00	m	0	\$ -
DN600 pipe <1m deep	\$ 861.00	m	307.3	\$ 264,585.30
DN750 pipe <1m deep	\$ 1,042.00	m	74.7	\$ 77,837.40
DN900 pipe <1m deep	\$ 1,243.00	m	41.4	\$ 51,460.20
DN1050 pipe <1m deep	\$ 1,405.00	m	0	\$ -
DN1200 pipe <1m deep	\$ 1,596.00	m	0	\$ -
DN1350 pipe <1m deep	\$ 1,802.00	m	0	\$ -
DN1600 pipe <1m deep	\$ 2,125.00	m	0	\$ -
DN2100 pipe <1m deep	\$ 2,804.00	m	0	\$ -
DN2350 pipe <1m deep	\$ 3,147.00	m	0	\$ -
DN2500 pipe <1m deep	\$ 3,372.00	m	0	\$ -
DN2800 pipe <1m deep	\$ 3,815.00	m	0	\$ -
DN225 pipe 1-2m deep	\$ 713.00	m	0	\$ -
DN300 pipe 1-2m deep	\$ 783.00	m	50.9	\$ 39,854.70
DN375 pipe 1-2m deep	\$ 870.00	m	109	\$ 94,830.00
DN450 pipe 1-2m deep	\$ 962.00	m	569.2	\$ 547,570.40
DN525 pipe 1-2m deep	\$ 1,047.00	m	13	\$ 13,611.00
DN600 pipe 1-2m deep	\$ 1,138.00	m	101	\$ 114,938.00
DN750 pipe 1-2m deep	\$ 1,323.00	m	190.1	\$ 251,502.30
DN900 pipe 1-2m deep	\$ 1,527.00	m	164	\$ 250,428.00
DN1050 pipe 1-2m deep	\$ 1,693.00	m	0	\$ -
DN1200 pipe 1-2m deep	\$ 1,888.00	m	0	\$ -
DN1350 pipe 1-2m deep	\$ 2,098.00	m	0	\$ -
DN1600 pipe 1-2m deep	\$ 2,427.00	m	0	\$ -
DN2100 pipe 1-2m deep	\$ 3,118.00	m	0	\$ -
DN2350 pipe 1-2m deep	\$ 3,468.00	m	0	\$ -
DN2500 pipe 1-2m deep	\$ 3,696.00	m	0	\$ -
DN2800 pipe 1-2m deep	\$ 4,147.00	m	0	\$ -
DN225 pipe 2-3m deep	\$ 1,830.00	m	0	\$ -
DN300 pipe 2-3m deep	\$ 1,903.00	m	0	\$ -
DN375 pipe 2-3m deep	\$ 1,992.00	m	0	\$ -
DN450 pipe 2-3m deep	\$ 2,085.00	m	0	\$ -
DN525 pipe 2-3m deep	\$ 2,172.00	m	0	\$ -
DN600 pipe 2-3m deep	\$ 2,265.00	m	0	\$ -
DN750 pipe 2-3m deep	\$ 2,453.00	m	0	\$ -
DN900 pipe 2-3m deep	\$ 2,662.00	m	0	\$ -
DN1050 pipe 2-3m deep	\$ 2,832.00	m	0	\$ -
DN1200 pipe 2-3m deep	\$ 3,030.00	m	0	\$ -
DN1350 pipe 2-3m deep	\$ 3,244.00	m	0	\$ -
DN1600 pipe 2-3m deep	\$ 3,579.00	m	0	\$ -
DN2100 pipe 2-3m deep	\$ 4,283.00	m	0	\$ -
DN2350 pipe 2-3m deep	\$ 4,639.00	m	0	\$ -
DN2500 pipe 2-3m deep	\$ 4,871.00	m	0	\$ -
DN2800 pipe 2-3m deep	\$ 5,329.00	m	0	\$ -
DN225 pipe >3m deep	\$ 2,332.50	m	0	\$ -
DN300 pipe >3m deep	\$ 2,427.50	m	0	\$ -
DN375 pipe >3m deep	\$ 2,543.75	m	0	\$ -
DN450 pipe >3m deep	\$ 2,665.00	m	0	\$ -
DN525 pipe >3m deep	\$ 2,778.75	m	0	\$ -
DN600 pipe >3m deep	\$ 2,898.75	m	0	\$ -
DN750 pipe >3m deep	\$ 3,143.75	m	0	\$ -
DN900 pipe >3m deep	\$ 3,413.75	m	0	\$ -
DN1050 pipe >3m deep	\$ 3,635.00	m	0	\$ -
DN1200 pipe >3m deep	\$ 3,892.50	m	0	\$ -
DN1350 pipe >3m deep	\$ 4,168.75	m	0	\$ -
DN1600 pipe >3m deep	\$ 4,603.75	m	0	\$ -
DN2100 pipe >3m deep	\$ 5,515.00	m	0	\$ -
DN2350 pipe >3m deep	\$ 5,975.00	m	0	\$ -
DN2500 pipe >3m deep	\$ 6,275.00	m	0	\$ -
DN2800 pipe >3m deep	\$ 6,866.25	m	0	\$ -
Manhole <1m deep	\$ 4,000.00	no.	9	\$ 36,000.00
Manhole 1-2m deep	\$ 7,000.00	no.	15	\$ 105,000.00
Manhole 2-3m deep	\$ 12,000.00	no.	0	\$ -
Manhole >3m deep	\$ 15,000.00	no.	0	\$ -
Excavate and dispose	\$ 35.00	m3	248704	\$ 8,704,640.00
Line channel	\$ 100.00	m3		\$ -
Plant	\$ 60.00	m2		\$ -
Grass	\$ 10.00	m2		\$ -
Land purchase	\$ 160.00	m2		\$ -
House purchase	\$ 250,000.00	no.		\$ -
Sub-soil system	\$ 85.00	m3	46632	\$ 3,963,720.00
Pitch	\$ 125.00	m3	46632	\$ 5,829,000.00
Outfalls	\$ 20,000.00	no.	6	\$ 120,000.00
Misc	\$ 150,000.00	LS	1	\$ 150,000.00
Pump Station	\$ 98,100.00	LS	3	\$ 294,300.00
Base Cost				\$ 21,053,876.30
Design and Consenting	8%			\$ 1,684,310.10
Contractor profit and overheads	10%			\$ 2,105,387.63
P&G	25%			\$ 4,210,775.26
Sub-total				\$ 29,054,349.29
Contingency	30%			\$ 8,716,304.79
Total plus Contingency				\$ 37,770,654.08

Option 7 - Discharge to Orari St. main

Description	Rate	Unit	Measure	Cost
DN225 pipe <1m deep	\$ 445.00	m	0	\$ -
DN300 pipe <1m deep	\$ 514.00	m	0	\$ -
DN375 pipe <1m deep	\$ 599.00	m	0	\$ -
DN450 pipe <1m deep	\$ 689.00	m	0	\$ -
DN525 pipe <1m deep	\$ 772.00	m	0	\$ -
DN600 pipe <1m deep	\$ 861.00	m	0	\$ -
DN750 pipe <1m deep	\$ 1,042.00	m	0	\$ -
DN900 pipe <1m deep	\$ 1,243.00	m	0	\$ -
DN1050 pipe <1m deep	\$ 1,405.00	m	0	\$ -
DN1200 pipe <1m deep	\$ 1,596.00	m	0	\$ -
DN1350 pipe <1m deep	\$ 1,802.00	m	0	\$ -
DN1600 pipe <1m deep	\$ 2,125.00	m	0	\$ -
DN2100 pipe <1m deep	\$ 2,804.00	m	0	\$ -
DN2350 pipe <1m deep	\$ 3,147.00	m	0	\$ -
DN2500 pipe <1m deep	\$ 3,372.00	m	0	\$ -
DN2800 pipe <1m deep	\$ 3,815.00	m	0	\$ -
DN225 pipe 1-2m deep	\$ 713.00	m	0	\$ -
DN300 pipe 1-2m deep	\$ 783.00	m	0	\$ -
DN375 pipe 1-2m deep	\$ 870.00	m	0	\$ -
DN450 pipe 1-2m deep	\$ 962.00	m	0	\$ -
DN525 pipe 1-2m deep	\$ 1,047.00	m	0	\$ -
DN600 pipe 1-2m deep	\$ 1,138.00	m	0	\$ -
DN750 pipe 1-2m deep	\$ 1,323.00	m	0	\$ -
DN900 pipe 1-2m deep	\$ 1,527.00	m	0	\$ -
DN1050 pipe 1-2m deep	\$ 1,693.00	m	0	\$ -
DN1200 pipe 1-2m deep	\$ 1,888.00	m	0	\$ -
DN1350 pipe 1-2m deep	\$ 2,098.00	m	0	\$ -
DN1600 pipe 1-2m deep	\$ 2,427.00	m	0	\$ -
DN2100 pipe 1-2m deep	\$ 3,118.00	m	0	\$ -
DN2350 pipe 1-2m deep	\$ 3,468.00	m	0	\$ -
DN2500 pipe 1-2m deep	\$ 3,696.00	m	0	\$ -
DN2800 pipe 1-2m deep	\$ 4,147.00	m	0	\$ -
DN225 pipe 2-3m deep	\$ 1,830.00	m	0	\$ -
DN300 pipe 2-3m deep	\$ 1,903.00	m	0	\$ -
DN375 pipe 2-3m deep	\$ 1,992.00	m	0	\$ -
DN450 pipe 2-3m deep	\$ 2,085.00	m	4.3	\$ 8,965.50
DN525 pipe 2-3m deep	\$ 2,172.00	m	0	\$ -
DN600 pipe 2-3m deep	\$ 2,265.00	m	0	\$ -
DN750 pipe 2-3m deep	\$ 2,453.00	m	0	\$ -
DN900 pipe 2-3m deep	\$ 2,662.00	m	0	\$ -
DN1050 pipe 2-3m deep	\$ 2,832.00	m	173.8	\$ 492,201.60
DN1200 pipe 2-3m deep	\$ 3,030.00	m	0	\$ -
DN1350 pipe 2-3m deep	\$ 3,244.00	m	0	\$ -
DN1600 pipe 2-3m deep	\$ 3,579.00	m	0	\$ -
DN2100 pipe 2-3m deep	\$ 4,283.00	m	0	\$ -
DN2350 pipe 2-3m deep	\$ 4,639.00	m	0	\$ -
DN2500 pipe 2-3m deep	\$ 4,871.00	m	0	\$ -
DN2800 pipe 2-3m deep	\$ 5,329.00	m	0	\$ -
DN225 pipe >3m deep	\$ 2,332.50	m	0	\$ -
DN300 pipe >3m deep	\$ 2,427.50	m	0	\$ -
DN375 pipe >3m deep	\$ 2,543.75	m	0	\$ -
DN450 pipe >3m deep	\$ 2,665.00	m	0	\$ -
DN525 pipe >3m deep	\$ 2,778.75	m	0	\$ -
DN600 pipe >3m deep	\$ 2,898.75	m	0	\$ -
DN750 pipe >3m deep	\$ 3,143.75	m	0	\$ -
DN900 pipe >3m deep	\$ 3,413.75	m	0	\$ -
DN1050 pipe >3m deep	\$ 3,635.00	m	0	\$ -
DN1200 pipe >3m deep	\$ 3,892.50	m	0	\$ -
DN1350 pipe >3m deep	\$ 4,168.75	m	0	\$ -
DN1600 pipe >3m deep	\$ 4,603.75	m	0	\$ -
DN2100 pipe >3m deep	\$ 5,515.00	m	0	\$ -
DN2350 pipe >3m deep	\$ 5,975.00	m	0	\$ -
DN2500 pipe >3m deep	\$ 6,275.00	m	0	\$ -
DN2800 pipe >3m deep	\$ 6,866.25	m	0	\$ -
Manhole <1m deep	\$ 4,000.00	no.	0	\$ -
Manhole 1-2m deep	\$ 7,000.00	no.	0	\$ -
Manhole 2-3m deep	\$ 12,000.00	no.	2	\$ 24,000.00
Manhole >3m deep	\$ 15,000.00	no.	0	\$ -
Excavate and dispose	\$ 35.00	m3	0	\$ -
Line channel	\$ 100.00	m3	0	\$ -
Plant	\$ 60.00	m2	0	\$ -
Grass	\$ 10.00	m2	0	\$ -
Land purchase	\$ 160.00	m2	0	\$ -
House purchase	\$ 250,000.00	no.	0	\$ -
Sub-soil system	\$ 85.00	m3	0	\$ -
Pitch	\$ 125.00	m3	0	\$ -
Outfalls	\$ 20,000.00	no.	0	\$ -
Misc	\$ -	LS	0	\$ -
Pump Station	\$ -	LS	0	\$ -
Base Cost				\$ 525,167.10
Design and Consenting	8%			\$ 42,013.37
Contractor profit and overheads	10%			\$ 52,516.71
P&G	25%			\$ 105,033.42
Sub-total				\$ 724,730.60
Contingency	30%			\$ 217,419.18
Total plus Contingency				\$ 942,149.78

