Council Meeting Agenda - 7 December 2022

Meeting will be held in the Council Chamber at Level 2, Philip Laing House
144 Rattray Street, Dunedin
ORC YouTube Livestream

Members:

Cr Cr Gretchen Robertson, Chairperson	Cr Tim Mepham
Cr Lloyd McCall, Deputy Chairperson	Cr Andrew Noone
Cr Alexa Forbes	Cr Bryan Scott
Cr Gary Kelliher	Cr Alan Somerville
Cr Michael Laws	Cr Elliot Weir
Cr Kevin Malcolm	Cr Kate Wilson

Senior Officer: Pim Borren, Interim Chief Executive

Meeting Support: Liz Spector, Governance Support Officer

07 December 2022 11:00 AM

Agenda Topic — Page

1. APOLOGIES

No apologies were received prior to publication of the agenda.

2. PUBLIC FORUM

Requests to speak should be made to the Governance Support team on 0800 474 082 or to governance@orc.govt.nz at least 24 hours prior to the meeting, however, this requirement may be waived by the Chairperson at the time of the meeting.

2.1 Public Forum - Free Public Buses

David Bainbridge-Zafar wishes to address the meeting concerning free public buses.

3. CONFIRMATION OF AGENDA

Note: Any additions must be approved by resolution with an explanation as to why they cannot be delayed until a future meeting.

4. DECLARATION OF INTERESTS

Members are reminded of the need to stand aside from decision-making when a conflict arises between their role as an elected representative and any private or other external interest they might have.

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The Council will consider minutes of previous Council Meetings as a true and accurate record, with or without changes.

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8. RESOLUTION TO EXCLUDE THE PUBLIC 579

That the Council excludes the public from the following part of the proceedings of this meeting (pursuant to the provisions of the Local Government Official Information and Meetings Act 1987), namely:

- Confidential minutes of the 9 November 2022 Council Meeting
- Review of Open Actions (confidential) of 2019-2022 meetings
- Amendments to Non-Freshwater Hearings Panel Appointment - pORPS Sch 1 Process
- Port Otago Resolution In lieu of Annual Shareholders Meeting
- Appointment of Independent Member to Audit and Risk Subcommittee

8.1 Public Exclusion Table 579

9. CLOSURE

Minutes of an ordinary meeting of Council held at The Gate Hotel Conference Room, 6 Barry Avenue, Cromwell on Wednesday 9 November 2022 at 1:00pm

Membership

Cr Gretchen Robertson	*(Chairperson)*
Cr Lloyd McCall	*(Deputy Chairperson)*
Cr Alexa Forbes	
Cr Gary Kelliher	
Cr Michael Laws	
Cr Kevin Malcolm	
Cr Tim Mepham	
Cr Andrew Noone	
Cr Bryan Scott	
Cr Alan Somerville	
Cr Elliot Weir	
Cr Kate Wilson	

Welcome

Chairperson Robertson welcomed Councillors, members of the public and staff to the meeting at 1:01pm. Staff present included Pim Borren, (interim Chief Executive), Nick Donnelly (GM Corporate Services), Anita Dawe (GM Policy and Science), Gavin Palmer (GM Operations), Richard Saunders (GM Regulatory and Communications), Amanda Vercoe (GM Governance, Culture and Customer), Dianne Railton (Governance Support Officer), Mike Roesler (Manager Corporate Planning), Sean Geary (Management Accountant) and staff present electronically were Andrea Howard (Manager Executive Advice), Fleur Matthews (Manager Policy), Francisco Hernandez (Principal Advisor Climate Change), and Warren Hanley (Senior Planner Liaison).

1. APOLOGIES

Resolution: Cr Malcolm Moved, Cr Laws Seconded:
That the apology for Cr Kelliher be accepted.
MOTION CARRIED

2. PUBLIC FORUM

There were three requests to speak at the Public Forum:

1. Mr Pierre Marasti spoke regarding Climate Change and the climate crisis on behalf of Extinction Rebellion and responded to questions from Councillors.

2. Mr Graye Shattky informed Council of Central Otago Heritage Trust's role and contribution to preserving Otago's rich heritage legacy and its vulnerability. Mr Shattky responded to questions from Councillors.

3. Ms Zella Downing spoke of the proposed airport near Tarras on behalf of Stop Central Otago Airport (SCOA). Ms Downing tabled a document to be circulated to Councillors.

3. CONFIRMATION OF AGENDA

Chair Robertson requested that the late paper Committee Structure 2022-2025 be considered.

Resolution: Cr Malcolm Moved, Cr Noone Seconded
That the Council
*1) **Accept** the late Committee Structure 2022-2025 paper for consideration.*
MOTION CARRIED

4. CONFLICT OF INTEREST

Cr Noone advised that he will sit back from the table for item 6.5 Recommendation for ORC Submission on National Direction for Plantation and Exotic Carbon Afforestation, due to a possible conflict of interest.

5. CONFIRMATION OF MINUTES

Resolution: Cr Wilson Moved, Cr Forbes Seconded
That the minutes of the (public portion of the) Council meeting held on 19 October 2022 be received and confirmed as a true and accurate record.
MOTION CARRIED

6. MATTERS FOR CONSIDERATION

6.1. Committee Structure 2022-2025

The paper was provided for Council to consider and adopt a committee structure for the Otago Regional Council for the 2022-2025 triennium. This structure can be reviewed at any point during the triennium. Chair Robertson spoke to the proposed Committee Structure and acknowledged working with the Governance team on the Committee Structure paper. She noted that the Public Transport Committee representatives were incorrectly listed in the attachment, and the names should be Cr Noone and Cr Forbes.

Cr Wilson asked if the Committee names could be changed at the next Council Meeting to make it easier for the community to understand the Committee's purpose.

Resolution CM22-266: Cr Wilson Moved, Cr Weir Seconded
That the Council:

*1) **Notes** this report.*
MOTION CARRIED

Resolution CM22-267: Cr Wilson Moved, Cr Weir Seconded
That the Council:

*1) **Adopts** the new committee structure attached to this report.*
MOTION CARRIED

Resolution CM22-268: Cr Wilson Moved, Cr Weir Seconded
That the Council:

*1) **Approves** the appointment of co-chairs to the committees as listed in the attachment.*

MOTION CARRIED
Cr Laws and Cr Malcolm voted against the motion and asked that their votes be recorded.

Resolution CM22-269: Cr Wilson Moved, Cr Weir Seconded
That the Council:

*1) **Approves** inviting mana whenua to nominate two representatives to be members of the Environmental Policy and Science Committee, including one as co-chair (nominations will be brought back to Council for confirmation).*
MOTION CARRIED
Cr Laws and Cr Malcolm voted against the motion and asked that their votes be recorded.

Resolution CM22-270: Cr Wilson Moved, Cr Weir Seconded
That the Council:

*1) **Approves** inviting mana whenua to nominate one representative to be a member of the Regional Leadership Committee (nomination will be brought back to Council for confirmation).*
MOTION CARRIED
Cr Laws voted against the motion and asked that his vote be recorded

Resolution CM22-271: Cr Wilson Moved, Cr Weir Seconded
That the Council:

*1) **Approves** the Chair nominating an independent member to Co-Chair the Audit and Risk Subcommittee (nomination will be brought back to Council for approval).*
MOTION CARRIED

Resolution CM22-272: Cr Wilson Moved, Cr Weir Seconded
That the Council:

*1) **Notes that** a further list of Council appointments to various internal and external working groups will be presented for consideration at the December 2022 Council Meeting.*
MOTION CARRIED

Resolution CM22-273: Cr Wilson Moved, Cr Weir Seconded
That the Council:

1) ***Notes*** *the updated name, membership, delegations, and terms of reference for each committee are brought back to a future Council Meeting.*

MOTION CARRIED

Resolution: Moved Cr Robertson, Seconded Cr Wilson
Cr Robertson moved that the meeting adjourn for formal Council photographs at 2.22pm
MOTION CARRIED

6.2. Councillor Remuneration Pool Allocation
The paper was provided for Council to consider the allocation of the ORC Councillors remuneration pool, as provided for by the Remuneration Authority's Determination. Cr Robertson spoke to the paper and responded to questions.

Chair Robertson advised the Chair's remuneration is set by the Remuneration Authority and recommended that the remuneration pool be split with the Deputy Chair receiving $84,869 and remaining Councillors each receiving $65,000.

Resolution CM22-274: Cr Noone Moved, Cr Wilson Seconded
That the Council:

1) ***Notes*** *this report.*
2) ***Notes*** *the Chair's remuneration set by Remuneration Authority is $152,881.*
3) ***Notes*** *the ORC's governance remuneration pool is set at $734,869, with the minimum Councillor remuneration at $50,833.*
4) ***Recommends*** *allocating the governance remuneration pool using the attached spreadsheet.*
5) ***Requests*** *the Chief Executive to send the attached spreadsheet to the Remuneration Authority by 16 November 2022, to be included in the Authority's pre-Christmas amending determination.*

MOTION CARRIED

6.3. Proposal for Participating in a Regional Sector Shared Services Council Controlled Organisation
To approve the proposal document for public consultation regarding ORC becoming a shareholder in a regional sector shared services organisation (RSHL – Regional Software Holdings Limited). Nick Donnelly (GM Corporate Services) and Andrea Howard (Manager Executive Advice) were present to speak to the report and respond to questions.

Mr Donnelly provided an overview of the progress to date and the consultation process. Cr Wilson and Cr Weir both indicated they would be available to review any submissions received.

Resolution CM22-275: Cr Noone Moved, Cr Wilson Seconded
That the Council:

1) ***Approves*** *the proposal for public consultation, as required under the Local Government Act 2002, on ORC becoming a shareholder in a new regional sector shared services organisation.*

2) ***Appoints*** *Cr Wilson and Cr Weir to review any submissions received via the public consultation process.*

MOTION CARRIED

6.4. Refresh of Councillor Liaisons for FMUs and Sponsors for Region Wide Topic Consultations

The paper was provided to assign Councillors as liaisons for freshwater management units (FMUs), and the sponsors of region wide topics for the development of the Land and Water Regional Plan (pLWRP). Anita Dawe (GM Policy and Science) was present to speak to the report and respond to questions.

Chair Robertson spoke to the proposed appointments and following discussion, Cr Wilson then moved:

Resolution CM22-276: Cr Wilson Moved, Cr Noone Seconded
That the Council:

1) ***Notes*** *this report.*

2) ***Appoints*** *Councillors to act as FMU liaisons:*

Upper Lakes Rohe:	*Michael Laws*
Dunstan:	*Alexa Forbes*
Manuherikia:	*Kevin Malcom, Tim Mepham*
Lower Clutha:	*Andrew Noone, Alan Somerville*
Taieri:	*Gretchen Robertson, Lloyd McCall*
Dunedin and Coast:	*Bryan Scott, Elliot Weir*
North Otago:	*Kevin Malcom, Elliot Weir*
Catlins:	*Kate Wilson, Lloyd McCall*
Roxburgh:	*Gary Kelliher (Kate Wilson as alternate)*
Clutha Mata-Au (Main stem):	*Kate Wilson (Bryan Scott as an alternate)*
Arrow and Cardrona:	*Bryan Scott*

3) ***Appoints*** *Councillors to act as sponsors of regionwide topics that will inform the proposed Land and Water Regional Plan, including attending key stakeholder discussions as observers, and if named sponsors aren't available then the Chair can name an alternative.*
Add Alan Somerville to Damming and Diversion
And Tim Mepham to Other Discharges
Add Elliot Weir to Stormwater and Wastewater Discharges
Add Lloyd McCall to Landfills and Cemeteries

MOTION CARRIED

6.5. Recommendation for ORC Submission on National Direction for Plantation and Exotic Carbon Afforestation

The paper was provided to advise Councillors on the Ministry for Primary Industries' (the Ministry) current consultation: "National direction for plantation and exotic carbon afforestation' (the consultation) and to consider options for a response from ORC. Anita Dawe

(GM Policy and Science), Fleur Matthews (Manager Policy), and Warren Hanley (Senior Resource Planner Liaison) were present to speak to the report and respond to questions.

Cr Noone sat back from the table due to a possible conflict of interest.

Chair Robertson advised that Councillors received the draft submission due to the short timeframe available. Following discussion Cr Forbes moved:

Resolution CM22-277: Cr Forbes Moved, Cr Weir Seconded
That the Council:

1) ***Notes*** *this report*
2) ***Notes*** *the draft submission, circulated on 8 November 2022.*
3) ***Delegates*** *to Chair Robertson the final approval of the submission, which will be lodged with the Ministry for Primary Industries on its proposed 'National direction for plantation and exotic carbon afforestation' before the close of submissions on 18 November 2022*

MOTION CARRIED

Cr Noone returned to the table.
Cr Laws returned to the meeting at 3.22pm

6.6. Recommendation for ORC Submission on QLDC Proposed Variation to the Proposed District Plan for Inclusionary Housing Contributions

The paper was provided to advise Councillors on the Queenstown Lakes District Council's (QLDC) a proposed plan variation "Inclusionary Housing Plan Change' (the proposed variation) to the proposed District Plan (PDP) and recommend options for an ORC response. Anita Dawe (GM Policy and Science) and Warren Hanley (Senior Resource Planner Liaison) were present to speak to the report and respond to questions.

Resolution CM22-278: Cr Wilson Moved, Cr Forbes Seconded
That the Council:

1) ***Notes*** *this report.*
2) ***Approves*** *the draft Otago Regional Council submission (attached), subject to any changes, to be lodged with Queenstown Lakes District Council on its proposed variation to the Proposed District Plan 'Inclusionary Housing Plan Change' before the close of submissions on 24 November 2022.*

MOTION CARRIED

6.7. Recommendation for ORC Submission on Second Tranche of Drinking Water and Wastewater Network Environmental Performance Measures

The paper was provided to advise Councillors on Taumata Arowai's consultation *"Second Tranche of Drinking Water and Wastewater Network Environmental Performance Measures'* (the consultation); and provides options for an Otago Regional Council (ORC) response. Anita Dawe (GM Policy and Science) and Warren Hanley (Senior Resource Planner Liaison) were present to speak to the report and respond to questions.

There was discussion on appointing a small group of Councillors who would meet to discuss the submission before giving their final approval of the submission.

Resolution CM22-279: Cr Robertson Moved, Cr Wilson Seconded
That the Council:

1) ***Notes*** *this report*
2) ***Notes*** *the draft submission, circulated on 8 November 2022.*
3) ***Delegates*** *to Chair Robertson, Cr Laws and Cr Scott the final approval of the submission, which will be lodged with Taumata Arowai on its proposed 'Second Tranche of Drinking Water and Wastewater Network Environmental Performance Measures' before the close of submissions on 25 November 2022.*

MOTION CARRIED

Cr Laws left the meeting at 3.42pm.

6.8. Agricultural Emissions Consultation

This report provided information to Council on the ongoing Government consultation to put a price on agricultural emissions, and outlines at a high level some potential implications of the proposed Government policy to the Otago region. Anita Dawe (GM Policy and Science), Francisco Hernandez (Principal Advisor Climate Change), Andrea Howard (Acting Manager Strategy) and Warren Hanley (Senior Resource Planner Liaison) were present to speak to the report and respond to questions.

Ms Dawe advised that ORC doesn't have a policy position on agricultural emissions. During discussion Cr Wilson suggested having a small working group to work on a submission that meets the objectives that already exist with Council.

Cr Scott left the room at 3.53pm.

Resolution CM22-280: Cr Forbes Moved, Cr Wilson Seconded
That the Council:

1) ***Notes*** *this report*
2) ***Delegates*** *to Cr Wilson, Cr Malcolm and Cr McCall the final approval of the submission, before the close of submissions on 18 November 2022.*

MOTION CARRIED

7. CHAIRPERSON'S AND CHIEF EXECUTIVE'S REPORTS

7.1. Chairperson's Report

Cr Robertson spoke to her report, and thanked Councillors and staff who have attended the FMU meetings.

Resolution: Cr Noone Moved, Cr Weir Seconded
That the Chairperson's report be received.
MOTION CARRIED

7.2. Chief Executive's Report

Resolution: Cr Noone Moved, Cr Weir Seconded
That the Chief Executive's report be received.
MOTION CARRIED

8. RESOLUTION TO EXCLUDE THE PUBLIC

Resolution: Cr Malcolm Moved, Cr Wilson Seconded:

Chair Robertson moved that the public be excluded from the following parts of the proceedings of this meeting, (pursuant to the provisions of the Local Government Official Information and Meetings Act 1987) namely:

- 1.1 Quarter One Financial Forecast
- 1.2 Amendments to the Delegation Manual
- 1.3 Zero Carbon Alliance
- 1.4 Public Transport Operations and Funding Options for the Future
- 1.5 CE Recruitment Update

MOTION CARRIED

The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution are as follows:

General subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Ground(s) under section 48(1) for the passing of this resolution
1.1 Quarter One Financial Forecast	**Section 7(2)(h)** To enable any local authority holding the information to carry out, without prejudice or disadvantage, commercial activities. **Section 7(2)(i)** To enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations).	Subject to subsection (3), a local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.
1.2 Amendments to the Delegation Manual	**Section 7(2)(g)** To maintain legal professional privilege.	Subject to subsection (3), a local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.
1.3 Zero Carbon	**Section 7(2)(g)** To maintain legal	Subject to subsection (3), a

Alliance	professional privilege.	local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.
1.4 Public Transport Operations and Funding Options for the Future	**Section 7(2)(b)(ii)** To protect information where the making available of the information—would be likely unreasonably to prejudice the commercial position of the person who supplied or who is the subject of the information. **Section 7(2)(h)** To enable any local authority holding the information to carry out, without prejudice or disadvantage, commercial activities. **Section 7(2)(i)** To enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations).	Subject to subsection (3), a local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.
1.5 CE Recruitment Update	**Section 7(2)(i)** To enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations).	Subject to subsection (3), a local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.

This resolution is made in reliance on section 48(1)(a) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 or section 7 of that Act or section 6 or section 7 or section 9 of the Official

Information Act 1982, as the case may require, which would be prejudiced by the holding of the whole or the relevant part of the proceedings of the meeting in public are shown above.

9. CLOSURE

There was no further business and Chairperson Robertson declared the meeting closed at 4:07pm.

_____ _____

Chairperson Date

Council
MINUTES

Minutes of an ordinary meeting of the Otago Regional Council held in the Council Chamber, Philip Laing House, Dunedin on Thursday 24 November at 4:00pm

PRESENT

Cr Gretchen Robertson	*(Chairperson)*
Cr Lloyd McCall	*(Deputy Chairperson)*
Cr Alexa Forbes	
Cr Gary Kelliher	
Cr Michael Laws	
Cr Kevin Malcolm	
Cr Tim Mepham	
Cr Andrew Noone	
Cr Bryan Scott	
Cr Alan Somerville	
Cr Elliot Weir	
Cr Kate Wilson	

IN ATTENDANCE

Chairperson Robertson welcomed Councillors, members of the public and staff to the meeting at 4:01 pm. Staff present included Dianne Railton (Governance Support), and present online were Anita Dawe (GM Policy and Science), Amanda Vercoe (GM Governance, Culture and Customer), and Tom Dyer (Manager Science).

1. APOLOGIES

Resolution: Cr Wilson Moved, Cr Robertson Seconded:
That the apology for Cr McCall, and the apology for lateness from Cr Forbes be accepted.
MOTION CARRIED

2. CONFIRMATION OF AGENDA

The agenda was confirmed as published.

3. CONFLICT OF INTEREST

No conflicts of interest were advised.

Cr Forbes joined the meeting at 4:04pm

4. MATTERS FOR CONSIDERATION

4.1. Submission to the Freshwater parts of the proposed Otago Regional Policy Statement

The paper was provided for Council to consider lodging a submission on the Freshwater Parts of the proposed Otago Regional Policy Statement (pORPS). Anita Dawe (GM Policy and Science) and Tom Dywer (Manager Science) were present to speak to the report and respond to questions.

Ms Dawe informed Council of modelling being done which show two narrow scenarios, indicating that the 2030 timeframes are unlikely to be met. She said that it is important to acknowledge that a hearings panel might ask for more than just GMP and GMP+, and this could mean we get there by 2030.

Cr Somerville questioned the wording paragraph [8]a. which says *'the freshwater visions for the Catlins FMU and the Upper Lakes rohe are anticipated to be achieved by 2030.'* Ms Dawe confirmed that was an error and [8]a. should read '*the freshwater visions for the Catlins FMU and the Upper Lakes rohe are **not** anticipated to be achieved by 2030.'*

Cr Scott asked for clarification of what the targets actually mean. Ms Dawe replied that the NPS says in Clause 3.3.1 every regional council must develop long term vision, and Clause 3.3.2.b says they must set goals that are ambitious but reasonable, that is difficult to achieve but not impossible, and identify a timeframe to achieve those goals that are both ambitious and reasonable, giving an example of 30 years. Ms Dawe also spoke to the staff recommendations outlined in the report for lodging a submission, also providing an overview of the modelling.

Cr Noone said that Council is alerting the decision-makers that we are under pressure, and unlikely to make the timeframe.

Cr Malcolm highlighted the extreme pressure on the Science Team at the moment and wanted to ensure that staff are not being overly stressed.

Resolution CM22-286: Cr Noone Moved, Cr Malcolm Seconded
That the Council:

1) ***Notes** this report.*
2) ***Notes** the main points to be considered for a submission.*
3) ***Agrees** to lodge a submission around the points made in paragraph 8, with the wording changed in paragraph 8.a.*

4) ***Authorises*** *any submission to be approved by the Chair, under delegated authority, and lodged by 29 November 2022.*

MOTION CARRIED

5. RESOLUTION TO EXCLUDE THE PUBLIC

Resolution: Cr Malcolm Moved, Cr Noone Seconded:

That the public be excluded from the following parts of the proceedings of this meeting, (pursuant to the provisions of the Local Government Official Information and Meetings Act 1987) namely: 1.1 Chief Executive Recruitment - Next Steps, and that Mr Doug Craig (Consultant from RDC Group) remain in the meeting, as he is assisting Council with the Chief Executive recruitment process.

MOTION CARRIED

The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution are as follows:

General subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Ground(s) under section 48(1) for the passing of this resolution
1.1 Chief Executive Recruitment – Next Steps	**Section 7(2)(a)** - To protect the privacy of natural persons, including that of deceased natural persons.	Subject to subsection (3), a local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.

This resolution is made in reliance on section 48(1)(a) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 or section 7 of that Act or section 6 or section 7 or section 9 of the Official Information Act 1982, as the case may require, which would be prejudiced by the holding of the whole or the relevant part of the proceedings of the meeting in public are shown above.

6. CLOSURE

There was no further business and Chairperson Robertson declared the meeting closed at 4:26pm.

_____ _____

Chairperson Date

6.1. Consideration of terms of reference for committee structure adopted on 9 Nov 2022

Prepared for:	Council
Report No.	GOV2277
Activity:	Governance Report
Author:	Gretchen Robertson, Chairperson
Endorsed by:	Gretchen Robertson, Chairperson
Date:	7 December 2022

PURPOSE

[1] To consider and adopt Terms of Reference and Delegations for the 2022-2025 Committee Structure for the ORC.

[2] To confirm Council Working Groups and memberships, Council appointments to various internal and external groups, and territorial authority nominations to the Regional Transport Committee.

EXECUTIVE SUMMARY

[3] On 9 November 2022 Council agreed to a committee structure for the 2022-2025 triennium and Co-Chairs for those Committees and noted that Terms of Reference and Delegations for the Committees would come to Council for consideration separately. Attached to this paper are proposed Terms of Reference and Delegations for the Committees, for Council to consider.

[4] A list of Council Working Groups and appointments to various internal and external groups is also included for Council consideration.

[5] For the 2022-2025 triennium it is proposed to establish two new working groups, the first on Resource Management Reform, and the second on Submissions. This will enable a smaller group of councillors to consider these priority issues in more depth throughout the triennium and provide advice and updates to Council. These groups will meet as required, and report to the Regional Leadership Committee.

[6] The Otago Regional Council convenes the Regional Transport Committee under the Land Transport Act, and appoints Territorial Authority nominated members to the Committee. Four out of the five Territorial Authority nominations have been included below, and the last will be brought to Council in February 2023.

RECOMMENDATION

That the Council:

1) ***Notes*** *this report.*
2) ***Adopts*** *the attached Terms of Reference and Delegations for the Committees, with or without amendments.*
3) ***Agrees*** *to change the name of the Public Transport Committee to the "Public and Active Transport Committee".*

4) ***Agrees*** *that the ORC Chair, CE, and Co-Chairs Public and Active Transport Committee take a lead in discussions with DCC and QLDC (Mayors and CEs) as well as Waka Kotahi, on the establishment of joint-member subcommittee/s under ORC's Public and Active Transport Committee by 28 February 2023.*
5) ***Agrees*** *that a paper be brought to the Public and Active Transport Committee addressing the opportunity to develop a regional public and active transport connectivity strategy by 30 April 2023.*
6) ***Approves*** *the list of Council Working Groups and membership of those groups, with or without amendments.*
7) ***Approves*** *the list of Council appointments, with or without amendments.*
8) ***Confirms*** *the Territorial Authority nominations to the Regional Transport Committee as follows:*
    - *Central Otago District Council: Cr Stuart Duncan*
    - *Clutha District Council: Cr Bruce Graham*
    - *Dunedin City Council: Cr Jim O'Malley (Cr Kevin Gilbert, alternate)*
    - *Queenstown Lakes District Council: To be named on 15 December*
    - *Waitaki District Council: Cr Jim Thomson (Cr Guy Percival, alternate)*
    - *Waka Kotahi/NZTA: Mr James Caygill*

BACKGROUND

[7] The Local Government Act 2002 gives local authorities the power to appoint committees, subcommittees, and other subordinate decision-making bodies that it considers appropriate (Section 30, Schedule 7). Clause 31(3) of Schedule 7 of the Local Government Act enables Council to appoint non-elected members to those committees.

DISCUSSION

Public and Active Transport Committee

[8] It is acknowledged that there is an ability for Council to adapt its structures and representations any time. Considering this ability, Council is signalling its early intent to revisit the Public and Active Transport structure early in 2023 to potentially add joint-party subcommittee/s.

[9] The Otago Regional Council has already chosen to affirm and give greater focus to, its important role in the delivery of public transport. ORC has created a separate Public and Active Transport Committee in response to increasing public interest in the transport and climate issues facing our region. The Council is also keen to further strengthen a collaborative focus. Recent internal discussions with Council's Chairperson, CE and Co-Chairs of the Public and Active Transport Committee have reaffirmed the intent to seek opportunity for additional joint-party subcommittee/s.

[10] There are many foreseen advantages of joint-party subcommittees reporting to ORC's Public and Active Transport Committee. This approach would harness collective knowledge, define broad challenges, develop strategic recommendations, and translate into relevant work streams.

[11] It is recommended that ORC lead discussion with DCC, QLDC and Waka Kotahi with the aim of developing recommendations on joint-party representation for the approval of our respective Councils/organisations. While looking for future opportunity to collaborate, we would be mindful of the need to avoid duplicated effort. Discussion on existing joint-party groupings should be included. Intended first steps would be to meet in early 2023 building on signalled support for collaboration from ORC, DCC and QLDC. Waka Kotahi is a crucial partner and should be included.

[12] Further to this, it is recommended that a paper be brought to ORC's Public and Active Transport Committee to discuss the opportunity to create wider future regional connectivity strategy and consider the need for a further related subcommittee.

OPTIONS

[13] To consider the Terms of Reference, Delegations, Working Groups, and appointments and confirm them with or without amendments.

CONSIDERATIONS

Strategic Framework and Policy Considerations

[14] A committee structure that enables clear policy and strategy decisions, while supporting monitoring and compliance is important.

Financial Considerations

[15] The cost of supporting the operation of the committee structure is budgeted for.

Significance and Engagement

[16] Not applicable.

Legislative and Risk Considerations

[17] The proposed committee structure meets the Council's legislative and risk obligations.

Climate Change Considerations

[18] This is an administrative report, though the Terms of Reference for the Regional Leadership Committee and the Safety and Resilience Committee include reference to climate change.

Communications Considerations

[19] Once adopted, this committee structure will be made available online, and councillor biographies will be updated to note their council co-chairing roles.

NEXT STEPS

[20] To implement the decisions made above.

ATTACHMENTS

1. 2022 2025 Committee Terms of Reference and Delegations DRAFT [**6.1.1** - 20 pages]

Committee Structure, Membership and Terms of Reference

2022 - 2025 Triennium

Adopted:

Finance Committee	Environmental Policy and Science Committee	Environmental Implementation Committee
Co-Chairs: Kevin Malcolm, Tim Mepham Committee of the Whole	Co-Chairs: Lloyd McCall, Iwi Representative Committee of the Whole Iwi representatives (2)	Co-Chairs: Bryan Scott, Kate Wilson Committee of the Whole

Public and Active Transport Committee	Regional Leadership Committee	Safety and Resilience Committee
Co-Chairs: Alexa Forbes, Andrew Noone Committee of the Whole	Co-Chairs: Bryan Scott, Elliot Weir, Michael Laws Committee of the Whole Iwi representative (1)	Co-Chairs: Gary Kelliher, Alan Somerville Committee of the Whole

Audit and Risk Subcommittee	Civil Defence and Emergency Management Joint Committee	Regional Transport Committee *(established by the Land Transport Management Act)*
Co-Chairs: Tim Mepham, Independent Member Alexa Forbes Gary Kelliher Kevin Malcolm Gretchen Robertson Kate Wilson	ORC Chair Otago Mayors	Kate Wilson (ORC) Alexa Forbes (ORC) Cr (DCC) Cr (CDC) Cr (CODC) Cr (QLDC) Cr (WDC) (NZTA) Alternates: Cr (DCC) Cr (NZTA) Cr (WDC) Cr (ORC)

1. Regional Leadership Committee

Co-Chairs	Bryan Scott, Elliot Weir, Michael Laws
Members	All councillors Iwi Representative (1)
Quorum	7
Meeting frequency	Quarterly

Purpose: To provide recommendations and advice to Council on Regional Leadership activities of the ORC Long-term Plan 2021-31. Monitor governance, communications, and regulatory functions of Council. Champion the Council's partnership with Kāi Tahu and engagement with Māori and uphold the four "wellbeings" in the work of Council.

Areas of responsibility

- Develop, and monitor implementation of Council's Strategic Directions
- Be the guardians of the Council's partnership with Kāi Tahu, engagement with Māori, and upholding the Treaty of Waitangi in the work of Council
- Develop and review Council positions and submissions, and advocacy on behalf of the Otago region on national and regional plans, policies and legislation
- Consider and develop community engagement plans, including how to reach new/all communities
- Monitor implementation of ORC's Regional Policy Statement
- Provide oversight of ORC's climate change mitigation responses and regional strategies and plans
- Participate in joint urban development policy development and consideration alongside Territorial Authorities, and other obligations set out by the National Policy Statement Urban Development
- Provide regional leadership in urban development policy direction, including by engaging with Territorial Authorities and by taking a regional approach to urban growth and development
- Consider Council meeting schedules, remuneration, and governance matters.
- As needed consider communications strategies *(noting that communications plans will be considered by the relevant committee alongside the work area)*
- Receive and review quarterly reporting from the Regulatory Group (including Harbourmaster, but excluding Biosecurity Act reporting)
- Consider and make recommendations to Council on a wellbeing framework as required under the Long-term Plan.

Delegations

The Committee has no general decision-making or financial delegations. It can:

1. Receive information for noting.
2. Make recommendations to Council on the matters within its responsibility.
3. Appoint working parties as appropriate provided they are limited to a time duration consistent with performance of their specified tasks and receive reporting from them.
4. Carry out any other function or duty delegated to it by the Council.

2. Finance Committee

Co-Chairs	Kevin Malcolm, Tim Mepham
Members	All Councillors
Quorum	6
Meeting frequency	Quarterly

Purpose: To guide, monitor and provide advice to Council on the Council's financial, commercial, and administrative affairs, including the Port shareholding and operational performance, Long-term Plan, Annual Plans, and implementation of the Local Government Act 2002.

Areas of Responsibility

- Review and monitor quarterly activity reporting against the agreed levels of service and target measures outlined in the Long-term and Annual Plans
- Review and monitor quarterly and annual financial statements including the statement of comprehensive income, balance sheet and treasury report
- Lead Long-term and Annual Plan process including consultation and hearings and make recommendations to Council for adoption
- Oversee and make recommendations to Council on financial policies including the Financial Strategy and Revenue and Financing Policy
- Oversee and make recommendations to Council on Rates, fees, charges, royalties and rentals policies and strategies
- Manage affairs with Port Otago Ltd (including Statement of Corporate Intent and receive the six month and annual reports)
- Review and monitor commercial activities, trading activities or investments held by the Council
- Review and monitor Council's assets, leases, and financial reserves

Delegations

- Receive information for noting.
- To award or approve contracts and tenders in excess of staff delegations and to a maximum of $2million.
- To consider and make recommendations to Council matters of financial impact other than as provided for in the Annual Plan.
- The Finance Committee shall carry out any other function or duty delegated to it by the Council.
- The Finance Committee may appoint subcommittees or working parties as appropriate provided they are limited to a time duration consistent with performance of their specified tasks.

3. Audit and Risk Subcommittee

Co-Chairs	Tim Mepham, Independent Member TBA
Members	Alexa Forbes Gary Kelliher Kevin Malcolm Gretchen Robertson Kate Wilson Other councillors are encouraged to attend meetings of the Subcommittee, but do not have voting rights.
Quorum	4 members
Meeting frequency	Quarterly

Purpose: To provide advice about governance, risk management, and internal control matters, external reporting and audit matters. The Subcommittee can make recommendations to the Council and/or the chief executive, and request information and advice through the chief executive when necessary.

Areas of Responsibility

- Council's financial risk and management of that risk,
- Strategic risk register and management of risks on the register
- Insurance renewals and notifications
- Annual audit process, including audit plan, management letter, and management response, and reviewing the draft annual report before it goes to Council
- Internal audit and control process
- Health and Safety reporting
- Investment management, including managed fund, performance of Council's investment manager including compliance of the managed fund with the Statement of Investment Policies and Objectives (SIPO), and appointment of fund manager.
- Legal compliance
- The Co-Chairs will report to Council annually on the activities of the Subcommittee.

Delegations

The Subcommittee has no general decision-making or financial delegations. It can:

- Receive information for noting.
- Receive the external audit engagement letters and letters of undertaking for audit functions and additional services provided by the external auditor.
- Review matters within its areas of responsibility and make recommendations to Council on those matters.
- Seek information it requires from the Chief Executive. The Chief Executive is required to cooperate with any requests unless excused by the Chair of the Otago Regional Council.
- Request access to outside legal or independent professional advice should it consider this necessary.

4. Environmental Policy and Science Committee

Co-Chairs	Lloyd McCall, Iwi Representative
Members	All Councillors Iwi representatives (2)
Quorum	7
Meeting frequency	As needed

Purpose To provide advice and guidance to Council on the development of Otago's environmental (water, land, air, biodiversity and biosecurity) plans, policies and strategies under the Resource Management Act, Biosecurity Act and other national directions. To ensure, through appropriate science and performance monitoring, the effective promotion of sustainable management of natural and physical resources of the Region. To ensure the Council partnership with Kāi Tahu is reflected in the above processes.

Areas of Responsibility

- Land and Water Regional Plan development, including policy, science, economics inputs
- Coast plan review, including the policy and science inputs
- Air Plan review, including the policy and science inputs
- Regional Pest Management Plan, including the policy and science inputs
- Strategy development related to the environment (water, air, land, coast, biodiversity and biosecurity)
- Receive and review science inputs as part of the policy, strategy and plan making process
- Review of State of the Environment monitoring, analysis and reporting

Delegations

The Committee has no general decision-making or financial delegations. It can:

1. Receive information for noting.
2. Receive reporting from the Land and Water Regional Plan Governance Group.
3. Make recommendations to Council on the matters within its responsibility.
4. Appoint working parties as appropriate provided they are limited to a time duration consistent with performance of their specified tasks.
5. Carry out any other function or duty delegated to it by the Council.

5. Environmental Implementation Committee

Co-Chairs	Bryan Scott, Kate Wilson
Members	All Councillors
Quorum	6
Meeting frequency	Quarterly

Purpose To monitor and provide advice to Council on ORC's delivery of environmental outcomes, and how we work with the community to achieve these environmental outcomes as set out in the Long-term Plan 2021-31 under the Environment activity (namely water, land, air, biodiversity and biosecurity).

Areas of Responsibility

- Monitor implementation of activities related to (but not limited to):
    - ORC work with catchment groups and Otago Catchment Community
    - Biodiversity strategy implementation
    - Biosecurity strategy/operational plan implementation
    - Air Strategy implementation
- Development and implementation of the Integrated Catchment Management programme
- Development of annual Biosecurity Operational Plan.
- Oversee the ECO Fund
- Receive biosecurity outcomes/compliance reporting

Delegations

The Committee has no general decision-making or financial delegations. It can:

1. Receive information for noting.
2. Make recommendations to Council when decisions are needed.
3. Appoint working parties as appropriate provided they are limited to a time duration consistent with performance of their specified tasks.
4. Carry out any other function or duty delegated to it by the Council.

6. Safety and Resilience Committee

Co-Chairs	Gary Kelliher, Alan Somerville
Members	All Councillors
Quorum	6
Meeting frequency	Quarterly

Purpose To consider and set the direction for programmes of work and provide advice to Council on matters that fall under the Safety and Resilience activity of the ORC's Long-term Plan 2021-31.

Areas of Responsibility

- Review and advise Council on ORC's programme of work on climate change adaptation
- Oversee the Otago Climate Change Risk Assessment
- Monitoring natural hazards risks and programmes to manage those risks
- Oversee and monitor waterway management, flood control and land drainage
- Oversee and monitor the condition and performance of council's river management, flood control and land drainage schemes and service delivery risks
- Natural hazards monitoring and warning systems and processes
- Monitor delivery of ORC's Civil Defence and Emergency Management responsibilities

Delegations

The Committee has no general decision-making or financial delegations. It can:

1. Receive information for noting.
2. Make recommendations to Council when decisions are needed.
3. Appoint working parties as appropriate provided they are limited to a time duration consistent with performance of their specified tasks.
4. Carry out any other function or duty delegated to it by the Council.

7. Public and Active Transport Committee

Co-Chairs	Andrew Noone, Alexa Forbes
Members	All Councillors
Quorum	6
Meeting frequency	Quarterly (or as needed)

Purpose To set the strategic and operational direction for approved Regional Council public transport policy and strategy, and monitor its implementation.

Areas of Responsibility

- Prepare and review the Otago Regional Public Transport Plan.
- Implement, monitor and review operational public transport policy and plans.
- Advocate for public transport with Waka Kotahi NZTA, territorial authorities, and Central Government.
- Set and monitor targets for public transport in the region.
- Oversee Public Transport Dunedin provision of service, routes, data, contracts, complaints, and communications
- Oversee Public Transport Queenstown provision of service, routes, data, contracts, complaints, and communications
- Regional Total Mobility Service
- In coordination with the work programme of the Regional Transport Committee, guide and review the public transport components of the Regional Land Transport Plan (RLTP) and make recommendations to Regional Transport Committee for incorporation into the RLTP.
- Receive reporting from the Regional Transport Committee
- Receive reporting from any working groups set up under this Committee

Delegations

The Committee has no general decision-making or financial delegations. It can:

1. Receive information for noting.
2. Make recommendations to Council when decisions are needed.
3. Appoint working groups with representatives from territorial authorities and other agencies as appropriate provided they are limited to a time duration consistent with performance of their specified tasks and receive reporting from those working groups.
4. Carry out any other function or duty delegated to it by the Council.

Otago Civil Defence Emergency Management Group (Joint Committee)

Chairperson	To be confirmed
Members	• Central Otago District Council • Clutha District Council • Dunedin City Council • Otago Regional Council • Queenstown Lakes District Council • Waitaki District Council Each member is represented on the joint committee by the Mayor/ Chairperson, or by an elected person from that authority who has delegated authority to act for the member.
Quorum	3
Meeting frequency	Quarterly

Constitution

Pursuant to section 12 of the Civil Defence Emergency Management Act 2002, the Otago Civil Defence Emergency Management Group is constituted as a joint standing committee under section 114S of the Local Government Act 1974 (a joint committee under section 30 of Schedule 7 of the Local Government Act 2002) by resolutions adopted by:

- Central Otago District Council
- Clutha District Council
- Dunedin City Council
- Otago Regional Council
- Queenstown Lakes District Council
- Waitaki District Council

Chairperson

The Otago Civil Defence Emergency Management Group shall appoint one of the representatives of its members as chairperson, and one of its members as deputy chairperson. Each will hold office for such period as agreed by the Group, but only so long as those persons remain a representative of a member of the Group.

Purpose

The Otago Civil Defence Emergency Management Group has the purpose and all of the functions, powers and obligations of a civil defence emergency management group as defined by the Civil Defence Emergency Management Act 2002 and subsequent amendments. Section 17 of the Civil Defence Emergency Management Act 2002 defines the function of a group and each of its members that, in summary, require it to:

- Identify, assess and manage relevant hazards and risks;

- Ensure provision of trained and competent personnel, an appropriate organisational structure and the necessary services and resources for effective civil defence emergency management in its area;
- Respond to and manage the adverse effects of emergencies;
- Carry out recovery activities;
- Assist other civil defence emergency management groups when requested;
- Promote public awareness of and compliance with the Civil Defence Emergency Management Act and legislative provisions relevant to the purpose of the Act;
- Develop, approve, implement, monitor and review a civil defence emergency management group plan;
- Participate in the development of the national civil defence emergency management strategy and the national civil defence emergency management plan.
- Promote civil defence emergency management in its area that is consistent with the purpose of the Civil Defence Emergency Management Act 2002.

Delegations

The Otago Civil Defence Emergency Management Group shall have all the delegated authorities that may be given by each member Council, including authority to fulfil the powers, obligations and functions of the Group as specified in the Civil Defence Emergency Management Act 2002, authority to appoint subcommittees, and authority to sub-delegate any authority able by law to be delegated.

Subcommittee

A subcommittee of all members of the Otago Civil Defence Emergency Management Group may be formed and given full delegated authority to carry out the functions, obligations and powers of the Group under the Civil Defence Emergency Management Act 2002 pursuant to section 114P(2) of the Local Government Act 1974 and section 30(2) schedule 7 of the Local Government Act 2002. Any meeting will transact routine business and not commit members to any major financial expenditure.

Standing Orders

The current Standing Orders of the Otago Regional Council shall govern the conduct of the meetings, except that order papers and agenda papers shall be sent to every member no less than five working days before the meeting. Notwithstanding anything in the Civil Defence Emergency Management Act or Standing Orders, adequate notice shall be given of all matters to be discussed at a meeting of the Group. Where a matter of significance is to be considered, where practicable, prior written notice of the background to that matter must be given in sufficient time to allow for consultation with each member.

Administering Authority

The Otago Regional Council as the administering authority shall provide administrative and leadership of the Group.

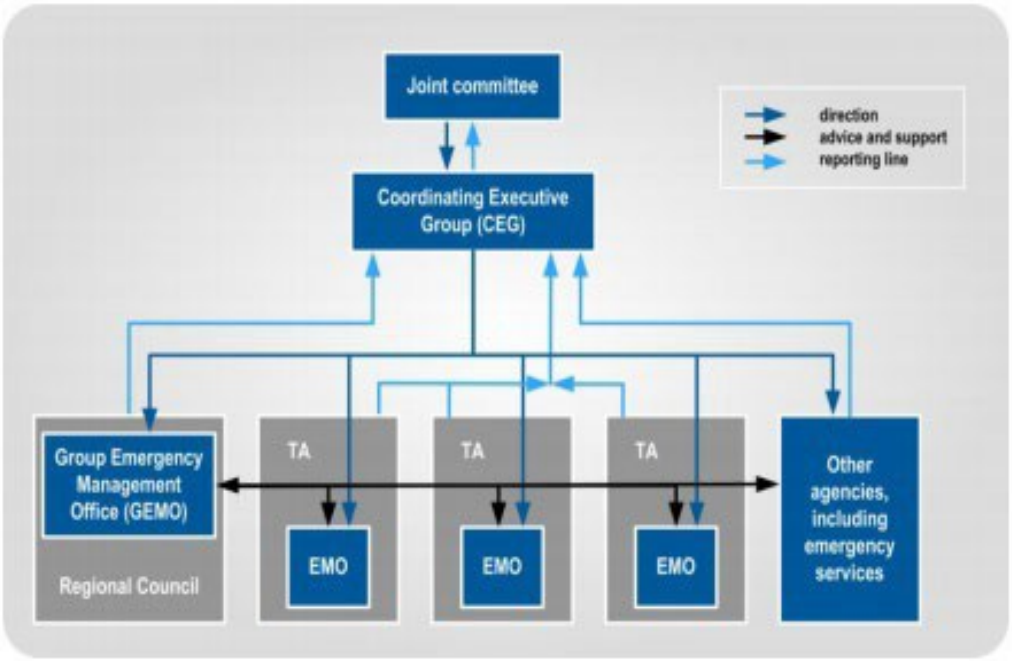
Reporting

The Group will report to each member.

Continuance of Joint Standing Committee

The Otago Civil Defence Emergency Management Group shall not be discharged by a triennial election but appointments of representatives of members shall be confirmed or new appointments made by each council following each election.

Otago CDEM Group Governance Structure



The **Otago CDEM Group Joint Committee**, made up of all the mayors from the five districts and the chairperson of the Regional Council, has overall governance responsibility for CDEM in the Otago area. The Chair is Mayor Aaron Hawkins, Dunedin City Council and the Deputy Chair is Councillor Andrew Noone, Chairperson, Otago Regional Council.

Operational management is supported by the **Coordinating Executive Group (CEG)**, made up of the Chief Executives of the six councils (or persons acting on their behalf), plus senior representatives from the NZ Police, Fire and Emergency NZ, St John, Southern District Health Board, Ngāi Tahu and the Ministry of Social Development. The CEG provides advice to the JC and ensures its decisions are implemented. The Chair is the Chief Executive of the Otago Regional Council.

Otago CDEM Group Management Office is a shared service across all six local authorities of Otago. Otago Regional Council is the Administering Authority for the CDEM Group. It:

- Employs all staff of Otago CDEM Group and is responsible for all employment-related matters including health and safety, wellbeing, welfare, operational policies, and conduct.
- Provides administrative and related services to the Group, such as preparing agendas, arranging meetings, and taking and disseminating minutes from meetings.
- Provides financial management for the CDEM Group, including budgeting and reporting.

In addition to the funding collected by the Regional Council through the targeted rate to resource the Otago CDEM Group and its activities.

Each **local authority member** of the Group is operationally and financially responsible for its **own local arrangements**. Each council also contributes skills, expertise and mutual support to the Group on an 'as available' basis.

For more information please see: https://www.otagocdem.govt.nz/media/1417/otago-cdem-group-plan-2018-28-print-version.pdf

Otago Regional Transport Committee

Chairperson	Alexa Forbes, Otago Regional Council
Deputy Chairperson	Kate Wilson, Otago Regional Council
Members Total membership of the Otago committee equals eight. This is dictated by Section 105 of the Land Transport Management Act 2003 (LTMA). Representatives are appointed by the Regional Council on the nomination of NZ Transport Agency and each of the territorial local authorities.	Two regional council representatives (Chair and Deputy Chair); One representative from the Waka Kotahi NZ Transport Agency; One district council representative from each of the: ○ Central Otago District Council ○ Clutha District Council ○ Dunedin City Council ○ Queenstown Lakes District Council ○ Waitaki District Council Alternates: ○ Central Otago District Council ○ Clutha District Council ○ Dunedin City Council ○ Queenstown Lakes District Council ○ Waitaki District Council
Quorum / Voting	An Otago RTC meeting cannot proceed unless five committee members are present, at least one of whom must be representative of the regional council and no more than one to be an alternate representative. No voting will occur unless there is a quorum of committee members from those organisations allowed to vote on these matters. The Chairperson has a deliberative vote and in the case of an equality of votes does not have a casting vote. Clause 24 of the 7th Schedule of the Local Government Act otherwise applies to voting. The purpose of encouraging each organisation to have alternates is to ensure that each of the organisations involved in the RTC (the TAs, Waka Kotahi NZ Transport

	Agency and the regional council) is able to bring their organisation's view to the table and to report back the outcome to their organisation. Each organisation (i.e., the regional council, Waka Kotahi NZ Transport Agency and each district/city council) is therefore encouraged to have alternative representatives to act as a replacement should the appointed representative be absent from a meeting. Alternates will count towards a quorum but do not have voting rights.
Meeting frequency	The RTC normally meets at least three times a year but may meet more regularly depending on the work to be undertaken or the issues to be addressed. Where possible, members will be advised, in advance, of the meeting schedule for the year. Typically, the Otago RTC meets alongside the Southland RTC.

Purpose

To undertake the functions as prescribed by the *Land Transport Management Act 2003 and subsequent amendments.*

Role and Functions

The role and functions of the Regional Transport Committee are as follows:

1. To undertake the statutory requirements of the *Land Transport Management Act 2003*;

2. To prepare the Regional Land Transport Plan (RTLP) in co-operation with the Otago Regional Transport Committee, to prepare any applications to vary the RLTP and to process any applications to vary the RLTP (*LTMA Section 106(1)(a)*);

3. To prepare and adopt a policy that determines significance in respect of:

    a) any variations made to the RLTP;
    b) activities included in the RLTP (*LTMA Section 106(2)*).

4. To provide any advice and assistance the regional council may request on its transport responsibilities generally (*LTMA Section 106(1)(b)*);

5. To undertake monitoring to assess implementation of the Regional Land Transport Plan

including monitoring of the performance of activities (*LTMA Section 16(3)(f) and 16(6)(e)*), in co-operation with the Otago Regional Transport Committee;

6. To consult on a draft RLTP for the region in accordance with the consultation principles specified in Section 18 and 18A of the *Land Transport Management Act 2003,* in co-operation with the Otago Regional Transport Committee;

7. To complete a review of the RLTP during the six-month period immediately before the expiry of the third year of the Plan (*LTMA Section 18CA*) in co-operation with the Otago Regional Transport Committee;

8. To advise the Council on any significant legislative changes, programmes, plans or reports relating to the region's transport system;

9. To prepare and implement regional transportation planning studies, or pan-regional studies with the Otago Regional Transport Committee, when necessary;

10. To represent and advocate for transport interests of regional and/or pan-regional Otago Southland concern;

11. To consider and submit on transport-related policies, plans and consultation documents issued by the Ministry of Transport, Waka Kotahi NZ Transport Agency, regional/district councils, and other relevant organisations as considered appropriate, including submitting jointly with the Otago Regional Transport Committee, when appropriate;

12. To liaise with the Ministry of Transport, Waka Kotahi NZ Transport Agency, Commissioner of Police, regional/district councils, KiwiRail, the Department of Conservation and other interested parties on transport matters, and advise the Council on any appropriate new initiatives as considered appropriate;

13. To operate in a collaborate manner in the combined meetings of the Otago and Southland regional transport committees and to engage with other regional transport committees and working parties, which from time-to-time may be established;

14. To consider advice and recommendations from the Otago Southland Regional Technical Advisory Group.

Members' responsibilities for reporting back to the organisation they represent

Each member of the Regional Transport Committee is expected to report back to their own organisations following each Regional Transport Committee meeting or workshop on matters discussed at those Committee meetings, and with particular reference to the RLTP. A briefing paper will be produced by the Regional Council for distribution to stakeholders and to assist members with their report back responsibilities.

Terms of Membership

Should a vacancy occur in the membership of the RTC, the Committee Secretary shall report this to the next meeting of the Council, which shall then invite the nominating organisation to nominate a replacement.

Delegated Authority – Power to Act

The Regional Transport Committee:

1. Does have the ability to appoint a panel to hear RLTP, submissions, working parties, advisory groups and, where there is urgency or special circumstances, a sub-committee to deal with any matters of responsibility within the Committee's Terms of Reference and areas of responsibility, and to make recommendations to the Committee on such matters, provided that a sub-committee does not have power to act other than by a resolution of the committee with specific limitations;
2. Does have the ability to make decisions in accordance with the Terms of Reference and the *Land Transport Management Act 2003*.

Power to Act (for the information of Council)

The Regional Transport Committee has the power to:

1. Monitor any transport activities of the regional council, territorial authorities and New Zealand Transport Agency in order to report on progress on the Regional Land Transport Plan;
2. Prepare and recommend variations to the Regional Land Transport Plan that trigger the RTC's significance policy;
3. Consider and recommend transportation planning studies and associated outcomes;
4. Provide recommendations to relevant government agencies on transport priorities for the region and the allocation of national or regional transport funds.

Council Established Working Groups

Meetings to be as required

Port Otago Liaison Working Group *Established by Council, 2016* *Reports to Council*	Chair, Cr Kevin Malcolm Council Chair – Cr Gretchen Robertson Finance Co- Chair – Cr Tim Mepham Council Deputy Chair - Cr Lloyd McCall CE
ECO Fund Decision Panel Chair *Established by Council in 2019* *Reports to Environmental Implementation Committee and Council*	Cr Alan Somerville
Land and Water Regional Plan Governance Group *Established by Council, May 2020* *Reports to Environmental Science and Policy Committee*	Council Chair - Cr Gretchen Robertson Cr Andrew Noone
ORC Whare Rūnaka Internal Steering Group *Established by Council, October 2021* *Reports to Council*	Council Chair – Gretchen Robertson Cr Kevin Malcolm Cr Andrew Noone
Otago Integrated Catchment Management (ICM) Working Group *Established by Council, September 2022* *Reports to Environmental Implementation Committee*	Council Chair – Cr Gretchen Robertson Council Deputy Chair – Cr Lloyd McCall
Submissions Working Group *Established by Council, December 2022 (to be confirmed)* *Purpose:* • To receive draft submissions and provide input and review feedback, ahead of submissions going to Council for approval, to help with timeliness and direction. • To seek support from councillors for submission positions ahead of them going to council for approval. *Reports to Regional Leadership Committee*	Members: • Cr Lloyd McCall (Chair) • Cr Andrew Noone • Cr Kate Wilson • Cr Elliot Weir

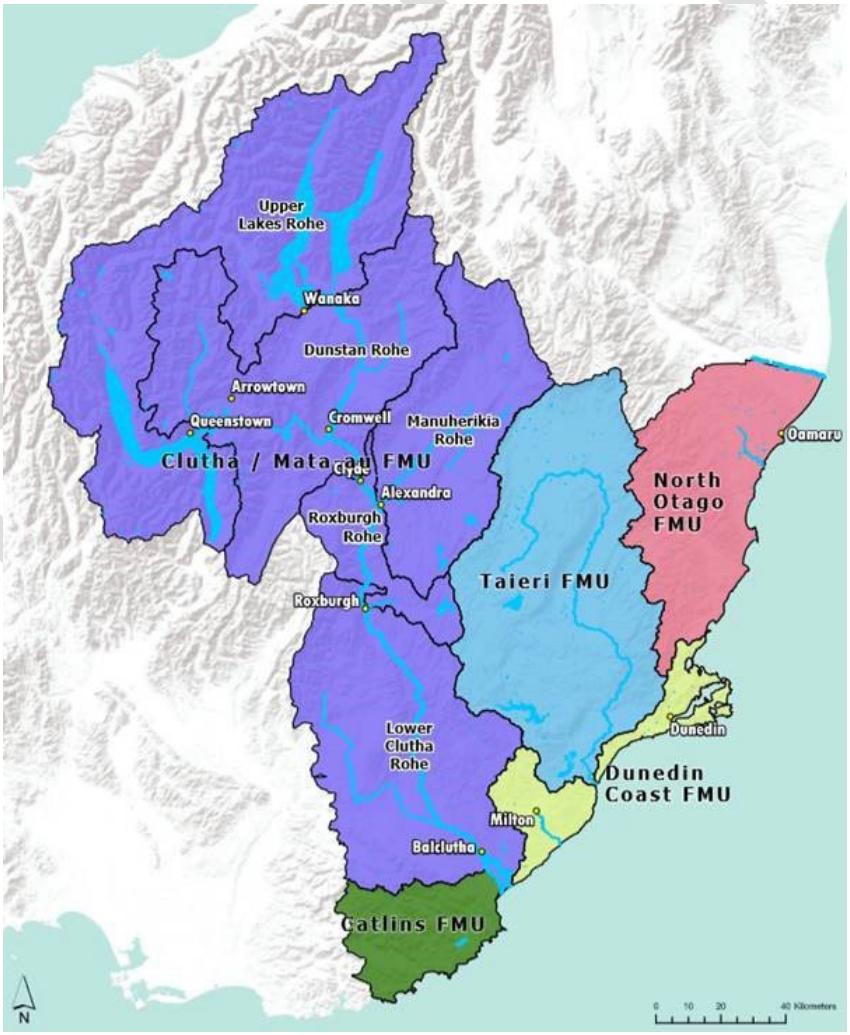
Resource Management Reform Working Group *Established by Council, December 2022 (to be confirmed)* *Purpose:* • Monitor and review resource management reform and its impacts on the ORC • Provide updates to Council about developments • Provide inputs to submissions on the reforms *Reports to Regional Leadership Committee*	Members: • Cr Andrew Noone (Chair) • Cr Kate Wilson • Cr Lloyd McCall • Cr Elliot Weir

Appointments as Representatives of Council

Mana to Mana	All councillors
Te Rōpū Taiao Southland	Chair – Cr Gretchen Robertson Deputy Chair – Cr Lloyd McCall
LGNZ Zone 6	Chair – Cr Gretchen Robertson Deputy Chair – Cr Lloyd McCall Attendance shared between Councillors
Regional Sector Group (RSG)	Chair/CE
Mayoral Forum	Chair/CE
CDEM Joint Committee	Chair/CE
Connecting Dunedin (transport related)	Cr Andrew Noone Cr Kate Wilson Cr Elliot Weir
Way to Go (Whakatipu) (transport related)	Cr Andrew Noone Cr Alexa Forbes Cr Kate Wilson
Dunedin Tracks Network Trust (DnTNT)	Cr Kate Wilson Cr Bryan Scott (alternate)
Dunedin Hospital Liaison Group	Cr Gretchen Robertson
Tertiary Precinct Planning Group	Cr Elliot Weir
Lower Waitaki River Scheme Liaison	Cr Kevin Malcolm
Otago Catchment Community (OCC) Governance Group	Cr Bryan Scott Cr Kate Wilson (alternate)
Manuherekia Exemplar Catchment Programme Governance Group (MfE)	Cr Kevin Malcolm Cr Michael Laws and Cr Lloyd McCall (alternate) CE
Regional Co-ordination Group for Wilding Conifer Management	Cr Alexa Forbes Cr Kate Wilson (alternate)
Regional Co-ordination Group for Wallaby Management	Cr Kevin Malcolm Cr Gary Kelliher (alternate)
Otago South River Care Group Governance Group	Cr Kate Wilson Cr Tim Mepham (alternate)
Grow Well Whaiora Partnership Governance Group (Queenstown Future Development Strategy Group) *note a separate paper will come on the DCC Future Development Strategy Group, as the governance arrangements for this are still to be considered	Cr Andrew Noone Cr Alexa Forbes

Land and Water Regional Plan: Freshwater Management Unit (FMU) and Rohe Liaisons

Upper Lakes Rohe	Cr Michael Laws
Dunstan	Cr Alexa Forbes
Manuherekia	Crs Kevin Malcolm, Tim Mepham
Lower Clutha	Crs Andrew Noone, Alan Somerville
Taieri	Crs Gretchen Robertson, Lloyd McCall
Dunedin and Coast	Crs Bryan Scott, Elliot Weir
North Otago	Crs Kevin Malcolm, Elliot Weir
Catlins	Crs Kate Wilson, Lloyd McCall
Roxburgh	Cr Gary Kelliher (Kate Wilson, alternate)
Clutha Mata-Au (Main Stem)	Cr Kate Wilson (Bryan Scott, alternate)
Arrow and Cardrona	Cr Bryan Scott



6.2. Consideration of Meeting Schedule for 2023

Prepared for:	Council
Report No.	GOV2276
Activity:	Governance Report
Author:	Liz Spector, Governance Support Officer
Endorsed by:	Pim Borren, Interim Chief Executive
Date:	7 December 2022

PURPOSE

[1] To adopt a meeting schedule for the Otago Regional Council for 2023.

EXECUTIVE SUMMARY

[2] At the inaugural Council meeting on 26 October 2022, a meeting schedule for the remainder of 2022 was adopted. At the 9 November 2022 Council Meeting a new committee structure was adopted setting the frequency of committee meetings. A draft schedule of meetings for 2023 has been put together for Council review and consideration.

[3] The proposed schedule for meetings in 2023 provides for monthly Council meetings, quarterly Finance, Environmental Implementation Committee, Public Transport, Regional Leadership, Safety & Resilience, and Audit & Risk committees and bi-monthly or as needed Environmental Policy & Science committee meetings. Workshops will also be scheduled on an as needed basis.

[4] A full agenda will be prepared and notified prior to each meeting, and it is anticipated meetings or workshops will commence at 9 a.m.

[5] It is also proposed that a Council or Committee meeting will be held in a location outside of Dunedin no less than twice annually through the triennium, with the first meeting being a Council Meeting on 26 April and Environmental Policy & Science Committee meeting on 27 April in Balclutha and the second an Environmental Policy & Science Committee meeting on 10 October, in Oamaru.

RECOMMENDATION

That the Council:

1) ***Notes** this report with draft meeting schedule.*
2) ***Adopts** the meeting schedule for 2023.*

OPTIONS

[6] The Council must adopt a schedule of meetings to allow legal obligations to be met. Adoption of the proposed meeting schedule does not preclude changes to future meeting dates and locations.

CONSIDERATIONS

Strategic Framework and Policy Considerations

[7] Council and Committee meetings enable decision making to support the strategic framework and development of policies and plans.

Financial Considerations

[8] Regular Council and Committee meetings are budgeted for in annual budgets.

Significance and Engagement Considerations

[9] Not applicable.

Legislative and Risk Considerations

[10] Meetings must be publicly notified in advance Under Part 7, section 46 of the Local Government Official Information and Meetings Act 1987, and Schedule 7, cl 19 of the Local Government Act 2002.

Climate Change Considerations

[11] Not applicable.

Communications Considerations

[12] The adopted Council calendar will be published on the website.

NEXT STEPS

[13] The Governance Team will send outlook calendar invitations to councillors for the agreed meeting dates and will publish the meeting dates on the Council's website and the local newspaper per statutory obligations.

ATTACHMENTS

1. Meeting Schedule [**6.2.1** - 1 page]
2. Meeting Schedule - Calendar View [**6.2.2** - 1 page]

					OTAGO REGIONAL COUNCIL SCHEDULE OF MEETINGS 2023							
2023	**Council (Monthly)**	**CE/Councillor only (monthly)**	**Workshop Days**	**Environmental Policy and Science Committee (As needed)**	**Finance Committee (Quarterly)**	**Audit and Risk Committee (Quarterly)**	**Environmental Implementation Committee (Quarterly)**	**Public Transport Committee (Quarterly)**	**Regional Leadership Committee (Quarterly)**	**Safety and Resilience Committee (Quarterly)**	**Chief Executive Performance Review (Biannually)**	**Regional Transport Committee**
JANUARY - NO MEETINGS SCHEDULED												
FEB 1 & 2			2/02/2023	1/02/2023			2/02/2023	1/02/2023	2/02/2023			
FEB 22 & 23	22/02/2023	22/02/2023 AM	23/02/2023		23/02/2023					23/02/2022		24/02/2023
MAR 22 & 23	22/03/2023	22/03/2023 AM	23/03/2023			23/03/2023						
APR 26 & 27	26/04/2023 away meeting		27/04/2023 site visits	27/04/2023 away meeting								
MAY 10 & 11			AP 11/05/2023				11/05/2023	10/05/2023	10/05/2023	10/05/2023		
MAY 24 & 25	24/05/2023	24/05/2023 AM	25/05/2023		25/05/2023 AP							
JUNE 22						22/06/2023						
JUNE 28 & 29	28/06/2023	28/06/2023	29/06/2023									
JULY 26 & 27	26/07/2023	26/07/2023	27/07/2023	27/07/2023								
AUG 9 & 10							9/08/2023	9/08/2023	10/08/2023	10/08/2023		
AUG 23 & 24	23/08/2023	23/08/2023 AM	24/08/2023		24/08/2023							
SEPT 20 & 21	20/09/2023	20/09/2023 AM	21/09/2023			21/09/2023						
OCT 11 & 12			12/10/23 site visits	11/10/2023 away meeting								
OCT 25 & 26	25/10/2023	25/10/2023 AM	26/10/2023		26/10/2023							
NOV 8 & 9			9/11/2023				8/11/2023	9/11/2023	8/11/2023	9/11/2023		
NOV 22 & 23	22/11/2023	22/11/2023 AM	23/11/2023									
DEC 6 & 7	6/12/2023	06/12/2023 AM	7/12/2023			7/12/2023						

Proposed 2023 Council Calendar

	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
Saturday				1			1					
Sunday	1			2			2			School hols 1		
Monday	2			3	1		School hols 3			2		
Tuesday	3			4	2		4	1		3		
Wednesday	4	Cttees 1	1	5	3		5	2		4	1	
Thursday	5	2	2	6	4	1	6	3		5	2	
Friday	6	3	3	Good Friday	5	2	7	4	1	6	3	1
Saturday	7	4	4	8	6	3	8	5	2	7	4	2
Sunday	8	5	5	9	7	4	9	6	3	8	5	3
Monday	9	Waitangi 6	6	Easter Mon	8	Q Bday 5	10	7	4	9	6	4
Tuesday	10	7	7	Easter Tue	9	6	11	8	5	10	7	5
Wednesday	11	8	8	School hols 12	C-ttees 10	7	12	Cttes 9	6	Cttee Oamaru 11	Cttees 8	Council 6
Thursday	12	9	9	13	11	8	13	10	7	Visits 12	9	W/shops 7
Friday	13	10	10	14	12	9	Matariki 14	11	8	13	10	8
Saturday	14	11	11	15	13	10	15	12	9	14	11	9
Sunday	15	12	12	16	14	11	16	13	10	15	12	10
Monday	16	13	13	17	15	12	17	14	11	16	13	11
Tuesday	17	14	14	18	16	13	18	15	12	17	14	12
Wednesday	18	15	15	19	17	14	19	16	13	18	15	13
Thursday	19	16	16	20	18	15	20	17	14	19	16	14
Friday	20	17	17	21	19	16	21	18	15	20	17	15
Saturday	21	18	18	22	20	17	22	19	16	21	18	16
Sunday	22	19	19	23	21	18	23	20	17	22	19	17
Monday	23	20	20	24	22	19	24	21	18	Labour 23	20	18
Tuesday	24	21	21	ANZAC 25	23	20	25	22	19	24	21	19
Wednesday	25	Council 22	Council 22	Council Balclutha 26	Council 24	21	Council 26	Council 23	Council 20	Council 25	Council 22	20
Thursday	26	W/shops 23	W/shops 23	cttе/visit 27	w/shops 25	A&R 22	Cttees 27	W/shops 24	W/shops 21	W/shops 26	W/shops 23	21
Friday	27	24	24	28	26	23	28	25	22	27	24	22
Saturday	28	25	25	29	27	24	29	26	23	28	25	23
Sunday	29	26	26	30	28	25	30	27	24	29	26	24
Monday	30	27	27		29	26	31	28	Schl hol 25	30	27	25
Tuesday	31	28	28		30	27		29	26	31	28	26
Wednesda			29		31	28		30	27		29	27
Thursday			30			Councill 29		31	28		30	28
Fri			31			w/s 30			29			29
									30			30
												31

6.3. Review of Open Actions (Public) from 2019-2022 Meetings

Prepared for:	Council
Report No.	GOV2278
Activity:	Governance Report
Author:	Amanda Vercoe, General Manager Governance, Culture and Communication
Endorsed by:	Pim Borren, Interim Chief Executive
Date:	7 December 2022

PURPOSE

[1] To present and report against outstanding actions from the 2019-2022 triennium.

EXECUTIVE SUMMARY

[2] The 2019-2022 outstanding actions register, with updated reporting against progress has been included as an attachment to this report. These are outstanding, mostly related to timing around implementing operational requests, though some also represent delays in work.

[3] Due to the disestablishment of some of the 2019-2022 Committees, we propose to report against all 2019-2022 actions quarterly, through a paper to Council (subject to Council agreement) instead of adding them to the 2022-2025 actions register for Council and its Committees.

RECOMMENDATION

That the Council:

1) ***Notes** this report.*
2) ***Notes** the progress against outstanding 2019-2022 actions.*
3) ***Agrees** to receive quarterly reporting against these 2019-2022 actions.*

BACKGROUND

[4] See attached action list from 2019-2022.

DISCUSSION

[5] Nil.

OPTIONS

[6] Council can choose to receive reporting against 2019-2022 outstanding actions quarterly as proposed, via inclusion in the 2022-2025 Council and Committees action registers.

CONSIDERATIONS

Strategic Framework and Policy Considerations

[7] Additional council resolutions and actions should be in alignment with ORC's Strategic Directions and policies and plans.

Financial Considerations

[8] Where actions are not budgeted, this should be highlighted to councillors when the decisions are being made, so that an understanding of how these will be funded is clear.

Significance and Engagement

[9] Not applicable.

Legislative and Risk Considerations

[10] Additional actions that result in new or unplanned and unbudgeted work can result in delays to existing work programmes.

Climate Change Considerations

[11] Not applicable.

Communications Considerations

[12] Not applicable.

NEXT STEPS

[13] Staff will continue to implement the outstanding actions and report against these.

ATTACHMENTS

1. Action List prior triennium [**6.3.1** - 9 pages]

Action Register

Search Criteria

Showing Completed Items: No

Applied Filters

End Meeting Date: 25th Oct 2022
Action Statuses: Assigned, In Progress
Meeting Types: Audit and Risk Subcommittee, Council Meeting, Data and Information Committee, Finance Committee, Governance, Communications and Engagement Committee, Implementation Committee, Regulatory Committee, Strategy and Planning Committee

Generated By: Liz Spector
Generated On: 01/12/2022 at 10:55am

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
Finance Committee 2021.08.25	PPT2113 Outcome of Interim $2 Dunedin Fare	Assigned	Invite a standing group of ORC and DCC councillors and officers to enhance and guide Dunedin public transport. **Res FIN21-120**	Councillor	**09/02/2022 Personal Assistant to CE & Chairperson** DCC Councillors have agreed to meet with ORC Councillors to discuss PT issues and this item will be discussed when a meeting occurs. **29/03/2022 Personal Assistant to CE & Chairperson** Meeting held with DCC 24/03/2022.	12/08/2021
Implementation Committee 2021.12.08	PPT2117 Outcomes from Dunedin Electric Bus Trial	Assigned	Prepare a report for consideration to the 8 June 2022 Implementation Committee regarding scope to prepare for a transition to a zero-emission public transport fleet. **IMP21-118**	General Manager Operations, Principal Advisor - Transport Planning	**09/11/2022 Governance Support Officer** Doug Rodgers (Mgr Transport) states "[W]ork yet to begin on this report. Resourcing challenges being addressed to deliver." **21/11/2022 Executive Assistant, Operations** A consultant has been engaged to prepare this report.	08/06/2022
Finance Committee 2022.06.01	CS2232 Annual Plan 2022-23 Deliberation and Recommendations	Assigned	Provide internal staff advice for consideration of better measures for Climate Change Action in time for preparation of the 2023/24 Annual Plan. **Res FIN22-113**	General Manager Governance, Culture and Customer, General Manager Policy and Science, Manager Corporate Planning, Principal Advisor - Climate Change	**01/09/2022 Governance Support Officer** 31/08/2022 - GM Policy and Science: To meet with Manager Corporate Planning. **09/09/2022 General Manager Policy and Science** 9 September 2022 : Manager Corporate has passed to Principal Climate Change Advisor to manage. No further action required from GM, Policy & Science at this time. **24/11/2022 General Manager Governance, Culture and Customer**	01/03/2023

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
					This has been discussed, and internal consideration is underway for the 2023/24 Annual Plan advice.	
Finance Committee 2022.06.01 (AP Deliberations)	CS2232 Annual Plan 2022-23 Deliberation and Recommendations	Assigned	Prepare a report on potential sites for public access to flood and drainage schemes. Staff and Councillors to consult with landowners/cycleway/walkway proponents before completing development of the policy on public access to flood and drainage infrastructure. **Res FIN22-114**	General Manager Operations	**02/08/2022 Executive Assistant, Operations** Staff are liaising with the proponents of the Mosgiel to Dunedin Cycleway.	
Finance Committee 2022.06.01 (AP Deliberations)	CS2232 Annual Plan 2022-23 Deliberation and Recommendations	Assigned	Provide staff advice on potential costs and work required to develop a business case for Central/Lakes public transport in time for consideration during consultation on the draft 2023/24 Annual Plan. **Res FIN22-115**	General Manager Operations, Manager Transport	**02/08/2022 Executive Assistant, Operations** To Start. **05/09/2022 Executive Assistant, Operations** Costs have yet to be set, however we have a figure of around $150,000 as an appropriate figure to undertake this. Work will continue on this , however this is not in the Annual Plan. We wouldn't necessarily need WKNZTA funding. QLDC Wanaka Optimisation Business Case will address the initial stages of the investigation.	01/03/2023
Extraordinary Council Meeting Public Excluded 2022.08.29	POL2206 Consideration of the pORPS into freshwater and non freshwater parts	Assigned	Organise a workshop to discuss the process for when iwi are or are not consulted on legal matters - following Cr Wilson asking for clarity on the process.	Interim Chief Executive		31/03/2023
Governance, Communications and Engagement	GOV2247 ORC - Approach to Engagement	Assigned	The CE to schedule a workshop with Councillors on the draft engagement framework before December 2022.	General Manager Governance,	**24/11/2022 General Manager Governance, Culture and Customer**	30/11/2022

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
Committee 2022.09.15			**Res GCE-109 (5)**	Culture and Customer, Interim Chief Executive	A consultant has been organised to undertake this work, but it was not possible to complete the Council workshop and the draft framework prior to this December meeting. This will be undertaken early in the New Year.	
Governance, Communications and Engagement Committee 2022.09.15	GOV2247 ORC - Approach to Engagement	Assigned	The Chief Executive is to present to Council for consideration by 9 December 2022 a draft community engagement framework and implementation plan developing an ORC-wide approach to engagement and provide a funding mechanism for this implementation in time for consultation on the 2023/24 Annual Plan. **Res GCE22-109 (2)**	General Manager Governance, Culture and Customer, Interim Chief Executive	**24/11/2022 General Manager Governance, Culture and Customer** A consultant has been organised to undertake this work, but it was not possible to complete the Council workshop and the draft framework prior to this December meeting. This will be undertaken early in the New Year.	09/12/2022
Audit and Risk Subcommittee Public Excluded 2022.09.21	CS2254 Consideration of Draft Annual Report for the year ended 30 June 2022	Assigned	Undertake a peer review for the financial year ended 30/06/2023 annual accounts process for the valuation of Port Otago Limited shares. **Res AR22-131 (5)**	General Manager Corporate Services and CFO		30/06/2023
Audit and Risk Subcommittee 2022.09.21	CS2253 Budgeting for Operational Deficits	Assigned	Reporting to Audit and Risk on work towards achieving a balanced budget is to be provided during the 2022-2025 triennium regularly and monitored through the Actions Register. **Res AR22-130 (3)**	General Manager Corporate Services and CFO		01/09/2025
Audit and Risk Subcommittee 2022.09.21	CS2253 Budgeting for Operational Deficits	Assigned	Provide detailed information as to how public transport deficits have occurred in a staff report to the first meeting of the Audit and Risk Subcommittee following the 8/10/22 election. **Res AR22-130 (4)**	General Manager Corporate Services and CFO		28/02/2023
Audit and Risk Subcommittee	CS2254 Consideration of	Assigned	The next Audit and Risk Subcommittee in consultation with the auditors shall	General Manager		30/09/2023

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
Public Excluded 2022.09.21	Draft Annual Report for the year ended 30 June 2022		consider the process for auditors to provide a supplemental Management Letter for release to the public. **AR22-131 (4)**	Corporate Services and CFO		
Finance Committee 2021.05.26	CS2126 Long Term Plan 2021-2031 Deliberation and Recommendations	In Progress	Establish a harbour facilities and management plan in a collaboration with iwi, community boards and groups, DCC and Port Otago with a budget of $100k in each of financial years 2 and 3 of the LTP2021-31. Staff and Councillors to determine ToRs. **Res FIN21-109**	General Manager Operations	**09/12/2021 General Manager Strategy, Policy and Science** On track. **16/03/2022 Governance Support Officer** *This action was reassigned to the GM Operations on 16/3/2022.* **28/03/2022 Executive Assistant** An approach to developing the plan is being scoped. Initial discussion held with Port Otago Ltd's consultant. The consultant is arranging staff to meet with Port Otago. **21/11/2022 Executive Assistant, Operations** Port Otago briefed ORC staff on their proposed amenities plan.	30/06/2023
Finance Committee 2021.05.26	CS2126 Long Term Plan 2021-2031 Deliberation and Recommendations	In Progress	Provide a paper discussing re-establishment of the Otago Regional Council Environmental Awards. **Res FIN21-111**	General Manager Regulatory and Communications	**23/11/2022 Governance Support Officer** A report is being prepared for consideration as part of the 2023/2024 Annual Plan process.	31/12/2021
Finance Committee 2021.05.26	CS2126 Long Term Plan 2021-2031 Deliberation and Recommendations	In Progress	Consider the potential of realtime data and citizen science input when upgrading or investing in assets. If this requires extra funding, those purchases should be brought back to Council for consideration. **Res FIN21-109**	General Manager Policy and Science, General Manager Strategy, Policy and Science, Manager Science	**09/12/2021 General Manager Strategy, Policy and Science** On track. **01/09/2022 Governance Support Officer**	30/06/2022

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
					13/07/2022 GM Policy and Science: Discussed with Co-Chairs of Strategy and Planning and agreed to bring the discussion to the new Council following the election. **22/11/2022 Governance Support Officer** **22/11/2022 GM Policy and Science:** A paper on citizen science will be brought to the Environmental Policy and Science Committee at an appropriate time.	
Council Meeting 2021.09.29	Chairperson's Report	In Progress	Undertake a review of the Manuherekia Governance decision making process. **Res CM21-167**	Chairperson, Councillor	**09/02/2022 Personal Assistant to CE & Chairperson** Delayed until TAG complete science work. **29/03/2022 Personal Assistant to CE & Chairperson** Still waiting for TAG to complete the science work.	09/12/2021
Finance Committee 2022.02.23	CS2210 Taieri Flood and Drainage Rates	In Progress	Provide further information on benefits, exacerbators, affordability/fairness and simplicity/logic and provide this information three weeks prior to the next Finance Committee meeting to allow the working group to provide a report to the next Finance Committee meeting as to next steps. **FIN22-104**	General Manager Corporate Services and CFO	**18/05/2022 General Manager Corporate Services and CFO** Working Group met on 5 May 2022.	25/05/2022
Implementation Committee 2022.03.09	OPS2206 Environmental Implementation Quarterly Update	In Progress	Develop a credible methodology to measure effectiveness of the Pest Management Plan with regards to combatting the #1 pest in Otago (rabbits). **Res IMP22-102**	General Manager Operations	**28/03/2022 Executive Assistant** This is currently under investigation by the Environmental Implementation Team **21/11/2022 Executive Assistant, Operations**	

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
					ORC methodology for measuring rabbit numbers has been reviewed, a report will be taken to the first Environmental Implementation Committee	
Governance, Communications and Engagement Committee 2022.03.10	COMS2202 Otago Regional Council Community Survey 2021 - Draft Action Plan	In Progress	Staff to report back on progress against the Community Survey Action Plan 2021/22 as part of reporting results of the 2022/2023 survey. **Res GCE22-101**	General Manager Regulatory and Communications	**01/09/2022 Executive Assistant - Regulatory** The results of the 2022 ORC Community Survey will be presented to the 7 December 2022 Council Meeting alongside a report on progress made against the 2021 action plan.	31/12/2022
Council Meeting 2022.03.23	ENG2202 Bylaw Approval to Commence Consultation	In Progress	Dr Palmer (GM Operations) to develop a policy around construction of walkways on ORC owned floodbanks by 30 June 2022. **Res CM22-132**	General Manager Operations	**22/04/2022 Executive Assistant** A policy is in preparation. The timeframe is unable to be met due to the resolution made by finance committee on 1 June 2022. **21/11/2022 Executive Assistant, Operations** A draft policy has been prepared and will be finalised as part of the action for RES FIN22/114.	30/06/2022
Strategy and Planning Committee 2022.04.13	HAZ2201 Otago Active Faults: Planning Options	In Progress	Provide a report to the relevant Council Committee by January 2023 on a recommended option and implementation plan, developed in collaboration with Territorial Authorities, for incorporating a tiered approach into planning frameworks across Otago. **Res SP22-104**	General Manager Operations, Manager Natural Hazards	**14/06/2022 Executive Assistant, Operations** In preparation.	31/01/2023
Council Meeting 2022.06.29	CS2233 Annual Plan 2022/23 - Adoption	In Progress	Staff to report back to Council on alternative catchment based rating systems for river management (and potentially other catchment funded work streams) in time for consideration in the 2023/2024 Annual Plan. **Res CM22-196**	General Manager Corporate Services and CFO, Manager Corporate Planning	**17/08/2022 General Manager Corporate Services and CFO** This will be included in the Annual Plan 2023-24 process.	30/06/2023

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
Data and Information Committee 2022.06.30	PPT2208 Queenstown and Dunedin Patronage Report	In Progress	Transport staff was requested to provide a media briefing to ODT/other new outlets regarding public transport issues as presented in the quarterly report. **Res DAIC22-109**	General Manager Operations, Implementation Lead - Transport, Manager Transport	**02/08/2022 Executive Assistant, Operations** To be arranged. **23/08/2022 Executive Assistant, Operations** We have released a number of positive media releases regarding increased patronage. More recently we have had media releases regarding the effectiveness of the reduced timetable on limiting missed trips. Media releases for positive outcomes have been ongoing. **06/09/2022 Executive Assistant, Operations** A briefing will be prepared shortly. **09/11/2022 Governance Support Officer** Doug Rodgers (Mgr Transport) states: Interim Transport Manager has met with Communications team to develop and programme a briefing. Work is ongoing to finalise.	14/09/2022
Audit and Risk Subcommittee 2022.09.21	CS2253 Budgeting for Operational Deficits	In Progress	The Chief Executive to provide a report on how to achieve an annual balanced budget (and how to achieve that when unanticipated expenditures arise) to the first meeting of the Finance Committee meeting following the 8/10/22 election. **Res AR22-130 (2)**	General Manager Corporate Services and CFO, Interim Chief Executive	**17/11/2022 Governance Support Officer** The Chief Executive to provide at first Finance Committee meeting of the 2022-2025 Triennium.	01/02/2023

Action Register

Search Criteria

Showing Completed Items: Yes
Include Items Completed From: 28/09/2022

Applied Filters

End Meeting Date: 25th Oct 2022
Action Statuses: Completed
Meeting Types: Audit and Risk Subcommittee, Council Meeting, Data and Information Committee, Finance Committee, Governance, Communications and Engagement Committee, Implementation Committee, Regulatory Committee, Strategy and Planning Committee

Generated By: Liz Spector
Generated On: 01/12/2022 at 11:01am

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
Finance Committee 2021.05.26	CS2126 Long Term Plan 2021-2031 Deliberation and Recommendations	Completed	Staff to ensure opportunities exist to allow all interested parties to be fully involved in any scheme performance review process. **Res FIN21-108**	General Manager Operations	**23/02/2022 Executive Assistant** Opportunities are being provided through community engagement sessions. The first sessions were held in December 2021. The next sessions will be held in late 2022. **21/11/2022 Executive Assistant, Operations** Next session to be held in early 2023.	01/06/2022
Data and Information Committee 2021.06.09	SPS2132 Coastal Monitoring Programme	Completed	Present a paper to the Strategy and Planning Committee in 2022 outlining monitoring options for a State of the Environment network and seek Council approval to implement the programme. **Res DAIC21-103**	General Manager Policy and Science, General Manager Strategy, Policy and Science, Manager Science	**09/12/2021 General Manager Strategy, Policy and Science** On track. **19/01/2022 Governance Support Officer** Gwyneth Elsum: The Science Team are doing work such as coastal mapping that will provide input into the development of a coastal monitoring programme. **01/09/2022 Governance Support Officer** July 2022 - GM Policy and Science: The Coastal Monitoring Programme is in place.	30/06/2022
Finance Committee 2022.02.23	COMS2201 Enviroschools Programme Future Options	Completed	Allow consideration of options presented for the future of Enviroschools for inclusion in the 2023/24 Annual Plan. **FIN22-105**	General Manager Corporate Services and CFO, General Manager Regulatory and Communications	**07/03/2022 General Manager Regulatory and Communications** Paper on Enviroschools expansion options presented to Council. Resolved the Chair Noone was to take this matter to the Mayoral forum for discussion	31/03/2023
Audit and Risk Subcommittee 2022.02.24	A&R2201 Legislative Compliance and Mandatory	Completed	Track Public Records Act 2005 recordkeeping on the Action Register until the new records management system is implemented.	General Manager Corporate Services and CFO, Team	**02/05/2022 General Manager Corporate Services and CFO**	30/09/2022

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
	Documents Register		**Res AR22-102**	Leader Investigations	Action will remain until new records system is implemented later in 2022 **29/11/2022 General Manager Corporate Services and CFO** Action marked as complete as this will be tracked in the register and noting in action register is not separately required. Records system implementation has commenced and will be completed by 30 June 2023.	
Finance Committee 2022.06.01 (AP Deliberations)	CS2232 Annual Plan 2022-23 Deliberation and Recommendations	Completed	Ensure a balanced budget is achieved for the 2022/23 financial year. This may mean savings will need to be made to allow for inevitable unforeseen costs which may arise. **Res FIN22-119**	Interim Chief Executive	**17/11/2022 Governance Support Officer** A confidential report was provided to Council on 9 November 2022 about achievement of a balanced budget for 2022/23.	30/06/2023
Finance Committee 2022.06.01 (AP Deliberations)	CS2232 Annual Plan 2022-23 Deliberation and Recommendations	Completed	Group suggestions and ideas raised in 2022/23 Annual Plan submission comments by how they relate to the ORC's strategic directions and highlight them to the new council prior to developing the 2023/24 Annual Plan. **Res FIN22-117**	General Manager Corporate Services and CFO, Manager Corporate Planning	**17/08/2022 General Manager Corporate Services and CFO** This will be included as part of the Annual Plan 2023-24 process.	28/02/2023
Finance Committee 2022.06.01 (AP Deliberations)	CS2232 Annual Plan 2022-23 Deliberation and Recommendations	Completed	Provide an issues discussion paper on potential funding of large site-led community biosecurity projects to the 14 September 2022 Implementation Committee. **Res FIN22-116**	General Manager Operations	**02/08/2022 Executive Assistant, Operations** In preparation. **05/09/2022 Executive Assistant, Operations** A paper is being brought to the 14 September 2022 Implementation Committee.	19/05/2022

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
Finance Committee 2022.06.01 (AP Deliberations)	CS2232 Annual Plan 2022-23 Deliberation and Recommendations	Completed	Report any cost savings to the adopted 2022/23 Annual Plan budgets quarterly to Council. **Res FIN22-118**	General Manager Corporate Services and CFO, Manager Corporate Planning, Manager Finance - Reporting	**17/08/2022 General Manager Corporate Services and CFO** This will be continue to be reported as part of the quarterly report provided to the Finance Committee.	28/02/2023
Data and Information Committee 2022.06.30	SPS2221 Lake Snow Report	Completed	The Chair, Deputy Chair, and CE are to follow up with other councils facing issues like Lake Snow with a view to jointly requesting help from Central Government. **Res DAIC22-108**	General Manager Policy and Science, Interim Chief Executive	**04/07/2022 General Manager Policy and Science** No action required from GM. Will support the CE if required **17/11/2022 Governance Support Officer** The CE will follow up with Minister Mahuta on 29 November and report back to Council. **22/11/2022 Governance Support Officer** 21/11/2022 GM Policy and Science: Letter sent to Ministers and Bay of Plenty Regional Council has supported through conversations with the MfE. This is also on the agenda for the Regional CEO meeting.	28/09/2022
Audit and Risk Subcommittee 2022.08.11	CS2242 Corporate Policy Overview Report	Completed	Provide dashboard data for the Working Better Together framework from the first Audit and Risk meeting of the next triennium. **Res AR22-124**	General Manager Governance, Culture and Customer	**24/11/2022 General Manager Governance, Culture and Customer** The team is working on dashboard reporting and this will be presented to the first A&R subcommittee meeting.	28/02/2023
Audit and Risk Subcommittee Public Excluded 2022.09.21	CS2254 Consideration of Draft Annual Report for the year ended 30 June 2022	Completed	Include authority to release information to the public in delegations for future Audit and Risk Subcommittees when adopting terms of reference. **AR22-131 (3)**	General Manager Governance, Culture and Customer	**24/11/2022 General Manager Governance, Culture and Customer** This will be added for consideration to the delegations for the Subcommittee Audit and Risk.	30/11/2022

Document	Item	Status	Action Required	Assignee/s	Action Taken	Due Date
Council Meeting 2022.09.28	GOV2254 Regional Wellbeing Framework Progress Update and Draft Report	Completed	Regional Wellbeing Framework Workshop to be held with the new Council, once iwi have reviewed and provided feedback on the draft Framework. **Res CM22-248**	General Manager Governance, Culture and Customer	**24/11/2022 General Manager Governance, Culture and Customer** Discussed with the team, and a workshop has been pencilled in for early in the New Year. Reporting against this measure is included in the quarterly activity reporting.	30/11/2022

6.4. Otago Lakes Management Review report

Prepared for:	Council
Report No.	STG2207
Activity:	Environmental: Water
Author:	James Adams, Senior Strategic Analyst Andrea Howard, Acting Manager Strategy
Endorsed by:	Amanda Vercoe, General Manager Governance, Culture and Customer
Date:	7 December 2022

PURPOSE

[1] To deliver the Otago Lakes Management Review report, prepared for the Council by Landpro Ltd (Landpro).

[2] To summarise linkages with current and planned work that will contribute to addressing several the report's recommendations, outline where future initiatives need to be pursued, and seek approval to proceed to the next stage of the scoping process.

EXECUTIVE SUMMARY

[3] In response to concerns regarding aspects of lake management, such as invasive weed control, the protection of pristine water bodies, and improved amenity values, Council requested work be undertaken to determine what steps needed to be taken to address lake management issues and opportunities.

[4] Stage 1 of the agreed process was to 'confirm the case for an Otago Lakes Strategic Plan'. ORC contracted Landpro to review the status of lake management in Otago, to identify gaps, and provide recommendations for addressing those gaps. The attached report contributes to this objective and suggests that an Otago Lakes Strategic Plan is required to guide holistic and integrated lakes management.

[5] The report identifies 43 strategic and operational recommendations aimed at improving lakes management in Otago. While there is more work to do, many recommendations contained in the report are already being actioned through existing initiatives and large-scale work programmes including the Land and Water Regional Plan (LWRP) process and via the newly established Integrated Catchment Management (ICM) programme.

[6] Once existing programmes of work are completed (or furthered), the parallel workstreams should result in accelerated progress towards improved management of Otago's lakes.

[7] Any future strategy will need to carefully consider existing work to 'connect the dots' and avoid unnecessary duplication, whilst also filling gaps and providing an overarching direction of travel. This will undoubtedly require further (and potentially considerable) resourcing, at a level which reflects Council's overall aspirations. Council will also need

to consider whether this is an ORC plan, or a regional collaboration plan jointly owned by the range of stakeholders responsible for the management of lakes.

[8] Further work is also required to confirm the strategic issues that a Plan should address, the environmental outcomes sought and to consider the responsibilities of the multiple stakeholders who have interests or formal responsibilities in lake management, including but not limited to the Council. The review report from Landpro notes that the management of lakes is "complex, involving many agencies and a wide variety of issues and pressures".

[9] Council now needs to decide whether to proceed to Stage 2 of the agreed scoping approach, namely, to make 'recommendations on the scope of an Otago Lakes Strategic Plan.'

RECOMMENDATION

That the Council:

1) ***Notes** the attached Otago Lakes Management Review report.*

2) ***Notes** the range of complementary business as usual work underway or planned that will address many of the recommendations contained in the Otago Lakes Management Review report.*

3) ***Notes** that recommendations not currently under active consideration (through current or planned work programmes) will be reviewed, prioritised, and costed as part of the 2024-2034 Long-Term Plan process.*

4) ***Approves** proceeding to Stage 2 of the scoping study, namely, to make recommendations on the scope of an Otago Lakes Strategic Plan.*

5) ***Directs** staff to draft, scope, and investigate the internal and external resourcing required to develop an Otago Lakes Strategic Plan to inform the 2024-2034 Long-Term Plan process.*

6) ***Considers** the additional level of medium-term investment Council is willing to support to implement an Otago Lakes Strategic Plan, so that any additional funding required can be considered as part of the 2024-2034 Long-Term Plan process.*

BACKGROUND

[10] On 26 May 2021, Council requested:

"[E]stablishment and funding of a scoping study for an Otago Lakes Strategic Plan, in association with relevant stakeholders, that creates lake management plans aimed at improving the environmental and amenity value of these water bodies, and acquire the science, partnerships and information for these purposes with an initial budget of $100,000 in each of years one and two of the LTP 2021-31."

[11] On 10 November 2021, the Strategy and Planning Committee approved a staff proposal to divide the scoping study into two separate stages:

a. Stage 1: confirming the case for developing a strategic plan, and
b. Stage 2: if a strategic plan was seen as an appropriate tool, clarifying the purpose, scope, and function of a strategic plan.

[12] This division into two stages recognised the need to mitigate the risk of overlap with ORC's existing projects, primarily the review of the Land and Water Regional Plan and

development of new integrated catchment management plans. It also recognised the complexity of the roles and responsibilities in lakes management.

[13] Stage 1 included:

a. Reviewing the state of knowledge on Otago's lakes, their values, states, and pressures.
b. Reviewing the lake management framework, including key planning or strategic documents across all relevant parties; roles and responsibilities; and coordination mechanisms.
c. Assessing gaps in lake management, and opportunities to enhance lakes management, in consultation with key stakeholders.
d. recommendations for additional methods to address identified gaps and opportunities, beyond the development of an Otago Lakes Strategic Plan.

[14] A contract was awarded to Landpro in June 2022 to perform stage 1, which has become known as the Otago Lakes Management Review.

[15] To balance competing priorities, mana whenua expressed a preference to use existing methods for consultation and input rather than duplicate effort. Both Aukaha and Te Ao Mārama Inc. are heavily involved in development of the LWRP and ICM and see these as the key mechanisms to provide a comprehensive framework for managing all lakes in a way that will uphold and restore the unique mauri of each one.

[16] The final report (Attachment A) was delivered in late November 2022. The report provides an important input by way of a stocktake into the strategic plan scoping exercise.

[17] Further work is required to confirm the strategic issues that a strategic plan should address, the environmental outcomes sought, and to consider the responsibilities of the multiple stakeholders who have interests or formal responsibilities in lake management, including but not limited to the Council. The report notes that the management of lakes is "complex, involving many agencies and a wide variety of issues and pressures".

[18] As agreed by Council in November 2021, Stage 2 of the scoping study will clarify:

a. Whether an Otago Lakes Strategic Plan should cover all lakes or certain specified lakes only;
b. The Plan's purpose and function, and how it integrates with existing workstreams;
c. Whether the Plan will be jointly developed and owned with key stakeholders, or be an ORC-owned document;
d. Associated governance arrangements to oversee the delivery and review;
e. Any further resourcing required;
f. Consultation needs and approaches.

DISCUSSION

Otago Lakes Management Review

Methodology

[19] The definition of "Lake" is broad and includes over 7,000 water bodies in Otago. Landpro established a selection process to rationalise the number of lakes included in the study;

83 lakes were considered as part of their review, providing a good representative cross section of lakes in Otago.

[20] Landpro developed 5 categories for Otago Lakes, based on their geographical location/characteristics and the extent and nature of human use:
a. Deep Water Lakes (e.g., Lakes Hāwea, Wānaka and Whakatipu Waimāori/Whakatipu).
b. Remote High-Altitude Lakes (e.g., Lakes Ōtaka/Lochnagar, Unknown and Ōtākaha/McKellar).
c. Accessible High-Altitude Lakes (e.g., Waiwhakaata/Lake Hayes, Ōturu/Diamond Lake, Glenorchy, Punamāhaka/Waikāmāhaka/Moke Lake)
d. Dams and Reservoirs (e.g., Lake Onslow)
e. Coastal and Lowland Lakes (e.g., Roto-nui-a-Whatu/Lake Tuakitoto)

[21] Page 170 of the report (Appendix A) summarises the process undertaken by Landpro to select and categorise the sub-set of lakes for inclusion in the review.

Stakeholders

[22] Landpro approached a range of stakeholders to identify current management practices, regimes, concerns, and values held by these stakeholders regarding lakes. The full list of stakeholders approached is given in the report (page 201 of the report). Not all stakeholders responded, and our mana whenua partners chose to refer to values and priorities articulated through other Council processes due to competing demands. In brief, the list of stakeholders approached includes:
a. Local Authorities
b. Takata whenua
c. Environmental groups
d. Government agencies
e. Community and industry groups
f. Electricity generators

[23] Consultation was undertaken over a period of seven weeks. Feedback was obtained through:
a. An online survey using Microsoft Forms
b. Online, phone and in person interviews.

[24] Groups were asked about their role in lakes management, geographic area of interest, interactions with other stakeholders, concerns held for Otago's lakes and any perceived gaps in management or current knowledge.

[25] Once the report reached a completed draft stage, Landpro held two stakeholder workshops in early November to discuss the report and the recommendations in it.

[26] Stakeholder feedback generally centred around four themes:
a. There is a deficiency in knowledge and understanding of lakes;
b. There is currently no specific management for lakes via a planning or regulatory framework, at both an individual lake scale and catchment scale;
c. Collaboration and coordination between agencies are generally good at an individual level, but lacking at a strategic or overall level;
d. Identified 'degraded' lakes have been the focus of restoration efforts lately, but the protection of lakes still in good shape also needs to be prioritised.

[27] Stakeholder feedback commented on the range of consultation processes being undertaken by the Council, most required by legislation, and the perceived lack of follow-up implementation. Some patience is required for these processes to be concluded and for the benefits of increased funding and new resources to be realised.

Outcomes

[28] The report identifies research, information gaps and management gaps for lakes management. It concludes that completing or enhancing efforts in these areas will contribute to an evidence-based, holistic management regime.

[29] To that end, the report makes 43 recommendations for improvement, across the following areas:

a. Strategy (9 recommendations)
b. Management (9 recommendations)
c. Collaboration, Coordination and Consultation (9 recommendations)
d. Information and monitoring (16 recommendations)

[30] The keystone recommendation is to develop an Otago Lakes Strategic Plan in partnership with mana whenua, and in consultation with key stakeholders and the wider community.

[31] The report notes that there are several agencies with responsibilities[1] for, or interest in, lake management in the region but has not clearly identified who is responsible for what. However, ORC is well placed to provide leadership and regional oversight in this space.

[32] The report proposes that an Otago Lakes Strategic Plan would sit alongside ORC's existing regional strategies and be used to guide ORC's activities and provide direction for other agencies or groups involved or interested in lakes management. It would also inform and support the development of other management frameworks such as the LWRP and Catchment Action Plans via the ICM process.

Initial Reflections and Linkages to Existing Work

[33] Staff have undertaken a preliminary review of the report recommendations. Attachment B provides a basic comparison of existing workstreams and planned work against the report recommendations.

[34] While there is further work to be undertaken, a number of the recommendations contained in the report are already being progressed through existing initiatives and large-scale work programmes including the LWRP process and ICM programme.

[35] The key recommendation to develop a strategy has some overlap with the remaining 42 recommendations. Of those 42 recommendations, ORC's current work programmes already have planned work or work underway that addresses 26 of them to at least some extent.

[1] Including but not limited to various central government agencies (DoC, LINZ, MPI, NIWA), territorial authorities (CODC, QLDC etc), energy sector, alongside interest groups such as environmental groups, catchment groups, recreational groups etc.

[36] Council's Proposed Otago Regional Policy Statement 2021 (Proposed RPS 21) sets the direction for future management of Otago's natural and physical resources and includes objectives for freshwater management, including lakes.

[37] The National Policy Statement for Freshwater Management (NPSFM) requires councils to include environmental outcomes as an objective, or multiple objectives, in its regional plans[2] and establish action plans for implementing those outcomes.[3] This work is underway through the LWRP process, and the ICM programme, and consultation is underway with communities about priorities for lakes management.

[38] Once these various existing programmes of work are completed (or progressed further), the parallel workstreams should result in significant progress towards improved management of Otago's lakes. A future strategy will need to carefully consider existing work to 'connect the dots' and avoid unnecessary duplication.

[39] ORC's new Environmental Implementation team is well positioned to contribute to many environmental goals, including actions relating to lakes management. The ICM programme, including Integrated Catchment Action Plans is a flexible tool that, although organised at an FMU level, is being developed to deliver outcomes at various levels. A more 'fit for purpose' planning framework will also contribute positively to improved lake management and associated environmental outcomes.

[40] As pointed out in the review, a key focus of the strategic plan should be to better facilitate collaboration across the multiple external stakeholders who have responsibilities concerning lake management in the region. This will ensure the collective efforts of a range of organisations can be prioritised and coordinated for the greatest impact.

OPTIONS

[41] The broad options at this stage include:

a. Proceed with Stage 2 to clarify the purpose, scope, and function of a strategic plan, or
b. Defer Stage 2 and revisit once existing initiatives (e.g., LWRP, ICM) have been progressed to a point where strategic gaps are more obvious.

Why develop a Lakes Strategy?

[42] Strategy documents are useful when there is a need for:

a. Growth and development of management techniques and approaches;
b. A high level of coordination across teams or activity areas;
c. Partnership/coordination with other organisations;
d. Clarity in decision making, especially with complex issues.

[43] They can also assist with providing clarity and transparency where there is high public interest.

[44] The report clearly indicates that lakes management has the above needs. Briefly, a strategy could:

[2] NPSFM, Clause 3.9(4)

[3] NPSFM, Clause 3.15

a. Provide overarching guidance and direction to ensure connected and holistic lakes management;
b. Identify sources of information, initiatives, and responsibilities relating to lakes, and the relationships between those sources, to guide ORC in its decision making and policy direction;
c. Provide clarity for both ORC and stakeholders regarding roles and responsibilities;
d. Provide criteria for prioritising research and monitoring needs and focus areas for restoration and protection efforts;
e. Be a touchstone for and support engagement with the public and community groups involved in lakes management;
f. Recommend the best model/s for regional external input and advice required to support better outcomes[4].

What are the caveats?

[45] Factors to be aware of in deciding whether to progress with developing an Otago Lakes Strategic Plan include:

a. LWRP plan development is advanced, and the plan is due for notification in late 2023, so the influence of a new strategic plan on that process is likely to be limited;
b. Such a plan is non-statutory and has limited weight in the planning hierarchy;
c. Many factors recommended for inclusion are already the subject of existing workstreams, as mentioned above and outlined in Attachment B;
d. The community and stakeholders are already overwhelmed with consultation and inputs to plans and legislative reform;
e. Implementation of the plan will need to be properly resourced, and this is not included in current budgets. Council will need to determine the level of investment they are willing to support, noting that this is one part of ORC's overall work programme;
f. The recommendations provide for a very detailed and comprehensive focus on lakes alone – this would need to be properly integrated with the broad range of ORC's obligations.

Overall

[46] There is most likely a case for developing a specific strategy for lakes management. However, the focus of the strategy needs to be carefully considered. A new strategy will need to effectively integrate both with ORC's existing stated objectives for freshwater management, and with current workplans.

CONSIDERATIONS

Strategic Framework and Policy Considerations

[47] Progressing to Stage 2, to scope out a Strategic Plan would be consistent with ORC's Strategic Directions and complement work already underway to address environmental protection and degradation.

Financial Considerations

[48] A budget of $200,000 over 2 years has been allocated to the scoping of an Otago Lakes Strategic Plan over the next 2 years, under the Long-Term Plan.

[4] Including, for example, considering how to incorporate such requests as the concept for an Otago Alpine Lakes Assessment Working Group for the Upper Lakes Rohe. It was proposed that such a group would determine information gaps, agree on research necessary to answer key questions and inform physical and biological models for the lakes, ensure regular assessment of key lake attributes and recommend lakes' management measures.

[49] Full development of the Otago Lakes Strategic Plan is not accounted for within current budgets. While some recommendations from the Otago Lakes Management Review report are within the scope of existing budgets, others are not.

[50] Depending on how ambitious Council (and its key stakeholders) wish to be, additional funding may be required to achieve the outcomes sought and progress may need to be phased and prioritised against other environmental domains.

[51] Implementation funding for the Otago Lakes Strategic Plan would need to be sought via the 2024-2034 LTP process.

Significance and Engagement

[52] This management assessment is consistent with ORC's Significance, Engagement and Māori Participation policy. However, note that mana whenua partnership will need to be to the forefront in developing responses to the recommendations and in the development of a broader strategic plan.

Legislative and Risk Considerations

[53] A strategic focus on lake health could help ORC more effectively and efficiently discharge ORC's responsibilities under the Local Government Act 2002 and Resource Management Act 1991.

Climate Change Considerations

[54] Climate change will likely have significant impacts on lake health. A strategic focus on Lakes could provide guidance to strategic decision making associated with ORC's climate change work programme.

Communications Considerations

[55] The Otago Lakes Management Review report will be made public via this Council paper. Updates on progress towards addressing the recommendations not already underway will be provided to future committees.

NEXT STEPS

[56] If approved, staff will develop a plan to implement the Stage 2 approach, including procuring any required resources. A workshop will be held with Council to elicit input into clarifying the scope of the Strategic Plan, and whether this is an ORC plan, or a regional collaboration Strategic Plan jointly owned by key stakeholders, alongside other matters outlined in the Otago Lakes Management Review report.

[57] The recommendations contained in the Otago Lakes Management Review report will continue to be reviewed by staff and, where appropriate, staff will provide updates on progress towards completing the recommendations. In many cases, this will be via existing programme reporting processes.

ATTACHMENTS

1. 22368 Otago Lakes Management Review Report Final 20221123 [**6.4.1** - 216 pages]
2. Lakes Management Review Recommendations Preliminary ORC staff assessment [**6.4.2** -5 pages]

LANDPRO

Make the most of your land

Otago Lakes Management Review

Prepared for Otago Regional Council

Prepared For

Otago Regional Council

Prepared By

Landpro Ltd
13 Pinot Noir Drive
PO Box 302
Cromwell
Tel +64 3 445 9905

QUALITY INFORMATION

Reference:	Mandis, K, Muller, T, Perkins, C (2022) Otago Lakes Management Review. Prepared for Otago Regional Council. Landpro. p.194
Date:	23 November 2022
Prepared by:	Kate Mandis, Tim Muller, Claire Perkins, Della Clark
Reviewed by:	Kate Scott
Client Review:	James Adams, Hugo Borges, Eve Bruhns and Libby Caldwell
Version Number:	2

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1. Executive Summary

Otago's lakes are a critical part of the region's identity and are highly valued for their natural character, recreation opportunities, species habitat, flood mitigation, water supply, electricity generation, tourism and cultural importance. Lakes are dynamic environments, vulnerable to degradation and once degraded are difficult to restore. The management of these lakes is complex, involving many agencies and a wide variety of issues and pressures.

As the region's leading organisation on freshwater management, biosecurity and navigation safety, the Otago Regional Council (ORC) has an important role in overarching lakes management. In light of this, and the complex and vulnerable nature of lakes, ORC are investigating whether there is a need for a new Otago Lakes Strategic Plan, or whether other initiatives are needed to enhance the way lakes are managed in the region.

This report documents the results of a scoping study commissioned by ORC in response to the suggestion of an Otago Lakes Strategic Plan. In order to confirm whether there is a need for such a plan, a stocktake was undertaken to review the current state of knowledge of lakes and their values, states and pressures, the existing management framework for lakes in Otago, and the roles and responsibilities of those involved in lakes management.

Because there are a very large number of lakes in Otago, it was necessary to select a subset of the lakes to enable a meaningful review within the time and budget constraints of the stocktake. As a first step, a process for the identification and selection of lakes included in this study was established. Through this process, 83 lakes were identified for inclusion in the study. These lakes were then divided into five categories to facilitate comparison and discussion:

- **Deep water lakes (DWL):** large, inland glacial lakes of several hundred metres depth.
- **Remote high-altitude lakes (RHAL):** natural lakes situated at higher altitude than the DWL (~300 m), which are not accessible by a short walk from the nearest road. Generally located within the DOC estate.
- **Accessible high-altitude lakes (AHAL):** Similar to RHAL, but experiencing potentially greater pressures due to being easily accessible.
- **Dams and reservoirs (DR):** Artificial or heavily modified lakes which are managed by humans for uses such as recreation, hydroelectricity, irrigation, and/or community water supply.
- **Coastal/lowland lakes (CLL):** Natural lakes and lagoons situated at less than 300 m elevation, typically near the coast and often situated within regionally significant wetlands.

A literature review focussing on the existing environmental state of the included lakes was then undertaken. Peer-reviewed and 'grey' literature related to existing ORC monitoring, as well as water quality and ecological health was reviewed to establish the current level of knowledge of lakes in addition to the state of their pressures. The Pressure-State-Impact (PSI) framework was adopted for this review to discuss the state of

and risks to each lake category. Results for each lake category are described in Table 1 below.

Table 1: Pressure-State-Impact Summary for Otago's Lakes

Lake category	Pressure/state/impact comments
All lakes	All lakes in Otago have the potential to be affected by climate change, and by invasive species. In the case of climate change, the effects are likely to be the greatest on shallower lakes, most notably the remote high-altitude lakes (RHAL; due to their location where the greatest temperature changes are projected) and coastal and lowland lakes (CLL; due to their proximity to the coast and vulnerability to sea level rise). Various invasive species are already established in lakes across Otago, ranging from exotic fish such as perch to pest plants and micro-organisms such as *lagarosiphon* and *didymo*. Vigilance is needed to prevent (or failing that, manage), further arrivals of pest species, or their spread to other Otago lakes. It is possible that pest species present further north in New Zealand may range-shift south or to higher altitudes as temperatures increase.
Deep water lakes	Overall, water quality in the DWL is very good; the best of the regularly monitored lakes discussed in this report. However, there is conflicting information on the trends in water quality and ongoing vigilance is needed to ensure that any degradation is identified early so that appropriate management steps can be taken. The main pressure affecting these lakes is increasing human activity in their catchments. Urban development of Queenstown and Wānaka (and associated discharges of stormwater and other contaminant sources) is probably the primary concern here, although agricultural intensification is also occurring in some areas near these lakes. Stormwater discharges to large water bodies such as Lakes Wānaka and Whakatipu are unlikely to result in meaningful increases in heavy metals and other contaminants throughout the lake (particularly given that the primary urban centres near each lake are relatively close to the outlets). However, it is possible that concerning concentrations of stormwater contaminants could develop locally. The great size and depth of these lakes is likely to increase their resilience to direct climate change impacts. However, hydrological changes in their upper catchments

	may have greater effects, for example increased sedimentation near tributaries. The deep water lakes have been affected by invasive species (e.g. Lake Snow and didymo), and further incursions are possible.
Remote high-altitude lakes	Very little is known about the state of these lakes, although given their mostly pristine catchments and limited human activity nearby, they may reasonably be expected to be in something close to their natural state. This is unlikely to change in the foreseeable future, although some lakes may be vulnerable to invasive species brought accidentally by back country users. As discussed above, these lakes may be particularly vulnerable to climate change impacts. In particular, it is possible that flora and fauna adapted to the cold climate these alpine lakes experience may struggle to adapt to warming conditions, and some pest species may range-shift southwards and/or to higher altitudes.
Accessible high-altitude lakes	Lakes Hayes and Johnson are both significantly impacted by elevated nutrient concentrations that have caused eutrophication. There is some evidence that ongoing management issues are resulting in improvement, at least in the case of Lake Hayes. However, restoration of these lakes is likely to take a very long time and will require active efforts to minimise nutrient inputs, among other measures. Very little information is available on the other lakes in this group. However, some are within catchments partially occupied by agriculture and/or housing and may be vulnerable to similar issues to those which affected Lakes Hayes and Johnson (though probably to a lesser extent). Blue Lake was found in one study to have elevated concentrations of heavy metals (inferred to be from acidic groundwater associated with historical mining activity). While not confirmed, if the inferred cause is correct, ongoing increases in contaminant concentrations would be expected.
Dams and reservoirs	Because these dams and lakes are in a wide variety of settings, they are subject to different pressures. Lake Dunstan is perhaps the best-studied lake in this group (disregarding the intensive investigations of Lake Onslow which are underway, but for the most part currently unpublished). Lake Dunstan has well publicised issues with sedimentation and aquatic pests (*lagarosiphon*). Most of these lakes are also potentially vulnerable to the same issues as lakes in other categories, to differing extents. For example, stormwater discharges to Lake Dunstan may become of concern as Cromwell grows, while many DR are in agricultural or horticultural catchments and may be affected to a lesser or greater degree by nutrients and other related inputs.

Coastal and lowland lakes	Many of these lakes are already in a degraded condition, owing in large part to their position low in catchments, downstream of various human activities. Often they are shallow and therefore vulnerable to both sediment (which can be readily resuspended by wind and waves) and temperature increases due to climate change. Some of these lakes are tidally influenced and subject to saline intrusion from time to time. As noted above, the intensity of these phenomena is expected to increase in the coming decades due to sea level rise.

Parallel to this literature review, a review of the relevant lake management documents, plans, policies, strategies and other management tools was undertaken. The direction provided by instruments under the Resource Management Act 1991 (RMA) and other national legislation, Pest Management Plans, Iwi Management Plans, District Regulations, Catchment management plans and resource consents was reviewed in the context of lakes management. The management framework review established that lakes management is governed by a very large number of documents, many of which have interrelated or overlapping functions and are administrated by a wide range of agencies.

Information about values attributed to Otago's lakes was also collated and documented in the stocktake. Values for freshwater have been well established for the Otago Region with extensive consultation occurring over recent years through a variety of processes. These processes include work led by ORC through regulatory procedures, including the development of the new Regional Policy Statement, changes to the existing Regional Plan Water for Otago, and the new Land and Water Regional Plan currently under development. Other community groups have initiated their own consultation processes to identify freshwater values, generally extending beyond lakes to all water bodies in their areas of interest, and takata whenua have documented cultural values attributed to the region's lakes through Iwi Management Plans, Cultural Values Statements and other planning processes.

Central to this stocktake was obtaining feedback from stakeholders involved in lakes management. At the outset of this process, potential stakeholders were identified. These ranged from those with a formal role in lakes management, key lake users, advocacy groups, catchment and community groups and other interested parties. Stakeholders were grouped into the following categories:

- Otago Regional Council staff;
- Takata Whenua
- Central Government Agencies;
- Territorial Authorities;
- Environmental Groups;
- Catchment-based Community Groups;
- Recreational Groups;
- Electricity Generators;

- Irrigation Companies;
- Rural Groups (including catchment groups);
- Harbourmasters, Water Safety and Marina Operators;
- Tourism;
- Education and Research; and
- Resident's Associations.

Stakeholder consultation took place over an eight-week period between July and September 2022. In total, 115 individual stakeholders were contacted representing 86 groups. Consultation was undertaken primarily using an online survey via Microsoft Forms, phone calls/emails or informal interviews. 43 responses were received from the online survey and 27 individuals were interviewed. In total, all stakeholder categories were represented in the feedback received, however not all individual groups contacted provided a response.

Representatives from Aukaha and Te Ao Marama were contacted for feedback for this study. Both organisations and the rūnaka they represent have existing relationships with ORC, formalised through partnership agreements. The preference is to rely on the existing methods for consultation that have been established through these partnership agreements to provide mana whenua input into ORC processes and decision making. Both Aukaha and Te Ao Marama are heavily involved in development of the Land and Water Regional Plan and Catchment Action Plans and see these as the key mechanisms to provide a comprehensive framework for managing all lakes in a way that will uphold and restore the unique mauri of each one (Aukaha, 2022).

Stakeholder feedback confirmed that lakes are highly valued by those involved in their management and Otago's communities. All stakeholders agreed that lakes are important and warrant our attention and protection but opinions on exactly how this should be done varied between stakeholders. Feedback generally centred around four themes:

- There is a deficiency in our knowledge and understanding of lakes;
- There is currently no specific management for lakes via a planning or regulatory framework, at both an individual lake scale and catchment scale;
- Collaboration and coordination between agencies is generally good at an individual level, but lacking at a strategic or overall level; and
- Identified 'degraded' lakes have been the focus of restoration efforts lately, but the protection of lakes still in good shape also needs to be prioritised.

Feedback also centred around the number and frequency of ORC related consultation processes in recent times. Many groups reported feeling that recent consultations from ORC have been repetitive and that the feedback provided in the past has not been used to inform future efforts. Stakeholders approached for this study often commented that they had previously (and recently) been approached by ORC or consultants acting on behalf of ORC about similar matters and expressed frustration at being asked about the same

questions or topics.

Another concern raised by many groups that span the region is the lack of an appropriate forum for them to give input into issues and options for lakes management. Recent consultations have involved online surveys and public meetings, with some stakeholders unable to effectively engage through these processes. More meaningful and considered consultation from ORC was desired by many who provided feedback into this study.

In considering all of the information gathered through this study, recommendations have been developed to assist with filling the identified knowledge and management gaps in order to enhance lakes management in Otago. These recommendations are outlined in full in Section 8, and each recommendation has been given a priority rating and timeframe. While ORC is currently developing the Land and Water Regional Plan and Catchment Action Plans, tools which will undoubtedly be important for lakes management, overall coordination, direction and focus is needed to ensure lakes are managed at an appropriate level.

The primary recommendation of this study is that lakes management in Otago requires overarching guidance and direction to ensure opportunities to provide for connected and holistic management are not missed. The gaps identified in this study, particularly those relating to deficiencies in information and collaboration, are at risk of not being addressed through the processes currently underway.

The Catchment Action Plan framework at a Rohe or FMU level could result in inadequate attention being paid to some of the region's more complex or vulnerable lakes as the CAP will cover a broad range of issues over a large geographic area. As evidenced in this study, there is a wealth of information, initiatives and responsibilities relating to lakes, but no one repository for this information. A strategic plan could address these matters, and guide ORC in its decision making and policy direction.

The intent of such a strategy is not to dictate the management of every lake in the region. Rather, the strategy (henceforth referred to as the Otago Lakes Strategy) could provide a place to capture guiding principles and information relating to lakes management that can be used to inform the development of the LWRP or a CAP. In addition to guiding the development of these key documents, the Strategy could also provide a mechanism to connect all parties who have a role to play in the various aspects of lakes management. The recommendation for an Otago Lakes Strategy is described below:

Develop an Otago Lakes Strategy for lakes management in Otago, in partnership with key stakeholders and mana whenua, addressing:

- *Desired outcomes for lakes management in Otago*
- *Guiding principles for how ORC will work in relation to lakes management*
- *Roles and responsibilities for lakes management, including overlapping functions*
- *Forums for collaboration between lake management agencies and other stakeholders*
- *Criteria for identifying and reviewing vulnerable and degraded lakes*
- *Criteria for prioritising projects in these catchments*
- *Identification of lakes that require (sub catchment) specific management*

- *Criteria for alignment of ORC funding (e.g. via the Long Term Plan or the Eco Fund) with management priorities*
- *Prioritisation of monitoring and research efforts, potentially through the creation of a lakes assessment working group*
- *Actions or efforts required urgently in relation to lakes management, monitoring and research ahead of the development of other tools such as the LWRP and CAPs.*

This strategy would sit alongside ORC's existing regional strategies, and can be used to guide ORC's activities and provide direction for other agencies or groups involved or interested in lakes management, and the development of other management frameworks such as the LWRP and CAPs.

This report considers that there is great potential in ORC's Catchment Action Plan initiatives, providing that the lake-specific issues are not lost due to the large geographic scale of these documents. Therefore, it is recommended that the Otago Lakes Strategy provide clear guidance on what waterbodies require particular or bespoke management. For some Rohe or FMU this may not be necessary. For example, the Upper Lakes Rohe is considered to be at a scale appropriate for management of the Deepwater Lakes and the other lakes in their catchments. However, the lakes within the Taieri FMU are so diverse a single Catchment Action Plan may not adequately address the complex management required across all of the lakes in the FMU.

Other management and collaboration recommendations identified through this study and classed as high priority include:

- *Address lake levels, water quality load limits, aquatic lake biodiversity and cumulative land use management for lake catchments in the Land and Water Regional Plan development.*
- *Highlight vulnerable or degrading lakes (or lake categories) within the Catchment Action Plan process, to ensure that specific issues with these waterbodies is not lost through an FMU or Rohe scale action plan.*
- *Ensure that Catchment Action Plan development working groups include representatives or input from key lakes management stakeholders such as District Councils, LINZ or electricity generators.*
- *Identify areas in lakes catchments (in collaboration with District Councils) that are more sensitive to land use and development, and encourage planning controls to minimise effects on the relevant lakes.*
- *Tailor public consultation processes to all stakeholder groups with an interest in lakes management. Public meetings and online surveys are generally not the most appropriate way to obtain feedback from groups like DOC, Fish and Game, Electricity Generators etc.*
- *Develop, encourage and support effective community groups, both urban and rural, focused on lakes or catchment issues. Leverage this resource and incentivise communities to work together around the management of lakes in the region. Recognise that community groups expend significant personal input and that leaving these groups to it if they are performing well is not the best way to realise the benefits provided by these groups.*
- *Enable ORC representatives to attend catchment group, community group and other forums relating to lake management on an ongoing basis. In particular, ORC attendance at the Guardians of Lake Wānaka forum is recommended.*

A full list of management and collaboration recommendations is provided in Section 8.

Although there is a significant amount of information available on Otago's lakes, important data gaps remain,

and the information that does exist is present in disparate locations and formats, limiting its usefulness. There is a need to increase monitoring of lakes in Otago overall. Priority recommendations for improving information and monitoring are summarised below, and outlined in full in Section 8:

- *Create and maintain a database of water quality information submitted with consent applications, compliance monitoring or in published articles, similar to the databases for water take records, contaminated sites, or GIS bore locations*
- *Generate a map of lake catchments and overlay this with Land Cover Data Base layers to identify land use at catchment scale, including changes over time. Catchments with a high or increasing proportion of urban or intensive agricultural land uses should be prioritised for input modelling, monitoring and management.*
- *Recognise and document local knowledge about lakes (and other waterbodies) in the region.*

What is clear from this study is that while ORC is not responsible for all aspects of lakes management, other groups, agencies and stakeholders look to the Council for direction and guidance on these matters. An Otago Lakes Strategy could set outcomes for Otago's lakes, inform ORC's work programmes through the prioritisation of projects, establish criteria for identifying vulnerable and degraded lakes requiring specific management and establish a framework for collaboration. A strategy could complement the current framework, and provide a pathway to holistic management of these critical waterbodies.

ORC is in an opportune position to provide direction for lakes management, through the existing and developing tools and relationships with other groups, agencies and stakeholders. By providing strategic guidance for the management of these water bodies, management and information gaps can begin to be filled. The recommendations outlined in this report aim to assist ORC in achieving holistic, effective, evidence-based lakes management.

2. Introduction

Often referred to as "the jewels in Otago's crown", Otago's lakes are a critical part of the region's identity, economy and its communities' overall well-being. Lakes are highly valued by local and regional communities, as well as visitors to the region, for the recreational opportunities they provide and for their scenic value. They have historic and current significance to takata whenua and are important to Māori for ara tāwhito (traditional travel routes) and mahika kai (food gathering) resources, and feature in many traditional stories about the region. Otago's lakes play a crucial role in providing habitat for a number of aquatic and avian species, assist with buffering flooding, and supply many communities with their drinking water. They attract visitors and fuel the tourism industry in their surroundings. They contribute to New Zealand's security of electricity supply by providing renewable energy generation, and support the region's agricultural and horticulture sector through irrigation. They have an important role to play in mitigating the effects of climate change.

Lakes are vulnerable to degradation and once degraded are difficult to restore. Issues like sedimentation, algal blooms and invasive species are already present in the region, and the state of Otago's lakes is varied across the region. Each lake has its own unique set of values, attributes, threats and pressures.

Management of lakes in Otago is complex: it involves multiple agencies and addresses a wide variety of issues and pressures. As the regions' leading organisation on freshwater management, biosecurity and navigation safety, the Otago Regional Council (ORC) has an important role in overarching lakes management. While there are initiatives underway to address freshwater management in the region, more may need to be done in view of the value and diversity of Otago's lakes, their vulnerability, and the complexity of the current management framework.

In May 2021, Council requested that a scoping study for an Otago Lakes Strategic Plan be carried out (ORC, 2021a). As a first step, the scoping study's aim is to review current lake management practices in Otago, with the view of confirming the need for a new Otago Lakes Strategy or the opportunities for other initiatives that will enhance management of lakes in the region.

This report summarises the results of this stocktake, including:

- The current state of knowledge of lakes, their values, states and pressures
- The existing management framework for lakes in Otago
- The roles and responsibilities of those involved in lakes management
- Feedback from stakeholder consultation with those involved or interested in lakes management
- Identified gaps and opportunities for enhancing lakes management.

This report provides recommendations on how best to fill the identified gaps and take advantage of any opportunities.

3. Otago's Lakes

3.1 Background

3.1.1 Selection and categorisation of lakes

The process of identifying lakes for inclusion in this review is discussed in detail in Appendix 2. Briefly, we have focussed on named lakes, which were identified initially from LINZ data and ORC's *Regional Plan: Water*. A small number of additional lakes were subsequently added because they have a name not recorded in these sources, and/or have other specific values which warranted their inclusion.

Details of the lakes included are given in Table 2. There are numerous ways these lakes could be categorised, however for the purposes of this review they have been divided into five groups based on their geographical location/characteristics and the extent and nature of human use of the lakes:

- **Deep water lakes (DWL):** large, inland glacial lakes of several hundred metres depth. Includes Lakes Whakatipu, Wānaka and Hāwea. (See note on Lake Hawea in 3.3.1).
- **Remote high-altitude lakes (RHAL):** natural lakes situated at higher altitude than the DWL (~300 m), which are not accessible by a short walk from the nearest road. Generally located within the DOC estate. Typical examples: Lochnagar and Lakes McKellar and Harris.
- **Accessible high-altitude lakes (AHAL):** Similar to RHAL, but experiencing potentially greater pressures due to being easily accessible. Typical examples: Lakes Hayes and Johnson, Blue Lake.
- **Dams and reservoirs (DR):** Artificial or heavily modified lakes which are managed by humans for uses such as recreation, hydroelectricity, irrigation, and/or community water supply. Typical examples: Lakes Dunstan, Roxburgh and Onslow, Poolburn Reservoir.
- **Coastal/lowland lakes (CLL):** Natural lakes and lagoons situated at less than 300 m elevation, typically near the coast and often situated within regionally significant wetlands. Typical examples: Lakes Waihola and Tuakitoto, Tomahawk Lagoon

Otago's lakes are shown in Figures 1 to 5, below.

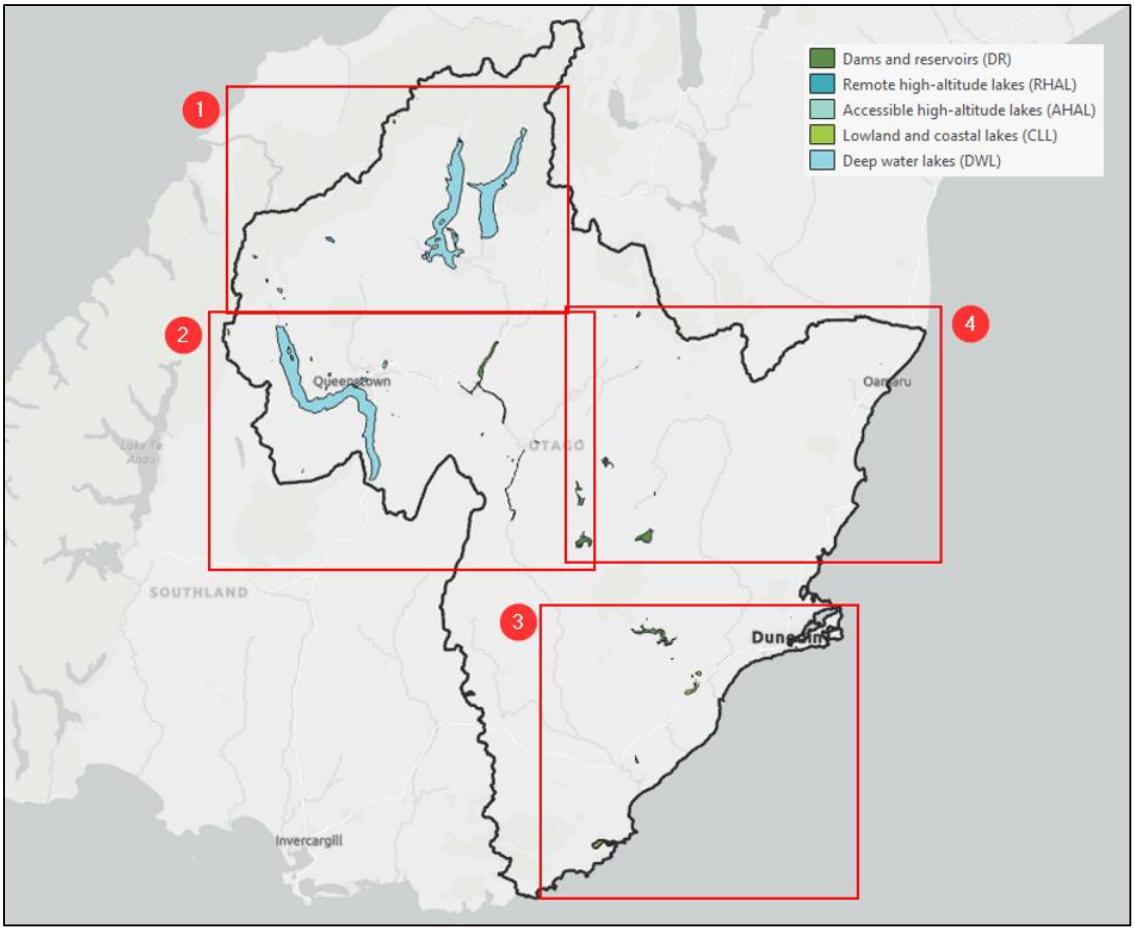

Figure 1: Locations of selected lakes (see also following figures)

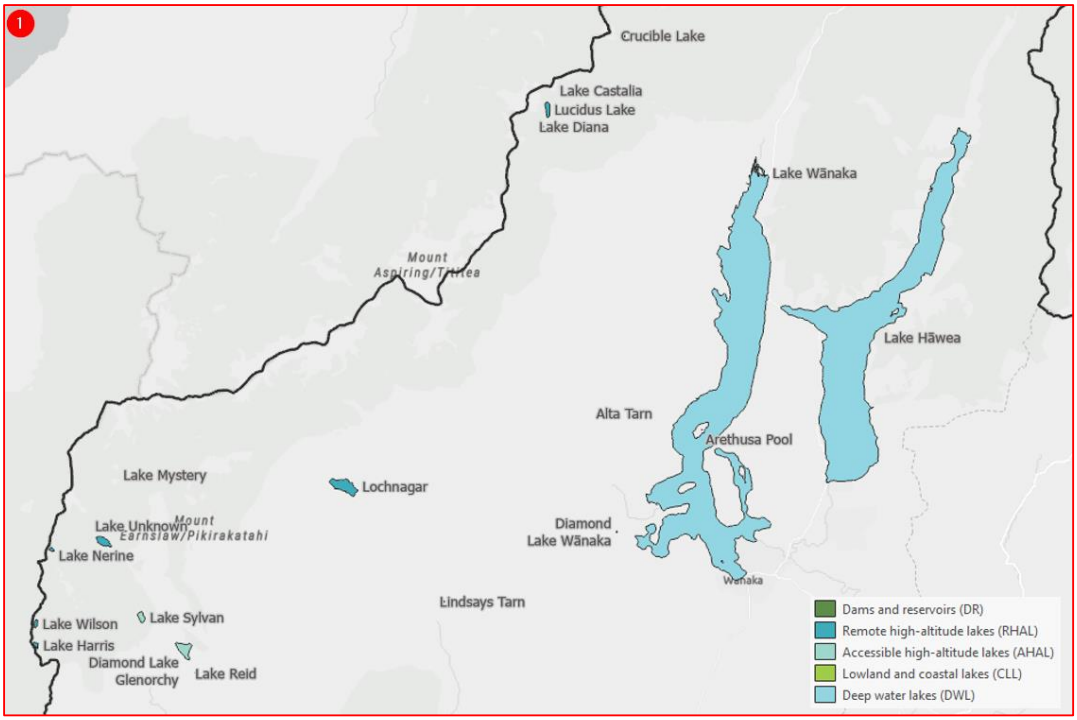

Figure 2: Inset 1 - Locations of selected lakes. Not to Scale.

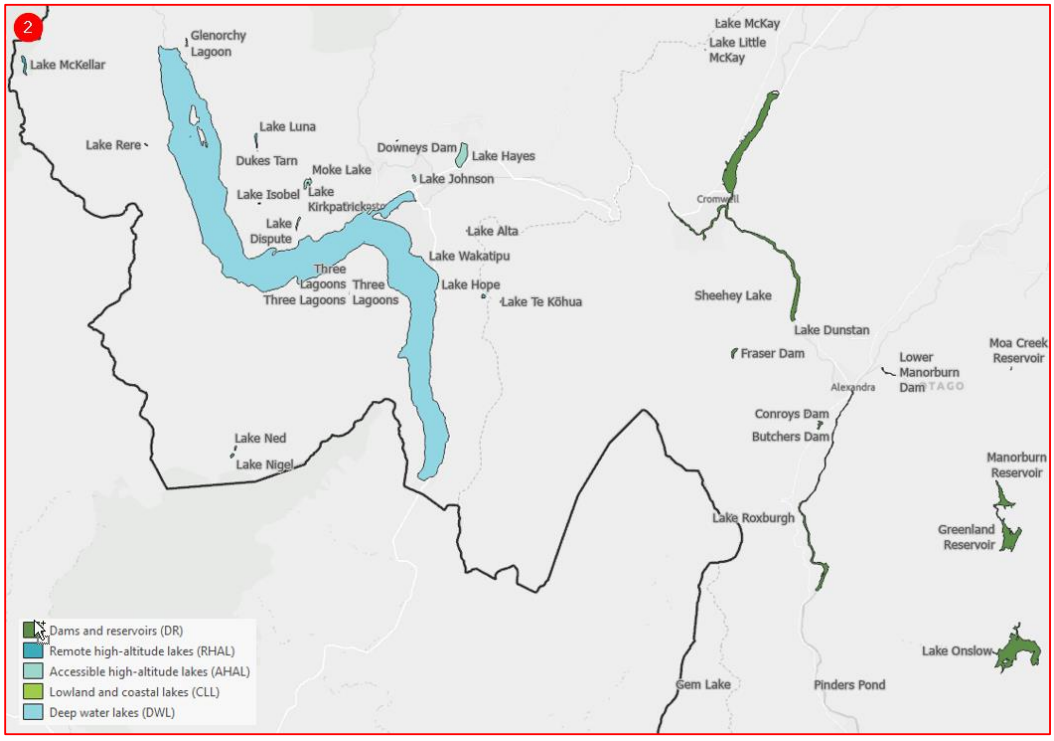

Figure 3: Inset 2 - Locations of selected lakes. Not to scale.

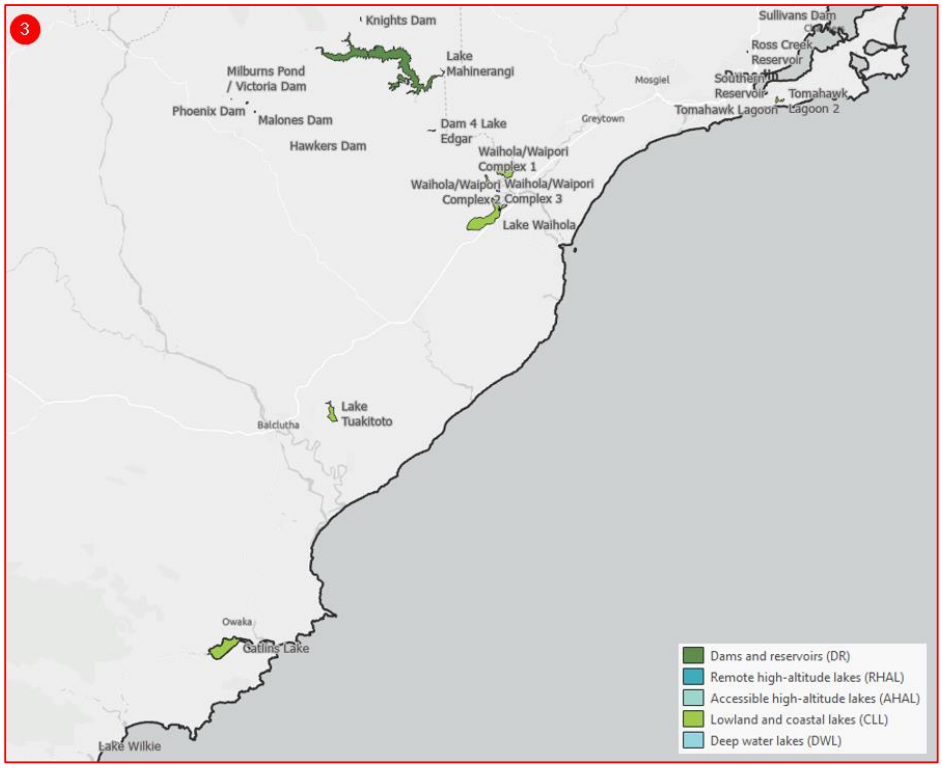

Figure 4: Inset 3 - Locations of selected lakes. Not to scale.

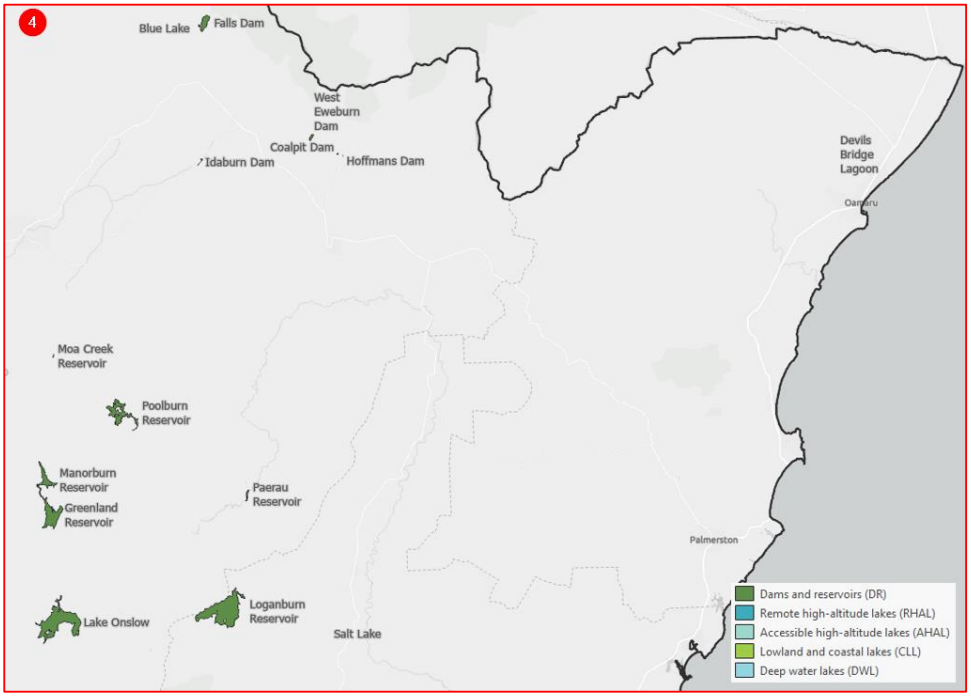

Figure 5: Inset 4 - Locations of selected lakes. Not to scale.

The Southern Ngāi Tahu dialect uses a 'k' interchangeably with 'ng'. The preference in Otago is to use a 'k', for example 'Ngāi Tahu' is written and pronounced 'Kāi Tahu'. In this document, the 'k' is used throughout, except when referring to iwi in general or where there is reference to Ngāi Tahu ki Murihiku (Southland).

Where possible, we have identified the te reo Māori names and presented these in the table below along with the common/English names. Note that in some cases these Māori names reflect Southern Ngāi Tahu/Kāi Tahu dialect, and therefore may differ from 'standard' te reo Māori spelling. The common name Lake Wakatipu is (to the best of our understanding) an incorrect transliteration of the Māori name Whakatipu Waimāori. "Lake Whakatipu" is used in this report to minimise the potential for confusion while also acknowledging the correct Māori spelling.

Table 2: Lakes included in review

Category	Lake (common name)	Te Reo Māori name (if available and different)	Freshwater Management Unit and rohe	Area (ha)
Deep water lakes (DWL)	Lake Whakatipu	Whakatipu Waimāori	Clutha Mata-Au, Upper Lakes	29,400
	Lake Wānaka		Clutha Mata-Au, Upper Lakes	19,900
	Lake Hāwea		Clutha Mata-Au, Upper Lakes	15,200
Remote high-altitude lakes (RHAL)	Lochnagar	Ōtaka	Clutha Mata-Au, Dunstan	303
	Lake Unknown		Clutha Mata-Au, Upper Lakes	108
	Lake McKellar	Ōtākaha	Clutha Mata-Au, Upper Lakes	73
	Lucidus Lake		Clutha Mata-Au, Upper Lakes	67
	Lake Luna		Clutha Mata-Au, Dunstan	35
	Lake Wilson		Clutha Mata-Au, Upper Lakes	28
	Lake Harris	Te Hokaputu	Clutha Mata-Au, Upper Lakes	22
	Lake Hope		Clutha Mata-Au, Upper Lakes	19
	Lake Nigel		Clutha Mata-Au, Upper Lakes	16
	Lake Nerine		Clutha Mata-Au, Upper Lakes	16
	Crucible Lake		Clutha Mata-Au, Upper Lakes	12
	Lake Ned		Clutha Mata-Au, Upper Lakes	11
	Lake Te Kōhua		Clutha Mata-Au, Dunstan	10
	Lake Rere		Clutha Mata-Au, Upper Lakes	7
	Lake Isobel		Clutha Mata-Au, Upper Lakes	5
	Lake Mystery		Clutha Mata-Au, Upper Lakes	4
	Lake Castalia		Clutha Mata-Au, Upper Lakes	4
	Lindsays Tarn		Clutha Mata-Au, Upper Lakes	3
	Alta Tarn		Clutha Mata-Au, Upper Lakes	3
	Lake McKay		Clutha Mata-Au, Dunstan	2

Category	Lake (common name)	Te Reo Māori name (if available and different)	Freshwater Management Unit and rohe	Area (ha)
	Gem Lake		Clutha Mata-Au, Lower Clutha	1
	Little Lake McKay		Clutha Mata-Au, Dunstan	1
	Lake Diana		Clutha Mata-Au, Upper Lakes	1
	Dukes Tarn		Clutha Mata-Au, Dunstan	1
	Three Lagoons		Clutha Mata-Au, Upper Lakes	0.2-0.4
	Sheehey Lake		Clutha Mata-Au, Dunstan	0.2
Accessible high-altitude lakes (AHAL)	Lake Hayes	Waiwhakaata	Clutha Mata-Au, Dunstan	273
	Diamond Lake, Glenorchy	Ōturu	Clutha Mata-Au, Upper Lakes	176
	Moke Lake	Punamāhaka/Waikāmāhaka	Clutha Mata-Au, Dunstan	81
	Lake Sylvan		Clutha Mata-Au, Upper Lakes	61
	Lake Dispute		Clutha Mata-Au, Dunstan	29
	Lake Johnston	Waipuna	Clutha Mata-Au, Dunstan	25
	Glenorchy Lagoon		Clutha Mata-Au, Upper Lakes	17
	Lake Alta		Clutha Mata-Au, Dunstan	12
	Lake Reid		Clutha Mata-Au, Upper Lakes	12
	Blue Lake		Clutha Mata-Au, Manuherekia	8
	Diamond Lake, Wānaka		Clutha Mata-Au, Upper Lakes	3
	Lake Kirkpatrick		Clutha Mata-Au, Dunstan	3
	Arethusa Pool	Associated with Mou Waho (Harwich Island)	Clutha Mata-Au, Upper Lakes	1
Dams and reservoirs (DR)	Lake Dunstan		Clutha Mata-Au, Dunstan	2,278
	Lake Mahinerangi		Taieri	1,738
	Loganburn Reservoir	Te Pariparu-a-Te-Kaunia	Taieri	1,278
	Lake Onslow		Clutha Mata-Au, Roxburgh	1,139
	Lake Roxburgh		Clutha Mata-Au, Roxburgh	513
	Greenland Reservoir		Clutha Mata-Au, Manuherekia	447
	Poolburn Reservoir		Clutha Mata-Au,	424

Category	Lake (common name)	Te Reo Māori name (if available and different)	Freshwater Management Unit and rohe	Area (ha)
			Manuherekia	
	Manorburn Reservoir		Clutha Mata-Au, Manuherekia	214
	Falls Dam		Clutha Mata-Au, Manuherekia	143
	Fraser Dam		Clutha Mata-Au, Roxburgh	46
	Butchers Dam		Clutha Mata-Au, Roxburgh	31
	Deep Stream Reservoir		Taieri	26
	Unnamed dam formed by Paerau Weir		Taieri	25
	West Eweburn Dam		Taieri	24
	Lower Manorburn Dam		Clutha Mata-Au, Manuherekia	17
	Conroys Dam		Clutha Mata-Au, Roxburgh	13
	Lake Edgar		Taieri	9
	Idaburn Dam		Clutha Mata-Au, Manuherekia	8
	Phoenix Dam		Clutha Mata-Au, Lower Clutha	7
	Sullivans Dam		Dunedin & Coast	4
	Knight Dam		Taieri	4
	Southern Reservoir		Dunedin & Coast	4
	Malones Dam		Clutha Mata-Au, Lower Clutha	3
	Coalpit Dam		Taieri	2
	Ross Creek Reservoir		Dunedin & Coast	2
	Pinders Pond		Clutha Mata-Au, Roxburgh	2
	Moa Creek Reservoir		Clutha Mata-Au, Manuherekia	2
	Downeys Dam		Clutha Mata-Au, Dunstan	2
	Hawkers Dam		Clutha Mata-Au, Lower Clutha	2
	Greys Dam		Clutha Mata-Au, Lower Clutha	1
	Hoffmans Dam		Taieri	1
	Milburns Pond /		Clutha Mata-Au, Lower	0.4

Category	Lake (common name)	Te Reo Māori name (if available and different)	Freshwater Management Unit and rohe	Area (ha)
	Victoria Dam		Clutha	
Lowland and coastal lakes (CLL)	Lake Waihola	Waihora	Taieri	604
	Catlins Lake	Kuramea	Catlins	432
	Lake Waipori		Taieri	212
	Lake Tuakitoto	Roto-nui-a-Whatu	Clutha Mata-Au, Lower Clutha	129
	Three smaller unnamed lakes in Waihola-Waipori wetland complex		Taieri	7-31
	Tomahawk Lagoon		Dunedin & Coast	18
	Devil's Bridge Lagoon		North Otago	7
	Salt Lake / Sutton Salt Lake		Taieri	3
	Lake Wilkie		Catlins	0.7

3.1.2 Sources of information

The information in the remainder of this section is based on a literature review completed by Landpro as part of this assessment, the review protocol for which is attached as Appendix 3. Over 400 documents (including duplicates) were considered in the review. After removal of duplicates, these documents were screened against the inclusion criteria stated in Appendix 3 with approximately 150 unique documents meeting the criteria. The scope of this assessment did not allow for a comprehensive review of this volume of research, so only the 33 highest priority documents (as per the scoring system detailed in Appendix 3) were reviewed. This included all documents with a priority rating of 4 or 5 (the highest ratings) as well as 11 lower-rated documents, selected to maximise the geographical and topical range of the review.

Appendix 3 also contains details of all the documents considered, to facilitate further research including review of the documents identified as relevant but unable to be reviewed here.

Some of the key sources referred to repeatedly below are:

- The LINZ data service website, which contains a number of relevant GIS layers. In particular, the "NZ Lake Polygons (Topo, 1:50k)" layer was the primary source used to identify the lakes considered in this assessment, and for mapping their extents.
- ORC's *State and Trends of River and Lake Water Quality in the Otago Region, 2000-2020* (Ozanne, 2020), which records the results of ORC's state of the environment (SOE) monitoring.
- The New Zealand Freshwater Fish Database (NZFFD) is maintained by NIWA and contains records of a very large number of fish surveys carried out throughout New Zealand. For the purposes of this

assessment, ArcGIS Pro 2.9.2 was used to identify fish surveys carried out within the mapped extent of the relevant lakes (as per the LINZ layer mentioned above), as based on anecdotal information we understand that the recorded water body is not always reliable. The resulting filtered dataset was then plotted (after removing any rows in which the 'totalCount' value was blank or zero *and* the 'present' value was 'FALSE', as well as entries stating "no species detected").[1] The advantage of this approach is that it gives a simple, high-level picture of the presence of fish species in different lakes without the need for detailed manual interpretation of each fish survey record. The limitations are that it does not account for abundance, does not factor in surveys carried out in tributaries which may be relevant to lake fish populations, and also does not reflect changes over time. For example, species recorded in early fish surveys of a particular lake which have since become locally extinct will show as present in the NZFFD summary graphs in the following sections. Also, from inspection of the raw data it is clear that there are some inconsistencies in data entry between different ecologists using the NZFFD, which this method cannot account for. We recommend more detailed analysis of the individual survey records in and near any lakes for which key management decisions are reliant on fish survey data.

- NIWA's LakeSPI report (2021). SPI is an acronym for submerged plant indicators, and this report details the results of monitoring for both native and introduced aquatic plants.
- The Upper Clutha Community Catchment Plan (Landpro, 2019; updated 2022), which was commissioned by WAI Wānaka and includes a literature review similar to this one, but focused on Lakes Hāwea and Wānaka and their tributaries and outlets. A few directly relevant paragraphs of this report have been simply repeated here (in Sections 3.3.3 and 3.3.4).

The availability of data from these key sources for each lake is summarised in Figure 6 below (excluding the LINZ GIS layer, which has location information only, and the CCP which focusses primarily on Lakes Wānaka and Hāwea only). Additionally, the figure shows lakes for which water quality and/or sediment studies are underway through the Lakes 380 programme, a nationwide research programme on lake water quality, ecology, and environmental history which includes 29 Otago Lakes (including several small unnamed lakes which are not within the scope of this review). The data from Lakes 380 is mostly yet to be reported. The remainder of this report briefly discusses the limited data that is available, but the full dataset, when released, will represent a significant addition to the overall body of information available on Otago's lakes, and therefore it warrants inclusion as a critical (if not current) data source.

[1] Note that no 'TRUE' values were recorded for the 'soughtNotD' (sought but not detected) column.

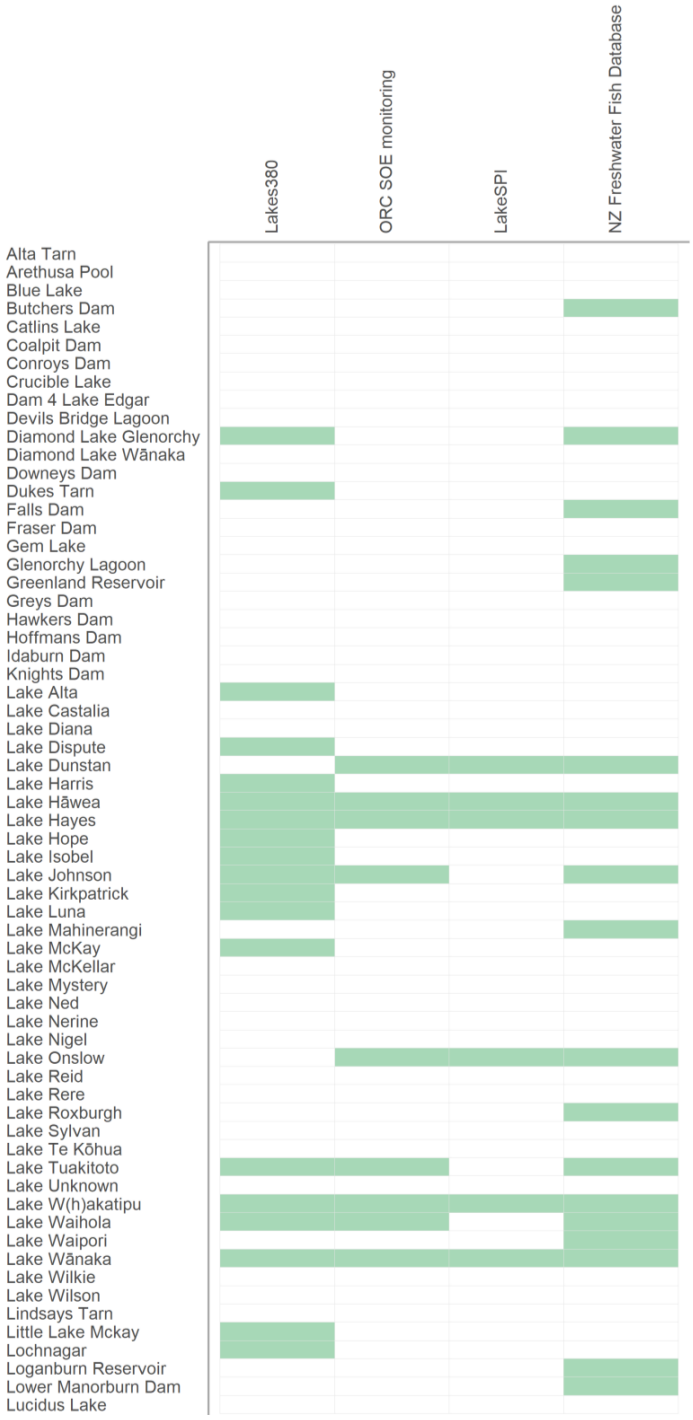

Figure 6: Index of availability of key data sources by lake (in alphabetical order, A-L)

Figure 6 (cont.), index of availability of key data sources by lake (in alphabetical order, M-Z)

The Ozanne, 2020 report referred to above is an updated version of several similar reports produced by ORC in recent years (ORC, 2007; Ozanne, 2012; Uytendaal & Ozanne, 2018). These report the results of ORC's state of the environment (SOE) water quality monitoring programme, which includes nine lakes (with 22 sampling locations/depths within those lakes, though not all monitoring points are still sampled) and numerous stream/river sites. Lakes Wānaka, Hāwea, Whakatipu, Johnson, Hayes, Dunstan, Onslow, Waihola and Tuakitoto have been monitored regularly for a number of years (though monitoring of Lake Johnson was discontinued in 2018 following a NIWA review of the SOE monitoring programme). Additionally, Tomahawk Lagoon was recently added to the monitoring programme, though after the 2020 report was published. In comparison to the earlier SOE reports, the 2020 report:

- Was able to analyse trends over a longer time period than had previously been possible due to several years of further data collection,
- Assesses the data against current regulatory standards for water quality that have come into force since the most recent of the earlier documents,
- Is considered, taking the above into account, to effectively supersede these previous reports for the purposes of understanding the current state and medium-term trends (years to 1-2 decades) in water quality in Otago.

Samples collected as part of ORC's SOE monitoring programme are tested for:

- **Nutrients and other indicators for phytoplankton and periphyton growth**. These are aquatic plants and algae which can multiply excessively when nutrient concentrations are high. This can have a negative effect on ecosystems and human uses of water. Chlorophyll-*a* is commonly tested for as a proxy for the biomass of these organisms. Additionally, nutrients including nitrate nitrogen (NO_3-N), ammoniacal-N (NH_4-N), dissolved reactive phosphorus (DRP), total nitrogen (TN) and total phosphorus (TP) are monitored as high concentrations of these can lead to excessive growth of periphyton and phytoplankton.
- **Suspended sediment**, which can adversely affect a range of aquatic life, particularly smaller organisms which rely on riverbed gravels and suffer habitat loss when this is covered with finer sediments. Suspended sediment can be monitored directly, or using clarity or turbidity measurements as a proxy.
- **Toxic substances**, including some nutrients which are also toxic at high concentrations: ammonia and nitrate (although nitrate generally causes adverse effects as a nutrient well below the concentration where it becomes toxic).
- **Aquatic life**, represented by a group of variables related to the macroinvertebrate community index (MCI).
- ***E. coli***, as a microbiological indicator of human or animal faecal contamination and therefore the risk of infection from contact with surface water.

For the lake sites specifically, water quality is reported primarily in terms of chlorophyll-*a*, TN, TP, ammonia and *E. coli*, which are the variables specified in the *National Policy Statement for Freshwater Management* 2020 (NPSFM; Ministry for the Environment, 2020; see Section 4.1.2.1) as the primary indicators of lake health.

This assigns water quality bands based on statistical summaries of the monitoring data for each contaminant. For each variable, these bands range from 'A' (best) to 'D' (worst), apart from *E. coli* for which there is also an 'E' band. Note that some variables have multiple relevant standards, for example, one for the maximum and one for the median concentration of that variable. For most variables, a 'D' grade is considered unacceptable with regard to national bottom lines defined in the NPSFM. More details on the grading of sites are available in Ozanne (2020). Because the full monitoring dataset is extremely detailed, summaries of water quality information from the Ozanne report in the remainder of this document will focus on the results of that grading, and interpretation of those results.

In addition to assessing the current state of the water quality in the relevant lakes, the Ozanne (2020) report also assessed trends, where sufficient data was available. This is discussed in detail in Section 6.2 of the Ozanne (2020) report, and is difficult to summarise due to the complexity of the analysis (in part due to variations in the quantity and frequency of data available from different sites, which necessitated the use of different time periods for different sites in the trend analysis). Where sufficient data was available, trends

were categorised on a nine-point scale from “exceptionally likely” to be improving, through to “exceptionally unlikely”. For clarity, trends categorised as unlikely to represent improvement can be assumed to represent degradation, while “as likely as not” indicates that an increasing or decreasing trend are equally likely, given the data available (pers. comm., Rachel Ozanne).

Note that Lee and Ozanne (2020) contains a summary of the same information in Ozanne (2020), with pages 25-28 of that document focussing specifically on the results for the lake monitoring sites. Note also that the data discussed in these two documents is largely the same as that discussed on the Land, Air, Water Aotearoa (LAWA) website (LAWA, 2020). Although LAWA includes some more recent data, we have focussed on the dataset reported in Ozanne (2020) as it includes detailed analysis that would otherwise have to be repeated.

3.1.3 Trophic Level Index

The trophic level index (TLI) is a widely used indicator of the health of a lake. As discussed in more detail in a TLI fact sheet on LAWA, the TLI score from 0-9 (with lower values indicating better water quality) is calculated based on the total nitrogen, total phosphorus, water clarity and chlorophyll-*a* within a lake.

Based on this score, lakes are assigned to one of five categories. As shown in Table 3, the category associated with each TLI score band generally corresponds to a particular water quality state. These categories each have both a technical name (microtrophic, oligotrophic, etc.) and a simplified water quality description (very good, good, etc.), with the latter being generally used on the LAWA website, and also in the remainder of this report.

Table 3: Summary of Trophic Level Index Scores and Descriptions (from LAWA, 2020)

TLI score	Technical term	Water quality description	
		Simplified	Detailed
0-2	Microtrophic	Very good	The lake is very clean with very low levels of nutrients and algae. The lake can have snow or glacial sources.
>2-3	Oligotrophic	Good	The lake is clear and blue, with low levels of nutrients and algae
>3-4	Mesotrophic	Fair	The lake has moderate levels of nutrients and algae
>4-5	Eutrophic	Poor	The lake is murky, with high amounts of nutrients and algae
>5	Supertrophic	Very poor	The lake has very high amounts of phosphorus and nitrogen, and can be overly fertile and often associated with poor water clarity. Excessive algae growth can occur. Suitability for recreational purposes is often poor.

3.2 Weather and climate

Otago experiences a temperate climate with annual median temperatures typically around 10 °C in populated areas, and lower in higher altitude parts of the region. Inland Otago experiences a pseudo-continental climate with particularly hot summers and cold winters, while coastal regions have a more moderate climate. As shown in Figure 7, rainfall varies significantly throughout the region, ranging from ~400 mm per year in parts of Central Otago to approximately 800 mm in southern coastal Otago and over 2,000 mm per year in the highest peaks of Queenstown Lakes District (Macara, 2015).

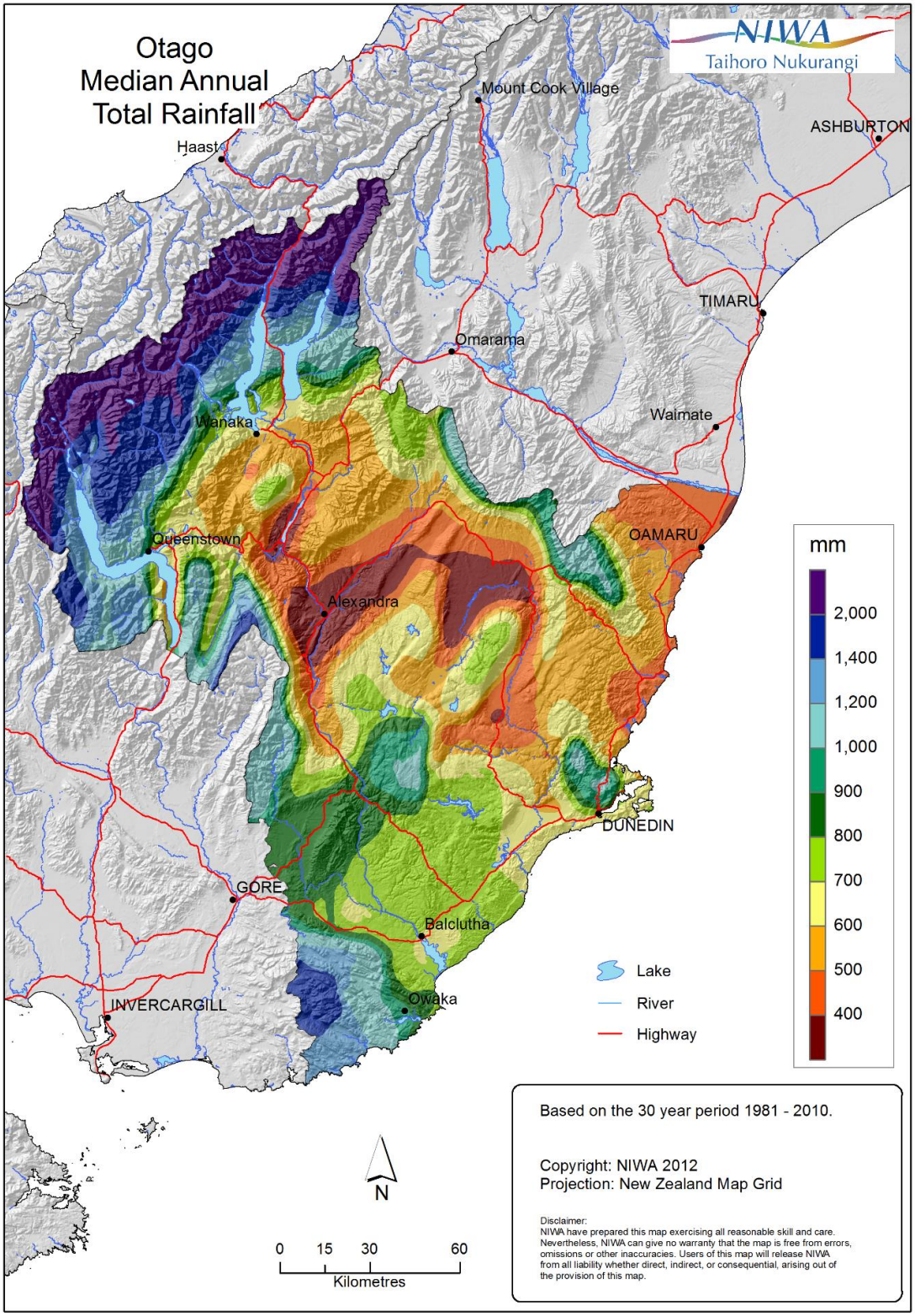

Figure 7: Modelled median annual rainfall for Otago. Source: Macara, 2015

30

NIWA's *Climate Change Projections for the Otago Region* (Macara *et al.*, 2019) covered expected climatological and hydrological changes in Otago due to modelled climate change impacts up to the year 2100. The projections were based on two of the four climate change scenarios used by the Intergovernmental Panel on Climate Change's: RCP 4.5 (the second-most optimistic scenario) and RCP 8.5 (the most pessimistic, 'business as usual' scenario).

The report notes that there is a wide range in potential increases of annual average temperatures: 0.5-1.5 °C by 2040 and 0.5-3.5 °C by 2090 (compared to 1986-2005 temperatures). These are typical projected values and both regional variation and temporal variation due to the ongoing impacts of natural climate phenomena (such as the El Niño/La Niña cycle) are to be expected. The greatest temperature increases are expected to occur in the high-altitude areas near Wānaka and Queenstown.

Annual rainfall is projected to increase slightly in Otago – 0.10 % greater by mid-century and 10-20 % (and potentially greater in Central Otago and Queenstown Lakes Districts) by the end of the century. Much of this additional rainfall is expected to occur in winter. Extreme rainfall events are also expected to become more severe, with a '1 in 100 year' event resulting in up to 35 % more rainfall in a one hour period under the most extreme climate projections.

The combined effect of this is expected to result in average annual flows increasing region-wide, and flood flows also increasing, potentially doubling under extreme scenarios. The minimum flows in rivers and streams are expected to mostly increase in the Upper Clutha catchment and parts of Coastal and North Otago, while decreasing elsewhere, most notably in the Taieri catchment. Overall, relatively little change in water supply reliability is projected.

An additional climate change assessment for Otago focussed specifically on the risks and opportunities posed to the economy, built environment and natural environment (including lakes) was carried out by Tonkin and Taylor (2021). Table 4 (reproduced from Table ES-1 of the Tonkin and Taylor report) summarises the risks identified which are of direct relevance to lakes:

Table 4: Summary of climate change risks potentially relevant to lakes (as assessed by Tonkin and Taylor, 2021)

Risk	Risk rating		
	Present	2040	2090
Risks to the freshwater (rivers and lakes) ecosystems from increasing temperatures and extreme weather events	Medium	High	**Extreme**
Risks to the coastal and marine ecosystems from climate change hazards including ocean acidification and marine heatwaves	Low	High	**Extreme**
Risks to coastal, inland and alpine wetland ecosystems from drought, higher temperatures, changes in rainfall and reduced snow and ice	High	**Extreme**	**Extreme**
Risks to Otago water quality and quantity from changes in rainfall, higher temperatures, flooding, drought and reduced snow and ice	Medium	**Extreme**	**Extreme**
Risks to native ecosystems posed by increasing threats from invasive plants, pests and disease due to climate change	Medium	Medium	**Extreme**

Specific potential effects of climate change identified by Tonkin and Taylor that are relevant to lakes include:

- Increased sediment and nutrient load to rivers and lakes due to higher intensity of rain events and greater flooding.
- Direct effects of increasing temperature on flora and fauna. According to the report, lakes (particularly large lakes) have some ability to buffer increasing temperatures, but may experience rapid changes once that capacity is exceeded.
- The salinity of coastal freshwater systems may change as tidal influence reaches further inland. This may also affect the resident flora and fauna, favouring more salt-tolerate species.
- Variation in moisture in wetlands and other aquatic systems due to increasing overall rainfall in some areas and decreasing in others.
- Adverse effects on the alpine ecosystems, which are adapted to cold conditions (e.g. increases in the lower elevation limit which may result in 'islanding'). Tonkin and Taylor discuss this in Section 5.2 of their report, which focusses on terrestrial flora and fauna. However, it is possible that some species

dependent on alpine lakes and tarns may be affected by the same phenomena, in which case the effects may be exacerbated by the fact that lakes are found in limited, discrete, static locations.

- A general reduction in inland lake levels, particularly in the warmer months.
- Increased thermal stratification, particularly of coastal lakes.
- Range expansion of pest species (including diseases), which are, generally speaking, expected to be more tolerant to increasing temperatures than native species.

Some climate change-related opportunities for Otago were also identified, but none relevant to the natural environment domain.

3.3 Deep Water Lakes

3.3.1 Lakes included

There are three Deep Water Lakes (DWL) in Otago: Lakes Hāwea, Wānaka and Whakatipu (known in Te Reo Māori as Whakatipu Waimāori). Details of these lakes are given in Table 2.

Note that Lake Hāwea is dammed, but has been listed in this category (rather than Dams and Reservoirs) as it retains a significant degree of natural character, and is considered overall more similar to Lakes Wānaka and Whakatipu than to other lakes used for hydroelectric storage/generation.

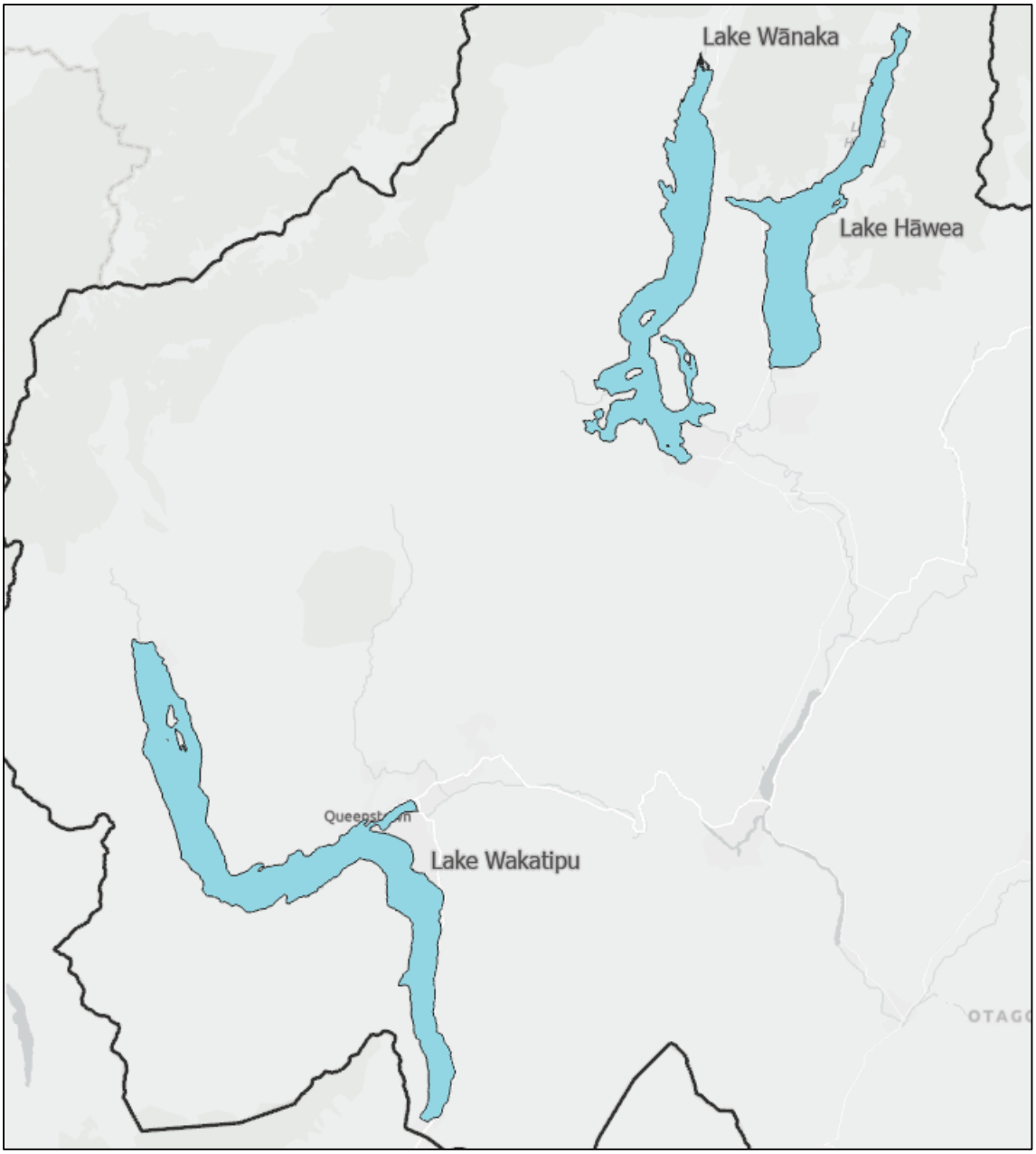

Figure 8: Locations of the Deep Water lakes. Not to scale.

3.3.2 Environmental setting

The environmental setting of Lakes Hāwea and Wānaka and the surrounding Upper Clutha region is presented in detail in the literature review completed for the Upper Clutha *Community Catchment Plan* (CCP - and sources referenced therein). Note that an equivalently detailed discussion of the environmental setting does not exist for most of the other lakes included. In summary, the CCP reports that:

- The geology of the area is dominated by schist formed 250-130 million years ago, while the present valleys in the area were carved by glaciers, mostly over the last 2 million years. Rock debris (till) deposited by the glaciers when they melted dams all of the large southern lakes.
- Lakes Wānaka and Hāwea have water levels of approximately 276-278 and 341-345 masl, respectively (levels measured approximately September 2021-22).
- In most places the land rises steeply from the sides of the two lakes, with numerous peaks of ~1,000-2,000 masl present within approximately 5 km of the lake shores, including on the narrow isthmus between Lakes Wānaka and Hāwea. The various mountain ranges are separated by smaller river valleys, which make up a small proportion of the catchment area. Further to the north and west of the lakes, the catchment includes large parts of Mount Aspiring National Park. This is a mixture of native bush and alpine landscapes, with some glaciers. The catchment boundaries in this area are defined by large peaks, most notably Mt Aspiring/Tititea at 3,033 masl (note that the peak of Mt Aspiring and therefore a small part of the Lake Wānaka catchment is not in Otago but in the neighbouring West Coast Region).
- The Wānaka basin experiences a temperate climate comparable to the neighbouring Central Otago area with hot dry summers and cold dry winters meaning the area has New Zealand's closest equivalent to a semi-arid continental climate. Rainfall varies significantly around the lakes however, with a mean of 594 mm experienced annually at Wānaka airport, compared to 2,447 mm at Makarora.
- Lake Wānaka's principal tributaries are the Matukituki/Mātakitaki and the Makarora-Wilkins-Young river system. The Hunter River is Lake Hāwea's largest tributary.
- The outlet of Lake Wānaka near Dublin Bay forms the Clutha River/Mata-Au, one of New Zealand's largest rivers. Lake Hāwea's outlet is the Hāwea River, which joins the Clutha near Albert Town.
- Trout were released into Lake Wānaka in 1876 and Lake Hāwea in 1911, in addition to exotic terrestrial species (e.g. deer and rabbits) also introduced by European settlers in the early colonial years.
- The town of Wānaka had no public sewerage system until at least the late 1950s, and water quality issues in Bullock Creek (a Lake Wānaka tributary) were recorded around that time. While infrastructure has improved considerably since then, the population has also increased considerably, from approximately 1,000 in the late 1960s to almost 10,000 in 2018.
- Lake Hāwea was dammed for hydroelectricity storage purposes in the 1950s, resulting in an approximate 20 m rise as well as considerable artificial variation in the lake level. The Roxburgh and Clyde dams downstream on the Clutha/Mata-Au also prevented movement of migratory fish upstream.

Figure 9: Lake Hāwea and the Hāwea River in 1951, before the Hāwea Dam was built. Source: National Library's Timeframes database. Reference: WA-28373-F.

- The hillsides around the Wānaka basin which are not part of the conservation estate (including those near Lakes Wānaka and Hāwea) are used predominantly for low-intensity agriculture, i.e. drystock farming. Some more intensive agriculture is present to the south, mostly outside the lake catchments.
- Based on land cover data base, it appears that relatively little change has occurred in land use at a catchment scale in the last ~20 years. However, it is clear that there has been significant change over a longer timescale, particularly in Wānaka township (see Figure 10)

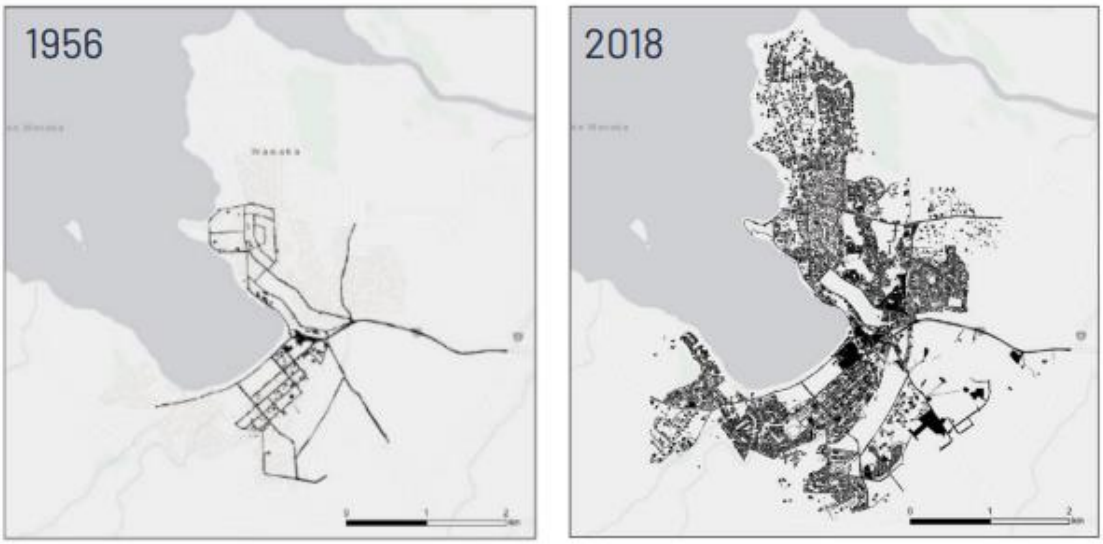

Figure 10: Change in impervious surface cover in Wānaka between 1956 and 2018. Source: Grant (2021). See detailed discussion in Section 2.4 of CCP.

- Lakes Hāwea and Wānaka together with Lake Whakatipu contribute approximately 75 % of the Clutha/Mata-Au's flow at Balclutha, with Hāwea and Wānaka's contribution being a significant majority of that. The Clutha is one of New Zealand's largest rivers.

Note that the original references for the points noted above have been omitted but can be found in Sections 2.2-2.6 of the CCP.

ORC (2009) note that Lake Wānaka is the second largest lake in Otago and the fourth largest in New Zealand, with a surface area of 180 km^2. It is up to 311 m deep, and has six islands. The catchment area is dominated by "tall tussock grassland (37 %) and indigenous forest (14 %), with approximately 10 % occupied by agriculture or horticulture (listed in descending order of area occupied as "low producing grassland", "high producing exotic grassland", and "orchard/other perennial crops"). Most of the remainder of the catchment is made up of various natural land covers, although approximately 0.2 % is built up (i.e. urban) area.

ORC (2009) also describe the setting of Lake Whakatipu as follows:

> *The second largest of the southern glacial lakes, Lake Wakatipu is 75.2km long and up to 5km wide, and covers an area of 289 km^2. The lake is 310 m above sea level, is up to 380 m deep, and occupies a single elongated glacial trench which has a gently sloping flat floor.*
>
> *The Dart and Rees Rivers flow into the northern end. The lake then runs south for 30km before turning*

abruptly to the east. Twenty kilometres further along, it turns sharply to the south, reaching its southern end 30km further south, near Kingston. The lake is drained by the Kawarau River, which flows out from the lake's Frankton Arm, 8km east of Queenstown. At the foot of the lake is a natural dam of moraine.

Similar to the other two DWL, Lake Whakatipu is bordered mostly by mountains, but there is a comparative lack of forest within the lake catchment area. Only 0.2 % of the Lake Whakatipu catchment is built-up area (i.e. developed for urban use), while approximately 11 % is pasture (high producing exotic grass or low producing grassland). The remainder of the catchment is dominated by "tall tussock grassland" (41 %) with indigenous forest (16 %), alpine gravel and rock (7 %) and various other natural land covers also present (ORC, 2009).

3.3.3 Water quality

All monitoring sites in the DWL achieved the 'A' attribute state with respect to all variables measured. No data was available for *E. coli* at the Lake Wānaka Open Water 10 m site, or for ammoniacal nitrogen at the Lake Hāwea Outflow at Dam monitoring site. These results are consistent with very good (microtrophic) water quality for all 3 lakes, as reported on the LAWA website at the time of writing.

In addition to the above information on the current state of these lakes, statistical trends were able to be established for some sites/contaminants. As noted above, this is complicated by a number of factors and consequently difficult to summarise. Briefly, however:

- Turbidity appears to be worsening significantly (rated "extremely" or "exceptionally" unlikely to be improving) at the outflow from all three lakes.
- Insufficient *E. coli* data was available to assess a trend, with the exception of at the Lake Wānaka Outlet site for the 18-year trend analysis period, where an improving trend was indicated to be "as likely as not". That is, *E. coli* concentrations are equally likely to be increasing or decreasing, based on the data available.
- Nutrient concentrations (nitrogen and phosphorus species) were generally found to be improving where sufficient data was available to assess the trend. However, the shortest trend analysis period (10 years) generally indicates less positive (or in several cases negative) trends. It is possible this indicates that conditions in these lakes have begun to degrade recently, and this should be closely monitored.

Table 5: Attribute states summary for Deep Water Lakes (reproduced from Figure 6 of Ozanne, 2020).

Site	Nutrients and other periphyton/ phytoplankton indicators				Toxic substances		*E. coli*				
	Chlorophyll-a (max)	Chlorophyll-a (median)	Total nitrogen	Total phosphorus	Ammoniacal N (max)	Ammoniacal N (median)	*E. coli* – g260	*E.coli* – g540	*E. coli* – median	*E. coli* – Q95	*E. coli* - swim
Lake Hāwea North Open Water 10 m	●	●	●	●	●	●	●	●	●	●	●
Lake Hāwea South Open Water 10 m			●		●	●	●	●	●	●	●
Lake Hāwea Outflow at Dam			●				●	●	●	●	●
Lake Wānaka Open Water 10 m			●		●	●					
Lake Wānaka at Outlet			●				●	●	●	●	●
Lake Whakatipu Open Water 10 m			●		●	●	●	●	●	●	●
Lake Whakatipu at Outflow			●				●	●	●	●	●
Lake Whakatipu at Frankton Arm 10 m			●		●	●	●	●	●	●	●

Notes: blank cells indicate no data, white cells with circles indicate data available, but (as at 2020) below the minimum sample numbers recommended as per the NPS-FM, filled cells indicate minimum sample numbers met.

Colour coding: A attribute state = green, B = yellow, C = orange, D = red.

Analysis of the ORC dataset (Schallenberg *et al.*, 2022)[2] indicates increasing in chlorophyll-*a* concentrations in all three DWL. The trend of monthly monitoring data for chlorophyll-*a* concentrations in the three lakes showed concentrations approximately doubling from ~0.2-0.5 µg L^{-1} in 2016 to ~0.5-1.0 µg L^{-1} in 2021.

> Earlier, ORC (2008) reported on their annual water quality monitoring for Lakes Whakatipu and Wānaka (plus three other lakes in other categories, discussed in following sections). Both DWL covered in this report were noted to have good water quality (i.e. they were oligotrophic lakes at that time – see 1.1.3). The chlorophyll-*a* levels, Secchi depth, and total nitrogen and phosphorus concentrations in both lakes were low and consistent with this classification. The 2008 document is a fact sheet and does not include detailed monitoring results. It is therefore not clear whether the apparent change in water quality (from good/oligotrophic in 2008 to very good/microtrophic as reported in LAWA currently) reflects changes in methodology, such as improved detection limits, or a genuine improvement.
>
> ORC (2009) then provided a more detailed report based on monthly monitoring in five Otago lakes, including Whakatipu and Wānaka, from approximately May 2006 to April 2009 (dates vary slightly between monitoring sites and note that this includes the data discussed in the 2008 report). The 2009 report also includes some historical data, most notably for the Frankton Arm of Lake Whakatipu, where the Secchi depth measurement record goes back as far as 1952. Monitoring was carried out for various nitrogen and phosphorus species, chlorophyll fluorescence, and for physicochemical variables (pH, dissolved oxygen, clarity etc.), and these data were used to identify the trophic level of each lake. This is a highly detailed report and only a brief summary of the results for each lake covered is possible here. Specifically, we have chosen to focus on the trophic state of each lake at the time, which was the primary subject of the report, as well as the trends in the individual variables used to determine it.
>
> Lake Whakatipu was monitored in three locations, two near built-up areas (Frankton Arm and Queenstown Bay) and one in the open water south-west of Kelvin Heights. Seasonal trends were complex and varied between the sites. Chlorophyll-*a* and Secchi depth both had statistically significant increasing trends for at least one site. Overall, the lake was classified as oligotrophic (good), although some variables were in the microtrophic (very good) range.
>
> Lake Wānaka also had three monitoring locations, in Roys Bay, Dublin Bay, and an open water site west of Beacon Point and south-west of the tip of The Peninsula. Clear seasonal trends were evident at all sites (though with notable noise), with total phosphorus, total nitrogen, chlorophyll-*a* all highest during summer, and clarity highest in winter. There was a significant increasing trend in chlorophyll-a concentrations at all three sites, with mixed (and mostly non-significant) trends for the remaining variables. Similar to Lake Whakatipu, Lake Wānaka was classified as oligotrophic (good) overall, with chlorophyll-*a* concentrations

[2] Note that this paper was published when the draft of this report was nearing completion and was not formally included in the literature review. However, the relevant analysis had been provided to us before publication and included in the draft report, and this reference has been updated to refer to the published paper.

in the microtrophic (very good) range.

Weaver *et al.* (2017) studied N, P and dissolved organic carbon concentrations entering Lake Wānaka from several upland streams and rivers. They found that agricultural grassland watersheds had higher concentrations of N and dissolved organic carbon entering Lake Wānaka than more natural watersheds.

After an urban stormwater workshop in 2018, WAI Wānaka funded research into stormwater quality in waterways entering Lake Wānaka. The results of this are reported in Grant (2020 and 2021), and a plain-English summary of the results has also been prepared by WAI Wānaka (Rabel, 2021a).

The purpose of the research was to assess how contaminants are flushed during rainfall from urban land within Wānaka into the Lake, and how this process is affected by ongoing land use changes. Sampling was carried out on 11 occasions between November 2017 and February 2020 at 12 urban streams and stormwater outlets flowing through the town, with sampling events occurring following rainfall of 1 mm/hour or greater. Additionally, baseline water quality data was available. This was from samples collected in 2017-18 during periods with no significant rainfall.

The study also investigated changes in urban land cover, as discussed above in Section 3.3.2. The results are summarised in more detail in the CCP and in the plain-English summary referenced above, but briefly:

- Samples were analysed for *E. coli*, suspended sediment, and selected nutrients and metals, and the results were compared with relevant guidelines from ANZECC (2000, 80% protection of freshwater species) and ORC (*Regional Plan: Water*, Schedule 15).
- Nitrate concentrations in baseline samples from Bullock Creek were elevated (~1 mg/L) in comparison to the other surface water bodies studied, including Stoney and Waterfall Creeks. This is believed to be due to groundwater inflow to Bullock Creek.
- Apart from the headwaters of Bullock Creek, water quality during storm flows was found to be outside the ANZECC/ORC guidelines for at least one contaminant at all sampling locations, with exceedances also observed in some baseline samples.
- Measurements of turbidity, *E. coli* and total phosphorus were positively correlated with impervious surface cover in sub-catchments, while potential relationships (though not statistically significant) were also identified for most other contaminants studied.

As discussed in the CCP, Weaver (2013) studied inputs to Lake Wānaka from several tributary rivers and streams. Weaver investigated the potential for changes in land use change (and therefore inputs) to impact the lake state. It was noted that the incidence of lake snow may reflect changes in land use patterns. Converting native grassland to pasture was found to increase concentrations of inorganic nitrogen and organic matter in the streams sampled during periods of low to moderate flow. These same pressures are expected to also be relevant for Lake Hāwea, although possibly to a lesser extent due to the lesser proportion

of agricultural or urban development in the catchment.

3.3.4 Ecology

The historical abundance of native species in the Upper Clutha area generally is indicated by the fact that it was an important food gathering area for local Māori. As stated in the CCP (Section 2.2):

> *Weka and eels were among the primary source of food in the area, and Moa were also hunted, probably from early in the history of Māori settlement. It was said that, at Makarora, "Counting the eels is like counting a swarm of sandflies" (H.K. Taiaroa). In addition to the above, there were numerous bird, fish and tree/plant species available... Probably the most marked impact of Māori settlement on the landscape was fire, with significant deforestation occurring between the arrival of Māori and later European settlement.* (note: references for this paragraph have been omitted above but are available in the CCP)

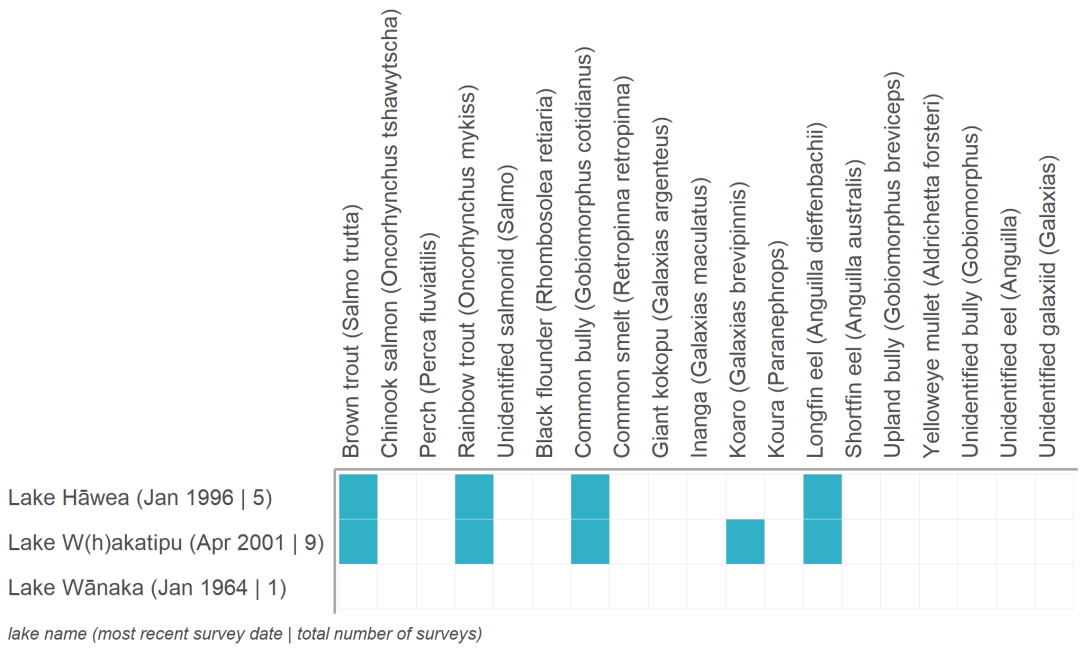

Figure 11: Summary of species identified in the Deep Water Lakes from NZFFD fish survey data. (See comments below re the Lake Wānaka data).

The NZFFD contains a total of 15 fish surveys carried out in the three DWL, primarily in Lakes Hāwea and Whakatipu, and mostly before 2000. For Lakes Hāwea and Whakatipu, the NZFFD data give a mostly consistent picture, with brown and rainbow trout, common bully and longfin eel present in both lakes, and

kōaro also recorded in Lake Whakatipu.

Surprisingly, only one survey was recorded in Lake Wānaka, and no species were recorded in that survey (which is why all cells in the Lake Wānaka row are blank). On closer inspection, it appears that the Lake Wānaka survey was carried out specifically in search of the common bully, which was not found at the location surveyed. An additional 1996 survey was included in NZFFD as being in Lake Wānaka but was excluded from our subset of the data because the co-ordinates recorded plot outside the lake boundary (on the Wānaka township lakefront) indicated the presence of rainbow trout and common bully in that part of the lake at that time (refer to NZFFD record number 15346).

The CCP (and references therein) does contain information on fish and other aquatic species in Lake Wānaka, including that:

- Three species of native fish (kōaro, common bully and long fin eel/tuna) are present in the lake. Chinook salmon, rainbow trout and brown trout were all introduced to the lake.
- Research commissioned by Fish and Game indicated that salmonid populations in Lake Wānaka were relatively consistent in 2007-09, while in Lake Hāwea populations declined from 2007-08 before increasing to a maximum (for those three years) level in 2009.
- Lakes Hāwea, Wānaka and Whakatipu have generally similar macroinvertebrate communities. The most common taxa reported include snails (*Potamopyrgus antipodarum*, *Gyraulus*, *Lymnaea* and *Physa*), chironomid midges (*Chironomus*, *Orthocladiinae*, *Tanypodinae*), worms (*Oligochaeta*, *Nematoda*) and caddis flies (especially the purse-cased caddis *Paroxyethira*).
- Kelly and McDowall (2004) observed that "there were once … enough kōaro on Lake Wānaka to support a small 'lake whitebait' fishery in the Matukituki River". They note that it is unlikely such a fishery could have been supported at the time they were writing, and that whitebait fishing in Lake Wānaka was prohibited many years before as "whitebait were considered more important for feeding trout than for feeding humans".
- Ruehle *et al.* (2021) identified in common bullies in all three DWL, in a study of a parasite which lives in the eyes of that species.

An ecological assessment of Lake Whakatipu near Kingston was carried out as part of a resource consent application to upgrade the Kingston Township Community Wastewater system. The application documents summarised the ecological and surface water quality of Lake Whakatipu and other unnamed tributaries. We reviewed the e3Scientific report which summarised work carried out by them and by Ryder Environmental Limited. Several methods were used to determine quantity and species of fish present and water quality. Fish were sampled via an over-night set of bailed traps and fyke nets and the results were analysed to determine the suitability of aquatic habitat. Aquatic life found in Lake Whakatipu were generally consistent with the NZFFD, these included:

- Kōaro;

- Longfin eel;
- Common bully, and;
- Brown trout.

The document also contained limited information on water quality (nitrogen and *E. coli*) in Lake Whakatipu.

Figure 12: Lake Whakatipu near Kingston. Taken June 2018

Dwyer (2017) undertook a dissertation to identify the implementation gaps that influence the biodiversity framework within New Zealand, with lake snow within Lake Wānaka used as a key case study. Lake snow was first reported in Lake Wānaka in 2003, by the fouling of a fisherman's line. University of Otago scientist Dr Marc Schallenberg raised concerns with ORC five years later, once he and a PhD student collected water samples and identified the algae. By 2016, lake snow had spread to all three deep water lakes: Wānaka, Hāwea and Whakatipu. Dwyer's research focussed primarily on the regulatory response to lake snow, and is discussed in more detail in Section 5.14.

Schallenberg and Novis (2018) completed a literature review for ORC regarding the potential management of lake snow *(Lindavia intermedia*) and how to reduce the spread of lake snow amongst lakes. The article discussed how lake snow is dispersed around the deep water lakes in Otago, with specific reference to Lake Wānaka, Whakatipu and Hāwea, there was some reference to other relevant lakes, these will be discussed in the following sections. The relevant literature generally agrees that lake snow became prominent in Lake Wānaka in 2003-2004, but developed into a nuisance around 2018 (Schallenberg and Novis, 2018; Dywer, 2017; Grant, 2020). Schallenberg and Novis's (2018) literature review evidence would suggest that *L. Intermedia* spread to Lake Hāwea/Dunstan via:

- Downstream flow or drift, i.e Lake Wānaka colonising Lake Dunstan via the Clutha River/Mata-Au
- Recreational activities i.e gear or machines that have been used in one lake and not cleaned efficiently and placed in another.
- Dispersal through water bodies by fish and waterfowl.

Table 6: Lakes known to contain *Lindavia Intermedia* in Otago (Schallenberg and Novis, 2018; Otago Regional Council, 2022).

Lake	Year *L. Intermedia* was first detected	Lake snow events observed	Nature of event
Deep Water Lakes			
Lake Wānaka	2002-03	Yes	Persistent
Lake Whakatipu	2015	Yes	Persistent
Lake Hāwea	2015	Yes	Persistent
Accessible High-Altitude Lakes			
Lake Johnston	2018	Unknown	N/A
Lake Hayes	2002-03	No	Intermittent
Moke Lake	2008	Yes	Unknown
Dams and Reservoirs			
Lake Dunstan	2015	Unknown	Persistent

The Schallenberg and Novis (2018) article confirms that there is a presence of lake snow in the deep water lakes. The article provided a number of potential management strategies:

1. Manage nutrient load and nitrogen and phosphorus losses from land to water.
2. Assess whether the thermal structure has changed over the last three decades to determine if there have been any impacts of climate change.
3. Ensure and measure the concentrations of lake snow in local domestic water supplies in order to determine the potential exposure to human populations via ingestions and associated pathogens.
4. Make a lake snow management plan to mitigate the effects of it spreading it other Otago lakes and to reduce the exposure to humans.

The CCP also reviewed various sources related to the ecology of Lakes Wānaka and Hāwea. An adapted version of this discussion (incorporating data on Lake Whakatipu where available) is given below.

Didymo (*Didymosphenia geminata*) is present in the Clutha catchment and was first found in the Hāwea River in September 2005 (ORC, 2008). It can grow extremely fast and it quickly becomes a major nuisance and is visually unsightly. Didymo blooms are caused by low P concentrations (Kilroy 2014), hence why it is a problem in the relatively high-quality waters of the Upper Clutha. At the time of the ORC report didymo had been identified in Lakes Wānaka and Whakatipu, as well as Lake Dunstan, though not widespread within those lakes. A study undertaken by ORC found that flow variation is a natural control on didymo growth. They found that when flows were low and stable didymo cover was high but when freshes occurred most of the biomass was displaced and washed downstream with native algae replacing it. As flows again became more stable, didymo cover increased again (ORC, 2008).

Following the urban stormwater workshop mentioned above, WAI Wānaka commissioned ecological research, which was carried out by Melanie Vermeulen (2020) and is also available in a summarised form (Rabel, 2021b). The research included testing of 20 sites across Stoney Creek, Bullock Creek, and a water body known as the Water Race Drain, and comparison of stream health measures with land use type and residential density. This research related primarily to small tributaries of Lake Wānaka within/near Wānaka township, and showed elevated concentrations of suspended sediment in some streams, as well as elevated arsenic (possibly naturally occurring) in stream sediment. Kōaro were identified in the lower reaches of Bullock Creek (and therefore presumably also still present in Lake Wānaka).

Hall (2020) completed an ecology thesis on macroinvertebrate communities in near stormwater outlets in Lakes Wānaka and Whakatipu. Five sub-families of the Chironomidae family of freshwater insects were found in Lake Wānaka, with one of the five (Orthocladiinae) found to be significantly less abundant in areas impacted by stormwater discharges.

NIWA's (2021) LakeSPI programme carried out sampling in Lakes Hāwea and Wānaka in 2020. Both lakes were considered to be in excellent condition, with the LakeSPI score and the native condition around 80% for both lakes. However, there was some evidence of a declining trend in relation to previous readings (beginning in the 1980s), particularly for the invasive impact rating, and more so for Lake Wānaka than Lake Hāwea. The excellent water condition is a reflection of the deep water lakes having high levels of native vegetation and little impact from invasive weed species.

Finally, there have been various studies into native fish and other aquatic species which are only partially relevant (usually due to covering a wide range of sites), but warrant a brief mention:

- Augspurger *et al.* (2021) investigated populations of a galaxiid species (*Galaxias brevipinnis*) in various waterways including Lake Wānaka, finding (among other things) that "lakes foster divergence of lake-developing populations from each other and from coastal stream populations".
- Ingram *et al.* (2020) investigated potential genetic, morphological or ecological differentiation with depth in lake populations of the common bully (*Gobiomorphus cotidianus*), finding evidence that "individual bullies associate with shallower or deeper habitats within their lifetimes", but with no evidence found of genetic differentiation within lakes. Both Lakes Wānaka and Hāwea were included in this study.
- Schallenberg *et al.* (2021) studied picocyanobacterial communities in lakes, finding noticeable spatial variability in Lake Wānaka.

3.4 Remote High-altitude Lakes

3.4.1 Lakes included

There are 24 RHAL, as shown in Table 2. Most of these are located on the DOC estate within the

Queenstown Lakes District and the Upper Lakes Rohe of the Clutha/Mata-Au FMU.

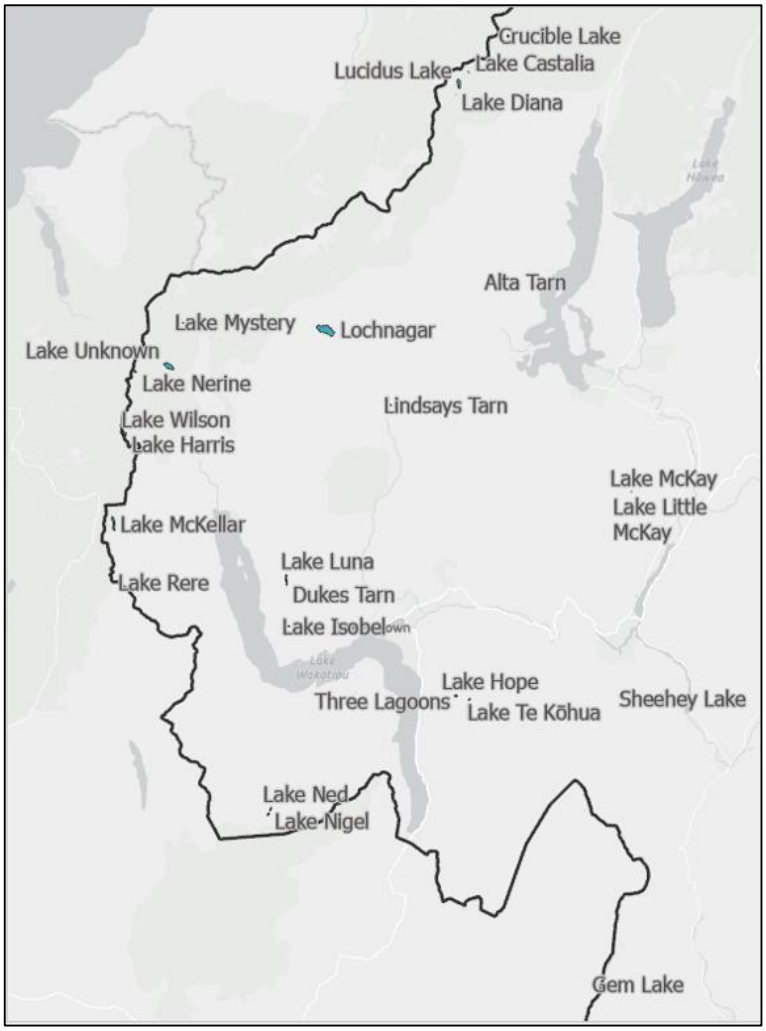

Figure 13: Locations of the Remote High-altitude Lakes. Not to scale.

3.4.2 Environmental setting

The majority of these lakes are situated within national parks or other largely unmodified catchments, many within the upper catchment of the DWL. Due to their altitude, many are located within particularly cold weather zones, and the lake ecosystems are likely to reflect this.

For the most part, these lakes are expected to be essentially pristine, but there is very limited data available as reflected in the following sections.

3.4.3 Water quality

No RHAL are included in ORC's SOE monitoring programme.

Vanhoutte *et al,.* (2006) compared the catchment characteristics of small high-altitude tarns and lakes in the South Island of New Zealand and Tasmania. Lake McKellar/Ōtākaha was the only identifiable lake in Otago that was named in the study. Vanhoutte *et al,* (2006) examined various datasets to determine the chemical limnology, physical characteristics and water quality of these remote high-altitude lakes and tarns.

Vanhoutte *et al,* (2006) found Lake McKellar, unlike other high-altitude lakes, had low pH (5.2) and high calcium concentrations (0.08 $mg.L^{-1}$) and conductivity (5.9 $\mu s.cm^{-1}$). Larger lakes included in the study (which were otherwisesimilar to Lake McKellar), were typically found to have higher ion loads, which is influenced by the lower throughputs of water passing through the water bodies. High annual rainfall also influenced the level of ion composition and dilution found in water bodies in most high-altitude South Island lakes. The study found that there were low nutrient concentrations in high-altitude oligotrophic South Island lakes generally, no such nutrients were measured in Lake McKellar.

Figure 14: Lake Harris/Te Hokaputu. Image source: Lakes380 website.

3.4.4 Ecology

Of the RHAL, only Lindsays Tarn has a fish survey recorded in NZFFD. This was carried out in 1992 and no fish species were recorded.

The Lakes 380 project includes sediment core analysis for a number of RHAL, of which the data for Lake McKay has already been published on their website. The sediment data indicates that the catchment (high in the Pisa range between Wānaka and Cromwell) was dominated by podocarp and beech forest before human settlement. Alpine grasses were also present. Charcoal in the sediment core indicates naturally occurring fires in the pre-human period, with a significant increase in fire after settlement (both in the pre-European and colonial periods). This was associated with an increase in bracken fern and grasses in the sediment core.

Algae have been present in the lake throughout the core record, but have increased significantly in the last ~100 years.

ORC's *Science Summary: Upper Lakes Rohe* includes comments on biodiversity of aquatic and water-dependent species in the Upper Lakes Rohe:

> *The Upper Lakes FMU has a diverse range of native freshwater fish, invertebrates, birds, plants, and a bat that depend on freshwater ecosystems. The seven native freshwater fishes include three non-migratory galaxias, one migratory galaxias (whitebait), one eel and two bullies. All the non-migratory galaxias are threatened. Freshwater invertebrates include freshwater crayfish and freshwater mussels.*
>
> *A high proportion of native birds depend on freshwater ecosystems, either as permanent or transient (migratory) populations. Threatened birds include Australasian bittern, black-billed gull, blue duck, and southern crested grebe. Many plants are freshwater-dependent, including the threatened Brachyscome linearis, Crassula peduncularis, Crassula multicaulis, and Carex strictissima. The introduced sports fishes include brown trout, rainbow trout, and chinook salmon. Information is often missing at a species level, particularly for freshwater invertebrates, non-vascular plants, and algae. Many native freshwater species are under threat and continue to decline.*

Note that the Upper Lakes Rohe also includes the three DWL, as well as various streams and rivers, and some of the above information may relate primarily or entirely to those other water bodies.

No other ecological data on the RHAL was found.

3.5 Accessible High-altitude Lakes

3.5.1 Lakes included

There are 13 AHAL included in this review, which are listed above in Table 2. Most are located in

Queenstown Lakes District.

Figure 15: Locations of the Accessible High-altitude Lakes. Not to scale.

3.5.2 Environmental setting

In pre-human conditions, the environmental setting of the AHAL is generally expected to have been very similar to the RHAL. However, the AHAL are closer to human settlements (particularly Queenstown and Wānaka), and are therefore more likely to have experienced some degradation. In particular, Lakes Hayes (Waiwhakaata) and Johnson (Waipuna) are only slightly above the arbitrary 300 m elevation cutoff for this group, and are both within relatively developed catchments and have known issues, as discussed in detail below.

ORC (2009) included Lakes Hayes and Johnson. It describes Lake Hayes as a "small relatively shallow lake" with a depth of up to 33 m. The principal tributary is Mill Creek, the flow in which is augmented by snow melt in late Winter and Spring. The outlet (Hayes Creek) flows through a raupo swamp in the south-eastern part of the lake. The catchment was dominated by agriculture at the time of ORC's report (approximately 65 % high producing exotic grass or low producing grassland). More recently, significant rural residential and other developments have occurred within the catchment.

Similarly, Lake Johnson is also described as a "small relatively shallow lake" with a depth of up to 27 m and an area of 0.2 km^2. It has a very small catchment with no natural tributaries or outlets. About 70 % of that

catchment is occupied by the same agricultural land uses referred to above for Lake Hayes.

Blue Lake is unique in this category as an artificial lake. It was included in this group rather than the Dams and Reservoirs as it was formed from an abandoned mine pit, not a dam or weir (though arguably it could fit into either category). The mine was abandoned in the 1940s, and the lake formed in the pit is approximately 19 m deep, with a surface elevation of ~500 masl (Barker *et al.*, 2004). Other lakes in this category are naturally occurring, generally without significant hydrological alterations, although there have been proposals to modify the hydrology of the Lake Hayes catchment to improve water quality.

3.5.3 Water quality

Water quality in the two AHAL monitored as part of ORC's SOE monitoring programme (Lakes Hayes and Johnson, both near Queenstown) is poor. Specifically:

- Measures of chlorophyll-*a* concentrations range from the B-D attribute state bands.
- Nitrogen concentrations were elevated in both lakes, but particularly Lake Johnson. Measures of nitrogen species were commonly in the B attribute state, but were worse (D) for total nitrogen at Lake Johnson and better (A) for median ammoniacal nitrogen at Lake Hayes.
- Total phosphorus was in the C attribute state for both lakes.
- Measures of *E. coli* concentrations were in the A attribute state in most cases, but were in the B attribute state in some cases for the Lake Hayes and Bendemeer Bay site (but not Lake Hayes at Mid Lake).

These results for Lake Hayes are consistent with eutrophic (poor) water quality conditions, as reported on the LAWA website. As noted above, monitoring of Lake Johnson was discontinued in 2018, so there is no more recent LAWA data for comparison.

Sufficient data to analyse trends was available only for the Lake Hayes sites. Again, these results are complex but can be summarised as follows:

- Nutrient and chlorophyll-a concentration trends were mostly positive, except for ammoniacal nitrogen at the Lake Hayes at Bendemeer Bay site (for which the 10-year trend was "as likely as not" to be improving) and nitrite/nitrate nitrogen at the Mid Lake site ("as likely or not" or "unlikely" to be improving, depending on depth).
- Trends for *E. coli* (Bendemeer Bay, 10-year trend) and Secchi depth (a measure of clarity; Mid Lake 10 m site, step-trend) were worsening.
- 10-year trends for suspended solids and turbidity at Bendemeer Bay were "as likely as not" to be improving.

Note that based on their environmental setting, it is not unexpected that these two lakes would have a high

degree of impact from human activities. These results should therefore not necessarily be considered representative of the other AHAL, for which in most cases there is very limited data available.