Option 8 - Open Channel

Description	Rate	Unit	Measure	Cost
DN225 pipe <1m deep	\$ 445.00	m	0	\$ -
DN300 pipe <1m deep	\$ 514.00	m	0	\$ -
DN375 pipe <1m deep	\$ 599.00	m	0	\$ -
DN450 pipe <1m deep	\$ 689.00	m	0	\$ -
DN525 pipe <1m deep	\$ 772.00	m	0	\$ -
DN600 pipe <1m deep	\$ 861.00	m	0	\$ -
DN750 pipe <1m deep	\$ 1,042.00	m	0	\$ -
DN900 pipe <1m deep	\$ 1,243.00	m	0	\$ -
DN1050 pipe <1m deep	\$ 1,405.00	m	0	\$ -
DN1200 pipe <1m deep	\$ 1,596.00	m	0	\$ -
DN1350 pipe <1m deep	\$ 1,802.00	m	0	\$ -
DN1600 pipe <1m deep	\$ 2,125.00	m	0	\$ -
DN2100 pipe <1m deep	\$ 2,804.00	m	0	\$ -
DN2350 pipe <1m deep	\$ 3,147.00	m	0	\$ -
DN2500 pipe <1m deep	\$ 3,372.00	m	0	\$ -
DN2800 pipe <1m deep	\$ 3,815.00	m	0	\$ -
DN225 pipe 1-2m deep	\$ 713.00	m	0	\$ -
DN300 pipe 1-2m deep	\$ 783.00	m	0	\$ -
DN375 pipe 1-2m deep	\$ 870.00	m	0	\$ -
DN450 pipe 1-2m deep	\$ 962.00	m	0	\$ -
DN525 pipe 1-2m deep	\$ 1,047.00	m	0	\$ -
DN600 pipe 1-2m deep	\$ 1,138.00	m	0	\$ -
DN750 pipe 1-2m deep	\$ 1,323.00	m	13.4	\$ 17,728.20
DN900 pipe 1-2m deep	\$ 1,527.00	m	0	\$ -
DN1050 pipe 1-2m deep	\$ 1,693.00	m	0	\$ -
DN1200 pipe 1-2m deep	\$ 1,888.00	m	0	\$ -
DN1350 pipe 1-2m deep	\$ 2,098.00	m	0	\$ -
DN1600 pipe 1-2m deep	\$ 2,427.00	m	30.1	\$ 73,052.70
DN2100 pipe 1-2m deep	\$ 3,118.00	m	0	\$ -
DN2350 pipe 1-2m deep	\$ 3,468.00	m	0	\$ -
DN2500 pipe 1-2m deep	\$ 3,696.00	m	0	\$ -
DN2800 pipe 1-2m deep	\$ 4,147.00	m	11.6	\$ 48,105.20
DN225 pipe 2-3m deep	\$ 1,830.00	m	0	\$ -
DN300 pipe 2-3m deep	\$ 1,903.00	m	0	\$ -
DN375 pipe 2-3m deep	\$ 1,992.00	m	0	\$ -
DN450 pipe 2-3m deep	\$ 2,085.00	m	0	\$ -
DN525 pipe 2-3m deep	\$ 2,172.00	m	0	\$ -
DN600 pipe 2-3m deep	\$ 2,265.00	m	0	\$ -
DN750 pipe 2-3m deep	\$ 2,453.00	m	0	\$ -
DN900 pipe 2-3m deep	\$ 2,662.00	m	0	\$ -
DN1050 pipe 2-3m deep	\$ 2,832.00	m	0	\$ -
DN1200 pipe 2-3m deep	\$ 3,030.00	m	0	\$ -
DN1350 pipe 2-3m deep	\$ 3,244.00	m	0	\$ -
DN1600 pipe 2-3m deep	\$ 3,579.00	m	0	\$ -
DN2100 pipe 2-3m deep	\$ 4,283.00	m	28.1	\$ 120,352.30
DN2350 pipe 2-3m deep	\$ 4,639.00	m	0	\$ -
DN2500 pipe 2-3m deep	\$ 4,871.00	m	0	\$ -
DN2800 pipe 2-3m deep	\$ 5,329.00	m	0	\$ -
DN225 pipe >3m deep	\$ 2,332.50	m	0	\$ -
DN300 pipe >3m deep	\$ 2,427.50	m	0	\$ -
DN375 pipe >3m deep	\$ 2,543.75	m	0	\$ -
DN450 pipe >3m deep	\$ 2,665.00	m	0	\$ -
DN525 pipe >3m deep	\$ 2,778.75	m	0	\$ -
DN600 pipe >3m deep	\$ 2,898.75	m	0	\$ -
DN750 pipe >3m deep	\$ 3,143.75	m	0	\$ -
DN900 pipe >3m deep	\$ 3,413.75	m	0	\$ -
DN1050 pipe >3m deep	\$ 3,635.00	m	0	\$ -
DN1200 pipe >3m deep	\$ 3,892.50	m	0	\$ -
DN1350 pipe >3m deep	\$ 4,168.75	m	0	\$ -
DN1600 pipe >3m deep	\$ 4,603.75	m	0	\$ -
DN2100 pipe >3m deep	\$ 5,515.00	m	46	\$ 253,690.00
DN2350 pipe >3m deep	\$ 5,975.00	m	0	\$ -
DN2500 pipe >3m deep	\$ 6,275.00	m	0	\$ -
DN2800 pipe >3m deep	\$ 6,866.25	m	0	\$ -
Manhole <1m deep	\$ 4,000.00	no.	0	\$ -
Manhole 1-2m deep	\$ 7,000.00	no.	1	\$ 7,000.00
Manhole 2-3m deep	\$ 12,000.00	no.	0	\$ -
Manhole >3m deep	\$ 15,000.00	no.	1	\$ 15,000.00
Excavate and dispose	\$ 65.00	m3	16783	\$ 1,090,922.63
Line channel	\$ 100.00	m3	2604	\$ 260,400.00
Plant	\$ 60.00	m2	3166	\$ 189,987.00
Grass	\$ 10.00	m2	15832	\$ 158,322.50
Land purchase	\$ 160.00	m2	10687	\$ 1,709,960.00
House purchase	\$ 250,000.00	no.	21	\$ 5,250,000.00
Sub-soil system	\$ 85.00	m3	0	\$ -
Pitch	\$ 125.00	m3	0	\$ -
Outfalls	\$ 20,000.00	no.	0	\$ -
Misc	\$ 150,000.00	LS	1	\$ 150,000.00
Pump Station (2.1m3/s - 150kW)	\$ 2,060,100.00	LS	1	\$ 2,060,100.00
Base Cost				\$ 11,404,620.53
Design and Consenting	8%			\$ 912,369.64
Contractor profit and overheads	10%			\$ 1,140,462.05
P&G	25%			\$ 2,851,155.13
Sub-total				\$ 16,308,607.35
Contingency	30%			\$ 4,892,582.21
Total plus Contingency				\$ 21,201,189.56

Option 9 - Divert Tainui

Description	Rate	Unit	Measure	Cost
DN225 pipe <1m deep	\$ 445.00	m	0	\$ -
DN300 pipe <1m deep	\$ 514.00	m	0	\$ -
DN375 pipe <1m deep	\$ 599.00	m	0	\$ -
DN450 pipe <1m deep	\$ 689.00	m	0	\$ -
DN525 pipe <1m deep	\$ 772.00	m	0	\$ -
DN600 pipe <1m deep	\$ 861.00	m	0	\$ -
DN750 pipe <1m deep	\$ 1,042.00	m	0	\$ -
DN900 pipe <1m deep	\$ 1,243.00	m	0	\$ -
DN1050 pipe <1m deep	\$ 1,405.00	m	0	\$ -
DN1200 pipe <1m deep	\$ 1,596.00	m	0	\$ -
DN1350 pipe <1m deep	\$ 1,802.00	m	0	\$ -
DN1600 pipe <1m deep	\$ 2,125.00	m	0	\$ -
DN2100 pipe <1m deep	\$ 2,804.00	m	0	\$ -
DN2350 pipe <1m deep	\$ 3,147.00	m	0	\$ -
DN2500 pipe <1m deep	\$ 3,372.00	m	0	\$ -
DN2800 pipe <1m deep	\$ 3,815.00	m	0	\$ -
DN225 pipe 1-2m deep	\$ 713.00	m	0	\$ -
DN300 pipe 1-2m deep	\$ 783.00	m	0	\$ -
DN375 pipe 1-2m deep	\$ 870.00	m	0	\$ -
DN450 pipe 1-2m deep	\$ 962.00	m	0	\$ -
DN525 pipe 1-2m deep	\$ 1,047.00	m	0	\$ -
DN600 pipe 1-2m deep	\$ 1,138.00	m	0	\$ -
DN750 pipe 1-2m deep	\$ 1,323.00	m	0	\$ -
DN900 pipe 1-2m deep	\$ 1,527.00	m	0	\$ -
DN1050 pipe 1-2m deep	\$ 1,693.00	m	0	\$ -
DN1200 pipe 1-2m deep	\$ 1,888.00	m	0	\$ -
DN1350 pipe 1-2m deep	\$ 2,098.00	m	0	\$ -
DN1600 pipe 1-2m deep	\$ 2,427.00	m	0	\$ -
DN2100 pipe 1-2m deep	\$ 3,118.00	m	0	\$ -
DN2350 pipe 1-2m deep	\$ 3,468.00	m	0	\$ -
DN2500 pipe 1-2m deep	\$ 3,696.00	m	0	\$ -
DN2800 pipe 1-2m deep	\$ 4,147.00	m	0	\$ -
DN225 pipe 2-3m deep	\$ 1,830.00	m	0	\$ -
DN300 pipe 2-3m deep	\$ 1,903.00	m	0	\$ -
DN375 pipe 2-3m deep	\$ 1,992.00	m	0	\$ -
DN450 pipe 2-3m deep	\$ 2,085.00	m	0	\$ -
DN525 pipe 2-3m deep	\$ 2,172.00	m	0	\$ -
DN600 pipe 2-3m deep	\$ 2,265.00	m	0	\$ -
DN750 pipe 2-3m deep	\$ 2,453.00	m	0	\$ -
DN900 pipe 2-3m deep	\$ 2,662.00	m	0	\$ -
DN1050 pipe 2-3m deep	\$ 2,832.00	m	0	\$ -
DN1200 pipe 2-3m deep	\$ 3,030.00	m	701	\$ 2,124,030.00
DN1350 pipe 2-3m deep	\$ 3,244.00	m	0	\$ -
DN1600 pipe 2-3m deep	\$ 3,579.00	m	0	\$ -
DN2100 pipe 2-3m deep	\$ 4,283.00	m	0	\$ -
DN2350 pipe 2-3m deep	\$ 4,639.00	m	0	\$ -
DN2500 pipe 2-3m deep	\$ 4,871.00	m	0	\$ -
DN2800 pipe 2-3m deep	\$ 5,329.00	m	0	\$ -
DN225 pipe >3m deep	\$ 2,332.50	m	0	\$ -
DN300 pipe >3m deep	\$ 2,427.50	m	0	\$ -
DN375 pipe >3m deep	\$ 2,543.75	m	0	\$ -
DN450 pipe >3m deep	\$ 2,665.00	m	0	\$ -
DN525 pipe >3m deep	\$ 2,778.75	m	0	\$ -
DN600 pipe >3m deep	\$ 2,898.75	m	0	\$ -
DN750 pipe >3m deep	\$ 3,143.75	m	0	\$ -
DN900 pipe >3m deep	\$ 3,413.75	m	0	\$ -
DN1050 pipe >3m deep	\$ 3,635.00	m	0	\$ -
DN1200 pipe >3m deep	\$ 3,892.50	m	0	\$ -
DN1350 pipe >3m deep	\$ 4,168.75	m	0	\$ -
DN1600 pipe >3m deep	\$ 4,603.75	m	0	\$ -
DN2100 pipe >3m deep	\$ 5,515.00	m	0	\$ -
DN2350 pipe >3m deep	\$ 5,975.00	m	0	\$ -
DN2500 pipe >3m deep	\$ 6,275.00	m	0	\$ -
DN2800 pipe >3m deep	\$ 6,866.25	m	0	\$ -
Manhole <1m deep	\$ 4,000.00	no.	0	\$ -
Manhole 1-2m deep	\$ 7,000.00	no.	0	\$ -
Manhole 2-3m deep	\$ 12,000.00	no.	0	\$ -
Manhole >3m deep	\$ 15,000.00	no.	0	\$ -
Excavate and dispose	\$ 35.00	m3	0	\$ -
Line channel	\$ 100.00	m3	0	\$ -
Plant	\$ 60.00	m2	0	\$ -
Grass	\$ 10.00	m2	0	\$ -
Land purchase	\$ 160.00	m2	0	\$ -
House purchase	\$ 250,000.00	no.	0	\$ -
Sub-soil system	\$ 85.00	m3	0	\$ -
Pitch	\$ 125.00	m3	0	\$ -
Outfalls	\$ 20,000.00	no.	1	\$ 20,000.00
Misc	\$ 150,000.00	LS	1	\$ 150,000.00
Pump Station	\$ 993,262.50	LS	1	\$ 993,262.50
Base Cost				\$ 3,287,292.50
Design and Consenting	8%			\$ 262,983.40
Contractor profit and overheads	10%			\$ 328,729.25
P&G	25%			\$ 657,458.50
Sub-total				\$ 4,536,463.65
Contingency	30%			\$ 1,360,939.10
Total plus Contingency				\$ 5,897,402.75