Table 7: Attribute states summary for Accessible High-Altitude Lakes (reproduced from Figure 11 of Ozanne, 2020).

Site	Nutrients and other periphyton/ phytoplankton indicators				Toxic substan-ces		*E. coli*				
	Chlorophyll-a (max)	Chlorophyll-a (median)	Total nitrogen	Total phosphorus	Ammoniacal N (max)	Ammoniacal N (median)	*E. coli* – g260	*E. coli* – g540	*E. coli* – median	*E. coli* – Q95	*E. coli* - swim
Lake Hayes at Mid Lake 10 m			●		●	●	●	●	●	●	●
Lake Hayes at Bendemeer Bay			●				●	●	●	●	●
Lake Johnson at South Beach Huts			●				●	●	●	●	●

Notes: blank cells indicate no data, white cells with circles indicate data available, but (as at 2020) below the minimum sample numbers recommended as per the NPS-FM, filled cells indicate minimum sample numbers met. Colour coding: A attribute state = green, B = yellow, C = orange, D = red.

Schallenberg and Martin's (2008) report presented the results of an integrated lake water quality assessment for Lake Hayes by assessing the biological significance of specific nutrients. Water quality was sampled in the lake at seven various surface/groundwater sites during March-July 2006. One 40 litre sample of lake water was collected to determine magnitude of phytoplankton at a depth of 0.5-3 metres. A nutrient budget was also completed to determine the nutrient concentrations and flow measurements, inputs and outputs of water into the lake.

Schallenberg and Martin's (2008) note that the Lake Hayes catchment has seen a reduction in N, since the introduction of the Lake Hayes Management Strategy 2005. The goal of the document was to improve water quality in Lake Hayes and prevent further algal blooms. A clear result of this strategy saw the reduction in stock numbers and use of P fertilisers observed to have a visible difference in water quality. Despite these efforts, phytoplankton blooms persisted in the landscape. Schallenberg and Martin's (2008) report found that the availability of zinc and boron may have been contributing factors causing the rise in phytoplankton blooms in Lake Hayes.

ORC (2008) reports that both Lakes Hayes was eutrophic (poor water quality) at that time, while Lake Johnson was mesotrophic (moderate water quality). Detailed information is included on Lakes Hayes, which experienced a significant algal bloom the dinoflagellate *Ceratium* in the 2007-08 summer. Both the pH and the temperature were noted to be very high at the surface of the lake (up to ~pH 10 and 21 ^{o}C, respectively), which may indicate the presence of ammonia at concentrations potentially toxic to fish. Dissolved oxygen concentrations were also noted to be very low below the top few metres of the lake.

The eutrophic lake has also experienced significant algal blooms, which is linked to the pH and high surface water temperatures, reducing dissolved oxygen during the algae blooms and also leading to ammonia toxicity. These factors make Lake Hayes an undesirable habitat for trout.

In the monitoring of Lake Hayes by ORC (2009), clear seasonal trends were seen in algal biomass, total nitrogen, and (to a lesser extent) total phosphorus, with all increasing in summer while clarity reduced in summer. Longer-term trends within the 3-year period were not statistically significant. The lake was classified as eutrophic (poor water quality), and very close to supertrophic (very poor). The deeper part of the lake (hypolimnion) was found to be severely oxygen-depleted during summer. It was found that nutrients from the lake sediments are released to the hypolimnion at high concentrations during this period, later mixing with shallow waters in early winter. Further information on the algal blooms discussed in ORC (2008) is also given, most notably that the *Ceratirum* algae responsible for the blooms during this period differed from the toxic blue-green algae *Anabaena flos-aquae* recorded in blooms in the 1970s and 1980s. The reason for this change is not clear.

Lake Johnson exhibited similar seasonal trends to Lake Hayes, but longer-term trends (increasing chlorophyll-a, and decreasing clarity, total phosphorus and total nitrogen) were statistically significant. The report suggests that the reducing nutrient concentrations may have failed to result in improvements of the other variables because the initial nutrient concentrations were so high. Also like Lake Hayes, the deep waters were oxygen-depleted during the warmer months. The results also corresponded with poor (eutrophic) water quality (ORC, 2019).

The McBride *et al.,* (2019) modelling report for Lake Hayes presented the results of synthesised lake monitoring data between 1983 to 2017 to determine the drivers of poor water quality. The report was undertaken on behalf of ORC to gain further understanding on how to manage the quality of the lake based

on physical and chemical dynamics. The study found that:

> Nutrients concentrations measured in the lake (measured monthly between 2011-2018) indicated the average ratio of nitrogen to phosphorus is 10:1. Based on this ratio, nitrogen may be the factor that limits phytoplankton growth in Lake Hayes.
> Phytoplankton was observed between 2016-2017, however, the results suggested that despite a spring bloom being present, the bloom collapsed at the beginning of October, assumed to be a result of the increased zooplankton grazing pressure.

The results of McBride *et al.,* (2019) study outlined four key management scenarios to manage Lake Hayes water quality. When compared to international literature, it was found that a holistic and comprehensive approach for lake restoration is required to manage water quality and algal blooms. The report identified four management scenarios; nutrient load reduction, Arrow River diversion, artificial aeration and geochemical engineering.

Khan (2021) completed an ecological study of Lakes Hayes and Johnson, and reported that Lake Hayes was "on the verge of eutrophication during the late 1940s". This was inferred to be linked to releases of agricultural nutrients to water in the catchment. Khan also reports that both Lake Hayes and Lake Johnson were reported to be eutrophic in the late 1960s (see also the references cited by Khan in Section 1.2 of his thesis). The reader is referred to Khan's thesis for more detail on his research, which cannot be summarised in detail here, but also included studies of the history of Lake Hayes through sediment cores, and an investigation of the feeding habits of perch in the lake. Khan concludes that reducing the population of perch in Lake Hayes has the potential to have a cascading effect through the lake ecosystem that would meaningfully increase water quality, as well as improving native fish populations. However, further research to test the feasibility of this biomanipulation method was recommended.

Barker *et al.* (2004) completed a study of the chemical composition of Blue Lake, focussing on major ions, trace elements, and geochemistry. Samples were collected in March 2002 from various depths within the lake, selected nearby streams, and from lake sediment. Lake water pH was circumneutral, reducing slightly with depth (from ~7.7 to 7.0). Most of the major ions and trace elements measured were found to be present at higher concentrations in Blue Lake than in nearby streams, apart from an input stream considered representative of acidic groundwater input to the lake, which had significantly elevated concentrations of most analytes. One of the authors noted that he has not observed this input stream flowing in the ~20 years since the study was undertaken (pers. comm. Dave Craw). In the paper, the authors attribute the elevated metal concentrations in the lake to a combination of evaporative concentration and input of metal-rich acidic groundwater.

Zinc, nickel and sulphate were all present in Blue Lake at concentrations 10 or more times higher than the streams expected to be representative of regional background water quality. As shown in Table 8, of the three heavy metals measured, both copper and zinc were present in at least one sample at concentrations

exceeding the Australian and New Zealand 95 % protection freshwater quality guidelines, indicating concentrations that may be ecotoxic to some freshwater species (ANZECC, 2000). Nickel was present at about one quarter of the guideline value. The authors note that "metal enrichment in lake water will probably continue to occur into the future" and recommend further investigation into the bioavailability and speciation of heavy metals in the lake. To the best of our knowledge, this further work has never occurred.

Table 8: Heavy metal concentrations measured in Blue Lake, March 2002 (Barker *et al.*, 2004)

Metal	Blue Lake concentrate-ion range (µg/L)	ANZECC 2000 95 % protection freshwater quality guideline (µg/L)
Copper	1.1-**2.5**	**1.4**
Nickel	2.5-2.8	**11**
Zinc	2.6-**8.6**	**8**

Note: Guidelines for *copper*, *nickel* and *zinc* are taken from ANZECC (2000) and have not been adjusted for hardness. Blue Lake concentrations are taken from Table 2 of Barker *et al.* (2004). Note unit conversion from nmol/L in the paper to µg/L above

3.5.4 Ecology

NZFFD fish survey data is available for five of the AHAL: Diamond/Ōturu (Glenorchy) and Moke/Punamāhaka Lakes, Glenorchy Lagoon, and Lakes Hayes and Johnson. In most cases, only one survey has been recorded for each lake. The common bully was identified in all of these except Diamond Lake. Longfin eel was the only other native species identified, present in two of these lakes. All except Glenorchy Lagoon were also found to contain one or more introduced species: perch, brown or rainbow trout, and/or an unidentified salmonid.

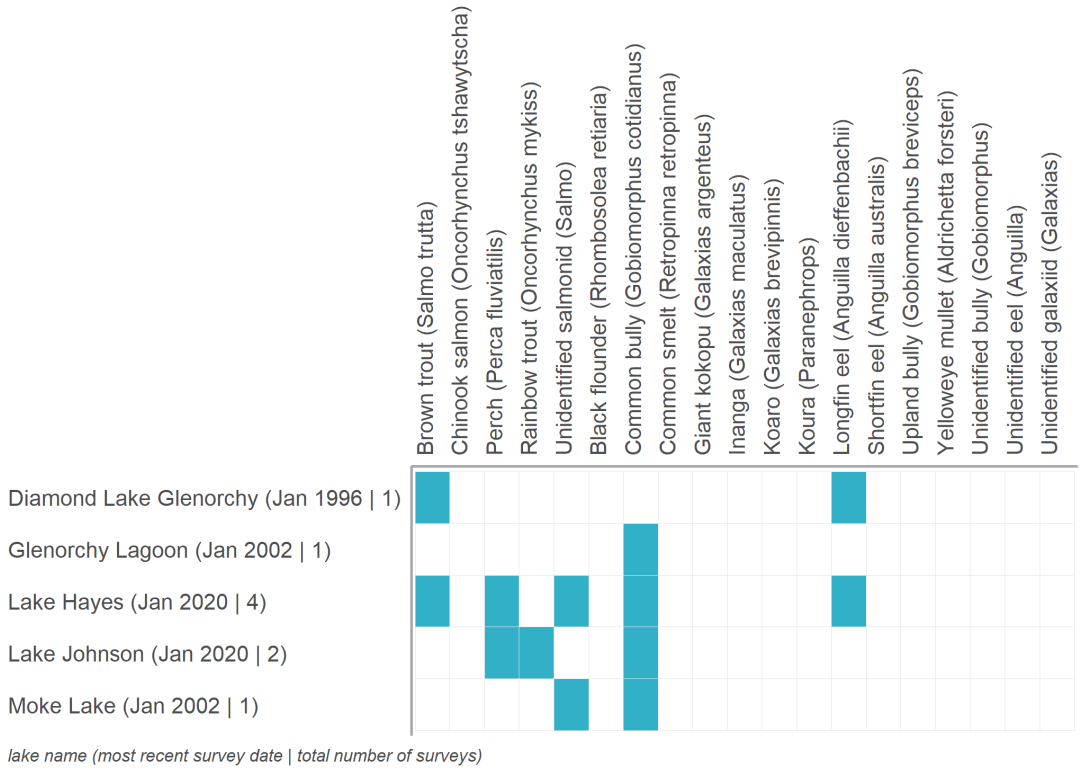

Figure 16: Summary of species identified in the Accessible High-altitude Lakes, from NZFFD fish survey data

The findings of Ruehle *et al.* (2021) also confirm the presence of common bullies in Lake Hayes.

Khan (2021) notes that the fish communities in Lakes Hayes and Johnson both include common bullies (*Gobiomorphus cotidianus*), while kōaro (*Galaxias brevipinnis*) and longfin eel (Anguilla dieffenbachia) are both present in Lake Hayes only. These lakes also have introduced fish, with European perch (*Perca fluviatilis*) present in both, brown trout (*Salmo trutta*) in Lake Hayes, and rainbow trout (*Oncorhynchus mykiss*) in Lake Johnson. Khan's observations are generally consistent with the NZFFD data, except that kōaro is not reported in these lakes in NZFFD.

Khan also notes the presence of both native (*Daphnia thomsoni*) and non-indigenous (*D. pulicaria*) species of *Daphnia*, a genus of planktonic crustaceans, as a key part of the food web.

Owing to its nutrient-enriched state, Lake Hayes has suffered from blooms since at least the 1970s, and severe blooms associated with the microplankton species *Ceratium hirundinella* (which we understand has been renamed *C. furcoides*) have been noted since 2006. There have also been recent summers without significant blooms, in 2009-10 and 2016-17. These events may be associated with poor recruitment of perch

larvae, resulting in increased presence of *Daphnia* and reduced *Ceratium*. It is possible that this indicates that the lake is "approaching a tipping point for recovery" (Khan, 2021 and references therein).

NIWA's (2022) LakeSPI (submerged plant indicators) programme included Lake Hayes. It was considered to be in moderate ecological condition, with a LakesSPI score of 40%. Lakes Hayes was a particularly interesting case, as the LakeSPI and native condition has shown signs of improvements since it was last surveyed in December 1992. Conversely, there has also been a 20% decrease in the level of invasive species cover, particularly *elodea canadensis*, a low growing plant (up to 0.5 metres). In the two sites measured in Lake Hayes, the presence of *elodea* was high, sampling just under 95% of the area to a maximum depth of 4.9 m.

As noted in Table 6, the organism which causes lake snow has been observed in Moke Lake as well as Lakes Hayes and Johnson. However, only Moke Lake had had a recorded outbreak of lake snow at the time of that study (Schallenberg and Novis, 2018).

3.6 Dams and Reservoirs

3.6.1 Lakes included

There are 32 dams and reservoirs included in this review, ranging from large lakes like Lake Dunstan/Te Wairere to small dams such as that formed by Paerau Weir. These are spread throughout Otago, but dominantly in the Clutha River/Mata-Au catchment and in the hills east of the Clutha. These lakes support a variety of uses, most commonly hydroelectric generation, irrigation, and municipal water supply.

Otago also contains many smaller dams which are unnamed and were excluded from this review, as discussed in Section 3.1.1.

3.6.2 Environmental setting

Because these lakes are defined by being artificial or heavily modified, they occur in a wide range of environmental settings. Many, such as Lake Onslow and the Greenland Reservoir, are at relatively high-altitude, owing to their use to store and supply water to lower altitudes for irrigation and/or hydroelectricity generation. In contrast, Lakes Dunstan and Roxburgh are on the main stem of the Clutha River/Mata Au and are at low altitude (<200 masl).

ORC (2009) includes a discussion of the environmental setting for Lake Onslow. The lake is "set in wide open Otago tussock 700 m above sea level". The lake is 9.5 m deep and has an area of 3.8 km^2, within a 126 km^2 catchment, 86 % of which is occupied by "tall tussock grassland".

3.6.3 Water quality

Of the two DR included in ORC's SOE water quality monitoring:

- Lake Dunstan was found to be in the A attribute state for all of the variables considered. Of the variables with sufficient data for a trend analysis, nutrient concentrations generally had positive trends, suspended solids and turbidity trends were "as likely as not" or "likely" to be improving, and *E. coli* trends were "as likely as not" or "unlikely" to be improving (depending on the trend period).
- Lake Onslow was found to be in the A attribute state for most of the variables monitored, except for total phosphorus (C), total nitrogen and median chlorophyll-*a* (both B state). Of the variables for which trends could be established, turbidity, suspended solids, total phosphorus, total nitrogen and nitrite/nitrate nitrogen were all improving (with varying degrees of certainty), while ammoniacal nitrogen and chlorophyll-*a* were both degrading over a 10-year period.

These results indicate good (oligotrophic) water quality for Lake Dunstan and fair (mesotrophic) for Lake Onslow.

Table 9: Attribute states summary for Dams and Reservoirs (reproduced from Figures 11 and 20 of Ozanne, 2020).

Site	Nutrients and other periphyton/ phytoplankton indicators				Toxic subst-ances		*E. coli*				
	Chlorophyll-a (max)	Chlorophyll-a (median)	Total nitrogen	Total phosphorus	Ammoniacal N (max)	Ammoniacal N (median)	*E. coli* – g260	*E.coli* – g540	*E. coli* – median	*E. coli* – Q95	*E. coli* - swim
Lake Dunstan at Dead Mans Point											
Lake Onslow at Boat Ramp							●	●	●	●	●

Notes: blank cells indicate no data, white cells with circles indicate data available, but (as at 2020) below the

minimum sample numbers recommended as per the NPS-FM, filled cells indicate minimum sample numbers met. Colour coding: A attribute state = green, B = yellow, C = orange, D = red.

ORC (2008) report that Lake Onslow had fair water quality (mesotrophic) at that time.

ORC (2009) also monitored Lake Onslow, although Secchi depth was not measured as the lake is noted to be naturally tannic (and therefore to have a low clarity), and also because the sampling location was relatively shallow. Slight seasonal trends of increasing total nitrogen, total phosphorus and chlorophyll-*a* in summer were notable in the data. Long term trends were not significant. Overall, the lake was classified as eutrophic (poor), although some variables were within the mesotrophic (fair) range. This suggests that water quality in Lake Onslow may have improved over the last 10-15 years, which would be consistent with the mostly improving trends for individual water quality variables. However, much more detailed analysis would be required to confirm this.

Several water bodies around New Zealand have been dramatically modified by large scale water projects. Young *et al.* (2004) assessed the effects on water quality, ecology and people, as well as management impacts. The article outlined several effects of storage on water quality, with longer residence times associated with poorer water quality. The article discusses the Clyde and Roxburgh Dams (which form Lakes Dunstan and Roxburgh, respectively). These, particularly Lake Dunstan, intercept sediment transported by the Kawarau and Shotover Rivers, which causes changes in water clarity, and turbidity.

Reservoirs often cause the interception of organic matter which is crucial for riverine organisms, and alters the composition of reservoirs and downstream rivers. Young *et al.* also record values associated with water bodies affected by these projects, including:

- Rivers support significant cultural and recreational values and are a major contributor to the natural aesthetic of the landscape and a location's identity.
- Dams and reservoirs can improve public access and recreational assets for anglers, swimmers and boat owners. However, some recreational assets were lost during the creation of reservoirs, for example, rapids that were popular on the Kawarau River were inundated from the flooding of Lake Dunstan.
- Kāi Tahu estimate that 90% of wāhi tapu sites near to Lake Hāwea, Lake Dunstan and Lake Roxburgh have been lost because they were close to the lake/river's edge and are now drowned under the hydro-electricity lakes.
- The article also identified several ecological impacts of reservoirs and man-made hydro dams. For example, the flooding of Lake Dunstan caused the changes in the terrestrial vegetation, and organic material. Six years after the flooding, around 16 species of aquatic plants species including the lake weed *Lagarosiphon*, which dominates the lake in the depth range between 2-4 metres, inhabited the lake. The management of *lagarosiphon* in Lake Dunstan and other lakes is discussed in more detail in Section 4.6.5.

- Complexity around the confinement of fish populations including those in Lake Mahinerangi on the Waipori River resulted in kōaro becoming landlocked. Related to this is the need to capture juvenile eels and transfer them above and below dams.

Regarding the issue of sedimentation mentioned by Young et al, we are aware from our consultation and local knowledge that monitoring of sedimentation in the Kawarau arm of Lake Dunstan is carried out by both Contact Energy Ltd, as well as a citizen science initiative by the Cromwell College geography department. The relevant reports have not (to the best of our knowledge) been published and therefore were not identified as part of our literature search. However, Contact's monitoring has been summarised as follows:

> *Every two years, since the lake began filling in 1992, Contact has surveyed cross sections of the lakebed in the Kawarau Arm, something it must do to fulfil resource consent obligations. Based on these surveys, the amount of sediment accumulating in the Kawarau Arm of the lake has averaged one million cubic metres a year from 1994 to 2018.* (Crux.org.nz, June 2020)

Little or no water quality data appears to be available for the other DR, at least in documents covered by our search strategy. It is particularly noteworthy that water quality data does not appear to be available for Lake Roxburgh, which is a significant water body and situated on the main stem of the Clutha River/Mata-Au. That said, results for Clutha water quality monitoring sites reported in Ozanne (2020) could be used to infer conditions in Lake Roxburgh, to an extent.

3.6.4 Ecology

A large amount of fish survey data from NZFFD is available for this group of lakes, covering 15 dams and reservoirs in all, though with only one or two surveys per lake in most cases. Most of these lakes contained brown and/or rainbow trout, with perch and/or salmon also present in some. Of the native species, common bully was also present in most of the lakes, with other bullies, eels, kōaro and/or koura each also present in a few lakes, and an unidentified galaxiid recorded in Lake Dunstan.

The one survey recorded in the Manorburn Reservoir (on an unknown date in 1982) notes brown trout, rainbow trout, upland bully, or common bully in the raw NZFFD data, but gives 'totalCount' = 0 and 'present' = FALSE for all four species. In our opinion, it is likely that this is a data entry error, but for consistency these species are marked as absent in the figure below, in accordance with the data as recorded in NZFFD.

Figure 17: Summary of species identified in the Dams and Reservoirs, from NZFFD fish survey data

Trotter (2021) provided evidence on behalf of Otago and Central South Island Fish and Game Council during the Environment Court hearing for Plan Change 7 to the Regional Plan: Water for Otago. In his evidence, Trotter (2021) suggested that the irrigation storage water bodies provide high value angling, specifically the Pool Burn Reservoir, Upper Manorburn and Falls Dam. Several of these large reservoirs also support the flows in the Manuherekia River, a regionally significant river for adult trout fishing with spawning and juvenile rearing habitat throughout the catchment. However, these water bodies are also influenced by low flows of Central Otago rivers.

NIWA's (2022) LakeSPI (submerged plant indicators) programme carried out sampling in Lakes Onslow and Dunstan in 2020. Lake Onslow was considered to be in high ecological condition with a LakeSPI score of 67%. Whereas Lake Dunstan was considered to be in moderate ecological condition with a score of 49%.

3.7 Coastal and Lowland Lakes

3.7.1 Lakes included

There are nine (groups of) lakes included in the coastal and lowland lakes (CLL) category, noting that the three small unnamed lakes in the Waihola-Waipori wetland complex have been counted as one for this purpose. Details of these lakes are given in Table 2.

The locations of these lakes are shown in Figure 18. They are spread across most of the length of the Otago coast, and are situated within four different freshwater management units.

Figure 18: Locations of the Coastal and Lowland Lakes. Not to scale.

3.7.2 Environmental setting

Figure 19: 2022 satellite image showing Tomahawk Lagoon (upper and lower), on the outskirts of Dunedin City. Source: Google Earth Pro

While the upper elevation cutoff for the CLL category was 300 m (see Appendix 2), in practice most of them are at much lower altitude than this. Most are very close to the coast and are tidally influenced and/or partially saline. Some, such as Lake Tuakitoto, have artificial systems to control the influence of the tides.

Several of the CLL are in the Catlins FMU, for which ORC has prepared a science summary (ORC, n.d.). The area is noted to be sparsely populated with approximately 1000 human residents. Land use includes a range of primary industries (sheep farming, sheep and beef, some dairy grazing and forestry), along with many unmodified natural ecosystems. Regarding biodiversity, ORC state that:

> *The Catlins FMU has a diverse range of native freshwater fish, invertebrates, birds, plants, and a bat that depend on freshwater ecosystems. The nineteen native freshwater fish include two eels, five bullies, four migratory galaxias (whitebait), lamprey, smelt, torrentfish, estuarine triplefin, black flounder, and three non-migratory galaxias. The threatened freshwater fishes are non-migratory galaxias and the lamprey. Freshwater invertebrates include freshwater crayfish, freshwater mussels, and shrimp.*

It Is noted that Catlins Lake (also known as the Catlins River Estuary) "is the most affected by human activity [of the four estuaries in the Catlins] and experiences nuisance algal growth, increased sedimentation and poor sediment oxidation predominately in the upper estuary compared to the other three estuaries which are located in less-modified catchments."

The environmental setting of Lake Tuakitoto is described in Ozanne (2014). It is a freshwater wetland in the lower Clutha/Mata-au catchment, with the main tributaries being Lovells Creek, Stony Creek and Frasers Stream. The lake level is less than a metre above mean sea level, with a depth measured in the tens of centimetres. It is noted to be "the only large humic lake on the East Coast of the South Island and the only major wetland remaining in the Lower Clutha catchment". The land use in the catchment is dominated by agriculture, predominantly sheep farming, with smaller areas used for mixed sheep and beef farming, and dairy farms.

There were no recorded water takes from the lake for irrigation at the time the report was written. The lake is used as part of a flood control system and a system of control gates/locks is used to manage lake levels for this purpose, while also maintaining a minimum level for ecological reasons.

Dunedin City Council (2019) prepared a resource consent to discharge residential stormwater from Spencer and Gloucester Streets into Tomahawk Lagoon. The land use surrounding the lagoon is predominantly farmland with the residential suburb of Tomahawk lying to the east, north and south-east. The consent application acknowledged that water quality was an issue within Tomahawk Lagoon due to untreated sewage and fertiliser run off increasing phosphorus and nitrogen levels, but did not provide details. A 2014 report referenced in the application indicated that 72% of the lower lagoon's catchment is pastoral.

The Sutton Salt Lake Is unique among this group, and indeed may be unique as the only saline lake in New Zealand. It is an intermittent lake which forms in a c. 5 m depression in the schist bedrock at an elevation of approx. 250 masl near Middlemarch, filling during winter and drying up most summers. When full, the lake is typically approximately 150 m wide, 340 m long and only 0-4-0.5 m deep. The lake water is understood to be sourced entirely from rainfall, with no groundwater contribution (Craw and Beckett, 2004).

3.7.3 Water quality

There are two CLL which are monitored as part of ORC's SOE monitoring programme (excluding Tomahawk Lagoon, which was added to the programme recently). The results can be summarised as follows:

- Measures of chlorophyll-*a* concentrations were in either the C or D state in Lake Tuakitoto, and either B or C in Lake Waihola.
- Total nitrogen and total phosphorus were in the D state in Lake Tuakitoto and the C state in Lake Waihola.
- Ammoniacal nitrogen was in the A attribute state at Lake Waihola, while at Lake Tuakitoto the median concentration was also in the A state and the maximum was in the B state.
- The various measures of *E. coli* concentration were generally in the A attribute state (with some 'B's) in Lake Waihola, and a mixture of 'A's and 'B's at Lake Tuakitoto.

Trends were variable, but in general:

- At Lake Tuakitoto, *E. coli*, suspended solids and turbidity trends were improving, and nutrient concentration trends were either "as likely as not" to be improving, or were worsening.
- At Lake Waihola (end of jetty site), ammoniacal nitrogen and chlorophyll-*a* trends were improving, while dissolved reactive phosphorus, total phosphorus, *E. coli* and nitrate/nitrate nitrogen had generally decreasing trends. Trends for suspended solids, turbidity and total nitrogen were worsening on an 18-year timescale and improving on a 10-year timescale. This, and the fact that the worsening trends in Lake Waihola were all assessed as less likely to be worsening on the 10-year basis compared to the 18-year period, suggests that an earlier decline in water quality in the lake may be in the process of being reversed, but other interpretations may also be possible.

Table 10: Attribute states summary for Coastal and Lowland Lakes (reproduced from Figures 24 and 31 of Ozanne, 2020).

Site	Nutrients and other periphyton/ phytoplankton indicators				Toxic subst-ances		*E. coli*				
	Chlorophyll-a (max)	Chlorophyll-a (median)	Total nitrogen	Total phosphorus	Ammoniacal N (max)	Ammoniacal N (median)	*E. coli* – g260	*E.coli* – g540	*E. coli* – median	*E. coli* – Q95	*E. coli* - swim
Lake Tuakitoto at Outlet											
Lake Waihola at Waihola mid	●	●	●	●	●	●	●	●	●	●	●
Lake Waihola at End of jetty			●				●	●	●	●	●

Notes: blank cells indicate no data, white cells with circles indicate data available, but (as at 2020) below the minimum sample numbers recommended as per the NPS-FM, filled cells indicate minimum sample numbers met. Colour coding: A attribute state = green, B = yellow, C = orange, D = red.

Additionally, Catlins Lake (also known as the Catlins River Estuary) is included as an estuarine state of the environment monitoring site. There are two monitored sites within the estuary, near Papatowai Highway in the west (inland) end and near Pounawea in the east. Estuarine monitoring sites are assigned an estuary macrofauna score (EMS), somewhat comparable to the TLI, which provides an overall indicator of estuarine ecosystem health based on ecological data and mud content. As reported in LAWA, the inland side has an EMS of 4.48 (high impacts), versus 3.09 (moderate impacts) for the Pounawea site. The main difference between the two sites appears to have been the mud content (43 % inland vs 1.3 % at Pounawea), with the concentrations of various heavy metals in sediment all complying with the relevant guidelines.

Ozanne (2014) found that Lake Tuakitoto's status based on state of the environment monitoring data from July 1995-June 2013 was supertrophic (very poor water quality), with very high concentrations of both total

phosphorus and total nitrogen, and chlorophyll-a concentrations also elevated (though in that case only to eutrophic/poor levels). Statistically significant trends over this time period were identified for dissolved reactive phosphorus (increasing) and ammoniacal nitrogen (decreasing), with other variables measured not exhibiting statistically significant trends.

In addition to the SOE monitoring, more intensive (fortnightly) water quality monitoring was carried out from September 2012-2013. This covered 13 sites in the Lake Tuakitoto catchment, mostly in tributaries. The statistical summaries of the lake outlet site monitoring data are presented somewhat differently than for the longer SOE monitoring dataset due to comparison with different guideline values, but in general the two datasets appear to be consistent, as would be expected. It was noted that periphyton in the Lake Tuakitoto catchment appeared to be phosphorus-limited.

The report also notes that Lake Tuakitoto spent extended periods of time below the specified minimum lake level of 0.77 m above sea level in the years 2005/06 to 2012/13, with three years during that period having 70 or more days below that level.

Schallenberg and Burns (2003) investigated the meteorological and hydrological factors influencing water quality in Lakes Waihola and Waipori. The study investigated how hydrological and meteorological factors influenced water quality in the lakes, and how water quality in turn affected lake ecological communities. This is a detailed and complex study which is difficult to summarise accurately in the space available, however, some of the key findings were:

- Re-suspension of sediment by wind on the surface is a key influence on water quality in these lakes, which are relatively shallow (1-2 m, approximately).
- Water quality in the lakes was also notably influenced by the Waipori River (both upper and lower branches), with inflow of saline water due to tidal influence also a factor.
- A range of zooplankton were identified in the lakes – 33 taxa in Lake Waihola and 36 in Lake Waipori (with ten taxa identified in only one of the two lakes).
- Zooplankton community structure was influenced by water quality, however, wind-induced sediment resuspension did not appear to have adverse effects as has been observed in other lakes, possibly because

the sediment is high in organic matter which may provide food for the plankton.

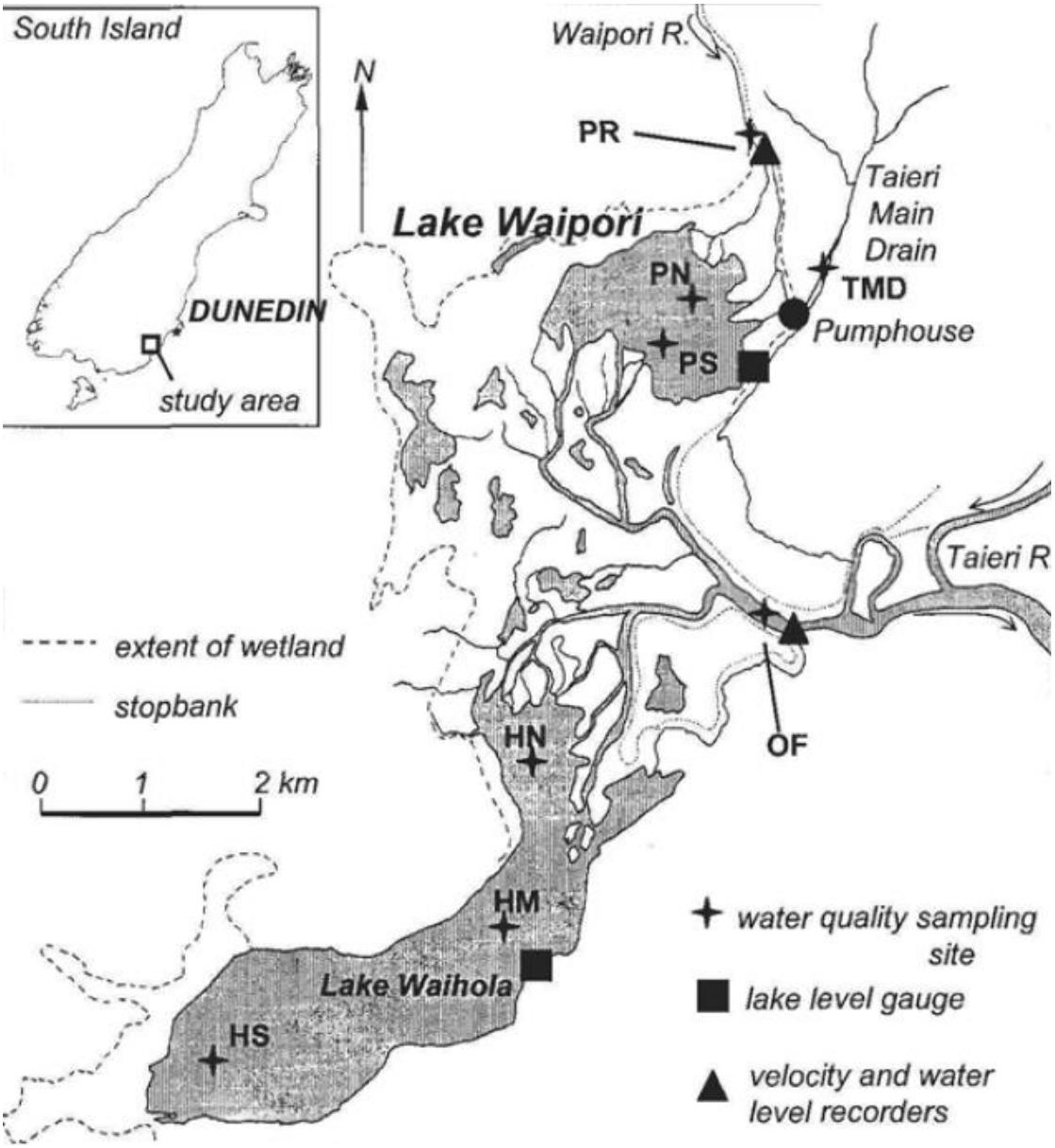

Figure 20: Lakes Waihola and Waipori. Map is by Schallenberg and Burns (2003) and shows their sampling sites.

Craw and Beckett (2004) studied the water and sediment chemistry of Sutton Salt Lake, based on sampling carried out at varying lake levels in January and November 1998 and August 2003, with the 2003 samples collected from remnant pools when the lake was dry. The lake water pH was consistently 9.0-9.1 when full, and in the range of 7.7-8.4 when nearly dry. The lake waters are highly elevated in sodium (~2,000-

13,000 ppm) and chloride (~5,000-23,000 ppm), which the authors note corresponds to a ~1:1 molar ratio and a salinity one quarter to one third that of sea water. Other major ions (potassium, calcium, magnesium and sulphate) were present at much lower concentrations, typically in the hundreds of ppm. Based on analysis of these data in comparison to seawater and local surface and groundwater sources, the authors concluded that the ionic composition of the lake reflects sea water (via marine aerosols) as the source of salinity in the lake. A number of toxic trace elements were also tested for in lake sediment (but apparently not in water samples), with strontium, zinc and chromium all detected in the hundreds of ppm.

Bernot *et al.,* 2018 examined the influence of emerging organic contaminants (EOCs) on the freshwater of Dunedin. EOC's are human-derived contaminants, these include but are not limited to: wastewater, soaps, medications, food additives etc. Four sites were sampled, two in low-density areas (outfall of Ross Creek Reservoir and Lindsay Creek in Chingford Park), one high density area (lower Leith River) and one vulnerable location (Tomahawk Lagoon) that often receives urban wastewater effluent from the emergency outfall location. The sites were sampled twice in February 2017, where sediment and water quality samples were collected.

Of the 36 tested samples, four compounds were detected at elevated concentrations. These included; carbamazepine, cotinine, caffeine, and DEET. Tomahawk Lagoon had the highest and most consistent count of EOC's for both sampling events. DEET was the most frequently detected compound at all four of the sites, with higher concentrations being detected in the latter half of the sampling period. DEET is the active ingredient in many insect repellents.

3.7.4 Ecology

NZFFD contains data for four of the CLL: Lakes Tuakitoto, Waihola and Waipori, as well as Tomahawk Lagoon No. 2. Multiple surveys were available for each lake, but in the case of Lake Waipori there appear to have been only two, with the most recent more than 40 years ago.

Perch were present in all of these lakes except Tomahawk Lagoon (anecdotally we understand that they are present there, but this is not reflected in the NZFFD data), with brown or rainbow trout and/or unidentified salmonids present in all except Lake Waipori. A range of native species were also identified, with common bully, inanga and longfin eel present in all four of these CLL, shortfin eel present in all except Tomahawk, and various other native fish identified in one or two of these lakes.

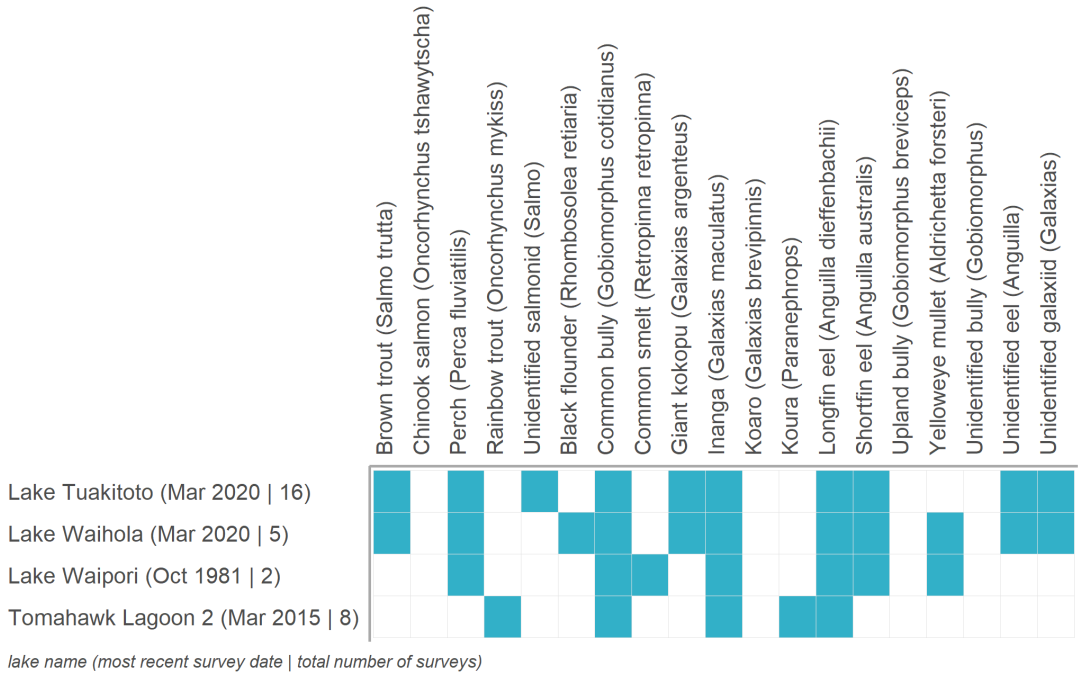

Figure 21: Summary of species identified in Coastal Lakes and Lagoons, from NZFFD fish survey data

Ozanne (2014) report on fish survey data for the Lake Tuakitoto catchment as at July 2012 from NZFFD. As would be expected, this largely agrees with the data in Figure 21, although common smelt, freshwater shrimp and koura are also listed in Ozanne's report, presumably as they were identified in tributaries rather than the lake itself. Lamprey were also identified in one tributary (Lovells Creek) in a May 2013 electric-fishing survey.

Studies of freshwater mussels in Lake Tuakitoto were carried out in 1991 and 2013 and summarised in Ozanne (2014). The mussel population in the lake appeared to have notably reduced (both in population density and biomass terms) between the two survey dates, possibly due to reduced water levels over that period and/or reduced populations of Galaxias (whitebait), which have an important role in the mussel life cycle. Mussels may have an important role in filtering lake water, and consequently it is possible that the apparent reduction in mussel population may adversely affect physicochemical water quality in the lake.

It is also noted that the Lake Tuakitoto wetland system hosts a high diversity of indigenous flora and fauna, with approximately 50 species of bird recorded, including threatened species the Australasian Bittern and Banded Dotterel.

There are three CLL with a sediment core record published on the Lakes380 website:

- For Tomahawk Lagoon (upper), the data indicate that the prevalence of tree ferns and (to a lesser extent) podocarp in the lagoon catchment was already in decline in the late pre-human period, and

that decline continued in the following years - predominantly post Māori settlement in the case of tree ferns, predominantly post European settlement in the case of podocarp. In both cases, that was associated with a significant increase in the presence of charcoal since Māori settlement (and ongoing in the colonial era), presumably associated with clearance by human-induced fires, whether deliberate or accidental. The vegetation was then dominated by bracken fern for a time after Māori settlement, before grasses became dominant after colonisation. Meanwhile, the prevalence of algae has been relatively stable throughout the last ~2,000 years, before spiking significantly in what appears to be the last few decades.

- The Lake Tuakitoto catchment was dominated by podocarps and ground ferns for much of the period covered by the sediment core (~1,500 years). In recent years these species have reduced significantly, being replaced by pine and grasses. The presence of algae was remarkably consistent throughout the sediment core record, before increasing significantly in recent decades.
- The Lake Waihola catchment was dominated by podocarps until late in the pre-European period or early after European settlement. At this time, the presence of charcoal in the sediment core spikes, along with increased presence of bracken ferns. These were then gradually replaced by grasses and pine in recent decades. Algae were evidently more abundant around 1,000 years ago, when the Lakes 380 factsheet for Lake Waihola indicates the lake was more saline. Algae levels were relatively stable for about 700 years after this spike, but have increased again in recent years.

4. Management Framework

4.1 National Direction

4.1.1 Resource Management Act 1991

Management of water resources in New Zealand is governed by the Resource Management Act 1991 (RMA). This is the principal resource management legislation in New Zealand with the purpose of promoting the sustainable management of natural and physical resources including freshwater, land, air, and the coastal marine area. The RMA regulates land use and the provision of infrastructure, allowing for the use natural resources if doing so is permitted under the RMA or authorised by a resource consent. The RMA regulates activities such as the use of land within a catchment, the taking, damming or diversion of water, discharges of contaminants and activities involving surface or bed of lakes and other waterbodies.

The RMA provides national direction for local decision-making using national policy statements and national environmental standards.

On 3 August 2020 the Government released the 'Essential Freshwater' package (previously known as the 'Action for Healthy Waterways' package). The 'Essential Freshwater' package introduced new rules and regulations which are designed to manage New Zealand's freshwater resources and improve water quality within five years, and reverse past damage within a generation. The package included the release of new National Environmental Standards for Freshwater 2020, Stock Exclusion Regulations 2020 and the updated National Policy Statement for Freshwater Management 2020. These documents are discussed further below.

Under the RMA, Regional Councils are required to develop plans for integrated management of natural and physical resources and are responsible for making decisions about discharges of contaminants, to land, air or water, water quality and quantity. Other regional council functions include soil conservation, aquatic ecosystems, biodiversity and natural hazards.

Territorial authorities (City or District Councils) are required to prepare district plans for their district. District plans cover the functions of territorial authorities, including the effects of land use and managing activities on the surface of water in rivers and lakes. Other territorial authority functions include the control of land for the purpose of avoiding or mitigating natural hazards, managing contaminated land, and the maintenance of indigenous biodiversity.

Reform of the RMA has been announced by the current Government. In February 2021, the Ministry for the Environment, and Minister David Parker announced the RMA will be repealed and replaced with three new acts. These proposed acts are:

1. Natural and Built Environments Act (NBA) to provide for land use and environmental regulation (this would be the primary replacement for the RMA);
2. Strategic Planning Act (SPA) to integrate with other legislation relevant to development, and require long-term regional spatial strategies; and
3. Climate Change Adaptation Act (CAA) to address complex issues associated with managed retreat and funding and financing adaptation.

In 2021, the Government released an exposure draft of the NBA. The exposure draft covers key aspects of the NBA including the purpose and related provisions, the National Planning Framework and the Natural and Built Environments (NBE) plans.

Key changes from the RMA includes the setting of environmental limits for aspects of the natural environment. These limits will be framed as a minimum acceptable state, or a maximum amount of harm that can be caused to that state. In addition, the exposure draft proposes to develop one NBE plan per region, prepared by a plan committee comprising representatives from local government (regional and territorial), central government (Minister of Conservation), and mana whenua. The intention is to consolidate over 100 RMA policy statements and regional and district plans into under 20 plans. This means that changes to the existing regional planning framework can be expected following the implementation of the three new Acts.

4.1.2 National Policy Statements

4.1.2.1 National Policy Statement for Freshwater Management 2020

The National Policy Statement for Freshwater Management was first introduced in 2011. It was updated and replaced in 2014 and amended in 2017. A new National Policy Statement for Freshwater Management (NPSFM) came into force on 3 September 2020 and replaces the National Policy Statement for Freshwater Management 2014 (amended 2017), as part of the 'Essential Freshwater' package.

The fundamental concept underpinning the NPSFM (2020) is Te Mana o te Wai, recognising the fundamental importance of water and the health of water in protecting the health and well-being of the wider environment. Te Mana o te Wai was introduced in the 2014 version of the NPS but was further detailed in the 2020 version. Te Mana o te Wai sets out a hierarchy of obligations that prioritises:

(a) first, the health and well-being of water bodies and freshwater ecosystems
(b) second, the health needs of people (such as drinking water)
(c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

These obligations are reflected in the Objective of the NPSFM. To achieve this objective, the NPSFM sets out policies relating to freshwater management, which include requiring:

- active involvement of takata whenua in freshwater management, including decision making processes, and the identification of and provision for Māori freshwater values;
- management or freshwater in an integrated way, considering the effects of land use on a whole of catchment basis;
- the implementation of a National Objectives Framework to improve the health and well-being of degraded water bodies and freshwater ecosystems, and maintain the health and well-being in all other water bodies and freshwater ecosystems;
- the protection of significant values of outstanding water bodies;
- the protection of habitats of indigenous freshwater species, trout and salmon;
- the setting and achievement of water quality targets;
- the systematic monitoring of the condition of water bodies over time, and the regular reporting and publication of information about the state of these water bodies; and
- that communities are enabled to provide for their social, economic and cultural well-being in a way that is consistent with the NPSFM.

The NPSFM includes new obligations for territorial authorities to include provisions in their district plans addressing cumulative effects of land use and development (particularly urban development) on water bodies, freshwater ecosystems and receiving environments.

ORC must give effect to the objectives and policies of the NPSFM in their planning framework, including the revised Regional Policy Statement and the Land and Water Regional Plan (LWRP) currently under development. These requirements have triggered the definition of Freshwater Management Units (FMUs) and the setting of long-term visions for each, resulting in extensive consultation across the region about community values and issues when it comes to freshwater. Each FMU will essentially form a chapter of the new Land and Water Regional Plan, allowing water management on locally determined visions and values and catchment specific issues, rather than a one-size-fits-all regionwide approach (ORC, 2021b).

Under the National Objectives Framework (NOF), target attribute states must be set for all identified values. In Otago, this may result in more explicit regulation relating to lakes, as many of the freshwater values identified (see Section 5) are lake specific. Appendix 2A of the NPSFM outlines certain attributes requiring limits on resource use.

Specific limits are set for several lake attributes under the NOF, separating them from other water bodies. Lake specific limits are set for parameters such as phytoplankton (trophic state), total nitrogen (trophic state), total phosphorus (trophic state), ammonia (toxicity) and cyanobacteria. The NPSFM also outlines lake specific attributes that require regional councils to prepare an action plan for achievement of target attribute states. These are required (in a lake setting) for submerged plants, both native and invasive, dissolved oxygen (seasonally stratifying lakes only) and *E. coli* (primary contact sites only).

While some biodiversity indicators are identified in the NPSFM lake-specific attributes tables, overall

direction regarding biodiversity is less specific to lakes. While requirements to address biodiversity are directly referenced in relation to natural inland wetlands and rivers, no such reference is made for lakes. However, the compulsory values found in Appendix 1A include a requirement to manage aquatic life, including abundance and diversity of biota.

The NPSFM also requires that every regional council set environmental flows and levels for each FMU. Lakes must have a level set which any taking, damming, diversion or discharge of water meets the environmental outcomes for the lake, any connected water body, and receiving environments. This will be a new change in the way in which many lakes in Otago, which previously have not had flow or levels set, are managed. While this will benefit some lakes in terms of protection of water quality and quantity, it may not be practicable for others. In particular, Remote High-altitude Lakes have little in the way of pressures from use and development, but Councils will be obligated to set levels and limits for them. Perhaps in these scenarios, limits could be set at a catchment scale, recognising the interconnected nature of these waterbodies.

4.1.2.2 National Policy Statement for Renewable Electricity Generation 2011

The National Policy Statement for Renewable Electricity Generation 2011 (NPSREG) recognises the importance of renewable energy and was enacted to help New Zealand meet its target of 90% renewable electricity by 2025 and a 50% reduction in greenhouse gas emissions by 2050. The NPSREG sets out an objective and policies to enable the sustainable management of renewable electricity generation under the RMA.

This NPS drives a consistent approach to planning for renewable electricity generation in New Zealand. It gives direction on the benefits of renewable electricity generation and requires all councils to make provision for it in their plans. The objective of the NPSREG is to recognise the national significance of new and existing renewable electricity generation activities by providing for their development, operation, maintenance and upgrading such that the proportion of New Zealand's electricity generated from renewable energy sources increases to a level that meets or exceeds the New Zealand Government's national target for renewable electricity generation.

It sets policies to achieve this objective, covering matters such as practical implications and constraints of and on renewable electricity generation, and management of reverse sensitivity effects. Hydroelectricity is specifically provided for in policy E2, which requires regional policy statements and regional and district plans to include objectives, policies, and to provide for the development, operation, maintenance, and upgrading of new and existing hydro-electricity generation activities.

Otago's hydro lakes, through the NPSREG, are recognised as nationally significant in their ability to provide for renewable electricity generation, and this importance must be recognised in the relevant planning documents in the region.

4.1.2.3 Exposure Draft: National Policy Statement for Indigenous Biodiversity 2022

In 2022, an exposure draft of the proposed National Policy Statement for Indigenous Biodiversity (NPSIB) was released by the Ministry for the Environment (MfE), with the intention of the gazettal of the new NPS in late 2022. While the RMA provides the main framework for maintaining and protecting indigenous biodiversity from adverse effects on private land, the new NPS aims to provide detailed direction on the protection of indigenous biodiversity in New Zealand.

The draft NPSIB is underpinned by the fundamental concept of *Te Rito o te Harakeke*, the need to maintain the integrity of indigenous biodiversity. It recognises the intrinsic value and mauri of indigenous biodiversity as well as people's connections and relationships with it.

The draft NPSIB requires councils to consistently identify areas with significant vegetation and habitats of significant indigenous fauna (called Significant Natural Areas) and manage their protection through regional and district plans. In addition, the NPSIB features requirements for councils to promote restoration of degraded significant natural areas, threatened and rare ecosystems, buffering or connectivity areas, wetlands or other areas that align with the national priorities.

The draft NPSIB does not directly address aquatic biodiversity, however notes that some species use water bodies as part of their lifecycle. The management of freshwater ecosystems is not paid much attention in the draft, perhaps because the NPSFM addresses biodiversity matters. However, as noted in Section 4.1.2.1 above, the NPSFM does not directly address biodiversity in lakes (but does in other freshwater bodies).

While the NPSIB may not relate directly to lakes, it will impact the way land is managed in the catchments of lakes into the future.

4.1.3 National Environmental Standards

4.1.3.1 Resource Management (National Environmental Standards for Freshwater) Regulations 2020

The Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NESF) regulates activities that pose risk to the health of freshwater and freshwater ecosystems. The NESF came into force on 3 September 2020, although some clauses relating to certain farming activities came into force in mid-2021, and further clauses are due to come into force in November 2022.

The NESF introduces requirements that will indirectly affect lakes primarily by controlling activities within the catchment. The requirements relate to two areas: farming activities and other activities that relate to freshwater. Farming activities covered by the NESF include feedlots and other stockholding areas, agricultural intensification, intensive winter grazing and the application of synthetic nitrogen fertiliser to pastoral land. Key provisions relating to these activities are summarised below:

- New controls on further agricultural intensification until the end of 2024, until regional councils can give effect to changes under the NPSFM. This applies to the conversion of more farmland or plantation forestry to dairy farming, increasing irrigated pasture for dairy or increase in dairy support activities.
- Minimum requirements for feedlots and other stockholding areas
- The introduction of resource consent requirements for intensive winter grazing of forage crops and additional controls on the slope of land where intensive winter grazing occurs and buffers between crops and waterways.
- Limits on the discharge of synthetic nitrogen fertiliser to pastoral land to no more than 190kg per hectare per year and reporting of fertiliser use

Other activities relating to freshwater that are controlled by the NESF include activities in and around natural wetlands, the reclamation of rivers and the passage of fish affected by new structures (culverts, weirs, dams, etc). The NESF introduces new requirements for resource consent and more detailed information requirements to be provided for permitted activities relating to these activities.

While the NESF does not treat lakes differently to other water bodies, it does endeavour to control activities in the catchment with potential adverse effects on lakes (and other waterbodies), as well as improving the passage of fish and wetland function. The NESF sets a baseline above which further intensification or development requires resource consent. This is effectively a hold point for the activities it covers, and further regulation is expected to be driven through future plan changes.

Missing from the NESF are control for urban activities that can affect freshwater quality.

4.1.3.2 Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007

The National Environmental Standards for Sources of Human Drinking Water (NESDW) came into effect on 20 June 2008. It is intended to reduce the risk of contaminating drinking water sources, including lakes. It does this by requiring regional councils to consider the effects of activities on drinking water sources in their decision making.

The NESDW requires regional councils to ensure that effects on drinking water sources are considered in decisions on resource consents and regional plans. Specifically, councils are required to:

- decline discharge or water permits that are likely to result in community drinking water becoming unsafe for human consumption following existing treatment;
- be satisfied that permitted activities in regional plans will not result in community drinking water supplies being unsafe for human consumption following existing treatment; and

- place conditions on relevant resource consents requiring notification of drinking water suppliers if significant unintended events occur (eg. spills) that may adversely affect sources of human drinking water.

The NESDW is currently being reviewed by the Ministry for the Environment. Proposed changes relate to the identification and delineation of at-risk source water areas, the regulation of activities that pose risks to source water, and the protection of all registered water supplies. Consultation on proposed changes closed in March 2022 and the regulations are expected to be redrafted and gazetted later in 2022.

4.1.3.3 Resource Management (Stock Exclusion) Regulations 2020

As part of the Essential Freshwater package, the Resource Management (Stock Exclusion) Regulations 2020 (the Stock Exclusion Regulations) were introduced in September 2020. The Stock Exclusion Regulations place obligations on any person who owns or controls stock to exclude them in certain situations from rivers and streams greater than 1m wide, lakes and natural wetlands.

Certain stock (dairy cattle and dairy support cattle, pigs, beef cattle, deer) are covered by the regulations, but sheep are excluded. The level of regulation will depend on the type of animal, grazing practices and the slope of the surrounding land.

4.1.4 Other National Direction

4.1.4.1 Conservation Act 1987

A significant proportion of the Otago region is held as conservation estate. The Conservation Act 1987 includes directions for management of crown-owned land managed by the Department of Conservation. As directed by the Act, a Conservation Management Strategy and Plan can be prepared, the purpose of which is to implement conservation management strategies and establish detailed objectives for the integrated management of natural and historic resources, and for recreation, tourism and other conservation purposes.

The Otago Conservation Management Strategy is a high-level document with a focus on protecting landscapes, ecosystems and species across the region. It was partially reviewed in 2022 to enable the consideration of bike tracks and trails on public conservation lands and waters. The partial review was approved and became operative in 2022. The policies in the Otago Conservation Management Strategy provide direction on such things as vehicle access, biosecurity, animals, grazing, mining, and recreation for example, however there is no clear guidance on overall management of lakes or water quality.

4.1.4.2 National Parks Act 1980

Two National Parks are located within the boundaries of the Otago Region – Mt Aspiring National Park and a small part of Fiordland National Park. Many of Otago's lakes are located within Mt Aspiring National Park, but

only one lake (Lake McKellar) is located in Fiordland National Park.

The National Parks Act 1980 aims to preserve in perpetuity those parts of the country that "contain scenery of such distinctive quality, ecological systems, or natural features so beautiful, unique, or scientifically important that their preservation is in the national interest". DOC administers the National Parks Act, and is required to prepare and implement management plans for every National Park. Management plans fall under the umbrella of Conservation Management Strategies, and must not be inconsistent with them, but generally provide more detail about how the park will be managed. DOC is also responsible for granting concessions for the occupation or use of land in National Parks.

The Mt Aspiring National Park Management Plan recognises that there are risks arising from increasing use at some sites, development pressure, and threats from plant and animal pests. It also recognises that climate change may have an impact on indigenous plants and animals, and public use, may pose future challenges. The Plan outlines that the key purpose of the park is to preserve indigenous plants, animals and natural features, and where consistent with preserving these values, for public use and enjoyment. It contains policies specific to the management of particular lakes within the Park, such as Lake Sylvan and Lake Crucible, but does not address lake management at a broader scale.

4.1.4.3 Land Act 1948

The Land Act 1948 is administered by Toitū Te Whenua Land Information New Zealand (LINZ) and governs the development, classification and leasing of Crown Land. Under the Act, a Commissioner of Crown Lands is appointed to manage Crown Property, and this function is delegated to LINZ. LINZ acquire, manage and dispose of land in a way that balances public interest and private property rights. Crown land includes most of the major lakes in the South Island and the beds of navigable rivers. Under the Land Act 1948, anyone wanting to undertake an activity involving a lake or riverbed may need the permission of the Commissioner. Examples of activities that require consent include building a jetty or boat mooring, anchoring swimming pontoons, or extracting gravel.

4.1.4.4 Reserves Act 1977

The Reserves Act 1977 was established to acquire, preserve and manage areas for their conservation values or public recreational and educational values. A main function of the Reserves Act is to ensure, as far as practicable, the preservation of access for the public to lakeshores and other waterbodies and to encourage the protection and preservation of the natural character of these areas. Under the Reserves Act, reserves are administered by DOC or by other ministers, boards, trustees, local authorities, societies and other organisations appointed to control and manage the reserve, or in whom reserves are vested. The administering body must prepare a Reserves Management Plan for every reserve that they administer. For reserves administered by DOC, they are required to be managed in accordance with a conservation management strategy and conservation management plan.

Many of the lake fronts in Otago are managed under the Reserves Act, usually by the District Council, including Lake Waihola, Tomahawk Lagoon, Lake Wānaka, Lake Hayes and Lake Whakatipu.

4.1.4.5 Lake Wānaka Preservation Act 1973

The Lake Wānaka Preservation Act 1973 (LWPA) is relevant to the management of water quality and quantity in Lake Wānaka. The purpose of the LWPA includes preventing damming of the lake, maintaining the natural flow between the lake outlet and the Cardrona River confluence, preserving the lake water levels and shoreline in their natural state and maintaining and improving the quality of water in the lake.

The LWPA provides for the Guardians of Lake Wānaka to be established in order to provide guidance to the Minister of Conservation on matters that may affect the purpose of the Act.

4.1.4.6 Water Conservation (Kawarau) Order 1997

Water Conservation Orders (WCOs) are designed to recognise and protect the outstanding amenity or intrinsic values of a particular body of water. They may be applied over rivers, lakes, streams, ponds, wetlands or aquifers and geothermal water. A WCO can prohibit or restrict a regional council from issuing new water and discharge permits that relate to that water, although it cannot affect existing permits. Regional policy statements, regional plans and district plans cannot be inconsistent with the provisions of a WCO.

The Water Conservation (Kawarau) Order 1997 came into force on 17 April 1997 and covers the Kawarau River and all contributing waters. It specifically excludes Lake Dunstan and the operation of the Clyde Power Station. The WCO recognises the Kawarau River, in its natural state, has outstanding amenity and intrinsic values that must be protected, and, where it is no longer in its natural state, has characteristics that warrant protection because they are outstanding.

While the WCO applies to the Kawarau River, it also covers all contributing waters. This includes several lakes:

- Lake Whakatipu
- Lake McKellar
- Lochnagar
- Diamond Lake (Glenorchy)
- Lake Reid
- Lake Te Kohua

The WCO requires waters in their natural state to be preserved. For those that are no longer in their natural state, it prevents damming or diversion, and requires fish passage and water quality standards to be met. Within the current Regional Plan Water, the WCO is recognised and provisions reflecting its wording are included. It is unclear whether in practice the contributing waters are provided for, as they are not specifically listed in the plan.

4.1.4.7 Ngai Tahu Claims Settlement Act 1998

The Ngāi Tahu Claims Settlement Act 1998 (NTCSA) gives effect to the Deed of Settlement signed by the Crown and Te Rūnanga o Ngāi Tahu on 21 November 1997 to achieve a final settlement of Ngāi Tahu's historical claims against the Crown.

The settlement act introduced a new instrument called a Statutory Acknowledgement. Statutory Acknowledgements recognise Ngāi Tahu's particular cultural, spiritual, historical, and traditional association in relation to a range of sites and areas in the South Island, and provide for this to be reflected in the management of these areas. Statutory acknowledgements impact upon RMA processes concerning these areas. There are 70 Statutory acknowledgements in the South Island. Seven of these relate to lakes in the Otago region:

- Kā Moana Haehae (Lake Roxburgh)
- Kuramea (Catlins Lake)
- Lake Hāwea
- Lake Wānaka
- Te Wairere (Lake Dunstan)
- Waihola/Waipori Wetland
- Whakatipu-wai-māori (Lake Whakatipu)

The NTCSA, in providing for Statutory Acknowledgements, requires consent authorities to forward summaries of all relevant resource consent applications to Te Rūnanga o Ngāi Tahu and requires consent authorities to have regard to the Statutory Acknowledgement when forming an opinion as to whether Te Rūnanga o Ngāi Tahu is an affected party in relation to a resource consent application.

In addition to Statutory Acknowledgements, the NTCSA addresses Ngāi Tahu's interests in traditional food and other resources and the places where they are gathered. The NTSCA identifies seventeen nohoaka sites, or areas of lakeshores or riverbanks that are to be used to facilitate the gathering of natural resources in a modern context. The sites allow Ngāi Tahu whānui temporary, but exclusive, rights to occupy the sites. Nohoaka sites are identified on several of Otago's lakes:

- Te Wairere (Lake Dunstan)
- Lake Hāwea (3 sites)
- Lake Wānaka (2 sites)
- Lake Whakatipu

4.1.4.8 Crown Pastoral Land Act 1998

Many of Otago's lakes have large areas of crown pastoral land in their catchment. Pastoral land owned by the Crown, including much of the South Island high country, is the responsibility of the Commissioner of Crown Lands. The Commissioner leases this land for farming, giving leasees the right to graze the land, but the Commissioner has overall say on any other uses of the land. In addition, leasees own any improvements made to the land (such as new infrastructure) and are required to either take them when their lease expires, or obtain compensation for the value of the improvement, depending on the circumstance. are entitled to any improvements made LINZ assists the Commissioner in the management of pastoral leases, including conducting rent reviews, monitoring compliance of consented activity and administration of the (now complete) tenure review process. Lessees are required to apply for consent, called a discretionary action, from the Commissioner to carry out various types of work on the land, with a particular focus on activities that disturb the soil, clearing vegetation, cultivating new areas or burning vegetation.

The Crown Pastoral Land Act does not specifically provide for the management of lakes, but affects how land in many of Otago's lake catchments is managed.

4.1.4.9 Overseas Investment Act 2005

The Overseas Investment Act 2005 (OIA) regulates investments by overseas persons in sensitive land or significant business assets, including residential land or rural land over 5ha. The administration of this act is through the Overseas Investment Office, a department of LINZ. Overseas investors are required to apply for consent to purchase specified land in New Zealand.

Part of this process includes a "benefit to New Zealand test", whereby prospective purchasers must demonstrate a benefit to New Zealand, any part of it or a group of New Zealanders. Factors taken into account in this test include economic benefits, environmental benefits, public access, protection of historic heritage, advancement of government policy, oversight benefits and consequential benefits. In addition to these requirements, farmland has additional requirements whereby economic benefits or oversight or participation by New Zealanders must be of a scale and nature that represents a substantial benefit to New Zealand.

With much of the land surrounding Otago's lakes in the world-renowned and iconic high country, it attracts a great deal of interest from overseas investment and many OIA transactions have taken place over the past 17 years. Some of the benefits afforded by these purchases have been via increased productivity of the farming operation or the creation of jobs, while others are via environmental benefits such as the creation of walking tracks to natural features. An opportunity exists to encourage overseas investments in lake catchments to provide benefits relating to identified priority areas, such as ecological restoration, particularly those with iconic lakes in their catchment.

4.1.4.10 Water Services Act 2021

The Water Services Act (WSA) was introduced in November 2021 as part of Central Government's Three Waters Reforms. It establishes drinking water standards and regulates all persons and organisations that supply drinking water.

Prior to the introduction of the WSA, only large-scale water suppliers were captured by health regulations. Under the WSA, any person who supplies water to another household or dwelling, which may be used for drinking water, is considered a supplier. The WSA is underpinned by the concept of Te Mana o te Wai (See Section 4.1.2.1), and all those exercising or performing a function, power, or duty under the WSA must give effect to Te Mana o te Wai.

A key change is the emphasis now placed on source water, the water body from which water is abstracted for use in a drinking water supply, such as a lake. One of the purposes of the WSA is to provide a source water risk management framework that, together with the RMA and NPSFM, enables risks to source water to be properly identified, managed, and monitored. The WSA requires drinking water suppliers to identify, assess and manage risks to source water, monitor source water quality and places obligations on local authorities to share information relating to source water with drinking water suppliers.

While still a new requirement, the WSA is likely to mean that drinking water suppliers (many of whom are Territorial Authorities) take a greater role in the management of water quality. There is an opportunity for greater collaboration between ORC and drinking water suppliers, particularly when it comes to water quality sampling.

4.2 Regional Direction

4.2.1 Regional Policy Statements

Regional Policy Statements provide an overarching policy framework that identifies and drives progress on significant resource management issues facing a region.

The Partially Operative Otago Regional Policy Statement 2019 (POORPS2019) was declared partially operative on 15 March 2021. Parts of the POORPS2019 are still under appeal, and will eventually be replaced by the Proposed Otago Regional Policy Statement 2021 (PORPS). The PORPS aims to achieve long-term environmental sustainability by integrating the protection, restoration, enhancement, and use of Otago's natural and physical resources at a region-wide level.

The Proposed Otago Regional Policy Statement 2021 (PORPS) was notified on 26 June 2021. The PORPS outlines overarching timeframes for implementation of the NPSFM in Otago, and sets the values and expectations of each Freshwater Management Unit (FMU) in the region. It is a high-level policy framework for the sustainable integrated management of resources, identifying regionally significant issues and the

objectives and policies that direct how natural and physical resources are to be managed.

Submissions and further submissions on the PORPS have closed, and hearings were due to commence in October 2022, however the outcome of recent High Court proceedings have declared that the PORPS is not a freshwater planning instrument in terms of section 80A of the RMA. Hearings on the non-freshwater parts of the RPS will commence in January 2023.

The PORPS includes a wide-ranging set of provisions that address integrated management, air, coastal environment, land and freshwater, ecosystems and indigenous biodiversity, energy, infrastructure and transport, hazards and risks, historical and cultural values, natural features and landscapes and urban form and development. It recognises the integrated nature of the environment, as an interconnected system, which depends on its connections to flourish, and must be considered as an interdependent whole. Resource management, therefore, must reflect the integrated nature of land and freshwater.

Pressures on Otago's lakes from tourism and population growth is identified as a significant resource management issue for the region:

> *"The beauty, recreational opportunities and regional climate of Lakes Wānaka, Wakatipu, Hāwea and Dunstan and their environs attract visitors and residents from around the region, the country and the world. This influx brings economic opportunity, but the activities and services created to take advantage of it can degrade the environment and undermine the experience that underpins their attractiveness."*

It is acknowledged that tourism and population growth, while bringing benefits to the region, also have environmental, economic and social impacts on these lakes, through issues such as the spread of pest species, reputational/brand impacts on the region's "clean, green" image, overcrowding and overloaded infrastructure such as wastewater networks. Some of these issues are applicable to lakes elsewhere in Otago.

Throughout the PORPS, lakes and rivers tend to be grouped together and treated in a similar fashion in the relevant objectives and policies. The exception to this is Lake Wānaka, which has a number of specific policies resulting from the direction provided by the Lake Wānaka Preservation Act 1973 (discussed above).

The PORPS sets visions for every FMU in the region, and timeframes for achieving these visions. Many of the visions relate indirectly to lakes, through the protection of water quality at a catchment level, however there are several direct references to lakes. For example, in the Upper Lakes Rohe, Objective LV-VM-O2 (7)(a) requires that the high-quality waters of the lakes and their tributaries are protected, recognising the significance of the purity of these waters to Kāi Tahu and to the wider community. In the Taieri FMU, special consideration is given to the reduction of sedimentation in the Waipori/Waihola complex.

4.2.2 Regional Plan: Water for Otago

The Regional Plan: Water for Otago (RPW), which drives water management in Otago, was publicly notified in 1998 and made fully operative in 2004. Since then, there have been a number of plan changes that, in broad terms, have established flow and allocation regimes for some surface water catchments, groundwater allocation regimes for some aquifers, provisions to manage water quality issues, and most recently provisions to delay the commencement of some water quality rules to allow time for ORC to review the wider Water Plan for the region and incorporate changes from the updated NPSFM and NES.

More recently, Plan Change 7 (PC 7) has added objectives, policies, and rules to the current RPW to manage the replacement of expiring deemed permits and water permits. Plan Change 8 (PC 8) strengthens rules relating to on farm effluent management, clarifying rules relating to discharges and those relating to nitrogen leaching rates.

PC 7 provides a mechanism for the ORC to only issue short term consents for both replacement and new water take consents. The intent of this is to ensure that the majority of water permits are brought in line with the new Land and Water Regional Plan soon after the new plan has been made operative. The key long-term outcome will be to achieve NPSFM compliant outcomes that will be outlined in that new regional planning framework, including the PORPS.

PC 8 brings Otago into line with other jurisdictions in New Zealand with respect to effluent management and discharge requirements to ensure best practice when it comes to the storage and discharge of effluent (animal waste), with a specific emphasis on the management of dairy shed effluent, its storage and discharge to land. It also includes a number of rules and policies relating to minimum standards and good management practices for farming activities. PC8 also includes provisions related to the discharge of sediment associated with subdivision and residential development.

The ORC has introduced new sections to the RPW relating to good farming practices through PC 8. This includes new policies, which requires farming activities to reduce adverse environmental effects, through the implementation of good management practices, as well as managing stock access to water bodies, through fencing. There is new policy that sets minimum standards for intensive grazing, as well as limiting areas and duration of exposed soils and identification and management of critical source areas.

The RPW outlines issues and objectives and policies relating to natural and human use values of lakes and rivers, water quantity, water quality, the beds and margins of lakes and rivers, groundwater and wetlands. Rules relating to water take and use, discharges of contaminants, activities on lake or river beds or regionally significant wetlands and other land uses are set out by the plan. Generally, lakes are treated in the same way as other surface water bodies in the RPW, with some exceptions outlined below.

Specific policies exist for the management of lake levels in Lake Tuakitoto, a requirement which is carried over from the Local Water Conservation (Lake Tuakitoto) Notice 1991, which aims to protect recreational and

wildlife features. Other policies manage lake levels for those lakes that are already controlled through the use of dams for a specific purpose such as irrigation supply or electricity generation, recognising the values associated with these lakes, but also guiding the management of the associated environmental impacts. Aside from these two examples, lake levels are generally not controlled in the RPW.

In terms of rules, lakes that are subject to higher order protection have the benefit of specific rules included in the RPW. For example, the erection of a dam is prohibited in Lakes Wānaka (in accordance with the Lake Wānaka Preservation Act 1973) and those lakes that are covered by the Water Conservation (Kawarau) Order 1997. Lake Tuakitoto is the only lake to have a minimum lake level specified by the plan, below which the taking of water from the lake is prohibited, a result of the incorporation of the previous Local Water Conservation (Lake Tuakitoto) Notice 1991 into the RPW at the time it was drafted. Discharges of sewage to land within the Lakes Hayes catchment is specifically controlled and requires a resource consent. This is likely a result of the former Lake Hayes Management Plan that was absorbed by the RPW when drafted. Both Lake Hayes and Lake Tuakitoto are catchments listed in Schedule 2A, which sets allocation limits and minimum flows for key tributaries of these waterbodies.

The ORC has committed to a full review of the Water Plan in order to implement the NPSFM and NESF and create a tailored approach to water management. It is anticipated that the direction provided by these higher order documents will be reflected in the new Land and Water Regional Plan, which is expected to be notified by December 2023 (ORC, 2022a).

There is a gap at present in respect of urban water quality, and how stormwater is managed within the current Water Plan. While discharges of wastewater from reticulated systems require consent under the Plan, the majority of the urban stormwater discharges from roads and reticulated stormwater systems are considered to be permitted activities. This has led to little control over where and how the discharges are occurring and a lack monitoring data regarding the quality of these discharges. Only recently through PC 8 have discharges of sediment from residential developments required a resource consent, allowing ORC more control over these activities. There is still however a gap with regard to other discharges, particularly stormwater, in Otago's urban areas.

4.2.3 ORC Regional Pest Management Plan

Regional councils have a mandate under Part 2 of the Biosecurity Act 1993 to provide regional leadership in activities that prevent, reduce or eliminate adverse effects from harmful species that are present in their region. Otago Regional Council (ORC) holds this role in the Otago region.

The ORC Regional Pest Management Plan (RPMP) outlines a framework to manage or eradicate specified pests in the Otago region in order to minimise the actual or potential adverse or unintended effects associated with those organisms and to maximise the effectiveness of individual actions in managing pests through a regionally coordinated approach.

The plan specifies a management framework for 51 identified pests, through exclusion, eradication, progressive containment, sustained control or site-led programmes. Lagarosiphon major is the only aquatic species currently present in Otago that is managed through the RPMP. It is actively managed by LINZ in the waterbodies where it is present or at risk of establishment, being Lakes Wānaka, Dunstan and Whakatipu and the Kawarau River. ORC also undertakes surveillance in waterbodies not managed by LINZ, being Moke Lake; Manorburn Reservoir, Poolburn Reservoir, Butchers Dam, Conroys Dam, Falls Dam, Fraser Dam, Albert Town stormwater detention ponds and Bullock Creek sites. Hornwort (*Ceratophyllum demersum*) and Egeria (*Egeria densa*), other aquatic species not currently present in Otago, are managed through an exclusion programme under the RPMP.

Lake snow (*Lindavia intermedia*) is not actively managed through the RPMP but is listed as an Organism of Interest. Didymo is subject to the Check-Clean-Dry programme and isn't covered by the RPMP.

In conjunction with the RPMP, ORC has also prepared a Biosecurity Strategy which sets out ORC's objectives for biosecurity management in the region using the full range of statutory and non-statutory tools available. The Biosecurity Strategy sets four key regional priorities and associated actions for the management of biosecurity risks in Otago for any organism, not just those formally declared as pests in the RPMP.

4.3 Iwi Management Plans

Iwi Management Plans are a written statement identifying important issues regarding the use of natural and physical resources in an area. While the RMA does not define IMPs, it refers to these plans as 'planning documents recognised by an iwi authority'. A regional or territorial authority must take into account any relevant Iwi Management Plan when preparing or changing a regional or district plan. Iwi Management Plans can also assist in the implementation of the RMA by guiding councils in giving effect to the purpose and principles of the RMA, informing the preparation or change of regional policy statements and informing the preparation and assessment of applications for resource consent.

There are three iwi planning documents relevant to the Otago region in the context of lakes management:

- Kāi Tahu ki Otago Natural Resource Management Plan 2005
- Te Tangi a Tauira (The Cry of the People), Ngāi Tahu ki Murihiku 2008
- Te Rūnanga o Ngāi Tahu Freshwater Policy 1999

4.3.1 Kāi Tahu ki Otago National Resources Management Plan 2005

The Kāi Tahu ki Otago Natural Resource Management Plan 2005 (KTO NRMP) is the principal planning document for Kāi Tahu ki Otago. It provides information, direction and a framework to achieve a greater understanding of the natural resource values, concerns and issues of Kāi Tahu ki Otago. The KTO NRMP outlines the consultation expectations of Kāi Tahu and forms a basis from which their participation in the management of the natural, physical and historic resources of Otago can be further developed.

The NRMP sets out the issues, objectives and policies for Kāi Tahu in the Otago Region. Region wide matters considered by the plan include water, wāhi tapu, mahika kai and biodiversity, cultural landscapes, air and atmosphere, the coastal environment and pounamu. Issues, objectives and policies at a catchment scale are also set out by the plan. Lakes are addressed in a number of objectives and policies, including specific policies for named lakes (for example, **Policy 9.4.3.6** – *"to encourage mahika kai habitat enhancement around Lake Waipori/Waihola*")

4.3.2 Te Tangi a Tauira (The Cry of the People), Ngāi Tahu ki Murihiku 2008

The Ngāi Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan consolidates Ngāi Tahu ki Murihiku values, knowledge and perspectives on natural resource and environmental management issues. The Plan assists Ngāi Tahu ki Murihiku in carrying out kaitiaki roles and responsibilities, but also recognises the role of communities in achieving good environmental outcomes and healthy environments. The plan emphasises the importance of continued interagency integrated management of resources.

The Plan describes the values underpinning the relationship between Ngāi Tahu ki Murihiku and the natural environment and identifies the primary issues associated with natural resource and environmental management in the takiwā, from the perspective of Ngāi Tahu ki Murihiku. It outlines policies and management guidelines for natural resource and environmental management, wāhi tapu and wāhi taonga.

4.3.3 Te Rūnanga o Ngāi Tahu Freshwater Policy 1999

Te Rūnanga o Ngāi Tahu prepared the Te Rūnanga o Ngāi Tahu Freshwater Policy Statement in 1999. It describes in general terms Ngāi Tahu's association with freshwater resources, the ways in which Ngāi Tahu, as tangata tiaki, want to participate in freshwater management, and the environmental outcomes sought. The key objectives, and strategies to achieve them as set out the policy statement, are:

- To afford total protection to waters that are of particular spiritual significance to Ngāi Tahu
    - By identifying sites of significance and for protection and working with Councils.
- Restore, maintain and protect the mauri of freshwater resources
    - By developing an understanding of affected freshwater bodies, integrating management with Councils, managing instream flows, damming, irrigation, cumulative effects, point source and non-point source discharges, and identifying water quality standards
- To maintain vital, healthy mahika kai populations and habitats capable of sustaining harvesting activity
    - By identifying mahika kai values, promoting restoration of habitats, species conservation and maintaining access to waterbodies
- To promote collaborative management initiatives that enable the active participation of Ngai Tahu in freshwater management

- By ensuring consistency with legislation, collecting information, increasing capacity and capability within Papatipu Runaka, input into planning and policy making and monitoring

4.4 Other Regional Strategies

ORC has developed a number of strategies for the region, setting out direction and reflecting values and aspirations of the region's communities. While these strategies do not have legal standing, they provide guidance and direction for how ORC manage the environment in the region, and direct others in the same manner.

Two water quality strategies exist for Otago: one urban, and one rural. The Rural Water Quality Strategy (2011) promotes an effects-based direction for achieving water quality in Otago. The strategy focusses on a system of self-management by farmers and managing discharge quality from land use, rather than controlling farming activities. Predating a number of plan changes to the Regional Water Plan and the NPSFM and NESF, the strategy does not appear to align with current management approach in Otago. If the strategy is no longer relevant, it is recommended that it is withdrawn.

The Urban Water Quality Strategy (2017) sets the same objective as the Rural strategy: "Otago will enjoy safe and healthy water resources which everyone can use and appreciate". It outlines how issues which threaten urban water quality can be approached and addressed. It anticipates that organisations and the Otago community will work together for the same common purpose, with all individuals taking accountability for their own actions. The strategy proposes approaches such as kaitaiki and takata whenua partnerships, community engagement, integrated catchment management, interagency collaboration, cost effective methods and evidence and risk-based methods to achieve the water quality visions for the region. The strategy sets aspirational goals and suggested methods for achieving them, however it does not set actionable targets and does not assign responsibility for the goals or methods.

The Biodiversity Strategy identifies how ORC will add value and strategic leadership to the biodiversity initiatives of communities and other organisations in Otago. It outlines guiding principles and desired outcomes for biodiversity in the region, identifying what ORC will do to achieve these outcomes. The strategy provides a high level plan that ORC can add to and refine as it is implemented. It sets time bound actions for achieving the vision of the strategy, and outlines key ecosystems, their key species and threats.

The Biosecurity Strategy complements the Biodiversity Strategy and sets out goals, key pest species, issues and the role of ORC and other agencies in biosecurity management. It describes key priorities and actions to achieve the strategy's goals. It breaks down these actions into a plan, describing roles and responsibilities, collaborating agencies and timeframes. It links clearly to the Regional Pest Management Plan.

These strategies play an important role in Otago's lake management framework. The Biosecurity and

Biodiversity strategies are referred to as guidance material for Ecofund applications, and there are clear links between these two strategies and other regional planning documents such as the Regional Pest Management Plan. The urban and rural water quality strategies, however, are less known and utilised.

Other agencies rely on strategic direction from the ORC when forming their own strategies and plans. For example, LINZ align their biosecurity practices with councils' Regional Pest Management Plans and consider priorities and risks identified by regional councils in their respective strategies (particularly biodiversity and biosecurity strategies) to inform strategic direction and prioritisation (LINZ 2021).

4.5 District Regulations

4.5.1 District Plans

District and City councils have a key role under the Resource Management Act 1991, which charges them with managing land use and subdivision. They prepare district plans to assist the Council to carry out its functions under the RMA which includes activities on the surfaces of rivers and lakes. District plans often include rules relating to activities utilising the surface of water bodies and/or lake margins, such as jetties, wharves, boat ramps, boatsheds, as well as recreational activities and events.

In addition, District Plans include controls that impact the wider lakes catchment, such as the use of land (e.g. subdivision and earthworks) and managing adverse effects of human activities on the environment, protecting significant values in the natural environment (e.g. maintaining areas of outstanding landscape value and significant native vegetation), and making provision for activities that enable people to meet their needs as well as the needs of future generations (e.g. controlling the boundaries of urban development and maintaining rural land for rural purposes). The following district plans are relevant to lakes management in the Otago region:

- Dunedin City District Plan (2006) – Dunedin City Council
- Second Generation Dunedin City District Plan (2GP) (2015) – Dunedin City Council
- Central Otago District Plan (2008) – Central Otago District Council
- Operative District Plan (2005) – Queenstown Lakes District Council
- Proposed District Plan (2015) – Queenstown Lakes District Council
- District Plan 1998 – Clutha District Council
- Waitaki District Plan 2010 – Waitaki District Council

Examples of consideration given to lakes in these documents are provided below:

- Dunedin City District Plan (2006)
    - The Sutton Salt Lake (and surrounding area) is identified as an Outstanding Natural Feature in the Second Generation Dunedin City District Plan.
- Queenstown Lakes District Council Proposed District Plan (2015)

  - The Queenstown Lakes District Council Proposed District Plan includes an objective to protect, maintain or enhance the natural character of lakes and rivers and their margins, while providing for appropriate activities on the surface of lakes and rivers, including recreation, commercial recreation and public transport
  - The use of motorized craft on Lake Hayes and the tributaries of several rivers is prohibited by the Queenstown Lakes District Council Proposed District Plan.
  - The Queenstown Lakes District Council Proposed District Plan identifies several lakes as Wāhi Tūpuna (sites of significance to Iwi), including Lake Whakatipu, Lake Wānaka, Lake Hāwea and Diamond Lake.
- Central Otago District Plan (2008)
  - The Central Otago District Plan includes provisions to protect that area identified as the "Upper Manorburn/Lake Onslow Landscape Management Area" from the adverse effects of inappropriate subdivision, use and development.
  - The Central Otago District Plan provisions for the Water Surface and Margin Resource Area includes a method (5.5.7) stating Council shall advocate to the Otago Regional Council and Central Government that increased financial commitment be given to education and publicity in an effort to prevent spread of lakeweed to non-infested water bodies, as well as management, control and containment, or eradication if practicable.
- Clutha District Council District Plan (1998)
  - The Clutha District Plan identifies Lake Tuakitoto as an Outstanding Natural Feature and Significant Habitat of National Importance.
  - The Clutha District Plan outlines cross boundary issues with drainage systems affecting waterbodies, such as effluent drainage from municipal and rural systems in Dunedin City Council boundaries to Lakes Waihola and Waipori, located in Clutha District.
  - The Clutha District Plan identifies that there are water bodies with deficiencies in terms of secure public access and enacts a policy to ensure that development and subdivision of land maintains or enhances public access to and along the margins of these water bodies. Lake Tuakitoto, Phoenix Dam, Lakes Waihola and Waipori are identified as waterbodies with such public access requirements.
- Waitaki District Plan 2010
  - The Waitaki District Plan identifies Devils Bridge Lagoon as an Area of Conservation Merit.

4.5.2 Bylaws

Bylaws are rules or regulations made by local authorities. Most bylaws are made under the Local Government Act 2002, which empowers a local authority to make bylaws on a diverse range of subjects. Other Acts also empower local authorities to make bylaws on specific topics, such as the Maritime Transport Act 1994, which enables regional councils to make bylaws for the purpose of ensuring maritime safety. Within the Otago

region, there are a number of bylaws that relate to the use or management of lakes.

4.5.2.1 ORC Navigation Safety Bylaw 2020

This Bylaw was developed under the Maritime Transport Act (1994). The Act gives ORC the authority to regulate ports, harbours, waters and maritime-related activities in the Otago Region. The bylaw covers all inland waters in Otago, apart from the waters of the Queenstown Lakes District. Responsibility for these waters has previously been transferred by ORC to Queenstown Lakes District Council (QLDC).

The Bylaw implements general safety requirements, speed limits and other restrictions on boating activity in Otago. It also imposes special provisions for Lake Dunstan which exclude powered vessels from certain areas. Written approval is required from the ORC Harbourmaster to undertake any activities contrary to the provisions of the Bylaw.

4.5.2.2 QLDC Navigation Safety Bylaw 2018

Waters in the Queenstown Lakes District are managed by Queenstown Lakes District Council. The QLDC Navigation Safety bylaw governs the waterways within the district and implements general safety requirements, rules for specific water-based activities and locations. It also sets out the procedures for obtaining permission to operate commercial vessels, use or occupy structures owned by Council and place moorings. Written approval is required from the QLDC Harbourmaster to undertake any activities contrary to the provisions of the Bylaw.

4.5.2.3 Other Bylaws

All district councils in Otago have bylaws relating to the supply of drinking water:

- Clutha District Council Water Services Bylaw 2019
- Queenstown Lakes District Council Integrated Three Waters Bylaw 2021
- Central Otago District Council Water Supply Bylaw 2008
- Dunedin City Council Water Bylaw 2008
- Waitaki District Council Water Supply Bylaw 2021

The specifics of these bylaws vary between councils, but all contain provisions relating to the protection of the water supply system and requiring approval for works that could impact them. As many councils rely on dams, reservoirs and natural lakes for their drinking water supplies, these bylaws often impose limits or conditions on activities within Otago's Lakes.

4.5.3 Other District-Wide Management

In addition to their operative and proposed District Plans, in 2019 QLDC issued guidelines for Environmental Management Plans. These guidelines provide content requirements for the preparation of Environmental

Management Plans (EMPs) associated with land development activities as required under QLDC issued resource consents. EMPs are required for medium to high risk projects, and provide guidance to consent holders on how to meet environmental protection requirements, such as sediment control, water quality, chemicals and fuels and waste management.

4.6 Catchment scale management

4.6.1 ORC Integrated Catchment Management Programme

Historically, ORC has focussed on achieving integrated catchment management through the Regional Policy Statement and underpinning plans as part of its RMA functions. It has been less active in undertaking and coordinating non-regulatory measures, facilitating and coordinating activities and initiatives across agencies and functions at a catchment scale, and providing a wholistic view of catchments' natural resources health, trends and risks to enable informed engagement and integrated decision making (ORC, 2022).

With ORC's functions not being managed at the same geographic scale, or following a consistent community focussed planning process, objectives that span all relevant environmental domains (water, land and soil, biodiversity) at a catchment scale have not been set. Similarly, apart from community or catchment group initiatives, there has been little coordination of environmental activities across agencies and groups. Integrated catchment management (ICM) was introduced at an ORC workshop in 2020, and was formalised in the Long-Term Plan 2021-2031, which included a performance measure to "lead the development, implementation and review of Integrated Catchment Plans in collaboration with iwi and community."

Development of an ICM programme at ORC has been underway since December 2021, including how Catchment Action Plans (CAPs) can be developed in collaboration with iwi and the community. The ICM Programme to date has been based on developing one CAP for each FMU or Rohe. In August 2022, councillors endorsed a recommendation to proceed with the development of a CAP for the Catlins Rohe as a pilot, from which the process and/or approach can be adapted as required for future CAPs. While still in the early stages, it is understood that a working group will be formed consisting of councillors, community representatives, Aukaha and Te Ao Marama representatives and ORC staff later in 2022, followed by the development and implementation of a community collaboration plan and CAP development process, with a view to begin CAP development in June 2023.

The CAP development process requires careful consideration to how lakes, particularly those that are at risk or declining, are dealt with at the FMU and Rohe scale. At a large geographic scale, CAPs will need to recognise that some lakes (or other significant water bodies) require bespoke or tailored management. Treating lakes in the same way across large geographic areas, as has been the approach by ORC in the past, could hinder efforts to protect or restore them (in particular, those that are at risk or declining). Further refinement to the CAP development process should recognise this risk and address it in the pilot and future CAPs. Combined with robust regulatory measures through the developing Land and Water Regional Plan, CAPs have the

potential to form part of an effective management 'toolbox' for Otago's lakes.

4.6.2 WAI Wānaka CCP

WAI Wānaka has developed a comprehensive Community Catchment Plan (CCP) for the Upper Clutha Catchment, which acts as a blueprint for future action. It is described as a "roadmap to improve and maintain the long-term health of the wider Upper Clutha's freshwater" (WAI Wānaka, 2022). The plan was developed with input from the Upper Clutha community, including iwi, residents, commercial operators, visitors, farmers, scientists and councils. The plan sets out key risks to the health of waterbodies, knowledge gaps and outlines 60 actions for improvement of the health of freshwater in the catchment.

Some of the actions fall within the responsibility of the Otago Regional Council and the Queenstown Lakes District Council. Others are led by WAI Wānaka in collaboration with the community. A review of the CCP is currently underway.

The Upper Clutha CCP is one of the more comprehensive examples of a catchment-scale management plan in Otago. Learnings from the development of the CCP will certainly be of use for the ORC's CAP development, particularly for the Upper Lakes Rohe.

4.6.3 Understanding and Protecting Otago's Deepwater lakes – A Jobs for Nature Strategy for WAI Wānaka

Following on from the development of the CCP, WAI Wānaka have also prepared a strategy for Otago's Deepwater Lakes. While WAI Wānaka's focus is primarily on the Upper Clutha catchment (Lakes Wānaka and Hāwea), the strategy notes that it could apply equally to Lake Whakatipu. The strategy provides a framework for WAI Wānaka to help enhance understanding and management of the deepwater lakes.

The strategy outlines its intended outcomes, which focus heavily on increasing the understanding of the health and processes of the deepwater lakes in a structured and collaborative way. The establishment of an evidence-based management decision making process with stakeholders to guide future research, monitoring and lakes management actions is highlighted. In addition, increasing public engagement regarding the deepwater lakes, progress towards achieving the actions identified in the CCP relating to lakes, and enhanced preparedness for climate change impacts are all intended outcomes of the strategy. To achieve these outcomes, the strategy proposes 9 actions, including the establishment of an Alpine Lakes Assessment Working Group, to bridge the gap between regional council regulation and assessments of lake health, to enable evidence-based management decisions.

The WAI Wānaka strategy sets desired outcomes for the management of deepwater lakes in Otago, and actions to achieve these outcomes. It complements the existing Upper Clutha CCP.

4.6.4 Tomahawk Lagoon and Lake Tuakitoto Catchment Outline Management Plans

In the Long Term Plan, ORC identified three priority site specific projects to address degraded water bodies. Tomahawk Lagoon and Lake Tuakitoto were two of the three projects identified. Through community consultation, ORC has developed a Catchment Outline Management Plan (COMP) for each lake. The COMP outlines a vision, values and issues for the catchment gleaned through community consultation. It sets objectives for the catchment and indicators of success for these objectives. Based on the objectives, potential improvement projects for the catchment are listed. For Tomahawk Lagoon this includes an ecological assessment, introduction of a water quality testing programme, sediment management at the outlet, citizen science projects, education and awareness, pest and weed programmes, riparian management including fencing and planting, and algae removal and urban stormwater management. For Lake Tuakitoto this includes an ecological assessment, introduction of a water quality testing programme, hydrological investigation, riparian planting plans, pest and weed programmes, fish passage management strategy and various community outcomes. Lake specific projects, such as access and walking track improvements, are also outlined.

The COMPs act as a starting point for further development of a specific management plan. Prioritised actions for Tomahawk Lagoon lend well to future management, including the establishment of a catchment group, an ecological assessment and the establishment of a permanent water quality monitoring site. Similarly in Lake Tuakitoto, priority actions are all related to information gathering (Ecological water quality and hydrological assessments), data from which can be used to further enhance management of the lake and catchment.

It is unclear how these plans will fit in with the wider Catchment Action Plans discussed above, but a logical application would be to utilise the plan as a component for further development in catchment management of the relevant FMU/Rohe.

4.6.5 Lagarosiphon Management Plans (Wānaka, Whakatipu, Dunstan)

Toitu te Whenua Land Information New Zealand, in their role as the manager of crown lands including the beds of Lakes Wānaka, Whakatipu and Dunstan, have commissioned the preparation of 10 year management plans in relation to the control of Lagarosiphon in these water bodies:

- Ten Year Management Plan for Lagarosiphon at Lake Dunstan: 2016 – 2025
- Ten Year Management Plan for Lagarosiphon at Lake Wānaka: 2016 – 2025
- Ten Year Lagarosiphon Management Plan for Lake Whakatipu: 2020 to 2030

Each plan sets a high-level strategy with a vision statement and goals and objectives specific to each water body. The plans reference the responsibilities of all involved, including LINZ, ORC, QLDC/CODC, DOC and other location specific agencies, such as the Wānaka Marina Company and Contact Energy. It defines the current

known state of the issue, impacts, and threats, and then sets out proactive management, surveillance and control methodologies. The Plan is implemented through Annual Operational Plans developed by LINZ, following a process of site inspections and stakeholder feedback. An example of this process for Lake Dunstan is shown in Figure 22, below.

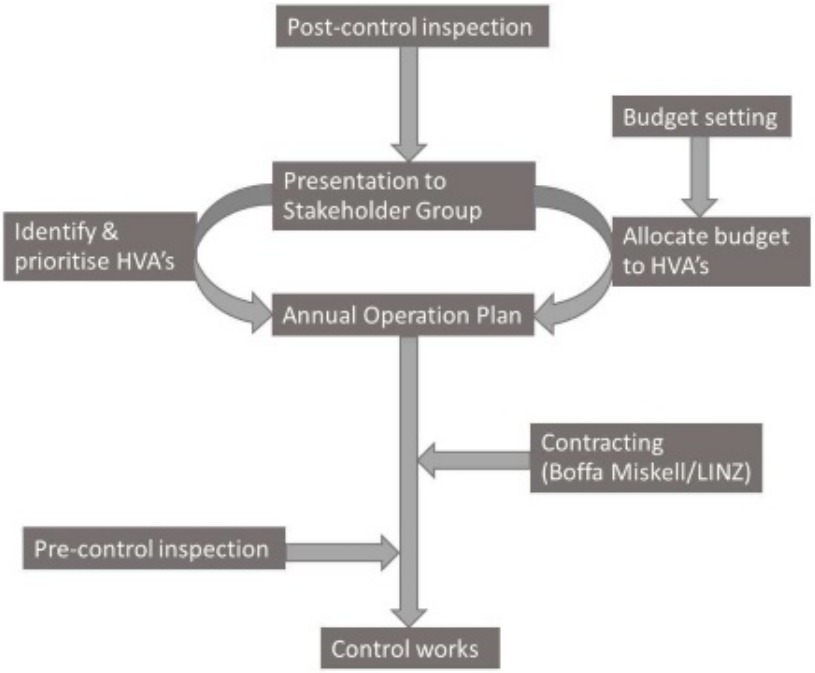

Figure 22: Annual Process for planning Lagarosiphon control works in Lake Dunstan (Source: LINZ, 2016)

These plans are specific to each relevant lake, in the overall strategy and then the implementation. For example, management in Lake Whakatipu is targeted at controlling Lagarosiphon in the upper Kawarau River and preventing its expansion into the Lake, recognising that this will have significant and unacceptable impacts on the lake's iconic status. On the other hand, Lake Dunstan, is already saturated with Lagarosiphon, and the weed is present in the upstream rivers feeding the lake. The strategy in Lake Dunstan is therefore sustained control, to prevent further spread of the weed via recreation (e.g. boating) and to mitigate impacts of the weed on amenity values. Lake Wānaka, again has a different strategy, being to contain the spread and progressively remove Lagarosiphon from the lake.

These plans, while specific to one issue (Lagarosiphon), provide an example of collaborative management at a lake-specific level. This format is one which could be replicated to other issues, or expanded to encompass more than just pest control.

4.7 Individual Resource Consents

Much of the management of Otago's lakes, particularly via Electricity Generation and Irrigation companies, is directed by the conditions on the individual resource consents held for these activities. In most cases, these are regional consents issued under the ORC's regional planning framework, and therefore should reflect the direction set by the higher order planning documents discussed above. However, many consents were issued a number of years ago, pre-dating current planning regulations, or through Environment Court proceedings, making compliance monitoring more complex as ORC staff themselves did not process these consents or draft the conditions. Recent queries about Contact's management of Lake Dunstan have required the ORC to refer back to the Environment Court proceedings in order to understand the intent of the consent conditions.

Consent conditions are specific to each situation but can relate to flow rates, lake levels and flood protection, management of amenity values and environmental mitigation. Consent conditions also lead collaboration with other stakeholders, such as Contact's obligation to relocate tuna above the Clyde Dam, which is done in collaboration with DOC and Kāi Tahu.

Many of these organisations also undertake environmental initiatives in addition to what is required by their resource consent conditions, through community engagement and environmental programmes. These vary between organisation and are location specific.

5. Stakeholders

5.1 Consultation Approach

Over recent years there have been numerous consultation efforts by groups around the region, including ORC and catchment-based community groups (e.g. WAI Wānaka, Lake Dunstan Charitable Trust, and others). These efforts have gleaned important information around values held by the community with regard to Otago's lakes, summarised in Section 5 of this report. A key component of this review is the feedback gained from consultation. Consultation was undertaken over a period of seven weeks in order to identify current management practices and regimes, concerns and values held by the Otago community with regard to lakes.

The consultation approach was informed primarily through the condensed timeframe for the review, and the desire to avoid over consultation or consultation fatigue, given large number of consultation processes currently or recently undertaken. In addition to this work, there are other pressures currently facing many of the key stakeholders who are involved in Council planning processes which are occurring concurrently (e.g. RPS and LWRP development).

To counter this, and due to the variety of stakeholders, time of day which they are available and geographic spread of their location across Otago, and further afield, holding open workshops as the main form of consultation was not undertaken. Instead, because there is a wide range of community interest in Otago's lakes, feedback was primarily obtained via an online survey using Microsoft Forms and via online, phone and in person interviews. A full summary of the consultation processes, including the online survey questions and results and a full list of parties consulted, is appended (Appendix 3).

Groups were asked about their role in lakes management, geographic area of interest, interactions with other stakeholders, concerns held for Otago's lakes and any perceived gaps in management or current knowledge. While responses were received from most stakeholder groups, where direct contact was not made information on the previously mentioned topics was obtained through publicly available sources (websites, documents, submissions on council processes etc).

Following the preparation of the draft of this report, a series of workshops were held. Those stakeholders who had participated in either the online survey or the informal interviews were invited to attend. The purpose of the workshops was to obtain stakeholder feedback on the conclusions and recommendations drawn from this review.

These topics and the feedback received are summarised in the sections below.

5.2 Otago Regional Council

ORC is responsible for the sustainable management of Otago's natural resources of land, water and air on behalf of the community. The council has wide-reaching functions, including development of policies and

rules, processing and monitoring of resource consents, pollution response, pest plant and animal control, environmental monitoring, flood control and water safety functions, among others. Representatives from various departments at ORC were interviewed for this report and their feedback is discussed further below. Table 11 summarises the roles of the various teams interviewed as part of this study, however it is noted that there will be other teams and individual roles within the Council that have an interaction with Otago's Lakes.

Table 11: ORC Team Responsibilities relating to Lakes Management

Science	**Policy**	**Resource Consents**
• Analysis of environmental monitoring data sets • Review and adaptation of the monitoring network to meet changing legislation or council priorities and directives. • Provide advice to other departments within Council, such as assistance to the Policy Team with regard to setting environmental limits for Lakes in the LWRP.	• Development of regional plans and policy statements • Ensuring that changes in the national environmental framework (e.g. the NPSFM and NPSIB) are given effect to in ORC's planning framework.	• Processing of resource consents covering activities on the beds of lakes and rivers, as well as activities in the wider catchment. • Part of this function has been transferred for s13 land use consents relating to Lake Dunstan (to CODC) and lakes within the Queenstown Lakes District (to QLDC). • ORC retain oversight on the consents processed by the District Councils and have the ability to call in significant or contentious applications.
Environmental Monitoring	**Engineering**	**Compliance**
• Environmental data collection in the field and analysis of this data. • Scope is directed by other processes – Regional Planning Documents, Strategies, Long Term and Annual Plans, etc. • Management is outside of EM Team's scope.	• Manage Otago's flood protection and land drainage infrastructure, which interfaces with lakes in some locations. • Soil conservation and erosion also within remit.	• Monitors compliance with resource consent conditions across Otago • Monitors compliance with dam safety regulations across Otago • Responds to pollution incidents • Undertake enforcement action where appropriate

Natural Hazards	**Environmental Implementation**	
• Investigate natural hazards in the region, in particular flooding, debris flows, landslides, seismic events and tsunamis. • Provide information on lake levels during weather events • Work with other partners to study natural hazard risks. • Assess monitoring data to understand long term trends • Recommend management through planning documents.	• Development and implementation of ORC's Integrated catchment Management programme. • Encourage best practice environmental management, through monitoring, community partnerships, education and promotion of sustainable land management practices. • Focus areas are biodiversity, biosecurity and water quality.	

The role and functions of teams within ORC are interrelated and interdependent in many cases. The Environmental Monitoring team, despite not having a formal role in lakes management, plays a critical part in it, through the collection of environmental data required by the Policy, Science, Natural Hazards and Environmental Implementation teams to make management decisions and set priorities. Their scope is also heavily dependent on the direction provided by these departments, which links back to higher order frameworks such as the NPSF.

Of the teams at ORC, the Policy and Environmental Implementation teams have the most direct influence over lakes management. Policy, through the setting of objectives, policies and rules that dictate how resource consents are processed, the monitoring of compliance and the collection of environmental data, and Environmental Implementation through both regulatory functions relating to biosecurity and non-regulatory functions like the integrated catchment management programme and community engagement and education. In the current regional planning framework, lakes are treated no differently from other waterbodies and therefore are managed as such.

These teams rely on a good knowledge base, built through the work of the Science team. All staff spoken to at ORC have aspirations to increase monitoring and the baseline information held by the council with regard to Otago's lakes, but are limited by resources, budgets and staffing. While ORC's monitoring programme has markedly improved in the recent past, there is not a clear or long enough record to provide a baseline for

future limit setting. In addition, staff perception is that the information gathered has been underutilised in terms of feeding into management practices or actions.

The Environmental Implementation Team (formed in 2021) acts as a conduit between the regulatory function of ORC and the community and is important for promoting sustainable management through both regulatory and non-regulatory means. This is well established in the case of biosecurity, where the team leads the Check-Clean-Dry programme (with Biosecurity NZ), works collaboratively with LINZ and key stakeholders in the Upper Lakes area in the management of Lagarosiphon, and work DOC and LINZ on the identification and management of pests not covered by other strategies (such as goldfish).

The Environmental Implementation team also administers the ORC's Eco Fund, a contestable fund of $290,000 every year to support community-led projects that protect, enhance or promote Otago's environment. Applications are assessed based on a standard set of criteria, including how well the project aligns with ORC's activities and priorities. These are derived from significant activity areas in the ORC's Annual and Long Term Plans, as well as other strategies such as the Council's Biodiversity and Biosecurity strategies.

Within the Long Term Plan is a target to support three site specific action plans for degraded waterbodies. It's unclear what criteria was used to select the priority projects currently underway in Lake Hayes, Lake Tuakitoto and Tomahawk Lagoon. This is something the Environmental Implementation team are investigating, with a plan to develop criteria for selection of future priority waterbodies, aligning with overall catchment visions and aspirations.