Appendix B – Table of Runs

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Model-Run-Details¶

Model-Run¶	Scenario¶			Rainfall-Event¶					Climate-Change¶			Tide-Level¶		Flood-M¶	
	Current¶	2031 ² ¶	2060 ² ¶	2yr¶	5yr¶	10yr¶	50yr¶	100yr¶	None¶	Mean¶	Extreme¶	MHWS ³ ¶	Extreme¶	LoS¶	Deep-Flood-¶
1¶	✓¶	¶	¶	Actual¶					✓¶	¶	¶	Actual¶		✓¶	¶
2 ⁵ ¶	✓¶	¶	¶	✓¶	¶	¶	¶	¶	✓¶	¶	¶	✓¶	¶	✓¶	¶
3 ⁵ ¶	✓¶	¶	¶	¶	✓¶	¶	¶	¶	✓¶	¶	¶	✓¶	¶	✓¶	¶
4¶	✓¶	¶	¶	¶	¶	✓¶	¶	¶	✓¶	¶	¶	✓¶	¶	✓¶	¶
5¶	✓¶	¶	¶	¶	¶	¶	✓¶	¶	✓¶	¶	¶	✓¶	¶	¶	✓¶
6¶	✓¶	¶	¶	¶	¶	¶	¶	✓¶	✓¶	¶	¶	¶	1-in-2yr¶	¶	¶
7¶	¶	✓¶	¶	¶	¶	✓¶	¶	¶	✓¶	¶	¶	✓¶	¶	✓¶	¶
8¶	¶	✓¶	¶	¶	¶	✓¶	¶	¶	¶	✓¶	¶	✓¶	¶	✓¶	¶
9¶	¶	✓¶	¶	¶	¶	✓¶	¶	¶	¶	¶	✓¶	✓¶	¶	✓¶	¶
10¶	¶	✓¶	¶	¶	¶	¶	✓¶	¶	¶	✓¶	¶	✓¶	¶	¶	✓¶
11¶	¶	¶	✓¶	¶	¶	✓¶	¶	¶	¶	✓¶	¶	✓¶	¶	✓¶	¶
12¶	¶	¶	✓¶	¶	¶	✓¶	¶	¶	¶	¶	✓¶	✓¶	¶	✓¶	¶
13¶	¶	¶	✓¶	¶	¶	¶	✓¶	¶	¶	✓¶	¶	✓¶	¶	¶	✓¶
14¶	¶	¶	✓¶	¶	¶	¶	¶	✓¶	¶	¶	✓¶	¶	1-in-20yr¶	¶	¶

¶

¶ For the same year associated with 'Scenario'¶

¶ Assumes 2031 population with maximum allowable development/imperviousness¶

¶ Mean High Water Springs (MHWS)¶

¶ Only shows flooding > 300-mm deep¶

¶ Run results are not included in this report¶

LGOIMA SR.31780 RELEASE



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ENGINEERING EVALUATION OF 'OVERALL BEST SOLUTION' FOR SOUTH DUNEDIN DRAINAGE UPGRADE DRAFT BRIEF – Version 2 - 22/12/2025

Preface

It has long been recognized that the present South Dunedin Stormwater drainage system is under-capacity, as evidenced by the 2015 flood when about 1,200 houses/businesses were inundated. The cost of the damage in the 2015 food has been estimated at \$123 million. It must, however, be recognized that that in the 2015 food, blocked mud tanks exacerbated the flooding – one estimate suggested that the mud tank problem about doubled the volume of flood inundation as compared to what would have occurred had the mud tanks had been fully functional.

A further smaller flood occurred in October 2024, necessitating the evacuation of about 60 homes.

The main initiatives since 2015 include the following (note that this is not a comprehensive list):

- Various minor improvements (eg new screen at Portobello pumpstation)
- Report by Opus Consultants in 2017 on engineering options to upgrade the South Dunedin stormwater system (noting that this study had limitations, eg it did not account for stormwater runoff overflow from the surrounding hill suburbs; a peer review commissioned by DCC identified both technical issues and potentially flawed costing assumptions)
- DCC's 2025 'South Dunedin Futures Study' and the attendant public consultation
- DCC's 2025 decision to commit \$29.1 million to various engineering works to mitigate flooding (note that without the investigations set out below, there is no way to know if these works are justifiable in the larger scheme of things)

At this time, especially given the election of a new Council in October 2025, it would be opportune to 'take stock' of the situation in the context of deciding on the most appropriate long-term solution to the flooding in South Dunedin, in turn taking account for the effects of the likes of climate change and forecast sea level rise. In this context, in order to reach a conclusion, a pre-requisite should be to know the components and estimated cost of the most cost-effective engineering works to bring the South Dunedin stormwater system up to an acceptable performance standard (herein, such a scheme is termed the 'overall best solution', or 'OBS'). This would then serve as a 'benchmark', against which to assess other options, including those referred to above. As such, it would not necessarily commit DCC to implementing the OBS but rather it would be serve as a reference point for future deliberations by Council on way forward.

Given the foregoing, the next step is to identify the components of the OBS. Rather than having to evaluate a long-list of options, the aforementioned Opus study did just that, looking at xx options. Whilst, as above, the aforementioned Opus study had limitations, it identified a clear favourite in benefit/cost terms. This involved constructing a trunk 'interceptor' pipe (ie diverting upper catchment runoff) feeding to a pond and pump station/outfall at Forbury Park near St Kilda. By diverting the upper catchment (likely at a point on Hillside Rd near Burns/Bradshaw Sts), capacity would be 'freed-up' in the existing main trunk pipes on downstream to the Portobello Rd pump station. It is noted, however, that under-capacity pipes feeding to the main trunk pipes (ie both upstream and downstream of the diversion point) would also need to be addressed to find the most cost-effective local solutions (eg through the likes of pipeline duplications or diversions). The key quantitative analytical tool needed to investigate the aforementioned options – leading to sizing of the required pipework and allied improvement works – is the existing computer model of the South Dunedin stormwater system. A map showing the likely key elements of the Obs is shown below.

Building on the foregoing, the remainder of this document takes the form of a detailed brief for executing the required modelling/engineering/costing studies for the OBS. This brief is necessarily quite detailed, reflecting the fact that many options will need to be evaluated with the framework of the OBS whereby the final OBS proposal represents the most cost-effective package of works and is robust in terms of its technical feasibility, cost and resilience to both future climate change and sea level rise.

It should be noted that the studies to be conducted according to this brief are necessarily complicated (eg as compared to the likes of a stormwater system serving a greenfield development), requiring the bringing-to-bear of extensive directly applicable drainage engineering expertise. To this end, it is proposed that the studies be closely overseen throughout by an experienced independent peer review engineer (ie rather than just conducting a peer review of the findings). Insofar as practical, this brief flags prospective issues and options that should be addressed, including, where warranted, giving guidance on various possibilities to be evaluated (eg 'optimising' both the interceptor diversion point, the interceptor route, the pond/pump capacities, etc).

It should be recognised that a decision by Council to proceed with the proposed study would in no way commit Council to proceed with implementation of the identified upgrading works, in full or in part.

It is envisaged that this 'Draft Brief' would be refined by inputs from Councilors and other parties that Council might invite comments from.



1. Set-Up

The key activities to be undertaken in setting-up for the studies involve the following:

- Finalise the study brief (ie building on the draft version herein)
- Appoint modelling team
- Appoint engineering team
- Hold joint workshop with modellers/engineers and peer reviewer to discuss the execution of the work
- Agree the applicable drainage system performance standard (refer 3 below) and climate change and sea level rise forecasts (refer 4 below) to be applied in the studies
- Confirm the availability of the base data needed for the studies¹

¹ Includes habitable floor levels (elevations) for all dwellings (if not already available, obtain using high accuracy GPS)

- Appoint a peer reviewer² (refer 2 below)
- Establish study budgets and work programmes
- Agree project management arrangements and progress reporting

2. Scope of Peer Review

Given the aforementioned complexities of the studies, it is proposed to engage an experienced independent peer review engineer to oversee the studies. Note that, rather than limiting the peer review to evaluating the end-product of the studies, it is envisaged that the peer reviewer would work closely and collaboratively with the modellers/engineers throughout the studies and so be able to 'sign-off' on the study findings, with all issues arising resolved. The exact scope of the peer reviewer's inputs will depend on the skill/experience levels of the modellers/engineers, but indicatively the following peer review inputs are envisaged (note: if the modellers/engineers are highly experienced, some of the listed inputs may not be necessary):

- Agreement on the scope of the peer review
- Agreement on matters set out in 3 – 5 below
- Interpretation of modelling results – and giving guidance to the modelling team on the scope of the modelling work to follow
- Receiving from the engineering team the proposed components of the OBS (ie as they are formulated) and giving guidance on matters arising (eg on the likes of technical and costing facets)
- Other, as may be identified as the study proceeds

In order to clarify specific areas in which the peer reviewer is expected to have inputs, these are flagged in the brief with a '#' against the work item. In this context, the modellers and/or engineers (as applicable) would pass to the peer reviewer applicable documentation (eg model run results, in an agreed format) and agree with the peer reviewer decisions on the next step(s) in the studies

3. Applicable Target Drainage System Performance Standards

All new stormwater drainage systems are required to meet the following performance standards:

- No surface flooding in up to the 1:10 year return period event (ie the stormwater system must have the capacity to achieve this), and
- No flooding of habitable floors of dwelling (and some other property categories³) in up to the 1:50 year return period event (ie as prescribed in the Building Act, 2004)

It is known that the existing South Dunedin stormwater system does not meet this standard. As a 'target', it is proposed that upgrades to the system (ie to the 'OBS') seek to meet the foregoing standards, insofar as practicable (NB: this objective to be agreed with Council). It is recognized, however, that the costs of meeting these standards through upgrading works may be prohibitive for some of the lowest-lying properties, instead meaning the need for alternative solutions (eg house-raising, local flood walls⁴, property purchase and demolition, other) – noting that judgement would be applied in establishing the 'cut-off' between the scope of the upgrading works and the resort to the likes foregoing measures. In determining the local drainage system upgrading in items 6 and 7 below, this issue should be accounted for and properties that cannot be economically protected by the upgrades reviewed under item 12.