ORC Staff have established relationships with the community groups in catchments where there are active projects or initiatives, such as Friends of Lake Hayes, the Tomahawk Lagoon Citizen Science Group and the Lake Tuakitoto community, reflecting the three ORC priority projects currently underway in these catchments. Most staff expressed aspirations to work with more groups but capacity and resource limitations make it difficult to get involved with every project underway. Where groups are well organised, resourced and active in the community, the tendency by ORC staff is to "leave them to it" and focus on those who need assistance in getting off the ground. Staff acknowledged that while they are aware of many community and catchment groups and their initiatives, there could be many more that they are not aware of or haven't engaged with.

The challenge faced by ORC, according to staff feedback, is that all groups are operating within their own processes and timeframes, and are constrained by capacity and budgets. Aside from the recent RPS processes, there hasn't really been something "to hang your hat on" in terms of bringing all of the relevant groups together. Knowledge sharing across agencies is currently informal and ad hoc, with little in the way of structured forums for this purpose. ORC staff see the changes in national direction as promising to improve collaboration, through the implementation of concepts such as Te Mana o te Wai and a Ki Uta Ki Tai (from mountains to sea).

Recent ORC initiatives have endeavoured to address this, through community consultation processes. ORC are currently undertaking an Economic Impact Assessment, which is a broader project to consider the economic impacts of the Land and Water Regional Plan on local communities. As part of this, ORC are developing Catchment Stories to highlight the social context and enable catchment groups and communities to share their perspectives and stories with ORC for consideration in the development of new regulations.

ORC staff identified the lack of planning framework relating to lakes as a critical gap, and one that is hoped to be addressed through the Land and Water Regional Plan. Lakes are described as the "poor cousin" of all the freshwater bodies, with prior efforts (particularly in planning processes) heavily focussed on rivers, groundwater and wetlands. Current management of lakes is on a case by case basis with a limited framework to provide guidance. The new FMU and Rohe framework is predicted to assist with this gap, through the setting of environmental limits at a catchment scale, which would help to address cumulative effects.

Key concerns relating to lakes raised by ORC staff did not differ significantly from those raised by various stakeholder groups. Concerns included biosecurity threats (particularly in the deepwater lakes), sedimentation (through both the presence of dams as well as land use activities like residential development), discharges from septic tanks and wastewater systems, water takes, increasing algae in the deepwater lakes, impacts of climate change, elevated nutrients in lowland lakes, catchment land use, urban development and natural hazards. ORC staff stressed the importance that the physical environment is understood as a whole, combining ecological, social and physical aspects to ensure any management and development is working with the environment, instead of trying to control it.

5.3 Takata Whenua

Kāi Tahu are takata whenua of the Otago region. The takiwā or tribal area of Kāi Tahu includes all the lands, islands, and coasts of Te Waipounamu south of Te Parinui o Whiti on the east coast and Te Rae o Kahurangi Point on the west coast as described in the Te Rūnanga o Ngāi Tahu Act 1996.

Four Kāi Tahu ki Otago Papatipu Rūnaka are based in Otago. These are Te Rūnanga o Moeraki, Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou, and Hokonui Rūnanga. Three Ngāi Tahu ki Murihiku Rūnaka – Awarua Rūnanga, Waihopai Rūnanga and Ōraka-Aparima Rūnanga – are based in Southland but also share interests with Kāi Tahu ki Otago in South Otago, the Clutha River/Mata-Au, and the inland lakes and mountains.

Kā Papatipu Rūnaka are recognised in the Te Rūnanga o Ngāi Tahu Act 1996, and are principally responsible for managing the collective interests of their members in the areas of cultural, spiritual, economic, moral and social spheres. The Kāi Tahu ki Otago Papatipu Rūnaka are represented by Aukaha, who facilitate Kāi Tahu engagement in resource management processes and provide a first point of contact for the public seeking to engage with Papatipu Rūnaka. Te Ao Marama performs the same function on behalf of the Ngāi Tahu ki Murihiku Rūnaka in Southland and in areas of shared interest in Otago.

Representatives from Aukaha and Te Ao Marama were contacted for feedback for this study. Both organisations and the rūnaka they represent have existing relationships with ORC, formalised through partnership agreements. Their preference is to rely on the existing methods for consultation that have been established through these partnership agreements to provide mana whenua input into ORC processes and decision making. Both Aukaha and Te Ao Marama are heavily involved in development of the Land and Water Regional Plan and Catchment Action Plans and see these as the key mechanisms to provide a comprehensive framework for managing all lakes in a way that will uphold and restore the unique mauri of each one.

5.4 Central Government Agencies

5.4.1 Department of Conservation

The Department of Conservation (DOC) is the lead government agency charged with conserving New Zealand's natural and historic heritage. DOC administers the Conservation Act 1987, under which it is responsible for advocating for and promoting the benefits of the conservation of natural resources. DOC are responsible for preserving indigenous freshwater fisheries and protecting recreational freshwater fisheries and freshwater fish habitats. DOC advocate and submit on conservation matters relevant to resource consent applications under the Resource Management Act 1991 and other planning processes. DOC's areas of interest that relate to lakes are shown in Table 12 below.

Table 12: DOC Areas of Interest Relating to RMA Processes (not exhaustive). Source: DOC, 2022.

Freshwater	Land
○ Protected freshwater areas (including proposed protected freshwater areas) ○ The integrity of freshwater natural ecosystems and habitats ○ Maintenance and where necessary enhancement of freshwater habitats, including those providing access for migratory species, and or important to the survival of indigenous freshwater fish stocks ○ The natural character of wetlands, lakes and rivers and their margins, and their protection from inappropriate subdivision, use and development ○ Nationally important lakes and rivers	○ Existing and proposed protected areas ○ Natural land ecosystems and habitats that are important for safeguarding indigenous biodiversity ○ The habitat of protected and/or threatened species ○ Areas adjoining and/or connected to significant protected heritage lands ○ Landscapes significant in the protection of the natural character of the coastal environment and lakes, rivers, wetlands and their margins ○ Activities which may degrade the experience of visitors to any protected area managed by DOC

DOC manage all Public Conservation Land (PCL), including National Parks, Wildlife Areas, Conservation areas (including stewardship areas) and Reserves. In the management of these areas, DOC are responsible for pest

plant and animal control (including aquatic species). DOC operational staff with a role or interest in lakes management were contacted for this study, and their comments are incorporated into the information below.

DOC staff have active involvement in many catchment based community groups and management forums, such as WAI Wānaka, the Tiaki Maniototo Project, the Sinclair Wetlands Trust and Guardians of Lake Wānaka. They also have ongoing working relationships with LINZ through the Lagarosiphon Management group, Contact Energy (whose consent conditions require a number of mitigation measures, including eel relocation and lamprey surveys) and mana whenua. Like ORC, DOC are limited in their involvement with groups by resource availability. Representatives noted a recent increase in approaches from catchment groups requesting DOC assistance and involvement, and while they are supportive of this, they do not have the capability to be actively involved with every group. DOC try to engage with individual landowners in specific catchments, such as around Lake Mahinerangi where they are actively working with farmers around stock access to waterways.

DOC staff expressed concern that they have limited ability to influence management of lakes that are not located on public conservation land. Most lakes on or adjoining conservation land are typically alpine lakes (both RHAL and AHAL) which are considered to have fewer pressures than those in lower catchments.
While the protection of freshwater fish and their habitats is within DOC's remit, this role is largely through advocacy. In many cases, DOC rely on being identified as an affected party on resource consent applications that may impact freshwater fish or conservation values.

The most consistent and recent frustration has been with ORC's public consultation processes where DOC are expected to provide feedback in the same way as the general public, such as through public meetings or a website link. The nature of DOC's role is non-political and these formats do not cater for their unique position and structure. An example was given about the recent RPS review, where DOC raised this issue with ORC and were offered a separate consultation process (along with other similar organisations, such as Fish and Game). This separate process never eventuated and as a result, DOC were not able to provide feedback prior to lodging their submission on the RPS. Similar feedback was received from other agencies in a similar position.

DOC representatives noted a disconnect in the management across the region's lakes. Management tends to be site specific without an apparent overall plan or higher strategy, resulting in reactive, not proactive, management. The current approach does not look at the ecosystem as a whole, but rather in separate parts. Aside from the RMA advocacy that goes on in the background, there has been limited active management of these waterbodies. While there are management programmes for specific issues (e.g. weed control) what is lacking is a cohesive whole-of ecosystem management. This means that gains made by previous initiatives are not being maintained or fully realised. An example of this is the removal of willows in Lake Waihola some time ago. This work was highly commended by DOC staff, however they also queried why it didn't extend to Lake Waipori (or other lakes, like Tuakitoto). Now, the willows are growing back in Lake Waihola and there

appears to be no plan to maintain the good work that was achieved there. It is hoped that the direction provided by the NPSFM will address some of these matters.

DOC staff have a number of concerns relating to the state of the region's lakes. Like others interviewed for this study, they hold concerns for the deepwater lakes, which generally are regarded as having excellent water quality, something which can easily be taken for granted. There is significant concern about activities at the headwater of these lakes and the impact they will have on water quality in the future.

Many of Otago's lakes are habitat for rare or threatened fish species. While fish species may not spend their entire lives in the lakes, they form an important part of their lifecycle. For example, kōaro rely on both river and lake environments for various parts of their lifecycle. DOC have recorded a decline in kōaro populations in the past 10 years in the Cardrona catchment. This is believed to be due to both competition from trout and water quality impacts from surrounding land use (urban and rural).

In terms of information gaps, like others in this study, DOC acknowledge that there is much that we do not know about lakes, that would benefit management. The hydrodynamics of the deepwater lakes is one example – we cannot understand the impacts of point source discharges from urban areas until we know how they will be distributed. Likewise for the implications of changing climates, such as rainfall patterns or smaller glaciers, and how this will impact the hydrology of the deepwater lakes. If there is no baseline knowledge, how will change be measured?

Respondents from DOC noted that knowledge of lakes tends to be location specific, and there are calls for more catchment-scale research. The impact of vegetation removal (particularly tussock) on water quantity in lake catchments is one example. Tussock provides an important service in slowing snow melt and retaining water in the catchment. The removal of tussock, through land use change and development, has implications for water quantity in the catchment that are not yet well understood. Similarly, our understanding of native fish populations is currently limited to discrete parts of the catchment. There is a case for understanding native fish populations at a catchment scale, including what role lakes play in their lifecycle and what the impacts from landuse and management are.

DOC representatives see a need for a more holistic view of the role of lakes in the wider ecosystem, including how they influence water bodies upstream and downstream of their location. Their view is that we don't currently know enough about what threats and challenges each lake is facing in order to effectively manage them. Lakes form part of a much bigger picture, but we also need to understand what is happening at a lake specific level. DOC continue to advocate for these matters but are faced by resource constraints and have to work in line with priorities set in their work programme. As one representative noted "*DOC have the mandate, but not the resource*".

5.4.1.1 Otago Conservation Board

The Otago Conservation Board is a statutory body serviced by DOC. The Otago Conservation Board is made up of members appointed by the Minister of Conservation, and provides advice to DOC on local conservation matters. The board also leads the development and implementation of the Otago Conservation Management Strategy and the Mount Aspiring National Park Management Plan. The Board works with various conservation organisations and members of the public to ensure they represent the interests of their locale in conservation.

Feedback for this study was provided by a representative of the Board, who reflected that lakes need to be recognised as an ancestor and life force in themselves and are not a commodity that can be depleted. Similar to feedback provided by others in this study, there is a concern that the "pristine" deepwater lakes are currently being taken for granted: "*They are a taonga that must be nurtured so that we are able to continue using them and so they remain fit and healthy for our descendants.*"

Native fish species and water quality were identified as areas where more information is needed. Likewise, the representative noted that they simply do not know enough about how lakes are managed in Otago.

5.4.2 Toitū te Whenua Land Information New Zealand

Toitū te Whenua Land Information New Zealand (LINZ) is the lead government agency responsible for managing crown property, which includes pastoral land in the South Island high country, lakebeds and riverbeds, Crown Forest Land and a broad range of residential and commercial properties.

In Otago alone, LINZ manage over 640 properties, large areas of the high country pastoral land, the beds of Lakes Whakatipu, Wānaka, Dunstan and Hāwea, and many rivers (LINZ, 2018). LINZ are responsible for managing pest plants and animals in these areas and controlling activities of third parties on Crown land, by issuing licences and leases for activities such as moorings or other structures in lakes. LINZ also administer leases on Crown Pastoral land to farmers for grazing stock on behalf of the Commissioner of Crown Lands. Outside of Crown Land, LINZ are responsible for administering the Overseas Investment Act 2005 through the Overseas Investment Office (OIA).

LINZ's Manager Biosecurity and Biodiversity (Crown Property) and Otago Land and Property Portfolio Manager were contacted for this study. Comments from the Manager Biosecurity and Biodiversity (Crown Property) were provided and are incorporated into this report. All other information has been sourced from publicly available sources (referenced throughout).

As the lead agency for managing Crown property, LINZ have a mandate to achieve the best public value from the Crown estate through their own activities and the advice they give to government and other agencies (LINZ, 2018). The Toitū te Whenua Crown Property Strategy outlines that LINZ will achieve this by, among other methods, supporting great outcomes for the South Island high country, and supporting and leading

biosecurity initiatives affecting the Crown estate (LINZ, 2018). LINZ are responsible for managing the bed of lakes and rivers, which means issues not associated with the lake bed (e.g. pest fish or water quality) are not within the remit of Toitū te Whenua to manage.

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LINZ has active *Lagarosiphon major* control programmes in Lakes Whakatipu, Dunstan and Wānaka. Fluctuations in the level of Lake Hāwea (due to its role in Contact's Clyde power scheme) prevent the establishment of the weed there. The lakeweed control programme in Otago's lakes represents LINZ's largest investment in biosecurity in the country. The purpose of the aquatic work programme is to control and reduce submerged aquatic weeds that impact on the environmental, cultural, recreational, and economic values of the lakes, to stop further spread of the weed to new lakes, and to reduce weed extent and maintain past gains at key sites. Currently, each lake is managed through an individual Lake Management Plan (Section 3.6.5), to reflect the different goals and approaches required for each lake.

In terms of Biosecurity, LINZ work closely with ORC and many other agencies, reflective of the complicated structure of management in these larger lakes. For example, in Lake Wānaka, the Wānaka Marina Company are responsible for the control of Lagarosiphon major around their facility, and so any control work undertaken in the surrounding area needs to be coordinated with the Marina to achieve the best results. At a broader scale, Central Otago and Queenstown Lakes District Councils manage most of the land forming lake margins and the surface of the water. There is crossover in the regulation of activities in these areas between the agencies.

Generally, LINZ staff identified the need for more collaboration across agencies, including clarifying roles and responsibilities, and assistance with communications. Increased collaboration is desired, particularly with the ORC and QLDC Harbourmasters who could enhance the biosecurity programme through enforcement and education of lake users.

A key concern for Toitū te Whenua is the possible emergence of other pest species in Otago from elsewhere in New Zealand, such as hornwart and egeria, in addition to species not currently present in New Zealand such as zebra and quagga mussels. Lagarosiphon grows to approximately 6m depth, while native aquatic plants exceed 20m depth in lakes Whakatipu and Wānaka. Species like Hornwart and Oxygen weed (Egeria) (currently present elsewhere in New Zealand but not in Otago) have the ability to grow deeper than Lagarosiphon and could outcompete native aquatic plant species. In Lake Tawarewa in the North Island,

hornwart has been known to smother native plants below 20m in depth.

Toitū te Whenua align their biosecurity practices with councils' Regional Pest Management Plans to support regional biosecurity goals. To inform strategic direction and prioritisation, Toitū te Whenua also consider priorities and risks identified by regional stakeholders, biodiversity strategies and iwi management plans to achieve mutual goals (LINZ, 2021). A lakes strategy, if one existed, could assist in informing other agencies when they are developing their own strategies.

5.4.3 Ministry of Primary Industries - Biosecurity NZ

Biosecurity NZ are a business unit of the Ministry of Primary Industries, responsible for leading New Zealand's biosecurity system. Biosecurity NZ aid inter-agency coordination to help increase collaboration and improve delivery of freshwater biosecurity outcomes. Possibly the most recognisable role of Biosecurity NZ in lakes management is through the Check Clean Dry (CCD) campaign, that aims to change freshwater users' behaviours to stop the spread of freshwater pests. As part of this campaign, Biosecurity NZ provide resources and funding to a regional CCD advocacy campaign via the Otago Regional Council.

Biosecurity NZ have existing working relationships with ORC, DOC and Toitū te Whenua. Feedback from Biosecurity NZ as part of this study noted that ORC tends to have longevity in biosecurity staff members, which is a strength to the management of the lakes. They suggested that there could be improvement with how the various agencies work with each work other, particularly across regions. While there is already some collaboration, it could be more efficient and effective. There is also opportunity for greater collaboration with industries that use and can impact the lakes, such as tourism and agriculture, and additional resources to enable compliance monitoring of the Lakes, to ensure users are adhering to CCD or other bylaws to stop the spread of freshwater pests.

5.4.4 National Institute of Water and Atmospheric Research (NIWA)

NIWA (the National Institute of Water and Atmospheric Research) is a Crown Research Institute. NIWA's mission is to "conduct leading environmental science to enable the sustainable management of natural resources for New Zealand and the planet" (NIWA, 2022). While NIWA did not provide feedback as part of this report, their work is relied upon by many of the other stakeholders consulted. Research conducted by NIWA assists ORC, DOC and catchment groups (amongst others), informing management practices and identifying issues. In addition, ORC rely on several NIWA owned monitoring sites in waterbodies across the region for water quality and level monitoring data.

5.5 Territorial Authorities

Within Otago, there are five Territorial Authorities:

- Central Otago District Council

- Clutha District Council
- Dunedin City Council
- Queenstown Lake District Council; and
- Waitaki District Council

Waitaki District only has one lake identified in this study (Devil's Bridge Lagoon), as the larger lakes that form the Waitaki hydro scheme are located within the Canterbury region.

In addition to the control of land use under the RMA (discussed in Section 3.5.1), Territorial Authorities have a number of interests in lakes and their management. For example, Territorial Authorities are responsible for supplying drinking water, much of which is extracted from natural lakes or held in manmade reservoirs. They attract economic development in the region, usually through tourism, which benefits from the presence of these lakes as a drawcard. Territorial Authorities maintain many reserve areas on lake margins.

Economic development managers, Regulatory Managers and Infrastructure Managers from the councils listed above were contacted for this study. Responses were received from Clutha District Council (Planning Team) and Queenstown Lakes District Council (Regulatory Team and Property Team) representatives. Their feedback is discussed further below.

5.5.1 Queenstown Lakes District Council

The regulatory team at QLDC leads research, draft policies and guidelines, monitors outcomes under the Local Government Act (LGA) and the Resource Management Act (RMA). The team advise the Council on urban and rural planning policy and RMA matters, prepares planning strategies, analysis reports, plan changes and evidence. In terms of lakes, they are involved with environmental monitoring and enforcement of resource consents and district plan rules, moorings and jetties (through the Property team) and implementing bylaws such as the Navigation Safety Bylaw 2018.

The Resource Consent team processes a variety of resource consent applications (both land use and subdivision), including resource consents for activities on the surface of lakes and rivers, such as recreation, commercial recreation and public transport. ORC has transferred their function in relation to the processing of s13 land use consents to QLDC for all lakes within the district. In addition, ORC has also transferred their harbourmaster function to QLDC within the district, discussed further in Section 4.12 below.

The Planning Policy team has a relationship with Kāi Tahu (through Te Ao Marama Inc and Aukaha), which involves consultation on the ongoing development of the District Plan, including plan changes and the District Plan Review. More broadly, the team works with other stakeholder groups such as catchment-based community groups, LINZ, Fish and Game, ORC, commercial operators and water safety groups.

Within the QLDC planning framework, several lakes are classified as either Outstanding Natural Landscapes

(ONL) or Outstanding Natural Features (ONF) as well as being identified as Wāhi Tūpuna areas, including Lake Whakatipu, Lake Wānaka, Lake Hāwea (ONLs) and Lake Hayes (ONF). In addition, the council has included parts of these lakes as priority areas within Council's Landscape Schedules (currently out for submissions as part of the Proposed District Plan). Roy's Bay, Dublin Bay and Queenstown Bay have all been identified as priority areas within ONLs.

In terms of information gaps, QLDC identify the cumulative effects of moorings and jetties on the values of the lake as a key area. All moorings and structures, such as jetties, boatsheds or slipways in the Queenstown Lakes District are privately owned. Structures in the lake must hold a valid permit (renewed annually). However, recently concerns have been raised about the number of these structures within QLDC's lakes. Currently, very little is understood about the impact of these and there is little guidance available. QLDC question whether the current framework is fit for purpose for understanding ongoing ecological effects from disturbance (such as from chains attached to mooring blocks that drag on the lakebed).

In terms of management gaps, QLDC acknowledge the perception that ORC and QLDC do not always communicate effectively and share information. They see a need to ensure there is better understanding of the local issues, more consistency across Otago's lakes, filling funding gaps and avoiding a silo approach to achieve better outcomes.

5.5.2 Clutha District Council

Like QLDC, Clutha District Council control land use through District Plan and resource consent processes for subdivision and land use under the RMA. They work with Kāi Tahu in the management of Otago's lakes but did not specify in what capacity. Lakes of particular interest to the council are Lake Waihola, Lake Waipori, Lake Tuakitoto, Catlins Lake and Lake Mahinerangi.

The Clutha District Council representative identified public access to shorelines and the surface of the lake as an area of concern, as much of the margins of Clutha District's lakes are located within private land. The District Plan identifies that there are water bodies with deficiencies in terms of secure public access and enacts a policy to ensure that development and subdivision of land maintains or enhances public access to and along the margins of these water bodies. Lake Tuakitoto, Phoenix Dam, Lakes Waihola and Waipori are identified as waterbodies with such public access requirements. Other concerns include the maintenance of serenity and other amenity values with regard to the district's lakes.

Feedback provided from Clutha District Council queried whether managing all lakes using a single mechanism was the right approach. Lakes have very different ecosystems, natural processes and pressures from uses. A key information gap is to understand the impact of a lake's physical characteristics and pressures to better inform management actions, with the representative posing the question: *"Why are all lakes apparently managed to the same end? Management of lakes should reflect the diversity of lakes, their uses and pressures".*

5.6 Environmental groups

5.6.1 Forest and Bird

Forest and Bird is an independent conservation organisation. Their role includes advocacy for environmental causes including a national campaign for freshwater, climate change work, leading various volunteer projects for monitoring, restoration, planting and pest control, submitting on plans, resource consents and plan changes and communication to the public via social media, email, publications and their website.

The Regional Conservation Manager for Otago and Southland provided feedback for this study. Their feedback outlined that while Forest and Bird are concerned with all lakes and freshwater in the country, in Otago, the New Zealand Battery Project at Lake Onslow is of particular interest to the organisation.

Key issues identified by Forest and Bird include:

- The rapid growth of urban and intensive rural development around Otago's lakes
- An imbalance in access to resources for water users over ecosystems, species and recreational users
- The management of the region's lowland lakes
- The potential loss of habitat and biodiversity with the New Zealand Battery Project in Lake Onslow, particularly the Teviot Flathead Galaxiid
- The management of wetlands and lake fringes

Forest and Bird are also concerned with how the NPSFM will be implemented, including the concept of Te Mana o te Wai (discussed in Section 3.1.2.1).

Information gaps identified by Forest and Bird echoed what has been raised by other stakeholder relating to ecosystem services and their value (both economic and non-monetary) and the impacts of climate change on the lakes. Other gaps included information about lakes' cultural significance, their role in carbon sequestration, and what the impact on lakes will be if full urbanisation was utilised in the District Plan of the associated council (e.g. through maximum subdivision potential and greenfield development).

Monitoring was identified as a key management and information gap, similar to feedback from other stakeholders. The current monitoring programme is considered deficient to adequately identify changes in lake health, with the respondent noting that "*a monthly grab sample is barely adequate for proper analysis over time*". In addition to monitoring, additional management of invasive species, wastewater and stormwater runoff, rural discharges, tougher monitoring of existing consents and more stringent conditions on new consents were suggested as management improvements in the region. Forest and Bird's perception is that capacity building within ORC is needed, as there do not appear to be enough monitoring staff to be able to ensure consent holders are complying with their consents and to properly monitor the lakes.

The Forest and Bird feedback, like others in this study, identifies an opportunity for collaboration between all

of the relevant parties (iwi, communities, NGOs, government agencies) for better management. It called for ORC to take ownership of the issues and the important role they play in protection and remediation of the region's lakes.

5.6.2 The Otago Fish and Game Council

A representative from the Otago Fish and Game Council provided feedback for this study. In addition, Fish and Game shared the online survey link with their licence holders, several of whom submitted individual responses. The Otago Fish and Game Council response is summarised here, and the individual responses are summarised in Section 4.8 Recreation Groups.

The Otago Fish and Game Council is the statutory manager of sports fish and game birds in the Otago region, and is responsible for regulating fishing and hunting activity for those species. It also has a legislated role to advocate for the interests of licence holders and the Fish and Game Council, including its interest in habitat. Like the Department of Conservation, Fish and Game has direct responsibility for species management but not habitat, which is a main contributor to the health of populations. As a result, the advocacy role has become a critical part of Fish and Game's legislated functions.

Fish and Game works with a range of other groups or organisations, such as environmental groups, local government, regional councils, catchment groups, commercial businesses and individuals. The representative noted that while the various groups and agencies involved in lakes management collectively do good work, there is no overarching plan or vision that they are all working towards in a coordinated fashion. The representative noted that the presence of both new and long standing issues, particularly around water quality, in Otago's lakes suggests that collectively the work either isn't effective or is not enough.

Fish and Game is particularly worried about the speed of urban and agricultural development around high country lakes in Central Otago. These areas have historically been subject to lighter stocking rates but the expansion of irrigation has brought with it an increased stocking rate and increased nutrient inputs to land. The result is a greater risk of degrading lake water quality. Outside of the deepwater lakes, the representative noted that many lowland lakes have very poor water quality and have been in this situation for many decades.

Lakes and adjacent wetland areas have historically been drained and in many places, such as Lake Tuakitoto, the existing drainage regime continues today. These ecosystems suffer as a result of this drainage, among other influences. Lakes created by dams or weirs are causing significant fish passage issues - particularly in the Clutha/Mata-Au system. Lakes have long been used for duck hunting during the season, which is only part of the year. In recent years, there has been increasing tension between existing hunting activities and new activities, such as cycling.

In terms of information and management gaps, the representative noted that there are few reliable regulatory tools to measure nutrient export to waterways. Overseer has been controversial for this task and there are no regulatory measures in the Otago planning framework that fully address this. In the absence of

measurement, the representative advocated for clear land use rules which will allow nutrient input to be regulated.

Other knowledge gaps include species interaction in Otago lakes and the contribution of introduced fish to algae blooms. These are both areas that Fish and Game are investigating at a national level.

The Fish and Game representative reflected the sentiment expressed by others consulted in this study: *"Lake management has been patchy across the region. Historically, in places without significant land use pressure lakes have fared well, in the remainder they have not. With land use pressure now extending into places where it has not previously been a problem, we need urgent action. Lake health in Otago will no longer be coincidentally high."*

5.7 Catchment Based Community Groups

5.7.1 WAI Wānaka

WAI Wānaka is a catchment-based organisation dedicated to building healthy ecosystems and supporting community well-being in the Upper Clutha area. WAI Wānaka focuses on water management in the region, taking a whole of basin approach and using science, community action and educational projects and programmes to address existing water issues and current and future risks to freshwater resources.

WAI Wānaka's work focusses heavily on Lakes Wānaka and Hāwea, and their connecting catchments. As discussed in Section 3.6.2, WAI Wānaka have prepared a Community Catchment Plan (CCP), which is an example of community led, evidence-based catchment management. The CCP sets out key risks, values and objectives for the catchment, and outlines measurable attributes and actions targeted to achieve these.

In addition, WAI Wānaka have prepared a strategy for Understanding and Protecting Otago's Deepwater Lakes. The strategy draws on the work already completed through the CCP and other initiatives and provides a framework for the enhancement of understanding and management of deepwater lakes. The strategy, while focussed on Lakes Wānaka and Hāwea recognises that the same issues and knowledge gaps apply to Lake Whakatipu, and therefore the suggested actions could be applied to all three deepwater lakes. Feedback from WAI Wānaka representatives strongly advocated for the adoption of this strategy by ORC with regard to the management of the region's deepwater lakes.

WAI Wānaka are regarded as an "umbrella" organisation, facilitating the connection of other environmental and community groups and initiatives. One of the larger community groups in the region, they play a large role in the advocacy for freshwater matters. Feedback from stakeholders consulted in this study consistently identified the CCP as one of the more comprehensive management documents specific to water quality in the region.

Representatives from WAI Wānaka have expressed concern with the perceived inertia on the part of ORC with regard to freshwater generally and lakes in particular. An absence of process and lack of meaningful

stakeholder consultation were also raised as issues. The current monitoring regime is not sufficient to quantify the impacts of the changes in land use over recent decades and inform evidence-based lake and catchment management decisions. Deepwater lakes are widely regarded as "pristine", and the degradation of water quality is not a visible issue like others in the catchment. This, in the eyes of WAI Wānaka representatives, has resulted in a lack of action from ORC.

An opportunity exists to use the learnings from the development of the CCP in future management framework development. The same actions and recommendations could apply, with some modification, to other lakes in the region. Collaboration and knowledge sharing between ORC and WAI Wānaka could provide benefits for the development of the Catchment Action Plan programme, particularly in the Upper Lakes Rohe.

5.7.2 Guardians of Lake Hāwea and Guardians of Lake Wānaka

The Guardians of Lake Hāwea are a subcommittee of the Hāwea Community Association Inc. As the name suggests, the Guardians of Lake Hāwea advocate on behalf of their community to ensure that the water quality, biodiversity and ecosystems of Lake Hāwea and its surrounds are maintained and managed sustainably for the benefit of all. The Guardians of Lake Hāwea's role in lake management is mostly informal, voluntary and restricted to small parts of the catchment of the lake, primarily along the southern margin.

The Guardians of Lake Hāwea undertake and support riparian and foreshore planting projects and biodiversity programmes, such as the installation of grebe nesting platforms in Lake Hāwea. They maintain a close working relationship with Contact Energy through their resource consent responsibilities (see Section 3.7). They plan and support initiatives for key areas of concern, such as the impacts of freedom camping on the lake edges and make submissions on resource consents for activities within the Lake's catchment.

The Guardians of Lake Wānaka advise the Minister of Conservation over issues affecting the purpose of the Lake Wānaka Preservation Act, or the recreational use of the lake and to liaise with ORC over matters which may affect the lake. The Guardians of Lake Wānaka report to the Minister of Conservation over these matters.

When there are applications for resource consents (by landowners or business owners) for activities in Lake Wānaka's catchment or in the lake itself that may impact lake water quality or lake ecosystems, the Guardians of Lake Wānaka have made submissions to the consenting body. ORC is required, under the Lake Wānaka Preservation Act 1973, to consult the Guardians of Lake Wānaka when considering resource consent applications which may affect the lake.

The Guardians of Lake Wānaka are also members of the Lagarosiphon Management Committee which manages the invasive Lagarosiphon population in Lake Wānaka.

Both Guardians work with many other groups in relation to Lakes Hāwea and Wānaka, noting in their feedback that the net effect of this is likely to be small and catchment-based with very little impact on a lake-

wide scale. While the different groups are aware of each other, there is limited coordination between the groups. Both groups expressed a primary concern for the lack of formal evidence-based management of Lakes Hāwea and Wānaka. The responsibility for ensuring water quality, lake ecosystem and biodiversity management is beyond either groups' capability, a role which is the responsibility of Otago Regional Council and one that they consider it has not fulfilled in this respect. The Guardians hold deep concerns about the absence of research and monitoring to support effective evidence-based management of Lake Hāwea and Lake Wānaka, but also Lake Whakatipu.

Guardians of Lake Hāwea have supported and engaged with the Lake Hāwea Stakeholders Group (one meeting so far) to explore and progress ways of better lake and catchment management. This new group was formed by the Lake Hāwea Catchment Group (a group of Lake Hāwea catchment landowners which was formed through WAI Wānaka). Increased coordination between groups could be enhanced through facilitation by ORC at a much broader scale than is occurring currently.

5.7.3 Lake Dunstan Charitable Trust

The Lake Dunstan Charitable Trust was established in 2015 and is regarded by the community as the "Guardians of Lake Dunstan". The Trust's objectives are to work with the wider Cromwell community and relevant organisations to enhance and protect Lake Dunstan and its catchments, raise awareness about the importance of maintaining and improving the water quality and health of the lake and other waterways, to encourage the development of a management plan and monitoring framework for Lake Dunstan, to work with the community and relevant agencies to support measurement and monitoring of water quality and to seek funding and assistance to support the Trust's activities.

The Trust is made up of a group of volunteers, who in 2020 successfully obtained funding through Toitū te Whenua Land Information New Zealand via the Jobs for Nature programmes for landscape restoration, community outreach, and the development of a shared community vision and plan for Lake Dunstan. While the Trust doesn't have a formal management role in Lake Dunstan, they are the primary community group advocating for issues and community interests relating to Lake Dunstan.

Current initiatives being led by the trust include the recently published Long Term Vision report for Lake Dunstan (discussed further in Section 4) and the Bridge to Bridge project. The Bridge to Bridge Project plans to use the $500,000 of funding it received to restore native species and improve recreational access and use on the margins of Lake Dunstan from Lowburn Bridge to Deadman's Bridge. Other ongoing initiatives include lakeside clean up days, and the establishment of a community tool shed for use by community groups in local projects.

The Trust's key concerns relate to the prevalence of Lagarosiphon in Lake Dunstan, the siltation of the Kawarau Arm (due to the presence of the Clyde Dam and the impacts it has on sediment flow) and the associated issues these pose for recreation and amenity values of the lake. The Trust are also concerned with

water quality in the lake, particularly in relation to Cromwell's drinking water, which is currently not treated for protozoa contamination.

The Trust have been active in raising concerns that Contact Energy is not meeting its obligations in relation to Lake Dunstan, particularly in the management of effects on the landscape and visual amenity values in the bed of the Kawarau Arm. This advocacy has, in part, resulted in a meeting between Contact, ORC, CODC and the Trust to discuss the Landscape and Visual Amenity Management Plan for the Kawarau Arm and an ongoing commitment for consultation amongst the parties. In late August 2022, ORC announced its intention to review the Landscape and Visual Amenity Management conditions of Contact's consent for Clyde dam.

The Trust have concerns that lake management is too narrow – restricted to individual conditions of consent or plan rules, as opposed to a holistic approach. Overall, there is a lack of leadership in issues relating to the lake. While there are plenty of interested parties, no one is taking the lead and it falls to volunteer groups like the Trust to fill this gap.

In terms of information, the Trust feels there is a lack of independent information on Lake Dunstan. Most of the current knowledge and research available comes from Contact. The Trust would like to see research into the siltation of the Kawarau Arm to establish what the Kawarau Arm will look like in 20 years' time, to assist in strategies for future management.

5.7.4 Friends of Lake Hayes

The Friends of Lake Hayes Group (FOLH) is a community-led group of concerned residents formed in response to the deterioration of Lake Hayes, triggered by the growth in land use change, causing algae blooms and the severe decline of biodiversity. The group advocates for research and restoration efforts in the lake to improve water quality and biodiversity. A FOLH representative was interviewed for this study, and their comments are incorporated into the information below.

FOLH consider that the Lake Hayes catchment is distinctive in that it includes a range of land uses, including residential development, rural land uses, several commercial businesses as well as a golf course and resort. It is a lake that is highly valued and highly visible to the local community as well as visitors to the region, due to its proximity to the busy Lake Hayes-Arrow Junction Highway (State Highway 6). The lake is considered a degraded water body and has issues with elevated phosphorus concentrations, which is held in the lake bed sediments from historic land use, resulting in algal blooms over summer periods.

The FOLH have lobbied ORC to increase water quality monitoring in the ORC and Mill Stream catchment, and a monitoring buoy has been installed in the lake. They have also commissioned a number of reports, including a restoration and monitoring plan (Schallenberg and Schallenberg, 2017), which has subsequently been reviewed by ORC who have further developed the restoration options and commenced a priority project under the Long Term Plan. The FOLH are also involved in an update to the 1995 Lake Hayes Management Strategy (led by ORC), which is overseen by a steering group including QLDC, ORC, DOC and iwi (FOLH, 2022).

Key interests and concerns for the group are the pollution loads within the lake, particularly around human uses in the catchment. Sediment is the main contaminant of concern and FOLH are supporting efforts to remove it from the lake system, including by encouraging private landowners to remove sediment accumulated in ponds and sediment traps to prevent it from flushing into the lake during high precipitation events. Other initiatives that FOLH are involved with include the development of constructed wetlands around the lake, the upgrade of an undersized culvert at the lake's outlet, and using augmented water from the Arrow River Irrigation scheme to 'flush' the lake and improve water quality. The FOLH's aim is to remove 1,000 tonnes of sediment from the Lake Hayes system. Some of these initiatives have been the bolstered via environmental enhancement funding allocated by ORC in the Long-Term Plan 2021-2031. In addition to ORC funding, FOLH are involved with a 3-year, $4.45 million Jobs for Nature funded project currently underway, led by Mana Tāhuna, who are working with FOLH and DOC to undertake native planting, wetland restoration, pest control and the installation of sediment traps in the Lake Hayes catchment.

FOLH see opportunities for ORC to increase monitoring capacity by utilising the community, who in many cases are already active and engaged in water quality issues. Other opportunities include providing environmental education to council contractors about sediment and other water quality issues in the Lake Hayes catchment, and ensuring that infrastructure (particularly stormwater) is keeping up with development. The issue of stormwater inputs into the lake are the next focus area for FOLH, as they are seeing a lot of development in the catchment with stormwater discharging, untreated, to the lake.

While the group's focus is Lake Hayes, they are also looking towards Lake Whakatipu, which they see as at risk of degradation. Lessons from Lake Hayes should be taken and applied around the region, as the cost to restore the lake far outweighs the cost of protecting it in the first place. They are looking to the new Land and Water Plan to continue to address these issues, noting that unless the plan provisions have "teeth" the existing issues in Otago will not be resolved.

5.7.5 ECOTAGO Charitable Trust

The ECOTAGO Charitable Trust (EOCT) is a group of teachers, scientists, students and community members who are concerned for the health of Tomahawk Lagoon. The EOCT project lead and facilitator provided comments for this report.

EOCT has received funding from ORC's Eco Fund to support its citizen science project in Tomahawk Lagoon. There is a lack of monitoring data for the lagoon (which previously was not monitored by ORC as part of their SOE monitoring), prompting the formation of the group in 2015. To bridge this gap, EOTC collect environmental data and monitor water quality every two weeks to inform the community on the current health and trends in water quality at the lagoon. EOCT's involvement with Tomahawk Lagoon is based on building a robust baseline data in respect to water quality and biodiversity. The Trust recognises that in order to describe the ecological health and make restorative plans it is critical to understand how the ecosystem functions.

Feedback from EOTC outlined that the work the group does is a huge undertaking requiring significant personal input to a large range of waterways. They suggest that ORC focus on developing and supporting effective community groups, which will assist the Council in its functions.

5.8 Recreational groups

As described elsewhere in this report, Otago's lakes are highly valued for recreation. Anecdotal evidence from the QLDC Harbourmaster indicates there can be up to 700 private boats per day on Lake Wānaka in the peak season. Recreational uses include angling, yachting, rowing, water skiing, swimming, jetboating, kayaking, tramping, walking, picnicking and bird watching. Eleven recreation groups with an interest in Otago's lakes were contacted as a part of this study and five responses were received from three groups representing the Upper Clutha Angling Club, Lake Dunstan Boat Club and Jetboating New Zealand (Otago). In addition, several individual responses from Fish and Game licence holders were received and are incorporated into this section.

Recreation groups generally do not have a formal role in lakes management, but are often key advocates for recreation interests in resource management processes. One respondent noted that industry lobby groups generally have more resources than voluntary groups and can operate together to promote their interests rather than the wider community interest. There is a perceived power imbalance – smaller and voluntary organisations and individual members of the public are not always able to participate in these processes due to limited resources.

All of the respondents listed urban development pressures as a concern for Otago's lakes. Other common concerns were rural development pressures, spread of pest plants and animal species and sedimentation and reduced water quality. Unsurprisingly, respondents with interests in angling listed reduced sport fish populations as a concern, particularly in lowland rivers and lakes. Increasing recreational activity was noted by one respondent, who clarified that this requires careful management and understanding of environmental limits, that is supported by monitoring (which there is currently little of).

Responses noted that access to lakes (and other waterbodies), a value which was well represented in recent ORC consultations (see Section 5.1) are being impacted by urban and rural residential development with new landowners seeking to prevent these activities in locations where they have historically occurred, such as hunting for game birds, or access to fishing locations.

Respondents sought better communication from ORC with the general public and lake users, increased enforcement of existing and new rules, and a more robust approach to management supported by effective monitoring and data collection. One response advocated for a precautionary approach to lakes management, stating "where information is lacking don't use that as an excuse for doing nothing and/or allowing (the) current practices to continue." Others sought a clear long-term strategy for lake restoration and management.

When asked for comments about the overall management of lakes one respondent noted: *"This survey is the answer to your question. It would not be necessary if there had been active management. Lakes have been ignored in ORC strategy and management and by the relevant local bodies".*

5.9 Electricity generators

Within Otago, there are three electricity generation companies who are involved in the management of the region's lakes:

- **Contact Energy:** Clutha Power Scheme including the Hāwea Dam (Lake Hāwea) Roxburgh Dam and Power Station (Lake Roxburgh) and Clyde Dam and Power Station (Lake Dunstan)
- **Manawa Energy:** Waipori Scheme including Lake Mahinerangi and associated dams, Paerau Scheme including Loganburn Reservoir and Paerau Reservoir, and Deep Stream Scheme including an unnamed reservoir above Lake Mahinerangi
- **Pioneer Energy:** Generation units on Fraser Dam, Lake Onslow and Falls Dam

Representatives from Pioneer Energy Ltd, Contact Energy Ltd and Manawa Energy Ltd provided feedback for this study, which is summarised below.

Hydrogeneration is an important aspect of the region's use of freshwater. The Clutha Scheme alone produces around 9% of New Zealand's electricity (pers. comm. Boyd Brinsdon). Hydro lakes in Otago are valued for a multitude of reasons aside from power generation, such as irrigation, recreation, amenity and drinking water.

When managing these lakes, generators are subject to unique constraints and regulations. Hydro lakes are managed differently to natural lakes, and have a significant level of human intervention. Primarily, these waterbodies function to produce electricity and lake levels and outflows are managed for that purpose.

The operation of hydro lakes is heavily regulated by resource consent conditions which dictate many aspects of their management. In addition to regulatory obligations under the RMA, generators are also required to meet other regulatory obligations regarding the management, operation and safety of dams. In May 2022, the Ministry for Business, Innovation and Employment (MBIE) announced new regulations for dam safety (Building (Dam Safety) Regulations 2022) which will come into effect in May 2024. Once in force, these regulations could require comprehensive investigations into or remedial works on dams in Otago. Above all else, dam safety is paramount in the management of hydro lakes.

Many of the lakes used for hydrogeneration serve a dual purpose. For example, Fraser Dam is owned by the Fraser Dam Company (made up of several irrigation companies) and is operated by Pioneer Energy. In addition to its role in power generation, the dam plays an important role during period of low flows, where it becomes a critical source irrigation for the multitude of orchards, vineyards and farms on the Earnscleugh flats, with water released from the dam into the Fraser River for subsequent abstraction downstream. Similarly, the

Deep Stream hydroelectric power scheme, which channels water flowing from an existing diversion to a storage reservoir, and then allows the water to be released to generate electricity through a series of canals, also provides an emergency water supply for Dunedin City in the event of prolonged drought.

Key concerns raised by Contact and Manawa representatives are the lack of recognition given by ORC to the unique set of challenges faced by generators in the management of these lakes. Electricity generators aspire to enhance renewable energy generation in Otago in line with Government direction, however there are many processes in play when it comes to the management of the existing electricity infrastructure in the region. Similar to DOC, representatives expressed disappointment in recent consultations held by ORC which catered to the general public but did not provide an avenue for effective consultation with Electricity Generators.

All of the generation companies contacted noted that there are many values associated with hydro lakes. Recreational activities on some hydro lakes have grown to a point that the original purpose of the lake is often considered secondary by the community. Generators hold the responsibility of managing these lakes in line with their consent conditions and for the purpose of electricity generation, however other uses of these lakes are significant.

The Pioneer Energy representative identified an information gap in quantifying the benefit these fixtures provide to the region (i.e. through recreation, amenity, provision of services and economic benefits). In general, generators would like to see the ORC's engagement with electricity producers enhanced. Improved cooperation and coordination between all of the relevant agencies and ORC is hoped to achieve improved environmental outcomes for these waterbodies. Contact and Manawa representatives suggested that there would be a benefit in ORC staff (particularly policy makers) visiting these sites to better understand the processes at play.

5.10 Irrigators

Across Otago, there are many irrigation groups with an interest in Otago's lakes, ranging from those who hold resource consents to extract water from both man made and natural lakes, through to ownership and control of various dams and reservoirs. Survey responses as part of this study were received from four of the seven irrigation companies contacted.

The roles of irrigation companies in lakes management varies between lakes, and often is in collaboration with other stakeholders, particularly electricity generators. For example, Falls Dam is owned and operated by the Falls Dam Company, however Pioneer Energy run a small hydro scheme in the lake. Generally, the management of lakes by irrigation companies is directed by the requirements of their various resource consents, and agreements with their customers.

Key concerns raised by respondents included the spread of pest plant and animal species, sedimentation and reduced water clarity, human health risks, loss of native species, urban development pressures (e.g. stormwater runoff, wastewater discharges), tourism related impacts and increasing recreational activity.

Several respondents raised the issue of climate change, and the probable future strain this will place on irrigation lakes. If water becomes scarcer due to changes in rainfall patterns, it is possible that more people will come to rely on irrigation dams and these lakes could be put under further strain, resulting in increases in lake levels or changes to flow patterns. Already, many irrigation dams also provide drinking and domestic water to communities, some of which do not have an alternative supply.

Irrigation, generally, is a function of lakes valued by more than just the irrigation companies. Many of the stakeholders contacted for this report (particularly from the rural sector) listed irrigation as a key value of the region's lakes. Similarly, many dams/reservoirs managed by irrigation companies are highly valued for recreation and amenity values, such as Lower Manorburn Reservoir, Poolburn Reservoir and Conroys Dam.

One respondent noted that the value community irrigation schemes provide (both economic and cultural) is not fully recognised. *"Schools, hospitals, shops, sports groups, food production, trades, food and retail is in place due to the security of these schemes and certainty for farmers to be able to be productive. The water being used responsibly upholds whole communities."* Information gaps identified by respondents included better methods for the eradication of pest species (e.g. geese and swans), impacts of increasing population on lake water quality and quantity, an appreciation of historical significance of some schemes and quantification of the economic value that lakes bring to the area.

5.11 Rural groups

To capture feedback from the rural sector, online surveys were sent to catchment groups, Federated Farmers and Horticulture NZ. Fifteen catchment groups were contacted, with consultation focussed on those with lakes within their catchment area. Federated Farmers and Horticulture NZ both shared the survey with their Otago representatives. Responses were received from several catchment groups and Federated Farmers representatives, and these are summarised together below.

Common issues identified by rural groups include both urban and rural development pressures, tourism related impacts, the spread of pest plants and animal species and the effects of climate change. Groups also identified the loss of biodiversity and native species as issues of concern. One respondent noted that regulations impact the ability of communities to work together around a challenge, noting that *"social capital needs to be valued as a solution to managing these challenges".*

Knowledge gaps identified by rural groups reiterate those raised by others in relation to a lack of monitoring and scientific data about the region's lakes. In particular, catchment group representatives around Lake Wānaka called for deep water monitoring and more consistent inflow and outflow monitoring (including urban discharges). One respondent noted that while the monitoring data may exist, it isn't fed back to the community in a clear and concise way, leading to a lack of awareness about the state of the lakes. Another gap raised by a respondent was a lack of recognition of local knowledge about these lakes. Farmers have a deep connection to the land they work on, and in many cases have been there for generations. This depth of

understanding could be used as a resource for ORC in their decision making around lakes management.

Feedback around management practices was consistent in recognising the benefit community groups can provide to lakes management in the region. One respondent noted that while ORC may not be actively managing the lakes it is important to consider all the work that is being undertaken by individuals and groups to manage land and tributaries that feed into the lakes both in the rural and urban environments.

Respondents noted that ORC aren't leveraging this resource and need to incentivise communities to work together around the management of our lakes, as regulators are not resourced to do this alone.

Other comments called for ORC to recognise that the lakes are all very different and one strategy is unlikely to fit all, stating it is *"important not to create yet more policy and rules to manage lakes that are being managed well by individuals/ groups and communities. Management does not need to be in the form of more regulation."*

5.12 Harbourmasters, Water Safety and Marina Operators

The position of Harbourmaster sits within the ORC, who have delegated its harbourmaster function within the Queenstown Lakes District to QLDC. QLDC have oversight of this function and contract out the operations to a third party. Both Harbourmasters provided feedback for this study. The QLDC harbourmaster commented that lakes management in Queenstown Lakes District generally works very well, and attributed this to the fact that many functions relating to lakes are undertaken by QLDC (including Harbourmaster and Consenting in addition to the usual district council responsibilities). On the other hand, the ORC Harbourmaster noted increasing recreational activity as a concern and a lack of commitment from some District Councils to manage structures (e.g. swimming pontoons) within lakes. The ORC harbourmaster also noted that many stakeholders are operating individually, and that a more collaborative approach would be advantageous. Overall, understanding of Navigational Safety Bylaws and general boating rules was identified as a gap in general knowledge of the public.

In addition to the Harbourmaster, Coastguard New Zealand are active in Otago's lakes through incident response and education of boat users on the water. In Otago, three Coastguard units operate around lakes, being the Wānaka Lakes, Queenstown and Clyde units. All three units provided feedback for this report, identifying increasing recreational activity and leaks and spills of fuels or other chemicals on the lake as common concerns. In Lake Wānaka, increasing sedimentation from urban development was also noted as a concern. Like the ORC harbourmaster, feedback indicated that more education of lake users around boat safety is needed to reduce the risk of a major spill or incident. Other comments indicated that ongoing monitoring is required to ensure the deepwater lakes do not become degraded over time.

Two commercial marinas were identified on Otago's lakes: the Wānaka Marina on Lake Wānaka and the Queenstown Marina on Lake Whakatipu. The operators of these facilities were contacted for this study but did not provide any feedback. Feedback from other stakeholders indicate that these facilities have an

important role to play, particularly in the control of aquatic weeds. For example, the Wānaka Marina Company sits on the Lake Wānaka Aquatic Stakeholder Group (with regard to Lagarosiphon management) and is responsible for weed control works in an area extending 50m from the marina in all directions. Marinas also provide a potential resource for communication with and education of boat users around issues that impact the lakes.

5.13 Tourism

The region's lakes are undoubtably important for tourism, both at a local and an international level. Lakes like Whakatipu and Wānaka frequently feature in tourism marketing both locally and internationally and remain an important drawcard for bringing visitors to the region. Outside of the "iconic" lakes, Lakes like Lake Dunstan, Lake Wahiola, Catlins Lake and many others are popular amongst New Zealanders, with many travelling from outside of Otago to holiday near these features.

Regional Tourism Organisations for each district in Otago were contacted as part of this study. Responses were received from Destination Queenstown and Lake Wānaka Tourism and are discussed below.

One respondent noted that while tourism organisations don't manage the lakes, they are a crucial component of the region's tourism offering. In addition, they are important for regional identity and the lives and lifestyles of Otago's communities. Lakes are described as a "*key part of the DNA of this place*". There is a very strong historic and current connection for the people who live here as well as drawing in people from outside Otago. In addition to natural character and amenity values, lakes are a valuable transportation network around the region, particularly the Whakatipu basin.

Key concerns raised include urban and rural development pressures, loss of biodiversity, spread of pest plant and animal species, sedimentation and reduced water clarity, fuel or chemical spills, the effects of climate change and possible effects of the Alpine Fault. Both groups expressed a lack of environmental data and understanding about how these lakes are managed as a key information gap.

5.14 Education & Research

For this report, representatives from Enviroschools and the University of Otago were contacted to provide feedback from an education and research point of view. In addition, a thesis authored by Alice Tilley of the University of Oxford regarding environmental change and values associated with Lake Dunstan and the Clyde Dam, and a dissertation authored by Stephanie K Dwyer identifying the implementation gaps that influence the biodiversity framework within New Zealand using lake snow within Lake Wānaka as a key case study are summarised. While the authors of these documents were not stakeholders consulted for this study, their work provides relevant commentary on the management of lakes in Otago and so is included here.

Enviroschools is an environmental education programme which teaches young people about sustainability through student-led projects within their community. ORC coordinates the Enviroschools programme in

Otago. A representative from Enviroschools provided feedback for this report. Key concerns identified in relation to Otago's lakes included loss of native species, leaks and spills of fuels and other chemicals, and effects of climate change. The representative identified mātauraka Māori and mahika kai knowledge as an information gap, and processes and practices for managing wastewater and stormwater as a gap in the current management framework.

Dr Marc Schallenberg, a lakes scientist from the University of Otago, also provided comments for this report. Dr Schallenberg's body of work regarding Otago's lakes has been extensive and he highlighted that there are many gaps in our knowledge of Otago's lakes, because while monitoring has recently improved, historically monitoring has not been frequent or widespread enough, or has used inappropriate analytical methods.

Specific gaps in our knowledge include the impacts of land use change (i.e. tenure review) on high-altitude lakes, the impacts of invasive species, particularly on the accessible lakes, our knowledge of inland saline waterbodies such as the Sutton Salt Lake and other rare lake types, and the impacts of climate change, especially in alpine lakes.

A key concern of Dr Schallenberg's is the impact of human pressures on lakes. He used the example of alpine lakes in Europe which were once regarded as pristine and are now suffering from significant eutrophication problems. It cost more than €4.0 billion to restore Lake Constance in Germany/Switzerland/Austria. These examples show the critical importance of preserving the health of lakes. Dr Schallenberg noted that SOE monitoring in Otago has historically not been sufficient to detect degradation. For example, prior to 2016, chlorophyll and nutrient readings in the big Otago lakes were often below the detection limit and so it was assumed that there was no problem with these lakes. However, now that a more precise method of monitoring is used, patterns in chlorophyll levels in particular can be identified which hint towards some degradation in the Deepwater Lakes.

While monitoring has improved since 2016 more could be done, a key initiative being the installation of monitoring buoys in lakes, which will give much better data and a better understanding that we currently have. There are a multitude of opportunities for research to better inform management. For example, there is some evidence that an invasive zooplankton species could inhibit eutrophication. Further research into options for restoration of degraded lakes is also needed, in addition to protecting what remains in good condition.

Dr Schallenberg outlined that there are a huge range of lakes and stressors, as well as aspirations with regard to their management. In an ideal world, every lake in Otago that has important values should have its own management plan. Furthermore, lakes management and research in Otago will benefit from increased collaboration with takata whenua and should be supported to increase capacity in this area.

Tilley (2022) used the case study of the construction of the Clyde Dam to consider the different ways water is valued through social, political environmental and economic factors and the challenges this brings to the

management of a shared natural resource. Tilley (2022) poses that water it is difficult to measure and reflect the full range of benefits and values of water as a resource in decision making. These challenges were evident in the construction of the Clyde dam, which Tilley (2022) concludes provided an uneven distribution of benefits between Central Government and communities of Cromwell, Clyde and Bannockburn. The research suggests that when making collective decisions regarding a common pool resource, different ways of valuing water should be accounted for so that benefits can be distributed somewhat evenly to all involved.

The quantitative analysis conducted in the research showed that there was an increase in distribution of benefits over time, however perspectives towards water use are siloed between the relevant actors, as they do not share the same values (Tilley, 2022). This poses a challenge to water management in a collective manner, as water is valued in a multitude of ways and that attitudes towards environmental changes are often emotional. Tilley (2022) concludes: *"motivation to overcome the institutionalised right to use water as an economic or political resource in will need to be replaced with a stronger perspective that accepts the diverse values of water across economic, political, social and environmental uses to overcome collective action problems. This will involve a counter narrative to traditional engineered hydropower infrastructure, turning away from mitigating distributional impacts and towards shared motivations and outcomes."*

Dwyer (2017) outlines that lake snow was first reported in Lake Wānaka in 2003, by the fouling of a fisherman's line. By 2016, lake snow had spread to all three deep water lakes: Wānaka, Hāwea and Whakatipu. Dwyer provides a summary table of the perceptions of experts and local government agencies on the approaches taken towards lake snow over the last twenty years

The results of Dwyer's (2017) research suggested that ORC's slow response in reacting to freshwater scientists' advice was fundamental in the lack of action to control the spread of lake snow. In terms of management, she indicated that there was a lack of consistency and coordination between various non-government and central and local government organisations, particularly when it came to the allocation of funding for future research. Dwyer (2017) identified that, for future biosecurity threats, there should be better collaboration and data sharing between governmental and non-governmental organisations i.e. research institutions to better understand the impact of a potential invasive species. Similarly, the key lesson from this investigation also acknowledged that for some invasive species, you don't have the luxury of time to invest in research.

5.15 Residents' Associations

Lakes hold significant value to those that live around them. Eleven Residents' Associations were contacted as part of this report and four groups provided feedback. Feedback from the Hāwea Community Association (HCA) is summarised in Section 4.7.2 above, as the Guardians of Lake Hāwea represent the HCA on matters regarding the lake. Likewise, feedback from Lake Dunstan Charitable Trust and Friends of Lake Hayes is summarised in previous sections.

The Albert Town Community Association, St Bathans Area Community Association and Kelvin Peninsula Community Association responded to the online survey and their feedback is summarised below.

Common concerns raised by these associations included urban and rural development pressures, spread of pest plant and animal species, sedimentation and reduced water clarity and loss of biodiversity. Other concerns include a lack of funding to investigate the health of Otago's lakes, and a lack of communication with the community about how water quality is monitored and how lakes in general are managed. Regarding management, respondents are concerned about a lack of coordination between agencies, noting that currently it appears fragmented between various organisations.

A representative from the Kelvin Heights Community Association made specific reference to preventing the same issues currently being dealt with in Lake Hayes from occurring elsewhere. They commented: *"to the casual local observer, the quality of the water in Lake Wakatipu appears fine but the occasional 'do not swim here' notice is starting to be concerning and the direction of travel in the water quality is clear."* Furthermore, they noted that *"what management there is is rather invisible to us* (sic)*. We occasionally hear of activity concerning Lake Hayes but little on Whakatipu".*

This sentiment was replicated by the other organisations who remarked on the lack of communication and coordination on the part of ORC and others who manage the region's lakes.

5.16 Workshop Feedback

Stakeholder feedback on the conclusions drawn on this report and the draft recommendations proposed was obtained via two workshops, one in person and one online. Stakeholders who had participated in either the online survey or the informal interviews were invited to attend the workshops to hear the outcomes of the review and provide feedback. Ahead of the workshops, attendees were provided with the draft executive summary and recommendations table.

Across the two workshops, 24 stakeholders attended. Stakeholders who could not attend either workshop were invited to provide feedback via email, and this was received from several stakeholders.

The general feedback was that most stakeholders agreed with the conclusions and recommendations, but some further clarification and refinement was required. Feedback themes arising from the workshop discussions are discussed further below. Full details of the workshop material are included in the Summary of Consultation attached as Appendix 4.

Data and Information

All participants agreed that we need to understand more about our lakes, however cautioned that data gathering needs to be targeted to priority areas (i.e. not just gathered for the sake of it). Stakeholders also stressed the importance of using the analysis of this data to inform management practices. Several

comments were made reiterating that it is not clear what is done with the information gathered by ORC's State of the Environment monitoring programme.

During the workshops it was highlighted that there is in fact a great deal of information available Otago's lakes, but as this is often held by individual groups or organisations, it is not readily accessible across the region. Information sharing and distribution was highlighted as a key area of improvement.

The suggested use of citizen science to increase monitoring was generally supported, but stakeholders expressed that it is important that any use of citizen science is supported by structure and process to ensure sample results can be relied upon. They also stressed that citizen science should be used to supplement expert science, not replace it.

To address information gaps and research needs, workshop participants raised the possibility of a lakes assessment working group consisting of suitable experts identifying where research is most needed. Such a group could be provided for via a lakes strategic plan. Other initiatives raised included co-funding a "Lakes Chair" with a focus on research at decadal timeframes, and a Lakes Research Facility.

ORC Processes and Developing Tools

Many of the questions raised at the workshop centred around other ORC processes, such as the LWRP and the CAP program. It was evident that while most participants had knowledge of these processes, they did not understand how all of the pieces fit together and where a Lakes Strategy, if one existed, would tie in. This highlighted an opportunity for ORC to expand public knowledge about the different tools and developments underway and how they all relate to each other.

Values

Workshop participants identified that it is important to recognise the dependency of communities on the health of Otago's lakes, in terms of both economic and social well being.

Participants generally agreed that values have been well canvassed by ORC and other groups in recent years, however a concern was raised about how well recreational values and stakeholders were represented in this review. It was noted that many recreational users often do not belong to a formal group (which was the focus of the stakeholder engagement in this study). In addition, many recreational users of Otago's lakes do not reside within the region, and therefore their views may not be represented by the Otago-based groups contacted for this study.

Community Groups

Participants from both workshops agreed that community groups play an important role in lakes management and suggested highlighting this further in the recommendations.

Iwi Engagement

Participants from both workshops emphasised that any outcomes from this review needed to be progressed in collaboration with mana whenua. While representatives from both Aukaha and Te Ao Marama indicated that their preference was to rely in the existing methods for engagement that have been established and therefore did not provide specific input to this study (discussed further above in Section 5.3), engagement with mana whenua will be essential in implementing the concept of Te Mana o te Wai in any future management efforts. A resulting strategy (should the recommendations of this report be adopted) will need to be developed in partnership with mana whenua.

Strategy Recommendation

Views on the recommendation for a lakes strategic plan were varied but generally positive – while many supported this concept in some form, others cautioned a risk of repetition of processes already underway through the LWRP and CAP development. A participant noted that lakes are part of a wider system and should be considered in that context in accordance with the concept of Te Mana o te Wai, and that much of the suggested content of the strategy (Recommendation 1.1) could be included in either the LWRP policies and rules, or in the CAPs. Other participants felt that relying solely on the LWRP to address lakes management runs the risk of repeating past mistakes, with no knowledge gained or retained about Otago's lakes. A strategy would be beneficial if it could address the urgency required to address lakes management in a way that other regulatory processes (like the LWRP) cannot.

Overall, most participants agreed with the content of the strategy, but had different views under which document each component should sit.

6. Values

Values for freshwater have been well established for the Otago Region with extensive consultation occurring over recent years through a variety of processes. These processes include work led by ORC through regulatory procedures, including the development of the new Regional Policy Statement, changes to the existing Regional Plan Water for Otago, and the new Land and Water Regional Plan currently under development. ORC has also led catchment-specific consultation in areas where site specific priority projects are underway, like Lake Tuakitoto and Tomahawk Lagoon.

Other community groups have initiated their own consultation processes to identify freshwater values, generally extending beyond lakes to all water bodies in their areas of interest. Community groups like WAI Wānaka, Shaping our Future and Lake Dunstan Charitable Trust have produced detailed reports of catchment values for the Upper Clutha, Dunstan and Whakatipu catchments.

Mātauraka Māori values have also been collated through a number of sources, including the proposed RPS and associated submissions by rūnaka groups and representatives, cultural values statements and iwi planning documents.

Finally, the online survey conducted as part of this work asked respondents whether there were any values they felt were often overlooked or understated.

The information provided in these sources is collated in the sections below.

6.1 Otago Regional Council

Over recent years, extensive consultation has been led by ORC regarding values associated with the region's waterbodies. This has been initiated through the development of new planning documents such as the Otago Regional Policy Statement (notified in 2021) and Land and Water Regional Plan (currently under development and due for notification in late 2023), the introduction of the new National Policy Statement for Freshwater Management (2020), plan changes for the Regional Water Plan and strategies for the replacement of expiring deemed permits in certain catchments. Overall, lakes are highly valued by Otago's communities for many (sometimes competing) purposes and reasons.

6.1.1 Regional Policy Statement Consultation 2020

As part of the review of ORC's planning framework in November 2019, a new Regional Policy Statement was prepared, with community consultation undertaken from February 2020 to inform the early stages of policy development. Stakeholders were consulted about the natural and physical resources which they valued, and those which they were concerned about. Through a series of public surveys and workshops a set of values, concerns and issue statements were developed for the region.

The values identified extended beyond lakes and freshwater to all natural and physical resources in Otago. However, nearly all of the most commonly identified values related (either directly or indirectly) to lakes. These are summarised below:

- **Healthy Lakes and Rivers**
  - This encompasses both quality and quantity of water available to Otago's communities. Value was placed on the accessibility of these resources for recreation, and the health of native flora and fauna associated with them.
- **Landscapes**
  - The distinct and diverse natural landscapes within Otago were acknowledged, and value was placed on the unique accessibility Otago's communities have to these landscapes. While not mentioned specifically in the summary report, lakes form a key feature of the landscape in Otago, particularly when viewed within a wider mountainscape or open grassland.
- **Access to the Natural Environment**
  - Otago's communities value accessing healthy lakes and rivers and unique landscapes. Lakes are highly valued for both recreation and economic benefits.
- **Biodiversity**
  - Healthy and thriving native flora and fauna were valued by respondents. This was linked to valuing conservation efforts and pest control.

The most commonly identified concern through this process was water health and degradation of water quality. Other concerns included activities in the catchment that have direct and indirect impacts on lakes, such as agricultural practices, pollution and waste and residential growth. Invasive flora and fauna were another key concern, including aquatic pests and their impacts on water quality (ORC, 2020).

6.1.2 Regional Policy Statement Long Term Visions for Freshwater 2020

In September 2020, following the release of Central Government's Essential Freshwater reforms, a new requirement was introduced through the NPSFM that obligated regional councils to develop long term freshwater visions for each FMU (or parts of those FMUs if appropriate). These visions need to be included as objectives in the RPS.

Feedback was sought from the community on concerns, issues and values which in turn informed the creation of long term aspirations for each FMU or Rohe.

Many of the FMUs and Rohes shared similar aspirations for freshwater, listed below (ORC, 2021c):

- Thriving habitats, supporting rich biodiversity (particularly native aquatic and avian species)
- Maintenance of the unique natural character of the area
- Water that is safe for swimming, drinking, fishing and mahika kai

- Management responsibilities and opportunities are shared across water users, and partnerships between communities and ORC are promoted
- Accessibility to freshwater for drinking, recreation and mahika kai is maintained.
- The management of water resources takes an intergenerational view – ensuring future generations are not disadvantaged by current management
- Communities have access to high quality monitoring information and education on the state of freshwater (usually through ORC)

Some FMUs/Rohes displayed aspirations specific to their geographic region. For example, communities in Roxburgh, Lower Clutha, Taieri and Dunedin & Coast identified the importance of stable and reliable hydroelectricity generation. Communities with larger proportions of rural land use valued efficient and sustainable irrigation and recognised the importance of water for food production. The importance of freshwater in attracting tourism was specifically identified in the Dunstan Rohe.

Issues specific to certain FMUs and Rohes also were indirectly referenced in their aspirations. In the Taieri FMU, water quality free of grey and black water discharges was specifically identified, as was water free of sediment for recreational and economic uses in the Roxburgh Rohe.

These aspirations, values and issues have been reflected in the Freshwater Visions identified in the Proposed Regional Policy Statement (2021), Section LF-VM.

6.1.3 Land and Water Regional Plan Development Consultation 2021

In late 2021, ORC begun consultation on a new Land and Water Regional Plan. Consultation aimed to identify what Otago communities valued about the region's waterbodies and inform the setting of environmental outcomes for these values.

A series of online and in person community meetings were held, as well as online and paper surveys. The values consulted on were similar across all FMUs/Rohe, with communities identifying which values they held in higher regard, and what attributes they associated with those values. The values identified through this process are outlined below:

- Swimming and water recreation
- Fishing
- Non-contact recreation (e.g. walking, picnicking, sightseeing)
- Aquatic species
- Threatened species
- Habitat
- Ecosystem function and processes
- Water Quality
- Lake levels, flow regimes and river behaviour

- Natural Character
- Water use
- Wetlands
- Groundwater

The Manuherekia Rohe did not complete this process, as it was already undergoing its own pre-existing comprehensive process to develop a management regime for that catchment. Values identified for the Manuherekia Rohe were generally similar to those above, except for the specific mention of the following values:

- Drinking water supply, irrigation and stockwater
- Heritage
- Tourism
- Wahi tupuna
- Mahika kai

6.2 Community Values

6.2.1 Whakatipu Water Report 2020/2021 and Upper Clutha Freshwater Taskforce Report 2019 (Shaping our Future)

In 2018, Shaping Our Future held public forums in Queenstown and Wānaka on the topic of freshwater in the Queenstown Lakes District. Over 220 responses were gathered through the public form and online submissions across the district. In addition, over 800 primary and secondary school pupils shared their views on the challenges, priorities, and ideal future of freshwater.

Values identified through this consultation process are summarised below:

- **Water Quality** – Water is safe to swim, drink and harvest from, and accessibility is maintained. Runoff is reduced and water is recycled. Diversity is high, and quality improves over time.
- **Water Quantity** – Water takes are managed with the environment as the priority. Water use is reduced and quality is maintained to meet demand.
- **Ecology** – Waterways are healthy and resilient and support biodiversity. Biosecurity issues (e.g. Lake Snow, Didymo) are resolved.
- **Strategic Management** – Water is managed collaboratively. Developments are planned and executed with minimal impacts and catchments are protected. Water is recognised for its scenic values and benefits to the district.
- **Community Culture** – Water is valued and respected by the community, and all users contribute to costs of improving freshwater. A balance is achieved between competing users and recreation is possible without fear of contamination.

- **Research and Monitoring** – Freshwater quality and quantity is continuously monitored, and results are acted upon and remediated.

Shaping our Future subsequently formed the Upper Clutha Freshwater Taskforce and the Queenstown Freshwater Taskforce with representatives from local community interest groups and residents who are interested in a sustainable and healthy future for freshwater.

Through these groups, visions for each catchment area were developed. These visions are shown in the table below:

Table 13: Shaping Our Future Community Visions

Whakatipu Community Vision (Shaping our Future, 2021a)	**All water:** • Supports and sustains life and well-being • Is resilient • Can exist in its natural state **The community:** • Are consciously and actively engaged with, responsible for and proud of our water • Benefits from it – well-being, access, recreation, health and scenic beauty, economic • Conserves, protects, respects the water • Review, reflect and respond to what the water needs
Upper Clutha Community Vision (Shaping our Future, 2019)	**Pure Water** – The water in our waterways is naturally swimmable, drinkable, renewable and healthy. We value the availability of water, its ecosystem services, and use it wisely to have little or no impact on the natural state of our waterways through urban or rural, recreational or commercial activities. Pure water also relates to the aesthetics of our waterways, the enjoyment and economic benefits for both residents and visitors. **Healthy Eco-system** – A diverse and species-rich eco-system which has good biological functionality, no species life-cycle impairment, no new invasive organisms and is one in which existing invasive species are managed or eradicated. Migratory species populations are restored and maintained (e.g. longfin eels). A healthy eco-system is safe for swimming and contact recreation, with high indigenous aquatic biodiversity. The waterways' natural flows and wetlands are restored and the waterways are resilient to natural changes and climate change. Land use that is consistent with the local climate, soils, water resources, ecosystems and therefore enduring and sustainable over centuries/generations. **Engaged Community** – Our people, community groups, landowners, business owners and agencies are educated and aware of the importance and value of our waterways. The community takes an active and collaborative approach to advocacy, leadership and strategic management of our waterways, with everyone understanding the issues and working together to secure the best possible outcomes for future generations.

6.2.2 Upper Clutha Community Catchment Plan (WAI Wānaka)

Through the development of a Community Catchment Plan for Upper Clutha by WAI Wānaka, catchment values and visions were collated from a number of sources, including several of the processes listed above. In addition to this, WAI Wānaka (Then the Upper Clutha Trust) conducted an online survey and series of workshops to gauge community views in the Upper Clutha Catchment (Perkins *et al.,* 2019). The results of this showed that Upper Clutha residents and visitors place a high value on local waterways for a range of reasons, including:

- Safe for swimming
- Drinkable water
- Biodiversity & healthy native ecosystems
- Water clarity
- Safe for wading & other water sports
- Control of invasive species
- Healthy fisheries
- Landscape/amenity values
- Natural (or near natural) water flow regimes
- Mauri/inherent value of waterways (and other similar cultural values)

6.2.3 Hāwea Community Visioning Forum Report 13 November 2021 (Shaping our Future)

A workshop was held with the Hāwea community in November 2021, with the local community asked to express their views on priority issues, values and visions. Workshop attendees listed values that represent what Hāwea means to them. In the workshop, natural character, biodiversity and recreational values common themes in the feedback. The value of the "open, unspoiled lake front" and Hāwea as a "gateway to activities" were also mentioned, indicating the importance of the presence of the lake to those that live around it. Following the workshop, an online survey further teased out values, issues and aspirations for the community. Some of the most common values attributed to the Hāwea area/community were related (either directly or indirectly) to the presence of the lake in the environment. Nature and scenery featured heavily, with respondents using descriptors such as "natural beauty", "pristine", and "unspoilt". "Lake" was listed by many of the respondents, as well as recreational opportunities (Shaping our Future, 2021b).

6.2.4 Delivering a Long-Term Vision for Lake Dunstan (Shaping our Future, Lake Dunstan Charitable Trust)

In 2020, Lake Dunstan Charitable Trust received funding, through Toitū te Whenua Land Information New Zealand, for a project under Central Government's Jobs for Nature programme. The project included elements to produce a community engagement plan, develop a vision around the potential future for the lake. Between January and July 2022, Shaping our Future were contracted to undertake long term community visioning work

for the Lake Dunstan Charitable Trust. A combination of face to face and online engagement processes captured input from over 350 members of the public and built on the findings of a survey of 250 people previously undertaken by the Trust. The findings produced a number of issues, value statements and descriptors of long term success, which were then prioritised by members of the public using an online engagement platform.

Community members were asked what they valued about Lake Dunstan, and the responses were generally in keeping with values that have been identified through other processes. People highly valued the lake for clean water, the native species it supports, accessibility, tranquillity and the open views of the landscape it provides. Recreational use of the lake was also highly valued, for both on water and adjacent activities such as the trails, tracks and picnic areas around it. The importance of the lake for both physical health and mental well-being was recognised through the survey results.

Other values identified were more polarizing in the respondents. Values such as a commercial uses of the lake, freedom camping and the use of the lake for motorised activities generated a higher level of conflict in the responses and were generally ranked lower than other values posed by the survey (Shaping our Future, 2022).

6.3 Stakeholder Consultation Feedback

The online survey conducted as part of this work asked respondents:

> *"There has been a lot of work done in Otago to understand values that the community holds with regard to freshwater. Are there any values you think are often understated or overlooked when it comes to Otago's Lakes?"*

Respondents were given the option to select values from a list or describe their own. Results from this question are shown in Figure 23, below. The most commonly selected option was ecological values (22 selections), followed by healthy fisheries, safe for swimming, wading and other contact recreations (both 21 selections) and water quality (20 selections). "Transport corridor" and "native species" were both added by respondents and subsequently received the lowest selections. Of the original list, navigational safety, tourism and commercial uses and power generation received the lowest number of selections.

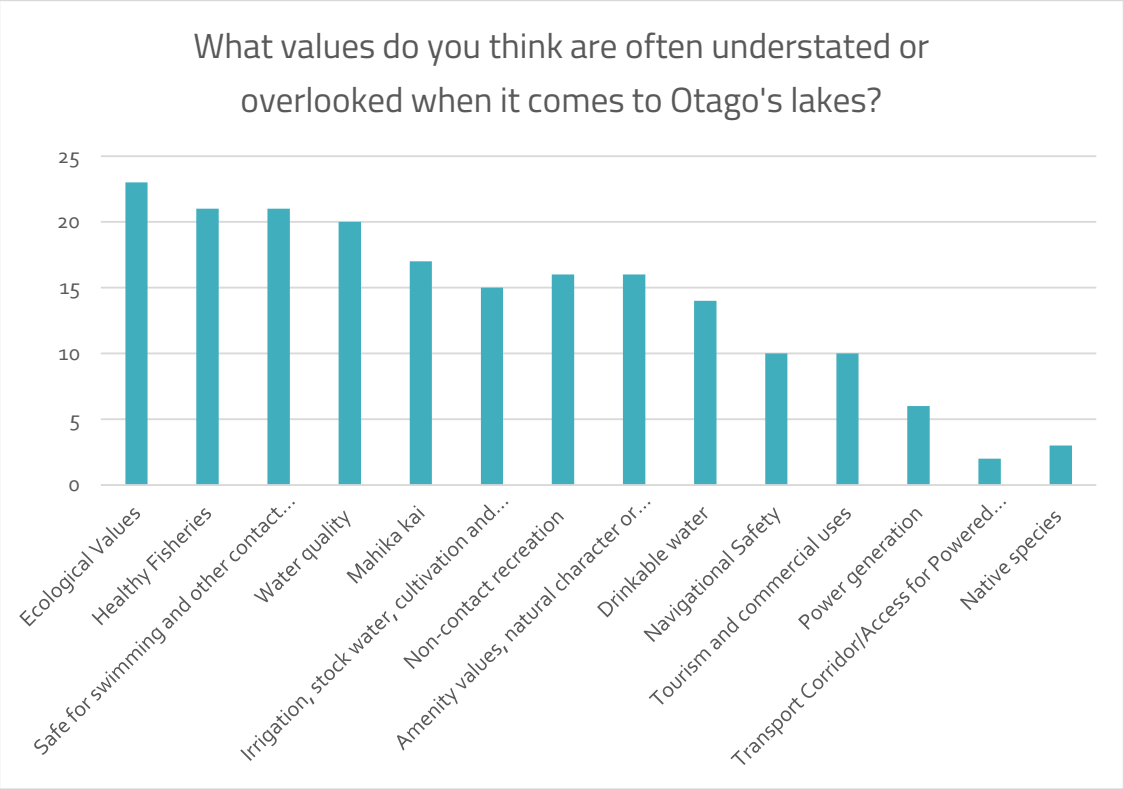

Figure 23: Responses from the online survey relating to values

Other responses included the restorative value and stress reduction capacity of lakes, value of the lakes for game bird hunting, flood protection/mitigation, and their historic value. Several comments highlighted that many of Otago's lakes are manmade, and the current recreational uses of those lakes has overtaken the original purpose (usually irrigation or power generation).

Some survey respondents commented on the consultation process itself, noting that *"Many ORC 'values' consultations have been held with the community. The outcomes seem to be the production of maps with dots, more plans but little or no action to research, manage or protect these values."* The responses stressed the importance of values information collected and using this information to improve management in the region.

Stakeholders commented that values identified through recent consultation processes generally focus on what's visible. Swimming, water quality and natural character are commonly identified, while 'intangible' values like ecosystem processes were less likely to be identified. Similarly, there is a growing awareness of Māori cultural values, which have historically not been well understood, and the role lakes play in the mitigation of natural hazards such as the buffering of floodwaters.

Several stakeholders expressed that values should be quantified (to the extent possible). Lakes are the region's "natural capital" and have real value. To illustrate this, one stakeholder pointed to the difference in price people are willing to pay for a section with a lake view, versus one without.

6.4 Takata Whenua Values

For Māori, water is the essence of all life and is a taoka (treasure) left by ancestors. It is for the present generation to ensure that the taoka is available for future generations in as good as, if not better quality (Te Rūnanga o Ngāi Tahu, 1999). Water has the spiritual qualities of mauri (lifeforce) and wairua (spirit), and the continued well-being of these is dependent on the physical health of the water (Ngāi Tahu ki Murihiku, 2008).

Water plays a significant role in the spiritual beliefs and cultural traditions of mana whenua, and the condition of water is seen as a reflection of the health of Papatūānuku (Earth mother). Effects on water quality have a cumulative effect on mahika kai and other resources.

The lakes of Otago are a significant feature of the region. Many traditional stories talk of lakes and their importance. For example, the great lakes are traditionally known as Ka Puna Karikari o Rākaihautū, the pools dug by Rākaihautū, the first known mortal person to explore the lands of Te Waipounamu (the South Island) (Kāi Tahu ki Otago, 2005).

Historically, lakes have provided Māori a multitude of ara tāwhito (traditional travel routes), mahika kai resources, and other cultural materials.

The following is an excerpt from written feedback provided by Aukaha on behalf of Kāi Tahu ki Otago:

> *"Kāi Tahu have a whakapapa relationship with wai māori, and there are mana whenua interests and kaitiaki obligations that arise from this in relation to all natural lakes.*
>
> *An understanding that all parts of the environment are interconnected is an important part of Kāi Tahu values and beliefs regarding wai māori (freshwater). The interconnectedness between all parts of the natural world acts to sustain life and life forms in a myriad of ways and requires reciprocal respect and care. The lakes form an integral part of the interconnections of Otago's waters from the mountains to the sea, and their management needs to recognise this.*
>
> *Otago's lakes have a significant place in Kāi Tahu creation traditions, history and cultural practices. Historically, they supported permanent and seasonal settlements and plentiful mahika kai, and with the rivers and associated lands, formed part of broader wāhi tūpuna networks. The ability to retain and pass on knowledge of these values is of continuing importance to Kāi Tahu cultural identity."*

7. Discussion

7.1 Pressure – State – Impact Framework

The Pressure-State-Impact (PSI) framework has been adopted for this review as it gives a good structure on which to describe what is happening within the study catchment. The Ministry for the Environment (MfE) and Statistics New Zealand both use the PSI framework for environmental reporting. The PSI framework gives more information on human activities and environmental effects than simply reporting on current state of the environment alone (Larned *et al.*, 2018). MfE commissioned NIWA to produce the report "Land-use impacts on freshwater and marine environments in New Zealand" that was released in June 2018 (authored by Larned *et al.*, 2018). This report for MfE provides a national level analysis of the research that has been completed in the New Zealand freshwater and marine context with regard to the relationships between land use pressures that influence changes in environmental state, and that in turn, have impacts on ecological, social, cultural and economic values (Larned *et al.*, 2018). Larned *et al.* (2018) identified three major classes of pressure variables that are at play in PSI relationships: land cover, land classes, and land management practices. For this review we have also included some additional pressure variables such as climate change, population growth, and tourism growth that were not included in their study.

This review uses this same basic PSI framework as the NIWA study but obviously with a focus on Otago lakes.

Table 14: Pressure-State-Impact Framework and Information Gaps for Otago's Lakes

Lake category	Pressure/state/impact comments	Research and Information gaps	Ref.
All lakes	All lakes in Otago have the potential to be affected by climate change, and by invasive species. In the case of climate change, the effects are likely to be the greatest on shallower lakes, most notably the remote high-altitude lakes (RHAL; due to their location where the greatest temperature changes are projected) and coastal and lowland lakes (CLL; due to their proximity to the coast and vulnerability to sea level rise). Various invasive species are already established in lakes across Otago, ranging from exotic fish such as perch to pest plants and micro-organisms such as lagarosiphon and didymo. Vigilance is needed to prevent (or failing that, manage), further arrivals of pest species, or their spread to other Otago lakes. It is possible that pest species present further north in New Zealand may range-shift south or to higher altitudes as temperatures increase.	ORC has already commissioned two reports on the likely effects of climate change specifically on Otago (see Section 3.2). While climate change impacts will be felt region-wide, as noted the RHAL and CLL appear likely to be particularly vulnerable. It will be important to establish monitoring programmes (where they do not already exist) to give clarity about the baseline state of these lakes with respect to relevant variables, and enable changes to be identified. In particular: • As noted in Section 3.4, there is very limited information on water quality and ecology in the RHAL, which will make identifying any future adverse climate-change related impacts on these lakes difficult. • For lakes and lagoons close to sea level and potentially vulnerable to increased salt water intrusion due to sea level rise, appropriate water level and salinity/conductivity monitoring equipment/programmes should be established as a priority. • For both groups of lakes, species and ecosystems particularly vulnerable to increasing temperature and/or salinity should be identified, and plans should be made to protect them as required.	R1

Lake category	Pressure/state/impact comments	Research and Information gaps	Ref.
		Information is available on pest species present in Otago from ORC's Pest Hub web page and a variety of other sources. However, there may be a benefit to providing this information in a more co-ordinated way, such as by producing a regular pest management report similar to the state of the environment reports produced on water quality and other issues.	R2
		Research into the causes and potential controls for Lindavia intermedia needs to continue.	R3
		Unlike other aquatic pests, *Lagarosiphon* in Lake Dunstan, Lake Wānaka and Lake Whakatipu is managed primarily by LINZ. Collaboration between LINZ, ORC and other agencies involved in Lagarosiphon management is generally very good, and it is important that this high standard of communication and co-ordination continues for such key tasks.	R4
		It is important that ORC staff have a clear understanding of land use patterns and land use change in all lake catchments to prioritise potentially vulnerable lakes for monitoring and/or management. This could be done by using GIS to overlay lake catchments with land cover data base (LCDB) layers, potentially supplemented by use of aerial and/or satellite imagery.	R5
Deep water lakes	Overall, water quality in the DWL is very good; the best of the regularly monitored lakes discussed in this report. However, there is conflicting information on the trends in water quality and ongoing vigilance is needed to ensure that	While this group of lakes is perhaps the best studied in Otago overall (with the possible exception of Lake Hayes), there remain some data gaps. Sampling sites tend to be clustered close to developed areas (though we understand some monitoring in the more remote northern reaches of these lakes has been	R6

Lake category	Pressure/state/impact comments	Research and Information gaps	Ref.
	any degradation is identified early so that appropriate management steps can be taken. The main pressure affecting these lakes is increasing human activity (both from tourism and general population growth) in their catchments. Urban development of Queenstown and Wānaka (and associated discharges of stormwater and other contaminant sources) is probably the primary concern here, although agricultural intensification is also occurring in some areas near these lakes. Stormwater discharges to large water bodies such as Lakes Wānaka and Whakatipu are unlikely to result in meaningful increases in heavy metals and other contaminants throughout the lake (particularly given that the primary urban centres near each lake are relatively close to the outlets). However, it is possible that concerning concentrations of stormwater contaminants could develop locally.	undertaken, but not yet reported). Focussing monitoring near occupied areas is understandable for practical reasons and also in terms of potential effects on human health from water-based recreation. However, given the size of these lakes, the existing dataset may not be representative (or at least not fully representative) of the overall state – for example if agricultural activities distant from towns are having impacts.	
		Related to this, there appears to be little information on mixing patterns within the lake. We understand that WAI Wānaka has commissioned research on this using 'drifters' on Lake Wānaka.	R7
		There is limited data on thermal stratification and deep-water quality in these lakes. This is one area where direct climate change impacts on these lakes may be significant. We understand that ORC's ongoing monitoring buoy programme is designed in part to address this.	R8
		The suite of contaminants tested for in lake water samples is mostly focused on contaminants commonly resulting from agricultural discharges (i.e. nutrients and pathogens). These are important, but in the case of Lakes Wānaka and Whakatipu particularly, the lack of regular monitoring for contaminants such as heavy metals and hydrocarbons near urban stormwater discharge points is a concern.	R9

Lake category	Pressure/state/impact comments	Research and Information gaps	Ref.
	The great size and depth of these lakes is likely to increase their resilience to direct climate change impacts. However, hydrological changes in their upper catchments may have greater effects, for example increased sedimentation near tributaries. The deep water lakes have been affected by invasive species (e.g. Lake Snow and didymo), and further incursions are possible.	Ongoing monitoring and management of invasive species established in these lakes will be needed. Additionally, invasive species at risk of establishing in these and other Otago lakes should be proactively identified, and monitoring and preventative measures put in place where possible.	R10
		There would be a benefit to nutrient budgeting and modelling of other contaminant sources (e.g. stormwater) to these lakes to identify whether current and reasonably foreseeable future land use patterns in the catchments are compatible with the ongoing health of the lake ecosystems, and if not, put preventative management measures in place. As far as is practicable, this should take account of not only land use, but land management (for example, stocking rates in the case of agricultural land uses and traffic movements in the case of stormwater discharges from roads). This recommendation is applicable for most other lake categories too, though perhaps to a lesser extent.	R11
Remote High-Altitude Lakes	Very little is known about the state of these lakes, although given their mostly pristine catchments and limited human activity nearby, they may reasonably be expected to be in something close to their natural state. This is unlikely to change in the foreseeable future, although some lakes may be vulnerable to invasive species brought accidentally by back country users. As discussed above, these lakes may be particularly vulnerable to climate change impacts. In particular, any flora	As noted, there is very limited information on the water quality of ecological state of these lakes. While very good water quality may be reasonably assumed, this is an assumption and confirmation of this with empirical data is needed. The Lakes380 project will address this in part, however we understand that this involves only a single sampling visit from each lake, and therefore will not give information on any seasonal or longer-term trends. As noted above, another concern here is the that the lack of information on the current state of these lakes means that there may be no meaningful baseline against which future impacts of climate change or other stressors can be measured.	R12

Lake category	Pressure/state/impact comments	Research and Information gaps	Ref.
	and fauna which are peculiarly adapted to the cold climate these alpine lakes experience may struggle to adapt to warming conditions, and some pest species may range-shift southwards and/or to higher altitudes.	Any species/ecosystems in or dependent on these lakes which are adapted to very cold alpine climates (and therefore potentially very vulnerable to increasing temperatures) should be identified and prioritised for conservation management.	R13
Accessible High-Altitude Lakes	Lakes Hayes and Johnson are both significantly impacted by elevated nutrient concentrations that have caused eutrophication. There is some evidence that ongoing management issues are resulting in improvement, at least in the case of Lake Hayes. However, restoration of these lakes is likely to take a very long time and will require active efforts to minimise nutrient inputs, among other measures. Very little information is available on the other lakes in this group. However, some are within catchments partially occupied by agriculture and/or housing and may be vulnerable to similar issues to those which affected Lakes Hayes and Johnson (though probably to a lesser extent). Blue Lake was found in one study to have elevated concentrations of heavy metals (inferred to be from acidic groundwater associated with historical mining). While not confirmed, if the inferred cause is correct, ongoing increases in contaminant concentrations would be expected.	Lake Hayes has been thoroughly studied, which is justified given its prominent location and significant water quality issues. Ongoing research to identify water quality improvement measures, and assess their effectiveness once implemented, is warranted.	R14
		Lake Johnson has similar issues, and research into the applicability to Lake Johnson of research and management proposals relating to Lake Hayes would be beneficial.	R15
		Further research on heavy metal inputs to and concentrations in Blue Lake is needed to confirm if concentrations are indeed increasing, and if so, what effects this may have on the lake ecosystem and/or human health.	R16
		Again, nutrient budgeting/input modelling may assist in the management of these lakes, by identifying what interventions will have the greatest impact in remediating degraded lakes, as well as identifying lakes potentially vulnerable to degradation and enabling preventative management.	R17

Lake category	Pressure/state/impact comments	Research and Information gaps	Ref.
Dams and Reservoirs	Because these dams and lakes are in a wide variety of settings, they are subject to different pressures. Lake Dunstan is perhaps the best-studied lake in this group (disregarding the intensive investigations of Lake Onslow which are underway, but for the most part currently unpublished). Lake Dunstan has well-publicised issues with sedimentation and aquatic pests (*Lagarosiphon*). Most of these lakes are also potentially vulnerable to the same issues as lakes in other categories, to differing extents. For example, stormwater discharges to Lake Dunstan may become of concern as Cromwell grows, while many DR are in agricultural or horticultural catchments and may be affected to a lesser or greater degree by nutrients and other related inputs.	It is important that monitoring of lake water quality and ecology is holistic and coordinated. This includes taking into account and reporting on lake-specific issues where required (e.g. sedimentation and *Lagarosiphon* in Lake Dunstan), and making the best use possible of data available from non-ORC sources (such as information available from consent applications and compliance monitoring for dam consents) to inform additional monitoring and management requirements. While these comments are true to some extent for all lakes, they are particularly pertinent to dams and reservoirs where at least one entity other than ORC almost always has a significant influence on lake management (and also often holds relevant monitoring data).	R18
		Lake Roxburgh is arguably the most significant lake in Otago which is not covered by regular state of the environment monitoring. That said, it is acknowledged that water quality in Lake Roxburgh can be inferred to some extent from other Clutha/Mata-Au catchment water quality data.	R19
Coastal and Lowland Lakes	Many of these lakes are already in a degraded condition, owing in large part to their position low in catchments,	As noted above, appropriate water level and salinity/conductivity monitoring should be established for lakes vulnerable to sea level rise effects, where this is not in place already.	R20

Lake category	Pressure/state/impact comments	Research and Information gaps	Ref.
	downstream of various human activities. Often they are shallow and therefore vulnerable to both sediment (which can be readily resuspended by wind and waves) and temperature increases due to climate change. Some of these lakes are tidally influenced and subject to saline intrusion from time to time. As noted above, the intensity of these phenomena is expected to increase in the coming decades due to sea level rise.	Ongoing monitoring and management will be needed in degraded lakes to prevent further decline, and restore them as far as is possible.	R21

8. Conclusions and Recommendations

Through this study, a review of the management framework relating to Otago's lakes has been undertaken. Gaps and opportunities for lakes management in the region have emerged through the examination of the existing mechanisms (policy and planning direction) and stakeholder feedback from both those with and without formal roles in lakes management. These are further described in this section and catalogued in Table 17 below.

Lakes are clearly highly valued by residents and visitors to Otago alike, for many (sometimes competing) reasons. They form a key component of the region's identity and many stakeholders including ORC staff spoke passionately about the importance of these waterbodies. All agreed that lakes are important and warrant our attention and protection but opinions on what exactly should be done varied between stakeholders. Feedback generally centred around four themes:

- There is a deficiency in our knowledge and understanding of lakes
- There is currently no specific management for lakes via a planning or regulatory framework, at both an individual lake scale and catchment scale
- Collaboration and coordination between agencies is generally good at an individual level, but lacking at a strategic or overall level
- Identified 'degraded' lakes have been the focus of restoration efforts lately, but the protection of lakes still in good shape also needs to be prioritised.

Completing or enhancing efforts in these areas will contribute to an evidence based, holistic management regime (Figure 24).

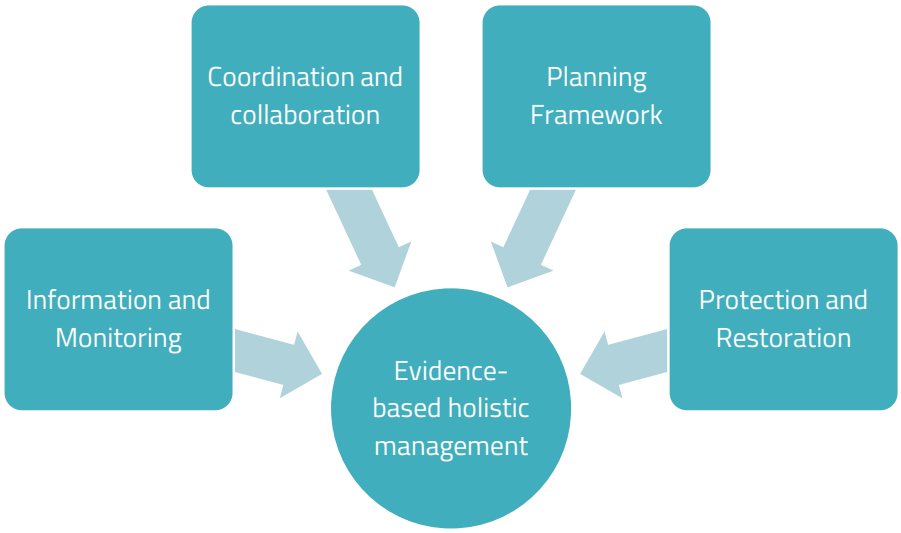

Figure 24: Gaps in the ORC Lakes management framework

Any management needs to be underpinned by robust and sound scientific knowledge. The Otago community has been consistent in expressing qualitatively their concerns, values and aspirations for the region's lakes, but this alone will not ensure they are managed appropriately. Data collection, research and modelling are essential to good lakes management, to ensure we understand how to protect lakes from degradation, enhance ecosystem health, manage invasive species and mitigate water quality effects. This needs to be on a scale sufficient to support evidence-based lake and catchment decisions. The literature review and stakeholder consultation completed for this report highlighted a number of gaps in the understanding of Otago's lakes. These gaps are presented in Table 14 above, with recommendations for research and monitoring where appropriate outlined in Table 17.

Direction for lakes management is provided through various higher order documents that form the regulatory framework. Section 3 of this report highlights the sheer number of documents relating to lakes management (either directly or indirectly) and this is unlikely to be an exhaustive list. Also obvious from this study were the number of stakeholder groups with an interest in lakes management, both those with formal management delegations or roles (such as councils, DOC and Toitu te Whenua LINZ), those who manage lakes via direction provided by resource consents (such as electricity generators and irrigators), those with informal or voluntary roles (such as catchment groups and community associations) and those who are affected by the way lakes are managed (recreation groups and residents associations). There is no one document or group guiding lakes management in the region, and aside from RMA processes such as the recent Otago RPS, this study has not identified a forum that brings these groups together to proactively address lakes management.

The most widely acknowledged gap in lakes management in Otago is the absence of a planning framework that addresses these waterbodies specifically. Lakes have not been addressed in the Regional Plan Water to the same extent that groundwater, rivers and wetlands have been. This has led to a case by case approach when it comes to decision making and a little consideration given to 'whole of lake' implications. Compounding this is an absence of comprehensive baseline data for many lakes around the region, leading to the assumption that some lakes are in good condition and focussing council's attention to the known degraded lakes, such as Lake Hayes, Lake Tuakitoto and Tomahawk Lagoon. This is not a criticism of ORC, as there is definite merit in the current efforts to restore degraded waterbodies. However, the region is blessed with many lakes that are still in good condition; this needs to be supported through monitoring and management at a catchment level to ensure they remain this way. At the most simplistic level, Council does not have the resources to restore every lake in the region if they become degraded. The return on investment is much greater if they are prevented from becoming that way in the first place. New management tools under development by ORC such as the new Land and Water Regional Plan have the potential to provide one component of a robust management framework for the region, but the missing pieces of the current regime need to be addressed in order to ensure they are not carried over to the new framework.

Any planning framework for the region's lakes needs to be complemented by non-regulatory measures, such as an integrated catchment management programme. Until recently, integrated catchment management has

not formed part of the Otago framework. The ORC is making great strides in this area. The current programme, while in its infancy, has the potential to supplement the new Land and Water Regional Plan through a range of non-regulatory measures. However, there is a risk that this programme, currently proposed at an FMU or Rohe level, may be at too large a scale to fully address management of some of the region's lakes. In such large geographic areas, lakes could get lost in the mix of other surface and groundwater bodies, while in others, this scale might be appropriate. The Upper Lakes Rohe is an example where Rohe-level lakes management is considered appropriate as the boundaries of the Rohe capture the catchments of all three Deepwater lakes which have similar pressures, information gaps and management requirements. On the other hand, the Dunstan Rohe includes both Lake Dunstan and Lake Hayes, two lakes facing very different pressures and with very different management regimes. As another example, the Taieri FMU includes Loganburn Reservoir, used for storing water for electricity generation and irrigation, the Sutton Salt Lake, a rare ecosystem unique in the region, Lakes Waipori and Waihola which are at the bottom of the catchment and facing many cross-boundary issues. Management of these lakes at such a large geographic scale risks not addressing the specific issues faced by these lakes.

While it is important to look at the system as a whole, lakes are unique in their features, dynamics and pressures and require particular attention that may not be applicable to other bodies. In the same vein, lakes are often managed by several different agencies. Any integrated catchment management programme needs to ensure that collaboration between the various groups and agencies is enabled and encouraged. Many stakeholder groups fed back that while they thought they worked well with the other agencies that they are directly involved with, there are many others that they have no interactions with. Underpinning this is a perceived absence of oversight from ORC. As one stakeholder commented: *"Lakes are a complex space, with lots of competing interests, but there is no oversight of overall management".* ORC is well placed to provide this coordination as they are the common thread between a very diverse group. The tools that are in development (Catchment Action Plans and the Land and Water Regional Plan) could be instrumental in assisting with this – if the opportunity is taken.

The diversity across the groups with an interest in lakes management is significant. There are the regulatory bodies, takata whenua, non-governmental organisations, companies, community groups and individuals. Ensuring that all of these groups' aspirations, needs and opinions are taken into consideration is central to good lakes management. Many stakeholders fed back strongly that recent consultations from ORC have been repetitive and that the feedback provided in the past has not been used to inform future projects. Stakeholders approached for this study often commented that they had previously (and recently) been approached by ORC or consultants acting on behalf of ORC about similar matters and expressed frustration at being asked about the same questions or topics. In addition to ORC led consultations, many community groups have led their own consultations recently. There is overlap in the information sought that may not have been passed on to the next project. This can disengage the community and hinder effective consultation in the future. Opportunities exist for significant savings in time and effort in consultation and the ability for ORC to really drill down into key issues and topics instead of receiving the same high-level information each

time.

Another concern raised by many groups that span the region is the lack of an appropriate forum for them to give input into issues and options for lakes management, such as via the recent RPS process. ORC consultation has been extensive, with public meetings held around the region to establish freshwater values for each FMU and take feedback on the community's concerns and aspirations for freshwater management. However, public meetings are not always appropriate for some groups to provide feedback or to air the issues they face, such as DOC who are non-political but have a mandated advocacy role, or electricity generators, who are heavily constrained by technical and safety considerations but have a functional need to be located where they are and play an essential role in the region's contribution to electricity generation. These groups have real concerns that their issues will not be addressed in the upcoming LWRP process.

The management gaps identified through this stocktake are further detailed in Table 15. Gaps have been attributed a reference and corresponding recommendations for addressing the gap linking back to this reference number.

Table 15: Identified Management Gaps

Ref	Topic	Identified Gap
M1	Collaboration	Coordination on an agency-to-agency level is generally good, however with multiple players in the lakes management role there is no one agency with principal oversight that can provide coordination between all involved. Current coordination tends to be issue or location specific.
M2	Collaboration	Outside of formal RMA processes, information sharing between agencies involved in lakes management is inconsistent or ad-hoc. There isn't a forum for information sharing and feedback gathering for these agencies involved in lakes management
M3	Collaboration	Many catchment or community groups expressed a desire for additional ORC involvement on a consistent basis. Many reported short-lived or inconsistent involvement from ORC with catchment or community groups. The Guardians of Lake Wānaka reported that despite extending an invitation for ORC to attend their meetings, this is not occurring on a regular basis.
M4	Management	There is no planning framework that addresses lakes management specifically. This has led to a case by case approach when it comes to decision making and little consideration able to be given to 'whole of lake' implications. Specifically, the current framework does not specify: - Minimum levels and allocation limits for lakes in Otago. This may not be necessary for every lake. - Water quality load limits (e.g. nutrients) for lake catchments - Cumulative land use management for lake catchments
M5	Management	The current framework does not differentiate between lakes that are natural and those that are man made or modified and used for other purposes such as electricity generation or irrigation. These lakes have specific constraints that may

Ref	Topic	Identified Gap
		require alternative management.
M6	Management	The identification and management of degraded lakes in the region is based on available data, which has not been prioritised in any formal way. Given the lack of monitoring in most lakes around the region, it is likely there are other degraded lakes that are not being managed in the same way. A consistent framework for identification and logical prioritisation of efforts for these lakes does not exist.
M7	Management	While there have been efforts to identify and restore degraded lakes, the same focus has not been applied to lakes at risk of degradation to enable active management to prevent degradation.
M8	Management	Community groups around the region have employed great efforts to produce detailed catchment management plans, develop values and visions for their area and undertake monitoring and research at a variety of scales. There is inconsistent recognition and (where appropriate) adoption of the efforts of these groups by ORC.
M9	Management	The current biosecurity programme across Otago is generally well managed, however there are opportunities for better coordination as there are many different initiatives underway by different agencies. Emerging pests and incursion processes are two areas where further efforts may be required.
M10	Management	Currently, ORC does not have an integrated catchment management framework for regulatory and non-regulatory management at an appropriate scale. While this is underway through the ICM programme to develop Catchment Action Plans, it still must be noted as it is likely to be some time before these plans are finalised.
M11	Management	There is a potential gap in the national direction for biodiversity. The NPSFM and NPSIB do not directly address aquatic biodiversity in lakes. Particular care needs to be taken by ORC to ensure this is not missed in the formation of future planning documents. The proposed RPS does include a method (LF-FW-M6) to include environmental flow and level regimes for waterbodies that provide for the needs of aquatic species in the Land and Water Regional Plan, however there is no specific policy direction.
M12	Consultation	ORC's usual methods of consultation on issues relating to lakes, such as the development of freshwater visions and values for each FMU, have generally been directed at the general public with limited ability for organisations to engage, as it is not always appropriate to voice their issues and feedback at public meetings
M13	Consultation	There have been many consultation processes run by ORC over the recent past, and little evidence to suggest that the information from each one has been used to inform the next.
M14	Funding	There is no ability to seed fund projects or groups involved in lakes management outside of the Ecofund. Ecofund supports existing groups who are already established, but does not provide seed capital. It also does not cover maintenance of existing projects, and preference is given to new applicants over previous applicants. There isn't the ability for ORC to identify an area needing funding and encourage or fund a project there. There is potential that existing projects are not maintained. There is a barrier to entry for areas that do not have an active

Ref	Topic	Identified Gap
		community group. Funding can be contestable, but still prioritised.