4. Modelling

² Minimum credentials: Engineer with 25 years drainage experience (including projects comparable to South Dunedin), extensive experience in directing modelling studies and /interpreting results, proven project management skills, work in peer review roles, demonstrated ability to 'think outside the square'

³ But excluding the likes commercial and industrial buildings – refer Building Act, 2004

⁴ eg as at Radius Fulton Home Care

Prior to modelling-proper starting, in order to assess the performance of proposed drainage upgrading measures (ie whence the sizings of the corresponding components), it is proposed that the following modelling/related work should be conducted:

- i. Establish the applicable rainfall intensity-duration-frequency relationships, based on analysis of historic rainfall data (refer also vii below), for both the applicable time-of-concentrations (Tc) and longer duration storm events that will be the 'critical case' in relation, for example, to sizing the proposed detention pond and pump station capacity – refer item 9 below)#
- ii. Determine temporal rainfall patterns to be applied (including variants)#
- iii. Model the July 2015 flood event, for both the 'then-existing condition' (compare to observed extent and duration of flooding compare to observed extent and duration) and with 'mud tanks fully cleared' cases#
- iv. Model the July 2024 flood event and again compare to observed extent and duration of flooding
- v. From (iii) and (iv), review the model calibration accuracy and establish if the model in its present form is 'fit-for-purpose' (if not, agree with the peer reviewer steps to improve model calibration accuracy)#
- vi. From modelling for both the Tc and various longer duration storm events and different temporal patterns, establish the contribution that overflows from hill catchments contribute to the peak trunk pipeline flows and the extent/duration of inundation (outputs to include hydrographs showing flows in trunk drainage system and hill overflows)#^{5 6}
- vii. Identify and quantify the allowances to be made in the modeling for both climate change and sea level rise (eg apply IPCC mean estimates to the year 2100 – paper on this to be prepared and put to Council for ratification)#
- viii. Receive advice from Council planners on allowances to be made for future increases in impervious area coverage and apply as necessary

5. Interceptor

Preliminary sizing of the proposed interceptor⁷ will involve the following steps, noting the need to model both the 1:10 year and 1:50 year floods to determine which is the critical case (NB: peer review inputs will apply to most of the tasks below):

- a) Confirm the basics of proposed OBS, ie trunk 'interceptor' pipe diversion point at/near Burns/Bradshaw Sts), feeding to a pond and pump station/outfall at Forbury Park
- b) Choose the approx. route of interceptor (eg most likely down the E side of Bathgate Park, through King's High grounds and then via streets [exact route to be determined] to Forbury Park)
- c) Model with over-sized interceptor and pond/pump⁸ to assess residual under-sized pipework in the upstream and downstream catchments
- d) Move the diversion point on Hillside Rd (i) upstream and (ii) downstream⁹ [consider if there is sufficient head available to back-flow up and get it to proposed interceptor routing, or if a new pipe would be required] to assess the residual under-sized pipework in the upstream and downstream catchments and compare with results from (b); whence tentative selection of preferred diversion point¹⁰

⁵ ie to test the rationale that overflows from hill catchments do not contribute to flooding, given their 'lag time' over South Dunedin catchment runoff and the fact that overflows will only occur when the hill catchment stormwater runoff exceeds the corresponding capacity (ie in theory only towards the end of a storm)

⁶ In the event that overflows from hill catchments are found to contribute to peak flows in the main trunk pipes, longer Tc's (and different temporal patterns) will need to be considered

⁷ Firming-up the interceptor sizing must await step 6 below eg diversions, such as pumping to Orari St main, would reduce the required flow capacity), whereas the likes of duplication will increase the flow to be handled by the interceptor – and possibly also '7' below if applicable (note that firming-up the interceptor sizing is undertaken in step 10)

⁸ ie to avoid any back-up effect that a smaller pipe might cause

⁹ Moving downstream would divert a larger catchment area, potentially reducing local drainage problems in downstream catchments

¹⁰ Note: may need to be re-visited after work under 6 & 7 (ie because each of these will likely involve local drainage improvements which will likely increase the flow in the trunk pipes)

6. Upstream Catchment Local Drainage Upgrading

Identify the residual under-sized pipework in the upstream catchment (ie needing upgrades to bring performance up-to-standard), and define-model-size-cost options to resolve, for example considering#:

- Diversions (eg diverting the catchment in the vicinity of the former Carisbrook, by pumping into the existing Orari St pressure main)
- Pipe replacement or duplication
- Interceptors

Note that experienced judgement, backed by targeted modelling, should be applied to 'zero-in' on the most cost-effective local drainage upgrading options. Cost estimates, to be used in selecting the most cost-effective of the options evaluated, can be approximate only at this stage.

Further, the findings from 4(vi) will determine the need, if any, for local drainage upgrading to handle overflows from hill catchments; these should be handled as above#.

With the results from the foregoing, identify the most cost-effective package of local drainage upgrading works to meet the specified drainage system performance standard.

7. Downstream Catchment Local Drainage Upgrading

Proceed, broadly as in '6' above, to identify residual under-sized pipework in the downstream catchment (ie needing upgrades to bring performance up-to-standard), and define-model-size-cost options to resolve#. Include, as applicable, consideration of potential diversions feeding to the interceptor (pumped if necessary)#.

8. Firming-Up Interceptor

The initial work on the proposed interceptor in item '5' needs to be refined to account for the changes to the flow in the interceptor determined by the work under items '6' and '7'. The following inputs are required:

- Re-model the proposed drainage improvements with the chosen interceptor point and all upstream and downstream (if applicable) local drainage upgrading works#¹¹
- Interceptor to be sized to allow for climate change, albeit recognizing that some components of upstream & downstream local drainage improvements may be able to be delayed until climate change effects are felt

9. Detention Pond and Pump Station

The steps to be followed in establishing the layout and sizing of the detention pond, pump station and ocean outfall system are as follows (# applies to all the following items):

- Determine the indicative pond area (allow to capture say 20 mm of runoff from the contributing catchment in a say 2.5 m deep pond) and, with this, establish the preferred location within Forbury Park for such a pond (consult Council planners on the preferred location)
- Establish the tentative pond - pump station- outfall layout
- Establish the optimum detention pond maximum and minimum operating levels, considering the following cases – with analysis/costing to establish the preferred choice:
 - Partial gravity discharge (eg at times when tide levels allow)¹² and/or

¹¹ If applicable

¹² But with pumping required at times when gravity discharge is not possible

- Pond with liner (eg clay or PVC), with relief valves to control uplift from groundwater [fed to pump sump], or
 - Unlined pond, with the accumulated groundwater pumped-out immediately ahead of an incoming storm¹³
- iv. Undertake a pond capacity and pump capacity optimisation exercise, model-testing the likes of pump capacities of say 35%, 50%, 65% and 80% of the incoming peak flow from the interceptor (ie for each case, set the pump capacity and run the model to determine the corresponding storage required¹⁴); from this estimate the pump-pond costs for each case and select the least-cost case, whence the 'design' pond capacity and pump capacity
- v. For the 'design' pond capacity, firm-up the pond top and bottom operating levels, whence the pond area¹⁵; also decide on pond perimeter slope protection method (NB: consult with Council on both the preferred part of Forbury Park to be used for the pond and the 'value', if any, to be ascribed to the land to be used for the pond in costing); from the foregoing, firm-up the pond layout and engineering details
- vi. For the pump station:
- Determine the number and size of pumps (allow for 2 no spare pumps¹⁶, 1 assumed to be out-for-maintenance and the other assumed to fail during the flood) – note that there likely should be a minimum of 5 pumps total (ie to avoid the investment in the 2 spare pumps being unnecessarily high)
 - Choose pump type (ie 'conventional' with dry/wet wells, or submersible)
 - Establish the layout and size of pump station building structure
 - Identify corresponding pump station ancillaries (eg siteworks, screens, gravity bypass [if applicable], electricity supply, mechanical/electrical equipment, standby generators, etc)

10. Ocean Outfall

The steps to be followed in establishing the layout and sizing of the ocean outfall are as follows (# applies to all the following items¹⁷):

- Research best practice for ocean stormwater outfalls and select preferred arrangement (considering consenting issues)
- Determine outlet pipe route, elevations, pipe diameter, length, signage, etc
- Assess the construction considerations involved in building such an outfall
- If deemed needed, undertake modelling forecasting stormwater discharge dispersal patterns in the local ocean area

11. Bathgate Park Detention Option

Previously, engineering consultant 'Water Resources Consulting Group Ltd' developed and analysed a potential drainage improvement option involving a detention pond at Bathgate Park¹⁸ (the documentation on this is attached to this Brief). In summary, this would entail diverting stormwater from the existing trunk mains in Hillside, Macandrew and Bayview Rds to a detention pond in Bathgate Park, to be constructed by lowering the ground level by excavating approximately 0.25 m to create temporary detention storage.

The proposed scheme would 'cream off' flow from the upstream catchment and temporarily store it at Bathgate Park before releasing water back into the aforementioned mains. At each diversion point, closing a gate/valve as a flood event is occurring would cause the water level in the manhole to rise, to the point where the likes of a side-overflow weir and pipe would convey flow to the proposed detention ponds in Bathgate Park. In this manner, the upper catchment does not

¹³ Requires the implementation of a real-time flood forecasting model – eg as in attached brief for Bathgate Park detention pond scheme

¹⁴ Noting that the 'critical design case' will be for longer duration storm events than the Tc case [refer 4(vi)]

¹⁵ Unless otherwise directed by Council, allow to dispose of surplus excavated material in the unused area of Forbury Park or in Kettle Park (allow for topsoil stripping/stockpiling and replacement)

¹⁶ With bay(s) for other pump(s), as may be needed in future to handle the extra runoff that will occur due to incremental climate change

¹⁷ Possibly also warranting peer review by outfall specialist

¹⁸ Or alternatively in Tonga Park

contribute to the magnitude of the peak discharge in the existing downstream stormwater conveyance and pumping system (ie both of which are presently under-capacity).

It should be noted that diversion would occur only very infrequently during intense rainfall events (eg on average only once every 5 years or so), meaning that sporting/recreational use of the Park would be largely unaffected (ie because, in such weather, such activities are unlikely to be active). Further, the grassed surface of the park would be reinstated at the lowered level whereby the existing park uses would be unaffected. It should be noted that 'detention-type' schemes like this are a widely used method of reducing flooding in urban areas¹⁹.

Subject to Council's approval, it is proposed that evaluation and reporting on the findings of this Bathgate Park detention option be undertaken according to the attached brief. This option could be considered as either (i) a stand-alone option (albeit able to achieve only a partial improvement to the frequency of flooding); or as one component of an OBS, ie either (ii) scheme with a higher flow diversion capacity than for the 'stand-alone' scheme²⁰, or (iii) being as (i) but with OBS-type interceptor, albeit with lower flow diversion capacity due to the attenuation effect of detention#

It is proposed to report to Council on the preliminary findings from the Bathgate Park detention pond scheme (including costings, as per item 14) and receive guidance on whether a type (ii) or (iii) scheme should form part of the OBS, or as a stand-alone option. In summary, the report would recommend whether a Bathgate Park scheme [ie type (ii) or (iii)] would achieve a lower-cost OBS as compared to an OBS without Bathgate (ie in turn requiring a larger interceptor)#.

12. Residual Flooding

As noted in item 3, it is recognised, however, that the costs of meeting the target drainage performance standard in item 3 through upgrading works may be prohibitive for some of the lowest-lying properties. For these cases, the following types of alternative solutions should be investigated and costed for each of the 'problem' properties:

- House-raising
- Local flood walls²¹
- Property purchase, demolition and re-sale of section

13. Engineering/Costing

The level of detail of engineering aspects of the studies (eg pre-feasibility or feasibility-level), would be agreed in advance with Council, noting that this affects the likes of the level-of-confidence of cost estimates.

Cost estimates for each component of the OBS would be prepared according to the following methodology; whence the estimated overall cost, with costs disaggregated as required to match staged development packages (refer item '14')#:

- i. Assemble quantities schedules, to appropriate level of detail
- ii. Develop unit rates from prior comparable recent contracts, also accounting for local Construction considerations, including disruption to traffic
- iii. From (i) and (ii) compute item-by-item cost estimates
- iv. Add allowance for engineering design and supervision
- v. Add allowance for contingencies
- vi. Add allowance for price escalation (if applicable)
- vii. Include commentary on cost uncertainties

¹⁹ An example of the use of detention is Michaels Avenue Park in Auckland

²⁰ Flow diversion capacity will match that for the interceptor in item 8, albeit noting that this option (ii) is unlikely to be viable because the high inflow rate to the detention, likely making its attenuating effect only minor

²¹ eg as at Radius Fulton Home Care

14. Potential for Staged Development and Implementation Considerations

Attention will be paid to assessing potential staged development options, eg (NB: documentation on these to be accompanied by flood maps from item '16'); also accounting for prior Council committed drainage works#:

- i. Only the interceptor/pump components of the OBS
- ii. As (i), plus the most cost-effective of both the proposed upstream and downstream local drainage upgrading works
- iii. As (ii), plus the remainder of either the proposed upstream or downstream local drainage upgrading works
- iv. As (iii), plus the remainder of the proposed upstream or downstream local drainage upgrading works
- v. As above with or without Bathgate Park detention option (ie per findings from '11')
- vi. Other stages, as may be identified by the studies as worthy of consideration

Comment would also be made on prospective solutions to the corresponding impacts covering the beyond 2100 climate change and sea level rise situation (or pre-2100 where forecast allowances were to be exceeded).

15. Flood Mapping

The flood maps to be incorporated in the study report (refer item '16') would be agreed with the peer reviewer, but would likely include the following (NB: flood map formats to be agreed with the peer reviewer):

- i. Maps depicting model calibration accuracy
- ii. Maps showing flooding in both the July 2015 flood (with mud tanks all clear and operating normally) and October 2024 flood
- iii. Maps showing flooding with proposed interceptor/pump components of the OBS, for the following cases:
 - 1:10 year, 1:50 year and 2015 floods
 - Each of the foregoing for both without and with forecast climate change to the year 2100
- iv. As (iii) but for full OBS per 14
- v. Other, as may be warranted, to show food levels and durations for all commercial/industrial/other properties (ie as distinct from the residential properties which are to be protected to the design performance standard by the OBS)
- vi. Other, as may be needed to illustrate flood effects of other options (eg staged development cases)

16. Documentation

Progress reports would be prepared, in formats and to timings agreed with Council.

The main end-product of the studies would be 'Final Report' (issued initially in draft form for comment by Council, with the 'Final' version released as Council sees fit). The tentative contents of this Report would be as set out below:

Section		Coverage
Executive Summary		
1	Introduction	Brief, etc (incl limitations), peer review role
2	Background to Flooding in South Dunedin	
3	Outline of Proposed Drainage 'Overall Best Solution' (OBS)	ie comprising interceptor, upstream & downstream local drainage upgrades, pond, pump station and ocean outfall
4	Methodology	Explanation of work done and corresponding methodologies (ie broadly per this Brief)
5	Applicable Target Drainage System Performance Standard	To expand on item '4' of this Brief
6	Account to be Taken of Forecast Climate Change and Sea Level Rise	Sets out the various forecasts by others and explains the figures applied in this application

7	Bathgate Park Detention Option	As either a stand-alone option, or as one component of an OBS, ie options (i), (ii) & (iii) in item '11'
8	Proposed Components of the OBS	ie comprising interceptor, upstream & downstream local drainage upgrades, pond, pump station and ocean outfall, proposals for dealing with residual flooding
9	Cost Estimates	Summary only from item '14' work (details in Appendix D)
10	Staged Development Options and Implementation Considerations	Per item '14'
11	Flood Mapping	Per item '15'
12	Conclusions	
13	Recommendations	
Appendices		
A	References	
B	Modelling Technical Report	Contents to be agreed between the peer reviewer & modelling team
C	Flood Maps	Per item 15 in Brief
D	Detailed Cost Estimates	In spreadsheet form
E	Peer Reviewer's Report	See below

Appendix E would take the form of a stand-alone appendix written by the peer reviewer, covering the likes of the following:

- Summary of peer review inputs
- Confirmation by the peer reviewer that all of his/her significant inputs were satisfactorily dealt with by the modelling/engineering teams
- Comments on limitations of the study findings

17. Limitations

Prior to proceeding to execute the studies set out in this Brief, guidance would be sought from Council on the level-of-detail to be met by the studies and, from this, any limitations arising would be documented (eg uncertainties, modelling limitations, climate change uncertainties, prospective construction impacts [eg from dewatering], confidence levels for cost estimates, etc#.

References

South Dunedin Stormwater Modelling Stage 3B Modelling Report, Opus, for Dunedin City Council, 2017
Review of Opus' South Dunedin Stormwater Modelling Reports, Water Resources Consulting Group Ltd for Dunedin City Council, April 2018
Building Act, 2004

ATTACHMENT

CONCEPT AND BRIEF FOR BATHGATE PARK DETENTION OPTION

1. Concept

In summary, this South Dunedin drainage improvement option involves installing high-flow diversions in the Hillside, Macandrew and Bayview Rds stormwater mains to convey stormwater into either Bathgate Park or Tonga Park, which would be lowered by excavating to create temporary detention storage (refer plan below). The proposed scheme would 'cream off' flow from the upstream catchment and temporarily store it at Bathgate/Tonga Park before releasing water back into the aforementioned mains. At each diversion point, closing a gate/valve as a flood event is occurring would cause the water level in the manhole to rise, to the point where the likes of a side-overflow weir and pipe would convey flow to the

proposed detention ponds in Bathgate/Tonga Park. In this manner, the upper catchment does not contribute to the magnitude of the peak discharge in the downstream stormwater conveyance and pumping system.



- 1: Bathgate Park
- 2: Tonga Park
- 3: Tentative Hillside Rd diversion point
- 4: Tentative Macandrew Rd diversion point
- 5: Tentative Bayview Rd diversion point

Rather than divert all of the flow all of the time, the diversion system would be 'intelligent', designed to ensure that the upper catchment does not contribute to the magnitude of the peak discharge in the downstream stormwater conveyance and pumping system. This 'intelligent' aspect means that the upper catchment is only diverted in a major flood event that would otherwise overtax the system, with corresponding benefits over an unintelligent system which would require the provision of appreciably more detention storage capacity. In terms of how such a system (termed the 'FMT system') would work, when the flow rate in the stormwater mains upstream of the diversion points was forecast to lead to the peak capacity in the downstream stormwater conveyance and pumping system being exceeded, each diversion gate/valve would be activated to divert flow to the Bathgate/Tonga detention pond. Similarly, operation of the pond outlet valve would be programmed as part of the FMT System with the imperative of avoiding contributing to the magnitude of the peak in the downstream stormwater conveyance and pumping system. Further, the intelligent system means that the park only receives water in a major storm event.

This FMT System would take the form of an 'intelligent' computerised real-time stormwater system flow monitoring/telemetry system, also incorporating real-time and predicted rainfalls, a rainfall-runoff model, pipe hydraulics, details of the Bathgate/Tonga pond system, etc²². It is important to note that by using this 'intelligent' regime, the amount of storage needed in Bathgate Park to achieve a given reduction in flooding in the trunk system downstream is reduced appreciably, as compared to a divert-the-full-flow arrangement.

²² Commercial software such as DHI's 'MIKE Operations' and Deltares' FEWS are available to be customised to form the proposed FMT system.

2. Points to be Accounted for in Scheme Development/Evaluation

2.1 Concept

- a) Each diversion point (ie on Hillside, Macandrew and Bayview Rds) should be located as far downstream as possible such that the detention pond(s) can be filled by gravity without water at the diversion manhole reaching road level
- b) From each diversion point, the possibility should be considered of using the same pipeline to feed water to the pond and deliver it back to the diversion point (albeit with a bifurcation at the pond end so that the outlet can be fitted with a gate, controlled by the FMT system)
- c) It is likely that detention would be at either Bathgate Park or Tonga Park (ie not both); the relative merits of each should be evaluated in consultation with DCC, on technical and amenity/other grounds; in turn it is tentatively envisaged that the maximum pond water depth should not exceed 0.3 m
- d) The pond top water elevation would likely be near to the natural ground level (although it could potentially be slightly higher or lower, as may be dictated by hydraulics); the pond bottom water elevation would need to be such that the pond can be emptied by gravity back to the diversion points
- e) The pond would need to be lined, most likely with a polythene sheet liner, covered by topsoil (ie to allow growth of grass cover to re-establish the playing field); to control uplift from groundwater a network of pressure relief valves would be needed, with discharge from the relief valves fed to sumps connected to the pond outlet pipe downstream of the outlet valve
- f) If needed, allowance should be made for a pond overflow spillway feeding to a designated overland flow path
- g) In order to minimise costs, consideration should be given to the practicality of disposing of excavated material at Kettle Park
- h) It should be noted that the 'intelligent' component of the diversion regime means that a much lower detention storage capacity is needed than would be the case if the entire flow to be diverted at the diversion point (or, put another way, diverting the entire flow would overwhelm the detention capacity and so make it ineffective – so, to avoid this, the 'intelligent' diversion regime is applied)

2.2 Analyses

- a) Modelling will need to evaluate a wide range of storm durations and temporal patterns, to determine the 'worst case' (ie that requiring the largest pond detention volume)
- b) In recognition that the proposed FMT/flood forecasting system will not be 100% accurate, the need for conservatism will dictate that diversion would likely want to commence slightly earlier than the FMT/flood forecasting system advises; to account for this, a margin should be added to the required pond detention volume (quantum to be determined by modelling, but expected to be of the order of 20 – 30%)
- c) Modelling should evaluate the performance of this option, specifically quantifying the storm ARI standard (years) that it allows to be accommodated before surface flooding occurs, to quantify the benefit, this should be compared to the current ARI

7(2)(a)

WRCG Ltd

Draft #2 – 22/12/25

From: Cr Kate Wilson
Sent: Tuesday, 23 June 2026 8:37 p.m.
To: Councillors; Richard Saunders
Subject: Fw: Council 25 June 26 Item 7 - SDF
Attachments: - South Dunedin Stormwater Modelling - draft for consult - OPUS - June 2017 (1).pdf; brief for SD drainage OBS - v2.docx

FYI since it wasn't shared to all of us. Cheers k



Kate Wilson
Councillor



| Kate.Wilson@orc.govt.nz

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From: Andrew Simms <andrew.simms@dcc.govt.nz>
Sent: Tuesday, 23 June 2026 20:18:18
To: Cr Chanel Gardner <Chanel.Gardner@orc.govt.nz>; Cr Kate Wilson <Kate.Wilson@orc.govt.nz>; Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>
Subject: FW: Council 25 June 26 Item 7 - SDF

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From: Andrew Simms
Sent: Saturday, 20 June 2026 6:26 pm
To: Sandy Graham <Sandy.Graham@dcc.govt.nz>; Sophie Barker <Sophie.Barker@dcc.govt.nz>
Cc: Council 2025-2028 (Elected Members) <council.2025-2028@dcc.govt.nz>; David Ward <David.Ward@dcc.govt.nz>; Scott MacLean <Scott.MacLean@dcc.govt.nz>; 7(2)(a)
Subject: Council 25 June 26 Item 7 - SDF

Ms Graham and Mayor Sophie

I must add my concern to that of Cr Vandervis about the inclusion in the Supplementary Agenda of Item 7 – South Dunedin Future for the meeting of 25 June 26.