The primary recommendation of this study is that lakes management in Otago requires overarching guidance and direction to ensure opportunities to provide for connected and holistic management are not missed. The gaps identified in this study, particularly those relating to deficiencies in information and collaboration, are at risk of not being addressed through the processes currently underway. The Catchment Action Plan framework at a Rohe or FMU level could result in inadequate attention being paid to some of the region's more complex or vulnerable lakes as the CAP will cover a broad range of issues over a large geographic area. As evidenced in this study, there is a wealth of information, initiatives and responsibilities relating to lakes, but no one repository for this information. A strategic plan could address these matters, and guide ORC in its decision making and policy direction.

The intent of such a strategy is not to dictate the management of every lake in the region. Rather, the strategy (henceforth referred to as the Otago Lakes Strategy) could provide a place to capture guiding principles and information relating to lakes management that can be used to inform the development of the LWRP or a CAP, such as:

- Identification of stakeholders in lakes management
- A description of roles and responsibilities
- Criteria for prioritising restoration and protection efforts
- Forums for collaboration and public awareness
- Research and monitoring needs and focus areas

As discussed above, this report considers that there is great potential in ORC's Catchment Action Plan initiatives, providing that the lake-specific issues are not lost due to the large geographic scale of these documents. Therefore, it is recommended that the Otago Lakes Strategy provide clear guidance on what waterbodies require particular or bespoke management. For some Rohe or FMU this may not be necessary. For example, the Upper Lakes Rohe is considered to be at a scale appropriate for management of the Deepwater Lakes and their catchments (provided that the Remote High-Alpine Lakes are also adequately considered). However, the lakes within the Taieri FMU are so diverse a single Catchment Action Plan may not adequately address the complex management required across all of the lakes in the FMU.

An Otago Lakes Strategy could set outcomes for Otago's lakes, inform ORC's work programmes through the prioritisation of projects, establish criteria for identifying vulnerable and degraded lakes requiring specific management and establish a framework for collaboration. A strategy could complement the current framework, and provide a pathway to holistic management of these critical waterbodies.

Although there is a significant amount of information available on Otago's lakes (see Section 3.1.2), important data gaps remain, and the information that does exist is present in disparate locations and formats, limiting

its usefulness. In our opinion, there is a need to increase monitoring of lakes in Otago overall. Recommendations to increase the body of information which can be usefully employed in making lake management decisions while working within the likely constraints where possible, have been given below.

Recommendations for lakes management, based on the outcomes of this study, are outlined in Table 17 below. To assist with prioritisation of these recommendations, each has been given a priory rating from 1 to 3, which correspond to a recommended timeframe for implementation. These timeframes are outlined in Table 16.

Table 16: Recommendation priority levels

Priority Rating	Recommended Implementation Timeframe
1	Within the next 12 months
2	Within the next 1 – 2 years
3	Within the next 2 – 5 years

The recommended priority ratings have been suggested to ensure timely adoption of improvements for lakes management. These timeframes reflect the strong feedback received from stakeholders imploring urgent action by ORC on many of the concerns or opportunities identified. The implementation of any of the recommended actions will need to take into account ORC's existing commitments, budgets and workload, and may be worked in with other projects where it is efficient or logical to do so. It is therefore understood that not all recommendations will be able to be implemented within the suggested timeframes.

The recommendations are relatively high level and do not go into detail on individual workstreams required. This would need additional work to scope out a programme for each of the recommendations.

Table 17: Recommendations

#	Recommendation	Priority Rating	Gap
1	**Strategy**		
1.1	Develop an Otago Lakes Strategy for lakes management in Otago, in partnership with key stakeholders and mana whenua, addressing: - Desired outcomes for lakes management in Otago - Guiding principles for how ORC will work in relation to lakes management - Roles and responsibilities for lakes management, including overlapping functions (see Recommendation 1.2) - Forums for collaboration between lake management agencies and other stakeholders (see Recommendation 1.3) - Criteria for identifying and reviewing vulnerable and degraded lakes (see Recommendation 1.4 and 1.5) - Criteria for prioritising projects in these catchments (see Recommendation 1.4 and 1.5) - Identification of lakes that require (sub catchment) specific management (see Recommendation 1.6) - Criteria for alignment of ORC funding (e.g. via the Long Term Plan or the Eco Fund) with management priorities (see Recommendation 1.7) - Prioritisation of monitoring and research efforts, potentially through the creation of a lakes assessment working group (see Recommendations 4.1-4.13) - Actions or efforts required urgently in relation to lakes management, monitoring and research ahead of the development of other tools such as the LWRP and CAPs. This strategy would sit alongside ORC's existing regional strategies, and can be used to guide ORC's activities and provide direction for other agencies or groups involved or interested in lakes management, and the development of other management frameworks such as the LWRP and CAPs.	1	All
1.2	Clearly document roles and responsibilities for lakes management across the region, identifying where there are overlapping functions and interests, and open channels for communication and collaboration between agencies with roles in lakes	1	M1 M2

	management i.e. through a lake management group forum.		
1.3	Take a leadership role in providing an avenue for coordination and collaboration between lakes management agencies. ORC is well placed to provide principal oversight to lakes management activities. A Lake management group/forum could act as an information sharing opportunity between all parties, outline current and proposed research, identify areas requiring further research, discuss new initiatives, identify opportunities for future initiatives and generally improve coordination between agencies.	2	M1 M2 R4
1.4	Develop and implement criteria for the identification of degraded lakes and selection of priority projects for these waterbodies to align with overall catchment visions and aspirations.	1	M6 R21
1.5	Develop and implement criteria for the identification of vulnerable lakes and consider extending the current programme of priority projects for degraded water bodies to include at risk lakes that are not yet degraded.	1	M7 R1
1.6	Using the criteria developed above to identify vulnerable and degraded lakes, identify individual lakes or categories of lakes which require a tailored management approach (i.e. individual management plan within the Catchment Action Plan, or direction in the LWRP).	1	M6 M7 R14 R15 R21
1.7	Align funding provided through the Long Term Plan, the EcoFund and other funding avenues to address priority areas of concern through set criteria. Use the document proposed in Recommendation 1 to prioritise key areas and assess applications in a consistent but targeted way.	2	M13
1.8	Encourage integration between the current biosecurity programme and developing lakes management framework (i.e. Catchment Action Plans and Lakes management forum, if adopted).	3	M9 R2 R4
1.9	Establish a working group of suitably qualified experts to identify research and monitoring needs and assist with prioritisation of these efforts, particularly in relation to the Deep Water Lakes (but with the possibility to extend this concept to other lake categories).	1	R1 to R20

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2	**Management**		
2.1	Address lake levels, water quality load limits, aquatic lake biodiversity and cumulative land use management for lake catchments in the Land and Water Regional Plan development.	1	M4 M11
2.2	Highlight vulnerable or degrading lakes (or lake categories) within the Catchment Action Plan process, to ensure that specific issues with these waterbodies is not lost through and FMU or Rohe scale action plan.	1	M10
2.3	Ensure that Catchment Action Plan development working groups include representatives or input from key lakes management stakeholders such as District Councils, LINZ or electricity generators.	1	M10
2.4	Maintain a register of existing ORC and other agency-led or funded projects, and community-led projects related to catchment improvements, including EcoFund recipients at an FMU level. Ensure that these efforts are integrated into Catchment Action Plans where appropriate. Use this register to identify areas that are underrepresented in terms of improvement projects. Incorporated with the identification of vulnerable or degrading lakes, this information can be used to encourage initiatives in priority areas if shared publicly.	2	M6 M10
2.5	Using the lake initiative register described above, identify projects (particularly Ecofund recipients) that require ongoing efforts to sustain the benefits realised. ORC can use this to encourage future Ecofund applicants to build on previous efforts and ensure that benefits are not lost over time.	2	M13
2.6	Engage with other lakes management agencies to identify key concerns and areas requiring additional focus as well as planned monitoring and restoration work in order to avoid redundancies and maximise efficiency. Work plans can be shared to coordinate activities between agencies. For example DOC are liaising with individual landowners in catchments containing endangered freshwater species. A collaborative approach between DOC and ORC could deliver more benefits.	2	M1
2.7	Where there are areas with overlapping roles or functions from multiple agencies, proactively liaise with these groups to determine where there are efficiencies to be made or where ORC could assist with the other agency's function (or vice versa). Recognise that not all agencies have the ability to address all issues under their remit in a timely manner, find synergies where these agencies can work together to fill the gaps. The example of Tomahawk Lagoon is useful here, where DOC holds	2	M1

	responsibility for management of the area in Wildlife Reserve, but this provides benefits (e.g. flood buffering) that are within ORC's remit, so working together will assist in achieving better outcomes for both parties.		
2.8	Identify areas in lakes catchments (in collaboration with District Councils) that are more sensitive land use and development, and employ planning controls to minimise effects on the relevant lakes (See also Recommendation 4.15)	3	M4
2.9	Recognise the constraints on Electricity Generators and Irrigators who provide an essential service to the region but have other obligations (i.e. dam safety and provision of electricity) and consider whether hydro and irrigation lakes require bespoke management in the Land and Water Regional Plan and Catchment Action Plans.	1	M5
3	**Collaboration, Coordination and Consultation**		
3.1	Expand public understanding on lakes and their management through the development and promotion of a public education programme about the state, monitoring and management of lakes (e.g. annual public information days to present SOE monitoring results, bringing in experts on key water quality or ecology topics, or introduce new initiatives such as the CAP programme). This could be extended to encompass all catchment issues. Currently, information available on lake water quality and ecology is technical in nature and generally found on the ORC website. This could help to promote the work ORC is undertaking and allow further opportunities for collaboration and information sharing between parties.	3	General
3.2	Create a repository for the outcomes and feedback from all ORC consultations, to avoid repeat and over consultation. While this cannot replace genuine and important engagement processes, it can be referred to for future developments to ensure the feedback obtained is not lost.	2	M11
3.3	Tailor public consultation processes to the stakeholder groups identified through stakeholder mapping. Public meetings and online surveys are generally not the most appropriate way to obtain feedback from groups like DOC, Fish and Game, Electricity Generators etc.	1	M12
3.4	Collaborate with other New Zealand councils and overseas regulators with similar issues around lakes, to share learnings from their experiences that could be applicable in Otago, such as Waikato and Bay of Plenty Regional Councils.	2	General
3.5	Develop, encourage and support effective community groups, both urban and rural, focused on lakes or catchment issues. Leverage this resource and incentivise communities to work together around the management of lakes in the region.	2	M8

	Recognise that community groups expend significant personal input and that leaving these groups to it if they are performing well is not the best way to realise the benefits provided by these groups.		
3.6	Enable ORC representatives to attend catchment group, community group and other forums relating to lake management on an ongoing basis. In particular, ORC attendance at the Guardians of Lake Wānaka forum is recommended.	2	M3
3.7	Recognise community group management plans and values assessments in ORC's management framework, particularly Catchment Action Plans. Where appropriate, these measures and information can be adopted into the ORC framework. Use the efforts of these groups as a resource.	2	M8
3.8	Improve understanding by ORC Policy Makers of the constraints faced by Electricity Generators and Irrigators by undertaking field visits to these sites to better appreciate the processes at play. Expand knowledge in general through field visits by Policy makers, potentially in collaboration with the Environmental Implementation and Compliance teams.	1	M5
3.9	Engage with mana whenua through existing partnership channels to better understand iwi concerns, opportunities and aspirations in relation to lakes management in Otago and obtain input into the development of an Otago Lakes Strategy (as outlined in Recommendation 1.1).	1	General
4	**Information and Monitoring**		
4.1	Create and maintain a database of water quality information submitted with consent applications, compliance monitoring or in published articles, similar to the databases for water take records, potentially contaminated sites, or GIS bore locations. Information on drinking water taken from lakes and other surface water sources may also be available from Taumata Arowai and/or District Councils and would be relevant for any samples collected pre-treatment, or for variables such as heavy metals which would not be expected to change significantly during standard forms of treatment (chlorination/UV etc.)	1	General
4.2	Generate a map of lake catchments (potentially adapted from existing Ministry for the Environment river/stream catchment GIS layers) and overlay this with Land Cover Data Base layers to identify land use at catchment scale, including changes over time. Catchments with a high or increasing proportion of urban or intensive agricultural land uses should be prioritised for input modelling, monitoring and management.	1	R5 R11
4.3	Undertake a stakeholder mapping exercise for each FMU or Rohe, and where appropriate, lake catchment, to ensure that all	3	General

	stakeholders who are involved in lakes management are identified and documented.		
4.4	Recognise and document local knowledge about lakes (and other waterbodies) in the region. This information is currently collected on an ad-hoc basis and generally not documented. Many landholders, such as farmers, have a deep connection to the land they work on, and in many cases have been there for generations. This depth of understanding could be used as a resource for ORC in their decision making around lakes management.	1	General
4.5	Overall, in our opinion there is a need to increase the scope of monitoring. In particular, a number of lakes have specific issues (e.g. urban stormwater discharges to Wānaka and Whakatipu and sedimentation in Lake Dunstan) that are not addressed by the current state of the environment monitoring, which is primarily focussed on nutrient concentrations and related variables. Additionally, the geographical scope should be expanded where possible – Lake Roxburgh is a notable omission from the current list of monitored sites. Additional monitoring sites within the larger lakes should also be considered. We recommend that ORC review the scope of its state of the environment monitoring programme in light of these limitations, as well as the information elsewhere in this report (particularly Table 14).	2	R1 R6 R9 R10 R12 R18 R19
4.6	As well as potential additions to the state of the environment monitoring programme, it is noteworthy that elevated and likely increasing heavy metal concentrations were identified in Blue Lake approximately 20 years ago (see Section 3.5.3), and no follow-up monitoring appears to have been conducted. Additional monitoring of this lake should be prioritised, including confirming the original findings, testing for additional heavy metals that may also be present, assessing whether concentrations are indeed increasing, and carrying out a risk assessment to identify whether any meaningful threats to lake ecosystems and/or human health exist.	1	R16
4.7	In considering any increases in the scope of monitoring ORC may make in response to Recommendation 4.2, in our opinion ORC should not 'let perfect be the enemy of good', so to speak. While it is important to maintain the 'gold standard' of high-quality, frequent monitoring for existing monitoring sites, for sites that are not currently being actively monitored, any information is better than no information (provided that the data quality is fit for purpose, of course). Where budget or other constraints limit ORC's ability to test additional sites, or test for additional relevant variables, consideration should be given to less frequent monitoring of new sites/parameters.	2	General

4.8	Additionally, ORC should investigate the use of citizen science in collaboration with community groups (e.g. iwi, Enviroschools, Otago University Tramping Club, local helicopter operators) to facilitate sampling and monitoring of lake water quality, biodiversity or pest species where funding is not available for this to be done in the traditional manner by ORC staff, particularly for the remote high alpine lakes.	2	General
4.9	Continue to investigate and (where appropriate) implement innovative new lake water monitoring techniques including buoys, deepwater sampling, 'drifter' studies and remote sensing of surface water.	2	R7 R8
4.10	Develop and publish a list of priority lake water quality research projects that ORC does not currently have funding for. This would be useful for researchers looking for projects, and it may assist them in finding funding from other sources if ORC has publicly stated that the research would be beneficial.	2	General
4.11	As noted in Section 3.1, our literature search uncovered a large body of literature, not all could be reviewed within this project (noting that the literature review was a relatively small component of the scope). Additionally, the Lakes 380 project will provide considerable additional relevant data in the near future. It is important that lake management is informed by the latest and best information, and we recommend that a further, comprehensive literature review be carried out. In our opinion, it would be most efficient to do this on a catchment by catchment/lake by lake scale, either as part of or in advance of the Catchment Action Plan process. Such literature reviews can use the attached list of documents identified as relevant but not yet reviewed as a starting point, and should be in accordance with the Collaboration for Environmental Evidence's guidance on systematic reviews, as far as is practicable.	3	General
4.12	Undertake an economic evaluation of the value of Otago's lakes, in collaboration with economic development managers at District Council, to quantify the benefits these lakes bring to the region and further validate their protection. The ecosystem services framework could be used to assist this evaluation.	2	General
4.13	Enhance preparedness for modelling and managing effects of climate change on lakes' hydrodynamics and ecosystem health, including by identifying species and ecosystems (particularly in the remote high alpine lakes and coastal and lowland lakes) which are vulnerable to direct and indirect effects of climate change and prioritising these for management.	3	R1 R12 R13 R20

4.14	Information is available on pest species present in Otago from ORC's Pest Hub web page and a variety of other sources. However, there may be a benefit to providing this information in a more co-ordinated way, such as by producing a regular pest management report similar to the state of the environment reports produced on water quality and other issues.	3	R2
4.15	There would be a benefit to nutrient budgeting and modelling of contaminant sources and hydrological loads to lakes, particularly Deep Water Lakes and Accessible High-altitude Lakes to identify whether current and reasonably foreseeable future land use patterns in the catchments are compatible with the ongoing health of the lake ecosystems, and if not, put preventative management measures in place (See Recommendation 2.8). This recommendation is applicable for most other lake categories too, though perhaps to a lesser extent.	3	R11 R17
4.16	Make monitoring data more accessible to other organisations and the general public. The information gained via the actions in recommendations 4.1, 4.2, 4.14, 4.15 or other initiatives could be presented using GIS and other tools to create an information portal for lakes in the Otago Region.	3	M2

Clear from this study is that while ORC is not responsible for all aspects of lakes management, other agencies, groups and stakeholders look to the Council for direction and guidance on these matters. ORC is in an opportune position to provide this direction, however relying on the initiatives already underway may not be enough, as these documents themselves require guidance and alignment with overall goals. The recommendations outlined in this report aim to assist ORC in achieving holistic, effective, evidence-based lakes management.

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Appendix 1: Lake Selection Process

Otago Lakes Management Assessment

3 August 2022 Landpro Reference: 22368

Subject: Lake selection and categorisation summary

1. Introduction

Otago Regional Council (ORC) has engaged Landpro Ltd (Landpro) to carry out an assessment of the Management of Otago's Lakes. Because there are a very large number of lakes in Otago, it was necessary to select a subset of the lakes to enable a meaningful discussion within the time and budget constraints of the assessment. This document summarises how lakes were selected for inclusion in the review, and how the included lakes were categorised for further discussion.

The "NZ Lake Polygons (Topo, 1:50k)" GIS layer (LINZ/Toitu Te Whenua, 2022, available from the LINZ data service website), contains over 7,000 individual features within Otago. However, 'lake' is defined by LINZ as "any standing body of fresh inland water", and therefore this figure includes a large number of wetlands, dams, ponds, tarns, and other water bodies that would not commonly be referred to as a lake. In order for this review to be achievable and worthwhile, it was necessary to focus on a subset of these 'lakes' that are significant to the people of Otago, and consistent with the common language definition of 'lake'.

The following steps were taken to identify the lakes to be covered by this review:

1. **Named lakes were identified** from LINZ and ORC sources.
2. **The largest (by area) of the remaining unnamed lakes were reviewed** to assess whether any of these should also be included.
3. The resulting list of lakes were **mapped against data on dams and wetlands** to assess whether any are better considered (and managed) as wetlands or ponds/dams rather than lakes.

4. The lakes identified using the above steps were **divided into categories** to facilitate discussion.

2. Selection process

2.1 Identification of named lakes

In this step, all lakes with a name listed in the LINZ GIS layer mentioned above, and/or in Schedule 1A of the *Regional Plan: Water for Otago* (RPW; ORC, 2004) were identified and included. The fact that a lake has been given a name is considered a strong indication that it is a significant geographical feature to the community who live nearby.

This step resulted in a list of 76 lakes (counting the Three Lagoons as one), ranging from the large glacial lakes such as Lake Wakatipu, hydro lakes such as Lake Roxburgh, large irrigation or drinking water dams/reservoirs such as Falls Dam, and smaller, but notable water bodies such as Tomahawk Lagoon and Lake Tuakitoto.

2.2 Review of largest unnamed lakes

Next, the 30 largest unnamed lakes in the LINZ GIS layer were identified and assessed for any factors which make them particularly significant, different from other lakes already considered, or otherwise worthy of inclusion in the review (including, where possible, checking whether they actually have a name that was not included in the LINZ dataset).

These 30 largest unnamed lakes ranged in area from 7 to 1,278 ha. Nine of these were considered worthy of inclusion in the review, however this sub-group of nine includes:

- The Loganburn Reservoir and Lake Waipori (the two largest lakes among the 30), the names of which were omitted from the LINZ dataset for unknown reasons. These two lakes were already included in our list from the previous stage, due to being listed in the RPW.

- Three smaller lakes within the same wetland complex as Lakes Waihola and Waipori, which are listed as a group in Table 1 below.
- Two features that proved to be parts of other lakes that were mapped separately for unknown reasons.
- The remaining two (Lake Edgar near Lake Waipori and the unnamed lake formed by the Paerau Weir in the upper Taeri catchment) were added to the review as they are associated with hydroelectricity schemes, potentially in addition to other significant community values.

Consequently, in practice only three additional lakes (counting the group of unnamed lakes near Waihola/Waipori as one) were added to the list, making 79 lakes in total after this stage.

2.3 Comparison with mapped dams and wetlands

The resulting list of 79 lakes was mapped against GIS layers for 'Significant Wetlands' (available from ORC GIS viewer) and 'NZ Dam Centrelines (Topo, 1:50k)' (LINZ, respectively) to assess whether any were inappropriate for inclusion in a review of lakes.

The intent with this step was to determine whether any of the identified 'lakes' were in fact better considered as wetlands or ponds/reservoirs and managed as such. It is acknowledged that some lakes may fit equally well into two or several categories (for example, large dams that form significant lakes), or be perceived as 'in between' these categories (such as Lakes Waihola and Waipori, which could arguably be considered part of a wetland system). For these reasons, it was decided that lakes would be retained at this stage unless there was a compelling reason to remove them from the list.

Ultimately, all of the lakes identified in the previous stages that are within or surrounded by mapped regionally significant wetlands were retained for inclusion in the review. In practice, while some of the lakes may be more commonly regarded as wetlands, no clear point of differentiation could be identified to objectively include those that are best considered lakes and exclude those better considered wetlands. We note, however, that these are included without prejudice to later stages of the process ORC is undertaking. For example, a possible conclusion of this assessment may be that some or all of

these lakes/wetlands would be best excluded from any future lakes management plan or similar and managed specifically as wetlands instead.

Similarly, comparison of the included lakes with mapped dams helped to confirm which lakes belong in the dams and reservoirs category below where this was not immediately obvious, but did not provide a basis for excluding any of these dams/ponds from our review. Again, it was considered that a water body being given a name by the local community indicates potentially significant values associated with the lake that warrant at least consideration as part of this assessment, even if it is not a natural feature.

There was, however, one lake added to the review as a consequence of this stage. Devils Bridge Lagoon in Waitaki District is mapped as a wetland (it is also included in the LINZ lakes layer, but is not named, nor among the 30 largest unnamed lakes). According to the *Waitaki District Plan*, this was an ephemeral lake but is now a permanent lake with significant ecological values, due to the installation of a weir (Waitaki District Council, 2010).

2.4 Categorisation of included lakes

Even with the above filtering criteria applied, there were still 80 lakes considered as part of this review. These were categorised as follows to enable meaningful comparison and discussion:

- **Deep water lakes (DWL):** large, inland glacial lakes of several hundred metres depth. Includes Lakes W(h)akatipu, Wānaka and Hāwea. Note that Lake Hāwea is dammed, but is significantly less modified than most other Otago hydro lakes and remains more similar to the other DWL than to other hydro lakes in most respects.
- **Remote high altitude lakes (RHAL):** natural lakes situated at higher altitude than the DWL (~300 m), which are not accessible by a short walk from the nearest road. Generally located within the DOC estate. Typical examples: Lochnagar and Lakes McKellar and Harris
- **Accessible high altitude lakes (AHAL):** Similar to RHAL, but experiencing potentially greater pressures due to being easily accessible. Typical examples: Lakes Hayes and Johnson, Blue Lake.

- **Dams and reservoirs (DR):** Artificial or heavily modified lakes which are managed by humans for uses such as recreation, hydroelectricity, irrigation, and/or community water supply. Typical examples: Lakes Dunstan, Roxburgh and Onslow, Poolburn Reservoir
- **Coastal/lowland lakes (CLL):** Natural lakes and lagoons situated at less than 300 m elevation, typically near the coast and often situated within regionally significant wetlands. Typical examples: Lakes Waihola and Tuakitoto, Tomahawk Lagoon

Information on the lakes included (grouped by category) is given in Table 1. Note that there are two Diamond Lakes in Otago (differentiated below by the nearest town/village), and three individual lakes within the Three Lagoons (which are not lagoons in the typical meaning of the word, being situated approximately 1,600 m above sea level, near Cecil Peak above Lake Wakatipu).

Table 1: Lakes included in review

Category	Lake (common name)	Te Reo Māori name (if available and different)	Freshwater Management Unit and rohe	Area (ha)
Deep water lakes (DWL)	Lake Wakatipu	Whakatipu Waimāori	Clutha Mata-Au, Upper Lakes	29,400
	Lake Wānaka		Clutha Mata-Au, Upper Lakes,	19,900
	Lake Hāwea		Clutha Mata-Au, Upper Lakes	15,200
Remote high-altitude lakes (RHAL)	Lochnagar	Ōtaka	Clutha Mata-Au, Dunstan	303
	Lake Unknown		Clutha Mata-Au, Upper Lakes	108
	Lake McKellar	Ōtākaha	Clutha Mata-Au, Upper Lakes	73
	Lucidus Lake		Clutha Mata-Au, Upper Lakes	67
	Lake Luna		Clutha Mata-Au, Dunstan	35
	Lake Wilson		Clutha Mata-Au, Upper Lakes	28

Category	Lake (common name)	Te Reo Māori name (if available and different)	Freshwater Management Unit and rohe	Area (ha)
	Lake Harris	Te Hokaputu	Clutha Mata-Au, Upper Lakes	22
	Lake Hope		Clutha Mata-Au, Upper Lakes	19
	Lake Nigel		Clutha Mata-Au, Upper Lakes	16
	Lake Nerine		Clutha Mata-Au, Upper Lakes	16
	Crucible Lake		Clutha Mata-Au, Upper Lakes	12
	Lake Ned		Clutha Mata-Au, Upper Lakes	11
	Lake Te Kōhua		Clutha Mata-Au, Dunstan	10
	Lake Rere		Clutha Mata-Au, Upper Lakes	7
	Lake Isobel		Clutha Mata-Au, Upper Lakes	5
	Lake Mystery		Clutha Mata-Au, Upper Lakes	4
	Lake Castalia		Clutha Mata-Au, Upper Lakes	4
	Lindsays Tarn		Clutha Mata-Au, Upper Lakes	3
	Lake McKay		Clutha Mata-Au, Dunstan	2
	Gem Lake		Clutha Mata-Au, Lower Clutha	1
	Lake Diana		Clutha Mata-Au, Upper Lakes	1
	Dukes Tarn		Clutha Mata-Au, Dunstan	1
	Three Lagoons		Clutha Mata-Au, Upper Lakes	0.2-0.4
	Sheehey Lake		Clutha Mata-Au, Dunstan	0.2

Category	Lake (common name)	Te Reo Māori name (if available and different)	Freshwater Management Unit and rohe	Area (ha)
Accessible high-altitude lakes (AHAL)	Lake Hayes	Waiwhakaata	Clutha Mata-Au, Dunstan	273
	Diamond Lake, Glenorchy	Ōturu	Clutha Mata-Au, Upper Lakes	176
	Moke Lake	Punamāhaka/Waikāmāhaka	Clutha Mata-Au, Dunstan	81
	Lake Sylvan		Clutha Mata-Au, Upper Lakes	61
	Lake Dispute		Clutha Mata-Au, Dunstan	29
	Lake Johnston	Waipuna	Clutha Mata-Au, Dunstan	25
	Glenorchy Lagoon		Clutha Mata-Au, Upper Lakes	17
	Lake Alta		Clutha Mata-Au, Dunstan	12
	Lake Reid		Clutha Mata-Au, Upper Lakes	12
	Blue Lake		Clutha Mata-Au, Manuherekia	8
	Diamond Lake, Wānaka		Clutha Mata-Au, Upper Lakes	3
	Lake Kirkpatrick		Clutha Mata-Au, Dunstan	3
	Arethusa Pool	Associated with Mou Waho (Harwich Island)	Clutha Mata-Au, Upper Lakes	1
Dams and reservoirs (DR)	Lake Dunstan		Clutha Mata-Au, Dunstan	2,278
	Lake Mahinerangi		Taieri	1,738
	Loganburn Reservoir	Te Pariparu-a-Te-Kaunia	Taieri	1,278
	Lake Onslow		Clutha Mata-Au, Roxburgh	1,139
	Lake Roxburgh		Clutha Mata-Au, Roxburgh	513

Category	Lake (common name)	Te Reo Māori name (if available and different)	Freshwater Management Unit and rohe	Area (ha)
	Greenland Reservoir		Clutha Mata-Au, Manuherekia	447
	Poolburn Reservoir		Clutha Mata-Au, Manuherekia	424
	Manorburn Reservoir		Clutha Mata-Au, Manuherekia	214
	Falls Dam		Clutha Mata-Au, Manuherekia	143
	Fraser Dam		Clutha Mata-Au, Roxburgh	46
	Butchers Dam		Clutha Mata-Au, Roxburgh	31
	Unnamed dam formed by Paerau Weir		Taeri	25
	West Eweburn Dam		Taieri	24
	Lower Manorburn Dam		Clutha Mata-Au, Manuherekia	17
	Conroys Dam		Clutha Mata-Au, Roxburgh	13
	Lake Edgar		Taeri	9
	Idaburn Dam		Clutha Mata-Au, Manuherekia	8
	Phoenix Dam		Clutha Mata-Au, Lower Clutha	7
	Sullivans Dam		Dunedin & Coast	4
	Knight Dam		Taieri	4
	Southern Reservoir		Dunedin & Coast	4
	Malones Dam		Clutha Mata-Au, Lower Clutha	3
	Coalpit Dam		Taieri	2
	Ross Creek Reservoir		Dunedin & Coast	2
	Pinders Pond		Clutha Mata-Au, Roxburgh	2
	Moa Creek Reservoir		Clutha Mata-Au, Manuherekia	2
	Downeys Dam		Clutha Mata-Au, Dunstan	2

Category	Lake (common name)	Te Reo Māori name (if available and different)	Freshwater Management Unit and rohe	Area (ha)
	Hawkers Dam		Clutha Mata-Au, Lower Clutha	2
	Greys Dam		Clutha Mata-Au, Lower Clutha	1
	Hoffmans Dam		Taieri	1
	Milburns Pond / Victoria Dam		Clutha Mata-Au, Lower Clutha	0.4
Lowland and coastal lakes (CLL)	Lake Waihola	Waihora	Taieri	604
	Catlins Lake	Kuramea	Catlins	432
	Lake Waipori		Taieri	212
	Lake Tuakitoto	Roto-nui-a-Whatu	Clutha Mata-Au, Lower Clutha	129
	Three smaller unnamed lakes in Waihola-Waipori wetland complex		Taieri	7-31
	Tomahawk Lagoon		Dunedin & Coast	18
	Devil's Bridge Lagoon		North Otago	7
	Salt Lake		Taieri	3
	Lake Wilkie		Catlins	0.7

Additional lakes may be considered for addition to the above list in the event that they are identified during consultation as having significant values.

Tim Muller, Kate Mandis and Della Clark

Landpro Ltd

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Waitaki District Council (2010); *Waitaki District Plan* (relevant section is Appendix C – Schedule of Areas of Significant Nature Conservation Value and Geopreservation Sites. Pg C5)

Appendix 2: Literature Review Protocol and Summary of Reviewed Literature

Otago Lakes Management Assessment

27 July 2022 Landpro Reference: 22368

Subject: Limited Literature Review Protocol

1. Introduction and Objective

Otago Regional Council (ORC) has engaged Landpro Ltd (Landpro) to carry out an Otago Lakes Management Assessment. One aspect of this wider project is a literature review focussing on the existing environmental state of the included lakes. This protocol sets out the methodology for the literature review.

There are approximately 80 named lakes in Otago which are included in the review. These are grouped into five categories: deep water lakes, remote high-altitude lakes, accessible high-altitude lakes, dams and reservoirs, and lowland and coastal lakes; as detailed in the *Lakes Identification Summary* document attached to the main report (Landpro. 2022).

Of those lakes, nine (Lakes Hāwea, Wānaka, W(h)akatipu, Johnson, Hayes, Dunstan, Onslow, Waihola and Tuakitoto) are regularly monitored for a range of chemical and microbiological indicators of lake health. The results of this monitoring (along with numerous river monitoring sites) were reported in detail recently in the ORC report *State and Trends of River and Lake Water Quality in the Otago Region 2000-2020* (Ozanne, 2020, referred to as "the *State and Trends* report" from now on). Accordingly, the primary focus of the literature review is information *not* covered by that report, specifically:

- Information relevant to water quality and ecology in the nine lakes mentioned above that is outside the scope of the *State and Trends* report. For example, the report did not include any water quality monitoring results for contaminants such as heavy metals or pesticides, and has limited ecological information for the lake sites.
- Any information relevant to water quality or ecology in the other ~70 lakes.

A brief summary of the results of the *State and Trends* report will also be included.

Because the review is only one part of a larger project and subject to time and budget constraints, it is not intended to be comprehensive. Instead, the focus will be on identifying key pieces of research to provide a broad picture of water quality and ecological health in Otago's lakes, while cataloguing other potentially relevant research to assist any more detailed literature review that may be carried

out in future. The scope excludes analysis of raw water quality data at this stage (with the exception of the New Zealand Freshwater Fish Database as discussed below). However, any important raw datasets identified during the review which have not formally reported on previously will be noted.

Due to the project objectives and constraints referred to above, completing a comprehensive review in strict compliance with systematic review requirements is neither necessary nor achievable. However, it is intended to follow systematic review principles as far as is reasonably practicable given the time and budget constraints. Accordingly, this protocol is loosely based on the Collaboration for Environmental Evidence *Guidelines and Standards for Evidence Synthesis in Environmental Management* (v.5, Pullin et al, 2018).

2. Sources of information and search strategy

For this limited review, peer-reviewed and other literature will be obtained by using the search functions of the University of Otago Library and Google Scholar. Initially, the following search phrase will be used:

Otago AND Lake AND 'water quality' OR ecology

The first 200 results from each source will be downloaded as a .xlsx/.ris file or similar for initial review as detailed below.

If specific information gaps become apparent after completing the majority of the review, further searches may be carried out for specific lakes and/or environmental parameters, for example:

'Lake Waihola' AND 'pesticide~'

In addition to information found from the above searches, the following sources of information will be used:

- Information provided by ORC, who were requested to provide any reports etc they hold which contain information relevant to the two bullet points in Section 1 above.
- The New Zealand Freshwater Fish database (NZFFD). Note that this is a database of raw fish observation data, but is expected to be the most comprehensive resource on ecology (though limited to fish) for the relevant lakes. The NZFFD dataset is therefore being included in the review despite the general exclusion of other sources of raw data.
- Any relevant information provided by parties with whom Landpro is consulting as part of the wider project this review is a part of (as detailed in the consultation strategy to which this protocol is attached).

- For Lakes Wānaka and Hāwea only, the *Literature Review: Upper Clutha Water Quality* (Landpro 2019; currently being updated) – as well as any comparable documents identified for other relevant lakes.

In the remainder of this report, the word 'document' is used to refer generally to any journal article, report, thesis or other research publication/resource identified as part of the above process.

3. Filtering and inclusion criteria

All documents identified in accordance with Section 2 will be catalogued in a master spreadsheet. The review will be broken into three stages as summarised in Table 1 and detailed below.

Table 1: Summary of review stages

Review stage	Documents included	Purpose
1. title only	All identified as described in Section 2	Remove duplicate and irrelevant articles by initial screening against inclusion criteria (as detailed below)
2. title and abstract	All retained as relevant after stage 1, and those for which relevance cannot be determined from title alone	Confirm relevance where unclear from title, categorise by lake(s) covered, water quality/ecology, and initial priority rating based on breadth of information available
3. full text	Approx. 30 most relevant documents from Stage 3, with consideration given to ensuring broad coverage both topically and geographically	Critically review, extract key details relevant to review and summarise for final report

In **Stage 1** of the review, after removing duplicates, all documents identified will be screened based on the title only for the following **minimum inclusion criteria**:

1. Contains direct measurements or observations of one or more water quality and/or ecology variables, AND
2. The above measurements relate to at least one Otago Lake included in the review.

Note that for the purposes of assessing inclusion, both 'water quality' and 'ecology' will be interpreted broadly to include matters such as sediment generation and invasive species, respectively.

Any documents for which the status the status against those inclusion criteria cannot be conclusively determined based on the title alone will be included in Stage 2 but their inclusion status will be noted as 'unclear'.

At **Stage 2**, after inclusion screening based on the abstract for the documents recorded as "unclear" at Stage 1, all documents which meet the inclusion criteria will be:

- **Categorised by the lakes covered**, according to which group(s) of lakes the research results relate to (as per the five categories listed above and detailed in the *Lakes Identification Summary*);
- **Categorised by the datatype (water quality or ecology)** which the research primarily relates to;
- **Assigned a priority rating** based on the breadth of information covered in the relevant research, as detailed in Table 2. For example, the *State and Trends* report includes recent information on a wide range of water quality variables for nine Otago lakes and would be rated '5' on this scale, while the NZFFD contains data on a small group of variables (presence/absence of various fish species) for a wide range of water bodies (expected to include many if not most of the included lakes) and would be rated '3' based on its content alone, or '4' accounting for the publication date (assuming that relevant post-2017 data is included). Note that this rating:
    - Is designed to assess the usefulness of the results to this specific review, and should **not** be taken as a judgment (negative or positive) on the methodological quality of the research reported in the document.
    - Is based on review of the title and abstract only. It is acknowledged that this may result in some documents being incorrectly categorised due to relevant information in the document that is not included in the abstract. However, full-text review of all relevant articles at Stage 2 would not be feasible given the time and budget constraints of this review, nor is this considered necessary to achieve the objectives.

Table 2: Priority rating scale to be used in Stage 2 (based on review of abstract and title only)

Priority rating	Description	Adjustment for publication date
1. very low	Document contains monitoring or observation data on one or a limited range of water quality and/or ecological variables for a single included lake	After assigning a rating based on the criteria to the left: • documents published in 2017 or later will gain one point (unless already rated '5'), and • documents published in 2007 or earlier will have one point deducted (unless already rated '1'). This is because the focus of the assessment is primarily on the current state of the relevant lakes, and therefore more recent data will be prioritised for review.
2. low	(in between the above and below categories)	
3. moderate	Document contains: • Data for a broad range of water quality and/or ecological variables for a single lake, OR • Data for a moderate range of variables for a small group (two to four) of included lakes, OR • Data for one or a limited range of variables for a large group of included lakes (five or more)	
4. high	(in between the above and below categories)	
5. very high	Document contains data for a wide range of water quality and/or ecological variables for a large group of included lakes (five or more)	

In **Stage 3**, a subset of the documents which meet the inclusion criteria will be selected for critical review and summarisation in the final report based on:

- The priority rating determined at Stage 2
- The categories of lake (five groups referred to above) and data type (water quality or ecology)

In general, the highest priority rating document for each lake/data type category combination (e.g. deep water lake ecology data or dam/reservoir water quality data) will be reviewed first to give an initial overview of the relevant information available. After this, additional documents will be reviewed for each lake type/data type combination as time allows, generally in accordance with the priority rating, but also considering the specific lakes and variables covered, as well as a preference for the most recent research. Where documents with a priority rating of 4 or 5 exist, these will be given a detailed critical review (subject to the number of documents requiring review and the time constraints). Documents with a lower priority rating will still be reviewed if time allows, but in less detail.

Given the constraints of the project as mentioned above, it is acknowledged that some relevant documents will almost certainly be identified but not be able to be reviewed. The full list of documents identified will be attached to the final report to assist any future researchers wishing to undertake a more detailed review.

4. Reporting

A narrative summary of the results of all documents reviewed at Stage 3 will be included in the final report for the Lakes assessment project, with the discussion structured based on lake category and data type. Depending on the nature and volume of the data available in the relevant documents, tabular or graphical summaries of key results may be included, however no meta-analysis will be attempted (nor is it expected that sufficient data would be available to complete one).

As noted above, this is not intended to be a strictly systematic review and the process may be somewhat iterative. Any changes to the above methodology will also be noted in the final report.

Tim Muller

Environmental Scientist

Landpro Ltd

References

Ozanne, 2020, *State and Trends of River and Lake Water Quality in the Otago Region 2000-2020*

Pullin et al, 2018, *Guidelines and Standards for Evidence Synthesis in Environmental Management, Version 5.0*, accessed July 2022 at https://environmentalevidence.org/information-for-authors/

DOCUMENTS REVIEWED

Title	Author	Publication date	Duplicate (confirmed)	Incl. criterion 1 (contains WQ or ecol data)	Incl. criterion 2 (relates to Otago Lakes)	Included at stage 1?	Included at stage 2?	Lake category covered	Datatype	Priority rating (ignoring date)	Priority rating (accounting for date)	Type of document	Reviewed at stage 3	Summary	Reviewed
State and trends of river and lake water quality in the Otago region 2000-2020	Ozanne, Rachel (Freshwater Scientist), author.	2020	No	Yes	Yes	Yes	Yes	All	WQ	5	5	Report	Yes	State of the environment report covering regular monitoring of mostly nutrients and E. Coli in Lakes W(h)akatipu, Wānaka, Hāwea, Johnson, Hayes, Dunstan, Onslow, Waihola and Tuakitoto.	TM
Linking land-use, water body type and water quality in southern New Zealand	GALBRAITH, Lisa M ; BURNS, Carolyn W	2007	No	Yes	Unclear	Unclear	Yes	Various	WQ	5	5	Journal article	Yes	Follow up study from the article below - Galbraith, Lisa 2004. No mention of any specific lakes.	DC
Lake water quality annual monitoring summary		2007-	No	Yes	Unclear	Unclear	Yes	Various	WQ	5	4	Report	Yes	Brief summary of trophic state of Wakatipu, Wānaka, Hayes, Johnson and Onslow, plus a report on an algal bloom in Hayes in Summer 2007-08.	TM
Effects of land use on pelagic food webs in a range of Otago wetlands	Galbraith, Lisa;	2004	No	Yes	Unclear	Unclear	Yes	Various (45 Otago lakes and wetlands)	WQ	5	4	Thesis	Yes	No mention of any specifc named lakes.	DC
Otago Regional Council Key Issues Report Plan Change 8 to the Regional Plan: Water for Otago and	Lee, Dolina; Ozanne, Rachel;	2020	No	Unclear	Unclear	Unclear	Yes	Various (9 Otago lakes)	WQ	5	5	Legal document	Yes	Essentially a summary of Ozanne (2020). No additional relevant information noted.	TM
A temperate, tidal lake-wetland complex 2. Water quality and implications for zooplankton community structure	Schallenberg, Marc ; Burns, Carolyn W.	2003	No	Yes	Yes	Yes	Yes	CLL	Ecology	4	3	Journal article	Yes	Schallenberg and Burns (2003) investigated the metrological and hydrological factors influencing water quality in Lakes Waihola and Waipori. The study investigated 15 sites throughout the Taieri Plain, upstream of the Waipori/Waihola Lake Wetland	DC
Ichthyofaunal assemblages in shallow littoral habitats of permanently open estuaries and intermittently closed and open lakes or lagoons in Otago, New Zealand	Taddese, Fasil ; Schallenberg, Marc ; Mikheev, Pavel ; Jarvis, Matt G. ; Closs, Gerard P.	2018	No	Yes	Yes	Yes	Yes	CLL	Ecology	4	5	Journal article	Yes	Not relevant to named lakes in this investigation.	DC
25. Littoral invertebrate and fish communities	Kelly, D and McDowall, R	2004	No	Yes	Unclear	Unclear	Yes	DR (Dunstan, maybe others) - brief mention of alpine tarns (i.e. RHAL)	Ecology	4	3	Book chapter	Yes	Kelly and McDowail (2004) report described the littoral invertebrates and fish communities in lakes around New Zealand - Lake Dunstan.	DC
37. Impacts of hydro-dams, irrigation schemes and river control works	Young, R. Smart, G. and Harding, J.	2004	No	Yes	Unclear	Unclear	Yes	DR (Dunstan, Roxburgh, Mahinerangi) plus Hāwea	Ecology	4	3	Book chapter	Yes	Young et al 2004 provided an overview of the water quality, ecological and effects on people and management impacts from hydro-dams and reservoirs.	DC
Upper Clutha Water Quality: Literature Review	Muller, T. Boyens, N., Perkins, C. and Langhans, S.	2019	No	Yes	Yes	Yes	Yes	DWL (Wānaka and Hāwea)	WQ	4	5	Report	Yes	Detailed literature review of water quality and ecological data for Lakes Hāwea, Wānaka, and their tributaries (plus other rivers downstream as far as Luggate)	TM
Lake Snow literature review	Schallenberg, M and Novis, P	2018	No	Yes	Unclear	Unclear	Yes	DWL + Hayes	Ecology	4	5	Report	Yes	Schallenberg and Novis (2018) article presented the results of a literature review regarding the potential management of lake snow (*Lindavia intermedia*) and how to reduce the spread of lake snow amongst lakes. Includes a list of NZ lakes in which Lindavia i. has been detected, with 6 Otago Lakes (Hayes, Wanaka, Moke, Wakatipu, Hawea and Johnson) among them.	DC
Otago lakes' trophic status : Lake Hayes, Lake Johnson, Lake Onslow, Lake Wakatipu, Lake Wanaka.		2009	No	Yes	Yes	Yes	Yes	Various	WQ	4	4	Report	Yes	Detailed water quality study of Lakes Hayes, Johnson, Onslow, W(h)akatipu and Wānaka, focussing on nutrient, clarity and physicochemical monitoring/sampling carried out 2006-2009. Wānaka and W(h)akatipu were found to be oligotrophic, the others eutrophic.	TM
22. Primary production in the open water	Schallenberg, M.	2004	No	Yes	Unclear	Unclear	Yes	Various (at least 7 Otago Lakes, various categories)	WQ	4	3	Book chapter	Yes	Schallenberg (2004) identified several anthropogenic impacts and the impacts of climate change Lake Waihola and Waipori, specifically the increase in salinity from the accelerating thermal expansion of sea levels.	DC
Processes affecting the chemical composition of Blue Lake, an alluvial gold-mine pit lake in New Zealand	BARKER, Shaun L. L ; KIM, Jonathan P ; CRAW, Dave ; FREW, Russell D ; HUNTER, Keith A	2004	No	Yes	Yes	Yes	Yes	AHAL	WQ	3	2	Journal article	Yes	Study of physicochemical parameters (major ions and selected heavy metals) in water and sediment in Blue Lake and relevant nearby streams in March 2002. Found elevated concentrations of Zn and Ni (and Cu, to a lesser extent) in the lake relative to nearby streams. This is attributed to a combination of evaporative concentration and input of acidic groundwater.	TM
CHAPTER TWO: Palaeolimnological evaluation of historical nutrient and food web contributions to the eutrophication of two monomictic lakes	Khan, Samiullah; Puddick, Jonathan; Burns, Carolyn W; Closs, Gerard P; Schallenberg, Marc;	2021	No	Unclear	Unclear	Unclear	Yes	AHAL (Hayes and Johnson)	Ecology	3	4	Thesis	Yes	Detailed study of the ecological food web in Lake Hayes, with some work also done on Lake Johnson. Indicates that perch predation of daphnia (a genus of planktonic crustaceans) may be a contributor to algal blooms in the lakes, and that perch population control may therefore improve water clarity.	TM

Distribution and diversity of diplostomids in New Zealand	Ruehle, Brandon P; Presswell, Bronwen; Bennett, Jerusha;	2021	No	Unclear	Unclear	Unclear	Yes	AHAL, DWL, RHAL? (Hayes, Wanaka, 10 OTA/CAN mountain lakes)	Ecology	3	4 Journal article	Yes	Study of a parasite living in the eyes of common bullies, among other hosts. Common bullies were identified in each of Lakes Hayes, Whakatipu, Wānaka and Hāwea.	TM
Water and sediment chemistry of Sutton Salt Lake, east Otago, New Zealand	Craw, D; Beckett, S;	2004	No	Yes	Yes	Yes	Yes	CLL (Salt Lake)	WQ	3	2 Journal article	Yes	Covers water and sediment (geo)chemistry sampling in the Salt Lake in 1998 and 2003. Lake has high pH (8-9) and salinity one quarter to one third that of seawater, primarily due to high NA and Cl. The authors argue that the salinity is sourced from seawater (via marine aerosols) rather than interaction with groundwater or nearby rocks.	TM
Water quality and ecosystem health in the Lake Tuakitoto catchment	Ozanne, R	2014	No	Yes	Yes	Yes	Yes	CLL (Tuakitoto)	WQ	3	3 Report	Yes	Summary of 2012-13 fortnightly water quality (nutrients + E coli) sampling and previous ~20 years of SOE monitoring data, as well as some ecological and general environmental setting information. Lake Tuakitoto was supertrophic at the time, with lake levels frequently below the specified minimum and a declining population of freshwater mussels, among other findings.	TM
Effects of agricultural and urban land cover on New Zealand's estuarine water quality	Dudley, Bruce D. ; R. Burge, Olivia ; Plew, David ; Zeldis, John	2020	No	Unclear	Unclear	Unclear	Yes	CLL ? 320 NZ estuarine and coastal sites - may include some relevant sites	WQ	3	4 Journal article	Yes	Dudley et al,. 2020 article investigated a national scale effects of land use cover on water quality. Though this article doesn't specifically identify any monitoring sites in Otago. Idnetified that water quality in estuaries was strongly influenced by nutirtient loads and land cover.	DC
Water Quality of Stormwater Runoff into Lake Wānaka, New Zealand	Grant, Victoria Annelise	2020	No	Yes	Yes	Yes	Yes	DWL	WQ	3	4 Thesis	Yes	Grant (2020) thesis examined how the change increase in impervious surfaces via an increase in urban land cover influences contaminant load for stormwater runoff into Lake Wanaka	DC
The impacts of stormwater runoff on the littoral-benthic macroinvertebrate communities along the shoreline of Lake Wanaka & Lake Wakatipu	Hall, Oliver;	2021	No	Yes	Yes	Yes	Yes	DWL (Wakatipu and Wanaka)	Ecology	3	4 Thesis	Yes	Hall (2021) thesis provided a natural extension from Grant (2020) research on the impact of stormwater runoff on the macroinvertebrate communities along Lake Wanaka and Wakatipu. Twelve sampling sites at both Lake Wanaka and Wakatipu	DC
RE: Kingston Wastewater Discharge Application RM20. 164 s92 Response-Aquatic Ecological and Surface Water Technical Review	e3 Scientific	2021	No	Yes	Unclear	Unclear	Yes	DWL (Wakatipu)	Ecology	3	4 Consent application	Yes	Review of the ecological assessment of Lake Wakatipu and fish species evident in proximity to the wastewater disposal area	DC
Low-intensity land use in grassland catchments: Effects on a large, oligotrophic lake	Weaver, Amy Katherine;	2017	No	Unclear	Unclear	Unclear	Yes	DWL (Wanaka)	WQ	3	4 Thesis	Yes	Study of N, P and dissolved organic carbon concentrations entering Lake Wānaka from several upland streams and rivers. They found that agricultural grassland watersheds had higher concentrations of N and dissolved organic carbon entering Lake Wānaka than more natural watersheds.	DC
Catchment characteristics and chemical limnology of small lakes, tarns and mire pools in New Zealand (South Island) and Tasmania	Vanhoutte, Koenraad; Verleyen, Elie; Kilroy, Cathy; Sabbe, Koen; Dasseville, Renaat; Vyverman, Wim;	2006	No	Yes	Unclear	Unclear	Yes	RHAL? (65 small SI lakes)	WQ	3	2 Journal article	Yes	Only covers Lake McKellar - examines the chemical limnology and water quality of RHAL in the South Island and Tasmania.	DC
Hierarchy of factors controls denitrification rates in temperate intermittently closed and open coastal lakes/lagoons (ICOLLS)	Crawshaw, Josie A; Schallenberg, Marc; Savage, Candida; Van Hale, Robert;	2019	No	Yes	Unclear	Unclear	Yes	Unclear (2 Intermittently closed and open lakes/lagoons, possibly in Otago)	WQ	3	4 Journal article	Yes	Study sites do not include lakes and lagoons covered by this review.	Della
Sedimentary phosphorus in contrasting, shallow New Zealand lakes and its effect on water quality	Waters, Sean; Verburg, Piet; Schallenberg, Marc; Kelly, David;	2021	No	Yes	Unclear	Unclear	Yes	Unclear (six shallow NZ lakes)	WQ	3	4 Journal article	Yes	Not relevant to the named lakes in this investigation.	DC
Assessment of six lakes in the Otago Region using LakeSPI	Burton, Tracey	2021	No	Yes	Yes	Yes	Yes	Various (Hāwea, Wakatipu, Wānaka, Onslow, Dunstan, Hayes)	Ecology	3	4 Report	Yes	NIWA's LakeSPI monitoring report (2021) presented the results of a comparative study of survey data of three Otago reservoirs & DWL.	DC
Investigation of nutrient limitation status and nutrient pathways in Lake Hayes, Otago, New Zealand: A case study for integrated lake assessment	Bayer, Tina K. ; Schallenberg, Marc ; Martin, Candace E.	2008	No	Yes	Yes	Yes	Yes	AHAL	Nutrients	2	2 Journal article	Yes	Schallenberg and Martin's (2008) report presented the results of an integrated lake water quality assessment for Lake Hayes by assessing the biological significance of specific nutrients	DC
Lake water quality modelling to assess management options for Lake Hayes	McBride, C.G. Muraoka, K. and Allan, M.G	2019	No	Yes	Yes	Yes	Yes	AHAL (Hayes)	WQ	2	3 Book	Yes	Modelling report for Lake Hayes that synthesised lake monitoring data between 1983-2017 to determine the drivers of poor water quality. It presented four key management scenarios: Nutrient load reduction, arrow river diversion, artificial aeration and geochemical engineering.	DC
Fish assemblages and life history patterns in estuaries along the Otago coastline, New Zealand	Taddese, Fasil Wolebu;	2019	No	Yes	Yes	Yes	Yes	CLL (12 Otago estuaries, may be some relevant)	Ecology	2	3 Thesis	Yes	Not relevant to named lakes in this investigation.	DC

Emerging organic contaminants (EOCs) in freshwaters in Dunedin, New Zealand	Bernot, Melody J. ; Bernot, Randall J. ; Matthaei, Christoph D.	2019	No	Yes	Unclear	Unclear	Yes	CLL (not named, 4 waterways in Dunedin)	WQ	2	3 Journal article	Yes	Bernot et al,. 2018 examined the influence of emerging organic contaminants (EOCs) on the freshwater of Dunedin. Tomahawk Lagoon had the highest and most consistent count of EOC's for both pre and post sampling events. DEET was the most frequently detected compound at all four of the sites, with higher concentrations being detected at the latter half of the sampling period.	DC
Between Otago Regional Council	Baker-Galloway, Maree; Giles, Roisin; Lloyd, Anderson;	2021	No	Unclear	Unclear	Unclear	Yes	DR (Poolburn, Manorburn, Falls)	Ecology	2	3 Legal document	Yes	Recreational values of irrigation dams.	DC
Otago Regional Council's response to lake snow: A planner's evaluation	Dwyer, Stephanie Kay	2017	No	Yes	Yes	Yes	Yes	DWL	Ecology	2	3 Dissertation	Yes	Identifying the implementation gaps that influence biodiversity framework, using the DWL and lake snow as a case study. Identified there was a fundamental lack of central and local government action in response to scientist advice.	DC

ARTICLES MEETING INCLUSION CRITERIA BUT UNABLE TO BE READ WITHIN THE SCOPE OF THIS REVIEW

Title	Author	Publication date	Duplicate (confirmed)	Incl. criterion 1 (contains WQ or ecol data)	Incl. criterion 2 (relates to Otago Lakes)	Included at stage 1?	Included at stage 2?	Lake category covered	Datatype	Priority rating (ignoring date)	Priority rating (accounting for date)	Type of document
Lake Hayes eutrophication and options for management : technical report	Robertson, B. M. (Barry M.)	1988?	No	Yes	Yes	Yes	Yes	AHAL	WQ	1	1	Book
Benthic Studies in Lake Hayes, with Special Reference to the Ecology and Production of Chironomus Zealandicus (Diptera: Chironominae): A Thesis Submitted for the Degree of Master of Science, at the University of Otago	Graham, Alan Arthur;	1976	No	Yes	YEs	Yes	Yes	AHAL	Ecology	1	1	Journal article
A Resource Consent Application for a Water Permit to the Otago Regional Council (and attachments - report by Ryder most relevant)	Brown and Pemberton Planning Group	2005	No	Unclear	Yes	Unclear	Yes	AHAL (Alta)	Ecology	3	2	Report
CHAPTER FOUR: Stomach contents and stable isotope analyses reveal non-indigenous perch (Perca fluviatilis) and Daphnia pulicaria	Khan, Samiullah; Burns, Carolyn W; Closs, Gerard P;											
trophic linkages in a eutrophic lake–implications for restoration by biomanipulation	Schallenberg, Marc;	2021	No	Yes	Unclear	Unclear	Yes	AHAL (Hayes and Johnson)	Ecology	1	2	Possible duplicate
Ecology and production of Chironomus zealandicus in Lake Hayes	Graham, AA;	1976	No	Yes	Yes	Yes	Yes	AHAL (Hayes)	Ecology	1	1	Thesis
Production and ecology of benthic chironomid larvae (Diptera) in Lake Hayes, New Zealand, a warm-monomictic eutrophic lake	Graham, Alan A; Burns, Carolyn W;	1983	No	Yes	Yes	Yes	Yes	AHAL (Hayes)	Ecology	1	1	Journal article
Lake Hayes Management Strategy	Council, Otago Regional; Council, Queenstown Lakes District;	1995	No	Yes	Yes	Yes	Yes	AHAL (Hayes)	WQ	3	2	Report
Spatial and temporal variability of stream phosphorus in a New Zealand high-country agricultural catchment	Caruso, Brian S;	2000	No	Yes	Unclear	Unclear	Yes	AHAL (Hayes)	WQ	1	1	Journal article
Integrated assessment of phosphorus in the Lake Hayes catchment, South Island, New Zealand	CARUSO, B. S	2000	No	Yes	Yes	Yes	Yes	AHAL (Hayes)	WQ	2	1	Journal article
Comparative study of organic Cd and Zn complexation in lake waters – seasonality, depth and pH dependence	Sander, Sylvia ; Ginon, Léticia ; Anderson, Barry ; Hunter, Keith A.	2007	No	Yes	Unclear	Unclear	Yes	AHAL (Hayes)	WQ	2	1	Journal article
A strategy for optimizing catchment management actions to stressor–response relationships in freshwaters	McDowell, RW; Schallenberg, M; Larned, S;	2018	No	Unclear	Unclear	Unclear	Yes	AHAL (Hayes)	WQ	1	2	Journal article
A preliminary study of the limnology of Lake Hayes	Jolly, VH	1951	No	Yes	Yes	Yes	Yes	AHAL (Hayes) and DWL (Wakatipu)	Ecology	4	3	Journal article
Impacts of an eye invading parasite on the behaviour and ecology of its freshwater fish host	Ruehle, Brandon Parker;	2020	No	Yes	Unclear	Unclear	Yes	AHAL (Hayes, maybe others)	Ecology	1	2	Thesis
CHAPTER THREE: The recruitment of non-indigenous perch (Perca fluviatilis) associated with zooplankton and phytoplankton biomass and community structure in an eutrophic lake	Khan, Samiullah; Burns, Carolyn W; Closs, Gerard P; Schallenberg, Marc;		No	Yes	Unclear	Unclear	Yes	AHAL (Hayes, maybe others)	Ecology	1	2	Thesis, duplicate?)
Risk-based targeting of diffuse contaminant sources at variable spatial scales in a New Zealand high country catchment	Caruso, Brian S	2001	No	Yes	Unclear	Unclear	Yes	AHAL (Lake Hayes)	WQ	3	2	Journal article
Where Water Hides a Multitude of Sins: Impacts of Agriculture on New Zealand's Water Quality,...	Drury, M	1995	No	Yes	Unclear	Unclear	Yes	AHAL?	Unclear	1	1	Thesis
The breeding ecology of the South Island Fernbird in Otago wetlands	Harris, Wayne F;	1986	No	Yes	Unclear	Unclear	Yes	CLL	Ecology	1	1	Thesis
Assessment of antibiotic activity in surface water of the lower Taieri Plain and impacts on aquatic bacteria in Lake Waipori, South Otago, New Zealand	Schallenberg, Marc ; Armstrong, Amy	2004	No	Yes	Yes	Yes	Yes	CLL	WQ	1	1	Journal article
An empirical model for sediment resuspension in shallow lakes	Hamilton, David P; Mitchell, Stuart F;	1996	No	Yes	Unclear	Unclear	Yes	CLL (? - seven shallow SI lakes)	WQ	1	1	Journal article
Effects of sediment resuspension on phytoplankton production: teasing apart the influences of light, nutrients and algal entrainment	Schallenberg, Marc ; Burns, Carolyn W.	2004	No	Unclear	Unclear	Unclear	Yes	CLL (? - unclear)	Ecology	1	1	Journal article
Effects of salinity and source of inocula on germination of Anabaena akinetes from a tidally influenced lake	FAITHFULL, CAROLYN L. ; BURNS, CAROLYN W.	2006	No	Unclear	Unclear	Unclear	Yes	CLL (? - unclear)	Ecology	1	1	Journal article
Vegetation patterns in salt marshes of Otago, New Zealand	Partridge, TR; Wilson, JB;	1988	No	Yes	Unclear	Unclear	Yes	CLL (13 Otago salt marches - may not be relevant)	Ecology	2	1	Journal article
Late summer hyperbenthic estuarine communities: comparing permanently open and intermittently closed systems along the Otago coastline	Lill, AWT ; Closs, GP ; Schallenberg, M	2011	No	Yes	Unclear	Unclear	Yes	CLL (26 Otago estuarine systems)	Ecology	3	3	Journal article
The Ecology of the Sutton Salt Lake Scenic Reserve, Central Otago, New Zealand (with Special Reference to the Effects of Fire and Release from Grazing): A Thesis Submitted for the Degree of Master of Science of the University of Otago, Dunedin, New Zealand	Luxford, Andrew Paul;	2001	No	Yes	Yes	Yes	Yes	CLL (Salt Lake)	Ecology	2	1	Thesis
Invasion ecology of the alien tussock grass Nardus stricta (Poaceae) at Lake Pukaki, Canterbury, New Zealand	Kissling, W Daniel; Schnittler, Martin; Seddon, Philip J; Dickinson, Katharine JM; Lord, Janice M;	2005	No	Unclear	Yes	Unclear	Yes	CLL (Taieri catchment, potentially Waihola etc	Ecology	2	1	Journal article
Phosphate, nitrate, and chloride in a eutrophic coastal lake in New Zealand	Mitchell, SF;	1975	No	Yes	Unclear	Unclear	Yes	CLL (Tomahawk)	WQ	2	1	Journal article
24. Littoral algal and macrophyte communities	de Winton, M. and Schwarz, A.	2004	No	Yes	Unclear	Unclear	Yes	CLL (Tomahawk) - maybe others	Ecology	2	1	Book chapter
Do planktivorous fish structure the zooplankton communities in New Zealand lakes?	Jeppesen, Erik; Lauridsen, Torben; Mitchell, Stuart F; Burns, Carolyn W;	1997	No	Yes	Unclear	Unclear	Yes	CLL (Tomahawk, maybe others)	Ecology	2	1	Journal article
The structuring role of submerged macrophytes in lakes	Jeppesen, Erik; Søndergaard, Martin; Søndergaard, Morten; Christoffersen, Kirsten;	2012	No	Yes	Unclear	Unclear	Yes	CLL (Tomahawk, maybe others)	Ecology	2	2	Book
The effects of the freshwater mussel Hyridella menziesi on the phytoplankton of a shallow Otago lake	Ogilvie, Shaun Craig;	1994	No	Yes	Unclear	Unclear	Yes	CLL (Tuakitoto	Ecology	3	2	Thesis
Fish passage issues at Lake Tuakitoto	Mitchell, Charles	1997	No	Yes	Yes	Yes	Yes	CLL (Tuakitoto)	Ecology	2	1	Report
Facultative amphidromy in galaxiids and bullies: the science, ecology and management implications.	Hicks, Andrew;	2012	No	Yes	Unclear	Unclear	Yes	CLL (unclear which, probably Otago)	Ecology	2	2	Thesis
Consequences of climate-induced salinity increases on zooplankton abundance and diversity in coastal lakes	Schallenberg, Marc; Hall, Catherine J; Burns, Carolyn W;	2003	No	Yes	Unclear	Unclear	Yes	CLL (Waihola)	Ecology	3	2	Journal article
Responses of crustacean zooplankton to seasonal and tidal salinity changes in the coastal Lake Waihola, New Zealand	Hall, Catherine J; Burns, Carolyn W;	2003	No	Yes	Yes	Yes	Yes	CLL (Waihola)	Ecology	2	1	Journal article
Survey of aquatic macrophytes in Lake Waihola, Summer 2002-2003	Schallenberg, Marc; Waite, Ed;	2004	No	Yes	Yes	Yes	Yes	CLL (Waihola)	Ecology	2	1	Report
Spatial and temporal variation in the fish community of a South Island, New Zealand coastal lake	Kattel, Giri R; Closs, Gerard P;	2007	No	Yes	Unclear	Unclear	Yes	CLL (Waihola)	Ecology	2	1	Journal article
Benthic shear stress gradient defines three mutually exclusive modes of non-biological internal nutrient loading in shallow lakes	Thomas and Schallenberg	2008	No	Yes	Unclear	Unclear	Yes	CLL (Waihola)	WQ	2	2	Journal article
Dominance and compensatory growth in phytoplankton communities under salinity stress	Flöder, Sabine ; Jaschinski, Sybill ; Wells, Gudrun ; Burns, Carolyn W	2010	No	Yes	Unclear	Unclear	Yes	CLL (Waihola)	Ecology	1	1	Journal article
Gradual, catastrophic and human induced environmental changes from a coastal lake, southern New Zealand	Schallenberg, M; Goff, J; Harper, MA;	2012	No	Unclear	Unclear	Unclear	Yes	CLL (Waihola)	WQ	1	1	Journal article
Otago Regional Council	Council, Otago Regional;	2013	No	Unclear	Unclear	Unclear	Yes	CLL (Waihola)	WQ	2	2	RMA report
26. Bird communities of lakes and wetlands	Williams, M.	2004	No	Yes	Unclear	Unclear	Yes	CLL (Waihola, Waipori, Tuakitoto at least)	Ecology	3	2	Book chapter
Salinity in the Taieri Estuary and the Waipori/Waihola Lake-Wetland Complex, Summer and Autumn, 2001-A Brief Report	Schallenberg, Marc; Krebsbach, Amy;	2001	No	Yes	Yes	Yes	Yes	CLL (Waihola/Waipori)	WQ	2	1	Journal article
Invasion biology and ecological impacts of brown trout Salmo trutta in New Zealand	Townsend, Colin R;	1996	No	Yes	Unclear	Unclear	Yes	CLL (Waihola/Waipori? - Taieri catchment)	Ecology	2	1	Journal article
Integration of ecology and health research at the catchment scale: the Taieri River catchment, New Zealand	Parkes, Margot; Eyles, Rebekah; Benwell, George; Panelli, Ruth; Townsend, Colin; Weinstein, Philip;	2004	No	Unclear	Unclear	Unclear	Yes	CLL (Waihola/Waipori?)	WQ	2	1	Journal article

Factors affecting water quality in the lower Taieri River catchment	Ryder, Gregory I. (Gregory Ian), 1961-	1995	No	Yes	Unclear	Unclear	Yes	CLL (Waihola/Waipori??)	WQ	1	2 Book
Hydrological mass-balance model of the Waipori/Waihola Lake-Wetland Complex: evidence of significant groundwater input	Schallenberg, Marc; Peake, Barrie M; Burns, Carolyn W;	2000	No	Unclear	Yes	Unclear	Yes	CLL (Waihola-Waipori)	WQ	3	2 Report
Occurrence of the agricultural nitrification inhibitor, dicyandiamide, in surface waters and its effects on nitrogen dynamics in an experimental aquatic system	Smith and Schallenberg	2013	No	Yes	Unclear	Unclear	Yes	CLL (Waihola-Waipori)	WQ	3	3 Journal article
A temperate, tidal lake-wetland complex 1. Water balance and ecological implications	Schallenberg, Marc; Burns, Carolyn W; Peake, Barrie M;	2003	No	Yes	Unclear	Unclear	Yes	CLL (Waihola-Waipori?)	Ecology	1	1 Journal article
Assessment of antimicrobial (antibiotic) activity in surface water of the lower Taieri Plain and impacts on native bacteria in Lake Waipori	Schallenberg, Marc; Krebsbach, Amy;	2002	No	Yes	Yes	Yes	Yes	CLL (Waipor)	WQ	1	1 Journal article
Non-diadromous recruitment in coastal populations of common bully (Gobiomorphus cotidianus)	Closs, Gerard P; Smith, Melvin; Barry, Bernard; Markwitz, Andreas;	2003	No	Yes	Unclear	Unclear	Yes	CLL (Waipori - though primarily focussed on rivers)	Ecology	1	1 Journal article
Plankton Response to Agricultural Contaminants and Their Potential as Environmental Indicators in Lake Waipori, New Zealand: A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of Bachelor of Science, with Honours (Ecology) at the University of Otago, Dunedin, New Zealand	Copson, Jonathan;	1998	No	Yes	Yes	Yes	Yes	CLL (Waipori)	Ecology	3	2 Thesis
Lake eutrophication in New Zealand—a comparison with other countries of the Organisation for Economic Co-operation and Development	White, E;	1983	No	Yes	Unclear	Unclear	Yes	Doesn't appear to include Otago lakes, but worth double checking if time	WQ	1	1 Journal article
Lake Dunstan zooplankton : community development and composition : a thesis submitted in partial fulfilment of the requirements for the degree of Masters of Science in Ecology at the University of Otago, Dunedin, New Zealand	Leach, Craig Robert, 1972-	1997	No	Yes	Yes	Yes	Yes	DR	Ecology	1	1 Thesis
27. Aquatic invaders and pest species in lakes	Closs, G, Dean, T., Champion, P., and Hofstra, D.	2004	No	Yes	Unclear	Unclear	Yes	DR (Dunstan, maybe others)	Ecology	2	1 Book chapter
Lake Hayes: Trends in water quality and potential restoration options	Bayer, T, Schallenberg, M	2009	No	Yes	Yes	Yes	Yes	AHAL (Hayes)	WQ	3	3 Report
Possible competitive exclusion of common river galaxias (Galaxias vulgaris) by koaro (G. brevipinnis) following impoundment of the Waipori River, Otago, New Zealand	McDowall, RM; Allibone, RM;	1994	No	Yes	Unclear	Unclear	Yes	DR (Mahinerangi)	Ecology	2	1 Journal article
23. Food webs in lakes	Rowe, D. and Schallenberg, M.	2004	No	Yes	Unclear	Unclear	Yes	DR (Mahinerangi, maybe others)	Ecology	3	2 Book chapter
Phytoplankton biomass and productivity in two oligotrophic lakes of short hydraulic residence time	Schallenberg, Marc; Burns, Carolyn W;	1997	No	Yes	Unclear	Unclear	Yes	DR/DWL (Dunstan and Wakatipu)	Ecology	3	2 Journal article
Ground Water Quality of the Wanaka and Wakatipu Basins, Central Otago, New Zealand	Rosen, Michael R;	1997	No	Unclear	Unclear	Unclear	Yes	DWL	WQ	3	Journal article (unclear if SW 2 sampling included)
The diatom Lindavia intermedia identified as the producer of nuisance pelagic mucilage in lakes	Novis, Phil; Schallenberg, Marc; Saulnier-Talbot, Émilie; Kilroy, Cathy; Reid, Michael; Kilroy, Catherine; Whitehead, Amy L; Wood, Susanna A; Vandergoes, Marcus J; Lambert, Paul;	2017	No	Yes	Unclear	Unclear	Yes	DWL	Ecology	2	3 Journal article
Predicting the potential distribution of the invasive freshwater diatom Lindavia intermedia in New Zealand lakes.	Novis, Phil M;	2021	No	Yes	Unclear	Unclear	Yes	DWL	Ecology	2	3 Journal article
Effective human wastewater management in rapidly growing towns in sensitive receiving environment-A perspective on Queenstown-Lakes District Area	Selvarajah, Selva;		No	Yes	Yes	Yes	Yes	DWL	WQ	2	2 Journal article
Notes on the submerged vegetation of Lake Hawea	Clayton, J; Schwarz, As; Coffey, B;	1986	No	Yes	Yes	Yes	Yes	DWL (Hāwea and Wānaka)	Ecology	3	2 Journal article
41. Sport fishery management	Deans, N., Unwin, M. and Rodway, M.	2004	No	Unclear	Unclear	Unclear	Yes	DWL (Hāwea and Wānaka) + DR (Dunstan)	Ecology	2	1 Book chapter
Contrasting controls on phytoplankton dynamics in two large, pre-alpine lakes imply differential responses to climate change	Bayer, Tina K; Schallenberg, Marc; Burns, Carolyn W;	2016	No	Yes	Unclear	Unclear	Yes	DWL (unclear, but sounds like Hāwea and Wānaka are described)	WQ	3	3 Journal article
Application of a numerical model to predict impacts of climate change on water temperatures in two deep, oligotrophic lakes in New Zealand	Bayer, Tina K; Burns, Carolyn W; Schallenberg, Marc;	2013	No	Yes	Unclear	Unclear	Yes	DWL (Wakatipu and Wanaka)	WQ	2	2 Journal article
Effects of climate change on two large, deep oligotrophic lakes in New Zealand	Bayer, Tina Karola;	2013	No	Unclear	Unclear	Unclear	Yes	DWL (Wakatipu and Wanaka)	Ecology	3	3 Thesis
Spatial abundance and distribution of picocyanobacterial communities in two contrasting lakes revealed using environmental DNA metabarcoding	Schallenberg, Lena A; Pearman, John K; Burns, Carolyn W; Wood, Susanna A;	2021	No	Yes	Unclear	Unclear	Yes	DWL (Wanaka)	Ecology	1	2 Journal article
The effect of land use on nutrient inputs, nutrient cycling and water quality in Lake Wānaka	Weaver, Amy Katherine;	2015	No	Yes	Yes	Yes	Yes	DWL (Wānaka)	WQ	3	3 Report
Studies on the distribution and ecology of the family lymnaeidae (Mollusca: Gastropoda) in New Zealand	Pullan, NB; Climo, FM; Mansfield, Caroline B;	1972	No	Yes	Unclear	Unclear	Yes	DWL, also Hayes and Tomahawk	Ecology	3	2 Journal article
The comparative limnology of some New Zealand lakes: 2. Plankton	Jolly, VH; Chapman, MA;	1977	No	Yes	Unclear	Unclear	Yes	DWL, maybe others (7 in Otago/Southland)	Ecology	3	2 Journal article
Ecological integrity of deep lakes in New Zealand across anthropogenic pressure gradients	Özkundakci, Deniz ; Hamilton, David P ; Kelly, David ; Schallenberg, Marc ; de Winton, Mary ; Verburg, Piet ; Trolle, Dennis	2014	No	Yes	Unclear	Unclear	Yes	DWL? (Not stated in abstract)	Ecology	2	2 Journal article
Shallow coastal lakes in New Zealand: current conditions, catchment-scale human disturbance, and determination of ecological integrity	Drake, D. C ; Kelly, David ; Schallenberg, Marc	2010	No	Yes	Unclear	Unclear	Yes	No stated in abstract, 45 shallow coastal lakes nationwide, likely to include Waihola and others	Ecology	3	3 Journal article
Lake managers handbook: a guide to undertaking and understanding investigations into lake ecosystems, so as to assess management options for lakes	Vant, WN;	1987	No	Unclear	Unclear	Unclear	Yes	Unclear	Unclear	1	1 Report
Tests of autotrophic picoplankton as early indicators of nutrient enrichment in an ultra-oligotrophic lake	Schallenberg, Marc ; W. Burns, Carolyn	2001	No	Yes	Unclear	Unclear	Yes	Unclear	Ecology	2	1 Journal article
Geomorphology and hydrology of Lakes	Mosley, P	2004	No	Yes	Unclear	Unclear	Yes	Unclear	WQ	1	1 Book chapter
28. Wetland ecosystems	Sorrell, B. and Gerbeaux, P.	2004	No	Unclear	Unclear	Unclear	Yes	Unclear	Ecology	2	1 Book chapter
39. Lake restoration	Rowe, D.	2004	No	Yes	Unclear	Unclear	Yes	Unclear	WQ	1	1 Book chapter
The invasion ecology of Didymosphenia geminata in New Zealand	Hammond, Vanessa Anne;	2013	No	Yes	Unclear	Unclear	Yes	Unclear	Ecology	1	1 Thesis
Ecosystem services of lakes	Schallenberg, Marc; de Winton, Mary D; Verburg, Piet; Kelly, David J; Hamill, Keith D; Hamilton, David P;	2013	No	Unclear	Unclear	Unclear	Yes	Unclear	Ecology	2	2 Journal article
Potential use of classical biomanipulation to improve water quality in New Zealand lakes: a re-evaluation	Burns, Carolyn W; Schallenberg, Marc; Verburg, Piet;	2014	No	Unclear	Unclear	Unclear	Yes	Unclear	Ecology	1	1 Journal article
Economic value of freshwater recreational angling in Otago: A travel cost method approach	Jiang, Liang;	2015	No	Unclear	Unclear	Unclear	Yes	Unclear	Ecology	1	1 Thesis
Water quality in New Zealand's planted forests: a review	Baillie, Brenda R ; Neary, Daniel G	2015	No	Yes	Unclear	Unclear	Yes	Unclear	WQ	3	3 Journal article
Body condition peaks at intermediate parasite loads in the common bully Gobiomorphus cotidianus	Maceda-Veiga, Alberto ; Green, Andy J ; Poulin, Robert ; Lagrue, Clément	2016	No	Yes	Unclear	Unclear	Yes	Unclear	Ecology	1	1 Journal article

Troubled waters: Maori values and ethics for freshwater management and New Zealand's fresh water crisis	Stewart-Harawira, Makere W.	2020	No	Unclear	Unclear	Unclear	Yes	Unclear	WQ	1	2 Journal article
Section 42A Hearing Report	Boyd, Felicity;	2022	No	Unclear	Unclear	Unclear	Yes	Unclear	WQ (unclear	1	2 Legal document (may include some WQ data)
Reference and current Trophic Level Index of New Zealand lakes: benchmarks to inform lake management and assessment	Abell, Jonathan M. ; van Dam-Bates, Paul ; Özkundakci, Deniz ; Hamilton, David P.	2020	No	Yes	Unclear	Unclear	Yes	Unclear - 1031 NZ lakes	WQ	2	3 Journal article
Methyl mercury bioaccumulation in long-finned eels, Anguilla dieffenbachii, from three rivers in Otago, New Zealand	Redmayne, Amanda C ; Kim, Jonathan P ; Closs, Gerard P ; Hunter, Keith A	2000	No	Yes	Unclear	Unclear	Yes	Unclear - eels sampled in rivers - included in case rivers sampled were connected to a relevant lake	Ecology	1	1 Journal article
A comparison of the trophic transfer of fatty acids in freshwater plankton by cladocerans and calanoid copepods	BURNS, CAROLYN W. ; BRETT, MICHAEL T. ; SCHALLENBERG, MARC	2011	No	Unclear	Unclear	Unclear	Yes	Unclear - lakes in NZ	Ecology	2	2 Journal article
Potential use of classical biomanipulation to improve water quality in New Zealand lakes: a re-evaluation	Burns, Carolyn W ; Schallenberg, Marc ; Verburg, Piet	2014	No	Yes	Unclear	Unclear	Yes	Unclear - perhaps Hayes or Waihola	Ecology	2	2 Journal article
Relating planktonic microbial food web structure in lentic freshwater ecosystems to water quality and land use	Burns, Carolyn W. ; Galbraith, Lisa M.	2007	No	Yes	Unclear	Unclear	Yes	Unclear - South Island water bodies including lakes	Ecology	3	2 Journal article
New Zealand lakes research, 1967–91	Burns, Carolyn W;	1991	No	Yes	Unclear	Unclear	Yes	Unclear - various NZ lakes	WQ	1	1 Journal article
Inputs of Nutrients and Fecal Bacteria to Freshwaters from Irrigated Agriculture: Case Studies in Australia and New Zealand	Wilcock, Robert J ; Nash, David ; Schmidt, Jochen ; Larned, Scott T ; Rivers, Mark R ; Feehan, Pat	2011	No	Yes	Unclear	Unclear	Yes	Unclear - water quality sites near irrigated pasture in Au/NZ)	WQ	2	2 Journal article
Relationships between land use and nitrogen and phosphorus in New Zealand lakes	Abell, Jonathan M; Özkundakci, Deniz; Hamilton, David P; Miller, Steven D;	2011	No	Yes	Unclear	Unclear	Yes	Unclear (101 NZ lakes)	WQ	2	2 Journal article
Lake Water Quality in New Zealand 2010: Status and Trends	Verburg, P., Hamill, K., Unwin, M., Abell, J.	2010	No	Yes	Unclear	Unclear	Yes	Unclear (112 NZ lakes)	Both	3	3 Report
Nitrogen and phosphorus limitation of phytoplankton growth in New Zealand lakes: implications for eutrophication control	Abell, Jonathan M; Özkundakci, Deniz; Hamilton, David P;	2010	No	Yes	Unclear	Unclear	Yes	Unclear (121 NZ lakes)	WQ	2	2 Journal article
The Role of Environmental Processes and Geographic Distance in Regulating Local and Regionally Abundant and Rare Bacterioplankton in Lakes	Pearman, John K et al	2022	No	Yes	Unclear	Unclear	Yes	Unclear (167 NZ Lakes)	Ecology	2	3 Journal article
Responses of lake phytoplankton to micronutrient enrichment: a study in two New Zealand lakes and an analysis of published data	Downs, Theresa M ; Schallenberg, Marc ; Burns, Carolyn W	2008	No	Yes	Unclear	Unclear	Yes	Unclear (2 NZ lakes, includes Marc Schallenberg)	WQ	3	3 Journal article
The application of stressor–response relationships in the management of lake eutrophication	Schallenberg, Marc;	2021	No	Yes	Unclear	Unclear	Yes	Unclear (3 NZ eutrophic lakes)	WQ	2	3 Journal article
Spread and status of seven submerged pest plants in New Zealand lakes	deWinton, Mary D; Champion, Paul D; Clayton, John S; Wells, Rohan DS;	2009	No	Yes	Unclear	Unclear	Yes	Unclear (344 NZ lakes surveyed)	Ecology	3	3 Journal article
Quantifying Relationships among Phosphorus, Agriculture, and Lake Depth at an Inter-Regional Scale	Taranu, Zofia E ; Gregory-Eaves, Irene	2008	No	Yes	Unclear	Unclear	Yes	Unclear (358 temperate lakes worldwide)	WQ	1	1 Journal article
Regime shifts between clear and turbid water in New Zealand lakes: environmental correlates and implications for management and restoration	Schallenberg, Marc; Sorrell, Brian;	2009	No	Yes	Unclear	Unclear	Yes	Unclear (37 NZ lakes)	Ecology	2	2 Journal article
Calanoid copepods versus cladocerans: consumer effects on protozoa in lakes of different trophic status	Burns, Carolyn W; Schallenberg, Marc;	2001	No	Unclear	Unclear	Unclear	Yes	Unclear (4 lakes, presumably in NZ, likely Otago)	Ecology	2	1 Journal article
Relating planktonic microbial food web structure in lentic freshwater ecosystems to water quality and land use	Burns, Carolyn W; Galbraith, Lisa M;	2007	No	Unclear	Unclear	Unclear	Yes	Unclear (45 south island water bodies)	Ecology	2	1 Journal article
Short title: microbial food webs in lakes and wetlands 16 Key words: bacteria, picocyanobacteria, heterotrophic flagellates, ciliates, trophic gradient 17 18	Burns, Carolyn W; Galbraith, Lisa M;	No	Yes	Unclear	Unclear	Unclear	Yes	Unclear (45 south island water bodies)	Ecology	3	2 Journal article? Duplicate?
Diatom-based models for reconstructing past water quality and productivity in New Zealand lakes	Reid, Michael;	2005	No	Unclear	Unclear	Unclear	Yes	Unclear (53 NZ lakes)	WQ	3	2 Journal article
Wave-induced shear stresses, plant nutrients and chlorophyll in seven shallow lakes	HAMILTON, DAVID; MITCHELL, STUART;	1997	No	Yes	Unclear	Unclear	Yes	Unclear (7 shallow SI lakes	WQ	2	1 Thesis
Tests of autotrophic picoplankton as early indicators of nutrient enrichment in an ultra-oligotrophic lake	Schallenberg, Marc; W. Burns, Carolyn;	2001	No	Yes	Unclear	Unclear	Yes	Unclear (DWL?)	Ecology	2	1 Journal article
Lake and species specific patterns of non-diadromous recruitment in amphidromous fish: the importance of local recruitment and habitat requirements	Hicks, Andy S; Jarvis, Matt G; David, Bruno O; Waters, Jonathan M; Norman, Marc D; Closs, Gerard P;	2017	No	Yes	Unclear	Unclear	Yes	Unclear (multiple SI lakes)	Ecology	2	3 Journal article
The impact of introduced brown and rainbow trout on native fish: the case of Australasia	Crowl, Todd A; Townsend, Colin R; McIntosh, Angus R;	1992	No	Yes	Unclear	Unclear	Yes	Unclear (no abstract)	Ecology	2	1 Journal article
Effects of climate change on New Zealand Lakes	Hamilton, David P; McBride, CG; Özkundakci, Deniz; Schallenberg, Marc; Verburg, Piet; de Winton, Mary; Kelly, David; Hendy, Chris; Ye, Wei;	2013	No	Unclear	Unclear	Unclear	Yes	Unclear (no abstract)	WQ	1	1 Book chapter
Identifying invertebrate invasions using morphological and molecular analyses: North American Daphnia 'pulex'in New Zealand fresh waters	Duggan, Ian C; Robinson, Karen V; Burns, Carolyn W; Banks, Jonathan C; Hogg, Ian D;	2012	No	Unclear	Unclear	Unclear	Yes	Unclear (NZ lakes, number not stated)	Ecology	1	1 Journal article
Locations of Recoversies of Black Swans, Cygnus atratus Latham, Banded at Lake Whangape and Lake Ellesmere New Zealand	Williams, Murray;	1977	No	Yes	Unclear	Unclear	Yes	Unclear (primarily Lake Ellesmere, reference to 'south-eastern NZ)	Ecology	1	1 Journal article
Assessment of Environmental Effects for water abstraction from Manuherikia River from the Falls Dam to the confluence with the Clutha/Mata Au	Hicken, M. and Olsen, D.	2020	No	Yes	Unclear	Unclear	Yes	Unclear (references to Falls Dam and others in Manuherikia, primarily focussed on the river)	Ecology	1	2 Report
Physical and chemical characteristics of lake water	Hawes, I., Davies-Colley, R., Hamilton, D.	2004	No	Yes	Unclear	Unclear	Yes	Unclear (various NZ lakes)	WQ	3	2 Book chapter
Water quality and the effects of different pastoral animals	McDowell, RW ; Wilcock, RJ	2008	No	Yes	Unclear	Unclear	Yes	Unclear, 38 catchment scale studies in NZ	WQ	2	2 Journal article

A bacterial index to estimate lake trophic level: National scale validation	Pearman, John K ; Wood, Susanna A ; Vandergoes, Marcus J ; Atalah, Javier ; Waters, Sean ; Adamson, Janet ; Thomson-Laing, Georgia ; Thompson, Lucy ; Howarth, Jamie D ; Hamilton, David P ; Pochon, Xavier ; Biessy, Laura ; Brasell, Katie A ; Dahl, Jenny ; Ellison, Riki ; Fitzsimons, Sean J ; Gard, Henry ; Gerrard, Tania ; Gregersen, Rose ; Holloway, McKayla ; Li, Xun ; Kelly, David J ; Martin, Reece ; McFarlane, Kiely ; McKay, Nicholas P ; Moody, Adelaine ; Moy, Chris M ; Naeher, Sebastian ; Newnham, Rewi ; Parai, Russleigh ; Picard, Maïlys ; Puddick, Jonathan ; Rees, Andrew B.H ; Reyes, Lizette ; Schallenberg, Marc ; Shepherd, Claire ; Short, Julia ; Simon, Kevin S ; Steiner, Konstanze ; Šunde, Charlotte ; Terezow, Marianna ; Tibby, John	2022	No	Yes	Unclear	Unclear	Yes	Unclear, 96 NZ lakes	Ecology	3	3 Journal article
Responses of lake phytoplankton to micronutrient enrichment: a study in two New Zealand lakes and an analysis of published data	Downs, Theresa M; Schallenberg, Marc; Burns, Carolyn W;	2008	No	Yes	Unclear	Unclear	Yes	Unclear, two NZ lakes	WQ	3	3 Journal article
Sports Fish and Game Management Plan for Otago Fish and Game Region, 2015-2025	Otago Fish and Game Council	2015	No	Yes	Yes	Yes	Yes	Various (especially DR and DWL)	Ecology	3	3 Report
Regulations of Effluent Discharges in the Otago Region	Selvarajah, Selva;	2008	No	Unclear	Unclear	Unclear	Yes	Various (Waipori, Wakatipu, Wānaka)	WQ	2	2 Conference presentation?