My concerns include:

1. Notwithstanding that much of the material presented has been rolled out to councillors at various workshops (some of it to previous councils), the sheer volume and complexity of the information attached to this agenda make it impossible to read, understand, and cross reference in the time available to councillors. This report encapsulates an enormous and, quite probably, unprecedented body of work completed by staff.
2. The warning attached to **Option 1 – Recommended Option** (page 19) is chilling when considered against the expenditure over two thousand, million dollars of Dunedin Ratepayers money. *“This option therefore requires proceeding with imperfect information and despite a range of information gaps, assumptions, and uncertainties, each of which carries a degree of risk”*. Staff are to be congratulated for their candidness. Any governor charged with making any part of a \$2B decision should pause to consider the implications for them of this warning.
3. **Option 3 – Alternate course as determined by Councils**. I agree fully with Cr Vandervis that this does not meet the requirements of the Local Government Act 2002, nor the precedent set in the well cited *Thorndon Quay Collective v Wellington City Council* Court of Appeal decision. It is for council staff to identify ALL practical options and to bring these to council for a decision along with the advantages and disadvantages of each option. Option 3 appears to suggest that it is up to the council to identify an alternative option for themselves. This option is uncosted and is not accompanied by any analysis of the advantages and disadvantages for Option 3.

In my view, Option 3 should be a baseline engineering solution based on that proposed by Opus in 2017 (attached) . Without a baseline engineering solution neither councillors or the community have anything to measure the proposed SDF options against. The ability to weigh up the solutions proposed by Opus, and others since, against the SDF options on a cost versus benefit is an essential missing piece in our ability to make a good decision. Significantly, the Opus solutions do not require the mass relocation of 1100 or more homes, the cost of which alone will exceed \$1B before any engineering work is done. The extensive modelling work done to produce the SDF options will allow the establishment of a baseline engineering model to be done quickly and inexpensively.

A fully costed engineering solution should be a component of the SDF Statement of Proposal that goes to the public for consultation. A far lower cost, far less invasive, shorter-term solution is a valid option that should presented and considered. If not, then the SDF Consultation risks not being consultation on three options, but instead on three versions of the same option.

The quantum of ratepayers money, alongside the financial and emotional implications of relocating no fewer than 1100 homes ensures that every move the council makes will be intensely scrutinised and the likelihood of future review seems inevitable.

I look forward to your consideration and advice

Andrew

Andrew Simms

Councillor / Co-Lead Economic Development

P 03 477 4000 | **M** 0274 346 394 | **E** andrew@simms.co.nz

Te Kaunihera a Rohe o Ōtepoti - Dunedin City Council

50 The Octagon, Dunedin

PO Box 5045, Dunedin 9054

New Zealand.

www.dunedin.govt.nz

From: Richard Saunders
Sent: Tuesday, 23 June 2026 9:04 p.m.
To: Councillors
Subject: FW: Response to South Dunedin matters
Attachments: Response to elected members regarding SDF.docx; DCC OPN - SDF Supplementary Agenda Report - 23.6.2026(44201839.4).pdf

Evening Councillors

Sorry for the late email. Thanks to Kate for circulating the previous email.

I am forwarding you an explainer which was sent to DCC Councillors late today, along with some legal advice which has been shared widely and can be made public. It responds to a number of the questions that have been raised over the last week.

I appreciate there is a lot of material to digest as there has been all the way through the South Dunedin programme. Jonathan will be present tomorrow along with Jean-Luc, Tom and myself to answer further questions. If you would like either of the attachments printed tomorrow for ease of reference please let me know.

Regards

Richard



Richard Saunders

Chief Executive
 Executive Leadership

7(2)(a) | Richard.Saunders@orc.govt.nz

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How should Otago's pests be managed?

Have your say!

Feedback closes 8 July

Kia ora Councillors

Further to my e-mail this morning, I set out below a substantive response to the various matters that have been raised by Councillors since the release of the South Dunedin Future report last week.

Overview:

1. The report to Council was released as a supplementary agenda at 9.26am last Wednesday, 17 June 2026. Although the report was called a “supplementary agenda”, it was released in advance of the full agenda. The use of the word “supplementary” is just a function of the computer system. The report was released well ahead of the statutory timeframes because staff wanted to give you more than a week to read the report.
2. From the outset, the South Dunedin Future programme has been run as an open and transparent process which is why this part of the process, was always intended to be in public. Transparency and openness have been at the centre of this project from its outset.
3. The SDF programme has been delivered over several years, based on a programme plan and programme strategy approved by Councils, and with regular progress reporting and public consultation. Since 2021, 12 papers have been presented to Councils, covering updates and decisions. There has been a clear Council mandate for this work and staff have consistently implemented decisions of Council. The current stage of the SDF process has been well signalled, Councillors received a report in September 2025 outlining the scope of work for the current stage, and Councillors were briefed on progress in March and June ahead of public release last week.
4. The 25 June report to Council sets out three options:
 - a) Option One - Does Council want to consult the community on the Three Shortlisted Approaches and the status quo? Or
 - b) Option Two - Does the Council want to defer consultation and undertake further work? Or
 - c) Option Three - Does Council want to do something else?
5. Simpson Grierson has advised that:
 - a) Given the background context to the SDF programme, and the scope of the report to the Council, the options presented in the current Report satisfy the requirements of section 77 of the Local Government Act 2002; and
 - b) Subject to the Council’s views on initiating consultation, it would be open for Council to decide to consult on the status quo and the Shortlisted Futures options (Futures 3, 4 and

5), and it could also decide to consult on other options (including options that have previously been identified)

6. To be clear:

- a) Option two of the options listed in the 25 June report to Council gives Council the choice to ask for further work on other options (eg a “baseline engineering solution”).
- b) Option three of the options listed in the June 25 Report gives Council the choice to broaden the scope of consultation if it wants to do that (eg to add further futures back in for consultation although it would need to have a reasonable basis for including specific futures).

7. The proposed process from here is as follows:

- a) Council to consider the Council report on Thursday 25 June
- b) If Council decides to consult (and decides what to consult on), then staff will prepare a further report to Council attaching draft consultation material. **Note:** This will be called a “pre-engagement process” as it will be pre-engagement ahead of the LTP.
- c) Staff will carry out a pre-engagement process and report back to Council on the results of that pre-engagement. Council will then decide on what, if anything, it wants worked up as a “Preferred Option” for formal consultation via a special consultative process via the LTP.
- d) The LTP will consult on the Preferred Option vs other alternative options for South Dunedin. This consultation will be city-wide as part of the LTP process.
- e) The draft LTP budget will incorporate Council’s preferred option as the base budget has to have an assumption. This will enable the community to assess the financial impact and trade-offs of Council’s preferred option against all the other items of expenditure in the draft LTP.

Other matters to note:

8. Regarding the proposal for a baseline engineering solution based on that proposed by Opus in 2017, I note the following:

- a) Opus (Opus International Consultants) was acquired by WSP in October 2027. WSP is one of the three consultancies working on the SDF programme (along with BECA and Tonkin & Taylor). The ‘Opus Report 2017’ has informed SDF work to date, but the shortlisted Futures

represent the consultant team's *latest* advice based on a wide range of additional science, research, and modelling undertaken since 2017.

- b) Cr Simms attached a document that was a concept developed by Mr Murray Menzies, which explores a particular project/approach referenced in the Opus Report. This is typically presented as an interim infrastructure measure that could be undertaken to alleviate flooding in South Dunedin in the short term.
- c) A 'baseline engineering approach' is already incorporated into the three shortlisted futures, each of which includes an initial focus on stormwater and groundwater engineering, with estimated costs of between \$358m-\$363m (for stormwater and groundwater networks, pump stations, and outfalls) in the short term (2025-50). As noted above, this is based on the latest information, modelling, and advice. Any decision to commit to those works would only be taken by Council after consultation, potentially as part of the next LTP.
- d) The opus Report of 2017 represented a response to one of the vulnerabilities in South Dunedin – pluvial flooding and was reflective of the knowledge and analysis techniques of the time. We now know that we also need to address groundwater which the updated reports do.
- e) Adopting an infrastructure-only approach to managing long term flood risk in South Dunedin (Future 2) was covered in the previous stage of the SDF programme, assessed along with other options, and did not progress to the shortlist stage. This has all been reported to Council. As a result, Future 2 was not developed to the extent of the Futures 3, 4 and 5. However, this could be done, if directed by Council – this is essentially Option 2 in the Council paper (i.e. undertake more technical work before consultation).

9. Regarding Cr Galer's e-mail complaint about the workshop, I note that:

- a) Staff are aware of the advice from the Office of the Ombudsman concerning workshops and, based on that advice. Like the ORC, DCC are currently taking part in a review of workshop processes by the Ombudsman. While we hold very few workshops in non-public, where we do, senior staff consider what reasons might exist for the public to be excluded.
- b) In this case, there was justification for holding the briefing in non-public. The reasons were:
 - s7(2)(d) - avoid prejudice to measures protecting the health or safety of members of the public;
 - s7(2)(e) - avoid prejudice to measures that prevent or mitigate material loss to members of the public;
 - s7(2)(g) - maintain legal professional privilege; and
 - s17(d) - information will soon be publicly available.

10. I have attached the workshop form completed in advance of the workshop for Councillors information. While we do publish grounds for holding workshops in non-public, we don't currently publish the assessment forms on the website but I will review whether we should in the future.
11. Regarding the use of Simpson Grierson, staff chose to seek external legal advice to avoid any perception of a lack of independence. While Council's inhouse legal team does most of Council's legal work, they brief matters out when this is considered appropriate based on a range of criteria. Simpson Grierson have provided advice at various stages of this programme and are considered one of NZ's pre-eminent local government law firms.
12. Regarding the reference by some elected members to the report being "climate alarmism" along with indulging Maori, I reject these assertions and find it discourteous to iwi, staff, and scientific consultants.
13. The issues highlighted re s82A of the LGA are irrelevant.
14. I would note as an aside, the use of AI for the legal challenge has put Council to considerable time and expense and has found no legal irregularity with the report.
15. On the basis of everything outlined in this response and in the attached legal advice, the item on South Dunedin will remain on the agenda for the meeting on 25 June 2026.

From: Richard Saunders
Sent: Wednesday, 24 June 2026 9:00 a.m.
To: Hilary Calvert
Cc: Cr Kevin Malcolm
Subject: RE: Council 25 June 26 Item 7 - SDF

Thanks Hilary

Did you get the attachment I sent all Councillors last night? It was an explanation from Sandy about the historic Opus work. I will print you a copy for when you get in.

Cheers



Richard Saunders

Chief Executive
 Executive Leadership

7(2)(a) | Richard.Saunders@orc.govt.nz

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From: Hilary Calvert <hcalvert@xtra.co.nz>
Sent: Wednesday, 24 June 2026 8:56 am
To: Richard Saunders <Richard.Saunders@orc.govt.nz>
Cc: Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>
Subject: Fwd: Council 25 June 26 Item 7 - SDF

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---- FYI

Sent from my iPad

Begin forwarded message:

From: Andrew Simms <andrew.simms@dcc.govt.nz>
Date: 23 June 2026 at 8:15:54 PM NZST
To: Hilary Calvert <hcalvert@xtra.co.nz>

Subject: FW: Council 25 June 26 Item 7 - SDF

Good to talk Hilary

Please see rationale below.

Engineering solution attached

Cheers

Andrew



If this message is not intended for you please delete it and notify us immediately; you are warned that any further use, dissemination, distribution or reproduction of this material by you is prohibited..

From: Andrew Simms

Sent: Saturday, 20 June 2026 6:26 pm

To: Sandy Graham <Sandy.Graham@dcc.govt.nz>; Sophie Barker <Sophie.Barker@dcc.govt.nz>

Cc: Council 2025-2028 (Elected Members) <council.2025-2028@dcc.govt.nz>; David Ward

<David.Ward@dcc.govt.nz>; Scott MacLean <Scott.MacLean@dcc.govt.nz>; 7(2)(a)

7(2)(a)

Subject: Council 25 June 26 Item 7 - SDF

Ms Graham and Mayor Sophie

I must add my concern to that of Cr Vandervis about the inclusion in the Supplementary Agenda of Item 7 – South Dunedin Future for the meeting of 25 June 26.

My concerns include:

1. Notwithstanding that much of the material presented has been rolled out to councillors at various workshops (some of it to previous councils), the sheer volume and complexity of the information attached to this agenda make it impossible to read, understand, and cross reference in the time available to councillors. This report encapsulates an enormous and, quite probably, unprecedented body of work completed by staff.
2. The warning attached to **Option 1 – Recommended Option** (page 19) is chilling when considered against the expenditure over two thousand, million dollars of Dunedin Ratepayers money. *“This option therefore requires proceeding with imperfect information and despite a range of information gaps, assumptions, and uncertainties, each of which carries a degree of risk”*. Staff are to be congratulated for their candidness. Any governor charged with making any part of a \$2B decision should pause to consider the implications for them of this warning.
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others since, against the SDF options on a cost versus benefit is an essential missing piece in our ability to make a good decision. Significantly, the Opus solutions do not require the mass relocation of 1100 or more homes, the cost of which alone will exceed \$1B before any engineering work is done. The extensive modelling work done to produce the SDF options will allow the establishment of a baseline engineering model to be done quickly and inexpensively.

A fully costed engineering solution should be a component of the SDF Statement of Proposal that goes to the public for consultation. A far lower cost, far less invasive, shorter-term solution is a valid option that should be presented and considered. If not, then the SDF Consultation risks not being consultation on three options, but instead on three versions of the same option.

The quantum of ratepayers money, alongside the financial and emotional implications of relocating no fewer than 1100 homes ensures that every move the council makes will be intensely scrutinised and the likelihood of future review seems inevitable.

I look forward to your consideration and advice

Andrew

Andrew Simms

Councillor / Co-Lead Economic Development

P 03 477 4000 | **M** 0274 346 394 | **E** andrew@simms.co.nz

Te Kaunihera a Rohe o Ōtepoti - Dunedin City Council

50 The Octagon, Dunedin

PO Box 5045, Dunedin 9054

New Zealand.

www.dunedin.govt.nz

From: Richard Saunders
Sent: Thursday, 25 June 2026 8:34 a.m.
To: Cr Alan Somerville; Governance
Subject: RE: SDF

Kia ora Alan

13) That a South Dunedin engineered flood protection system be designed and costed for inclusion in a future report for public consultation, this work is to be undertaken in partnership with the Dunedin City Council.

14) Delegates the Chair in consultation with the CEO the ability to approve minor modifications to the consultation topics to align with decisions made by Dunedin City Council.



Richard Saunders

Chief Executive
 Executive Leadership

7(2)(a) | Richard.Saunders@orc.govt.nz

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From: Cr Alan Somerville <alan.somerville@orc.govt.nz>
Sent: Thursday, 25 June 2026 8:21 am
To: Governance <Governance@orc.govt.nz>; Richard Saunders <Richard.Saunders@orc.govt.nz>
Subject: SDF

Kia ora

Could you please circulate the added recommendations to the SDF paper yesterday? I didn't copy them down at the time.

Kā mihi
 Alan



Alan Somerville
 Councillor

From: Richard Saunders
Sent: Thursday, 25 June 2026 5:52 p.m.
To: Councillors
Subject: Media release South Dunedin
Attachments: orc-logo-png-125px_6ba7d464-04aa-4e72-a0b6-65e3bcc6d940.png; facebook-logo-blue-circle-large-transparent-png_4b54f44a-c12d-4aaf-a929-03b16184c327.png; linkedin-circle-logo-for-signature_1a487568-4962-4633-a528-10dd42d6893d.png; youtube-circle-logo-for-signature_cd5605db-dfce-4a18-bca9-cb6ee6f79ea3.png; rpmpfeedbackemailsfinal260608_74788d21-849f-4537-a0ed-b2d4908fd6ed.jpg; Media release - South Dunedin Future programme to include more options.docx

Evening Councillors

A late addition to the media notes for today.

Please find attached a joint release on South Dunedin following decisions made at DCC today.

Cheers

Richard

Richard Saunders
 Chief Executive
 Otago Regional Council

Sent from my iPhone



Richard Saunders

Chief Executive
Executive Leadership

7(2)(a) | Richard.Saunders@orc.govt.nz

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From: 7(2)(a)
Date: 25 June 2026 at 5:47:33 PM NZST
To: Richard Saunders <Richard.Saunders@orc.govt.nz>
Subject: Clean copy MR



MEDIA RELEASE

South Dunedin Future programme to include more options

Dunedin (Thursday, 25 June 2026) – The South Dunedin Future programme will widen its focus to include a previously disregarded engineering flood prevention option in the next stage of public consultation, following direction from Otago Regional and Dunedin City councillors.

The decisions were taken at meetings of the Otago Regional Council on Wednesday and the Dunedin City Council today.

As a result, staff from both organisations – who are partners in the SDF programme – will spend the next few months detailing the engineering option, which will then be included in public consultation material alongside the status quo and three options already outlined.

The decisions mean a revised consultation programme will be presented to both Councils later this year, before the public are consulted on the revised shortlist of options.

DCC Chief Executive Sandy Graham says the public will be able to have their say on all the options as part of the next stage of public consultation.

“Staff are here to carry out the work as determined by Councillors, and as a result of this week’s decisions we’ll be working as quickly as we can – in collaboration with our partners at the ORC – to deliver the updated information to support the revised shortlist options.

“It’s important the information we put to the community is robust, so they can have an informed say, Councillors can make good decisions, and the final result delivers the best possible outcome for South Dunedin.”

ORC Chief Executive Richard Saunders says “ORC’s councillors are committed to continuing to work with communities to look at the best options for the long-term challenges facing South Dunedin.”

Ms Graham says the decisions taken this week, and the additional work now required, may also cause delays to parts of the DCC’s 10 year plan budget process. This means meetings expected to be held in December may occur in the new year.

More information: [South Dunedin Future - Dunedin City Council](#)

ENDS

From: Cr Andrew Noone
Sent: Monday, 29 June 2026 10:28 a.m.
To: Cr Kevin Malcolm
Subject: Re: DCC interpreted request of ORC for South Dunedin

Was hijacked by "the sky is falling" army!



Andrew Noone

Councillor

Elected Council Representative

[+64274301727](tel:+64274301727)

From: Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>
Sent: Monday, 29 June 2026 08:32:28
To: Cr Andrew Noone <Andrew.Noone@orc.govt.nz>
Subject: Re: DCC interpreted request of ORC for South Dunedin

Why didn't the DCC I act the Opus plan?



Kevin Malcolm

Deputy Chairperson

Elected Council Representatives

[+64278383003](tel:+64278383003)

From: Cr Andrew Noone <Andrew.Noone@orc.govt.nz>
Sent: Monday, 29 June 2026 07:22:36
To: Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>; [REDACTED] Cr Gary Kelliher
 <Gary.Kelliher@orc.govt.nz>; hillary.calvert@orc.govt.nz <hillary.calvert@orc.govt.nz>
Subject: Re: DCC interpreted request of ORC for South Dunedin

Good morning [REDACTED]
 Thanks for your email.

I checked out the video of DCC meeting.

ORC resolution " That a South Dunedin engineered flood protection system be designed and costed for inclusion for consultation"

DCC resolution " Option 2 Pipes and Pumps" , DCC also passed a resolution "noting the Pipes and Pumps option is to incorporate the ORC resolution".

What would be logical is for any existing technical information such as the 2017 OPUS report commissioned by the DCC that concluded an engineered stormwater upgrade would include catchment splitting into two sub-

catchments by installing additional pipe networks, pipe upgrades, creating detention ponds/areas in parks to address flooding be used as a starting point. An update on costings would be required and maybe some additional technical data as well however as you know the Sth D flooding issue has been well researched.

The OPUS report on South Dunedin was commissioned to assess natural hazard risks and evaluate potential engineered solutions to elevate stormwater and flooding challenges.

Kind regards
Andrew



Andrew Noone
Councillor

+64274301727 | Andrew.Noone@orc.govt.nz

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From: Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>

Sent: Friday, June 26, 2026 10:22 PM

To: 7(2)(a) Cr Gary Kelliher <Gary.Kelliher@orc.govt.nz>;
hillary.calvert@orc.govt.nz <hillary.calvert@orc.govt.nz>; Cr Andrew Noone <Andrew.Noone@orc.govt.nz>

Subject: Re: DCC interpreted request of ORC for South Dunedin

7(2)(a)

I'll do some thinking over the next while.

It is very disappointing when so called experts head to so called natural base lines and natural solutions when so many of our systems are highly modified and it is an absolute nonsense to return to a natural state.

All populations rely on pipelines to bring water and take water away.
Why can't South Dunedin?

Strange influences at play

Regards
Kevin



Kevin Malcolm
Deputy Chairperson

+64278383003 | Kevin.Malcolm@orc.govt.nz

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From: 7(2)(a)

Sent: Friday, June 26, 2026 10:08 PM

To: Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>; Cr Gary Kelliher <Gary.Kelliher@orc.govt.nz>;
hillary.calvert@orc.govt.nz <hillary.calvert@orc.govt.nz>

Subject: DCC interpreted request of ORC for South Dunedin

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OUT OF SCOPE

A large, solid grey rectangular area covers the majority of the lower half of the page, indicating that the content has been redacted. A large, diagonal watermark "LGOIMA SR.31780 RELEASE" is visible across the redacted area.

From: Cr Gary Kelliher
Sent: Tuesday, 30 June 2026 1:20 p.m.
To: Cr Hilary Calvert (ORC); Cr Andrew Noone
Subject: Fw: Consultation changes



Gary Kelliher

Councillor

Elected Council Representative

From: Cr Gary Kelliher <Gary.Kelliher@orc.govt.nz>
Sent: Tuesday, June 30, 2026 1:19 PM
To: 7(2)(a)
Subject: Re: Consultation changes

7(2)(a)

Thanks for your email.

I seconded Andrew Noone's motion because as the discussion went on and having listened to the community present to us in public forum, I could see a gaping hole in their decision to be made on the 3 futures. What was missing was what would it cost if no houses were to be removed, and if DCC just had to provide the necessary pipes and pumps to make stormwater functional as it should be in any municipal area anywhere. The pipes and pumps aspect included in the 3 futures was only associated with those futures and the changes they made, 1000+ houses gone and supposedly open waterways. That is not comparable to the pipes and pumps required with no houses gone.

I felt it was totally unfair on the people of South Dunedin to have to consider their future without that to compare. And if I was in their shoes I would be immediately wanting that too. We all know too that consultation processes brings in people directly affected and people who aren't directly affected, eg from outside South Dunedin. But embedding any of those 3 futures sets in place an impact on property values and residents ability to consider their future. As councillors we need to ensure the residents make fully informed decisions for their future, as they live with the outcome directly, as opposed to everyone else.

Hope this makes sense. Happy to explain further if needed.

Cheers

Gary



Gary Kelliher
Councillor

| Gary.Kelliher@orc.govt.nz

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From: 7(2)(a)

Sent: Tuesday, 30 June 2026 11:06:05

To: Councillors <Councillors@orc.govt.nz>; Council 2025-2028 (Elected Members) <council.2025-2028@dcc.govt.nz>; Lee Vandervis <lee@vandervision.co.nz>

Subject: Consultation changes

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Morning,

On the changes to the councils' consultation options for the South Dunedin Future programme:

Ms Barker told us yesterday that "it appears the ORC did not ask the question about what would be the impact of them adding another option, which is likely to cost hundreds of thousands of dollars for our council".

I wondered if you had a brief comment on this.

What do you make of these costs? Should they be shared between councils?

Did regional councillors understand the impact of their decision last week?

Ms Barker said it was clear "pipes and pumps" were incorporated into each of the three shortlisted options initially proposed for consultation.

Will the regional council's engineered flood protection system be a long-term measure for South Dunedin, like the other futures proposed?

There also been some discussion of the ongoing governance structure of the programme, including introducing a joint-committee of some kind - do you have a view on this?