ARTICLES FOUND USING SEARCH STRATEGY BUT EXCLUDED (DUPLICATE, NOT MEETING INCLUSION CRITERIA, OR FULL ARTICLE NOT LOCATED)

Title	Author	Publication date	Duplicate (confirmed)	Incl. criterion 1 (contains WQ or ecol data)	Incl. criterion 2 (relates to Otago Lakes)	Included at stage 1?	Included at stage 2?	Lake category covered
Spencer St stormwater - Land discharge consent application	Dunedin City Council	2019	No	Unclear	Yes	Unclear	No	Has some potentially useful background info on Tomahawk Lagoon in Section 3, but no water quality data that I could see.
The ecology of the halophytic vegetation at Lake Ellesmere, New Zealand	Evans, LT;	1953	No	Yes	No	No	No	
Plant ecology of part of the Godley Valley, Lake Tekapo	Scott, David;	1959	No	Unclear	No	No	No	
NEW ZEALAND Bibliography by J. W. Brodie BATHAM, EJ 1958. Ecology of Southern New Zealand Exposed Rocky Shore at Little Papanui, O	BRODIE, JW; Harbour, South Island; NZ, Roy Soc;	1960	No	Unclear	No	No	No	
Ecology of Leptospermum in Otago	Burrell, Juliet;	1965	No	Yes	Unclear	Unclear	No	
ECOLOGY OF LEPTOSPERMUM IN OTAGO	Thomas, RG;	1965	No	No	Unclear	No	No	
Nesting of the black swan at Lake Ellesmere, New Zealand	Miers, Kenneth Henley; Williams, Murray;	1969	No	Yes	No	No	No	
The size-efficiency hypothesis and the size structure of zooplankton communities	Hall, Donald J; Threlkeld, Stephen T; Burns, Carolyn W	1976	No	Yes	Unclear	Unclear	No	
Comparative feeding ecology of New Zealand marine shags (Phalacrocoracidae)	Lalas, Chris;	1983	No	Yes	Unclear	Unclear	No	
Inland waters of New Zealand	Viner, Anthony B;	1987	No	Unclear	Unclear	Unclear	Unable to locate	
The ecology of early Miocene plants of Central Otago	Pole, MS;	1988	No	Unclear	Unclear	Unclear	No	
Early Miocene floras from Central Otago, New Zealand	Pole, Mike;	1989	No	Unclear	Unclear	Unclear	No	
New Zealand's pre-human avifauna and its vulnerability	Holdaway, RN;	1989	No	Unclear	Unclear	Unclear	No	
Observations of gulls foraging on beach-stranded plankton in Otago Harbor, New Zealand	McClatchie, S; Jillett, JB; Gerring, P;	1991	No	Yes	No	No	No	
Microhabitat and thermal ecology of two sympatric species of lizard in Otago grassland	Spencer, Nicholas John;	1991	No	No	Unclear	No	No	
TEMPORAL CHANGES IN THE INDIGENOUS VEGETATION PATTERN OF OTAGO, EASfW ARDS FROM THE LAKES DISTRICT	Mark, AF;	1991	No	Unclear	Unclear	Unclear	No	
Lepidoptera and other insects of the Rastus Burn Basin, the Remarkables, Otago	Patrick, Brian H; Lyford, Brian M; Ward, John B; Barrat	1992	No	Unclear	Unclear	Unclear	No	
Population structure, shell morphology, age and condition of the freshwater mussel Hyridella menziesi (Unionacea: Hyriidae) from seven l	Roper, David S; Hickey, Christopher W;	1994	No	Unclear	No	No	No	
Where Water Hides a Multitude of Sins: Impacts of Agriculture on New Zealand's Water Quality,...	Drury, Maree;	1995	Yes			No	No	
Spatial and temporal variation in the relative density and size of juvenile brown trout in the Kakanui River, North Otago, New Zealand	Hayes, John W;	1995	No	Yes	Unclear	Unclear	No	
Aspects of the ecology and conservation of the threatened tree Olearia hectorii in New Zealand	Rogers, GM;	1996	No	No	Unclear	No	No	
Regeneration ecology, conservation status and recovery planning for the endangered tree Olearia hectorii	Rogers, Geoffrey Malcolm;	1996	No	No	No	No	No	
Marine, benthic ostracod ecology, taphonomy and evolution: studies from the South West Pacific	Swanson, Kerry Michael;	1996	No	Unclear	Unclear	Unclear	No	
Lake Dunstan Zooplankton: Community Development and Composition: a Thesis Submitted in Partial Fulfilment of the Requirements for t	Leach, Craig Robert;	1997	Yes			No	No	
Tors and local plant geography and ecology in Central Otago, New Zealand	Wearing, Alexander;	1997	No	Unclear	Unclear	Unclear	Unable to locate	
Seasonal variation in the diet of New Zealand fur seals ( ) at Otago Peninsula, New Zealand	Fea, Nyree I. ; Harcourt, Robert ; Lalas, Chris	1999	No	Unclear	Unclear	Unclear	No	
Whipcord Hebes-systematics, distribution, ecology and evolution	Wagstaff, Steven J; Wardle, Peter;	1999	No	Unclear	Unclear	Unclear	No	
Ecological assessment of two islands in west Otago lakes for potential re-introduction of buff weka (Gallirallus australis hectori)	Edwards, Eric Douglas; Logan, Rory;	1999	No	No	Unclear	No	No	
Manipulative field experiments in animal ecology: do they promise more than they can deliver?	Raffaelli, D; Moller, Henrik;	1999	No	Unclear	Unclear	Unclear	No	
Ecology and distribution of the freshwater crayfish Paranephrops zealandicus in Otago	Whitmore, Nathan; Huryn, Alexander D; Arbuckle, Chr	2000	No	Yes	Unclear	Unclear	No	
Distribution of the New Zealand crayfish Paranephrops zealandicus in relation to stream physico-chemistry, predatory fish, and invertebra	Usio, Nisikawa; Townsend, Colin R;	2000	No	Yes	Unclear	Unclear	No	
A woody shrub from the Miocene Nevis Oil Shale, Otago, New Zealand-a possible fossil divaricate?	Campbell, JD; Lee, DE; Lee, WG;	2000	No	Unclear	Unclear	Unclear	No	
Integrated assessment of phosphorus in the lake hayes catchment, south island, new zealand	Caruso, BS;	2000	Yes			No	No	
Water quality and habitat issues related to Lakes Waihola and Waipori	Council, Otago Regional;	2000	No	Yes	Yes	Yes	Unable to locate	
Regional river flow, water quality, aquatic ecological impacts and recovery from drought	CARUSO, BRIAN S.	2001	No	Yes	Unclear	Unclear	No	
Freshwater mussels (Hyriidae) of Australasia	Walker, Keith F; Byrne, Maria; Hickey, Christopher W;	2001	No	Yes	Unclear	Unclear	No	
Distribution of native forest in the upper Clutha district, Otago, New Zealand	Wardle, Peter;	2001	No	Unclear	Unclear	Unclear	No	
Ecology and Evolution of the Freshwater Mussels Unionoida: With 38 Tables	Bauer, Gerhard;	2001	No?	Yes	Unclear	Unclear	No	
Fruit features in relation to the ecology and distribution of Acaena (Rosaceae) species in New Zealand	Lee, William G; Macmillan, BH; Partridge, TR; Lister, R;	2001	No	No	No	No	No	
An analysis of phytolith assemblages for the quantitative reconstruction of late Quaternary environments of the Lower Taieri Plain, Otago	Prebble, Matiu; Schallenberg, Marc; Carter, John; Shu	2002	No	Unclear	Unclear	Unclear	No	
Ecology and conservation status of three “spring annual” herbs in dryland ecosystems of New Zealand	Rogers, Geoffrey; Walker, Susan; Tubbs, Michael; Hen	2002	No	No	No	No	No	
Temporal and spatial patterns of extreme low flows and effects on stream ecosystems in Otago, New Zealand	Caruso, BS;	2002	No	Unclear	Unclear	Unclear	No	
Conservation of lizards in Otago Conservancy	Whitaker, AH; Tocher, MD; Blair, Tracy;	2002	No	No	No	No	No	
Ecology of eelgrass, Zostera novazelandica Setchell, in Otago Harbour, Dunedin, New Zealand	Ismail, Norhadi Bin;	2002	No	Unclear	No	No	No	
Ecological effects of perturbation by drought in flowing waters	Lake, P. S.	2003	No	Yes	No	No	No	
A temperate, tidal lake-wetland complex 2. Water quality and implications for zooplankton community structure	Schallenberg, Marc; Burns, Carolyn W;	2003	Yes			No	No	
Distribution, ecology, and conservation status of freshwater Idoteidae (Isopoda) in southern New Zealand	Chadderton, WL; Ryan, PA; Winterbourn, MJ;	2003	No	Yes	Unclear	Unclear	No	
Comparison of the weevil fauna (Coleoptera: Curculionoidea) in two tussock grassland sites in Otago, New Zealand	Murray, TJ; Barratt, BIP; Dickinson, KJM;	2003	No	No	No	No	No	
Ecological effects of perturbation by drought in flowing waters	Lake, Phillip S;	2003	No	Yes	Unclear	Unclear	No	
A temperate, tidal lake-wetland complex 1. Water balance and ecological implications	Schallenberg, Burns and Peake	2003	Yes			No	No	
A temperate, tidal lake-wetland complex 2. Water quality and implications for zooplankton community structure	Schallenbergy and Burns	2003	Yes			No	No	
Consequences of climate-induced salinity increases on zooplankton abundance and diversity in coastal lakes	Schallenbergy, Hall and Burns	2003	Yes			No	No	
Assessment of antibiotic activity in surface water of the lower Taieri Plain and impacts on aquatic bacteria in Lake Waipori, South Otago, N	Schallenberg, Marc; Armstrong, Amy;	2004	Yes			No	No	
Scale-dependence of land use effects on water quality of streams in agricultural catchments	Buck, Oliver; Niyogi, Dev K; Townsend, Colin R;	2004	No	Yes	Unclear	Unclear	No	
Survey of aquatic macrophytes in Lake Waihola, Summer 2002-2003	Schallenberg and Waite	2004	Yes			No	No	

Effects of sediment resuspension on phytoplankton production: teasing apart the influences of light, nutrients and algal entrainment	Schallenberg and Burns	2004	Yes			No	No
40. Wetland management and resoration	Sorrell, B., Reeves, P., Clarkson, B.	2004	No	Unclear	Unclear	Unclear	No
Lake and Reservoir Management	Bhatti, Zafar	2005	No	Unclear	Unclear	Unclear	No
Tracing the Influence of Sewage Nitrogen in a Coastal Ecosystem Using Stable Nitrogen Isotopes	Savage, Candida	2005	No	Unclear	Unclear	Unclear	No
Ecology of Freshwater Fish in the Littoral Zone of Lake Waikere, Kai Iwi Lakes, Northland, New Zealand: For the Conservation of the Dune	Pingram, Michael Alister;	2005	No	Yes	No	No	No
The geochemical environment during rehabilitation of the Wangaloa opencast coal mine, Southeast Otago, New Zealand	Baker, Michelle Amy;	2005	No	Yes	Unclear	Unclear	No
Fire in wetlands and scrub vegetation: studies in Southland, Otago, and Westland	Johnson, Peter N;	2005	No	Unclear	Unclear	Unclear	No
Mobilisation and attenuation of boron during coal mine rehabilitation, Wangaloa, New Zealand	CRAW, D ; RUFAUT, C. G ; HAFFERT, L ; TODD, A	2006	No	Yes	Unclear	Unclear	No
Impacts of fine sediment addition to tussock, pasture, dairy and deer farming streams in New Zealand	MATTHAEI, CHRISTOPH D. ; WELLER, FLORIAN ; KELL	2006	No	Yes	Unclear	Unclear	No
Associations Between Weevils (Coleoptera: Curculionidea) and Plants, and Conservation Values in Two Tussock Grasslands, Otago, New Ze	Murray, T. J. ; Dickinson, K. J. M. ; Barratt, B. I. P.	2006	No	Unclear	Unclear	Unclear	No
Lake tourism in New Zealand: sustainable management issues	Hall, C Michael; Stoffels, Michelle;	2006	No	Unclear	Unclear	Unclear	No
Pit-lake water quality in coal deposits, Southland, New Zealand: a comparison between the lignite and sub-bituminous coal deposits of So	Mulliner, Timothy;	2006	Yes			No	No
Pit lake water quality in coal deposits	Mulliner, T;	2006	Yes			No	No
Temporal and spatial variability of acid rock drainage in a rehabilitated coal mine, Wangaloa, South Otago, New Zealand	Begbie, Michelle ; Craw, Dave ; Rufaut, Cathy ; Mart	2007	No	Yes	Unclear	Unclear	No
Stream Ecosystem Health Outcomes of Providing Information to Farmers and Adoption of Best Management Practices	RHODES, HEATHER M ; CLOSS, GERARD P ; TOWNSEN	2007	No	Unclear	Unclear	Unclear	No
Adoption of stream fencing among dairy farmers in four New Zealand catchments	Bewsell, Denise ; Monaghan, Ross M ; Kaine, Geoff	2007	No	Unclear	Unclear	Unclear	No
Impact of summer droughts on water quality of the Rhine River - a preview of climate change?	Zwolsman, J J G ; van Bokhoven, A J	2007	No	Unclear	No	No	No
Linking land-use, water body type and water quality in southern New Zealand	Galbraith, Lisa M; Burns, Carolyn W;	2007	Yes			No	No
Temporal and spatial variability of acid rock drainage in a rehabilitated coal mine, Wangaloa, South Otago, New Zealand	Begbie, Michelle; Craw, Dave; Rufaut, Cathy; Martin,	2007	Yes			No	No
Galaxias fossils from Miocene lake deposits, Otago, New Zealand: the earliest records of the Southern Hemisphere family Galaxiidae (Tele	Lee, DE; McDowall, RM; Lindqvist, JK;	2007	No	Unclear	Unclear	Unclear	No
Fossil scale insects (Hemiptera, Coccoidea, Diaspididae) in life position on an angiosperm leaf from an Early Miocene lake deposit, Otago,	Harris, Anthony C; Bannister, Jennifer M; Lee, Daphne	2007	No	Unclear	Unclear	Unclear	No
Stratigraphic controls on water quality at coal mines in southern New Zealand	Craw, D. ; Mulliner, T. ; Haffert, L. ; Paulsen, H-K. ; P	2008	No	Yes	Unclear	Unclear	No
Investigation of nutrient limitation status and nutrient pathways in Lake Hayes, Otago, New Zealand: a case study for integrated lake asse	Bayer, Tina K; Schallenberg, Marc; Martin, Candace E;	2008	Yes			No	No
Lake Rotokakahi: The kakahi (Hyridella menziesi) in a general framework of lake health.	Butterworth, Joseph;	2008	No	Yes	No	No	No
Guide to identification and ecology of New Zealand subfossil chironomids found in lake sediment	Dieffenbacher-Krall, Ann C; Vandergoes, Marcus J; Wo	2008	No	No	Unclear	No	No
The benthic ecology and food web dynamics of Te Waihora (Lake Ellesmere)	Wood, Hannah;	2008	No	Unclear	No	No	No
Coprolite deposits reveal the diet and ecology of the extinct New Zealand megaherbivore moa (Aves, Dinornithiformes)	Wood, Jamie R; Rawlence, Nicolas J; Rogers, Geoffery	2008	No	No	Unclear	No	No
Quantifying relationships among phosphorus, agriculture, and lake depth at an inter-regional scale	Taranu, Zofia E; Gregory-Eaves, Irene;	2008	Yes			No	No
Responses of lake phytoplankton to micronutrient enrichment: a study in two New Zealand lakes and an analysis of published data	Downs, Schallenberg and Burns	2008	Yes			No	No
Investigation of nutrient limitation status and nutrient pathways in Lake Hayes, Otago, New Zealand: a case study for integrated lake asse	Bayer, Schallenberg and Martin	2008	Yes			No	No
Effect of land use and moisture on phosphorus forms in upland stream beds in South Otago, New Zealand	MCDOWELL, Richard W	2009	No	Yes	Unclear	Unclear	No
Scientists at University of Otago target marine biology		2009	No	Unclear	Unclear	Unclear	No
Grassland farming and water quality in New Zealand	Quinn, JM; Wilcock, RJ; Monaghan, RM; McDowell, R	2009	No	Unclear	Unclear	Unclear	No
Glacial refugia in a maritime temperate climate: cicada (Kikihia subalpina) mtDNA phylogeography in New Zealand	Marshall, David C; Hill, Kathy BR; Fontaine, Kathryn M	2009	No	Unclear	Unclear	Unclear	No
Earliest orchid macrofossils: early Miocene dendrobium and earina (Orchidaceae: Epidendroideae) from New Zealand	Conran, John G; Bannister, Jennifer M; Lee, Daphne E;	2009	No	Unclear	Unclear	Unclear	No
Nitrogen yields from New Zealand coastal catchments to receiving estuaries	Heggie, Keira; Savage, Candida;	2009	No	Unclear	Unclear	Unclear	No
Parasite spillback: a neglected concept in invasion ecology?	Kelly, DW; Paterson, RA; Townsend, CR; Poulin, R; Ton	2009	No	Unclear	Unclear	Unclear	No
Otago lakes' trophic status : Lake Hayes, Lake Johnson, Lake Onslow, Lake Wakatipu, Lake Wanaka.	ORC	2009	Yes			No	No
Regime shifts between clear and turbid water in New Zealand lakes: environmental correlates and implications for management and restc	Schallenberg and Sorrell	2009	Yes			No	No
Contrasting effects of managed opening regimes on water quality in two intermittently closed and open coastal lakes	Schallenberg, M ; Larned, S.T ; Hayward, S ; Arbuckle	2010	No	Yes	Unclear	Unclear	No
Multiple stressors in freshwater ecosystems	ORMEROD, S. J. ; DOBSON, M. ; HILDREW, A. G. ; TO	2010	No	Yes	Unclear	Unclear	No
The impact of climate variability and change on cryptosporidiosis and giardiasis rates in New Zealand	Britton, Emma ; Hales, Simon ; Venugopal, Kamalesh	2010	No	Yes	Unclear	Unclear	No
Contrasting effects of managed opening regimes on water quality in two intermittently closed and open coastal lakes	Schallenberg, M; Larned, ST; Hayward, S; Arbuckle, C;	2010	Yes			No	No
A new fossil termite (Isoptera, Stolotermitidae, Stolotermes) from the early Miocene of Otago, New Zealand	Kaulfuss, Uwe; Harris, Anthony C; Lee, Daphne E;	2010	No	No	Unclear	No	No
Nutrient losses associated with irrigation, intensification and management of land use: A study of large scale irrigation in North Otago, Ne	McDowell, RW; Van der Weerden, TJ; Campbell, J;	2011	No	Yes	Unclear	Unclear	No
Shallow coastal lakes in New Zealand: current conditions, catchment-scale human disturbance, and determination of ecological integrity	Drake, DC; Kelly, David; Schallenberg, Marc;	2011	Yes			No	No
BEFORE THE OTAGO REGIONAL COUNCIL	ANDERSEN, LEN; LLOYD, ANDERSON;	2011	No	Unclear	Unclear	Unclear	No
Late summer hyperbenthic estuarine communities: comparing permanently open and intermittently closed systems along the Otago coas	Lill, AWT; Closs, GP; Schallenberg, M;	2011	Yes			No	No
Turbidity development and dissipation in paleoplacer gold deposits, southern New Zealand	Druzbicka, Joanna ; Craw, Dave	2012	No	Yes	Unclear	Unclear	No
The Impact of Extreme Low Flows on the Water Quality of the Lower Murray River and Lakes (South Australia)	Mosley, Luke M ; Zammit, Benjamin ; Leyden, Emily ;	2012	No	Yes	No	No	No
Quantifying relationships between land-use gradients and structural and functional indicators of stream ecological integrity	CLAPCOTT, J. E. ; COLLIER, K. J. ; DEATH, R. G. ; GOOI	2012	No	Yes	Unclear	Unclear	No
A Review of the Cost-Effectiveness and Suitability of Mitigation Strategies to Prevent Phosphorus Loss from Dairy Farms in New Zealand a	McDowell, Richard W. ; Nash, David	2012	No	Yes	Unclear	Unclear	No
Phylogeography of the endangered Otago skink, Oligosoma otagense: population structure, hybridisation and genetic diversity in captive	Chapple, David G ; Birkett, Alisha ; Miller, Kimberly A	2012	No	No	Unclear	No	No
Lauraceae from rainforest surrounding an early Miocene maar lake, Otago, southern New Zealand	Bannister, Jennifer M; Conran, John G; Lee, Daphne E;	2012	No	Unclear	Unclear	Unclear	No
The impact of extreme low flows on the water quality of the Lower Murray River and Lakes (South Australia)	Mosley, Luke M; Zammit, Benjamin; Leyden, Emily; He	2012	No	Yes	No	No	No
Predator control allows critically endangered lizards to recover on mainland New Zealand	Reardon, James T; Whitmore, Nathan; Holmes, Karina	2012	No	No	No	No	No
Evaluation of camera traps for monitoring European rabbits before and after control operations in Otago, New Zealand	Latham, A David M; Nugent, Graham; Warburton, Bru	2012	No	No	No	No	No
21st IAHR international symposium on ice 2012	Li, Zhijun; Lu, Peng;	2012	No	Unclear	Unclear	Unclear	No
Gradual, catastrophic and human induced environmental changes from a coastal lake, southern New Zealand	Schallenberg, Goff and Harper	2012	Yes			No	No
Marine phytoplankton temperature versus growth responses from polar to tropical waters--outcome of a scientific community-wide study	Boyd, Philip W ; Rynearson, Tatiana A ; Armstrong, E	2013	No	Yes	Unclear	Unclear	No
Agricultural Diffuse Nutrient Pollution Transport in a Mountain Wetland Complex	Caruso, Brian S ; O'Sullivan, Aisling D ; Faulkner, Sum	2013	No	Yes	Unclear	Unclear	No
A topography analysis incorporated optimization method for the selection and placement of best management practices	Shen, Zhenyao ; Chen, Lei ; Xu, Liang	2013	No	Unclear	Unclear	Unclear	No
Assessing aluminium toxicity in streams affected by acid mine drainage	WATERS, A. S ; WEBSTER-BROWN, J. G	2013	No	Yes	Unclear	Unclear	No
Agricultural diffuse nutrient pollution transport in a mountain wetland complex	Caruso, Brian S; O'Sullivan, Aisling D; Faulkner, Summ	2013	No	Yes	Unclear	Unclear	No
Bayesian Network for Point and Diffuse Source Phosphorus Transfer from Dairy Pastures in South Otago, New Zealand	Lucci, Gina M. ; Nash, David ; McDowell, Richard W. ;	2014	No	Yes	Unclear	Unclear	No

Evaporative Mine Water Controls on Natural Revegetation of Placer Gold Mines, Southern New Zealand	Druzbicka, J ; Rufaut, C ; Craw, D	2014	No	Unclear	Unclear	Unclear	No
Metal and proton toxicity to lake zooplankton: A chemical speciation based modelling approach	Stockdale, Anthony ; Tipping, Edward ; Lofts, Stepher	2014	No	Yes	Unclear	Unclear	No
Water, sanitation, hygiene, and soil-transmitted helminth infection: a systematic review and meta-analysis	Strunz, Eric C ; Addiss, David G ; Stocks, Meredith E ;	2014	No	Yes	Unclear	Unclear	No
Challenges facing the farmers of Central Otago	Stevens, DR; Garden, JP;	2014	No	Unclear	Unclear	Unclear	No
Recent environmental history of Wainono Lagoon (South Canterbury, New Zealand)	Schallenberg, Marc; Saulnier-Talbot, Émilie;	2014	No	Unclear	No	No	No
Integration of an off-paddock barn facility into a pasture-based dairy system in South Otago.	Dalley, DE; Laurenson, S; Stevens, D; Wall, A; Gorton,	2014	No	Unclear	Unclear	Unclear	No
Essentials of ecology	Begon, Michael; Howarth, Robert Warren; Townsend,	2014	No	Unclear	Unclear	Unclear	No
Modelling the hydrological impacts of land use change and integrating cultural perspectives in the Waikouaiti Catchment, Otago New Zea	Reeves, Emma;	2014	No	Unclear	Unclear	Unclear	No
Phosphorus losses from monitored fields with conservation practices in the Lake Erie Basin, USA	Smith, Douglas R ; Francesconi, Wendy ; Livingston, S	2015	No	Yes	No	No	No
Water Quality Prediction of Gangapur Reservoir (India) Using LS-SVM and Genetic Programming	Jadhav, Mrunalini Shivaji ; Khare, Kanchan Chandrash	2015	No	Yes	No	No	No
Soil carbon stocks in wetlands of New Zealand and impact of land conversion since European settlement	Ausseil, A.-G. E ; Jamali, H ; Clarkson, B. R ; Golubiew	2015	No	Unclear	Unclear	Unclear	No
A Geoenvironmental Model for Orogenic Gold Deposits to Predict Potential Environmental Effects	Craw, Dave ; Cavanagh, Jo ; Druzbicka, Joanna ; Harc	2015	No	Yes	Unclear	Unclear	No
Stratification and water quality of an abandoned opencast coal pit lake at Raniganj Coalfield Area, West Bengal, India	Mondal, Subinoy ; Mukherjee, Aloke K. ; Senapati, Ta	2015	No	Yes	No	No	No
Water physicochemistry and benthic macroinvertebrate communities in a tropical reservoir: The role of water level fluctuations and wate	Magbanua, Francis S ; Mendoza, Nikki Yvette B ; Uy,	2015	No	No	No	No	No
A review of the policies and implementation of practices to decrease water quality impairment by phosphorus in New Zealand, the UK, an	McDowell, R. W ; Dils, R. M ; Collins, A. L ; Flahive, K.	2015	No	Unclear	Unclear	Unclear	No
Drought impacts on the water quality of freshwater systems; review and integration	Mosley, Luke M;	2015	No	Yes	Unclear	Unclear	No
The distribution, phylogeny, and ecology of brood parasitism in calanoid copepods	Valois, Amanda;	2015	No	Unclear	Unclear	Unclear	No
Death RG, and Joy MK (2015). The plight of New Zealand's freshwater species. Conservation Science Statement No. 1, 14pp	Elston, E; Anderson-Lederer, R; Elston, E; Anderson-Le	2015	No	Yes	Unclear	Unclear	No
Contribution of particulate organic matter to riverine suspended material in the Glendhu Experimental Catchments, Otago, New Zealand	Bright, Christina E ; Mager, Sarah M	2016	No	Unclear	Yes	Unclear	No
Toward a Quality-Controlled and Accessible Pitzer Model for Seawater and Related Systems	Turner, David R. ; Achterberg, Eric P. ; Chen, Chen-Tu	2016	No	No	No	No	No
Young-of-the-year Coho Salmon Oncorhynchus kisutch recruit in fresh waters of remote Patagonian fjords in southern Chile (51°S)	Górski, Konrad ; González, Jorge F ; Vivancos, Aurélie	2016	No	Unclear	No	No	No
Contribution of particulate organic matter to riverine suspended material in the Glendhu Experimental Catchments, Otago, New Zealand	Bright, Christina E; Mager, Sarah M;	2016	Yes			No	No
From 'Producers' to 'Polluters': Farmers' experience in the Lake Taupō Water Quality Trading Program	Hall, Madeline;	2016	Yes			No	No
Life history variation and diet preference in non-diadromous Otago galaxiids	Morrison, Scott;	2016	No	Yes	Unclear	Unclear	No
Structural evolution of the semischist-schist transition in an accretionary complex: the Otago Schist section at Lake Hāwea, New Zealand	Cooper, Alan F. ; Norris, Richard J.	2017	No	No	No	No	No
Place names and landscape character: a case study from Otago Region, New Zealand	Atik, Meryem ; Swaffield, Simon	2017	No	No	Unclear	No	No
Otago Regional Council's response to lake snow: A planner's evaluation	Dwyer, Stephanie Kay;	2017	Yes			No	No
Water quality modelling of Te Waihora/Lake Ellesmere	Hamilton, David P; Dada, Christopher A; McBride, CG;	2017	No	Yes	No	No	No
An Assessment of Climate Change and Health Vulnerability and Adaptation in Dominica	Schnitter, Rebekka ; Verret, Marielle ; Berry, Peter ;	2018	No	No	No	No	No
Emerging scarcity and emerging commons: Water management groups and groundwater governance in Aotearoa New Zealand	Sarah Boone and Stephen Fragaszy	2018	No	Unclear	Unclear	Unclear	No
Ichthyofaunal assemblages in shallow littoral habitats of permanently open estuaries and intermittently closed and open lakes or lagoons	Taddese, Fasil; Schallenberg, Marc; Mikheev, Pavel; Ja	2018	Yes	Unclear	Unclear	No	No
Anthropogenic increases of catchment nitrogen and phosphorus loads in New Zealand	Snelder, Ton H. ; Larned, Scott T. ; McDowell, Rich W	2018	No	Yes	Unclear	Unclear	No
A strategy for optimizing catchment management actions to stressor–response relationships in freshwaters	McDowell, R. W. ; Schallenberg, M. ; Larned, S.	2018	No	Unclear	Unclear	Unclear	No
A review of regulations and guidelines related to winter manure application	Liu, Jian ; Kleinman, Peter J. A ; Aronsson, Helena ; F	2018	No	Unclear	Unclear	Unclear	No
The land use suitability concept: Introduction and an application of the concept to inform sustainable productivity within environmental c	McDowell, R.W ; Snelder, T ; Harris, S ; Lilburne, L ; I	2018	No	Unclear	Unclear	Unclear	No
The Waikōura Framework: a bicultural systems model for management of Lake Rotorua	Wilson-Rooy, Mereana;	2018	No	Unclear	No	No	No
A comparative assessment of Australia's Lower Lakes water quality under extreme drought and post-drought conditions using multivariat	Li, Tianyang; Li, Siyue; Liang, Chuan; Bush, Richard T; X	2018	No	Unclear	No	No	No
Evolution of Drought-Flood Abrupt Alternation and Its Impacts on Surface Water Quality from 2020 to 2050 in the Luanhe River Basin	Bi, Wuxia ; Weng, Baisha ; Yuan, Zhe ; Yang, Yuheng	2019	No	Yes	No	No	No
Engaging Colonial Entanglements: "Treatment as a State" Policy for Indigenous Water Co-Governance	Diver, Sibyl ; Ahrens, Daniel ; Arbit, Talia ; Bakker, Ka	2019	No	Unclear	Unclear	Unclear	No
Forest Investment Framework as a Support Tool for the Sustainable Management of Planted Forests	Yao, Richard ; Palmer, David ; Hock, Barbara ; Harris	2019	No	No	No	No	No
Assessing the efficacy of environmental restoration via noninferiority: A Bayesian perspective	Robinson, Timothy J. ; Wulff, Shaun S. ; Webb, Micha	2019	No	Unclear	Unclear	Unclear	No
Revisiting hydrological drought propagation and recovery considering water quantity and quality	Ahmadi, Behzad ; Moradkhani, Hamid	2019	No	Unclear	Unclear	Unclear	No
Ecology of orange-spotted geckos (Mokopirirakau "Roys Peak") in Central Otago and Queenstown-lakes districts	Knox, Carey D; Jewell, Tony R; Monks, Joanne M;	2019	No	No	Unclear	No	No
Spatiotemporal ichthyofaunal dynamics in a permanently open estuary, Otago, New Zealand	Taddese, Fasil; Closs, Gerard P;	2019	No	Yes	Unclear	Unclear	No
Lake water quality modelling to assess management options for Lake Hayes	McBride, Chris G., Muaoka, Kohji, Allan, Matthew	2019	Yes			No	No
A national-scale study of spatial variability in the relationship between turbidity and suspended sediment concentration and sediment prc	Bright, Christina E. ; Mager, Sarah M.	2020	No	Yes	Unclear	Unclear	No
The Case for Community-Led Geoheritage and Geoconservation Ventures in Māngere, South Auckland, and Central Otago, New Zealand	Gravis, Ilmars ; Németh, Károly ; Twemlow, Chris ; N	2020	No	Unclear	Yes	Unclear	No
Preliminary investigation on Cladocera and Copepoda in summer and autumn in Baiyangdian Lake, China	Cui, Tiefeng ; Li, Zizhu ; Liao, Chenyan ; Cao, Zhihan ;	2020	No	Yes	No	No	No
Dilution Processes of Rainfall-Enhanced Acid Mine Drainage Discharges from Historic Underground Coal Mines, New Zealand	Jewiss, Carrie ; Craw, Dave ; Pope, James ; Christens	2020	No	Unclear	Unclear	Unclear	No
Vegetation influences soil properties along riparian zones of the Beijiang River in Southern China	Zhao, Qinghe ; Ding, Shengyan ; Liu, Qian ; Wang, Sh	2020	No	Unclear	No	No	No
Fatal coastal drowning incidents: A 10-year review of body recovery times in New Zealand	Webber, Jonathon ; Moran, Kevin ; French, Claire ; F	2020	No	No	Unclear	No	No
Some aspects of the ecology of non-native Brook Charr (Salvelinus fontinalis) in headwater streams of Otago, New Zealand	Dorsey, Lance Wayne;	2020	No	Yes	Unclear	Unclear	No
State and trends of river and lake water quality in the Otago region 2000-2020	Ozanne, Rachel; Scientist, Freshwater;	2020	Yes			No	No
Lizards at elevation: thermal ecology and emergence activity of alpine lizards in Otago	Bertoia, Aaron James;	2020	No	No	Unclear	No	No
Beyond Sustainable Intensification: Transitioning Primary Sectors through Reconfiguring Land-Use	Bayne, Karen ; Renwick, Alan	2021	No	Unclear	Unclear	Unclear	No
University of Otago: Generous Gift From Emerita Professor Dame Carolyn Burns to Establish New Chair in Freshwater Sciences		2021	No	No	No	No	No
References		2021	No	No	Unclear	No	No
The implications of lag times between nitrate leaching losses and riverine loads for water quality policy	McDowell, R. W. ; Simpson, Z. P. ; Ausseil, A. G. ; Eth	2021	No	Unclear	Unclear	Unclear	No
CLUES model calibration: residual analysis to investigate potential sources of model error	Semadeni-Davies, Annette F. ; Jones-Todd, Charlotte	2021	No	Unclear	Unclear	Unclear	No
Investigating the decline and future of the threatened bladderwort Utricularia australis in New Zealand	Davies-Colley, Taylor;	2021	Yes			No	No
Social networks and social stability in a translocated population of Otago skinks (Oligosoma otagense)	Elangovan, Vanitha; Bovill, Luke; Cree, Alison; Monks,	2021	No	No	No	No	No
Agricultural land use management responses to a cap and trade regime for water quality in Lake Taupo catchment, New Zealand	Spicer, E Anne; Swaffield, Simon; Moore, Kevin;	2021	No	Unclear	No	No	No

Using palaeolimnology to guide rehabilitation of a culturally significant lake in New Zealand	Short, Julia ; Tibby, John ; Vandergoes, Marcus J. ; W	2022	No	Unclear	Unclear	Unclear	No
Native European crayfish Astacus astacus competitive in staged confrontation with the invasive crayfish Faxonius limosus and Procambari	Roessink, Ivo ; Zon, Van der, Karina A.E ; Reus, De, Sc	2022	No	Unclear	Unclear	Unclear	No
The politics of water governance in Central Otago, New Zealand: Struggling with a nineteenth century legacy	Watson, Niall ; Perkins, Harvey C.	2022	No	Unclear	Unclear	Unclear	No
The politics of water governance in Central Otago, New Zealand: Struggling with a nineteenth century legacy	Watson, Niall; Perkins, Harvey C;	2022	Yes			No	No
Growth at the limits: comparing trace metal limitation of a freshwater cyanobacterium (Dolichospermum lemmermannii) and a freshwate	Dengg, Markus; Stirling, Claudine H; Reid, Malcolm R;	2022	No	Yes	Unclear	Unclear	No
Flammability trajectories following destocking and forestation: a case study in the New Zealand high country	Lord, Janice M; Schloots, Cara-Lisa; Steel, John B;	2022	No	No	No	No	No
Time and complexity in historical ecology : studies in the neotropical lowlands	Symposium on Neotropical Historical Ecology (2002 :	©2006	No	Unclear	No	No	No
The Princeton guide to ecology	Levin, Simon A.	©2009	No	Unclear	Unclear	Unclear	No
Tropical ecology.		1961-	No	Unclear	No	No	No
Aquatic ecology (Online)		1968-	No	Unclear	Unclear	Unclear	No
Human ecology forum.		1971-1999	No	Unclear	Unclear	Unclear	No
Newsletter (Ecology Action Otago)		1972-	No	Unclear	Unclear	Unclear	No
Microbial ecology (Online)		1974-	No	Unclear	Unclear	Unclear	No
Newsletter (Ecology Action (N.Z.))		1974-1977	No	Unclear	Unclear	Unclear	No
Journal of tropical ecology (Online)		1985-	No	Unclear	Unclear	Unclear	No
Trends in ecology & evolution (Regular ed.)		1986-	No	Unclear	Unclear	Unclear	No
Landscape ecology (Online)		1987	No	Unclear	Unclear	Unclear	No
Ecology : potentials and limitations	Fenchel, Tom.	1987	No	Unclear	Unclear	Unclear	No
Population Ecology of Individuals. (MPB-25), Volume 25	Lomnicki, Adam, author.	1988	No	Unclear	Unclear	Unclear	No
Ethology, ecology & evolution (Online)		1989	No	Unclear	Unclear	Unclear	No
Behavioral ecology (Online)		1990	No	Yes	Unclear	Unclear	No
Lake Tuakitoto management strategy.	Otago (N.Z.) Regional Council.	1995	No	Yes	Yes	Yes	Unable to locate
Evolutionary Ecology across Three Trophic Levels : Goldenrods, Gallmakers, and Natural Enemies (MPB-29)	Abrahamson, Warren G., author.	1997	No	Unclear	Unclear	Unclear	No
Human ecology (Ithaca, N.Y. : Online)		2000	No	Unclear	Unclear	Unclear	No
Molecular ecology notes (Online)		2001-	No	Unclear	Unclear	Unclear	No
BMC ecology.		2001-2020	No	Yes	Unclear	Unclear	No
Waihola Waipori Wetlands An environmental education resource kit for use in the Sinclair Wetlands (Te Nohoaka o Tukiauau)		2002?	No	No	Yes	No	No
Issues and perspectives in landscape ecology		2005	No	Unclear	Unclear	Unclear	No
Nonequilibrium ecology	Rohde, Klaus, 1932-	2005	No	Unclear	Unclear	Unclear	No
Pit-lake water quality in coal deposits, Southland, New Zealand : a comparison between the lignite and sub-bituminous coal deposits of Sc	Mulliner, Timothy.	2006	No	Yes	No	No	No
Molecular ecology resources (Online)		2008-	No	Unclear	Unclear	Unclear	No
From 'Producers' to 'Polluters': Farmers' experience in the Lake Taupō Water Quality Trading Program	Hall, Madeline	2016	No	Yes	No	No	No
From 'producers' to 'polluters' : farmers' experience in the Lake Taupō water quality trading program : submitted in partial fulfilment of th	Hall, Madeline. author	2016	Yes			No	No
Freshwater acidification : natural history, ecology and environmental policy	Hildrew, A. G. author.	2018	No	Yes	Unclear	Unclear	No
Microbial Ecology	Laskin, Allen I., author.	2018	No	Unclear	Unclear	Unclear	No
Performance and ecology : what can theatre do?		2018	No	No	Unclear	No	No
Mudflat ecology		2018	No	Unclear	Unclear	Unclear	No
Political ecology, food regimes, and food sovereignty : crisis, resistance, and resilience	Tilzey, Mark, author.	2018	No	No	Unclear	No	No
RECOVER (Christchurch, N.Z.)		2018-	No	Unclear	Unclear	Unclear	No
Gasping fish and panting squids : oxygen, temperature and the growth of water-breathing animals	Pauly, D. (Daniel) author.	2019	No	Unclear	Unclear	Unclear	No
Plant Ecology	Schulze, E.-D. (Ernst-Detlef), 1941-	2019	No	Yes	Unclear	Unclear	No
Time in ecology : a theoretical framework	Post, Eric, author.	2019	No	Unclear	Unclear	Unclear	No
Ethology and behavioral ecology of odontocetes		2019	No	Yes	Unclear	Unclear	No
Cave Ecology		2019	No	Unclear	No	No	No
Ecology and Justice : Citizenship in Biotic Communities	Keller, David R., 1962- author.	2019	No	Unclear	Unclear	Unclear	No
Individual-based methods in forest ecology and management	Pommerening, Arne, author.	2019	No	No	Unclear	No	No
Thinking nature : an essay in negative ecology	McGrath, S. J., 1966- author.	2019	No	Unclear	Unclear	Unclear	No
Félix Guattari`s schizoanalytic ecology	Berressem, Hanjo, 1956- author.	2019	No	Unclear	Unclear	Unclear	No
The ecology of browsing and grazing II		2019	No	Unclear	Unclear	Unclear	No
The redesigned Earth : a brief review of ecology for engineers, as if the Earth really mattered	Tanacredi, John T., author.	2019	No	Yes	Unclear	Unclear	No
Aquatic insects : behavior and ecology		2019	No	Yes	Unclear	Unclear	No
Ecology and Evolution of Rhizobia : Principles and Applications	Wang, Entao, author.	2019	No	Unclear	Unclear	Unclear	No
Integrodifference equations in spatial ecology	Lutscher, Frithjof.	2019	No	Unclear	Unclear	Unclear	No
Feasibility study towards restoring missing fauna of Ōtamahua/Quail Island, with a focus on invertebrates	Visser, Sarah, author.	2019	No	Unclear	No	No	No
Fine scale monitoring of Paraparaumu and Waikanae Beaches, Kāpiti Coast, Wellington	Barrie, M. Forrest (Barrie Malcolm), author.	2019	No	Unclear	No	No	No
Wildlife disease ecology : linking theory to data and application		2019	No	Unclear	Unclear	Unclear	No
Stream ecology	Allan, J. David, author.	2020	No	Yes	Unclear	Unclear	No
Unsolved problems in ecology		2020	No	Unclear	Unclear	Unclear	No
Avian malaria and related parasites in the Tropics : ecology, evolution and systematics		2020	No	No	No	No	No
Complexity in landscape ecology		2020	No	Unclear	Unclear	Unclear	No
Polar night marine ecology : life and light in the dead of night		2020	No	Unclear	Unclear	Unclear	No
Mosquitoes : Identification, Ecology and Control	Becker, Norbert, 1949- author.	2020	No	Unclear	No	No	No
Ecology, conservation, and restoration of Chilika Lagoon, India		2020	No	Yes	No	No	No

Ecology of protozoa : the biology of free-living phagotrophic protists	Esteban, Genoveva F.	2020	No	Yes	Unclear	Unclear	No
Evolution, ecology and conservation of lorises and pottos		2020	No	Unclear	Unclear	Unclear	No
Culture, environment and health in the Yucatan Peninsula : a human ecology perspective		2020	No	Unclear	No	No	No
Arctic sea ice ecology : seasonal dynamics in algal and bacterial productivity	Lund-Hansen, Lars Chr.	2020	No	Yes	No	No	No
Reproductive ecology of flowering plants : patterns and processes		2020	No	Yes	Unclear	Unclear	No
Plant Physiological Ecology	Lambers, H.	2020	No	Yes	Unclear	Unclear	No
Toward a sound ecology : new and selected essays	Titon, Jeff Todd, 1943- author.	2020	No	Unclear	Unclear	Unclear	No
Introduction to R for terrestrial ecology : basics of numerical analysis, mapping, statistical tests and advanced application of R	Lakićević, Milena, author.	2020	No	No	No	No	No
The fate of energy: Wyrmwood: Road of the dead, ecology and Baudrillard's zombie	Nicholls, Brett	2020	No	No	No	No	No
Ecology : a very short introduction	Ghazoul, Jaboury, author.	2020	No	Unclear	Unclear	Unclear	No
Introduction to Bayesian methods in ecology and natural resources	Green, Edwin James, 1954- author.	2020	No	No	Unclear	No	No
Hindu Kush-Himalaya watersheds downhill : landscape ecology and conservation perspectives		2020	No	Unclear	No	No	No
Latin American dendroecology : combining tree-ring sciences and ecology in a megadiverse territory		2020	No	Unclear	No	No	No
Ecology	Bowman, William D., author.	2021	No	Unclear	Unclear	Unclear	No
2018 press conference records of Ministry of Ecology and Environment, the People's Republic of China	China. Ministry of Ecology and Environment, issuing b	2021	No	Unclear	No	No	No
Political ecology : a critical engagement with global environmental issues	Benjaminsen, Tor Arve, author.	2021	No	Unclear	Unclear	Unclear	No
Investigating the decline and future of the threatened bladderwort Utricularia australis in New Zealand	Davies-Colley, Taylor	2021	No	Yes	Unclear	Unclear	No
2019 press conference records of Ministry of Ecology and Environment, the People's Republic of China	China. Ministry of Ecology and Environment, issuing b	2021	No	Unclear	No	No	No
Molecular ecology and conservation genetics of neotropical mammals		2021	No	Yes	No	No	No
Animal population ecology : an analytical approach	Royama, Tomo, 1930- author.	2021	No	Unclear	Unclear	Unclear	No
Riverine ecology. Volume 1, Eco-functionality of the physical environment of rivers	Chakraborty, Susanta Kumar, 1960-	2021	No	Unclear	Unclear	Unclear	No
Ecology and conservation of pinnipeds in Latin America		2021	No	Unclear	No	No	No
The philosophy of ecology : an introduction	Justus, James, author.	2021	No	No	No	No	No
Ecology of coastal marine sediments : form, function, and change in the anthropocene	Thrush, Simon, author.	2021	No	Yes	No	No	No
Handbook of trait-based ecology : from theory to R tools	Bello, Francesco de, 1974- author.	2021	No	No	No	No	No
Sustainable production and consumption systems		2021	No	Unclear	Unclear	Unclear	No
Antarctic Peninsula Region of the Southern Ocean : oceanography and ecology		2021	No	Unclear	No	No	No
Sustainable development : society, ecology, economy : proceedings of the XVth International Scientific Conference 2019, 28 March 2019,	International Scientific Conference "Sustainable Devel	2021	No	Unclear	Unclear	Unclear	No
Habitat, ecology and ekistics : case studies of human-environment interactions in India		2021	No	Unclear	No	No	No
Theory of the spread of epidemics and movement ecology of animals : an interdisciplinary approach using methodologies of physics and r	Kenkre, V. M. (Vasudev M.), 1946- author.	2021	No	Unclear	Unclear	Unclear	No
Ethology and behavioral ecology of sea otters and polar bears		2021	No	Unclear	No	No	No
The population ecology of white-headed langur	Pan, Wenshi.	2021	No	Unclear	No	No	No
The intersection of environmental justice, climate change, community, and the ecology of life	Nesmith, Ande A., author.	2021	No	Unclear	Unclear	Unclear	No
BMC ecology and evolution.		2021-	No	Unclear	Unclear	Unclear	No
Metacommunity ecology	Leibold, Mathew A., author.	c2018	No	Unclear	Unclear	Unclear	No
EcoNZ@ Otago	Kahui, Viktoria;		No	Unclear	Unclear	Unclear	No
Department of Zoology, University of Otago, PO Box 56 Dunedin	SAMPLES, OF MIACROFAUNA FROM BOTTOMI;		No	Unclear	Unclear	Unclear	No
Economic Value of Freshwater Recreational Angling in Otago	JIANG, LIANG;		Yes			No	No
Graduate Studies in Ecology at Otago	Townsend, Colin;		No	Unclear	Unclear	Unclear	No
Pit-lake water quality in coal deposits, Southland, New	Mulliner, Tim; Craw, Dave; Pope, James; Peake, Barrie;		Yes			No	No
Pit-lake water quality in coal deposits, Southland, New Zealand.	Mullinerl, Tim; Crawl, Dave; Pope, James; Peake, Barrie;		Yes			No	No
LAGOON (SOUTH CANTERBURY, NEW ZEALAND)	Schallenberg, Marc; Saulnier-Talbot, Émilie;		No	Unclear	No	No	No
IN THE ENVIRONMENT COURT ENV-2018-CHC-133	LAKES, QUEENSTOWN; COUNCIL, DISTRICT;		No	Unclear	Unclear	Unclear	No

Appendix 3: Consultation Summary

Otago Lakes Management Assessment

10 November 2022 Landpro Reference: 22368

Subject: Consultation Process

1. Introduction

This document outlines the process undertaken to obtain feedback from stakeholders in the Otago Region with regard to the management of Otago's Lakes, as well as concerns, values and information gaps.

The following objective shaped how consultation for this project was undertaken:

> *Ensure that the key stakeholder and wider community's values and concerns are understood and included within the stocktake report on Otago's lakes and identify any gaps in knowledge or management approaches.*

Due to the variety and number of stakeholders, targeted consultation was undertaken primarily via an online survey using Microsoft Forms, phone call or informal interviews.

The online survey questions are enclosed as Appendix A.

2. Stakeholder Consultation Process

Stakeholder consultation took place over an eight-week period between July and September 2022. In total, 115 individual stakeholders were contacted representing 86 groups.

85 stakeholders were sent the online survey, with 43 responses received. Some groups submitted more than one response and others submitted a single response representing more than one group. Some stakeholders chose to respond via email, or the survey was completed over a phone call. Of these responses, 12 individual responses were received from the online survey. Fish and Game shared the survey link with their licence holders, and therefore five of the individual responses were attributed to this group.

Due to the condensed timeframe for this review, the large number of RMA planning processes currently underway in Otago, and capacity constraints at both Aukaha and Te Ao Marama Inc, there has been limited collaboration with mana whenua. However, written feedback was provided via email by both Aukaha and Te Ao Marama Inc.

Informal interviews and meetings were held with 27 individuals who represented organisations or groups involved in the management of lakes or lakes research. Interview questions largely replicated the online survey questions, but were tailored depending on the expertise of the stakeholder.

A full list of stakeholders contacted, the consultation method and whether a response was received, is summarised in Table 1 below.

Table 1: Stakeholder Information

Stakeholder Category	Stakeholder	Contact	Consultation Method	Response Received
Otago Regional Council	Policy Team	*Tom De Pelsemaeker – Team Leader Freshwater and Land* *Melanie Hardiman – Policy Analyst*	Interview	Yes
	Science Team	*Hugo Borges – Scientist – Lakes*	Interview	Yes
	Compliance Team	*Byron Pretorius – Team Leader Compliance Monitoring Coastal Otago*	Interview	Yes
	Environmental Implementation Team	*Libby Caldwell – Team Leader Environmental Implementation* *Anna Ferguson – Principal Advisor – Environmental Implementation*	Interview	Yes
	Natural Hazards Team	*Jean-Luc Payan – Manager Natural Hazards*	Interview	Yes
	Monitoring Team	*Evelyn Bruhns – Team Leader Monitoring*	Interview	Yes
	Consents Team	*Joanna Gilroy - Manager Consents* *Mat Bell - Team Leader Consents*	Interview	Yes
	Engineering Team	*Michelle Mifflin*	Interview	Yes
Takata Whenua	Aukaha	*Sandra McIntyre – Principal Planner*	Email correspondence	Yes
	Te Ao Marama	*Maria Bartlett – Senior Advisor*	Email correspondence	Yes
Central Government Agencies	Department of Conservation	*Christopher Kavazos – River Restoration Ranger* *Trudy Anderson – Senior Ranger*	Interview	Yes
		Clement Lagrue - Acting Operations Manager Coastal Otago	Interview	Yes
	Department of Conservation Otago Conservation Board	*Chair - Tim Barke*	Online Survey	Yes
	Toitū te Whenua Land Information New Zealand	*Otago Land and Property Portfolio Manager*	Online Survey	No
		Tracey Burton - Manager Biosecurity and Biodiversity	Interview	Yes
	Biosecurity NZ	*Helen Payn – Senior Advisor*	Online Survey	Yes
	NIWA		Online Survey	Declined
Territorial Authorities	Central Otago District Council	*Economic Development Manager*	Online survey	No
		Executive Manager Planning and Environment	Online survey	No
		Executive Manager Infrastructure Services	Online survey	No

Stakeholder Category	Stakeholder	Contact	Consultation Method	Response Received
	Dunedin City Council	*Economic Development Manager*	Online survey	No
		General Manager Infrastructure	Online survey	No
		General Manager Customer and Regulatory	Online survey	No
	Waitaki District Council		Online survey	No
	Clutha District Council	*Group manager Service Delivery*	Online Survey	No
		Fraser McRae - Planning Team	Online Survey	Yes
	Queenstown Lakes District Council	*Economic Development Manage*	Online Survey	No
		Three Waters Manager	Online Survey	No
		Liz Simpson – Senior Policy Planner, Urban Development	Online Survey	Yes
		Morgan Govender – Facilities Manager	Interview	Yes
Environmental Groups	Fish and Game	*Nigel Paragreen – Environmental Officer*	Online Survey	Yes
	Forest and Bird	*Chelsea McGaw – Regional Conservation Manager Otago*	Online Survey	Yes
	Central Otago Environmental Society		Online Survey	No
Catchment-based community groups	WAI Wānaka	*Dr Don Robertson – Trustee*	Meeting	Yes
		Andew Gawith – Co-Opt Trustee		
		Oliver Eden-Mann – Wānaka Water Project Manager & Community Activator		
	Guardians of Lake Hāwea	*John Langley – Chair*	Online Survey	Yes
		Dr Don Robertson – Member		
	Guardians of Lake Wānaka	*Dr Don Robertson - Chair*	Online Survey	Yes
	Lake Dunstan Charitable Trust	*Duncan Faulkner – Chair*	Interview	Yes
	Friends of Lake Hayes	*Mike Hanff - Chairman*	Interview	Yes
	ECOTAGO Charitable Trust	*Andrew Innes – Project Manager and Facilitator*	Online Survey	Yes
	Waihola-Waipori Wetlands Society		Online Survey	No
Recreational groups	Otago Anglers Association		Online Survey	No

Stakeholder Category	Stakeholder	Contact	Consultation Method	Response Received
	Teviot Angling Club		Online Survey	No
	Wakatipu Anglers Club		Online Survey	No
	Upper Clutha Angling Club	*Rick Boyd - Secretary*	Online Survey	Yes
	Wānaka Yacht Club		Online Survey	No
	Lake Dunstan Boat Club	*James Robinson - Commadore*	Online Survey	Yes
	Wakatipu Yacht Club		Online Survey	No
	Otago Rowing Association		Online Survey	No
	Otago Waterski Club		Online Survey	No
	Lake Wānaka Swimmers		Online Survey	No
	University of Otago Tramping Club		Online Survey	No
	Jet Boating NZ (Otago)	*Geoff Shaumann – Chairman*	Online Survey	Yes
		Stuart Mitchell – Vice Chairman	Online Survey	Yes
Electricity generators	Contact Energy	*Boyd Brinsdon – Market and Dispatch Manager*	Meeting	Yes
		Brigid Buckley – Consenting Specialist		
	Manawa Energy	*Nicola Foran – Environmental Policy Manager*	Meeting	Yes
		Evan Boyt – Team Leader, Operations		
	Pioneer Energy	*Tony Jack – Development Engineer*	Online Survey	Yes
Irrigators	Falls Dam Company	*Murray Heckler - Chairman*	Online Survey	Yes
	Last Chance Irrigation Company		Online Survey	No
	Ida Valley Irrigation Company		Online Survey	No
	Earnscleugh Irrigation Company	*Tony Lepper – Managing Director*	Online Survey	Yes
	Maniototo Irrigation Company	*Renee Weir – Company Support*	Online Survey	Yes
	Galloway Irrigation Society		Online Survey	No
	Hawkdun Idaburn Irrigation Company	*Ken Gillespie – Chairman*	Online Survey	Yes

Stakeholder Category	Stakeholder	Contact	Consultation Method	Response Received
Rural Groups	Federated Farmers	*Eleanor Linscott – Manager Policy, Southern Region (Shared with Federated Farmers Executive Members)*	Online Survey	Yes
	Horticulture NZ	*Ailsa Robertson – National Sustainability Manager (Shared with HortNZ Otago growers)*	Online Survey	No
	Wakatipu Catchment Group	*Ginny Kennedy*	Online Survey	Yes
	Glenorchy Catchment Group		Online Survey	No
	Cardrona Catchment Group		Online Survey	No
	Lake Wānaka Catchment Group		Online Survey	No
	Lindis Catchment Group		Online Survey	No
	Maungawera Catchment Group	*Phil Hunt*	Online Survey	Yes
	Ida Valley Catchment Group	*Sam Stevens*	Online Survey	Yes
	Teviot Valley Catchment Group		Online Survey	No
	Lake Tuakitoto Catchment Group	*Ben Cameron*	Online Survey*	Yes
	Lower Clutha Catchment Group		Online Survey	No
	Waitahuna Catchment Group		Online Survey	No
	Maniototo Catchment Group		Online Survey	Yes
	Lower Taieri Catchment Group		Online Survey	No
	Owaka Catchment Group	*Cody Hartvigsen*	Online Survey*	Yes
	Otago Peninsula Group		Online Survey	No
Harbourmasters, Water Safety and Marina Operators	Harbourmaster (ORC)	*Steve Rushbrook – Harbourmaster*	Online Survey	Yes
	Harbourmaster (QLDC)	*Morgan Govender – Facilities Manager QLDC* *Ricky Campbell – Cougar Security*	Interview	Yes
	Coastguard	*Mark Adams – Queenstown Unit Safety Coordinator*	Online Survey	Yes
		Jonathan Walmisley – Wānaka Lakes Unit President	Online Survey	Yes

Stakeholder Category	Stakeholder	Contact	Consultation Method	Response Received
		James Robinson – Clyde Unit President	Online Survey	Yes
	Queenstown Marina		Online Survey	No
	Wānaka Marina		Online Survey	No
Tourism	Clutha Development		Online Survey	No
	Enterprise Dunedin		Online Survey	No
	Destination Queenstown	*Mat Woods – Chief Executive*	Online Survey	Yes
	Lake Wānaka Tourism	*Tim Barke – General Manager*	Online Survey	Yes
	Tourism Central Otago		Online Survey	No
	Waitaki Visitors Centre		Online Survey	No
Education and Research	Enviroschools	*Madeline Enright – Assistant Regional Coordinator*	Online Survey	Yes
	University of Otago	*Dr Marc Schallenberg*	Interview	Yes
Residents' Associations	Shaping Our Future		Online Survey	No
	Albert Town Community Association		Online Survey	Yes
	Connect Cromwell		Online Survey	No
	Fernhill/Sunshine Bay Community Association		Online Survey	No
	Frankton Community Association		Online Survey	No
	Glenorchy Community Association		Online Survey	No
	Hāwea Community Association	*John Langley - Chair*	Online Survey	Yes**
	Kaitangata & Districts Promotions Inc		Online Survey	No
	Kelvin Peninsula Community Association		Online Survey	Yes
	Kingston Community Association		Online Survey	No

Stakeholder Category	Stakeholder	Contact	Consultation Method	Response Received
	St Bathans Area Community Association	*Alison Fitzgerald - Secretary*	Online Survey	Yes

* Survey completed over the phone survey completed over the phone

** Response provided by Guardians of Lake Hāwea on behalf of the HCA.

Following the drafting of the report summarising stakeholder feedback and recommendations for lakes management in Otago, further feedback on the conclusions drawn and the draft recommendations proposed was obtained via two workshops. One workshop was held in person in Cromwell, and one was held online via Microsoft Teams. Stakeholders who had participated in either the online survey or the informal interviews were invited to attend the workshops to hear the outcomes of the review and provide feedback. Ahead of the workshops, attendees were provided with the draft executive summary and recommendations table.

Across the two workshops, 24 stakeholders attended. Stakeholders who could not attend either workshop were invited to provide feedback via email, and this was received from several stakeholders. The material presented at the workshops is attached as Appendix B.

Appendix A – Online Survey Questions

Otago Lakes Management Assessment Survey

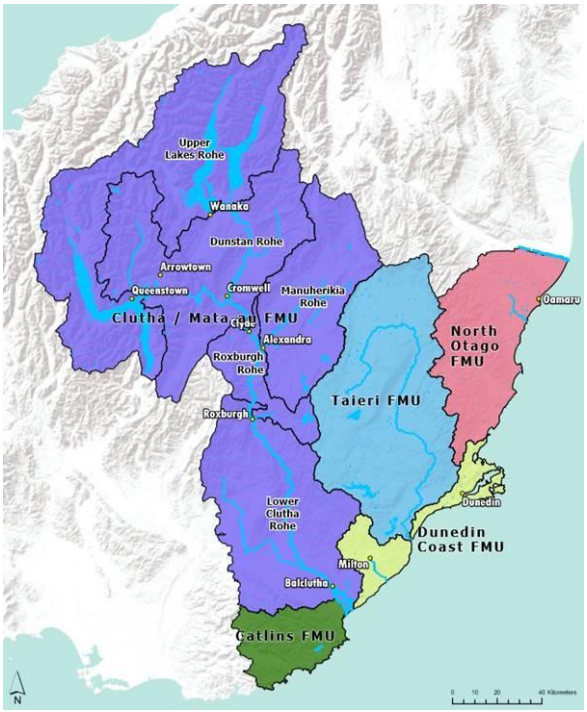
Freshwater lakes are a major part of Otago's identity. However, the management of the diverse range of lakes in the region is complex with multiple agencies involved and a wide variety of issues and pressures. Otago Regional Council is working with Landpro Ltd, a Cromwell-based consultancy, to undertake a stocktake of the state of knowledge of Otago lakes and their management. A key component of the stocktake is to identify and understand the current management framework, information gaps and values that our communities place on lakes across Otago. The aim of this review is to provide a foundation for knowledge sharing, collaboration and coordination among the various agencies, organisations and individuals. The information you provide in this survey will go towards helping ORC identify whether there is a need for a new Otago Lakes Strategy or if there are other opportunities for initiatives that will enhance management of lakes in the region.

This review extends to all lakes in the Otago region, from the large deepwater lakes to remote alpine lakes, lowland and coastal lakes to manmade lakes, dams and reservoirs.

*Compulsory questions are marked with an asterix**

1. **Who are you completing this survey on behalf of?***
    - Tangata whenua (iwi, hapū, rūnanga/rūnaka or similar) [If selected, triggers question to specify what iwi, hapū or rūnanga/rūnaka]
    - Industry group [If selected, triggers question to specify name of group]
    - Environmental group [If selected, triggers question to specify name of group]
    - Central/Local Government [If selected, triggers question to specify name of group]
    - Other organisation/group [If selected, triggers question to specify name of group]
    - An individual [If selected, triggers demographic questions A-E]

2. **What Freshwater Management Unit or Rohe do you operate in? Select all that apply.*** [For groups/organisations only]



- North Otago FMU
- Dunedin & Coast FMU
- Taieri FMU
- Catlins FMU
- Clutha Mata-Au FMU / Lower Clutha Rohe
- Clutha Mata-Au FMU / Roxburgh Rohe
- Clutha Mata-Au FMU / Manuherekia Rohe
- Clutha Mata-Au FMU / Dunstan Rohe
- Clutha Mata-Au FMU / Upper Lakes Rohe
- Other

3. Is there a particular Lake or Lakes that are most significant to you or your organisation?*

Free text

4. What role (if any) do you play in the management of Otago's Lakes?*

Free text

5. Are there other groups or organisations that you work with in the management of Otago's Lakes?

How well do you think the different groups or agencies coordinate with each other? Do you think you know enough about what others are doing in this space?

Free text

6. **There has been a lot of work done in Otago to understand values that the community holds with regard to freshwater. Are there any values that you think are often understated or overlooked when it comes to Otago's Lakes? Chose from the list below, or enter your own:**
    - Healthy fisheries
    - Safe for swimming, wading and other contact recreation
    - Non-contact recreation (e.g. boating, walking/jogging, bird watching, sunbathing/relaxing etc)
    - Ecological Values (e.g. absence of invasive species, biodiversity, ecosystem function etc)
    - Water quality (e.g. nutrient levels, suspended sediment etc).
    - Amenity values, natural character or mauri/inherent values
    - Navigational Safety
    - Power generation
    - Tourism and commercial uses
    - Drinkable water
    - Mahika kai / Mahinga kai
    - Irrigation, stock water, cultivation and production of food and beverages
    - Other/Not listed here with free text

7. **Is there anything else you'd like to add about values you attribute to Otago's Lakes?**
   Free text

8. **What concerns (if any) do you have about Otago's Lakes?***
    - Urban development pressures (e.g. stormwater runoff, wastewater discharges)
    - Rural development pressures (e.g. pesticide/herbicide use, nutrient runoff)
    - Tourism related impacts
    - Increasing recreational activity
    - Spread of pest plant and animal species
    - Human health risks
    - Loss of biodiversity
    - Loss of native species
    - Reduced sport fish populations
    - Sedimentation and reduced water clarity
    - Leaks and spills of fuels or other chemicals
    - Overuse of water
    - Effects of Climate change
    - Other (please specify)

9. **Is there anything else you'd like to add about concerns you have for Otago's Lakes?**
   Free text

10. **In your opinion, what information gaps are there in relation to our knowledge of Otago's Lakes?***
    Free text

11. **What is your perception of the overall management of Otago's Lakes?***

1 – Very poorly managed to 5 – Very well managed

12. **Is there anything else you'd like to add about the overall management of Otago's Lakes?**
    Free text

13. **In your opinion, what should be done to better manage Otago's Lakes? What is missing in the management practices that exist currently? ***
    Free text

14. **If you have any other comments relating to Otago's Lakes, please share them here.**
    Free text

15. **If you are happy for us to contact you regarding your survey responses, please leave your email address or phone number here.**
    Free text

OPTIONAL Demographics Questions – to be triggered if someone selects "individual" in Question 1.

A. What is your age?

- 0-17
- 18-24
- 25-39
- 40-59
- 60+

B. Which ethnic group do you belong to?

- European/Pākehā
- Māori
- Pacific
- Asian
- Middle Eastern
- Latin American
- African
- Other (please specify)

C. Which of these best describes you?

- A tourist/one off visitor to the Otago region
- A frequent visitor to the Otago Region (more than once a year)
- A resident of the Otago Region

D. Within which district council boundary do you live (Otago permanent residents only)

- Central Otago District
- Clutha District
- Dunedin City

- Queenstown Lakes District
- Waitaki District

E. Which, if any, of these sectors do you work in? (More than one sector may be selected if appropriate)

- Tourism and hospitality
- Primary industries (agriculture, horticulture, forestry etc)
- Other industries (manufacturing, communications etc)
- Local or national government
- Environmental sector
- Not for profit/volunteer sector
- Hydroelectricity generation
- None of the above

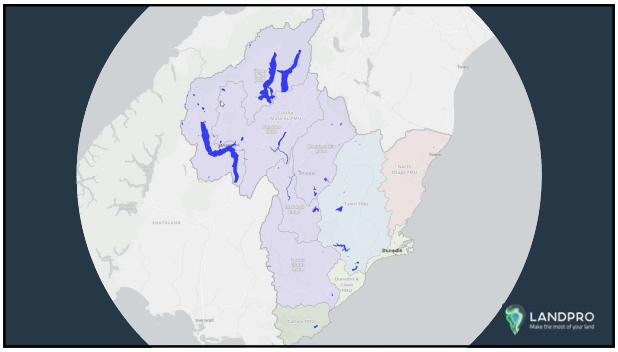
Appendix B – Workshop Presentation

LANDPRO
Make the most of your land

Otago Lakes Management Review

Stakeholder Feedback Workshop
3rd November 2022

1



2

Agenda

- Welcome
- Project Overview
- Key findings
- Workshop: Recommendations
- Strategy Recommendation
- Open floor discussion
- Closing

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Purpose of the Day

To obtain feedback from stakeholders on the conclusions we have drawn and the recommendations we have made for lakes management in Otago.

To identify any missing pieces or further opportunities

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Project Overview

- ORC is considering the development of a Lakes Strategic Plan
- Review initiated to "stock take" of lakes management in Otago
- Aim to identify whether there is a need for a strategic plan, or other opportunities
- Focus on the current state of lakes management, and identification of gaps, in consultation with stakeholders
- Overall purpose – to enhance lakes management in the region.

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5

Review Process

Management Framework Review → Literature Review → Stakeholder Engagement → Draft Report → Stakeholder Workshops → Final Report → Presentation to ORC

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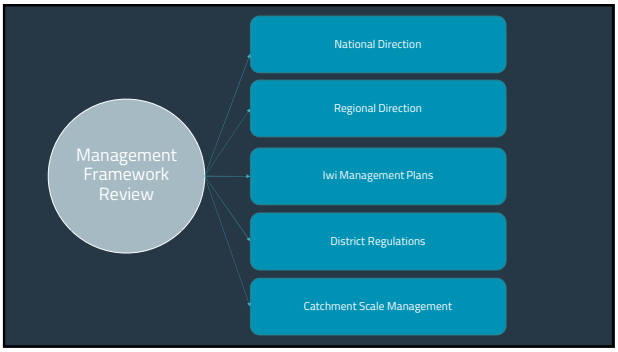
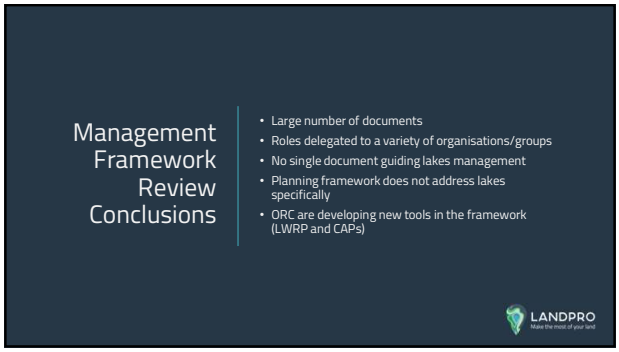

Management Framework Review
National Direction
Regional Direction
Iwi Management Plans
District Regulations
Catchment Scale Management

7


Management Framework Review Conclusions
Large number of documents
Roles delegated to a variety of organisations/groups
No single document guiding lakes management
Planning framework does not address lakes specifically
ORC are developing new tools in the framework (LWRP and CAPs)
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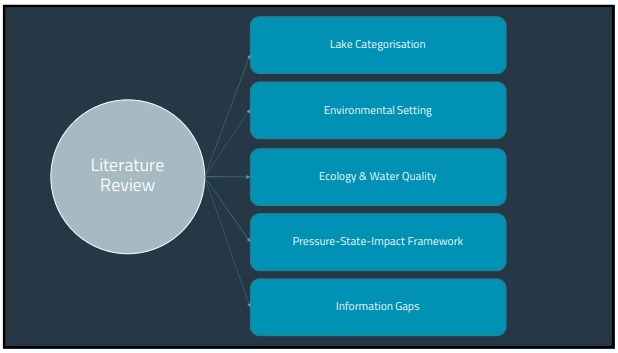
Literature Review
Lake Categorisation
Environmental Setting
Ecology & Water Quality
Pressure-State-Impact Framework
Information Gaps

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Literature Review Conclusions
Existing monitoring is high-quality but limited in scope.
Very little data available for Remote and Accessible High Altitude Lakes and (apart from Lakes Johnson and Hayes).
Deep water lakes: highest quality of those monitored but still some pressures.
Other categories of lake (particularly coastal and lowland lakes) have generally poorer water quality.
Climate change projections indicate that Remote High Altitude Lakes and Coastal and Lowland Lakes may be the most vulnerable.
Dams and reservoirs have specific management and environmental issues
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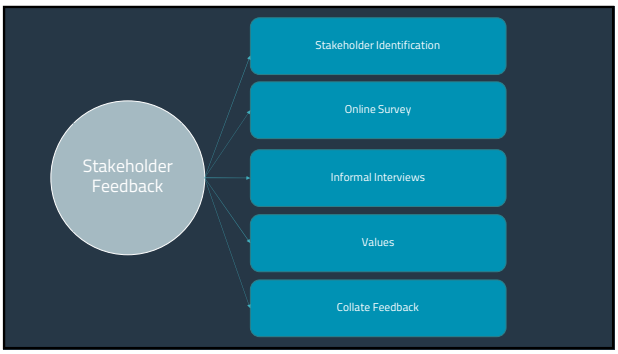
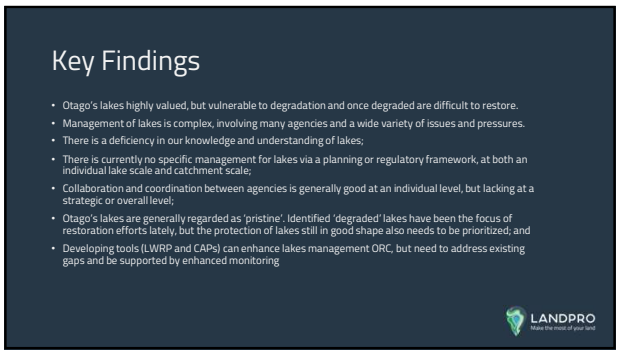

Stakeholder Feedback
Stakeholder Identification
Online Survey
Informal Interviews
Values
Collate Feedback

11


Key Findings
Otago's lakes highly valued, but vulnerable to degradation and once degraded are difficult to restore.
Management of lakes is complex, involving many agencies and a wide variety of issues and pressures.
There is a deficiency in our knowledge and understanding of lakes;
There is currently no specific management for lakes via a planning or regulatory framework, at both an individual lake scale and catchment scale;
Collaboration and coordination between agencies is generally good at an individual level, but lacking at a strategic or overall level;
Otago's lakes are generally regarded as 'pristine'. Identified 'degraded' lakes have been the focus of restoration efforts lately, but the protection of lakes still in good shape also needs to be prioritized; and
Developing tools (LWRP and CAPs) can enhance lakes management ORC, but need to address existing gaps and be supported by enhanced monitoring
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Workshop Exercise

- Do you agree with the conclusions we have drawn?
- Do you think we have missed anything?

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Information and Monitoring Recommendations

- Create and maintain a database of water quality information submitted with consent applications, compliance monitoring or in published articles, similar to the databases for water take records.
- Generate a map of lake catchments and overlay this with Land Cover Data Base layers to identify land use at catchment scale, including changes over time. Catchments with a high or increasing proportion of urban or intensive agricultural land uses should be prioritised for input modelling, monitoring and management.
- Increase the scope of monitoring in terms of geographic area, parameters monitored and number of sampling sites (particularly in larger lakes).
- Investigate the use of citizen science (e.g. iwi, Enviroschools, Otago University Tramping Club, local helicopter operators) to facilitate sampling and monitoring of lake water quality where funding is not available for this to be done in the traditional manner by ORC staff, particularly for the remote high alpine lakes.
- Develop and publish a list of priority lake water quality research projects that ORC does not currently have funding for. This would be useful for researchers looking for projects, and it may assist them in finding funding from other sources if ORC has publicly stated that the research would be beneficial.
- Undertake an economic evaluation of the value of Otago's lakes, in collaboration with economic development managers at District Council, to quantify the benefits these lakes bring to the region and further validate their protection.
- Enhance preparedness for modelling and managing effects of climate change on lakes' hydrodynamics and ecosystem health, including by identifying species and ecosystems (particularly in the remote high alpine lakes and coastal and lowland lakes) which are vulnerable to direct and indirect effects of climate change and prioritising these for management.

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Workshop Exercise

- Break out session to review recommendations
- Are there any you strongly agree or disagree with?
- If you had to prioritise one, which would it be?
- Discuss in your groups
- Choose a spokesperson/people to report back

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Other Recommendations

- Develop a public education programme about the state, monitoring and management of lakes (e.g. annual public information days to present SOE monitoring results, bringing in experts on key water quality or ecology topics, or introduce new initiatives such as the CAP programme).
- Create a repository for the outcomes and feedback from all ORC consultations, to avoid repeat and over consultation.
- Address lake levels, water quality load limits, aquatic lake biodiversity and cumulative land use management for lake catchments in the Land and Water Regional Plan development.
- Maintain a register of existing ORC and other agency-led or funded projects, and community-led projects related to catchment improvements, including EcoFund recipients at an FMU level. Use this register to identify areas that are underrepresented in terms of improvement projects. Incorporated with the identification of at risk or degrading lakes, this information can be used to encourage initiatives in priority areas if shared publicly.
- Recognise community group management plans and values assessments in ORC's management framework, particularly Catchment Action Plans. Where appropriate, these measures and information can be adopted into the ORC framework. Use the efforts of these groups as a resource.
- Engage with other lakes management agencies to identify key concerns and areas requiring additional focus. For example DOC are liaising with individual landowners in catchments containing endangered freshwater species. A collaborative approach between DOC and ORC could deliver more benefits.

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Workshop Exercise

- Break out session to review recommendations
- Are there any you strongly agree or disagree with?
- If you had to prioritise one, which would it be?
- Discuss in your groups
- Choose a spokesperson/people to report back

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Lakes Strategy Recommendation

Develop an Otago Lakes Strategy for lakes management in Otago, outlining:

- Desired outcomes for lakes management in Otago
- Guiding principles for how ORC will work in relation to lakes management
- Roles and responsibilities for lakes management, including overlapping functions
- Forums for collaboration between lake management agencies
- Criteria for identifying and reviewing at risk and degraded lakes
- Criteria for prioritising projects in these catchments
- Identification of lakes that require (sub catchment) specific management
- Criteria for alignment of ORC funding initiatives (e.g. the Eco Fund) with management priorities
- Prioritisation of monitoring and research efforts

This strategy would sit alongside ORC's existing regional strategies, and can be used to guide ORC's activities and provide direction for other agencies or groups involved or interested in lakes management.

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Workshop Exercise

Do you agree with this recommendation?

Do you think a strategy of this kind will help to enhance lakes management in Otago?

Is there anything missing?

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Open Floor Discussion

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Where to from here?

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Thank you for your contribution

If you have any further feedback you would like to share, please reach out via email:
kate.mandis@landpro.co.nz

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#	Recommendation	ORC current actions			
		To Consider	Planned	Underway	Comment/Summary
1	**Strategy**				
1.1	Develop an Otago Lakes Strategy for lakes management in Otago, in partnership with key stakeholders and mana whenua, addressing:				* Note several of the actions listed in this recommendation overlap with the recommendations in the remainder of the strategy section.
	- Desired outcomes for lakes management in Otago				Environmental outcomes should be covered by ICM work underway. Broader outcomes for management approaches would be useful to include in a strategy document.
	- Guiding principles for how ORC will work in relation to lakes management				A strategy document would be an appropriate repository for principles relating to lakes management. Any set of principles is likely to strongly reflect ORC's Strategic Directions.
	- Roles and responsibilities for lakes management, including overlapping functions (see Recommendation 1.2)				Many of these are set out by legislation; unless ORC is transferring functions there is limited scope for changing this, though interagency coordination could be assisted by having these clearly articulated.
	- Forums for collaboration between lake management agencies and other stakeholders (see Recommendation 1.3)				ORC and Toitū Te Whenua (Land Information New Zealand) meet monthly, but scope and membership could be widened. Meetings also occur with multiple parties, when required, on biosecurity and water quality matters as they relate to Lakes (e.g., with respect to restoration efforts or biosecurity management). Clearly identifying these forums would be useful.
	- Criteria for identifying and reviewing vulnerable and degraded lakes (see Recommendation 1.4 and 1.5)				While not 'criteria' per se, the NPSFM has the NOF which applies equally to lakes. The process for implementing the NPSFM requires vulnerable and degraded waterbodies to be identified (i.e where degraded to at least improve to C band, and then maintain or improve in line with freshwater visions), and this is underway through the LWRP and ICM processes.
	- Criteria for prioritising projects in these catchments (see Recommendation 1.4 and 1.5)				Prioritisation of actions within catchments (for lakes or otherwise) is intended to be part of the ICM/CAP work.
	- Identification of lakes that require (sub catchment) specific management (see Recommendation 1.6)				Having measures that relate to specific lakes is part of implementing the NPSFM, and this is underway through current workplans. Note that the round 2 consultation for the LWRP has been addressing this issue explicitly, e.g. with respect to Lake Hayes.
	- Criteria for alignment of ORC funding (e.g. via the Long Term Plan or the Eco Fund) with management priorities (see Recommendation 1.7)				This is already being done through ECO Fund, but priority areas / management priorities have not been identified.
	- Prioritisation of monitoring and research efforts, potentially through the creation of a lakes assessment working group (see Recommendations 4.1-4.13)				Staff would support additional focus on lakes research and monitoring, noting that this needs to be developed in conjunction with monitoring requirements of NPSFM & LTP conversations.
	- Actions or efforts required urgently in relation to lakes management, monitoring and research ahead of the development of other tools such as the LWRP and CAPs.				In general, action should follow strategy and policy development. Can be considered on a case-by-case basis but additional budget would most likely be required.
	This strategy would sit alongside ORC's existing regional strategies, and can be used to guide ORC's activities and provide direction for other agencies or groups involved or interested in lakes management, and the development of other management frameworks such as the LWRP and CAPs.				
1.2	Clearly document roles and responsibilities for lakes management across the region, identifying where there are overlapping functions and interests, and open channels for communication and collaboration between agencies with roles in lakes management i.e., through a lake management group forum.				Note responses above.
1.3	Take a leadership role in providing an avenue for coordination and collaboration between lakes management agencies. ORC is well placed to provide principal oversight to lakes management activities. A Lake management group/forum could act as an information				Note responses above.

#	Recommendation	ORC current actions			
	sharing opportunity between all parties, outline current and proposed research, identify areas requiring further research, discuss new initiatives, identify opportunities for future initiatives and generally improve coordination between agencies.				
1.4	Develop and implement criteria for the identification of degraded lakes and selection of priority projects for these waterbodies to align with overall catchment visions and aspirations.				Part of NPSFM implementation, as discussed above.
1.5	Develop and implement criteria for the identification of vulnerable lakes and consider extending the current programme of priority projects for degraded water bodies to include at risk lakes that are not yet degraded.				Part of NPSFM implementation, as discussed above.
1.6	Using the criteria developed above to identify vulnerable and degraded lakes, identify individual lakes or categories of lakes which require a tailored management approach (i.e. individual management plan within the Catchment Action Plan, or direction in the LWRP).				Part of NPSFM implementation, as discussed above.
1.7	Align funding provided through the Long Term Plan, the EcoFund and other funding avenues to address priority areas of concern through set criteria. Use the document proposed in Recommendation 1 to prioritise key areas and assess applications in a consistent but targeted way.				Note comments above – some parts of this recommendation are underway, but priority areas / management priorities have not been identified, and prioritisation through strategic plan is not a planned activity at this point.
1.8	Encourage integration between the current biosecurity programme and developing lakes management framework (i.e. Catchment Action Plans and Lakes management forum, if adopted).				Interaction between the CAPs and Biosecurity programme will occur. This could be extended to a lakes management framework after it is developed.
1.9	Establish a working group of suitably qualified experts to identify research and monitoring needs and assist with prioritisation of these efforts, particularly in relation to the Deep Water Lakes (but with the possibility to extend this concept to other lake categories).				Staff would support a science-led working group, noting that ORC would need to build a work programme and funding around it.
2	**Management**				
2.1	Address lake levels, water quality load limits, aquatic lake biodiversity and cumulative land use management for lake catchments in the Land and Water Regional Plan development.				Underway through LWRP review.
2.2	Highlight vulnerable or degrading lakes (or lake categories) within the Catchment Action Plan process, to ensure that specific issues with these waterbodies is not lost through an FMU or Rohe scale action plan.				Part of NPSFM implementation, as discussed above.
2.3	Ensure that Catchment Action Plan development working groups include representatives or input from key lakes management stakeholders such as District Councils, LINZ or electricity generators.				ICM development process will include stakeholder engagement.
2.4	Maintain a register of existing ORC and other agency-led or funded projects, and community-led projects related to catchment improvements, including EcoFund recipients at an FMU level. Ensure that these efforts are integrated into Catchment Action Plans where appropriate. Use this register to identify areas that are underrepresented in terms of improvement projects. Incorporated with the identification of vulnerable or degrading lakes, this information can be used to encourage initiatives in priority areas if shared publicly.				A register of projects is developed, and it is intended that all projects will be incorporated into a spatial online database. We note that areas may be under-represented in terms of projects for a number of reasons. Identifying such areas could be used as part of prioritising projects, but should be complemented by other methods also.
2.5	Using the lake initiative register described above, identify projects (particularly Ecofund recipients) that require ongoing efforts to sustain the benefits realised. ORC can use this to encourage future Ecofund applicants to build on previous efforts and ensure that benefits are not lost over time.				Without prejudice to pursuing this recommendation in some form, staff note that this may lead to an expectation of ongoing support from ECO Fund which is not possible nor the intent of the Fund.
2.6	Engage with other lakes management agencies to identify key concerns and areas requiring additional focus as well as planned monitoring and restoration work in order to avoid redundancies and maximise efficiency. Work plans can be shared to coordinate activities between agencies. For example DOC are liaising with individual landowners in catchments containing endangered freshwater species. A collaborative approach between DOC and ORC could deliver more benefits.				Regular engagement already occurring, but would be extended to focus on strategic priorities once an overall strategy is created.
2.7	Where there are areas with overlapping roles or functions from multiple agencies, proactively liaise with these groups to determine where there are efficiencies to be made or where ORC could assist with the other agency's function (or vice versa). Recognise that not				The recommended approach is appealing. The focus should be on outcomes. If all parties can collectively agree on particular outcomes this could removes barriers and avoid duplication.

#	Recommendation	ORC current actions			
	all agencies have the ability to address all issues under their remit in a timely manner, find synergies where these agencies can work together to fill the gaps. The example of Tomahawk Lagoon is useful here, where DOC holds responsibility for management of the area in Wildlife Reserve, but this provides benefits (e.g. flood buffering) that are within ORC's remit, so working together will assist in achieving better outcomes for both parties.				Proactive engagement already occurs with all relevant landowners and agencies for Council's current restoration projects, including Tomahawk Lagoon.
2.8	Identify areas in lakes catchments (in collaboration with District Councils) that are more sensitive land use and development, and employ planning controls to minimise effects on the relevant lakes (See also Recommendation 4.15)				Some of this is within ORC's functions under s30 RMA 1991, and will be addressed in the LWRP.
2.9	Recognise the constraints on Electricity Generators and Irrigators who provide an essential service to the region but have other obligations (i.e. dam safety and provision of electricity) and consider whether hydro and irrigation lakes require bespoke management in the Land and Water Regional Plan and Catchment Action Plans.				Staff note the imperative of te mana o te wai as set out in the NPSFM. CAPs and regional plans will be consistent with this hierarchy. The existing constraints for all catchments and stakeholders will be considered as a part of developing workable management approaches.
3	**Collaboration, Coordination and Consultation**				
3.1	Expand public understanding on lakes and their management through the development and promotion of a public education programme about the state, monitoring and management of lakes (e.g. annual public information days to present SOE monitoring results, bringing in experts on key water quality or ecology topics, or introduce new initiatives such as the CAP programme). This could be extended to encompass all catchment issues. Currently, information available on lake water quality and ecology is technical in nature and generally found on the ORC website. This could help to promote the work ORC is undertaking and allow further opportunities for collaboration and information sharing between parties.				There are no plans for a lakes-specific education programme at present, although aspects of lake management education occur through Council's annual 'Clean, Check, Dry' summer programme.
3.2	Create a repository for the outcomes and feedback from all ORC consultations, to avoid repeat and over consultation. While this cannot replace genuine and important engagement processes, it can be referred to for future developments to ensure the feedback obtained is not lost.				Staff agree in principle. While noting the difficulty in aggregating issue-specific information and the need to recognise the representativeness (or lack thereof) of any particular input, having a database to inform decision-making and build on past engagement would be valuable.
3.3	Tailor public consultation processes to the stakeholder groups identified through stakeholder mapping. Public meetings and online surveys are generally not the most appropriate way to obtain feedback from groups like DOC, Fish and Game, Electricity Generators etc.				Staff recognise the need for multiple modes of engagement to obtain a broad range of input. Staff also note that this can be resource intensive (in terms of both budget and time), and processes need to ensure that any particular stakeholder does not obtain influence above that of iwi partners , or the general public.
3.4	Collaborate with other New Zealand councils and overseas regulators with similar issues around lakes, to share learnings from their experiences that could be applicable in Otago, such as Waikato and Bay of Plenty Regional Councils.				Staff participate in a range of regional and national level forums on matters of mutual interest. Once the regions' priorities are established, collaboration can be focused on matters of priority. E.g. ORC has taken the issue of lake snow to central government and all regional councils, and is generating support for solutions.
3.5	Develop, encourage and support effective community groups, both urban and rural, focused on lakes or catchment issues. Leverage this resource and incentivise communities to work together around the management of lakes in the region. Recognise that community groups expend significant personal input and that leaving these groups to it if they are performing well is not the best way to realise the benefits provided by these groups.				ORC provides substantial funding to Otago Catchment Communities to support community groups. Catchment Advisors are also supporting all catchment groups. ICM processes will incorporate some of this work.
3.6	Enable ORC representatives to attend catchment group, community group and other forums relating to lake management on an ongoing basis. In particular, ORC attendance at the Guardians of Lake Wānaka forum is recommended.				ORC staff attend various forum and have membership on a number of groups, when invited and as resources allow. When groups prefer managers to be in attendance, this may not always be possible given the number of meetings and groups across Otago. Representation is a regional opportunity, not confined to one particularly group.
3.7	Recognise community group management plans and values assessments in ORC's management framework, particularly Catchment Action Plans. Where appropriate, these measures and information can be adopted into the ORC framework. Use the efforts of these groups as a resource.				This is a key part of CAP framework development
3.8	Improve understanding by ORC Policy Makers of the constraints faced by Electricity Generators and Irrigators by undertaking field visits to these sites to better appreciate the processes at play. Expand knowledge in general through field visits by Policy makers, potentially in collaboration with the Environmental Implementation and Compliance teams.				This occurs already, but continuous improvement and further engagement is always supported. Policy staff are familiar with NPS REG and NPSFM, and are cognisant of the legal framework for giving effect to both.

#	Recommendation	ORC current actions			
3.9	Engage with mana whenua through existing partnership channels to better understand iwi concerns, opportunities and aspirations in relation to lakes management in Otago and obtain input into the development of an Otago Lakes Strategy (as outlined in Recommendation 1.1).				This occurs already on a project by project basis and through mana whenua participation in all planning processes, but will be extended and strengthened as part of the strategy development process.
4	**Information and Monitoring**				
4.1	Create and maintain a database of water quality information submitted with consent applications, compliance monitoring or in published articles, similar to the databases for water take records, potentially contaminated sites, or GIS bore locations. Information on drinking water taken from lakes and other surface water sources may also be available from Taumata Arowai and/or District Councils and would be relevant for any samples collected pre-treatment, or for variables such as heavy metals which would not be expected to change significantly during standard forms of treatment (chlorination/UV etc.)				Staff support increasing transparency of info held by ORC and note progress on the Aquarius project.
4.2	Generate a map of lake catchments (potentially adapted from existing Ministry for the Environment river/stream catchment GIS layers) and overlay this with Land Cover Data Base layers to identify land use at catchment scale, including changes over time. Catchments with a high or increasing proportion of urban or intensive agricultural land uses should be prioritised for input modelling, monitoring and management.				Staff note this is complementary to recommendations 1.4, 1.5 and would be carried out as a part of that work. Much of this information may already be available through existing science work and land use mapping.
4.3	Undertake a stakeholder mapping exercise for each FMU or Rohe, and where appropriate, lake catchment, to ensure that all stakeholders who are involved in lakes management are identified and documented.				This will be part of CAP process.
4.4	Recognise and document local knowledge about lakes (and other waterbodies) in the region. This information is currently collected on an ad-hoc basis and generally not documented. Many landholders, such as farmers, have a deep connection to the land they work on, and in many cases have been there for generations. This depth of understanding could be used as a resource for ORC in their decision making around lakes management.				This is a good idea in principle, though the collection would be resource intensive and would need a robust approach to e.g. protect privacy and resolve conflicting knowledge. Consultation plays this role at present. This would need to apply to all landowners, urban and rural.
4.5	Overall, in our opinion there is a need to increase the scope of monitoring. In particular, a number of lakes have specific issues (e.g. urban stormwater discharges to Wānaka and Whakatipu and sedimentation in Lake Dunstan) that are not addressed by the current state of the environment monitoring, which is primarily focussed on nutrient concentrations and related variables. Additionally, the geographical scope should be expanded where possible – Lake Roxburgh is a notable omission from the current list of monitored sites. Additional monitoring sites within the larger lakes should also be considered. We recommend that ORC review the scope of its state of the environment monitoring programme in light of these limitations, as well as the information elsewhere in this report (particularly **Error! Reference source not found.**).				The need for additional monitoring sites will be considered as part of the LWRP, as it is a requirement. Implementation will require additional FTE and CAPEX to support/install and maintain new sites.
4.6	As well as potential additions to the state of the environment monitoring programme, it is noteworthy that elevated and likely increasing heavy metal concentrations were identified in Blue Lake approximately 20 years ago (see Section **Error! Reference source not found.**), and no follow-up monitoring appears to have been conducted. Additional monitoring of this lake should be prioritised, including confirming the original findings, testing for additional heavy metals that may also be present, assessing whether concentrations are indeed increasing, and carrying out a risk assessment to identify whether any meaningful threats to lake ecosystems and/or human health exist.				Note comments on monitoring above. No specific monitoring is planned for Blue Lake at this point; this will be considered through existing processes.
4.7	In considering any increases in the scope of monitoring ORC may make in response to Recommendation 4.2, in our opinion ORC should not 'let perfect be the enemy of good', so to speak. While it is important to maintain the 'gold standard' of high-quality, frequent monitoring for existing monitoring sites, for sites that are not currently being actively monitored, any information is better than no information (provided that the data quality is fit for purpose, of course). Where budget or other constraints limit ORC's ability to test additional sites, or test for additional relevant variables, consideration should be given to less frequent monitoring of new sites/parameters.				Note comments on monitoring above. ORC has already adopted a similar approach for air quality, though staff are cognisant of current capacity constraints and existing community concerns regarding available science and data. Monitoring still needs to be carefully considered and stored and collected in a way that it can be useful for management.
4.8	Additionally, ORC should investigate the use of citizen science in collaboration with				The Science/EM/EI teams are considering how to best support ongoing monitoring, including citizen

#	Recommendation	ORC current actions			
	community groups (e.g. iwi, Enviroschools, Otago University Tramping Club, local helicopter operators) to facilitate sampling and monitoring of lake water quality, biodiversity or pest species where funding is not available for this to be done in the traditional manner by ORC staff, particularly for the remote high alpine lakes.				science and better industry/community group collaboration.
4.9	Continue to investigate and (where appropriate) implement innovative new lake water monitoring techniques including buoys, deepwater sampling, 'drifter' studies and remote sensing of surface water.				Note comments on monitoring above.
4.10	Develop and publish a list of priority lake water quality research projects that ORC does not currently have funding for. This would be useful for researchers looking for projects, and it may assist them in finding funding from other sources if ORC has publicly stated that the research would be beneficial.				Staff support this concept.
4.11	As noted in Section **Error! Reference source not found.**, our literature search uncovered a large body of literature, not all could be reviewed within this project (noting that the literature review was a relatively small component of the scope). Additionally, the Lakes 380 project will provide considerable additional relevant data in the near future. It is important that lake management is informed by the latest and best information, and we recommend that a further, comprehensive literature review be carried out. In our opinion, it would be most efficient to do this on a catchment by catchment/lake by lake scale, either as part of or in advance of the Catchment Action Plan process. Such literature reviews can use the attached list of documents identified as relevant but not yet reviewed as a starting point, and should be in accordance with the Collaboration for Environmental Evidence's guidance on systematic reviews, as far as is practicable.				A form of literature review will be part of the CAP process, but time and resources will dictate how comprehensive this will be and at what scale.
4.12	Undertake an economic evaluation of the value of Otago's lakes, in collaboration with economic development managers at District Council, to quantify the benefits these lakes bring to the region and further validate their protection. The ecosystem services framework could be used to assist this evaluation.				Part of the economic work programme includes an assessment on the value of freshwater & land for Otago.
4.13	Enhance preparedness for modelling and managing effects of climate change on lakes' hydrodynamics and ecosystem health, including by identifying species and ecosystems (particularly in the remote high alpine lakes and coastal and lowland lakes) which are vulnerable to direct and indirect effects of climate change and prioritising these for management.				ORC's climate change work programme is progressing, though there is not a specific lakes focus. Staff expect that these considerations would be a part of the prioritisation criteria suggested in recommendations 1.4 and 1.5.
4.14	Information is available on pest species present in Otago from ORC's Pest Hub web page and a variety of other sources. However, there may be a benefit to providing this information in a more co-ordinated way, such as by producing a regular pest management report similar to the state of the environment reports produced on water quality and other issues.				This is a good idea in principle, though staff note that pests are not monitored in a way that is complementary to the data collected and reported in SOE reports.
4.15	There would be a benefit to nutrient budgeting and modelling of contaminant sources and hydrological loads to lakes, particularly Deep Water Lakes and Accessible High-altitude Lakes to identify whether current and reasonably foreseeable future land use patterns in the catchments are compatible with the ongoing health of the lake ecosystems, and if not, put preventative management measures in place (See Recommendation 2.8). This recommendation is applicable for most other lake categories too, though perhaps to a lesser extent.				This is covered by implementation of the NPSFM, and the NOF therein.
4.16	Make monitoring data more accessible to other organisations and the general public. The information gained via the actions in recommendations 4.1, 4.2, 4.14, 4.15 or other initiatives could be presented using GIS and other tools to create an information portal for lakes in the Otago Region.				Staff agree that more accessible data is a good idea.

6.5. Quarterly Financial Report – 30 September 2022

Prepared for:	Council
Report No.	CS2263
Activity:	Governance Report
Author:	Sarah Munro, Finance Manager – Reporting Jasmin Lamorie, Corporate Planning Business Partner
Endorsed by:	Nick Donnelly, General Manager Corporate Services & CFO
Date:	7 December 2022

PURPOSE

[1] To present the Council's Activity and Financial Performance Reports for the 3-month period ended 30 September 2022.

RECOMMENDATION

That the Council:

*1) **Notes** this paper and the Activity and Financial Performance Reports for the period 1 July 2022 to 30 September 2022 (quarter 1 of the 2022-23 financial year).*

BACKGROUND

[2] This report includes financial and non-financial performance information relating to the major aspects of service delivery as outlined in the Long-term Plan 2021-31. Progress over the 2022-23 financial year will be reported to the Finance Committee on a quarterly basis.

[3] The following Activity and Finance Reports are attached:

- Activity Performance Report
  - High-level overview of service performance against Annual Plan measures and targets by activity
  - High-level overview of financial performance by activity
  - Report is exceptions based and commentary provides explanations for performance that is not on track
- Activity Financial Summary
  - Includes variance analysis and forecast
- Statement of Comprehensive Revenue and Expenses
- Statement of Financial Position
- Treasury Report
- Detailed Activity Financial Report

CONSIDERATIONS

Strategic Framework and Policy Considerations

[4] Not applicable.

Financial Considerations

[5] Not applicable.

Significance and Engagement

[6] Not applicable.

Legislative and Risk Considerations

[7] Not applicable.

Climate Change Considerations

[8] Not applicable.

Communications Considerations

[9] Not applicable.

NEXT STEPS

[10] Not applicable.

ATTACHMENTS

1. Activity Performance Report [**6.5.1** - 14 pages]
2. Activity Financial Summary [**6.5.2** - 6 pages]
3. Statement of Comprehensive revenue and expenses [**6.5.3** - 2 pages]
4. Statement of Financial Position [**6.5.4** - 3 pages]
5. Treasury Report - September 2022 [**6.5.5** - 1 page]
6. Detailed Activity Financial Report September 2022 [**6.5.6** - 2 pages]

Activity Performance Report

2022-23 QUARTER ONE – September 2022

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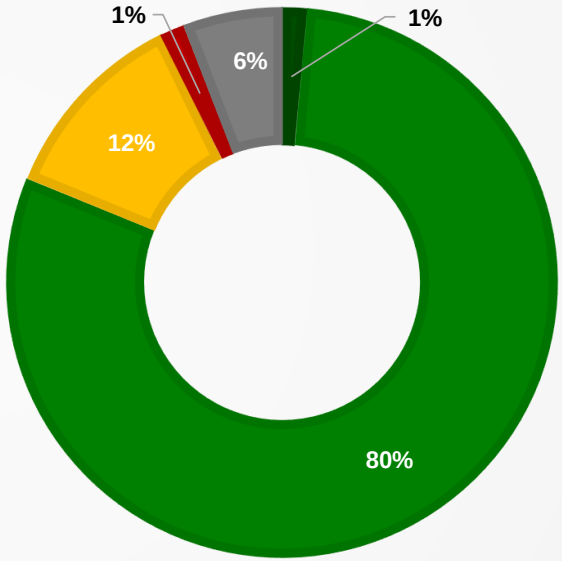
Service Delivery Performance

The 2022-23 Annual Plan contains 36 level of service statements, 62 measures and 69 targets related to activities being delivered in the 2022-23 year.

Results:

1	achieved
55	on track
8	at risk/may not achieve
1	will not be achieved
4	not able to be measured



A full list of measures, targets and the results for the quarter is included at the end of this report.

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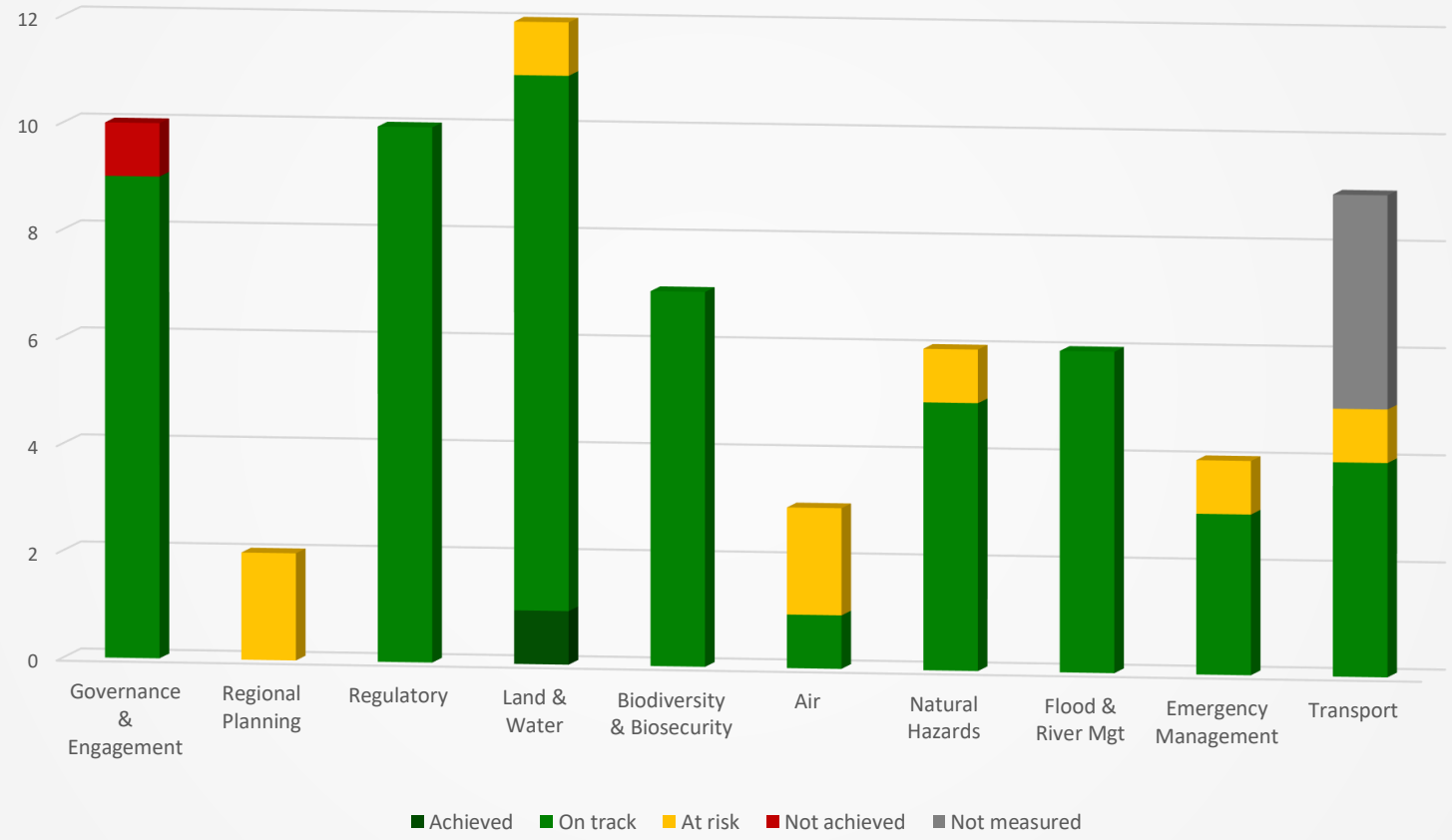
QUARTER ONE – 2022-23 (September)

Results by Activity



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QUARTER ONE – 2022-23 (September)

Service Delivery Highlights

- ORC responded effectively during the July/August flood event and flood protection schemes performed to their designed capacity. A flood damage and repair map will be uploaded to ORC website to provide communities with visibility of the extent and progress of repairs.
- Council employed a fixed term Kaitohutohu, Advisor to the Chief Executive to support high level partnership and participation with mana whenua and rūnaka.
- New Harbourmaster boat purchased. ORC now has vessels based in Dunstan and Dunedin; improving our ability to access waterways and engage across Otago.
- ORC ran a significant advertising campaign promoting people to stand, and vote in the Local Government elections, with higher voter turn-out for ORC.
- Planning underway for the Bee card to be installed and operational on the Whakatipu Ferry from October.
- Land and Water planning programme is progressing and on track for stage two consultation to launch in Q2.

Service Delivery Challenges and Risks

Quarter one challenges:

- A nationwide driver shortage impacted bus reliability. Reduced timetables were introduced in July and are set to continue into Q3. To address the shortages ORC committed to increase bus driver rates to the median wage from 1 October.
- At the end of Q1 ORC had 65 fewer staff than budgeted; recruitment continues to be challenging due to a tight skills market and this has been compounded by staff turn-over (18% in 2021-22). In some areas consultants have been engaged to keep programmes on track and in other instances work has been delayed.

Potential risks or future challenges:

- The July/August flood event caused damage to river margins and flood protection infrastructure and will require significant repairs, which will put further pressure on the planned engineering work programmes and resourcing for 2022-23.
- Delivery of some ORC work programmes, including 'catch-up' planning and operations, may be impacted by new or ongoing reform (e.g. air, highly productive land, urban/spatial, biodiversity, adaptation planning; RMA reform).

Performance Summary by Activity Group

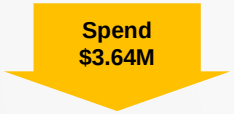
Key:

Service Delivery Results:

1	achieved
1	on track
1	at risk/may not be met
1	will not be met
1	not measured

The number in each 'traffic-light' shows the results for the Annual Plan service measure and targets for each activity this quarter. Commentary is exceptions based and provides detail regarding targets that are at risk, not achieved or where performance has not been able to be measured.

Financial Performance:



- The numbers in the arrows show the **actual** expenditure or revenue for the year to date (includes operational and capital).
- Colours indicate the **percentage variance** against budget:
  - Favourable less than 5%
  - Unfavourable 5-10%
  - Unfavourable over 10%
- Direction of arrows show whether there is a **deficit** (down) or **surplus** (up) against budget. (square if the variance is less than 1%)
- The example above shows that the actual expenditure for the year to date is $3.64M and that this is an underspend of between 5 -10% against what was budgeted for the activity.

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QUARTER ONE – 2022-23 (September)

Performance Summary by Activity Group

Regional Leadership	Service Delivery Results	Financial Performance
Governance & Engagement 9 1	⊗ 96% of LGOIMA requests (44 out of 46) responded to on time (target: 100%).	Revenue $1.77M Spend $1.61M Spend is $0.3M under, due staff time in other programmes, timing of external costs and contracts.
Regional Planning 2	⊖Urban programme is significantly reduced due to staff vacancies. ⊖ RPS timeframes have been pushed out by the High Court proceedings and is also under pressure due to vacancies and increased reliance on consultants.	Revenue $0.59M Spend $0.72M Revenue 2% over budget. Spend $0.04M over due to timing of Lakes Strategic Plan work and additional expenses related to the RPS.
Regulatory 10	All measures and targets are currently on track.	Revenue $2.58M Spend $3.33M Revenue $0.8M under due to higher non-chargeable time and staff vacancies. Spend $0.2M under due to staff vacancies, partly off-set by increased incident response and enforcement work.

Otago Regional Council

QUARTER FOUR – June 2022

Performance Summary by Activity Group

Environment	Service Delivery Results	Financial Performance
Land & Water 1 10 1	⊖ ICM – draft Catchment Action Plan delivery has been revised; a new collaboration approach means pilot CAP may take longer than initially expected.	Revenue $3.87M Spend $3.98M Revenue $0.1M under largely due to EMaR project budgeted but now hosted outside of ORC. Spend $0.3M under, largely due to timing of water implementation/remediation work and $0.1M reduction in EMaR costs.
Biodiversity & Biosecurity 7	All measures and targets are currently on track.	Revenue $1.69M Spend $1.40M Revenue $0.1M under due to timing of grants and charges. Spend $0.5M under largely due to timing of biosecurity contracts and vacancies.
Air 1 2	⊖ Review of the Regional Plan – Air is delayed due to staff vacancies. ⊖ Air network data capture rate was 93% due to technical issues at one site, now resolved; all other sites met targets.	Revenue $0.18M Spend $0.10M Spend is $0.04M under due to timing of contracts.

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QUARTER ONE – 2022-23 (September)

Performance Summary by Activity Group

Safety & Resilience	Service Delivery Results	Financial Performance
Natural Hazards & Climate Change 5 1	⊖ Areas for priority adaptation works identified as Head of Lake Wakatipu, South Dunedin/Harbourside, Clutha Delta, Henley and Roxburgh; most are progressing well however Henley and Roxburgh are still being scoped.	Revenue $0.81M Spend $0.44M Expenditure $0.4M under due to staff vacancies, timing of climate change adaptation works and quality issues with LiDAR capture impacting timing of other hazard work.
Flood Protection, Drainage & River Management 6	All measures and targets are currently on track, however repairs to damage caused by the July/August flood events may impact on planned delivery.	Revenue $2.60M Spend $2.13M Spend $0.2M over, due to July flood event response and Rees River work costs budgeted in prior year; offset slightly by underspends in other schemes and river programmes.
Emergency Management 3 1	⊖ Recruitment challenges adversely impacted staff training target. Training opportunities identified and planned for Q2.	Revenue $0.84M Spend $0.67M Spend $0.2M under largely due to staff vacancies, which also impacted timing and delivery of planned work.

Otago Regional Council

QUARTER ONE – 2022-23 (September)

Performance Summary by Activity Group

Transport	Service Delivery Results	Financial Performance
Regional & Public Transport 4 1 4	⊖ Driver shortages impacted on reliability in Q1; operating reduced bus timetables has seen some improvement in reliability. ⊙ Satisfaction surveys scheduled for Q3. Note: PT patronage is currently tracking higher than prior year and showing signs of recovery from Covid-19 impacts.	Revenue $7.57M Spend $8.24M Revenue $0.3M under due to reduced fare revenue, partly offset by additional grants for Covid disruptions. Spend is $0.5M under due to timing of infrastructure and business case work, reduced levels of service and ferry contract budget assumptions. Driver wage increase is expected to result in year-end budget overspend.

2022-23 Service Measure Quarterly Results

	Activity	Measures	Targets	Q1
Regional Leadership	Governance & Community Engagement	Percentage of official information requests responded to within statutory timeframes.	100%	
		Percentage of council agendas that are publicly available two working days or more before a meeting	100%	
		Deliver our statutory requirements with acceptable process and deliverables to decision-makers and the community	Unmodified audit reports received	
		Work done in partnership with iwi; increase the number of outputs and groups working together on projects	Maintain or increase (from 2021-22 baseline result: 19)	
		Build the bicultural competency of ORC staff and councillors	50 participants in programme	
		Annual survey is conducted to understand and improve community awareness, perceptions and expectations of ORC	Survey results show increased community awareness and improved satisfaction with the performance of ORC.	
		Customers express high levels of satisfaction with customer service provision	Determine methodology for establishing customer satisfaction.	
		Report on community wellbeing indicators	Complete annual report on wellbeing indicators and issues and report to Council by 30 June	
		Information on climate change in Otago is shared with the community and stakeholders.	Complete regional GHG* inventory and report to Council by 30 June	
		Report on regional stakeholder engagement and collaboration on climate change.	Complete annual report on regional climate change collaboration and report to Council by 30 June	
	Regional Planning	Develop an integrated planning framework that enables well managed urban growth across Otago	Develop draft regional Urban Development Strategy by 30 June	
		Complete review of existing Regional Policy Statement (RPS)	Make RPS operative by 30 June	
	Regulatory	Percentage of resource consent applications processed in accordance with Resource Management Act 1991 legislative timeframes	≥98%	
		Percentage of public enquiries for consent information completed within 7 working days	Maintain or increase (from 2021-22 baseline of 99%)	
		Percentage of performance monitoring returns completed each year, as per the Compliance Audit and Performance Monitoring Schedule targets	≥90%	
		Percentage of programmed inspections/audits completed each year, as per the Compliance Audit and Performance Monitoring Schedule targets	≥90%	
		Percentage of significant non-compliance identified where action is taken in accordance with Compliance Policy	100%	
		Maintain 24-hour/7 day a week response for environmental incidents	Pollution hotline staff available/on call 24/7	
		Maintain 20 appropriately trained responders for maritime oil pollution incidents	20 responders attend 3 exercises per year	
		Maintain compliance with Port and Harbour Marine Safety Code	Annual self review is completed by ORC and POL and signed off by the Chief Executives.	
		Major incidents on Otago's Harbours and waterways will be responded to	Major incidents and ORC's response are reported to Council quarterly	
		On-water engagement, education of recreational users and safety campaigns are documented and reported annually	Report to council by 30 June	

Otago Regional Council

Achieved, On track, May not achieve, Will not achieve, Delayed/Not measured

QUARTER ONE – 2022-23 (September)

2022-23 Service Measure Quarterly Results

	Activity	Measures	Targets	Q1
Environment	Land & Water	Complete the Land and Water Regional Plan(LWRP)	Report to Council on proposed management options for all FMUs (including rohe) by 30 June	
		Implement a regional coastal environment monitoring programme	Annual report on monitoring completed and reported to Council by 30 June	
		Implement freshwater and estuarine environment monitoring programmes	Annual report on monitoring programme completed and reported to Council	
		Percentage of data from the water monitoring network that is captured quarterly.	≥95% data capture achieved	
		Develop and implement a regional land use monitoring programme	Annual report on monitoring programme completed and reported to Council	
		Percentage of data from the land-use monitoring network that is captured quarterly.	95% data capture achieved	
		Otago Catchment Communities funding is administered as per agreement.	100%	
		Otago Catchment Communities is supported to meet deliverables and targets of funding agreement	Report to Council on deliverables and targets achieved by 30 June	
		Land owner/community led projects promoting best practice land management for soil conservation, water quality and the efficient use of water are identified and supported.	Three or more projects supported per year	
		At least three site specific action plans for selected degraded waterbodies are developed, prioritised, and implemented.	Projects confirmed and priority actions identified by 30 Sept.	
			90% of actions undertaken within specified timeframes	
		Integrated Catchment Action Plans (CAP) are developed in collaboration with iwi and community.	One Catchment Action Plan drafted	
	Biodiversity & Biosecurity	Develop and implement a regional indigenous biodiversity ecosystems monitoring programme.	Develop monitoring programme (including requirements of NPSIB*) and report to Council by 30 June	
		Actions listed in the Biodiversity Action Plan (BAP) are prioritised and progressed.	90% of current year actions achieved within timeframes specified	
		Biodiversity and biosecurity partnerships established and joint projects developed and progressed	Maintain or increase number of partnership engagement activities and events and report to Council (from 2021-22 baseline of 4)	
			Projects and progress against milestones reported to Council	
		Percentage of funding administered as per agreements.	100%	
		Complete a report on the initiatives and organisations supported and the key deliverables achieved.	Report to Council by 30 June.	
		Actions within the Biosecurity Operational Plan (BOP) are identified and progressed	90% of actions achieved within timeframes specified.	
	Air	Implement regional air monitoring programme.	Annual report on monitoring programme completed and reported to Council	
		Percentage of data from the air monitoring network that is captured quarterly.	≥95% data capture achieved	
		Complete review of the Regional Plan – Air.	Issues and options papers developed by 30 June	

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Achieved, On track, May not achieve, Will not achieve, Delayed/Not measured

QUARTER ONE – 2022-23 (September)

2022-23 Service Measure Quarterly Results

	Activity	Measures	Targets	Q1
Safety and Resilience	Natural Hazards & Climate Change	Develop a regional natural hazards risk assessment and a regional approach for prioritising adaptation	Report to Council on progress of natural hazard risk assessment and prioritisation approach.	
		Develop and implement prioritised natural hazard risks adaptation works	Work in priority areas is delivered as per plan by 30 June	
			Head of Lake Wakatipu natural hazards adaptation strategy progresses as per annual work plan	
			ORC contribution to the South Dunedin Future programme progresses as per annual work plan.	
		Relevant and up to date natural hazards information is available via the web-based Otago Natural Hazards Database	Database information is checked and updated monthly	
		Percentage of flood warnings that are issued in accordance with the flood warning manual.	100%	
	Flood Protection, Drainage & River Management	Major flood protection and control works are maintained, repaired, and renewed to the key standards defined in relevant planning documents.	≥85% of planned maintenance programme completed	
			Schemes function to their constructed design standards	
			≥90% of renewals programme completed	
		Damage identified, prioritised and a repair programme communicated with affected communities in a timely manner. (Flood Protection)	Programme developed and communicated within 3 months of the event	
		Percentage of identified and reported issues that have been investigated and appropriate action determined and communicated to affected landholders within 20 working days. (River Management)	100%	
		Percentage of planned maintenance actions achieved each year (River Mgnt)	≥90%	
	Emergency Management	Support is provided to the Otago CDEM Group as per the CDEM Act and Otago CDEM Partnership Agreement	Fulfil all requirements as the administering authority.	
		An adequate Emergency Coordination Centre (ECC) facility and staffing are available	Adequate staff who are trained and available for any activation of the ECC.	
			An appropriate facility is available for activation at all times	
		Maintain response functionality to enable operational situational awareness when ECC activated.	Response solutions are checked as scheduled and any issues remedied.	

Achieved, On track, May not achieve, Will not achieve, Delayed/Not measured

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QUARTER ONE – 2022-23 (September)

2022-23 Service Measure Quarterly Results

	Activity	Measures	Targets	Q1
Transport	Transport Planning & Public Transport	The Regional Land Transport Plan (RLTP) is reviewed and submitted in line with the Land Transport Management Act 2003 and any guidance issued by the New Zealand Transport Agency (NZTA)	RLTP implementation progress reported annually to Regional Transport Committee	
		Annual public transport boardings in Queenstown per capita	increase (2021-22: 806,802 total patronage and 52 trips per capita)	
		Annual public transport boardings in Dunedin per capita	increase (2021-22: 2,367,099 total patronage and 23 trips per capita)	
		Overall passenger satisfaction with Wakatipu Public Transport system at annual survey.	97%	
		Overall passenger satisfaction with Dunedin public transport system at annual survey	97%	
		Percentage of scheduled services delivered (reliability)	95%	
		Percentage of scheduled services on-time (punctuality – to five minutes)	95%	
		Percentage of users who are satisfied with the provision of timetable and services information	maintain or increase (from 2022 baseline: 70% (DN), 88% (QWTN)	
		Percentage of users who are satisfied with the overall service of the Total Mobility scheme	maintain or increase (from 2022 baseline: 87%)	

Achieved, On track, May not achieve, Will not achieve, Delayed/Not measured

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QUARTER ONE – 2022-23 (September)

Activity Financial Report- September 2022

YEAR TO DATE ACTUAL VS BUDGET

	Revenue			Expenses			Surplus/(Deficit)		
	Actual 2023 Year to Date $'000	AP 2023 Year to Date $'000	Variance $'000	Actual 2023 Year to Date $'000	AP 2023 Year to Date $'000	Variance $'000	Actual 2023 Year to Date $'000	AP 2023 Year to Date $'000	Variance $'000
Governance and Community	1,769	1,768	1	(1,610)	(1,889)	(279)	159	(121)	280
Regional Planning	585	573	12	(723)	(684)	39	(138)	(111)	(27)
Regulatory	2,577	3,340	(763)	(3,330)	(3,577)	(247)	(753)	(237)	(516)
REGIONAL LEADERSHIP	**4,931**	**5,681**	**(750)**	**(5,663)**	**(6,150)**	**(487)**	**(732)**	**(469)**	**(263)**
Land and Water	3,866	3,977	(111)	(3,977)	(4,228)	(251)	(111)	(251)	140
Biodiversity & Biosecurity	1,688	1,773	(82)	(1,401)	(1,893)	(492)	287	(120)	407
Air	180	180	-	(100)	(142)	(42)	80	38	42
ENVIRONMENT	**5,734**	**5,930**	**(196)**	**(5,478)**	**(6,263)**	**(785)**	**256**	**(333)**	**589**
Natural Hazards & Climate	812	813	(1)	(442)	(858)	(416)	370	(45)	415
Flood & Drainage	2,068	2,110	(42)	(1,647)	(1,501)	146	421	609	(188)
River Management	536	493	43	(482)	(422)	60	54	71	(17)
Emergency Management	836	834	2	(668)	(868)	(200)	168	(34)	202
SAFETY & RESILIENCE	**4,252**	**4,250**	**2**	**(3,239)**	**(3,649)**	**(410)**	**1,013**	**601**	**412**
Transport Planning	103	106	(3)	(108)	(106)	2	(5)	-	(5)
STEDS	43	31	12	(60)	(31)	29	(17)	-	(17)
PT- Dunedin	4,633	4,919	(286)	(5,073)	(5,184)	(111)	(440)	(265)	(175)
PT- Wakatipu	1,974	2,249	(275)	(2,181)	(2,815)	(634)	(207)	(566)	359
PT- Other	815	545	270	(817)	(579)	238	(2)	(34)	32
TRANSPORT	**7,568**	**7,850**	**(282)**	**(8,239)**	**(8,715)**	**(476)**	**(671)**	**(865)**	**194**
TOTAL	**22,485**	**23,711**	**(1,226)**	**(22,619)**	**(24,777)**	**(2,158)**	**(134)**	**(1,066)**	**932**

Note: This table includes both operating and capital expenditure.