My deadline is 3pm,

Kā mihi,

7(2)(a)

7(2)(a)

Reporter

Otago Daily Times

M: 7(2)(a)

P: (03) 477 4760 7(2)(a)

A: 52 Stuart Street

PO Box 517

Dunedin

9016

W: www.odt.co.nz

 **Otago Daily Times**

From: Cr Andrew Noone
Sent: Tuesday, 30 June 2026 3:20 p.m.
To: Cr Hilary Calvert (ORC); Cr Gary Kelliher
Subject: Fw: Consultation changes



Andrew Noone

Councillor

Elected Council Representative

[+64274301727](tel:+64274301727)

From: Cr Andrew Noone <Andrew.Noone@orc.govt.nz>
Sent: Tuesday, June 30, 2026 2:30 PM
To: 7(2)(a)
Subject: Re: Consultation changes

7(2)(a)

The question about the financial impact wasn't discussed as the driver at this point is to ensure the Sth Dunedin community were given all options. The 2017 Opus estimate talked about 120 million (clearly that figure is higher now) to split the catchment installing additional pipes, pipe upgrades and creating detention ponds. Option 2 potentially could deliver a higher level of service, faster and would be much much more affordable.

A governance structure that includes a joint committee certainly would be worth considering.



Andrew Noone
Councillor

[+64274301727](tel:+64274301727) | Andrew.Noone@orc.govt.nz

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From: 7(2)(a)
Sent: Tuesday, 30 June 2026 11:06:05
To: Councillors <Councillors@orc.govt.nz>; Council 2025-2028 (Elected Members) <council.2025-2028@dcc.govt.nz>; Lee Vandervis <lee@vandervision.co.nz>
Subject: Consultation changes

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Reporter

Otago Daily Times

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W: www.odt.co.nz

 **Otago Daily Times**

From: Cr Michael Laws
Sent: Tuesday, 30 June 2026 7:38 p.m.
To: Cr Hilary Calvert (ORC); Richard Saunders; Councillors
Subject: Re: SDFP governance

Can I just say Hilary, this is what governance looks like and well done to my ORC councillors for questioning the bureaucratic narrative on this: WE need to be satisfied that the process we are in is correct and robust. I would hate the ORC to leave this to an often dysfunctional DCC. There are anything from 1100-1700 homes involved and thousands of people affected.

Make haste, slowly. is my advice. The right answer not the quick answer.

Cheers

Michael



Michael Laws
Councillor

| Michael.Laws@orc.govt.nz

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From: Cr Hilary Calvert (ORC) <Hilary.Calvert@orc.govt.nz>

Sent: Tuesday, 30 June 2026 09:40:29

To: Cr Gretchen Robertson <Gretchen.Robertson@orc.govt.nz>; Richard Saunders <Richard.Saunders@orc.govt.nz>; Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>; Councillors <Councillors@orc.govt.nz>

Subject: Re: SDFP governance

Thanks Gretchen. You make some good points.

You are of course much more knowledgeable about the current arrangements around SDF than I.

I have asked Richard to help me understand more about the structure. Also about what is behind the difference between being reassured that the pipes and pumps plan for the next 25 years is essentially an update of the Opus (as they then were) plan from some years ago and the idea now on the website of SDF and our council that we are now expecting the canvassing of a previously discarded engineering plan which will now take hundreds of dollars and over 4 months to create.

It is not unheard of for arrangements to be made between councils where one takes the lead, especially in cases such as this where it is DCC ratepayers who are for the most part expected to foot the bill.

There may be other councillors who also wish to understand the arrangements better, so perhaps you could email us with what the arrangements are, including the arrangements between all 3 partners?

The ODT came to Sophie and I for particular comment, which I gave to the best of my knowledge specifically not suggesting our council has any position.

I apologise if you felt out of the loop. In this case I asked a couple of councillors who are far more experienced than

myself around whether it is usual to have governance in such groups and would they expect that to be a good idea.

I considered the ODT questions to be around governance thoughts, having been addressed to Sophie and myself and being what do you think questions.

I did not think of them as portfolio questions but I understand how you would feel I had left out checking with you 2.

Thanks for sharing your concerns.

Hilary



Hilary Calvert

Chairperson

Elected Council Representatives

From: Cr Gretchen Robertson <Gretchen.Robertson@orc.govt.nz>

Sent: Monday, 29 June 2026 15:10:10

To: Cr Hilary Calvert (ORC) <Hilary.Calvert@orc.govt.nz>; Richard Saunders <Richard.Saunders@orc.govt.nz>; Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>; Councillors <Councillors@orc.govt.nz>

Subject: Re: SDFP governance

Hi Hilary,

I've had a look at the ODT questions.

I don't like being confrontational but also don't think saying nothing is always helpful either so I'll respond and hope it's of some help as I'm keen to ensure we maintain good process and avoid division in the way we operate at ORC.

Firstly I want to note that any suggestion of a shift in governance or the ORC stepping back to a "time to time support" role was not something I was aware of, nor has it been discussed or agreed by Council.

Gary Kelliher and I are the portfolio co-leads for Science and Resilience.

More generally, I don't think it is optimal for the Chair to be outlining potential changes to ORC's role or contribution in correspondence of this nature without prior engagement or clarification from Council or relevant portfolio leads. It risks creating uncertainty about ORC's role and contribution in a space where we are already actively engaged, including significant resilience work such as the Clutha Delta programme.

The current South Dunedin Futures arrangements are a joint programme between councils and any discussion about alternative governance or one council taking a lead role without the other is not something Council has considered or agreed.

I'm sure staff or relevant portfolio leads would also be very happy to talk through roles and current arrangements if there is uncertainty, rather than it being framed publicly as an attempt to understand our role with our communities.

I think it would have been preferable for internal testing and advise (although I note some councillors may have discussed), before being raised externally or in correspondence with media. It's an important programme.

Thank you for your consideration of these points,

Gretchen



Gretchen Robertson
Councillor

| Gretchen.Robertson@orc.govt.nz

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From: Cr Hilary Calvert (ORC) <Hilary.Calvert@orc.govt.nz>

Sent: Monday, 29 June 2026 14:22:54

To: Richard Saunders <Richard.Saunders@orc.govt.nz>; Cr Kevin Malcolm <Kevin.Malcolm@orc.govt.nz>; Councillors <Councillors@orc.govt.nz>

Subject: Fw: SDFP governance



Hilary Calvert

Chairperson

Elected Council Representatives

From: Cr Hilary Calvert (ORC) <Hilary.Calvert@orc.govt.nz>

Sent: Monday, June 29, 2026 2:21 PM

To: 7(2)(a); Sophie Barker <sophie.barker@dcc.govt.nz>

Subject: Re: SDFP governance

7(2)(a)

I find the arrangement underpinning the South Dunedin Futures programme clunky.

The option of a joint overseeing group which has a small group of councillors from both councils involved has attractions for some of our councillors.

I am also canvassing the idea of the 2 councils being briefed together.

In the alternative the DCC could take charge and responsibility for the project, with any help the ORC can provide from time to time as required.

I understand that the current arrangements involve a partnership between the councils and a partnership between this partnership and mana whenua.

I am attempting to understand more around what the current arrangements involve.

Once the current arrangements are understood fully by the current ORC councillors we may form a view as to whether changes could usefully be made.

The papers presented to the ORC describe as I understand them the current funding decisions involving 3 of the 10 priority actions for the short to medium term being currently in the DCC LTP.

The DCC can advise whether the adding in of a further short to medium term option for consultation will hold up the beginning of the planning or indeed the work towards solutions for the South Dunedin issues raised by the SDF team.

Kind regards,
Hilary



Hilary Calvert
Chairperson



| Hilary.Calvert@orc.govt.nz

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From: 7(2)(a)

Sent: Monday, 29 June 2026 11:22:24

To: Cr Hilary Calvert (ORC) <Hilary.Calvert@orc.govt.nz>; Sophie Barker <sophie.barker@dcc.govt.nz>

Subject: SDFP governance

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Morning,

I'm working on an article looking at the governance of the South Dunedin Future programme.

At Thursday's meeting, Ms Graham said if the DCC's decision had not taken account of the ORC's decision to include a fourth consultation option, there would have been a delay anyway to navigate ambiguity between the councils' positions.

She also said a challenge of such a long-term piece of work was designing a programme that "doesn't rely on a three-year cycle, either locally or central government".

Mr Rowe said it was not possible for the regional councillors to be provided advice about the impact of their decision at Wednesday's meeting, and the impact was determined following.

It was the first time one council had made a decision slightly different to a decision put to the other council, he said. Ms Graham said this could raise consideration of future ongoing governance of the programme, whether or not the current arrangements were best or if, for example, a joint committee would be more suitable.

What do you make of this?

Do you have any reflections on the programme's governance following the councils' decisions last week?

Would you support SDFP decision-making by a joint committee, rather than both full councils? What

would be the make-up of any such committee?

What do you make of the delay and its impact on the councils' long-term planning?

Anything else to add?

My deadline is 4pm,

Kā mihi,

7(2)(a)

7(2)(a)

Reporter

Otago Daily Times

M: 7(2)(a)

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LGOIMA SR.31780 RELEASE

From: Hilary Calvert <hcalvert@xtra.co.nz>
Sent: Wednesday, 1 July 2026 1:15 p.m.
To: Councillors
Subject: Fwd: South Dunedin Futures programme.

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---- FYI
 Sent from my iPad

Begin forwarded message:

From: Hilary Calvert <hcalvert@xtra.co.nz>
Date: 1 July 2026 at 1:01:58 PM NZST
To: Richard Saunders <Richard.Saunders@orc.govt.nz>
Subject: Re: South Dunedin Futures programme.

Many thanks Richard.

From what I understood you to say there will be a first 25 years plan which would be a stage 1 for the later 3 possible options and a first 25 years plan which would be a stand alone plan which does not assume further options?

I understand the South Dunedin group who are concerned are preparing an equivalent stand alone plan for comparison.

Cheers,
 Hil
 Sent from my iPad

On 30 Jun 2026, at 8:55 AM, Richard Saunders <Richard.Saunders@orc.govt.nz> wrote:

Hi Hilary

I will get the team started on this but it will take some time. There priority is now working through the updated future to ensure consultation can occur.

We will aim for something by the end of July.

Richard

[<orc-logo-png-125px_6ba7d464-04aa-4e72-a0b6-65e3bcc6d940.png>](#)



Richard Saunders

**Chief Executive
 Tumu Whakarae**

Executive Leadership

7(2)(a) | Richard.Saunders@orc.govt.nz

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[Give your feedback on the Regional Pest Management Plan](#)

From: Hilary Calvert <hcalvert@xtra.co.nz>
Sent: Monday, 29 June 2026 9:28 am
To: Richard Saunders <Richard.Saunders@orc.govt.nz>
Subject: South Dunedin Futures programme.

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South Dunedin Futures programme.

Thinking about the awkwardness of where we got to last week in moving forward with consultation I wonder whether we can do better as we continue toward consulting further.

Some more facts it may be useful to have:

1. There seems to be dissonance around whether the short term proposals (para 22 of the report etc over the 2025 to 2050 time frame) are in essence the Opus report from some years ago updated with more recent information or something else. If they are indeed an update and they are the basis of all of the proposed futures, how can it take around 4 months to tease them away from the longer term futures? Are they contained in a specific technical report, and if so where is it please?
2. What is the relationship between the work intended to be carried out and the work proposed in the DCC LTP? Would the proposals change after the 4 month work in the short term beginning work?
3. Para 15 talks of tender processes for the consultant group to support delivery of the reports. Are the contracts for these available?
4. Para 16 and 17 talks of other external technical assistance. Were these advices tendered? What contracts exist for this advice? What is the advice?
5. Is there a memo of understanding or whatever as the basis for the partnerships

between our 2 councils and between SDF and Aukaha?

6. What information has SDF around the consultation/ feedback so far, bearing in mind the design principles have been developed through technical analysis and feedback?
7. What mana whenua values and community feedback are referred to in 25?
8. Where is the SDF budget to be found?
9. Could you point me to the stormwater modelling report where 10 key initiatives are described, together with which of the 3 are currently approved for delivery by the DCC and when they are approved to be delivered.
10. How is the work being done by SDF being managed/ overseen? It appears to have no governance from either council involved. Could it have?

Cheers,
Hil

Sent from my iPad



LGOIMA SR.31780 RELEASE