$100,000 REVENUE VARIANCE ANALYSIS		Actual 2023 Year to Date $'000	AP 2023 Year to Date $'000	Variance $'000	Comment
REGIONAL LEADERSHIP					
R1	Consent Processing	1,028	1,537	(509)	Consent processing revenue is below budget.
R2	Compliance Monitoring	948	1,146	(197)	Compliance monitoring revenue is below budget.
ENVIRONMENT					
SAFETY & RESILIENCE					
F3	Lower Clutha Flood protection	533	361	171	This revenue is above budgeted revenue due to grant funding received for flood repairs and Riverbank Road Climate Resilience programmes.
F4	Lower Taieri flood protection	378	580	(202)	This revenue is below budgeted revenue due to timing delays in the Climate Resilience project and MBIE funding. Funding is received as expenditure is incurred and will be received in the future as the project progresses.
TRANSPORT					
T4	PT- Dunedin	4,633	4,919	(286)	PT- Dunedin's decreased revenue compared to budget has been caused by multiple factors however the majority of the below budgeted revenue is due to reduced fare revenue, caused by $2 fares and reduced patronage compared to budget due to the reduced bus timetable and covid.
T5	PT- Queenstown	1,973	2,249	(275)	PT-Queenstown has reduced revenue $359,000 for ferry services which is being off set by increased revenue being received for bus transport services. There is also an impact within transport revenue classes caused by the central government 50% fare reduction policy. This has resulted in a reduction in other income (fares are $1 50% of the $2 rate) and increase in grant funding (the reduced fares have been funded by the NZTA).
T6	PT- Other	815	545	269	$176,000 of this above budgeted revenue is being caused by community connect programme (community services card bus transport discount) which is 100% funded by NZTA.

$100,000 EXPENDITURE VARIANCE ANALYSIS		Actual 2023 Year to Date $'000	AP 2023 Year to Date $'000	Variance $'000	Comment
REGIONAL LEADERSHIP					
G1	Communications and engagement	448	559	(111)	This majority of this decreased expenditure has been caused by reduced staff costs in communications due to staff working on other programmes (transport) and staff vacancies.
G8	Governance & Financial Contributions	1,164	1,329	(168)	This reduced expenditure is due to timing differences from budget. The expenditure is underspent largely in the strategy function.
R1	Consent Processing	1,387	1,538	(150)	This reduced expenditure has been caused by reduced staff time being spent on consent processing from budget due to staff vacancies.
R2	Compliance monitoring	1,069	1,277	(207)	This reduced expenditure has been caused by reduced staff time being spent on performance monitoring from budget, with time being spent on incident response.
I1	Incident response	555	433	122	Incident response expenditure is above budget due to more staff time being used than budgeted.
ENVIRONMENT					
W2	Land & water science and monitoring	2,391	2,496	(104)	The majority of this is caused by EMaR project that was budgeted at $93,000 but is now being managed by the regional sector RSHL office.
W3	Land & water implementation	705	889	(184)	The majority of the land and water implementation below budget expenditure has been caused by decreased expenditure in catchment management $88,000 and the Lake Hayes remediation programme $84,000.
L2	Biosecurity	1,121	1,470	(349)	This reduction in expenditure has been caused by multiple factors including: - Timing of work with contracts for the wilding conifer and wallaby programmes still be developed with MPI for the current year - Staff vacancies - Timing in operational programmes
SAFETY & RESILIENCE					
F4	Lower Taieri flood protection	325	202	124	Lower Taieri flood protection scheme above budgeted expenditure has been caused by higher operational staff and supplier costs due to flood repairs.

$100,000 EXPENDITURE VARIANCE ANALYSIS		Actual 2023 Year to Date $'000	AP 2023 Year to Date $'000	Variance $'000	Comment
N1	Natural Hazards	258	505	(247)	Natural hazards underspend has been caused by reduced staff time and supplier costs on the flood hazard programme.
N3	Climate change adaption	113	291	(177)	This underspend has been caused by modelling programmes being delayed.
E1	Emergency Management	669	867	(198)	This underspend has been caused by reduced staff costs due to vacancies.
TRANSPORT					
T4	PT- Dunedin	5,073	5,183	(110)	The majority of this under budget expenditure has been caused by: - $110,000 reduction in bus infrastructure costs due to construction/renewals work delayed - $200,000 reduction in Dunedin business case improvements due to the Mosgiel express service being delayed until March 2023 due to driver shortage - $140,000 increase in Dunedin bus service costs due to increase bus driver wages
T5	PT- Queenstown	2,181	2,815	(634)	This under budget expenditure has been caused by: - $459,000 reduced expenditure on the Queenstown ferry operation - $145,000 reduction in bus infrastructure costs due to construction/renewals work delayed
T6	PT- Other	816	579	237	The majority if this over budget expenditure has been caused by the RITS- Connect Community implementation programme which was not budgeted but is 100% funded by NZTA.

FORECAST to June 2023	Revenue			Expenditure			Surplus/(Deficit)		
	Forecast	Budget	Variance	Forecast	Budget	Variance	Forecast	Budget	Variance
Governance & Community	7,473	7,473		7,725	7,775	(50)	(252)	(302)	50
Regional Leadership	2,293	2,293		2,803	2,293	510	(510)	()	(510)
Regulatory	11,333	13,101	(1,768)	12,788	13,477	(689)	(1,454)	(375)	(1,079)
REGIONAL LEADERSHIP	**21,099**	**22,867**	**(1,768)**	**23,316**	**23,545**	**(229)**	**(2,217)**	**(678)**	**(1,539)**
Air	720	720		810	810		(90)	(90)	
Biodiversity & Biosecurity	10,260	10,465	(205)	11,142	11,460	(318)	(882)	(995)	113
Land & Water	15,692	16,575	(882)	18,337	18,937	(600)	(2,644)	(2,362)	(282)
ENVIRONMENT	**26,672**	**27,760**	**(1,087)**	**30,288**	**31,206**	**(918)**	**(3,616)**	**(3,447)**	**(169)**
Flood & Drainage	8,239	8,441	(202)	9,370	9,517	(147)	(1,131)	(1,076)	(55)
River Management	1,971	1,971		3,623	3,023	600	(1,653)	(1,053)	(600)
Hazards	3,253	3,253		2,757	3,413	(656)	496	(160)	656
Emergency Management	3,336	3,336		2,817	3,336	(519)	519		519
SAFETY & RESILIENCE	**16,798**	**17,000**	**(202)**	**18,567**	**19,289**	**(722)**	**(1,769)**	**(2,289)**	**520**
Regional Land Transport Planning	408	424	(16)	424	424		(16)		(16)
Stock Truck Effluent Disposal	124	124		124	124		()	()	
Public Transport - Dunedin	19,423	19,677	(253)	21,135	20,667	468	(1,712)	(991)	(721)
Public Transport - Wakatipu	8,447	9,596	(1,149)	10,700	11,261	(561)	(2,253)	(1,665)	(588)
Public Transport - Other	2,123	2,181	(58)	2,286	2,286		(163)	(105)	(58)
TRANSPORT	**30,525**	**32,001**	**(1,476)**	**34,669**	**34,762**	**(93)**	**(4,144)**	**(2,761)**	**(1,383)**
TOTAL	**95,095**	**99,627**	**(4,533)**	**106,840**	**108,801**	**(1,962)**	**(11,745)**	**(9,174)**	**(2,571)**

Funding of Surplus/(Deficit) Variance

FORECAST to June 2023

	Reserve funding of variance			
	General	**Targeted**	**Other**	**Total**
Governance & Community			(50)	(50)
Regional Leadership	510			510
Regulatory	1,079			1,079
REGIONAL LEADERSHIP	**1,589**		**(50)**	**1,539**
Air				
Biodiversity & Biosecurity		(113)		(113)
Land & Water	269	14		282
ENVIRONMENT	**269**	**(100)**		**169**
Flood & Drainage		1,285	(1,230)	55
River Management		600		600
Hazards	(656)			(656)
Emergency Management		(519)		(519)
SAFETY & RESILIENCE	**(656)**	**1,366**	**(1,230)**	**(520)**
Regional Land Transport Planning	16			16
Stock Truck Effluent Disposal				
Public Transport - Dunedin		721		721
Public Transport - Wakatipu		588		588
Public Transport - Other		58		58
TRANSPORT	**16**	**1,367**		**1,383**
TOTAL	**1,218**	**2,633**	**(1,280)**	**2,571**

Statement of Comprehensive Revenue and Expense for the 3-month period ended 30 September 2022

	Notes	Actual 2023 3 month period	Annual Plan 2023 3 month period	Variance 3 month period	Actual 2023 12 month period
REVENUE					
Rates revenue		11,726	11,707	19	40,211
Subsidies and grant revenue		4,751	4,591	160	21,691
Other income	1	2,057	3,708	(1,651)	11,114
Dividends		3,653	3,500	153	13,469
Interest and investment income		53	188	(135)	344
TOTAL REVENUE		**22,241**	**23,694**	**(1,453)**	**86,829**
EXPENDITURE					
Employee benefits expense	2	(6,873)	(8,173)	1,300	(26,692)
Depreciation and amortisation		(1,041)	(1,086)	45	(3,949)
Finance costs		(109)	(62)	(47)	(244)
Other expenses	4	(13,680)	(14,251)	571	(60,300)
TOTAL OPERATING EXPENDITURE		**(21,704)**	**(23,572)**	**1,868**	**(90,165)**
OPERATING SURPLUS/(DEFICIT)		**536**	**122**	**414**	**(3,336)**
Other gains/(losses)		162	252	(90)	(1,953)
Revaluation gain/(loss)–shares of subsidiary		-	-	-	87,960
Income tax benefit/(expense)		-	-	-	100
SURPLUS/(DEFICIT)		**698**	**373**	**325**	**82,771**

Notes

1. Other Income is $1,651,000 below budget due to the following:

- Consent processing is $520,000 below the $1,036,000 budget.

- Public transport revenue was $408,000 below budgeted revenue of $840,000 for the Dunedin network. Dunedin network reduced fare revenue was caused by:
    - Continuation of $2 flat fares. NZTA is not funding any of the fare difference between budgeted fares and the $2 flat fares.
    - Lower patronage for the year to date due to covid and the reduced bus timetable.
    - Central government's 50% fare revenue initiative (which was applied to the already reduced $2 flat fares). The effect of the 50% fare reduction has been funded through grant revenue from NZTA but only from the $2 level and not from the originally budgeted fare level.

- Public transport revenue for the Wakatipu network was $218,000 below budgeted revenue of $604,000. The Wakatipu network reduced fare revenue was caused by:
    - The Queenstown ferry service was $229,000 below budget. This was budgeted to be an operational route in the 2022/2023 financial year with Council receiving gross fare revenue, however this is still in trial phase with revenue being received under the contract by the operator and Council providing a net cost subsidy.

- Compliance monitoring and contaminated sites was $200,000 below budgeted revenue of $445,000.

- The remaining $305,000 below budget other income was caused by small variances over multiple programmes.

2. Employee benefits expenses is $1,300,000 below budget due to vacancies in budgeted positions in the Annual Plan. The following tables shows Annual Plan budget FTEs compared to actual FTEs for the Q1 (30 September 2022) and the prior year FTEs (30 June 2022).

Directorate	22/23 FTE Budget	Q1 2023 September 2022 FTEs	September variance from budget	Prior year end 30 June 2022 FTEs
Chief Executive	2.1	1	(1.1)	1
Corporate Services	55.3	41.1	(14.2)	46.3
Operations	91.7	71.4	(20.3)	79.5
Governance, Culture & Customer	20.5	19.8	(0.7)	18.9
Strategy, Policy and Science	73.4	54	(19.4)	57.6
Regulatory & Communications	91	81.6	(9.4)	76.6
	334	**268.9**	**(65.1)**	**279.9**

3. Other expenses are $571,000 below budget due to the following:

- Accommodation and travel expenses are $171,000 below budget of $184,000.

- Bus contractor costs are $520,000 below budget of $8,455,000 for Q1 due to reduced running costs caused by the reduced bus timetable.

- Legal expenses are $124,000 above budget costs of $332,000 due to increased spending on the incident response, policy and human resources.

- The remaining variance of $4,000 was caused by small variances across multiple expense ledger groups.

Statement of Financial Position as at 30 September 2022

	Notes	Actual 2023 3 month period	Actual 2022 12 month period	Variance	Annual plan 2023 12 month period
CURRENT ASSETS					
Cash and cash equivalents	1	6,769	13,243	(6,474)	2,049
Trade receivables	2	48,304	11,140	37,164	9,304
Other financial assets	3	23,589	23,434	155	36,796
Other current assets	4	1,175	883	292	698
TOTAL CURRENT ASSETS		**79,837**	**48,700**	**31,137**	**48,847**
NON- CURRENT ASSETS					
Property, plant and equipment	6	96,445	97,032	(587)	106,065
Investment property	7	16,795	16,795	-	16,810
Shares in subsidiary	7	700,290	700,290	-	657,795
Deferred tax asset		98	98	-	98
Related party loan- Port Otago Ltd	5	100,584	99,960	624	-
Intangible asset		1,173	1,450	(277)	3,982
TOTAL NON-CURRENT ASSETS		**915,385**	**915,625**	**(240)**	**784,750**
TOTAL ASSETS		**995,222**	**964,325**	**30,897**	**833,597**
CURRENT LIABILITIES					
Trade and other payables	8	(47,444)	(18,196)	(29,248)	(18,614)
Borrowings	5	(68,555)	(67,956)	(599)	-
Provision	9	-	-	-	-
Employee entitlement		(2,759)	(2,408)	(351)	(2,343)
TOTAL CURRENT LIABILITIES		**(118,758)**	**(88,560)**	**(30,198)**	**(20,957)**
NON CURRENT LIABILITIES					
Borrowings	5	(47,200)	(47,200)	-	(25,000)
Other financial instruments		-	-	-	-
TOTAL NON CURRENT LIABILITIES		**(47,200)**	**(47,200)**	**-**	**(25,000)**
NET ASSETS		**829,264**	**828,565**	**699**	**787,640**
EQUITY					
Reserves		724,404	723,546	858	666,120
Public Equity		104,860	105,019	(159)	121,520
TOTAL EQUITY AND RESERVES		**829,264**	**828,565**	**699**	**787,640**

Notes

1. Cash and cash equivalents decreased by $6,474,000 from the 30 June 2022 position of $13,243,000. This decrease was caused by funding Council operating cashflow requirements.

2. Trade Receivables has increased by $37,164,000 from the 30 June 2022 position of $11,140,000. The majority of this increase was caused by the following:

   - Debtors has increased by $42,471,000 due to rates for the 2022/2023 period having been invoiced 1 September 2022 but not due until 31 October 2022.
   - Dividend receivable increased by $2,500,000. The dividend from Port is accrued monthly but is paid in 2 instalments during the year.
   - GST receivable/payable decreased by $7,788,000 to a payable position of $6,813,000 due to the GST liability owed to the IRD for the 2022/2023 rates (due October 2022).
   - The remaining variance was in trade debtors, which increased due to the timing of debtor invoicing.

3. Other financial assets increased $155,000 from the 30 June 2022 position of $23,434,000 due to the increase in market value on the investments held in the JB Were long term managed fund.

4. Other current assets increased by $292,000 from the 30 June 2022 position of $883,000. This balance is prepayments that Council makes for annual licensing and insurance that is released throughout the license or insurance period.

5. During the 2021/2022 financial period Council drew down $15,000,000 current loans from the LGFA for Council cashflow requirements.

   Funding was also drawn down and on-lent to Port Otago Limited during 2021/2022 financial period. Council approved the lending of LGFA funds to Port Otago in March 2022. $98,750,000 of loans and $1,210,000 of LGFA borrower note funding (a security required for lending) was drawn down during 2021/2022 from the LGFA and on-lent to Port Otago Limited. At 30 September there was $623,000 of interest accrued on the LGFA loan and related party loan to Port Otago Limited.

6. Property plant and equipment decreased by $587,000 from the 30 June 2022 position of $97,032,000. This decrease is caused by:

   - Additions of $500,000, the majority being plant and vehicles $254,000 and WIP $242,000
   - Less: Disposals of $347,000, the majority being plant and vehicles $177,000 and Kuriwao endowment land $170,000
   - Less: Net depreciation of $740,000

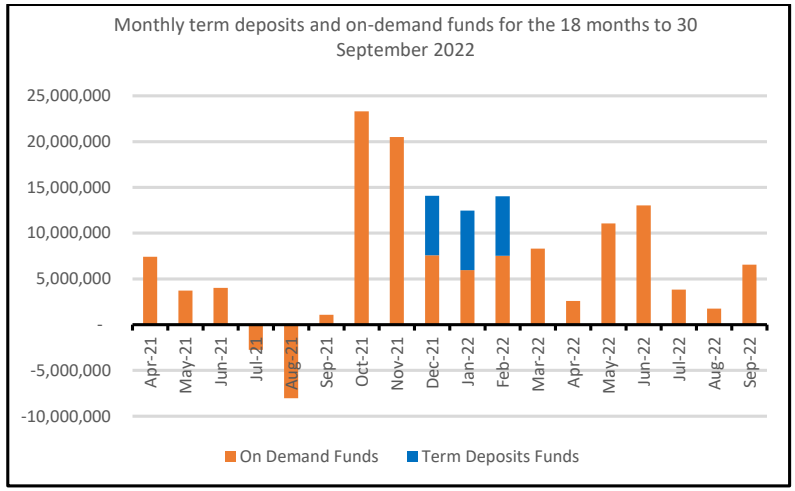
7. Investment property and shares in subsidiary (Port Otago Limited) are not revaluation during the financial year. These investments will be revalued for the final 30 June 2023 Financial Statements.

8. Trade and other payables are $29,248,000 above the 30 June 2022 position of $18,196,000 due to:
   - An increase in rates received in advance of $35,530,000. Rates are struck on 1 September but are earned over the entire financial period, being held in the liability account of rates received in advance and released monthly as earnt by council.

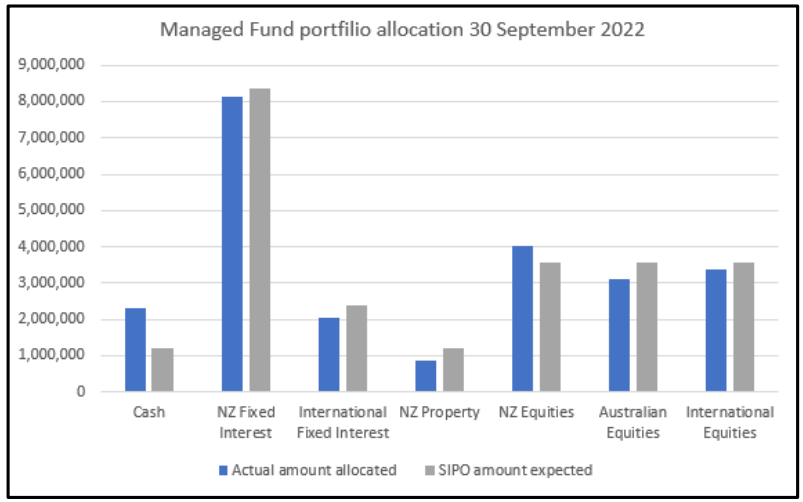
- The remaining decrease in payables of $6,282,000 from the 30 June 2022 position was caused by the timing of payments and incurred expenditure in Q1 2023 compared to 30 June 2022.

Treasury Report

Term Deposits - Portfolio Composition



Managed Fund – Portfolio Allocation - as at 30 September 2022



Portfolio Performance- for the year ended 30 September 2022

Managed Fund Income	Q1 2023 YTD	Q4 2022 YTD
Interest on managed fund	53,109	190,543
Dividends	153,373	468,725
Other	(33,794)	(125,000)
Market Value movement gain/(loss)	(22,549)	(2,412,211)
Withdrawal		
Total increase/(decrease) in managed fund	**150,139**	**(1,877,943)**

Asset Class Allocation - as at 30 September 2022

Asset Class	Actual amount allocated	%	SIPO amount expected	SIPO target	SIPO acceptable range		SIPO met
Cash	2,302,927	10%	1,194,578	5%	0%	25%	Yes
NZ Fixed Interest	8,126,764	34%	8,362,049	35%	25%	45%	Yes
International Fixed Interest	2,062,775	9%	2,389,157	10%	5%	15%	Yes
Defensive Total	**12,492,466**	52%	**11,945,784**	**50%**	**40%**	**60%**	Yes
NZ Property	865,735	4%	1,194,578	5%	2%	8%	Yes
NZ Equities	4,020,129	17%	3,583,735	15%	10%	20%	Yes
Australian Equities	3,128,191	13%	3,583,735	15%	10%	20%	Yes
International Equities	3,385,047	14%	3,583,735	15%	10%	20%	Yes
Growth Total	**11,399,102**	48%	**11,945,784**	**50%**	**40%**	**60%**	Yes
Total	**23,891,568**						

ACTIVITY DETAIL SEPTERMBER 2022			Operating Expenditure			Capital Expenditure			Other Expenditure			Total Expenditure			General rates			Targeted rates			Grants			Other Income			Total Revenue		
			Actual	Budget	Variance	Actual	Budget	Variance	Actual	Budget	Variance	Actual	Budget	Variance	Actual Gen Rate A	Budget Gen Rate B	Variance	Actual Targ Rate A	Budget Targ Rate B	Variance	Actual Grants A	Budget Grants B	Variance	Actual	Budget	Variance	Actual	Budget	Variance
			Opex A	Opex B	Variance	Capex A	Capex B	Variance	Other A	Other B	Variance																	
REGIONAL LEADERSHIP																												
Governance & Community	Communications & Engagement	G1	419	558	(139)	-	1	(1)	29	1	28	448	559	(111)	543	542	1	-	-	-	-	-	-	-	-	-	543	542	1
	Governance & Financial Contributions	G8	1,169	1,330	(160)	-	-	-	(8)	-	(8)	1,161	1,330	(168)	1,227	1,198	29	-	-	-	-	-	-	-	29	(29)	1,227	1,227	(0)
	Total Governance & Community		**1,588**	**1,887**	**(299)**	**-**	**1**	**(1)**	**22**	**1**	**20**	**1,610**	**1,889**	**(279)**	**1,769**	**1,739**	**30**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**29**	**(29)**	**1,769**	**1,768**	**1**
Regional Planning	RPS, Strategy, Urban Dev & Response to Issues	P1	717	684	32	-	-	-	6	-	6	723	684	39	574	573	1	-	-	-	-	-	-	11	-	11	586	573	12
	Total Regional Planning		**717**	**684**	**32**	**-**	**-**	**-**	**6**	**-**	**6**	**723**	**684**	**39**	**574**	**573**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**11**	**-**	**11**	**586**	**573**	**12**
Regulatory	Incident Response & Enforcement	I1	453	398	55	-	-	-	101	35	66	555	433	122	359	358	1	-	-	-	-	-	-	22	75	(53)	381	433	(52)
	Consent Processing	R1	1,279	1,538	(259)	-	-	-	109	-	109	1,388	1,538	(150)	500	499	1	-	-	-	-	-	-	528	1,039	(511)	1,028	1,538	(510)
	Compliance Monitoring & Contaminated Sites	R2	995	1,276	(281)	-	-	-	74	1	74	1,070	1,277	(207)	652	651	1	50	50	0	-	-	-	246	445	(199)	948	1,146	(198)
	Harbours Management	R4	216	223	(7)	92	98	(6)	11	8	2	318	329	(11)	205	204	0	-	-	-	14	19	(4)	-	-	-	219	223	(4)
	Total Regulatory		**2,944**	**3,435**	**(491)**	**92**	**98**	**(6)**	**295**	**44**	**251**	**3,331**	**3,577**	**(247)**	**1,716**	**1,712**	**4**	**50**	**50**	**0**	**14**	**19**	**(4)**	**796**	**1,559**	**(763)**	**2,577**	**3,340**	**(763)**
Total Regional Leadership			**5,249**	**6,007**	**(758)**	**92**	**99**	**(7)**	**323**	**45**	**278**	**5,664**	**6,151**	**(487)**	**4,060**	**4,025**	**35**	**50**	**50**	**0**	**14**	**19**	**(4)**	**807**	**1,588**	**(781)**	**4,932**	**5,682**	**(750)**
ENVIRONMENTAL																												
Land & Water Planning	Land & Water Planning	W1	899	843	56	-	-	-	(18)	-	(18)	882	843	38	704	702	2	-	-	-	-	-	-	-	-	-	704	702	2
	Land & Water Science and Monitoring	W2	1,999	2,264	(265)	209	150	58	184	81	103	2,391	2,496	(104)	2,543	2,537	6	-	-	-	-	-	-	(0)	91	(91)	2,542	2,628	(86)
	Land & Water Implementation	W3	694	736	(42)	-	150	(150)	11	3	7	705	889	(184)	235	234	1	310	309	1	75	103	(28)	-	-	-	620	646	(27)
	Total Land & Water Planning		**3,592**	**3,843**	**(251)**	**209**	**300**	**(92)**	**177**	**84**	**93**	**3,978**	**4,228**	**(250)**	**3,481**	**3,474**	**8**	**310**	**309**	**1**	**75**	**103**	**(28)**	**(0)**	**91**	**(91)**	**3,866**	**3,977**	**(111)**
Biodiversity & Biosecurity	Biodiversity Implementation	L1	151	226	(76)	-	-	-	3	-	3	153	226	(73)	277	276	1	-	-	-	25	37	(12)	-	-	-	301	313	(11)
	Biosecurity	L2	1,097	1,467	(370)	-	-	-	24	3	21	1,121	1,470	(349)	-	-	-	895	895	0	207	230	(23)	-	51	(51)	1,102	1,176	(74)
	Biodiversity Science & Monitoring	L8	114	194	(81)	7	-	7	6	3	3	127	197	(71)	285	285	1	-	-	-	-	-	-	-	-	-	285	285	1
	Total Biodiversity & Biosecurity		**1,362**	**1,888**	**(526)**	**7**	**-**	**7**	**32**	**6**	**26**	**1,401**	**1,894**	**(493)**	**562**	**561**	**1**	**895**	**895**	**0**	**232**	**266**	**(35)**	**-**	**51**	**(51)**	**1,688**	**1,773**	**(85)**
Air	Air Monitoring	A1	86	138	(52)	3	-	3	12	5	7	100	142	(42)	115	115	0	-	-	-	-	-	-	-	-	-	115	115	0
	Regional Plan: Air	A4	-	-	-	-	-	-	-	-	-	-	-	-	65	65	0	-	-	-	-	-	-	-	-	-	65	65	0
	Total Air		**86**	**138**	**(52)**	**3**	**-**	**3**	**12**	**5**	**7**	**100**	**142**	**(42)**	**180**	**180**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**180**	**180**	**0**
Total Environmental			**5,040**	**5,869**	**(829)**	**218**	**300**	**(82)**	**221**	**94**	**126**	**5,479**	**6,264**	**(785)**	**4,224**	**4,215**	**9**	**1,204**	**1,203**	**1**	**307**	**370**	**(63)**	**(0)**	**142**	**(143)**	**5,735**	**5,930**	**(195)**
SAFETY AND RESILIENCE																												
Climate Change & Hazards	Natural Hazards	N1	253	505	(252)	-	-	-	5	-	5	258	505	(247)	393	392	1	-	-	-	-	47	(47)	-	-	-	393	439	(46)
	Flood & Low Flow Risk Management	N2	66	60	6	-	-	-	4	1	3	70	61	9	93	93	0	-	-	-	-	-	-	-	-	-	93	93	0
	Climate Change Adaptation	N3	104	290	(187)	6	-	6	4	1	3	113	291	(178)	282	281	1	-	-	-	-	-	-	45	-	45	326	281	45
	Total Climate Change & Hazards		**423**	**856**	**(433)**	**6**	**-**	**6**	**13**	**2**	**12**	**442**	**858**	**(416)**	**768**	**766**	**2**	**-**	**-**	**-**	**-**	**47**	**(47)**	**45**	**-**	**45**	**812**	**813**	**(1)**
Emergency Managament	Emergency Management	E1	649	866	(217)	-	-	-	19	1	18	669	868	(199)	-	-	-	835	834	1	-	-	-	1	-	1	836	834	2
	Total Emergency Management		**649**	**866**	**(217)**	**-**	**-**	**-**	**19**	**1**	**18**	**669**	**868**	**(199)**	**-**	**-**	**-**	**835**	**834**	**1**	**-**	**-**	**-**	**1**	**-**	**1**	**836**	**834**	**2**
Flood Protection	Alexandra Flood Protection	F1	52	57	(5)	-	-	-	11	10	0	63	68	(5)	2	2	0	-	-	-	-	-	-	-	75	(75)	2	76	(75)
	Leith Flood Protection Scheme	F2	53	64	(11)	-	-	-	98	97	1	151	161	(10)	45	45	0	365	365	(0)	-	-	-	-	-	-	410	410	0
	Lwr Clutha Flood Protection & Drainage	F3	313	242	70	7	124	(116)	46	45	1	366	411	(45)	54	54	0	237	237	(0)	131	24	107	110	45	64	533	361	172
	Lwr Taieri Flood Protection Scheme	F4	243	160	83	76	31	45	7	10	(3)	326	202	124	55	55	0	263	263	0	60	263	(203)	0	0	0	378	581	(203)
	West Taieri Drainage	F5	156	150	6	8	15	(7)	46	51	(5)	210	216	(5)	31	31	0	205	205	(0)	-	-	-	11	17	(6)	246	253	(6)
	East Taieri Drainage	F6	149	139	10	-	3	(3)	26	23	3	176	164	11	19	19	0	153	160	(7)	-	-	-	1	0	1	173	179	(6)
	Tokomairiro Drainage	F7	36	27	9	-	-	-	1	1	0	37	28	9	-	-	-	40	40	(0)	-	-	-	-	-	-	40	40	(0)
	Shotover River Delta	F8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Scheme Oversight & Bylaws	F9	313	252	61	-	-	-	5	-	5	318	252	66	-	-	-	-	-	-	-	-	-	286	210	75	286	210	75
	Total Flood Protection		**1,315**	**1,091**	**223**	**92**	**172**	**(81)**	**240**	**237**	**3**	**1,647**	**1,501**	**146**	**206**	**205**	**0**	**1,263**	**1,270**	**(7)**	**192**	**287**	**(95)**	**407**	**348**	**60**	**2,068**	**2,110**	**(42)**
River Management	River Mgt - Dunedin	M1	80	50	30	1	-	1	4	3	1	84	53	31	-	-	-	45	45	0	-	-	-	-	-	-	45	45	0
	River Mgt - Clutha	M2	74	61	13	1	-	1	2	1	1	77	63	14	-	-	-	98	98	0	-	-	-	-	-	-	98	98	0
	River Mgt - Central	M3	49	134	(85)	1	-	1	1	0	1	51	134	(84)	-	-	-	85	85	0	-	-	-	-	-	-	85	85	0
	River Mgt - Wakatipu	M4	126	32	94	1	-	1	0	0	0	127	32	95	-	-	-	55	55	-	22	-	22	-	-	-	77	55	22
	River Mgt - Wanaka	M5	17	33	(16)	1	-	1	0	-	0	18	33	(15)	-	-	-	55	55	-	20	-	20	-	-	-	75	55	20
	River Mgt - Waitaki	M6	30	52	(23)	1	-	1	1	1	0	31	53	(22)	-	-	-	100	100	0	-	-	-	-	-	-	100	100	0
	Lwr Waitaki Flood Protection & River Control	M7	50	47	2	1	-	1	-	-	-	50	47	3	5	5	0	43	43	0	-	-	-	-	-	-	48	47	0
	Non Scheme Management	M8	44	8	37	-	-	-	0	-	0	45	8	37	8	8	0	-	-	-	-	-	-	-	-	-	8	8	0
	Total River Management		**469**	**417**	**52**	**4**	**-**	**4**	**9**	**6**	**4**	**482**	**423**	**59**	**12**	**12**	**0**	**481**	**480**	**1**	**43**	**-**	**43**	**-**	**-**	**-**	**536**	**493**	**43**
Total Safety and Resilience			**2,856**	**3,230**	**(374)**	**101**	**172**	**(71)**	**282**	**246**	**36**	**3,239**	**3,649**	**(410)**	**986**	**984**	**2**	**2,579**	**2,584**	**(6)**	**234**	**334**	**(100)**	**453**	**348**	**105**	**4,252**	**4,250**	**2**
TRANSPORT																												
	Regional Land Transport Planning	T1	106	106	0	-	-	-	2	-	2	108	106	2	52	52	0	-	-	-	46	54	(8)	5	-	5	103	106	(3)
	Stock Truck Effluent Disposal	T3	55	28	27	-	-	-	5	3	1	60	31	29	15	15	0	-	-	-	28	16	12	-	-	-	43	31	12
	Public Transport - Dunedin	T4	4,912	5,027	(115)	-	-	-	161	157	4	5,073	5,184	(111)	-	-	-	1,755	1,753	2	2,446	2,326	120	432	840	(408)	4,633	4,919	(286)
	Public Transport - Wakatipu	T5	2,142	2,779	(637)	-	-	-	39	37	3	2,181	2,815	(634)	-	-	-	436	434	2	1,152	1,211	(59)	386	604	(218)	1,974	2,249	(275)
	Public Transport - Other	T6	816	579	236	-	-	-	1	-	1	817	579	237	124	123	0	-	-	-	523	262	261	168	160	8	815	545	269
	Total Transport		**8,031**	**8,518**	**(488)**	**-**	**-**	**-**	**208**	**197**	**11**	**8,239**	**8,715**	**(477)**	**191**	**190**	**0**	**2,191**	**2,188**	**4**	**4,196**	**3,868**	**327**	**990**	**1,604**	**(614)**	**7,568**	**7,850**	**(283)**
Total Transport			**8,031**	**8,518**	**(488)**	**-**	**-**	**-**	**208**	**197**	**11**	**8,239**	**8,715**	**(477)**	**191**	**190**	**0**	**2,191**	**2,188**	**4**	**4,196**	**3,868**	**327**	**990**	**1,604**	**(614)**	**7,568**	**7,850**	**(283)**
Total Projects		**Total Above**	**21,175**	**23,624**	**(2,449)**	**411**	**572**	**(160)**	**1,033**	**583**	**451**	**22,620**	**24,778**	**(2,158)**	**9,460**	**9,414**	**47**	**6,025**	**6,025**	**(1)**	**4,751**	**4,591**	**160**	**2,249**	**3,682**	**(1,432)**	**22,486**	**23,712**	**(1,226)**

ACTIVITY DETAIL SEPTERMBER 2022			Surplus / (Deficit)			General Reserves			Targeted Reserves			Other Reserves			Total Funding		
			Actual	Budget	Variance	Actual Gen Res A	Budget Gen Res B	Variance	Actual Targ Res A	Budget Targ Res B	Variance	Actual Other Res A	Budget Other Res B	Variance	Actual	Budget	Variance
REGIONAL LEADERSHIP																	
Governance & Community	Communications & Engagement	**G1**	95	(18)	112	(95)	-	(95)	-	-	-	-	1	(1)	448	542	(94)
	Governance & Financial Contributions	**G8**	65	(103)	168	(65)	9	(74)	-	-	-	-	-	-	1,161	1,236	(74)
	Total Governance & Community		**160**	**(121)**	**280**	**(160)**	**9**	**(169)**	**-**	**-**	**-**	**-**	**1**	**(1)**	**1,610**	**1,778**	**(168)**
Regional Planning	RPS, Strategy, Urban Dev & Response to Issues	**P1**	(138)	(111)	(27)	138	-	138	-	-	-	-	-	-	723	573	150
	Total Regional Planning		**(138)**	**(111)**	**(27)**	**138**	**-**	**138**	**-**	**-**	**-**	**-**	**-**	**-**	**723**	**573**	**150**
Regulatory	Incident Response & Enforcement	**I1**	(173)	(0)	(173)	173	-	173	-	-	-	-	-	-	555	433	122
	Consent Processing	**R1**	(360)	(0)	(360)	358	-	358	2	-	2	-	-	-	1,388	1,538	(150)
	Compliance Monitoring & Contaminated Sites	**R2**	(122)	(131)	9	140	55	85	(18)	9	(27)	-	-	-	1,070	1,210	(140)
	Harbours Management	**R4**	(99)	(106)	7	7	-	7	-	-	-	92	98	(6)	318	322	(3)
	Total Regulatory		**(754)**	**(237)**	**(517)**	**678**	**55**	**623**	**(16)**	**9**	**(25)**	**92**	**98**	**(6)**	**3,331**	**3,502**	**(172)**
Total Regional Leadership			**(732)**	**(469)**	**(263)**	**656**	**64**	**592**	**(16)**	**9**	**(25)**	**92**	**99**	**(7)**	**5,664**	**5,854**	**(190)**
ENVIRONMENTAL																	
Land & Water Planning	Land & Water Planning	**W1**	(178)	(141)	(37)	178	-	178	-	-	-	-	-	-	882	702	179
	Land & Water Science and Monitoring	**W2**	151	133	18	(372)	-	(372)	-	14	(14)	221	150	70	2,391	2,793	(401)
	Land & Water Implementation	**W3**	(85)	(242)	158	-	-	-	85	316	(231)	-	20	(20)	705	982	(277)
	Total Land & Water Planning		**(112)**	**(251)**	**139**	**(194)**	**-**	**(194)**	**85**	**330**	**(245)**	**221**	**170**	**50**	**3,978**	**4,477**	**(500)**
Biodiversity & Biosecurity	Biodiversity Implementation	**L1**	148	86	62	(147)	-	(147)	-	-	-	(1)	75	(76)	153	388	(234)
	Biosecurity	**L2**	(20)	(294)	275	-	-	-	20	151	(132)	-	-	-	1,121	1,327	(206)
	Biodiversity Science & Monitoring	**L8**	159	88	71	(166)	-	(166)	-	-	-	7	-	7	127	285	(158)
	Total Biodiversity & Biosecurity		**287**	**(120)**	**408**	**(313)**	**-**	**(313)**	**20**	**151**	**(132)**	**6**	**75**	**(69)**	**1,401**	**1,999**	**(598)**
Air	Air Monitoring	**A1**	15	(27)	43	(18)	-	(18)	-	-	-	3	-	3	100	115	(15)
	Regional Plan: Air	**A4**	65	65	0	(65)	-	(65)	-	-	-	-	-	-	-	65	(65)
	Total Air		**80**	**38**	**43**	**(83)**	**-**	**(83)**	**-**	**-**	**-**	**3**	**-**	**3**	**100**	**180**	**(80)**
Total Environmental			**256**	**(333)**	**589**	**(589)**	**-**	**(589)**	**104**	**481**	**(377)**	**229**	**245**	**(16)**	**5,479**	**6,657**	**(1,178)**
SAFETY AND RESILIENCE																	
Climate Change & Hazards	Natural Hazards	**N1**	135	(66)	201	(135)	-	(135)	-	-	-	-	-	-	258	439	(181)
	Flood & Low Flow Risk Management	**N2**	23	31	(9)	(23)	-	(23)	-	-	-	-	-	-	70	93	(23)
	Climate Change Adaptation	**N3**	213	(10)	223	(216)	-	(216)	-	-	-	3	40	(37)	113	321	(208)
	Total Climate Change & Hazards		**371**	**(44)**	**415**	**(374)**	**-**	**(374)**	**-**	**-**	**-**	**3**	**40**	**(37)**	**442**	**853**	**(412)**
Emergency Managament	Emergency Management	**E1**	167	(34)	200	-	-	-	(167)	-	(167)	-	-	-	669	834	(165)
	Total Emergency Management		**167**	**(34)**	**200**	**-**	**-**	**-**	**(167)**	**-**	**(167)**	**-**	**-**	**-**	**669**	**834**	**(165)**
Flood Protection	Alexandra Flood Protection	**F1**	(61)	8	(70)	-	-	-	61	-	61	-	-	-	63	76	(13)
	Leith Flood Protection Scheme	**F2**	259	249	10	-	-	-	(259)	(187)	(72)	-	-	-	151	223	(72)
	Lwr Clutha Flood Protection & Drainage	**F3**	167	(50)	217	-	-	-	(174)	149	(323)	7	87	(80)	366	598	(232)
	Lwr Taieri Flood Protection Scheme	**F4**	52	379	(327)	-	-	-	(129)	82	(210)	76	-	76	326	663	(337)
	West Taieri Drainage	**F5**	36	37	(1)	-	-	-	(44)	73	(117)	8	-	8	210	326	(115)
	East Taieri Drainage	**F6**	(3)	15	(17)	-	-	-	3	57	(54)	-	-	-	176	236	(60)
	Tokomairiro Drainage	**F7**	3	12	(9)	-	-	-	(3)	8	(11)	-	-	-	37	48	(11)
	Shotover River Delta	**F8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Scheme Oversight & Bylaws	**F9**	(32)	(42)	10	-	-	-	32	-	32	-	-	-	318	210	108
	Total Flood Protection		**421**	**609**	**(188)**	**-**	**-**	**-**	**(513)**	**182**	**(694)**	**92**	**87**	**4**	**1,647**	**2,379**	**(733)**
River Management	River Mgt - Dunedin	**M1**	(39)	(8)	(31)	-	-	-	39	101	(62)	1	-	1	84	146	(61)
	River Mgt - Clutha	**M2**	21	35	(14)	-	-	-	(21)	45	(67)	1	-	1	77	143	(66)
	River Mgt - Central	**M3**	35	(49)	84	-	-	-	(35)	38	(74)	1	-	1	51	123	(73)
	River Mgt - Wakatipu	**M4**	(49)	23	(73)	-	-	-	49	58	(10)	1	-	1	127	113	13
	River Mgt - Wanaka	**M5**	58	22	36	-	-	-	(58)	26	(84)	1	-	1	18	81	(63)
	River Mgt - Waitaki	**M6**	69	47	22	-	-	-	(69)	(5)	(64)	1	-	1	31	95	(64)
	Lwr Waitaki Flood Protection & River Control	**M7**	(3)	-	(3)	-	-	-	2	-	2	1	-	1	50	47	3
	Non Scheme Management	**M8**	(37)	-	(37)	37	-	37	-	-	-	-	-	-	45	8	37
	Total River Management		**54**	**70**	**(16)**	**37**	**-**	**37**	**(95)**	**263**	**(358)**	**4**	**-**	**4**	**482**	**756**	**(274)**
Total Safety and Resilience			**1,013**	**601**	**412**	**(337)**	**-**	**(337)**	**(774)**	**445**	**(1,219)**	**99**	**127**	**(29)**	**3,239**	**4,822**	**(1,583)**
TRANSPORT																	
	Regional Land Transport Planning	**T1**	(5)	0	(5)	5	-	5	-	-	-	-	-	-	108	106	2
	Stock Truck Effluent Disposal	**T3**	(16)	(0)	(16)	16	-	16	-	-	-	-	-	-	60	31	29
	Public Transport - Dunedin	**T4**	(440)	(265)	(176)	-	-	-	440	248	193	-	-	-	5,073	5,167	(94)
	Public Transport - Wakatipu	**T5**	(207)	(566)	360	-	-	-	207	566	(360)	-	-	-	2,181	2,815	(634)
	Public Transport - Other	**T6**	(2)	(34)	32	2	-	2	-	26	(26)	-	-	-	817	571	245
	Total Transport		**(671)**	**(865)**	**194**	**24**	**-**	**24**	**647**	**840**	**(193)**	**-**	**-**	**-**	**8,239**	**8,690**	**(452)**
Total Transport			**(671)**	**(865)**	**194**	**24**	**-**	**24**	**647**	**840**	**(193)**	**-**	**-**	**-**	**8,239**	**8,690**	**(452)**
Total Projects		**Total Above**	**(134)**	**(1,066)**	**932**	**(247)**	**64**	**(311)**	**(39)**	**1,775**	**(1,813)**	**420**	**472**	**(52)**	**22,620**	**26,023**	**(3,403)**

6.6. Otago Regional Council Community Survey Results 2022

Prepared for:	Council
Report No.	COMS2204
Activity:	Community: Governance & Community
Author:	Richard Saunders, General Manager Regulatory and Communications
Endorsed by:	Richard Saunders, General Manager Regulatory and Communications
Date:	7 December 2022

PURPOSE

[1] This report presents the results of the Otago Regional Council (ORC) Community Survey 2022.

EXECUTIVE SUMMARY

[2] As part of the 2020/2021 Annual Plan, Councillors requested that staff initiate the delivery of a community survey for ORC. The first survey was completed in 2021 and the results reported to Council in December of that year. An action plan responding to the results of the survey was approved by Council in March 2022.

[3] The 2022 survey has now been completed by Versus Research and a final report prepared. The results of the 2022 report are similar to the 2021 report. The report contains the following recommendations:

a. Focus on actions which restore confidence in ORC.
b. Communicate plans and initiatives for important environmental issues.
c. Develop an ORC brand.
d. Address Public Transport issues.

[4] A draft action plan responding to the 2022 survey has been completed for the consideration of Council. This includes actions to address the primary recommendations from Versus Research.

RECOMMENDATION

That the Council:

1) ***Notes*** *this report.*
2) ***Approves*** *the ORC Community Survey Action Plan 2022.*
3) ***Notes*** *that the Otago Regional Council Community Survey will be carried out again in 2023 and reported to Council before the end of that calendar year.*
4) ***Notes*** *that progress reports on the Community Survey Action Plan will be reported to the Regional Leadership Committee during the 2023 year.*

BACKGROUND

[5] During the 2020/2021 Annual Plan process, Councillors requested that staff initiate a project to deliver a community survey for ORC.

[6] Versus Research were engaged to deliver a community survey annually for three years commencing in 2021. The results of the first survey were reported to Council in December 2021.

[7] Four key recommendations were made by Versus Research at the end of the 2021 report. These were:

a. Develop clear links to the environment and the role that ORC plays in this
b. Communicate the actions that have been taken with regards to environmental protection
c. Broaden the use of communication channels
d. Address or manage perceptions of in-fighting amongst Councillors

[8] An action plan was developed by staff and approved by Council on the 10 March 2022. This action plan sought to address some of the recommendations made in the Versus report.

DISCUSSION

Report back on 2021 Action Plan

[9] Attachment one shows the progress made against the approved 2021 Community Survey Action Plan. Many actions have commenced and will be continued as part of broader initiatives included in the draft 2022 action plan.

[10] A significant focus for the year has been increasing the number of positive news stories about the organisation and sharing more about what we are doing across a wide variety of platforms. This has resulted in increased content across all media channels.

[11] Highlights of the 2021 action plan include improvements to the pollution hotline process, increased communication channel use for promoting LWRP consultation, additional resources to support the consents public enquiries function, partnering with Otago Museum on science communication, commencing a range of on the ground programmes aimed at improving water quality, delivering a new water monitoring web portal to improve the amount and quality of information available to the public, and beginning the process to replace the current ORC website.

2022 Community Survey Results

[12] A copy of the full 2022 Community Survey report is included as Attachment 2. The results have been calculated using the new methodology approved by Council on 15 September 2022. The 2021 results have been updated within the 2022 report to ensure consistency.

[13] The results of the 2022 Community Survey can be summarised as being largely similar to those of 2021.

[14] A summary of the key findings for the five sections of the survey are:

Knowledge

a. Awareness at both a prompted and unprompted level is similar to that of 2021, with 75% of respondents correctly identifying ORC as the organisation responsible for the management of the Otago region's natural resources.
b. As in 2021, awareness of ORC is highest amongst Dunedin respondents. Respondents who were older, had higher household income, or who were ratepayers all had higher awareness of ORC. Respondents who were younger, had lower household income, and who were not born in New Zealand had lower awareness of ORC.
c. Respondents' awareness of the activities ORC undertakes has remained similar to 2021 both at a prompted and unprompted level.
d. Water-related actions continue to be the activities that respondents most associate with ORC, both at a prompted and unprompted level.
e. Respondents over the age of 65 years have the highest awareness of a number of activities that ORC undertakes.

Expectations

a. Water continues to be the most significant environmental issue facing the Otago region. This was followed by climate change and land/coastal erosion.
b. Water quality was significantly more important to respondents from Waitaki District. Key to water being prioritised over other issues was the importance of water for all parts of the environment and the level of degradation that has occurred over time.
c. Residents do not perceive there has been significant change in various environmental features since last year with most features deemed to be staying the same.
d. ORC's response to the environmental issues outlined by respondents was rated similarly to 2021, with a slight decline in the proportion of respondents who provided an excellent rating. Queenstown Lakes residents provided the highest rating for ORC's response, while Dunedin's residents provided the lowest rating.
e. There were no significant differences across respondents' ratings for ORC's responses to various environmental issues. Flood control and dairy farm pollution were the issues where ORC's response was most poorly rated, while air quality and transport/roading were the areas where ORC's responses was most highly rated.

Services

a. Forty-seven percent of respondents have used one of ORC's services. The most commonly used service was public transport followed by the ORC website. Overall usage rates were similar to 2021.
b. Bus service use was highest amongst respondents who were younger, female, born outside of New Zealand, and non-ratepayers.
c. Satisfaction ratings for the bus service declined this year with key service issues relating to a lack of reliability, driver shortages, and the bus not running to schedule.

d. Satisfaction ratings for inquiring to ORC's rules and the Pollution Hotline both increased this year, however there was a slight decrease in satisfaction for the service provided for resource consent applications.
e. In a new measure this year, 59% of respondents who accessed the ORC website were satisfied with the service. Those who rated the website poorly were unable to find the information they were after and found the site hard to navigate.

Performance

a. The results for ORC's environmental management, delivery, and reputation measures all remain on par with 2021. Across most measures, Queenstown Lakes respondents have provided higher ratings that respondents from other local authorities.
b. At an overall level, 30% of respondents were satisfied with how ORC services the Otago region, 43% provided a neutral rating, 19% were dissatisfied. These results were similar to those from 2021, however there has been a 4% increase in the proportion of respondents who provided a neutral rating.
c. Forty-five percent of respondents who were satisfied with how ORC services the region felt ORC was "doing okay" and 11% had no problems with ORC's service.
d. Neutral ratings were driven by a perception that ORC was a poor organisation, that respondents were unsure what ORC does, and that there was limited return for the rates paid.
e. The main reasons respondents were dissatisfied with how ORC services the region related to perceptions of ORC being a poor organisation, limited return for the rates paid, in-fighting between councillors, and perceptions of poor water management.

Engagement

a. Online continues to be the most significant channel for accessing information and news. A significant number of respondents access the news online or via an app. App-based sources were particularly important for respondents under the age of 39 years.
b. Traditional media sources were important for older respondents, particularly ratepayers.
c. There has been an increase in the proportion of people who received information from ORC via newspapers this year, and this channel has become the preferred source of information. The changes in channel preference are potentially a reflection of the recent local body election coverage, much of which was delivered in printed format.
d. Respondents provided strong ratings for ORC's provision of information with around 40% of respondents rating the information as credible and trustworthy. Slightly lower ratings were seen for ORC's information being easy to access.
e. Thirty-six percent of respondents were satisfied with the information from ORC. Information ratings were largely consistent across demographic groups and areas.

[15] Versus Research have made four key recommendations at the end of their report which should be considered when developing future communications, strategies, and initiatives.

a. Focus on actions which restore confidence in ORC.
b. Communicate plans and initiatives for important environmental issues.
c. Develop an ORC brand.
d. Address public transport issues.

2022 Community Survey Action Plan – Draft

[16] A copy of the draft 2022 Community Survey Action Plan is included as Attachment 3. This draft action plan addresses the four key recommendations from Versus Research. It also carries over a number of actions from the 2021 plan which require ongoing work.

[17] The plan includes a number of actions for the Communications and Marketing team, working in conjunction with other teams across the organisation. The primary purpose of these actions is to ensure that the community have a greater understanding of the work being carried out by ORC.

[18] Progress on the actions within the plan will be reported to the Regional Leadership Committee throughout the 2023 year. This will include seeking direction from the Committee on specific actions within the plan.

OPTIONS

[19] There are three options available to Council

Option 1

[20] Council approves the draft action plan.

Advantages

a. Delivering the action plan will respond directly to the findings of the 2022 ORC Community Survey.

b. Delivering an action plan will ensure a return on the investment made in the Community Survey programme.

c. Actions contained within the draft plan are within current work programmes and budgets. There is no additional funding required to deliver these actions.

Disadvantages

a. There are no identified disadvantages associated with delivering the draft action plan.

Option 2

[21] Council approves the draft action plan with changes.

[22] The advantages and disadvantages of this option are considered to be the same as option 1.

Option 3

[23] Council does not approve the draft action plan

Advantages

a. There are no identified advantages of not delivering an action plan in response to the community survey.

Disadvantages

a. Not approving an action plan for delivery will miss an opportunity to improve the public perception of ORC.

b. Not delivering an action plan in response to the community survey will lead to no return on investment from the Community Survey programme.

CONSIDERATIONS

Strategic Framework and Policy Considerations

[24] Developing an action plan in response to the findings of the Community Survey will assist ORC in achieving the vision and commitments contained within the strategic directions

Financial Considerations

[25] There are no financial considerations associated with this report. Actions contained within the draft plan are included within existing budgets.

Significance and Engagement

[26] The decision sought by this report is not considered significant when reviewed against He Mahi Rau Rika.

Legislative and Risk Considerations

[27] There are risk considerations associated with not approving a Community Survey Action Plan. It is important for Council to be seen to respond to the feedback we receive from the community.

Climate Change Considerations

[28] There are no climate change considerations associated with this report.

Communications Considerations

[29] The Communications and Marketing Team are identified as the lead team for a number of the actions contained within the draft Action Plan.

NEXT STEPS

[30] If Council approves the draft plan staff will continue or commence work on the actions contained within it.

ATTACHMENTS

1. ORC Community Survey Action Plan 2021 Progress Report [**6.6.1** - 4 pages]
2. ORC Community Survey Report 2022 [**6.6.2** - 86 pages]
3. 2022 Community Survey Action Plan DRAFT [**6.6.3** - 2 pages]

ORC Community Survey Action Plan 2021/2022 - **December 2022 Update**

Ref #	Description	Area of Focus Link to overall recommendations	Responsible team	Status as at December 2022
1	All customers who contact the pollution hotline will be called or emailed back and advised on the action taken by ORC	Perceptions: Services A/B	Compliance	Complete
2	Proactively advertise the existence of the Pollution Hotline service and its purpose. Identify opportunities to publicise jobs attended by the team and link those to appropriate environmental messages.	Knowledge: Awareness Perceptions: Services A/B	Compliance Communications and Marketing	Planning underway
3	Catchment stories website to be set up as a "listening post" for community groups (part of economic impact assessment of LWRP) Economic work programme - notesheet for public to outline the approach (on website and promoted with stakeholders) Planned community engagement around meaning of wellbeing in Otago	Knowledge: Awareness Engagement A/C	Strategy	On hold. Considered as part of Integrated Catchment Management programme
4	Youth engagement (e.g. attendance at careers fairs, graduate programme, school visits)	Knowledge: Awareness Engagement A/C	People and Culture GM's / Managers	Actioned and ongoing **
5	Masters projects with University of Otago Students: 1. Increasing the public's knowledge of the consent process	Knowledge: Awareness Perceptions: Services A/C	Regulatory	Complete. Awaiting final report from students

	2. Encouraging compliance with permitted activity stormwater rules			
6	SoE Reporting - Community Communication Strategy Joint Project With Science Communications staff from Otago Museum. Aim to make SOE monitoring results more accessible to the community	Knowledge: Awareness Perceptions: SOE Expectations: Environmental Response A/C	Science Communications and Marketing	Ongoing. Has contributed to LWRP consultation material and will now work on SOE reporting material
7	The EI team will be partnering with Ministry for Primary Industries to raise the profile (and ORC's role) in managing biosecurity threats - namely wilding conifers and wallabies. Further community and engagement strategies will be developed and implemented.	Knowledge: Awareness Perceptions: Services A/B	Environmental Implementation	Underway
8	Create publicly-accessible graphics of four key performance growth areas highlighted in our quarterly activity reports to promote the work or ORC	Knowledge: Awareness Perceptions B	Communications and Marketing Corporate	Delivered for Q1 2022/23 data
9	Deliver a new website for ORC	Knowledge: Awareness Perceptions Engagement A/B/C	Communications	Underway
10	Delivery of a range of 'on the ground' programmes over the coming years. This includes increased restoration of degraded waterways, facilitating community responses to pest management and supporting community groups and landowners/occupiers with solutions to environmental problems. Demonstrating a proactive response to complex environmental	Perceptions: Services Expectation: Lack of Action	Environmental Implementation Communications and Marketing	Underway / Ongoing

	issues should address the perceived lack of action. Ensure associated promotion of the positive news stories	A/B/C		
11	Implement a new map based 'communication piece' to support the communities understanding about the services it receives for the rates it pays. Was endorsed by Council Dec2021 and will be revised to for use in the 2022-23 Annual Plan process.	Knowledge: Activity Awareness Perceptions: Value for money A/C	Corporate Planning	On hold. Considered for 23/24 AP or next LTP communications
12	Development and implementation of catchment action plans, which will provide a mechanism to highlight the work undertaken by ORC and communities across a broad range of environmental domains.	Knowledge: Activity Awareness Perceptions: Services Engagement A/B/C	Environmental Implementation	Integrated Catchment Management Planning underway with Catlins identified as pilot area
13	Video Marketing Campaign aimed at increasing bus patronage in Dunedin and Queenstown	Perceptions: Services Engagement A/C	Public Transport Communications and Marketing	On hold. To be delivered as part of 2022 action plan
14	Explore opportunities for sharing of positive news stories or important updates on key topics across a range of media including print, web and social media	Perceptions: Services Perceptions: Value for Money Engagement A/B/C	Communications and Marketing	Actioned and ongoing

** List of schools visited as part of delivery of action 4

Date	**School name**
4-May-22	Waihola School
17-May-22	North East Valley

16-Aug-22	Lee Stream School
30-Aug-22	Portobello School
13-Sep	Wanaka Primary School
20-Sep	Mana Tahuna, Shotover Primary
22-Sep	Balmacewen School
23-Sep-22	Waitati School
29-Sep-22	Millers Flat School
25-Oct	TK Primary School
1-Nov	Clinton School
8-Nov	Warepa School
8-Nov	St Josephs School, Queenstown

Otago Regional Council Community Survey

November 2022

Versus RESEARCH

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Overview

Background

Otago Regional Council (ORC) is the local authority responsible for the management and monitoring of the natural resources in the Otago region. The role that ORC has in Otago involves the delivery of regional based outcomes to different communities.

As part of its ongoing commitment to delivering to community expectations, ORC commissioned a survey of residents in the region to understand how they can best engage with those who reside in the region.

The aims of the survey are:

- To provide an understanding of what the community knows about ORC (knowledge)
- To explore what matters to the community and what it expects from ORC (expectations and delivery on environmental issues)
- To provide an understanding of how ORC is perceived by the community in terms of service delivery and reputation (perceptions)
- To provide an understanding of how the community wants to engage with ORC (engagement)

This work will be used to improve understanding and practices at ORC through increased:

- Understanding of what the community values
- Clarity around perceptions of ORC
- Understanding of the community's expectations of ORC

This work is used to support policy development and increased information-based decision-making at ORC.

The project was first completed in 2021 and this report presents the findings from the second year of data collection.

Method

DATA COLLECTION
This work was completed via a quantitative survey utilising a dual-method approach to data collection involving online and telephone interviewing. A total of n=1,700 interviews were completed across the two data collection methods.

ONLINE INTERVIEWING
The first phase of this work was completed by online interviewing and aimed to capture a breadth of respondents from across the region. This component was completed through a third-party panel provider (Consumer Link) and resulted in a total of n=1,084 completed surveys. This phase was completed between the 6th September and the 30th of September 2022.

TELEPHONE INTERVIEWING
The second phase of this work was completed by telephone interviewing through Auckland-based call centre Symphony Research. The telephone interviewing was employed to target areas which were not sufficiently covered in the online phase of this work. This stage resulted in n=616 completed surveys and was undertaken between the 27th of September and the 22nd of October 2022. The dates for this work aligns with those from 2021*.

A breakdown of the areas achieved by each data collection method is shown in the table below. It should be noted that the area breakdown is disproportionate to the district profile, i.e., smaller districts are over represented. This was a deliberate design feature to ensure that sufficient sample was achieved in each individual district. These skews have been accounted for in the weighting of the final dataset.

SAMPLE BREAKDOWN BY DATA COLLECTION METHOD

Method	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha	TOTAL	2021
Online interviewing	187	158	165	460	114	1,084	1,057
Telephone interviewing	113	142	175	0	186	616	643
Total	300	300	340	460	300	1,700	1,700

**In 2021 online interviewing was completed between the 6th and 30th of September and telephone interviewing was completed between the 27th September and 20th October.*

Method

MARGIN OF ERROR

Margin of error (MOE) is a statistic used to show the amount of random sampling error present in a survey's results. The MOE is particularly relevant when analysing a subset of the data as smaller sample sizes incur a greater MOE. The final sample size for the study was n=1,700. This gives a maximum margin of error of +/-2.4% at the 95% confidence interval. That is, if the observed result on the total sample of n=1,700 is 50% (point of maximum margin of error), then there is a 95% probability that the true answer falls between 47.6% and 52.4%. The margin of error associated with the different sample sizes in this project are shown in the table below.

Sample size	Territorial Authority	Maximum Margin of Error at the 95% confidence interval
n=300	Waitaki, Central Otago, Clutha	+/-5.7%
n=340	Queenstown Lakes	+/-5.3%
n=460	Dunedin	+/-4.6%

WEIGHTING

Weightings have been applied to the final dataset to ensure the sample is representative of the population. Weighting is a common practice in research and is used to ensure different audiences are neither under nor over-represented in the final data set. That is, each demographic and geographic group proportionately reflects the demographic make-up of the Otago region's population. This project utilises a rim weighting approach which is based on the geographic and demographic proportions for the Otago region as a whole. These proportions are taken from the 2018 Census and are provided in the appendix.

SIGNIFICANCE TESTING

Significance testing has been applied to the results. This is indicated in two ways:

1. Within the charts to indicate if the result for 2022 is significantly higher or lower than the result for 2021. This is indicated through green shading on the 2022 result.
2. Within tables to indicate if a result for a given subgroup is statistically greater or lower than the result for all other subgroups. This is indicated by an arrow next to the result; an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.

QUESTIONNAIRE

The questionnaire was designed in consultation with ORC and focussed on the core areas of knowledge, perceptions, expectations, and engagement. The survey was on average 20 minutes in length. A copy of the survey can be found in the appendix.

Sample Structure

Key sample metrics by area are shown in the tables below. A comparison to the 2021 total is shown in the final column of each table. Other sample questions are included in the appendix.

GENDER

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha	TOTAL	2021
Male	33%	43%	50%	34%	48%	41%	52%
Female	67%	57%	50%	66%	52%	59%	48%

Which of the following best describes you?

AGE

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha	TOTAL	2021
Under 39 years	9%	15%	25%	41%	19%	24%	24%
40-64 years	46%	35%	44%	58%	42%	46%	46%
65+ years	45%	50%	32%	1%	39%	30%	30%

Which of the following age groups are you in?

Sample Structure

ETHNICITY*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha	TOTAL	2021
NZ European/ Pākehā	93%	94%	86%	87%	94%	90%	89%
Māori	5%	5%	2%	7%	7%	5%	4%
Pasifika	0%	0%	1%	1%	1%	1%	1%
Asian	0%	1%	5%	6%	0%	3%	4%
Another ethnicity	4%	4%	6%	4%	4%	4%	5%
Prefer not to say	1%	2%	1%	2%	0%	2%	1%

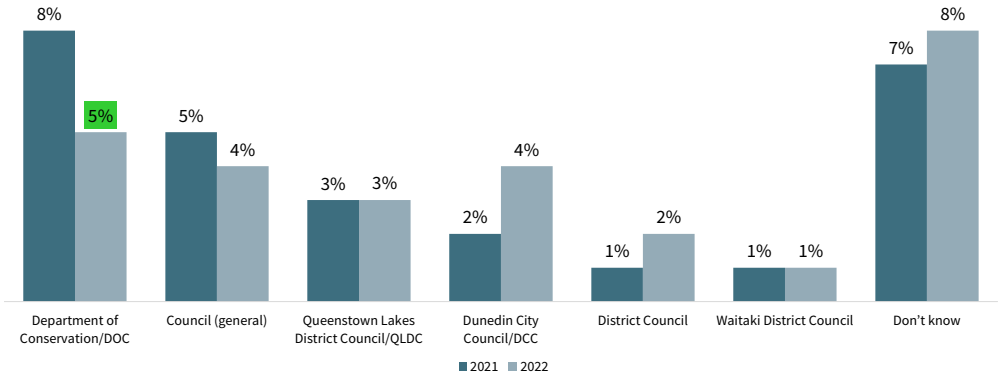
Which of the following best describes you?
**Multiple choice response, answers will add to more than 100%*

Knowledge

Top of Mind Awareness

This year 75% of respondents correctly named the Otago Regional Council, ORC, or the regional council as the organisation responsible for the management of the Otago region's natural resources; this result was the same as the 2021 result. Additional items mentioned showed a significant decrease in the number of people who mentioned the Department of Conservation/DoC and an increase in the number of people who mentioned a local territorial authority or who said they did not know which organisation was responsible. At a prompted level 98% of respondents were aware of ORC, which was a 2% decline from the 2021 result.

ADDITIONAL ITEMS MENTIONED*



75% correctly named ORC
2021 = 75%

Firstly, which organisation do you understand to be responsible for the management of the Otago region's natural resources? Base 2021 n=1,700, 2022 n=1,700
**Some respondents mentioned more than one organisation so % will add to more than 100%.*
Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.

Top of Mind Awareness

Top of mind awareness at a local level remains similar to 2021. Awareness in 2022 was highest amongst respondents from Dunedin and lower amongst respondents from Queenstown Lakes. Demographic analysis shows that awareness was higher amongst older respondents, ratepayers, and those who identify as New Zealand European.

TOP OF MIND AWARENESS BY AREA**

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
2022	73%	73%	65% ↓	79% ↑	74%
2021	67%	70%	68%	81%	74%

TOP OF MIND AWARENESS BY DEMOGRAPHICS

Highest awareness amongst those:
55-64 years 83% or 65+ years 82%
Ratepayers 83%
With a household income of $120k+ 87%
Born in New Zealand 78%
New Zealand European 78%
Older, no children 83%

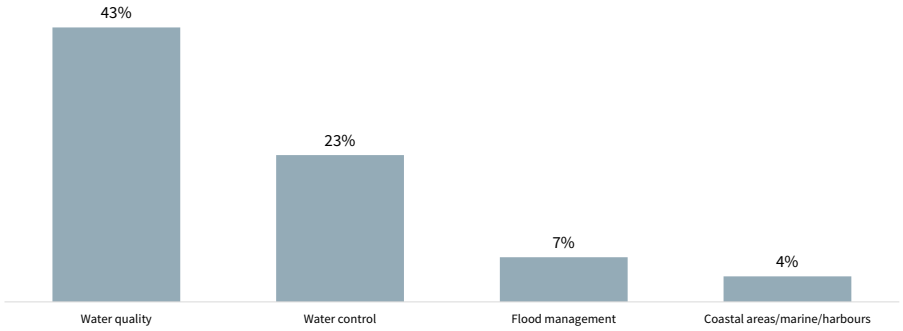
Lowest awareness amongst those:
Under 39 years 63%
Non-ratepayers 50%
With a household income of under $80k 67%
Not born in New Zealand 62%
Asian 45%
Younger, no children 57%

Firstly, which organisation do you understand to be responsible for the management of the Otago region's natural resources? Base 2021 n=1,700, 2022 n=1,700
**Some respondents mentioned more than one organisation so % will add to more than 100%.*
***an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

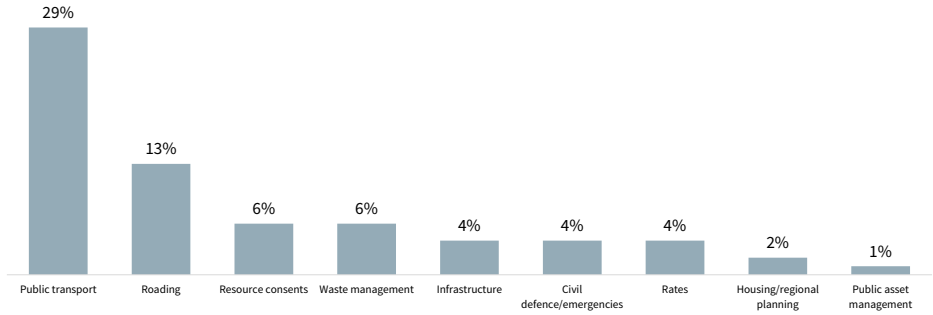
Activity Awareness

Respondents were asked to list the activities they thought ORC undertook. This year 61% noted an activity related to water and 49% noted an operational activity. Both of these categories have a similar number of mentions to 2021.

WATER (NET 61%, 2021 NET 64%)



OPERATIONAL (NET 49%, 2021 NET 51%)

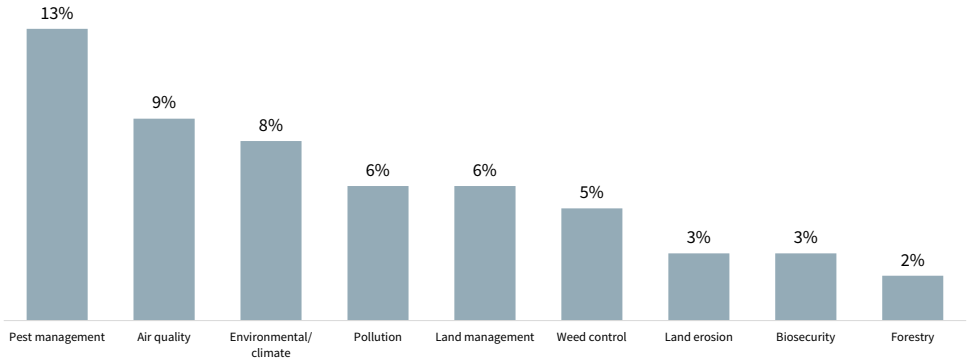


Otago Regional Council is the regional government authority which is responsible for the management of natural resources across the Otago Region including those in Waitaki, Queenstown Lakes, Dunedin, Clutha, and Central Otago districts. Thinking about the work the Otago Regional Council might do, please list all of the areas you are aware they are involved in. Base 2021 n=1,700, 2022 n=1,700

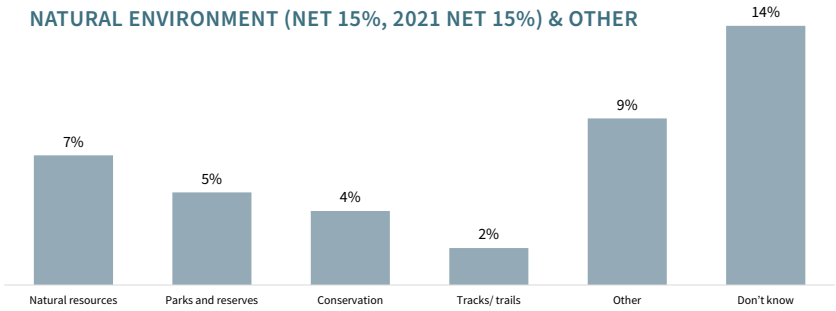
Activity Awareness

This year 38% of respondents mentioned an activity related to air and land, while 15% mentioned an activity related to the natural environment. These results are similar to the 2021 results.

AIR AND LAND (NET 38%, 2021 NET 37%)



NATURAL ENVIRONMENT (NET 15%, 2021 NET 15%) & OTHER



Otago Regional Council is the regional government authority which is responsible for the management of natural resources across the Otago Region including those in Waitaki, Queenstown Lakes, Dunedin, Clutha, and Central Otago districts. Thinking about the work the Otago Regional Council might do, please list all of the areas you are aware they are involved in. Base 2021 n=1,700, 2022 n=1,700

Activity Awareness

Water continues to be the activity most associated with ORC across the local authorities. Dunedin respondents were more likely to mention operational activities. Demographic analysis shows that ratepayers and those with a higher household income have greater awareness of ORC's activities, while non-ratepayers have lower awareness.

ACTIVITY AWARENESS BY AREA (NET)*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
Water	59%	65%	62%	59%	65%
Air and land	39%	44%	41%	36%	34%
Operational	40% ↓	42%	35% ↓	58% ↑	43%
Natural environment	10%	18%	20%	14%	17%
Other	7%	8%	5%	12% ↑	5%
Don't know	20% ↑	15%	17%	10% ↓	20%

ACTIVITY AWARENESS BY DEMOGRAPHICS (NET)

Water highest amongst those:
65+ years 73%
Ratepayers 66%
Household income 120k+ 73%
Born in New Zealand 64%
Older, no children 71%

Air and land highest amongst:
65+ years 48%
Ratepayers 42%
Born in New Zealand 40%
Older, no children 45%

Operational highest amongst:
Household income $120k+ 61%

Natural environment:
No significant differences

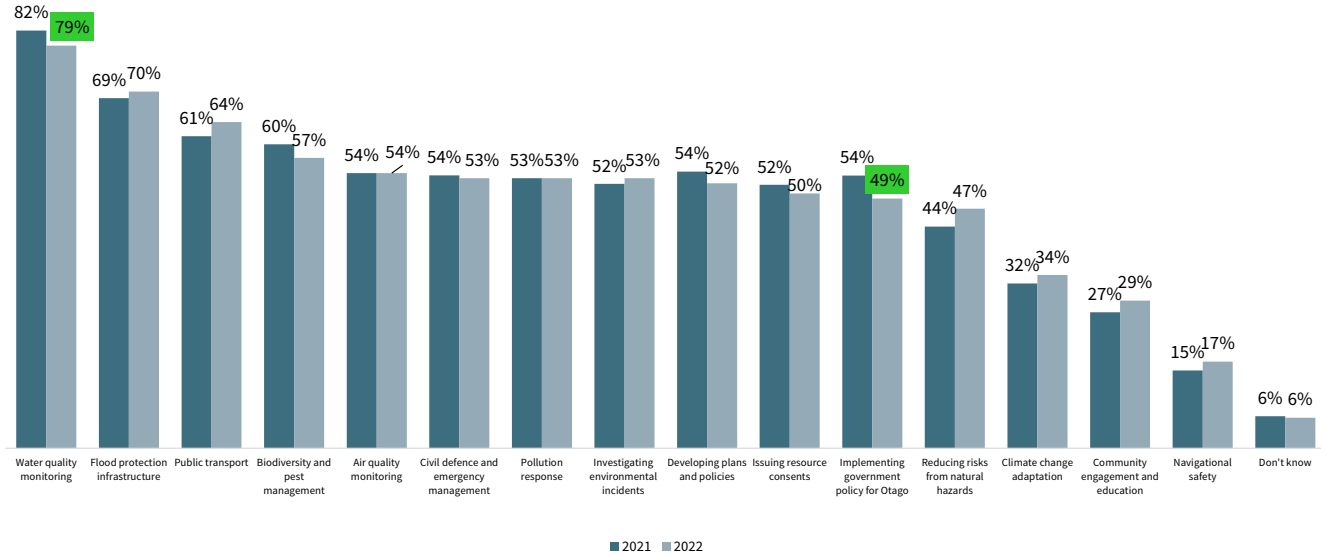
Don't know highest amongst:
Non-ratepayers 20%

Otago Regional Council is the regional government authority which is responsible for the management of natural resources across the Otago Region including those in Waitaki, Queenstown Lakes, Dunedin, Clutha, and Central Otago districts. Thinking about the work the Otago Regional Council might do, please list all of the areas you are aware they are involved in.
**an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Prompted Activity Awareness

Respondents were provided with a list of activities and asked to identify the ones they knew ORC undertook. The results for 2022 were similar to those in 2021 with water quality, flood protection, and public transport the primary activities mentioned by respondents. This year saw a slight increase in the proportion of people who were aware that ORC was responsible for reducing risks from hazards, and a significant decline in the proportion of people who were aware that ORC was responsible for water quality monitoring and implementing government policy.

PROMPTED ACTIVITY AWARENESS*



And before this survey, which of the following areas were you aware Otago Regional Council were involved in? Base 2021 n=1,700, 2022 n=1,700
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Prompted Activity Awareness

Water quality and flood protection were the activities most associated with ORC, although this was higher amongst respondents from Central Otago and Clutha. Dunedin respondents were less likely to be aware of a number of activities, but were significantly more likely to be aware ORC provided public transport.

TOP 10: PROMPTED ACTIVITY AWARENESS*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
Water quality monitoring	80%	89% ↑	83%	74% ↓	83%
Flood protection infrastructure, like stopbanks and drainage schemes	74%	76% ↑	70%	66% ↓	82% ↑
Public transport	49% ↓	54% ↓	59%	71% ↑	57% ↓
Biodiversity and pest management	58%	73% ↑	63% ↑	50% ↓	64% ↑
Air quality monitoring	61% ↑	73% ↑	60% ↑	45% ↓	69% ↑
Civil defence and emergency management	61% ↑	67% ↑	54%	47% ↓	66% ↑
Pollution response	64% ↑	71% ↑	61% ↑	44% ↓	68% ↑
Investigating environmental incidents and making sure people are following the rules	57%	68% ↑	65% ↑	42% ↓	69% ↑
Developing plans and policies to make sure our resources are managed properly	57%	66% ↑	62% ↑	43% ↓	63% ↑
Issuing resource consents	62% ↑	70% ↑	58% ↑	40% ↓	67% ↑

And before this survey, which of the following areas were you aware Otago Regional Council were involved in?
**an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Prompted Activity Awareness

Central Otago had the lowest proportion of respondents who stated they don't know which activities ORC undertook.

ALL OTHERS: PROMPTED ACTIVITY AWARENESS*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
Implementing government policy for Otago	57% ↑	64% ↑	61% ↑	40% ↓	61% ↑
Reducing risks from natural hazards	50%	57% ↑	54% ↑	40% ↓	59% ↑
Climate change adaptation	40% ↑	49% ↑	38%	26% ↓	44% ↑
Community engagement and education	38% ↑	40% ↑	41% ↑	21% ↓	40% ↑
Navigational safety	21%	31% ↑	25% ↑	10% ↓	25% ↑
Don't know	7%	3% ↓	5%	7%	7%

And before this survey, which of the following areas were you aware Otago Regional Council were involved in?
**an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Prompted Activity Awareness

Demographic analysis shows those who were older, male, or a ratepayer had higher awareness of nearly all the activities that ORC undertakes.

PROMPTED ACTIVITY AWARENESS BY DEMOGRAPHICS

Higher awareness of all activities amongst those aged 65+ years except public transport.

Males had greater awareness of most activities except public transport, biodiversity and pest management, water quality monitoring, and civil defence.

Ratepayers had greater awareness of all activities except public transport, civil defence, community engagement, and navigational safety.

Those who were older with no children at home were more likely to be aware of most activities, except public transport and community engagement.

No differences in prompted activity awareness across income or ethnicity.

And before this survey, which of the following areas were you aware Otago Regional Council were involved in?

Knowledge Summary

1. Awareness at both a prompted and unprompted level is similar to that of 2021, with 75% of respondents correctly identifying ORC as the organisation responsible for the management of the Otago region's natural resources.

2. As in 2021, awareness of ORC is highest amongst Dunedin respondents. Respondents who were older, had higher household income, or who were ratepayers all had higher awareness of ORC. Respondents who were younger, had lower household income, and who were not born in New Zealand had lower awareness of ORC.

3. Respondents' awareness of the activities ORC undertakes has remained similar to 2021 both at a prompted and unprompted level.

4. Water related actions continue to be the activities that respondents most associate with ORC both at a prompted and unprompted level.

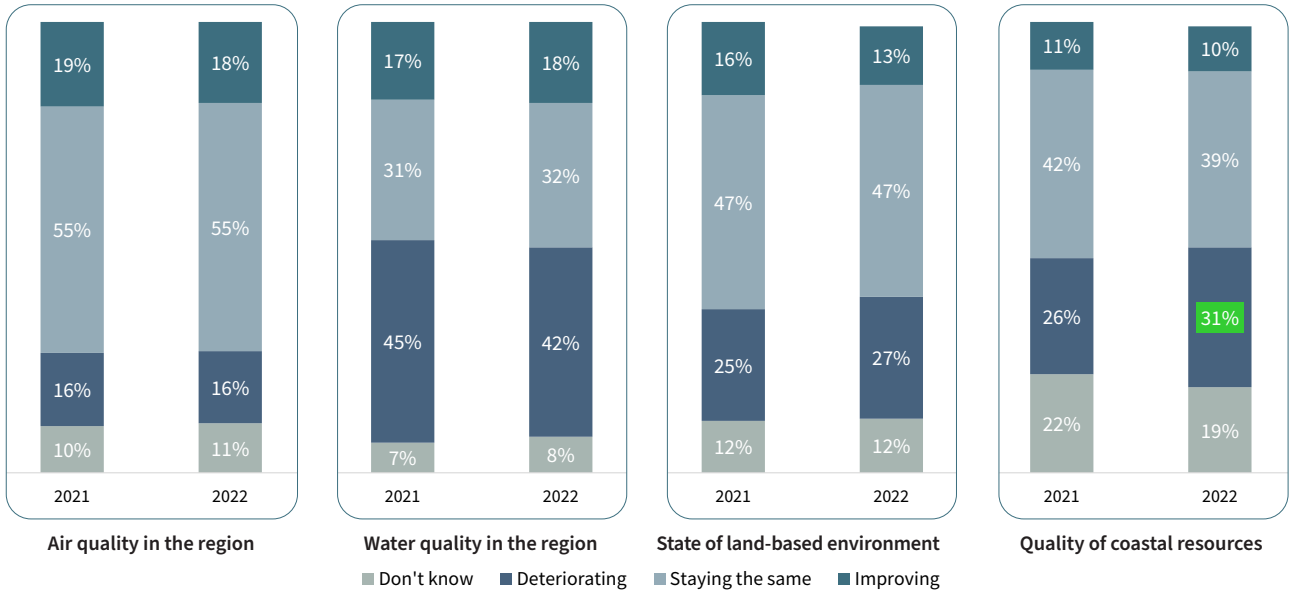
5. Respondents over the age of 65 years have the highest awareness of a number of activities that ORC undertakes.

Expectations: Environmental Issues & Delivery

Environmental Change

Respondents were asked their views on the state of different environmental features in the region. Respondents' perceptions were very similar to those of 2021, with a significant proportion of respondents stating water quality has deteriorated. Air quality continues to be the feature which the largest proportion of respondents state is unchanged while 47% of respondents perceived the land-based environment have stayed the same. Thirty-nine percent of respondents stated coastal resources have remained unchanged however, there has been a significant increase in the proportion of respondents who thought coastal resources were deteriorating.

ENVIRONMENTAL CHANGE*



And, for each of the following, do you think each of the following is generally improving, staying the same, or deteriorating in the Otago region? Base 2021 n=1,700, 2022 n=1,700
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Environmental Change

The tables below show the proportion of respondents who stated that an environmental feature was deteriorating. Air and water quality perceptions were fairly consistent across areas, however perceptions differed across land-based environment and coastal resources. The most significant difference was seen amongst Dunedin respondents' views on coastal resources and Queenstown Lakes respondents' views on the land-based environment. Demographic analysis showed that respondents who were ratepayers, with a household income over $120,000, or New Zealand European were more likely to state that water quality had deteriorated.

ENVIRONMENTAL CHANGE BY AREA (DETERIORATING)*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
Air quality in the Otago region	8% ↓	13%	18%	18%	11%
Quality of water in the Otago region's rivers, lakes, and streams	40%	48%	43%	43%	34% ↓
The state of the land-based environment in the Otago region	23%	24%	26% ↑	31% ↑	19% ↓
Quality of coastal resources in the Otago region	38%	19% ↓	15% ↓	41% ↑	18% ↓

ENVIRONMENTAL CHANGE BY DEMOGRAPHICS (DETERIORATING)

Air quality higher amongst:
Under 39 years of age 21%

Quality of water higher amongst:
Ratepayers 45%
Those with income $120k 52%

State of land-based environment higher amongst:
No differences

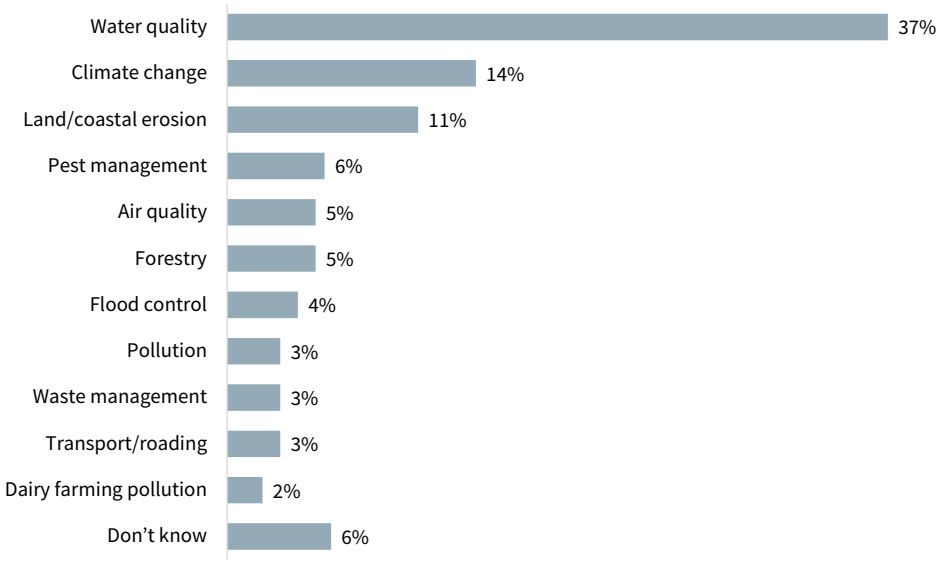
Quality of coastal resources higher amongst:
Females 36%

And, for each of the following, do you think each of the following is generally improving, staying the same, or deteriorating in the Otago region?
**an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Environmental Issues

Respondents were asked to identify the most important environmental issue facing the Otago region. At an overall level, 37% of respondents mentioned an issue with water quality. Fourteen percent of respondents noted an issue relating to climate change and 11% mentioned issues which related to land/coastal erosion. Although not shown below, 7% of respondents were unsure how to answer this question.

MOST IMPORTANT ENVIRONMENTAL ISSUE



What do you think is the most important environmental issue facing the Otago Region today?
Base 2022 n=1,700

Environmental Issues

Respondents from Waitaki were more likely than respondents from other areas to mention water quality was the most important environmental issue in the region, while respondents from Dunedin were more likely to state pest management was the most important environmental issue. There were no differences between demographic groups with regards to the most important environmental issue facing the Otago region.

MOST IMPORTANT ENVIRONMENTAL ISSUE BY AREA*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
Water quality	49% ↑	44%	39%	34%	30%
Climate change	11%	12%	15%	14%	17%
Land/coastal erosion	7%	9%	10%	12%	11%
Pest management	2%	3%	3%	8% ↑	4%
Air quality	4%	3%	6%	6%	3%
Forestry	5%	7%	5%	4%	9%
Flood control	3%	5%	4%	3%	6%
Pollution	4%	2%	3%	4%	3%
Waste management	3%	2%	3%	2%	5%
Transport/roading	1%	3%	1%	4%	2%
Dairy farming pollution	1%	1%	2%	3%	4%
Don't know	7%	8%	6%	5%	10%

What do you think is the most important environmental issue facing the Otago Region today?
**an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Issue Significance

Respondents were asked to state why they thought the environmental issue they mentioned was the most important issue facing the Otago region. Analysis of the comments provided by respondents are shown below.

It should be noted that not all of the issues respondents raised were part of ORC's jurisdiction; respondents were simply asked about the environmental issues they felt were important, not who is responsible for the management or response to such issues.

Water quality (37%)

The primary reason respondents felt water was an important environmental issue was due to the relevance of water for all parts of the environment and the life-giving properties of water generally.

"Water is fundamental for the health and wellbeing of people and the land they live on." - Waitaki resident

There were a number of comments about the importance of water for the local economy, both in terms of the effect on land-based activities but also tourism activities in the area.

"The water we use is for our agriculture, fruits and all those sort of things so we need to clean them and be good to them." - Central Otago resident

Respondents mentioned the long-term effect water degradation would have on the broader ecosystems and would impact future generations if corrective measures were not taken.

"Preventing water pollution is still not seen as more important than economic uses of water. As a result the environment we leave to our grandchildren will be poorer than the one we inherited, as each part of the environment is interconnected." - Central Otago resident

Climate change (14%)

Climate change was considered important as it is a significant global issue, that affects all parts of the environment.

"It's facing the world, it's pretty major, it's going to change the world as we know it." - Queenstown Lakes resident

Respondents noted the cascading effects that climate change has had at a local level. In particular respondents noted the increase in extreme weather events such as flooding, coastal changes, changes in rainfall, extreme heat, fire risk, drought, and loss of species.

Respondents noted the long-term effects of a changing climate will force people to live differently to how they currently do; it will affect the availability of natural resources which will likely have economic effects, particularly for areas where there is a high reliance on weather predictability.

"Climate change, means hotter temperatures, means higher water demand to supply our horticultural industry, one of the backbones of our economy in Central Otago for export dollars and for viticulture as well." - Central Otago resident

Respondents also noted the need to acknowledge and act on climate change issues with some urgency, as the rate of change

Issue Significance

within the climate appears to be moving faster than actions to counter these effects.

"There are other issues too but recent news of the sea levels rising faster than anticipated needs urgent action. South Dunedin and other areas like it, need to have plans in place for permanent evacuation as well as temporary evacuation. For example, new houses in those areas need to be relocatable so they can be easily and quickly moved when the time comes." - Dunedin resident

Land/coastal erosion (11%)

Land and coastal erosion was considered important because of the immediate impact it places on communities and people's lives. In particular, erosion has led to property loss and restricted access to certain areas of the region. Many respondents provided localised evidence of this occurring with examples of land, roading, and coastal erosion.

"Waitaki Boys High School have lost a lot of land, as has the land adjacent to the rail line. Buildings close to the ocean have ended up in the ocean in Oamaru." - Waitaki resident

"The coastal road is slowly eroding away so they have had to divert the road, the part that which remains is eroding, it is quite a long stretch of road." - Waitaki resident

Some comments were also made about the lack of management for areas which are at risk of erosion, with some comments focussing on a lack of long-term planning and limited upgrades to supporting infrastructure.

"As so far there does not seem to be any contingency plan for the erosion. I feel the DCC and the ORC have left it too late to make a significant difference to stop the erosion." - Dunedin resident

Pest management (6%)

Respondents who thought that pest populations (plant or animal) were the most significant issue facing the Otago region mentioned the destruction of the natural landscape that has occurred from pest pressure. Specifically, respondents mentioned the significant effects of pests on native plants and animals which result in reduced biodiversity in the long-term.

"They are killing the native biodiversity of the region, changing landscapes and impacting water ways." - Queenstown Lakes resident

Some respondents noted the significant economic effect of pests due to the loss of productive farming land, while others mentioned the increasing costs to control pest populations (both animal and plant) as an outcome of pest infestation.

"Pests such as rabbits are becoming worse as time goes by the damage they are causing, along with other pests, is devastating to our farmland and forests."- Waitaki resident

Some respondents considered pest populations out of control, making it difficult to reverse the destruction which has occured.

"Lots of uncontrolled pest rabbits eating native plants and lizards especially in Central Otago." - Dunedin resident

Issue Significance

Air quality (5%)
Respondents who noted air quality was an important environmental issue spoke of the side effects of poor air quality on people's health, and the visible affect it has on the environment. Notable causes included open fires and burn offs in rural areas.

"Several towns in Otago have really bad air quality, it is widely known and there does not seem to be anything done about it. It infuriates me that new builds are being done with fireplaces and in Alexandra, Arrowtown they have a problem and Clyde and Cromwell would have similar issues. The reason I picked it as the biggest as it affects all of us that live here, and it is proven to affect our health." - Waitaki resident

Comments suggest air quality was a more localised issue rather than one which affects the whole region, with some respondents suggesting the issue is not widely known or recognised.

"The area does have a lot of pollution from fires especially during the winter in the town of Alexandra at times, there is always an inversion layer over this part of the country most days when there are log fires, and bonfires of trees, that makes a bit of a mess of the air." - Central Otago resident

Forestry (5%)
The primary issues that respondents noted about forestry related to the reduction of agricultural land when it is replaced with forestry plantings. Respondents stated that this change in land management takes out a viable food production system for seemingly little return, with some expressing skepticism about the value of carbon credits relative to the loss of productive land.

"It's taking good farmland and turning it into wasteland, ruining the farm land by putting forestry on it, ruining good farmland." - Waitaki resident

"New Zealand needs its food production to feed the world. This carbon forestry will end up producing minimal income and reduce pastureland." - Waitaki resident

Increased forestry planting was also perceived to have a negative economic effect on local communities, as one respondent explained:

"The transition of pastoral farmland to forestry will disrupt and ultimately destroy our rural communities. It promotes monoculture land use with long-term environmental degradation post-harvest. A mixed-use land model should be encouraged to keep communities intact, deal with carbon emissions and encourage biodiversity and sustainability." - Clutha resident

Some comments were also made about how forestry plantings change the natural landscape of the Otago region, which is an attraction for local residents and tourists alike.

"It is going to kill the golden goose as tourists come here to see the sprawling countryside and if we let development spread out willy nilly it is going to spoil our lifestyle and take away our good farmland that generates wealth. Spoils the look of the countryside." - Central Otago resident

Issue Significance

Flood control (4%)
Flood control was an environmental issue mentioned by respondents primarily due to the loss of land and significant damage that flooding causes to residents and the wider community. Some respondents also noted the cost (both emotional and financial) of flood damage for residents, often through no fault of their own.

"Most people in need through no fault of their own are left, are the last people to be communicated with, untrained to get themselves out of the situation they are living in. A flood zone and the resources are not available to them and the resources that are spent are being spent unwisely." - Clutha resident

"It affects people, people not being able to claim anything from insurance, they bought those houses in good faith not knowing global warming is causing this problem." - Central Otago resident

Respondents also felt that flooding was increasing over time, either in frequency or severity. Interestingly, some respondents linked this to the added pressure of climate change on the environment which exacerbates the underlying problem.

"Long ignored problems that are now creating more issues increased with climate change issues." - Dunedin resident

Some respondents also mentioned that the current infrastructure and zoning should be reviewed in light of perceived increased flooding in the region.

"Climate change has affected our weather significantly. The flood banks were built too long ago for today's standards." - Clutha resident

All others (3% or fewer responses)
A summary of the issues mentioned by 3% (or fewer) respondents has been provided below.

Pollution (general mention): pollution was primarily mentioned as an important environmental issue for the Otago region because of the environmental damage this causes. Within this category, respondents mentioned this was a widespread/global issue which directly affects how people live.

"Pollution creates a lot of havoc with the atmosphere, smog, fires, we have to learn to do it in a different way." - Central Otago resident

Waste management: comments relating to waste management focussed on the volume of waste in the region and the negative effect this has on the environment's health and visual appeal. Some comments reflected a need for people to change their consumption behaviour, while others suggested there needs to be increased options for waste disposal.

"I don't think people are being held responsible for their share in doing the work, when I was a child, we used to do rubbish walks at least twice a year and now that's not a common thing, like you'll be walking down the road you'll see cans, face masks - all sorts of rubbish everywhere." - Clutha resident

Issue Significance

Transport/roading: respondents primarily noted that roading in the region was an issue due to the poor quality of the infrastructure, leading to safety concerns and increased wear and tear on vehicles. Some respondents also noted the need for repairs to be appropriate for the extreme weather conditions in Otago.

"The roads have become very deteriorated, they have not been very well maintained and are getting very dangerous, the potholes are very big on the roads so have become very worn out and very slippery, icy, and wet conditions." - Clutha resident

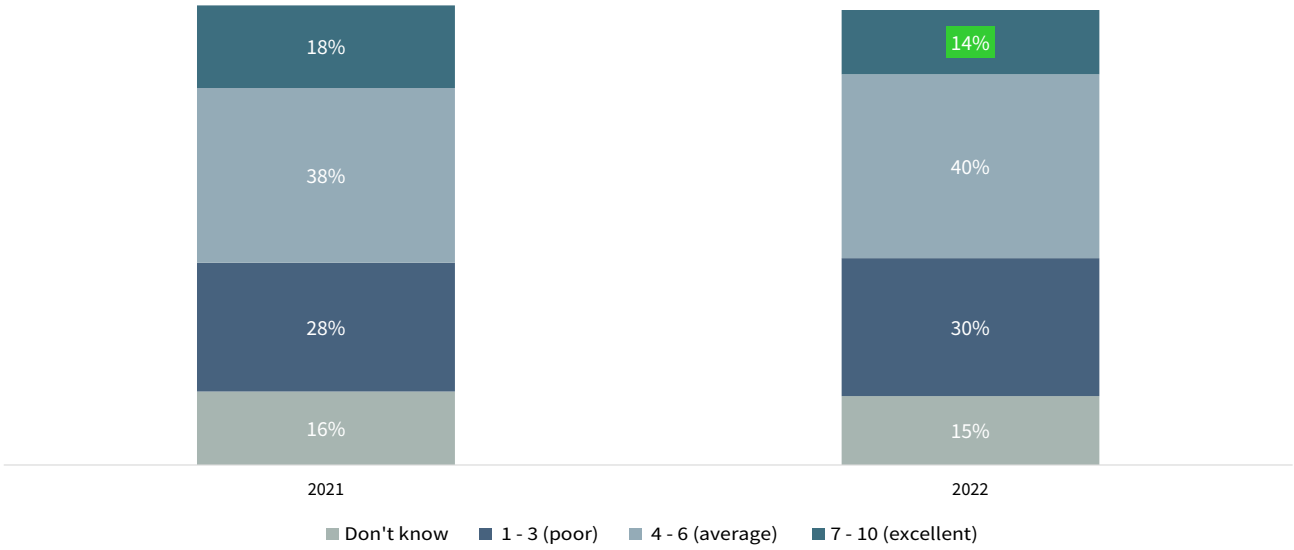
Dairy farming pollution: respondents who mentioned dairy farming pollution as an environmental issue for the region noted the effects that intensification has had on lake and river water quality and the surrounding environment. Some respondents noted that pollution from the dairy sector was a systemic and long-term challenge which requires practice changes and significant support.

"We seem to be locked into an industry that causes air, water, and soil damage, not to mention animal cruelty in some instances. I know farming is what many Otago communities are based on and rely on, but we need to be helping people to diversify and move away from the heavily industrialised model to producing cleaner, more high-value farm products for the local market rather than being the Chinese factory of milk and meat at the expense of our own environment." - Dunedin resident

Environmental Response

Respondents were asked how well they thought ORC has addressed the environmental issues they identified. Fourteen percent of respondents rated ORC's response as excellent, 40% rated ORC's response as average, and 30% rated ORC's response as poor. These results are similar to the 2021 results however, there has been a decline in the proportion of respondents who rated ORC's response as excellent.

RATING OF ENVIRONMENTAL RESPONSE*



Using a 1 to 10 scale where 1 is very poor and 10 is excellent, how well has Otago Regional Council responded to this environmental issue?
Base 2021 n=1,663. 2022 n=1,646
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Environmental Response

Queenstown Lakes respondents rated ORC's response to environmental issues highly, while Dunedin respondents rated ORC's response poorly. Respondents who were younger and who had no children in their household rated ORC's environmental response higher, while those who have children at home or who live in a household with an income of more than $120,000 rated ORC's response lower.

RATING OF ENVIRONMENTAL RESPONSE BY AREA (7-10 RATINGS)*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
2022	16%	12%	20% ↑	11% ↓	17%
2021	20%	21%	17%	17%	24%

RATING OF ENVIRONMENTAL RESPONSE BY DEMOGRAPHICS (7-10 RATINGS)

Highest ratings amongst:
Young, no children 22%

Lowest ratings amongst:
Household income over $120k+ 8%
Family 9%

No differences in rating for age, gender, ratepayer status, or ethnicity

*Using a 1 to 10 scale where 1 is very poor and 10 is excellent, how well has Otago Regional Council responded to this environmental issue?*An upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Environmental Response

The tables below show respondents' ratings of ORC's environmental response in relation to the issue that respondents identified. Although there were no significant differences between the issues, higher 7-10 ratings were provided for ORC 's response to transport/roading and air quality, with lower ratings provided for ORC's response to pest management, flood control, and dairy farming pollution.

RATING OF RESPONSE TO ENVIRONMENTAL ISSUE BY ISSUE

	Water quality	Climate change	Land/coastal erosion	Pest management	Air quality	Forestry
Sample size	*675*	*209*	*146*	*78*	*75*	*85*
1 - 3 ratings	28%	29%	29%	28%	22%	36%
4 - 6 ratings	41%	40%	40%	44%	40%	39%
7 - 10 ratings	14%	15%	16%	9%	20%	13%
Don't know	16%	16%	15%	18%	18%	12%

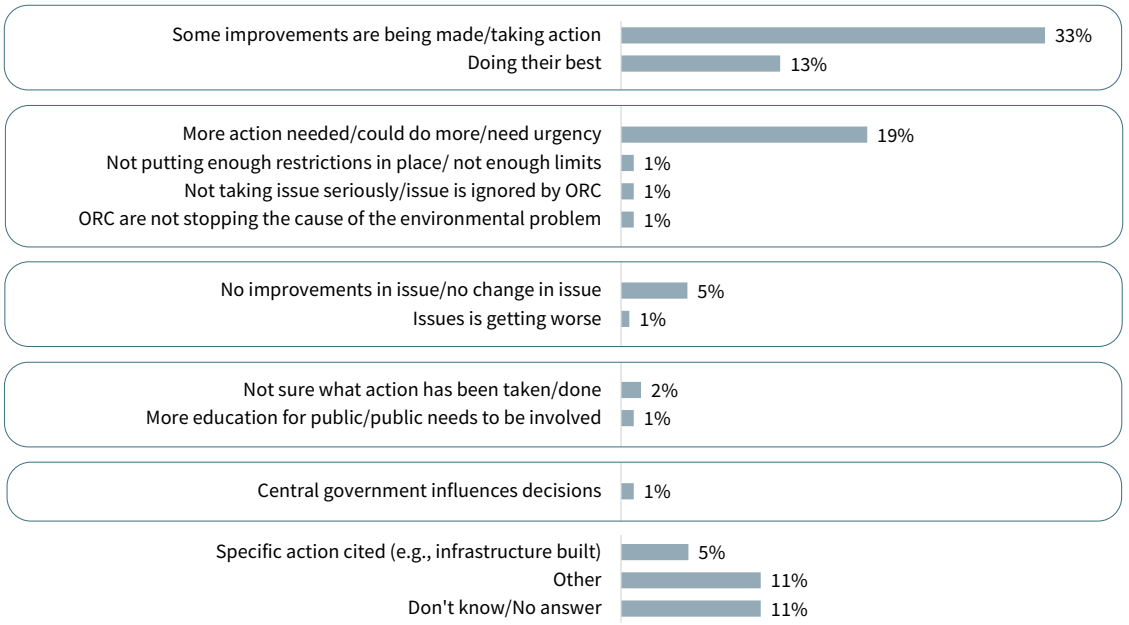
	Flood control	Pollution	Waste management	Transport/roading	Dairy farming pollution
Sample size	*57*	*50*	*45*	*35*	*45*
1 - 3 ratings	34%	38%	26%	11%	30%
4 - 6 ratings	54%	36%	50%	48%	55%
7 - 10 ratings	6%	12%	12%	23%	7%
Don't know	7%	13%	13%	19%	9%

Using a 1 to 10 scale where 1 is very poor and 10 is excellent, how well has Otago Regional Council responded to this environmental issue?

Response: Excellent Ratings

Respondents who rated ORC's response to environmental issues as excellent felt that ORC had taken action and were doing their best. However, 19% of respondents stated there needs to be more action taken, and 5% felt that there had been no improvement or change in the environmental issue. These results are similar to the 2021 results however, there has been a decrease in the proportion of respondents who want to see education around environmental issues.

REASONS FOR EXCELLENT RATINGS (7-10 RATINGS)



NET SCORES (2021)*

Council action: 46% (49%)

Council inaction: 22% (19%)

Issue getting worse 6% (4%)

More education: 3% (8%)

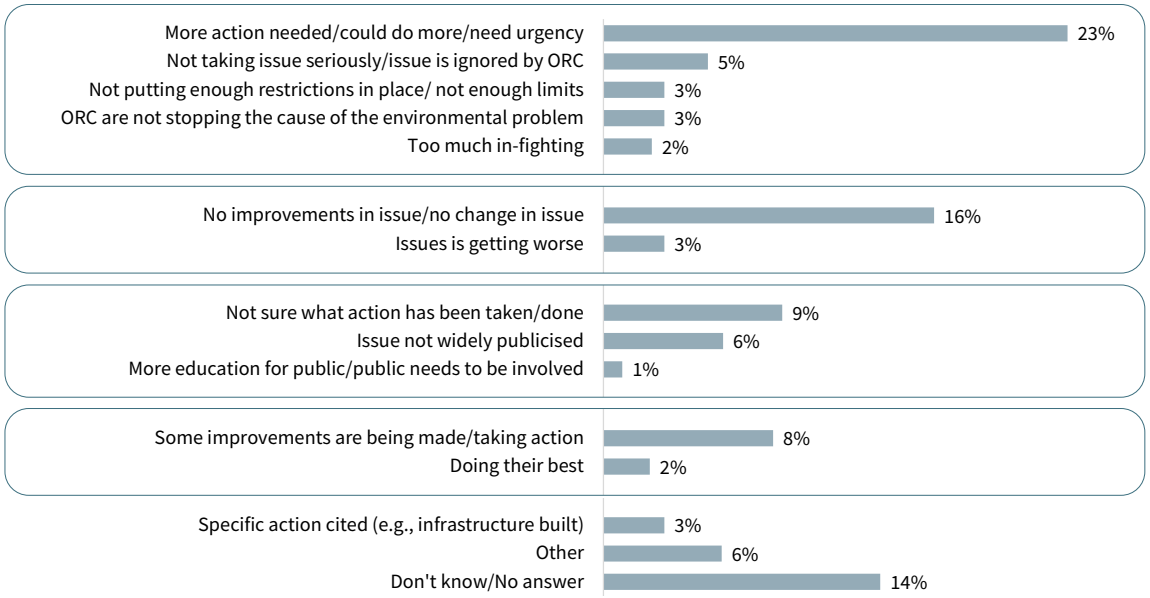
Issue significance: 1% (2%)

Why do you say that? Base 2021 n=319 2022 n=239
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Response: Average Ratings

Respondents who rated ORC's response to environmental issues as average noted more action needed to be taken and the issues were worsening. At a slightly lower level, 16% of respondents made a comment about the need for further education and 10% commented on ORC's actions. The proportion of respondents who noted ORC's inaction has remained the same as 2021 however, there has been an increase in the proportion of respondents overall who stated the issue was getting worse.

REASONS FOR AVERAGE RATINGS (4-6 RATINGS)



NET SCORES (2021)*

Council inaction: 36% (35%)

Issue getting worse: 19% (12%)

More education: 16% (16%)

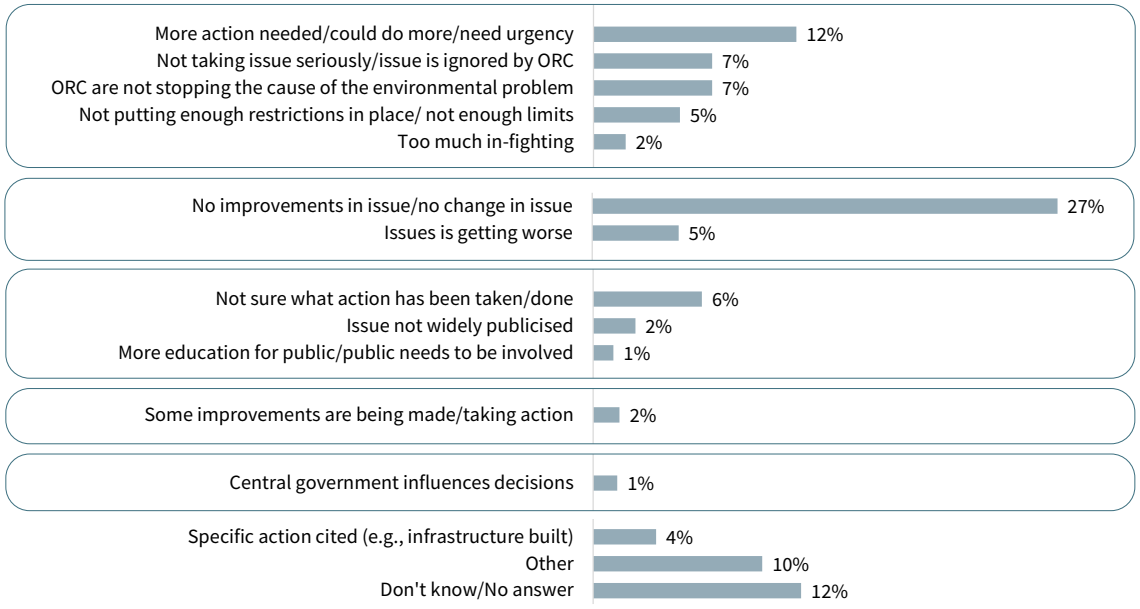
Council action: 10% (13%)

Why do you say that? Base 2021 n=623 2022 n=657
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Response: Poor Ratings

Respondents who rated ORC's response to environmental issues poorly stated the issue was worsening and there was a lack of action from ORC. Nine percent of these respondents stated there needed to be greater education about the issues. There has been an increase in the proportion of respondents who noted the issue was getting worse and a decrease in the proportion who noted the significance of the issue, education, or ORC inaction.

REASONS FOR POOR RATINGS (1-3 RATINGS)



NET SCORES (2021)*

Council inaction: 33% (36%)

Issue getting worse: 32% (21%)

More education: 9% (14%)

Council action: 2% (1%)

Issue significance: 1% (7%)

Why do you say that? Base 2021 n=496 2022 n=521
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Expectations Summary

1. Water continues to be the most significant environmental issue facing the Otago region. This was followed by climate change and land/coastal erosion.

2. Water quality was significantly more important to respondents from Waitaki District. Key to water being prioritised over other issues was the importance of water for all parts of the environment and the level of degradation that has occurred over time.

3. Residents do not perceive there has been significant change in various environmental features since last year with most features deemed to be staying the same.

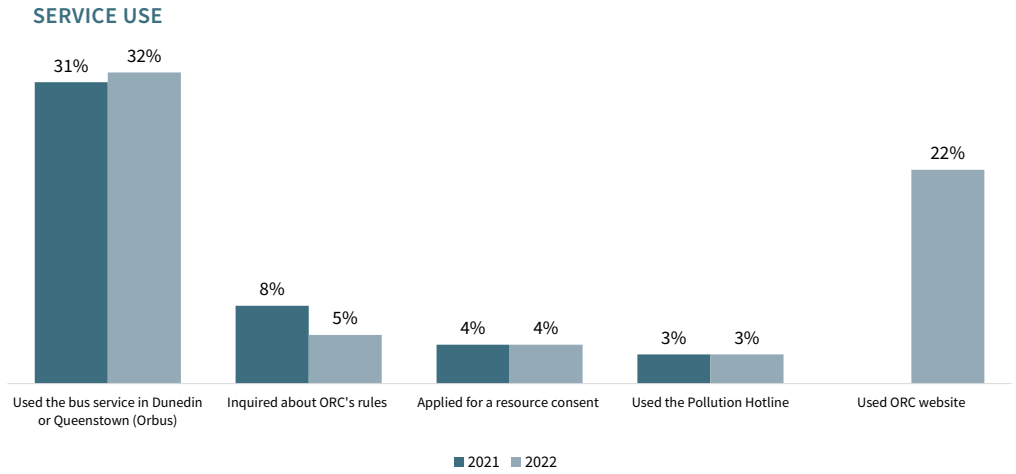
4. ORC's response to the environmental issues outlined by respondents was rated similarly to 2021, with a slight decline in the proportion of respondents who provided an excellent rating. Queenstown Lakes residents provided the highest rating for ORC's response, while Dunedin residents provided the lowest rating.

5. There were no significant differences across respondents' ratings for ORC's response to various environmental issues. Flood control and dairy farm pollution were the issues where ORC's response was most poorly rated, while air quality and transport/roading were the areas where ORC's response was most highly rated.

Perceptions: Services

Service Use

Respondents were asked about the ORC services they have used. Forty-seven percent of respondents have used one or more of the services provided by ORC. The most common service respondents have used was the bus service, followed by the ORC website (not included in the 2021 survey). Five percent or fewer respondents have inquired about ORC's rules, applied for a resource consent, or used the Pollution Hotline.



53% have not used any of ORC's listed services
61% in 2021*

**Question changed in 2022 to include website use which will alter this measure.*
Which, if any, of the following services have you used? Base 2021 n=1,700, 2022 n=1,700

Service Use

Respondents from Waitaki, Central Otago, or Clutha were less likely to have used any of ORC's services, while respondents from Dunedin and Queenstown Lakes were more likely to have used a range of ORC's services.
Bus use was highest amongst those who were younger, female, non-ratepayers, and those born outside of New Zealand. In comparison, those who were older, ratepayers, or born in New Zealand were less likely to have used any of ORC's services.

SERVICE USE BY AREA*	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
Used the bus service	3% ↓	7% ↓	34%	45% ↑	7% ↓
Inquired about ORC's rules	5%	9% ↑	8%	3% ↓	9% ↑
Applied for a resource consent	1% ↓	6%	7%	3%	4%
Used the Pollution Hotline	4%	2%	3%	2%	4%
Used the ORC website	14% ↓	23%	25%	22%	18%
None	79% ↑	66% ↑	48%	46% ↓	70% ↑

SERVICE USE BY DEMOGRAPHICS

Bus use highest amongst:
Under 39 years 44%
Females 38%
Non-ratepayers 46%
Born outside of New Zealand 45%
Young, no children 46%
Pacifika 76% or Asian 56%

Inquiry about ORC's rules:
No significant differences

Aplication for resource consent highest amongst:
Ratepayers 5%

Pollution Hotline highest amongst:
Pacifika 16%

Use of website:
No significant differences

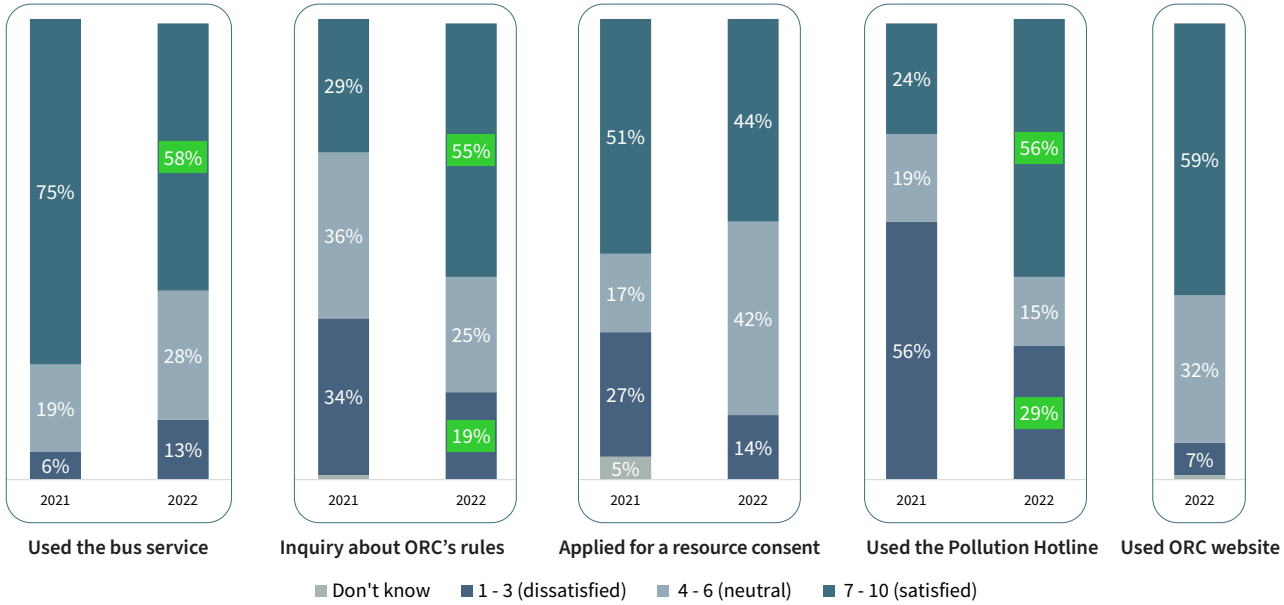
None:
65+ years of age 68%
Ratepayer 56%
Born in New Zealand 56%
Older, no children 61%
New Zealand European 55%

**An upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Service Satisfaction

Service users were asked to rate the quality of the service they received from ORC. This year there has been a decline in the proportion of respondents who were satisfied with the bus service and an increase in the proportion who were dissatisfied. The proportion of respondents who were satisfied with the service they received when they inquired about ORC's rules has increased along with the proportion of respondents who were satisfied with the service they received from the Pollution Hotline.

SERVICE SATISFACTION*

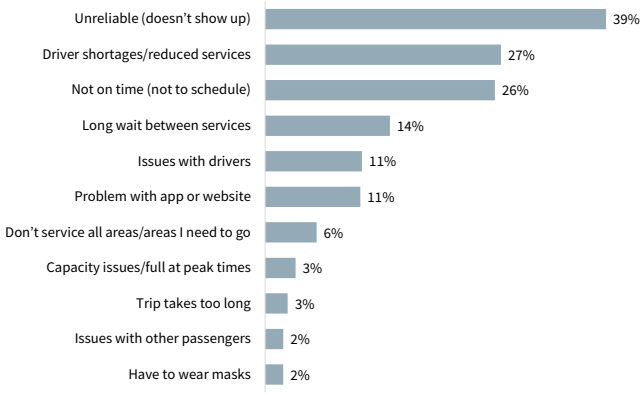


Using a 1 – 10 scale where 1 is extremely dissatisfied and 10 is extremely satisfied, please indicate how satisfied you were with the service you received when you… Base: 2021/2022 Used the bus service n=371/363; Inquired about ORC's rules n=154/109; Applied for a resource consent n=75/70; Used Pollution Hotline n=55/49; Used the ORC website n=350.
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

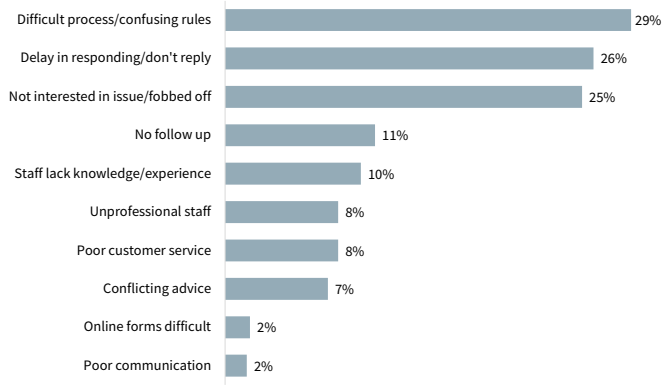
Dissatisfaction with Service

Respondents who were dissatisfied* with the service they received were asked to provide a reason for their rating. These responses were recorded verbatim and post-coded at the completion of the survey. Nearly 40% of bus users who were dissatisfied stated this was because they found the service unreliable. This was followed by a reduced service offering and the bus not arriving as scheduled. Respondents who inquired about ORC's rules and who were dissatisfied with the service stated the process was difficult and the rules were confusing, there was a delay in responding, and they found the ORC staff member responding was not interested in the issue.

BUS SERVICE



INQUIRED ABOUT ORC'S RULES

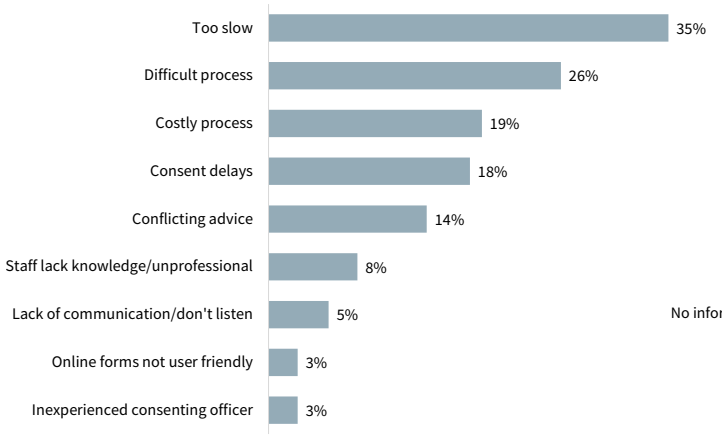


You indicated you were dissatisfied [service], why do you say that?
Base Bus service n=67, Inquiry to ORC rules n=28
**This analysis is based on a 1 - 4 rating.*

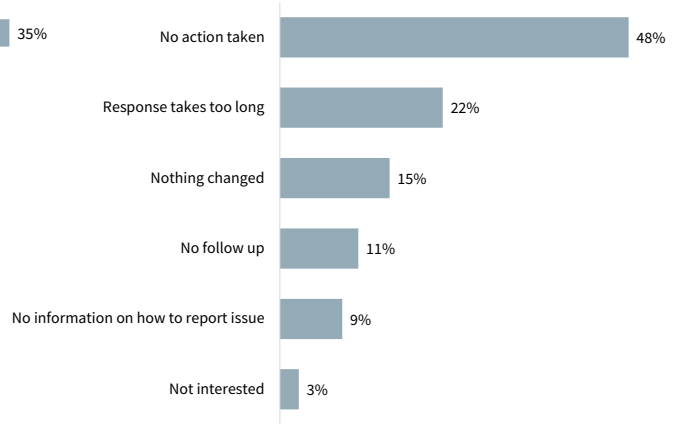
Dissatisfaction with Service

Respondents who were dissatisfied with the service they received when applying for a resource consent stated the process was too slow and found the process difficult and costly. Those who had used the Pollution Hotline and were dissatisfied with the service felt there was no action taken and the response took too long.

RESOURCE CONSENT



POLLUTION HOTLINE

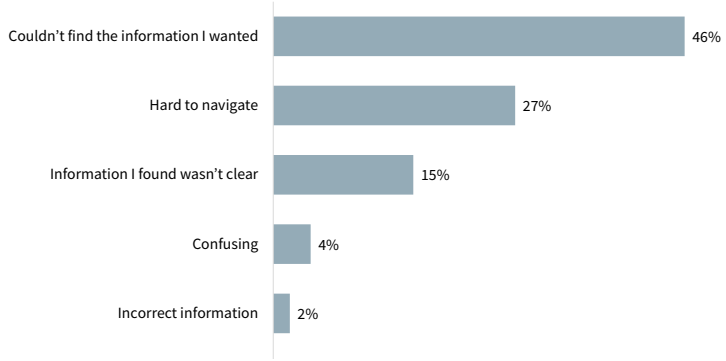


You indicated you were dissatisfied [service], why do you say that?
Base Resource consent n=19, Pollution Hotline n=23

Dissatisfaction with Service

The majority of respondents who were dissatisfied with the ORC website could not find the information they wanted, felt the website was hard to navigate, or thought the information they found was not clear.

WEBSITE USE



You indicated you were dissatisfied [service], why do you say that? Base Website n=51

Service Summary

1. Forty-seven percent of respondents have used one of ORC's services. The most commonly used service was public transport followed by the ORC website. Overall usage rates were similar to 2021.

2. Bus service use was highest amongst respondents who were younger, female, born outside of New Zealand, and non-ratepayers.

3. Satisfaction ratings for the bus service declined this year with key service issues relating to a lack of reliability, driver shortages, and the bus not running to schedule.

4. Satisfaction ratings for inquiring to ORC's rules and the Pollution Hotline both increased this year, however there was a slight decrease in satisfaction for the service provided for resource consent applications.

5. In a new measure this year, 59% of respondents who accessed the ORC website were satisfied with the service. Those who rated the website poorly were unable to find the information they were after and found the site hard to navigate.

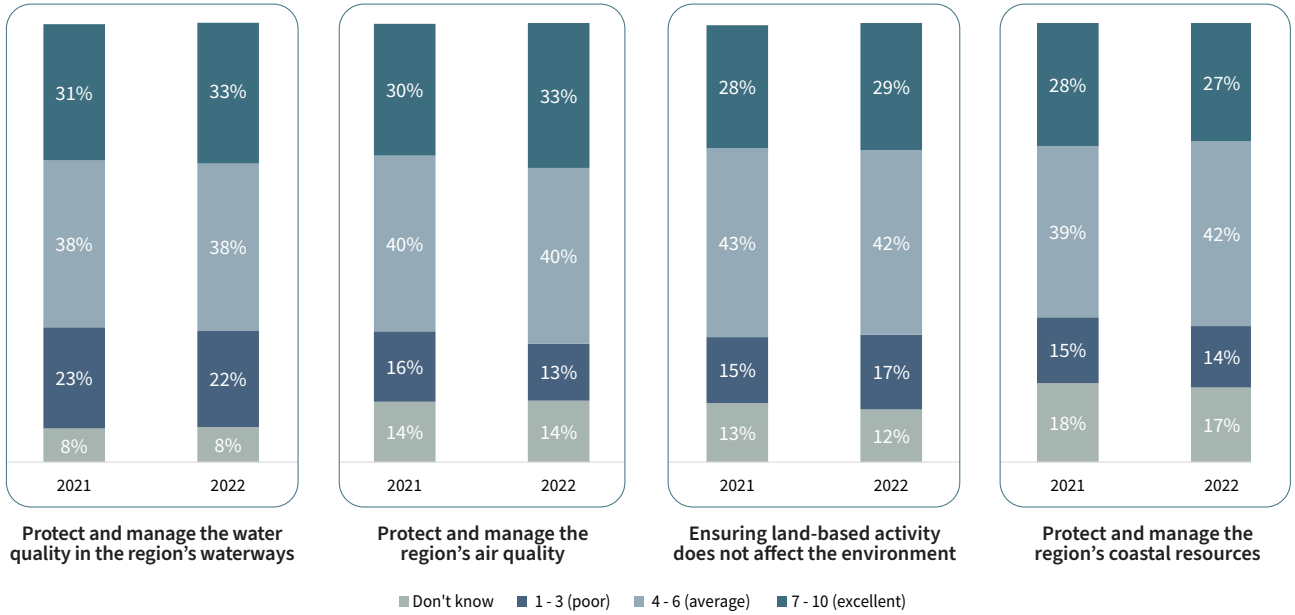
Perceptions: Performance

Perceptions: Performance

Respondents were asked to rate the performance of ORC in relation to different environmental protection measures. The highest ratings were accorded to protecting and managing water quality and air quality in the region. However, management and protection of water quality in the region was also the area where respondents rated ORC's performance poorly with 22% saying ORC had not performed well.

The results for 2022 remained on par with last year, with most results within 3% of the 2021 figures.

PERFORMANCE



And, using the same scale where 1 is extremely poorly and 10 is excellent how well or poorly do you think Otago Regional Council is... Base 2021 n=1,700, 2022 n=1,700

Perceptions: Performance

Respondents from Queenstown Lakes rated ORC's performance on protecting and managing water quality higher than respondents from other areas, while respondents from Central Otago rated ORC's performance for protecting and managing coastal resources lower than other areas. Younger respondents rated ORC's performance on managing coastal resources and land-based activities higher than other demographic groups.

PERFORMANCE BY AREA (7-10 RESULTS)*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
Protecting and managing water quality	28%	28%	41% ↑	31%	33%
Protecting and managing air quality	29%	31%	36%	32%	38%
Ensuring land-based activities do not affect the environment	22%	29%	33%	28%	32%
Protecting and managing coastal resources	24%	14% ↓	27%	30%	29%

PERFORMANCE BY DEMOGRAPHICS (7-10 RESULTS)

Water quality:
No significant differences

Air quality:
No significant differences

Ensuring land-based activities do not affect the environment highest amongst:
Under 39 years 35%
Non-ratepayers 42%
Young, no children 39%

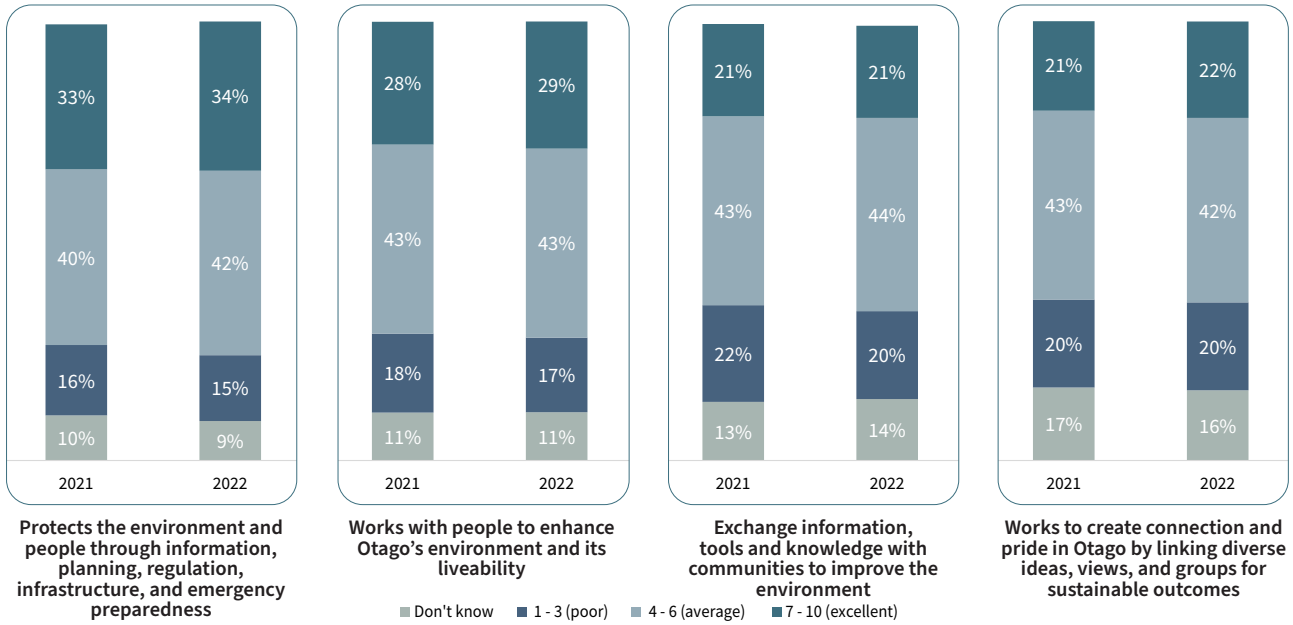
Protecting coastal resources highest amongst:
Under 39 years 34%
Young, no children 39%
Non-ratepayers 35%

And, using the same scale where 1 is extremely poorly and 10 is excellent how well or poorly do you think Otago Regional Council is....
**an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Perceptions: Delivery

Respondents were asked about their impressions of the ORC's delivery against key metrics. Respondents rated ORC highest for protecting the environment and people. This was followed by working with people to enhance the environment, creating connection and pride in Otago, and exchanging information, knowledge, and tools with the community. These results were similar to those from 2021 with most measures within 2% of last year's results.

DELIVERY



I am going to read out a list of statements about the role the Otago Regional Council has in the Otago region. Please indicate how well you think Otago Regional Council delivers on each of these areas using a scale where 1 is extremely poorly and 10 is excellent. Base 2021 n=1,700, 2022 n=1,700

Perceptions: Delivery

No significant differences were noted across the results for the different local authorities. Younger respondents and non-ratepayers provided higher ratings than other groups for enhancing Otago's environment and liveability and for creating connections and pride in the region.

DELIVERY BY AREA (7-10 RESULTS)

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
Protects Otago's environment and people	33%	30%	33%	34%	37%
Works with people to enhance Otago's environment and its liveability	25%	25%	32%	30%	27%
Exchanges information, so communities can improve the environment	20%	21%	26%	19%	22%
Works to create connections and pride in the region	17%	15%	24%	24%	18%

DELIVERY BY DEMOGRAPHICS (7-10 RESULTS)

Protect Otago's environment and people:
No significant differences

Works to enhance environment and liveability highest amongst:
Non-ratepayers 39%
Young, no children 38%

Exchanges information with communities:
Non-ratepayers 28%

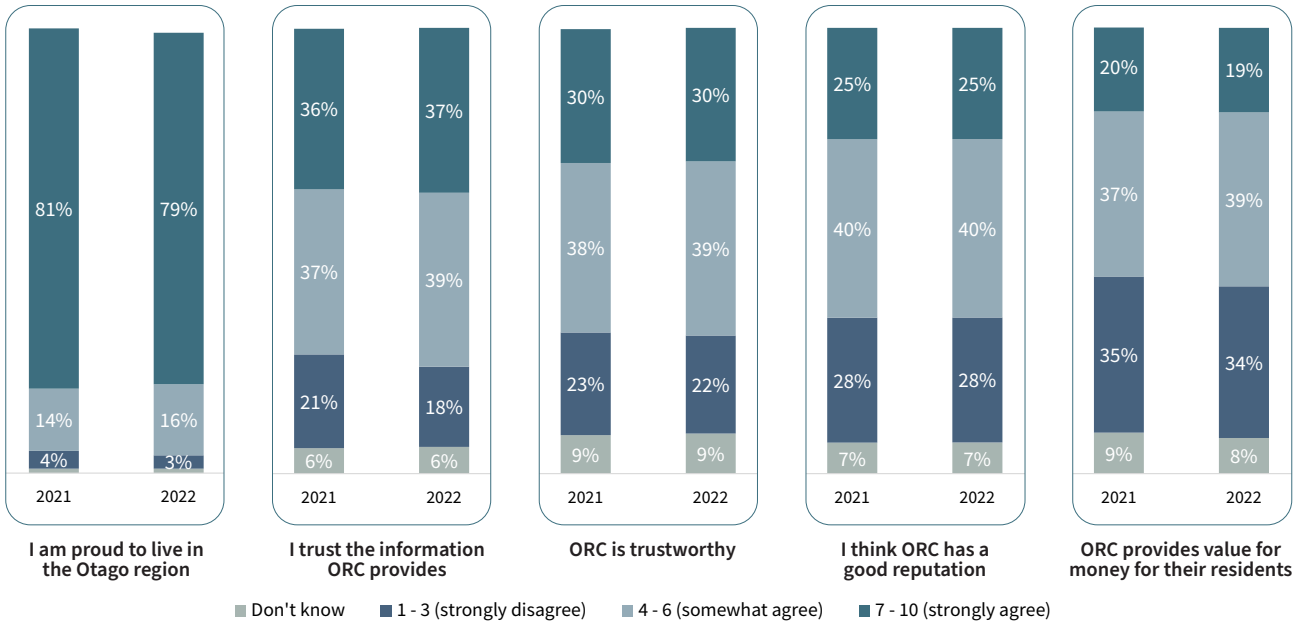
Works to create connections and pride in the region highest amongst:
Under 39 years 29%
Non-ratepayers 31%
Young, no children 37%

I am going to read out a list of statements about the role the Otago Regional Council has in the Otago region. Please indicate how well you think Otago Regional Council delivers on each of these areas using a scale where 1 is extremely poorly and 10 is excellent.

Perceptions: Reputation

Respondents were asked whether they agreed or disagreed with a series of statements about ORC's reputation. The highest level of agreement was with the statement 'I am proud to live in the Otago region'. Following this, 37% of respondents agreed they trust the information ORC provides and 30% agreed ORC is trustworthy. At a slightly lower level 25% of respondents agreed ORC has a good reputation and 19% agreed ORC provides value for money to residents. The results for 2022 were similar to 2021.

REPUTATION



The next few questions are about your perceptions of Otago Regional Council. Please indicate how much you agree or disagree with the following statements using a 1 - 10 scale where 1 is strongly disagree and 10 is strongly agree. Base 2021 n=1,700, 2022 n=1,700

Perceptions: Reputation

Queenstown Lakes respondents had higher levels of agreement across statements relating to regional pride, ORC being trustworthy, and ORC having a good reputation. Respondents from Dunedin had lower levels of agreement for statements relating to regional pride and ORC's reputation. Older respondents were more likely to agree they were proud to live in Otago, while younger respondents were more likely to agree they trusted information from ORC, ORC was trustworthy, and that ORC has a good reputation.

REPUTATION BY AREA (7-10 RESULTS)*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
I am proud to live in the Otago Region	77%	84%	87% ↑	75% ↓	82%
I trust the information ORC provides	33%	32%	44%	36%	33%
ORC is trustworthy	26%	31%	40% ↑	27%	31%
I think ORC has a good reputation	27%	24%	36% ↑	20% ↓	27%
ORC provides value for money for their residents	16%	18%	23%	18%	21%

REPUTATION BY DEMOGRAPHICS (7-10 RESULTS)

Pride in the region highest amongst:
65+ years 86%
Ratepayers 82%

Trust in information highest amongst:
Young, no children 52%

ORC is trustworthy highest amongst:
Young, no children 41%

ORC has a good reputation highest amongst:
Non-ratepayers 33%
Young, no children 37%

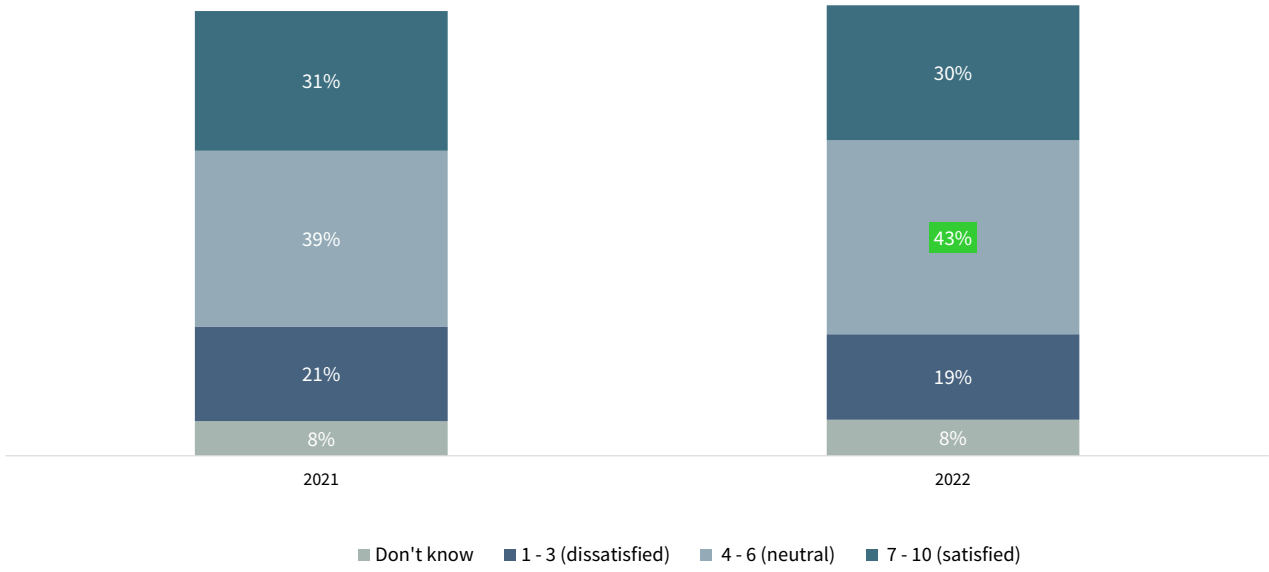
ORC provides value for money:
No significant differences

The next few questions are about your perceptions of Otago Regional Council. Please indicate how much you agree or disagree with the following statements using a 1 - 10 scale where 1 is strongly disagree and 10 is strongly agree.
**an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Overall Satisfaction

Respondents were asked how satisfied they were with how ORC services the region as a whole. Thirty percent of respondents were satisfied with how ORC has serviced the region, 43% provided a neutral rating, and 19% were dissatisfied. The results for 2022 were similar to those from last year, with an increase in the proportion of respondents who provided a neutral rating.

OVERALL SATISFACTION*



Using the same 1 – 10 scale can you please indicate how satisfied you are with how Otago Regional Council services the Otago region as a whole? Base 2021 n=1,700, 2022 n=1,700
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Overall Satisfaction

Queenstown Lakes respondents have the highest level of satisfaction with how ORC services the region, while Dunedin respondents have the lowest level of satisfaction. There were very few differences in satisfaction amongst different demographic groups however, non-ratepayers and respondents who were younger and without children in their household had slightly higher satisfaction levels.

OVERALL SATISFACTION BY AREA (7-10 RATINGS)*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
2022	28%	31%	39% ↑	27% ↓	34%
2021	35%	29%	33%	29%	37%

OVERALL SATISFACTION BY DEMOGRAPHICS (7-10 RATINGS)

Highest amongst:

Non-ratepayers 39%
Young, no children 42%

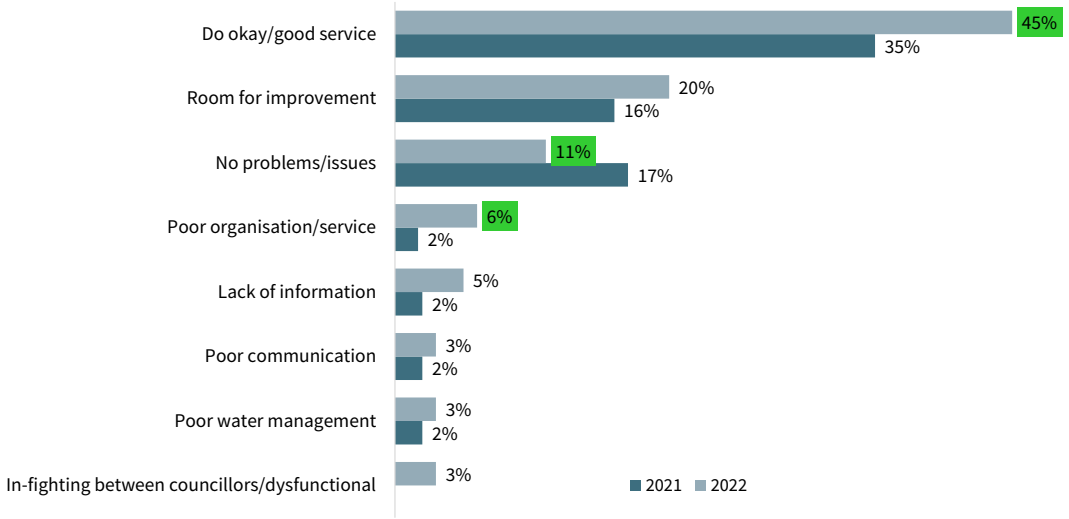
No differences amongst age, gender, household income, or ethnicity.

**An upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Overall: Satisfied Ratings

Respondents were asked to provide a reason for the satisfaction rating they gave. Forty-five percent of satisfied respondents noted that ORC does a good job. However, 20% of satisfied respondents stated there was room for improvement. Although 11% stated they had no problems or issues with ORC, this is a significant decline from 17% in 2021, and there has been an increase in the proportion of respondents who stated ORC is a poor organisation.

REASONS FOR SATISFIED RATINGS (7-10 RATINGS)*

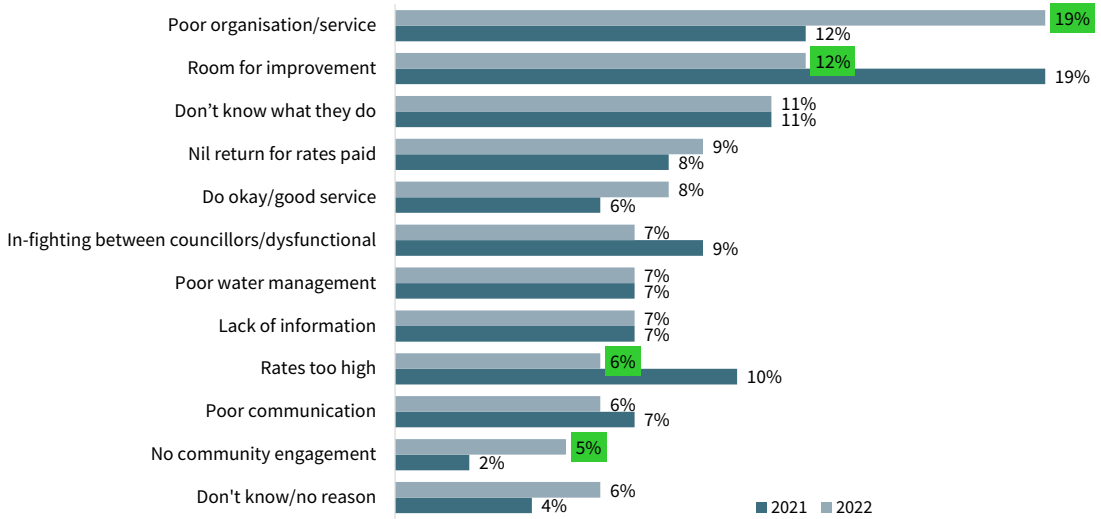


Why do you say that? Base 2021 n=539, 2022 n=515
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Overall: Neutral Ratings

Nineteen percent of respondents who provided a neutral rating stated that ORC was a poor organisation and 12% stated there was room for improvement. Eleven percent stated they were unsure what ORC does. Since 2021, there has been a significant increase in the proportion of respondents who stated ORC was a poor organisation and there was no community engagement. There have also been declines in the proportion of respondents who stated there was room for improvement at ORC and that rates were too high.

REASONS FOR NEUTRAL RATINGS (4-6 RATINGS)*

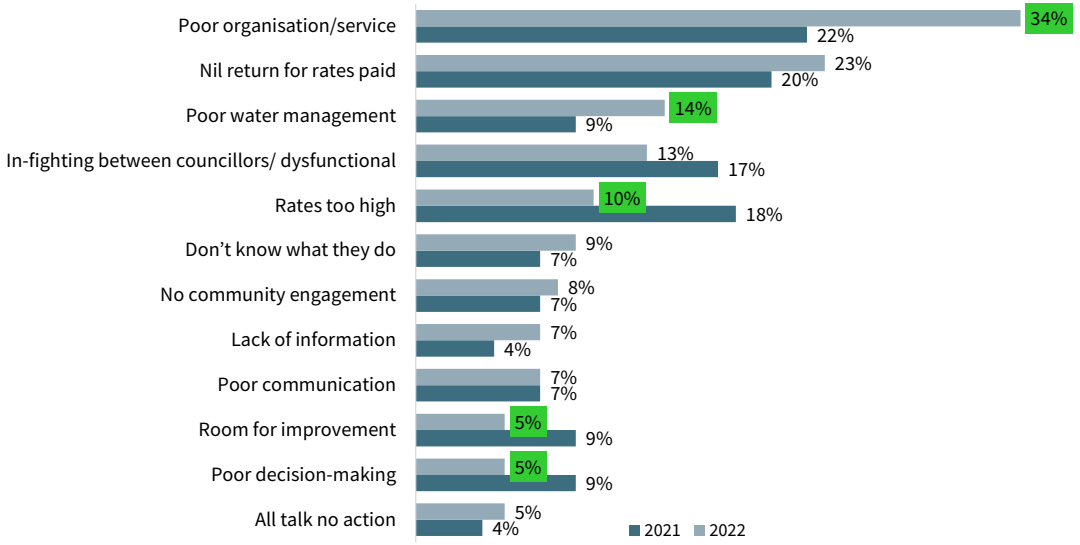


Why do you say that? Base 2021 n=683, 2022 n=718
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Overall: Dissatisfied Ratings

Respondents who were dissatisfied with how ORC services the region stated ORC was a poor organisation, there was nil return for the rates paid, there was in-fighting amongst councillors, and there was poor water management. There has been a number a significant changes in responses since 2021, with the largest pertaining to an increase in the proportion of respondents who stated ORC was a poor organisation and a decrease in the proportion of respondents who stated rates were too high.

REASONS FOR DISSATISFIED RATINGS (1-3 RATINGS)*



Why do you say that? Base 2021 n=354, 2022 n=327
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Performance Summary

1. The results for ORC's environmental management, delivery, and reputation measures all remain on par with 2021. Across most measures, Queenstown Lakes respondents have provided higher ratings than respondents from other local authorities.

2. At an overall level, 30% of respondents were satisfied with how ORC services the Otago region, 43% provided a neutral rating, 19% were dissatisfied. These results were similar to those from 2021, however there has been a 4% increase in the proportion of respondents who provided a neutral rating.

3. Forty-five percent of respondents who were satisfied with how ORC services the region felt ORC was "doing okay" and 11% had no problems with ORC's service.

4. Neutral ratings were driven by a perception that ORC was a poor organisation, that respondents were unsure what ORC does, and that there was limited return for the rates paid.

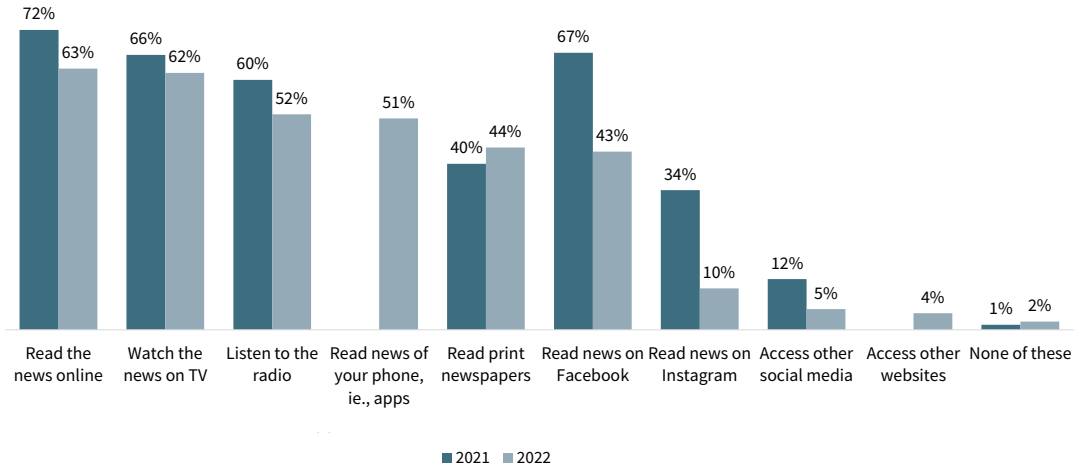
5. The main reasons respondents were dissatisfied with how ORC services the region related to perceptions of ORC being a poor organisation, limited return for the rates paid, in-fighting between councillors, and perceptions of poor water management.

Engagement

Media Accessed

The most common media accessed by respondents was online news (63%), this was followed by TV news (62%), and listening to the radio (52%). In a new measure this year, 51% of respondents read the news on their phone. Only 2% of respondents did not access media in any of these ways.

MEDIA ACCESSED REGULARLY*



*Question wording changed in 2022.
Which of the following do you regularly do? Base 2021 n=1,700, 2022 n=1,700

Demographic Analysis

Younger respondents were more likely to get their news from app-based sources and were less likely to use traditional media sources, e.g., radio, print, TV, all of which were more likely to be used by older respondents.

Male respondents were more likely to access traditional news sources, while female respondents were more likely to access news online.

MEDIA ACCESSED REGULARLY*

	Male	Female	Under 39	40-64	65+	Ratepayer	Non Ratepayer
Sample size	*697*	*1003*	*402*	*783*	*515*	*1355*	*312*
Read the news online	63%	63%	66%	64%	54% ↓	64%	61%
Watch the news on TV	67% ↑	57% ↓	40% ↓	70% ↑	91% ↑	68% ↑	46% ↓
Listen to the radio news	57% ↑	47% ↓	39% ↓	58% ↑	65% ↑	57% ↑	39% ↓
Read news on your phone (e g , news apps)	49%	53%	59% ↑	51%	35% ↓	52%	49%
Read print newspapers	54% ↑	34% ↓	25% ↓	45%	77% ↑	49% ↑	31% ↓
Read news on Facebook	33% ↓	53% ↑	57% ↑	39%	23% ↓	40% ↓	52% ↑
Read news on Instagram	7% ↓	13% ↑	18% ↑	6% ↓	4% ↓	8% ↓	13%
Access other social media	4%	5%	5%	6%	2% ↓	4%	7%
Access other websites	3%	5%	3%	5%	4%	4%	4%
None of these	3%	2%	3%	3%	1% ↓	2%	3%

Which of the following do you regularly do?
**an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Demographic Analysis

Respondents who were in a family household were more likely to access the news on their phone (via apps) or via Facebook, while those without family in their household were more likely to access news on Instagram.

There were very few differences between household income bands in terms of how people access their news.

MEDIA ACCESSED REGULARLY*

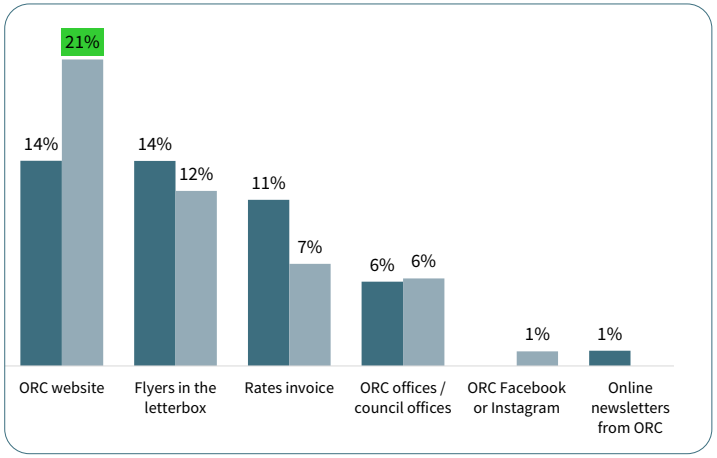
	Under $80,000	$80,001 - $120,000	$120,001+	Young, no kids	Family	Older, no kids
Sample size	*733*	*361*	*307*	*195*	*571*	*897*
Read the news online	57% ↓	62%	74% ↑	65%	67%	58% ↓
Watch the news on TV	63%	59%	60%	38% ↓	52% ↓	83% ↑
Listen to the radio news	50%	55%	55%	36% ↓	50%	62% ↑
Read news on your phone (e g, news apps)	41% ↓	61% ↑	61% ↑	63% ↑	56% ↑	40% ↓
Read print newspapers	45%	43%	44%	22% ↓	37% ↓	61% ↑
Read news on Facebook	41%	45%	49%	50%	52% ↑	32% ↓
Read news on Instagram	10%	9%	11%	18% ↑	11%	4% ↓
Access other social media	6%	4%	5%	5%	4%	5%
Access other websites	5%	2%	3%	2%	3%	6% ↑
None of these	2%	2%	2%	1%	3%	1%

Which of the following do you regularly do?
**an upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

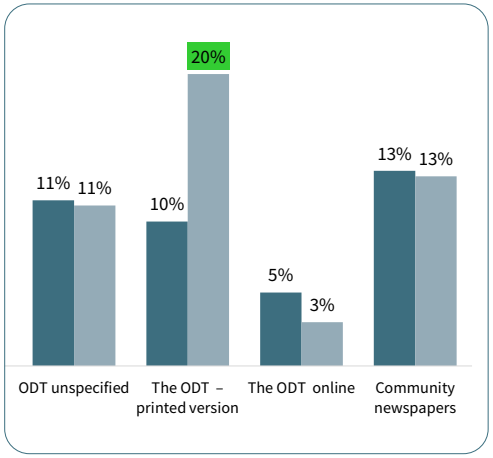
Information About ORC

When looking at information specifically about ORC, 40% of respondents accessed information directly from ORC with the most common source being ORC's website or letterbox flyers. Forty percent accessed information about ORC from newspapers, with the most common form being the printed version of the Otago Daily Times. Nine percent of respondents do not get any information from ORC (not shown in chart).

WHERE INFORMATION ABOUT ORC IS SOURCED FROM*



ORC DIRECT:
NET SCORE (2021)
40% (39%)



NEWSPAPERS:
NET SCORE (2021)
40% (29%)

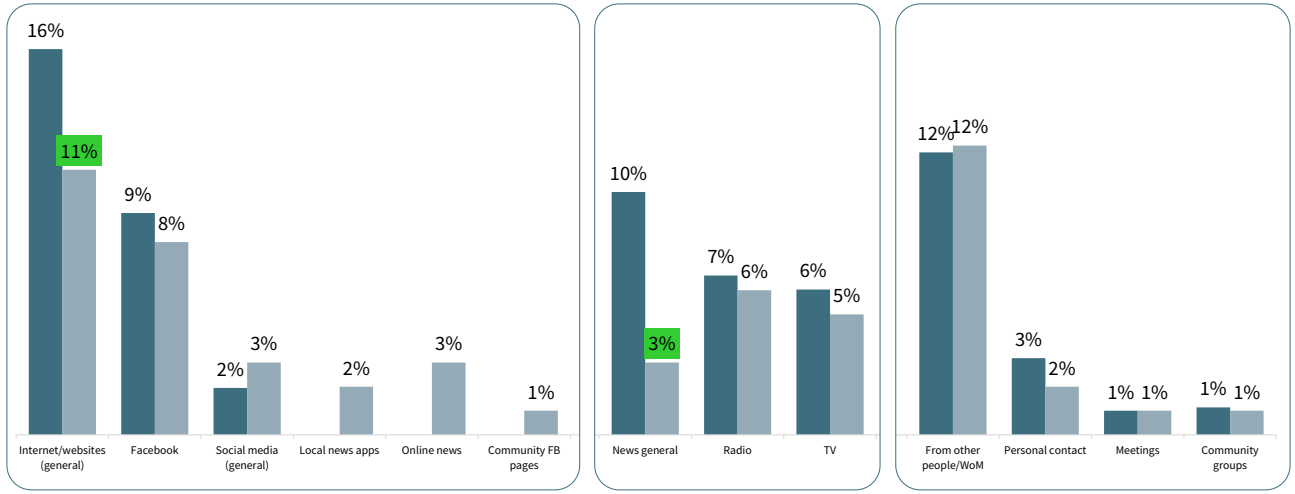
2021 2022

Please list all the places and people you get information about Otago Regional Council from?
Base 2021 n=1,700, 2022 n=1,700
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Information About ORC

When looking at other areas that information about ORC was sourced from, 26% of respondents used some form of online or social media. At a lower level, 11% used some form of traditional news media and 15% sourced information about ORC from other people or through personal contact.

WHERE INFORMATION ABOUT ORC IS SOURCED FROM*



ONLINE & SOCIAL: NET SCORE (2021) 26% (27%)

NEWS GENERAL: NET SCORE (2021) 11% (19%)

OTHER PEOPLE/PERSONAL CONTACT: NET SCORE (2021) 15% (16%)

Please list all the places and people you get information about Otago Regional Council from?
Base n=1,700, 2022 n=1,700
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Information About ORC

Respondents from Dunedin were more likely to source information about ORC directly from ORC or via online and social media channels. Respondents from more rural areas were less likely to use online and social media channels.

WHERE INFORMATION ABOUT ORC IS SOURCED FROM (NET SCORES) BY AREA*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
ORC direct	36%	33%	32% ↓	44% ↑	40%
Newspapers	45%	58% ↑	42%	34% ↓	43%
Online and social	18% ↓	18% ↓	24%	30% ↑	17% ↓
Traditional news media	11%	13%	10%	12%	6% ↓
Other people/personal contact	18%	16%	16%	13%	16%
I don't get any information from ORC	12%	8%	11%	8%	10%

WHERE INFORMATION ABOUT ORC IS SOURCED FROM (NET SCORES) BY DEMOGRAPHICS

ORC direct is more likely to be used by:
Females 44%
Family household 45%
Ratepayers 42%

Newspapers are more likely to be used by:
65+ years 62%
Older, no children 54%
Ratepayers 43%

Online and social media is more likely to be used by:
Under 39 years 33%
Younger, no children 36%

Traditional news media is more likely to be used by:
Older, no children 15%

Personal contact:
No significant differences

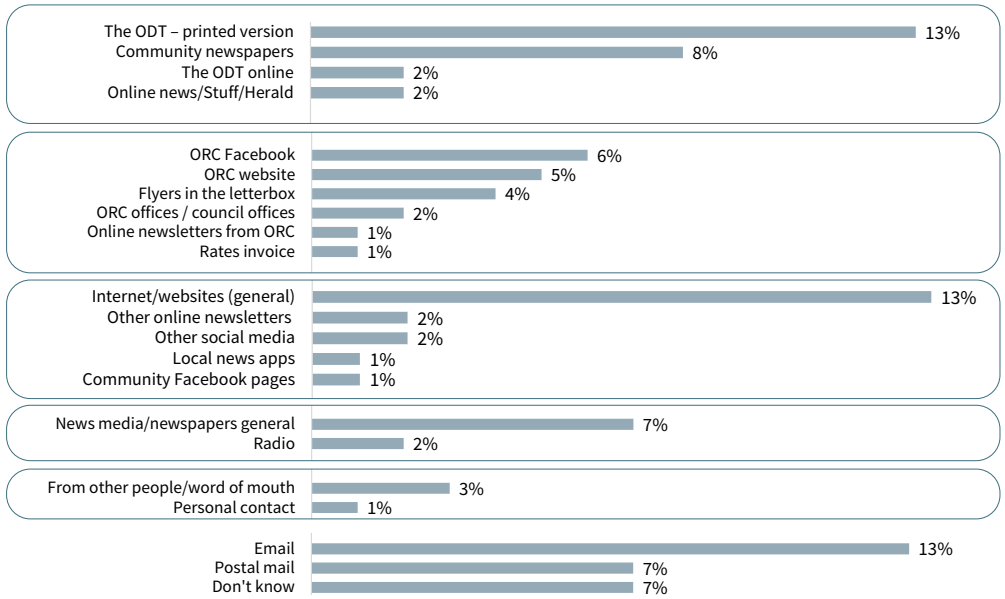
Those more likely to receive no information from ORC:
Non-ratepayers 15%

**An upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Preferred Information Source

Overall the most popular sources of information were newspapers followed by information directly from ORC. This was a change from 2021 when the most preferred source was online.

PREFERRED INFORMATION SOURCE FOR ORC CONTENT



TOTAL SCORES 2022 (2021)*

Newspapers:
25% (11%)

ORC direct:
19% (16%)

Online and social:
19% (26%)

News general:
9%(6%)

Other people/ personal contact:
4% (6%)

Which of these is your most preferred form of receiving information from Otago Regional Council?
Base n=1.636
**Green shading indicates the 2022 result is significantly higher or lower than the 2021 result.*

Preferred Information Source

Respondents from Dunedin were more likely to prefer online and social media channels as a source of information from ORC, while respondents from Clutha preferred communication directly from ORC. Respondents from Central Otago and Clutha have a greater preference for information from newspapers.

PREFERRED INFORMATION SOURCE FOR ORC CONTENT (TOTAL SCORES) BY AREA*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*287*	*286*	*322*	*460*	*281*
Newspapers	29%	41% ↑	29%	16% ↓	31% ↑
ORC direct	20%	19%	21%	19%	27% ↑
Online and social	14%	13%	18%	21% ↑	14%
News general	12%	10%	6%	8%	6%
Other people/personal contact	7%	9% ↑	7%	2% ↓	10% ↑

PREFERRED INFORMATION SOURCE FOR ORC CONTENT (TOTAL SCORES) BY DEMOGRAPHICS

Newspapers more likely to be preferred by:
65+ years 45%
Males 29%
Older, no children 35%

ORC direct:
No significant differences

Online and social more likely to be preferred by:
Under 39 years 25%

General news media more likely to be preferred by:
Older, no children 12%

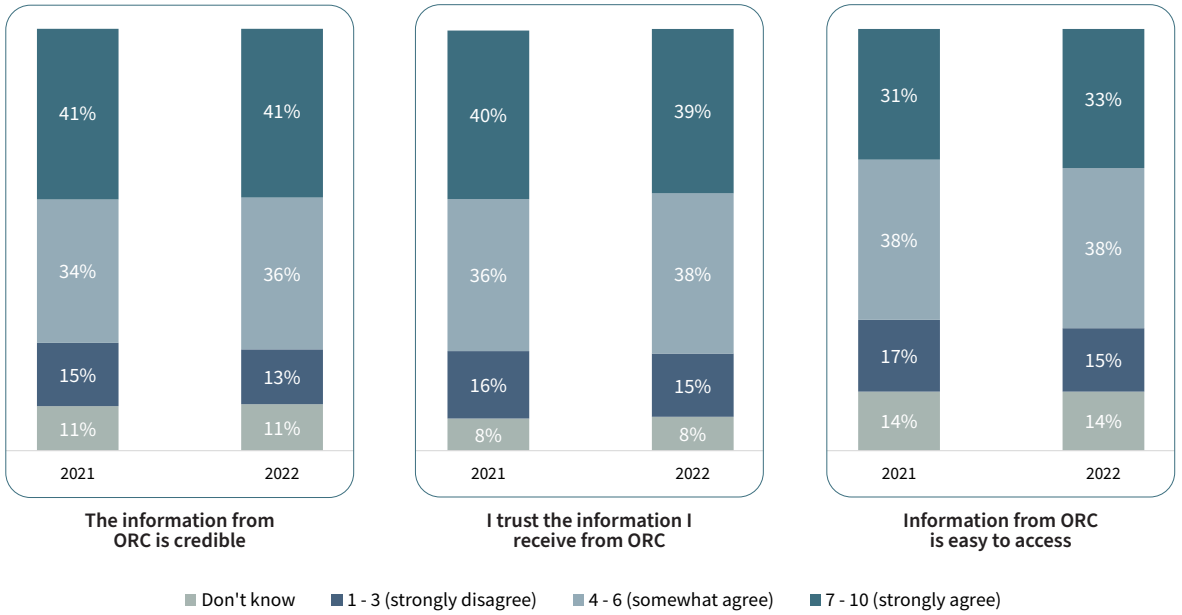
Personal contact more likely to be preferred by:
65+ years 8%
Males 7%

**An upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Information from ORC

Respondents were asked how much they agreed with a series of statements about the information they received from ORC. Forty-one percent of respondents agreed the information from ORC was credible and 39% agreed they trusted the information. Thirty-three percent of respondents felt the information from ORC was easy to access. Just under 40% of respondents indicated they somewhat agreed with each of these statements and only a small proportion disagreed.

RATING OF INFORMATION FROM ORC

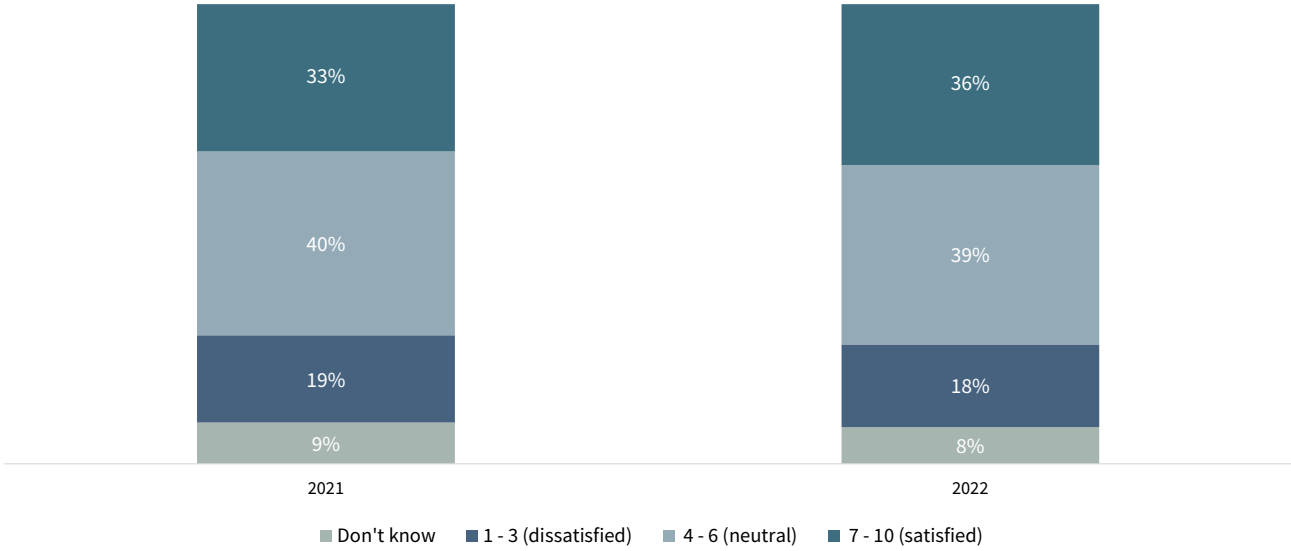


Using a 1 – 10 scale where 1 is strongly disagree and 10 is strongly agree, please rate how much you agree with each of the following statements about the information you receive from Otago Regional Council from? Base 2021 n=1,700, 2022 n=1,700

Satisfaction with Information

Respondents were asked how satisfied they were with the information they received from ORC. Thirty-six percent of respondents were satisfied with the information, 39% provided a neutral rating, and 18% were dissatisfied. This year there was a slight increase in the proportion of respondents who were satisfied with the information they received.

OVERALL SATISFACTION WITH INFORMATION FROM ORC



Using a 1 – 10 scale where 1 is very dissatisfied and 10 is very satisfied, overall how satisfied are you with the information you receive from Otago Regional Council? Base 2021 n=1,700, 2022 n=1,700

Information from ORC

There were no significant differences between the area results with regards to respondents' satisfaction with the information they received from ORC. At an overall level, non-ratepayers and respondents who were younger and with no children in their household were more likely to be satisfied with the information they received from ORC.

INFORMATION FROM ORC BY AREA (7 - 10 SCORES)*

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha
Sample size	*300*	*300*	*340*	*460*	*300*
The information from ORC is credible	34%	42%	49%	39%	44%
I trust the information I receive from ORC	37%	39%	48% ↑	36%	45%
Information from ORC is easy to access	35%	34%	38%	30%	35%
Overall satisfaction	**33%**	**35%**	**42%**	**33%**	**39%**

INFORMATION FROM ORC BY DEMOGRAPHICS (7 - 10 SCORES)

No significant differences across any of the information statements

Overall satisfaction highest amongst:

Non-ratepayers 44%
Young, no children 46%

Using a 1 – 10 scale where 1 is strongly disagree and 10 is strongly agree, how please rate how much you agree with each of the following statements about the information you receive from Otago Regional Council.
**An upward arrow (↑) indicates the result is significantly greater than other groups in 2022, a downward arrow (↓) indicates a result is significantly lower than other groups in 2022.*

Engagement Summary

1. Online continues to be the most significant channel for accessing information and news. A significant number of respondents access the news online or via an app. App-based sources were particularly important for respondents under the age of 39 years.

2. Traditional media sources were important for older respondents, particularly ratepayers.

3. There has been an increase in the proportion of people who received information from ORC via newspapers this year, and this channel has become the preferred source of information. The changes in channel preference are potentially a reflection of the recent local body election coverage, much of which was delivered in printed format.

4. Respondents provided strong ratings for ORC's provision of information with around 40% of respondents rating the information as credible and trustworthy. Slightly lower ratings were seen for ORC's information being easy to access.

5. Thirty-six percent of respondents were satisfied with the information from ORC. Information ratings were largely consistent across demographic groups and areas.

Concluding Comments

Concluding Comments

SUMMARY OF FINDINGS

This year there are similar levels of awareness about ORC to 2021. There has been a slight increase in the proportion of respondents who mentioned a local authority as the organisation responsible for managing the region's natural resources. However, this could be attributed to the 2022 interviewing being conducted close to local body elections, which may have resulted in a slight increase in mis-attribution.

Awareness of the activities that ORC undertakes has also remained consistent with 2021, with water monitoring and management remaining the primary activity respondents mentioned. There continues to be high awareness of ORC and the role it has in the region amongst older respondents, ratepayers, and New Zealand Europeans. In comparison, younger respondents and non-ratepayers were less likely to know about ORC or the role the organisation has.

Use of ORC provided services remains on par with last year with public transport and the ORC website the most commonly used services. Satisfaction ratings for the Pollution Hotline and inquiring into ORC's rules improved this year however, satisfaction with the bus service declined significantly. Key reasons for this decline related to service reliability, a reduction in services, and poor scheduling; these changes mostly affected younger and non-ratepaying respondents. In addition to service disruptions, respondents noted the limited communication about service changes caused frustration.

"While understanding ORC has been struggling with major driver staffing issues, the delays and reduced service provided to our area has been both frustrating and inconvenient." – Dunedin resident

"The service level is very bad and so is the communication. Buses randomly get cancelled stranding people in the cold at the bus stop for an hour at a time." - Dunedin resident

Despite the decline in bus service delivery, perceptions of ORC's reputation, performance, and delivery against key indicators remained the same as in 2021, suggesting there were no significant shifts in residents' views of ORC generally. As with 2021 the largest dissatisfaction ratings related to receiving value for money from rates, with 34% of respondents stating they were dissatisfied with this.

A significant proportion of respondents felt the region's water quality and the quality of coastal resources were in decline, while air quality and land-based environments remained unchanged. These results were similar to those from 2021.

Water quality continued to be a key environmental issue for the Otago region, this was particularly mentioned by respondents from Waitaki District. The relevance of water for all parts of the environment was the primary driver for water quality being a priority issue for the region.

"I believe we rely heavily on water, water quality in Otago Region, and with farming of course, we need to keep it to a high standard." – Clutha resident

Concluding Comments

Water issues were coupled with concerns about the effects of climate change in the region. In particular, respondents mentioned the increased severity and frequency of land erosion and flooding in Otago, with many reporting tangible results of such weather events.

Furthermore, loss of productive land through forestry and pest pressure were also noted as important environmental issues facing the region. Respondents were concerned about the growth of both issues and the impact they were having on the region's landscape.

This year slightly fewer respondents were positive about ORC's response to the environmental issues facing the region. Only 14% of respondents rated ORC's response as excellent, while 40% rated the response as average and 30% rated it poorly.

The primary reasons for poorer ratings pertained to a perceived lack of action from ORC. Some respondents noted that the environmental issues were worsening and ORC's response lacked a sense of urgency. Indeed, respondents noted that some environmental issues seemed to be progressing at a faster rate than the actions which are being taken to mitigate environmental decline.

"They are taking standard measures, but I really think we should be future-proofing Otago urgently."- Dunedin resident

At an overall performance level 30% of respondents were satisfied with how ORC services the region as a whole, while 43% provided a neutral rating and 19% were dissatisfied. Satisfaction ratings were driven by respondents having no issues with ORC, while dissatisfaction ratings were linked to perceptions that ORC was a "poor organisation". This view was primarily driven by the negative publicity of the past few years, which has eroded public confidence in the organisation and its ability to complete the tasks it is required to do.

"There has been so much bad publicity in the last couple of years regarding in-fighting amongst the executive that it feels like they are spending more time with this and less doing what they are meant to." - Queenstown Lakes resident

"There has been too much in-fighting in our councils which comes across as childish and irritating to the average ratepayer. It should be seen as a privilege to be voted to represent the community and not a platform." – Central Otago resident

"ORC has lost my trust over recent years. High staff turnover, poor decision-making around protecting our waterways, highly dysfunctional elected members, individuals representing vested interest groups and not protecting our environment and future of this region." – Dunedin resident

This issue was confounded by a perceived lack of visible improvement in the Otago environment, which many feel is facing increased pressure, particularly water quality.

"I like the work ORC is doing, although when it comes to the environment not much change is occurring. Natural resources are being challenged by human use. I think that the ORC's efforts aren't made very apparent to the public." – Queenstown Lakes resident

Concluding Comments

Ultimately the combined noise of the past few years has likely drowned out many of the positive outcomes that ORC has achieved. With a new Council in place, there is a need to show a united front and to build a future focus for both the organisation and the environment.

"I know the function is a challenging one and the council has many obstacles in front of pretty much every action. I think the council is doing an okay job because they have good priorities, but the way they are going about most of them seems to be neither hot nor cold and very little seems to be achieved. We are treading water, primarily because older folk don't want to accept how dire our natural situation is and the council doesn't want to rock anyone's boat. So, as it stands, we are just another area in New Zealand doing little for our kid's future, and they'll be the ones who will be paying for our communal lack of courage." – Clutha resident

RECOMMENDATIONS

Based on the above findings we recommend that the following points be considered when developing future communications, strategies, and initiatives.

Focus on actions which restore confidence in ORC: This year saw an increase in the proportion of respondents who noted that ORC is a poor organisation. Social commentary about wasting time, wasting resources, and in-fighting needs to be put to bed in the coming three years to restore residents' confidence in ORC. Presenting a united front and focussing on communicating decisions that are in the best interests of the region needs to be a priority for the incoming Council.

Communicate plans and initiatives for important environmental issues: Many of the environmental issues identified by respondents have a sense of "urgency" attached to them. While these issues are significant, e.g., global warming, communicating the plans and initiatives that ORC has in place and are undertaking at a local level is critical. Involving residents at a localised level will be key for raising awareness of this work in smaller communities.

Develop an ORC brand: The internal issues of the past few years has stymied ORC's ability to showcase the positive work it has undertaken. While awareness of the organisation has remained high, ORC's role in the region continues to be heavily linked with

Concluding Comments

water-based activities. Some consideration should be given to the development of a brand level strategy which brings consistency in messaging and content relating to the role and activities that ORC has in the region, i.e., why ORC exists and the outcomes it is working towards. The development of such a strategy would, in due course, assist with increasing engagement with residents and stakeholders.

Address public transport issues: The bus service is the primary ORC service respondents used however, there has been a significant decline in service ratings this year. The predominant users of this service were the more vulnerable members of the population, i.e., younger people, non-ratepayers, and the immigrant population. Interestingly, the feedback suggests that while disruptions have been an inconvenience it is the communication that has exacerbated these issues. While solutions to the issues facing public transport may be difficult to resolve and are part of a larger sector wide challenge, communication to bus users needs to be addressed to ensure those using the service are able to do so as easily as possible.

Appendices

APPENDIX 1

Weighting Proportions

The weight proportions for this work are provided below. These are taken from the 2018 Census data for Otago Region residents aged 18 and over.

Age	Census %
Under 39 years	40%
40 - 64 years	39%
65+ years	21%

Gender	Census %
Male	49%
Female	51%

Area	Census %
Waitaki District	9%
Central Otago District	10%
Queenstown Lakes District	20%
Dunedin City	54%
Clutha District	7%

APPENDIX 2

Questionnaire

INTRODUCTION

Good morning/afternoon/evening, it's [NAME] from Symphony Research I'm calling on behalf of a local authority, we are conducting a study about the environmental management of Otago's natural resources and would like to include opinions from your household, could I please speak to the youngest person in the household over the age of 16?
PROMPT: It should take about 15 minutes of your time.
PROMPT: At the end of the survey there is the opportunity to go into the draw to win 1 of 6 Prezzy Cards
PROMPT: We're from Symphony Research, an independent research company hired to do this research. All your responses are confidential - so please feel free to be as frank as you like.
PROMPT: Our client is a local authority interested in residents' awareness of activities and their views on environmental management.

SCREENERS

Before we start, can I please check that you are over 16 years of age?
1. Yes
2. No - thank and close

Does anyone in your household work for a local government council in Otago?
1. Yes - thank and close
2. No

Which of the following areas do you live in? CHECK QUOTAS
1. Waitaki District
2. Central Otago District
3. Queenstown Lakes District
4. Dunedin City
5. Clutha District
6. None of these – thank and close

IF WAITAKI: Are you in the Otago Region or the Canterbury Region of Waitaki?
1. Otago – continue
2. Canterbury – thank and close

Which of the following age groups are you in? CHECK QUOTAS - Read out
1. Under 39 years
2. 40-54 years
3. 55-64 years
4. 65+ years
5. Prefer not to say

And which of the following best describes you? CHECK QUOTAS
1. Male
2. Female
3. Gender diverse
4. I identify as_____
5. Prefer not to say

SECTION 1: KNOWLEDGE

1A: Firstly, which organisation do you understand to be responsible for the management of the Otago region's natural resources?
Record all mentions
1. Otago Regional Council/ORC
2. Department of Conservation/DOC
3. Regional Council
4. Council (general)
5. District Council
6. Queenstown Lakes District Council/QLDC
7. Environment Canterbury/ECAN
8. Dunedin City Council/DCC
9. Waitaki District Council
10. Central Government
11. Work and Income
12. MPI
13. Other specify
14. Don't know
15. No comment/none

1B: Have you heard of Otago Regional Council?
1. Yes
2. No
3. Not sure

1C: Otago Regional Council is the regional government authority which is responsible for the management of natural resources across the Otago Region including those in Waitaki, Queenstown Lakes, Dunedin, Clutha, and Central Otago districts.

Thinking about the work the Otago Regional Council might do, please list all of the areas you are aware they are involved in.
Record all mentions

APPENDIX 2

Questionnaire

1. Water quality
2. Air quality
3. Water control
4. Pest management
5. Flood management
6. Land erosion
7. Public transport
8. Resource consents
9. Roading
10. Rates
11. Weed control
12. Biosecurity
13. Waste management
14. Civil defence/emergencies
15. Natural resources
16. Pollution
17. Tracks/trails
18. Conservation
19. Infrastructure
20. Other specify
21. Don't know
22. No comment

1D: Before this survey, were you aware Otago Regional Council were involved in…?
Read out, select as many as applicable

1. Issuing resource consents
2. Air quality monitoring
3. Public transport
4. Biodiversity and pest management
5. Pollution response
6. Water quality monitoring
7. Investigating environmental incidents and making sure people are following the rules
8. Climate change adaptation
9. Reducing risks from natural hazards
10. Civil defence and emergency management
11. Community engagement and education
12. Developing plans and policies to make sure our resources are managed properly
13. Taking government policy about managing natural resources and implementing it for Otago
14. Flood protection infrastructure, like stopbanks and drainage schemes
15. Navigational safety
16. Something else, please specify
17. Don't know

1E: I am going to read out a list of statements about the role the Otago Regional Council has in the Otago region. Please indicate how well you think Otago Regional Council delivers on each of these areas using a scale where 1 is extremely poorly and 10 is excellent.

For this question the term ORC refers to Otago Regional Council.
Randomise row order

- ORC protects Otago's environment and people through information, planning, regulation, infrastructure and emergency preparedness and response.
- ORC works to create connection and pride in our region by linking diverse ideals, views, groups and sectors for sustainable outcomes.
- ORC works with people to enhance Otago's environment and its livability
- ORC exchanges information, tools and knowledge with communities, so they can do things better for the environment and people.

1F: And, using the same scale where 1 is extremely poorly and 10 is excellent how well or poorly do you think Otago Regional Council is…
Randomise row order

- Protecting and managing the quality of air in Otago Region
- Protecting and managing the quality of coastal resources in Otago Region
- Ensuring land-based activities do not adversely affect the environment in Otago Region
- Protecting and managing the quality of water in Otago Region's rivers, lakes, and streams

1G: And, for each of the following, do you think each of the following is generally improving, staying the same, or deteriorating in the Otago region?
Randomise row order

- Air quality in the Otago region
- Quality of coastal resources in the Otago region
- The state of the land-based environment in the Otago region
- Quality of water in Otago Region's rivers, lakes, and streams

APPENDIX 2

Questionnaire

SECTION TWO: PERCEPTIONS

2A: Which of the following services have you used in the past 12 months?
Read out, randomise options

1. Used the bus service in Dunedin or Queenstown (Orbus)
2. Applied for a resource consent through Otago Regional Council
3. Reported pollution to the Pollution Hotline
4. Made an enquiry about the rules to Otago Regional Council
5. Used the Otago Regional Council website to locate information about ORC services and rules
6. None of these - skip to Q2C

2B: Thinking now specifically about the service you received, not the outcome of a particular interaction, using a 1 – 10 scale where 1 is extremely dissatisfied and 10 is extremely satisfied, please indicate how satisfied you were with the service you received when you…

Ask for all selected at 2A,
Randomise row order

- Used the bus service in Dunedin or Queenstown (Orbus)
- Applied for a resource consent through Otago Regional Council
- Reported pollution to the Pollution Hotline
- Made an inquiry about the rules to Otago Regional Council
- Used the Otago Regional Council website to locate information about Council services and rules

[Ask 2B-1 to 2B-5 for all residents who rated 1-4 for each of the previous measures at Q2]
2B-1: You indicated you were dissatisfied with the bus service in Dunedin or Queenstown, why do you say that?

2B-2: You indicated you were dissatisfied with the service when you applied for a resource consent through Otago Regional Council, why do you say that?

2B-3: You indicated you were dissatisfied with the service you received using the Pollution Hotline, why do you say that?

2B-4: You indicated you were dissatisfied with the service when you made an enquiry about the rules to Otago Regional Council, why do you say that?

2B-5: You indicated you were dissatisfied with the Otago Regional Council website when locating information about Council services and rules, why do you say that?

2C: The next few questions are about your perceptions of Otago Regional Council. Please indicate how much you agree or disagree with the following statements using a 1 - 10 scale where 1 is strongly disagree and 10 is strongly agree.
Randomise row order

- Otago Regional Council is trustworthy
- I trust the information Otago Regional Council provides
- I think Otago Regional Council has a good reputation
- I am proud to live in the Otago Region
- Otago Regional Council provides value for money for their residents

2D: Using the same 1 – 10 scale can please indicate how satisfied you are with how the Otago Regional Council services in the Otago region as a whole?

1. 1 - Very dissatisfied
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9
10. 10 – Very satisfied
11. Don't know – SKIP TO 3A

2E: Why do you say that?
Do not read out, code all mentions

1. Poor communication
2. Poor organization/service
3. Do okay/good service
4. No community engagement
5. In fighting between Councillors/dysfunctional
6. Nil return for rates paid
7. Room for improvement
8. Rates too high
9. No problems/issues
10. All talk no action
11. Don't know what they do
12. Poor decision making

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13. Just average
14. Lack of information
15. Poor water management
16. Don't know
17. No comment
18. Other specify

SECTION THREE: EXPECTATIONS

3A: Can you please tell me what you think is the most important environmental issue facing the Otago Region today?

1. Climate change
2. Water quality
3. Public transport
4. Land/beach erosion
5. Air quality
6. Flood control
7. Pest management
8. Communication/information from ORC
9. Forestry/land management
10. Don't know
11. No comment
12. Other specify

3AA: Why do you think this is the most important issue facing Otago Region?
Record Verbatim

3B: Using a 1 – 10 scale where 1 is very poor and 10 is excellent, how well has Otago Regional Council responded to this environmental issue?

1- 1 - Very poor
1. 2
2. 3
3. 4
4. 5
5. 6
6. 7
7. 8
8. 9
9. 10- excellent
10. Don't know

3C: Why do you say that?

SECTION FOUR: ENGAGEMENT

4A: Which of the follow do you regularly do?
Randomise codes, read out

1. Read the news online
2. Read news on your phone (e.g., news apps)
3. Read print newspapers
4. Read news on Facebook
5. Read news on Instagram
6. Listen to the radio news
7. Watch the news on TV
8. Access other websites, (please specify)
9. Access other social media, please specify_____
10. None of these – skip to 4b

4a: Can you please tell me any other areas that you prefer to get your news from?
Do not read out, code all mentions

1. Friends/business associates
2. Otago Daily Times/local community papers
3. Local community news apps installed on your phone
4. Email
5. Television/radio
6. Web sites/Stuff/Herald
7. Facebook - Community Facebook pages
8. Facebook – general mention
9. YouTube/Twitter
10. Journal publications/reports
11. Postal mail
12. Magazines
13. Don't know/none
14. Other specify

4B: Where , or from whom, do you get information about Otago Regional Council?
Do not read out, code all mentions

1. The Otago Daily Times online
2. The Otago Daily times – print version
3. Local community printed newspapers
4. Community Facebook pages
5. Otago Regional Council Facebook

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6. Otago Regional Council Instagram
7. Local news apps e.g., Central Otago or Wanaka app
8. The Otago Regional Council website
9. Printing materials from Otago Regional Council's website
10. Rates invoice
11. Otago Regional Council flyers in the letterbox
12. Otago Regional Council offices / council customer staff
13. Yellow pages
14. Radio
15. Personal contact
16. From other people/word of mouth
17. Meetings
18. Community groups
19. School
20. TV advertisements
21. Advertisements on YouTube
22. Internet/websites (general)
23. Online paid advertisements
24. Other social media, please specify _____
25. Online newsletters from ORC
26. Other online newsletters
27. Other, please specify_____
28. I don't get any information about Otago Regional Council - skip to Q4d

4C: What is your preferred form of receiving information from Otago Regional Council?
Insert options selected at 4B

1. The Otago Daily Times online
2. The Otago Daily times – print version
3. Local community printed newspapers
4. Community Facebook pages
5. Otago Regional Council Facebook
6. Otago Regional Council Instagram
7. Local news apps eg the Central Otago or Wanaka app installed on your phone
8. The Otago Regional Council website
9. Printing materials from Otago Regional Council's website
10. Rates invoice
11. Otago Regional Council flyers in the letterbox
12. Otago Regional Council offices / council customer staff
13. Yellow pages
14. Radio
15. Personal contact
16. From other people/word of mouth
17. Meetings
18. Community groups
19. School
20. TV advertisements
21. Advertising on YouTube
22. Internet/websites (general)
23. Online paid advertising
24. Other social media, please specify _____
25. Online newsletters from ORC
26. Other online newsletters
27. Other, please specify_____

4D: Using a 1 – 10 scale where 1 is strongly disagree and 10 is strongly agree, how please rate how much you agree with each of the following statements about the information you receive from Otago Regional Council.
Randomise statements

- The information from Otago Regional Council is credible
- I trust the information I receive from Otago Regional Council
- Information from Otago Regional Council is easy to access

4E: Using a 1 – 10 scale where 1 is very dissatisfied and 10 is very satisfied, overall how satisfied are you with the information you receive from Otago Regional Council?

1. 1 - Very dissatisfied
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9
10. 10 – Very satisfied
11. Don't know

APPENDIX 2

Questionnaire

SECTION FIVE: DEMOGRAPHICS

5A: The final few questions are just to make sure we get a good cross section of people. Which of the following best describes your household situation?
Read out, single response

1. Young single, living alone
2. Group flatting together
3. Young couple, no children
4. Family, mainly pre-school children
5. Family, school children
6. Family, adult children
7. Middle aged couple/ single person
8. Older couple/ single person
9. Boarding or similar
10. Prefer not to say

5B: Which of the following best describes your household income before tax annually?
Read out, single response

1. Under $40,000
2. $40,001 - $80,000
3. $80,001 - $120,000
4. $120,001+
5. Prefer not to say

5C: Do you pay rates on a property in the Otago region?

1. Yes
2. No
3. Prefer not to say

5D: Which of the following best describes the kind of work you do?
Read out, multi choice

1. Full time paid work
2. Part time paid work
3. Part time self employed/ contractor
4. Full time self employed/ contractor
5. Caring for children (unpaid)
6. Volunteer work
7. Not currently in paid employment
8. Student
9. Retired
10. Other, please specify_____
11. Prefer not to say

5E: Which of the following best describes you?
Read out, multi choice

1. European/ New Zealander
2. Māori
3. Pacific Islander
4. Asian
5. Another ethnicity, please specify_____
6. Prefer not to say

5F: Where you born in New Zealand?

1. Yes
2. No
3. Prefer not to say

5G: Which if any of the following groups do you belong to:
Read out, multi choice

1. Environmental advocacy groups
2. Catchment group
3. Irrigation collective
4. Tourism or business advocacy groups
5. Primary sector advocacy or industry groups (please specify)
6. Other advocacy or interest groups that regularly interact with ORC (please specify)
7. None of the above

5H: Whereabouts in [insert area at S1] do you live?

Thank-you for those answers, that is all the questions for today. Would you like to go into the draw to win 1 of 6 Prezzy Cards?

1. Yes – fill in contact details
2. No – end survey

APPENDIX 3

Sample Structure

EMPLOYMENT	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha	TOTAL	2021
Full time paid work	34%	35%	50%	61%	39%	46%	47%
Part time paid work	19%	16%	19%	20%	17%	18%	20%
Caring for children (unpaid)	3%	4%	4%	5%	3%	4%	3%
Volunteer work	7%	7%	9%	2%	8%	6%	4%
Not currently in paid employment	5%	2%	2%	5%	7%	4%	4%
Student	1%	1%	2%	7%	3%	3%	3%
Retired	40%	43%	25%	4%	32%	26%	25%
Other	2%	1%	2%	2%	4%	2%	1%
Prefer not to say	2%	2%	1%	1%	1%	1%	1%

Which of the following best describes the kind of work you do?

APPENDIX 3

Sample Structure

HOUSEHOLD SITUATION

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha	TOTAL	2021
Young, no children	5%	6%	17%	18%	6%	11%	13%
Family	26%	29%	33%	46%	27%	34%	35%
Older, no children	68%	61%	48%	33%	64%	53%	50%
Other	1%	4%	1%	2%	3%	2%	2%

Which of the following best describes your household situation?

RATEPAYER

	Waitaki	Central Otago	Queenstown Lakes	Dunedin	Clutha	TOTAL	2021
Ratepayer	84%	84%	75%	74%	86%	80%	80%
Non-ratepayer	14%	15%	24%	23%	13%	18%	18%
Prefer not to say	2%	2%	1%	3%	1%	2%	1%

Do you pay rates on a property in the Otago region?


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Otago Regional Council Community Survey Action Plan - DRAFT

Group	Action	Connection to Survey Results	Status	Next Steps
Communications and Marketing	Work on a bi-monthly newsletter in the community newspapers — (replaces Waterlines) uses content from On Stream and other sources. Localise some content to each community.	Expectations: Delivery address lack of action and education. Perceptions: Performance, show what we do, increase reputation	Planning	Present draft newsletter to future Regional Leadership Committee meeting early 2023. Seek approval for form and distribution
Communications and Marketing	Work with the Corporate Team to create a publicly-accessible graphics summary of a quartlery 12-page performance report. Simplify and highlight key results and make more engaging to appeal to a wider audience. Use for social media posts, e.g., LinkedIn and FB, Onstream Work on a rates brochure to go out with 2023 rates notices providing a greater level of information to rate payers on the role of ORC	Perceptions: increase performance, satistisfaction ratings Address awarness/ perception about services and knowledge gaps of ORC's work. As above	Underway Planning	Aiming to do first one in December for Q1 results Kick-off meeting set up for January. Delivery with 2023 rates notices
Communications and Marketing	Wanaka A&P Show — Create an engaging stand that showcases what ORC does/the value added. Opportunity to build On Stream database to maximise ongoing communications	Performance: increase community engagement Knowledge: increase activity awareness and perception	Planning	Stand content is being planned with a range of ORC teams. Opportunities for Councillors to be on site during show to engage with members of the community alongside staff
Communications and Marketing	Build up Stakeholder Engagement lists with teams throughout the organisation. Engage with councillors for their community knowledge.	Engagement: people prefer info directly from us. Increase credibility and trustworthiness of info	Underway / ongoing	Work with Councillors and ORC teams to establish key stakeholder lists for direct communication of information
Communications and Marketing	Develop ORC Brand — Strategy around consistency in messaging. Visual identity, style guide etc. Templates for channels we are pushing consistency between touch points, end-user and best-practice focused. Understanding audience demographics and channels they prefer. Councillors input on their thoughts in this area	Delivers against all areas of survey	Underway / ongoing	Continue to develop a consistent look and feel for ORC communications. Build a greater understanding of preferred communications channels across Otago noting geographic and demographic diffrerences
Communications and Marketing	Develop ORC Brand — look at a strategy around messaging and content relating to role and activities. Look at all the areas we need to promote, tie in with other actions regarding communication. Have a content calendar so we are promoting beyond water.	Delivers against all areas of survey	Planning	Prepare draft for reporting to the Regional Leadership Committee
Communications and Marketing	Foster collaboration for stories to educate community on ORC's services	Awareness: increase prompted awareness, increase positive environmental response	Planning	All ORC teams encouraged to provide interesting and positive content to Communications and Marketing for use in communication material
Compliance	Work with the Compliance team to create our own news reel for Facebook (similar to Waikato Regional Council) that includes photographs and video of incidents we investigate, accompanied by commentary around the sorts of rules being broken.	Greater education about pollution and its causes — awareness and perception about ORC services	Planning	Commence 2023
Complinace	Proactively advertise the existence of the Pollution Hotline service and highlight some of the excellent info or 'saves' we have received from this with an advertising campaign on mainstream media and digital channels, e.g., FB. Also include Q and A's about some of the pollution topics.	Activity awareness and perception	Ongoing	Social media and radio interviews have been undertaken. Further promotion activities will be identified in 2023
Environmental Implementation	The Enviromental Implemenation Team will be partnering with the MPI to raise the profile (and ORC's role) in managing biosecurity threats — namely wilding conifers and wallabies. Further community and engagement strategies will be developed and implemented.	Knowledge: Activity Awareness and Perception	Planning	Partnership with MPI developed and work is underway on wallaby and wilding conifer work programmes. Development of a wilding conifer strategy is being progressed this year.
Environmental Implementation	Work with the Enviromental Implemenation Team to raise the profile of pest control through videos and photo-stories promoted in community newspapers and mainstream media, plus social media.	Positively address perception about services and ORC performance	Underway / Ongoing	Specific work begun on wallabys and also pines and rooks. Several social media campaigns completed plus TV/PR occuring here.
Natural Hazards	Work proactively with the Hazards team and Radio New Zealand and other media that have broad-ranging and in-depth environmental reporting to raise awarness among neighbouring communities and more widely in NZ of the problems and solutions needed to address concerns in these areas, e.g., Glenorchy good example	Positively address perception	Planning	Seeking options to develop in-depth stories which promote the work of ORC
Resource Consents	Raise general awareness of resource consents process with general public (attendance at events, social media)	Knowledge: Activity Awareness and Perception	Underway / Ongoing	New resources created, Facebook ads, attendance at community events roll out for more consents
Communications and Marketing	Project to improve and re-design our website and user experience Content cleanout- Go through and reduce duplications, out of date content, write for web and moblie first	Positively address customer experience and perception of how people engage with us	Underway / ongoing	Preparing tender document for early 2023 release. Councillor workshop to discuss project aspirations following selection of provider.
Communications and Marketing and Public Transport	Work collaboratively with public transport providers to improve the level of communication around services and service disruption.	Address significant decline in service ratings this year.	Underway	ORC have approached providers to discuss options for improved communication of service disruption. Dedicated communications and marketing resource has been allocated to the Queenstown bus network to support the existing resource based in Dunedin.
Communications and Marketing	Initiatie a video Marketing campaign to increase bus patronage in Dunedin and Queenstown	Positively address perception about services and ORC performance	Planning	Early planning for this campaign is underway

Strategy	Planned community engagement around meaning of wellbeing in Otago	Broadening use of comms channels Knowledge: Activity Awareness	Underway	On target to produce a baseline report against wellbeing indicators
People and Culture	Youth engagement (e.g., attendance at careers fairs, graduate programme, school visits)	Role of ORC and the environment/channels use	Underway / ongoing	Continue to seek opportunities to attend events which improve connections with youth
Science	SOE Reporting Community Communication Strategy — Joint Project With Science Communications staff from Otago Museum to provide summaries of SOE reporting that are more easily digestible for the community	Knowledge: Activity Awareness and Perception	Underway	Science staff are working with Otago Museum staff to develop new material which suppports the release of our SOE reports
Environmental Data	Complete the update of the ORC Web Portal and deliver the associated communiations plan	Knowledge: Activity Awareness and Perception	Underway	Web portal is ready to roll out in the new year

6.7. Future Development Strategy for Dunedin City – Scope and Focus

Prepared for:	Council
Report No.	SPS2254
Activity:	Governance Report
Author:	Fleur Matthews, Interim Manager Policy and Planning
Endorsed by:	Anita Dawe, General Manager Policy and Science
Date:	7 December 2022

PURPOSE

[1] The purpose of this report is to seek approval for the scope and overall focus for the Future Development Strategy for Dunedin.

EXECUTIVE SUMMARY

[2] The National Policy Statement on Urban Development 2020 (NPS-UD) requires the Dunedin City Council (DCC) and Otago Regional Council (ORC) to jointly prepare a Future Development Strategy (FDS) for Dunedin by mid-2024. The FDS is being prepared by DCC and ORC in partnership with mana whenua.

[3] To inform Council's decision on scope and overall focus for the FDS, this report also includes an updated 'rebased' Housing Capacity Assessment and the recent Principal Economic Business Land Capacity Assessment, which will be published on the DCC website.

[4] A similar report on the scope and focus for the FDS will be considered by the DCC at its meeting on 13 December 2022.

RECOMMENDATION

That the Council:

1) ***Notes** this report.*
2) ***Notes** the updated Housing Capacity Assessment;*
3) ***Notes** the publication of the Business Land Capacity Assessment and further business land assessment work being undertaken;*
4) ***Agrees** to using a medium growth scenario and recommended scope that includes the identified focus areas (Option One);*
5) ***Notes** that Dunedin City Council will be considering this matter on 13 December;*
6) ***Agrees** that, if Dunedin City Council agrees to a different scope option, the FDS Executive Steering Group meets to discuss and determine a way forward;*

BACKGROUND

Requirements Related to the Preparation of an FDS

[5] The NPS-UD requires the DCC and ORC to jointly prepare the FDS. The Dunedin FDS is also being prepared in partnership with mana whenua. This governance arrangement is referred to as 'the FDS partnership'.

[6] The purpose of an FDS is to ensure there is enough housing and business land capacity available; that the necessary infrastructure to support growth is planned, funded, and integrated with growth; and that growth delivers a 'well-functioning urban environment'. Future changes to the district plan (changes to zoning and planning rules) and infrastructure funding decisions must have regard to the FDS.

[7] The NPS defines a 'well-functioning urban environment' as an environment that, at a minimum:

- has a variety of homes that meet people's needs
- meets the needs of businesses
- enables Māori to express their cultural traditions and norms
- supports market competition
- provides for good accessibility including by way of public and active transport
- supports reductions in greenhouse gas emissions, and
- is resilient to the effects of climate change.

[8] The NPS requires an FDS to describe and spatially show the following:

- Hapū and iwi values and aspirations for urban development
- the existing and future areas that will provide for Dunedin's growth needs
- strategic infrastructure required to support and service that growth, and
- development constraints.

[9] Alongside the FDS, the partnership must also prepare an implementation plan and update this annually.

[10] The FDS must be informed by a range of inputs, including amongst other things: the most recent applicable housing and business land capacity assessments, national policy statements and feedback received through consultation and engagement.

Requirements Related to Housing and Business Land Capacity Assessment

[11] The NPS-UD sets out the requirements for undertaking housing and business land capacity assessments.

[12] Future housing needs are calculated by applying assumptions about household composition and consumer preferences to population projections. This identifies how many homes, and of which type, will be needed to house the future population.

[13] Growth projections are a key assumption in land use and infrastructure planning in the FDS. Growth projections are inherently uncertain, and a range of plausible scenarios are typically provided. The most likely scenario is typically the medium growth scenario. This is the scenario that was adopted for both the 2021 Housing Capacity Assessment and the DCC 2021-31 Long-term plan (LTP). From a planning perspective, the growth assumptions in the LTP and FDS will need to align.

[14] Dunedin's population projections are based on projections by Statistics New Zealand. New population projections by Statistics New Zealand are scheduled for release in December. It is expected that these new projections will indicate lower growth over the next 5-10 years than previously estimated but similar long-term growth rates. Once these new projections are released, further work will be undertaken to finalise the growth assumptions for the FDS and the next LTP.

[15] Housing capacity must be (a) plan-enabled, (b) infrastructure-ready, (c) feasible, and (d) reasonably expected to be realised. The housing capacity that is expected to be realised is a small sub-set of the total capacity that theoretically could be realised. The DCC uses a model to assess the development capacity of residential and commercial mixed use zoned land. The model evaluates capacity based on 2GP provisions, site conditions, the economic feasibility of potential developments, and the likelihood that the capacity will be taken up.

[16] The NPS-UD also requires a competitiveness margin which comprises an additional 20% of the demand capacity for the short-medium term (the next 10 years) and 15% for the long-term (years 10-30). This is to support the competitive operation of the market (an explicit objective of the NPS-UD) and increase the likelihood that there are sufficient homes to meet consumer preferences.

[17] The DCC released its latest Housing Capacity Assessment in July 2021. The Assessment showed that there would be sufficient development capacity if Variation 2 were to be progressed as notified (except a small long-term shortfall).

DISCUSSION

Housing Capacity Assessment Update

[18] Since the Dunedin Housing Capacity Assessment was published in July 2021, additional 2GP appeals have been resolved and decisions have been released on Variation 2 with the only appeal on that variation having been resolved. It is also likely that there will be additional capacity created through Variation 2 greenfield rezoning decisions (due out January 2023) before the publication of the FDS in 2024. Because of the additional capacity being provided, a new 'rebased' housing capacity assessment has been undertaken.

[19] This rebased housing capacity assessment (Attachment A) shows there is currently sufficient housing capacity to meet the capacity required under a medium growth scenario over all timeframes. It also shows there is significantly more housing capacity than required in the long-term. This includes sufficient housing capacity to meet

anticipated consumer demand for different types of housing, including demand for standalone houses and attached housing (duplexes, townhouses, etc.).

[20] This means there is currently more than sufficient housing capacity in the District Plan to meet the most likely growth scenario (i.e. the medium growth scenario).

Business Land Capacity Assessment

[21] In early 2022, DCC and ORC jointly commissioned Principal Economics to prepare a business development capacity assessment for Dunedin. The final report is attached to this report (Attachment B). The assessment uses an econometric approach which aggregates multiple sub-sectors of the economy into broader industry-wide economic sectors.

[22] The assessment finds that there is a shortfall in industrial and large-format retail land in the short-term (i.e. 2024-2027) but this is expected to be overcome in the medium-term (2027-2034). Except for this temporary shortfall, there is currently sufficient business land development capacity provided in the District Plan to meet expected future demand under a medium growth scenario over the 30 year FDS period (2024-2054).

[23] The Principal Economics work is being supplemented by qualitative analysis involving interviews with a range of businesspeople, major employers and other stakeholders. The initial areas of focus for this research are known areas of change. This includes the Campus environment, the areas affected by the Dunedin Hospital relocation, Mosgiel's centre and industrial areas, the Princes, Parry and Harrow Streets zone, the Kaikorai Valley Road industrial area, and South Dunedin. The supplementary work will consider business land needs for the purposes of the FDS and will inform a future review of the District Plan.

Focus and Scope of the FDS

[24] While the results of the Housing and Business Land Capacity Assessments do not indicate the need for additional growth areas, there are other strategic issues that the FDS will need to consider and address. Some of these are mandatory considerations and others will be driven by community needs and preferences.

[25] The mandatory considerations were outlined in paragraph 8. A key component of the mandatory content will be identifying the essential three waters and land transport (including public transport) infrastructure required to support the growth areas that have been included in the District Plan. Responding to iwi and hapū aspirations will be another key focus area.

[26] There are five suggested additional focus areas for the FDS:

a) Community and social housing
b) Supporting resilience of outlying settlements and rural areas
c) Supporting resilience of South Dunedin
d) Non-essential infrastructure to deliver strategic priorities and objectives (with a suggested focus on green and blue corridors)
e) Additional long-term intensification opportunities (National policy direction on intensification).

[27] These focus areas form the basis of the recommended Option One, however, they can be considered and decided on individually if required.

Focus Area 1: Community and Social Housing Aspirations

[28] The Dunedin Housing Action Plan identifies the role community and social housing plays in a well-functioning housing system. The FDS provides an opportunity to collaborate with Kāinga Ora and engage with other community and social housing providers to identify strategic opportunities to improve social housing outcomes through the FDS.

Focus Area 2: Supporting the Resilience of Outlying Townships and Settlements

[29] The existing Dunedin Spatial Plan has a strategic direction of supporting the resilience of Dunedin's outlying townships and settlements. Resilience can take the form of resilience to natural hazards and climate change but also access to local services and employment. Engagement with DCC Councillors before the election and ongoing feedback from the community suggests that this remains an important priority for the city.

Focus Area 3: Supporting the Resilience of South Dunedin

[30] The DCC and ORC have committed to a programme of work to address climate resilience in South Dunedin. South Dunedin is the urban area of Dunedin that is likely to be most severely affected by climate change. This focus area will draw on the work being undertaken as part of the South Dunedin Future programme.

Focus Area 4: Non-Essential Infrastructure to Deliver Strategic Priorities and Objectives

[31] The FDS must identify essential 'development infrastructure' to deliver strategic priorities and objectives. This includes 3 waters infrastructure and land transport. However, to deliver a well-functioning urban environment, there are benefits to considering additional infrastructure to service future growth. It is proposed that this work area focus on opportunities for developing green and blue corridors. This focus area was chosen based on feedback from past community engagement and engagement with DCC Councillors prior to the election. Blue and green networks can provide for biodiversity outcomes, the amenity of the city, and public access to nature which contributes to the health and wellbeing of residents.

Focus Area 5: Additional Long-Term Intensification Opportunities

[32] Dunedin is a tier 2 area under the NPS-UD. Policy 5 of the NPS-UD requires district plans applying to tier 2 and 3 urban environments to enable heights and density of urban form commensurate with the greater of:

a) the level of accessibility by existing or planned active or public transport to a range of commercial activities and community services; or

b) relative demand for housing and business use in that location.

[33] The FDS provides an opportunity to respond to this requirement by identifying additional areas that are likely to be suitable for intensification. This assessment will largely revisit potential areas for intensification that were not included in the 2GP or added through Variation 2 due to three waters infrastructure constraints. It will identify infrastructure improvements necessary to support these areas. It is likely that the community and social housing opportunities focus area will overlap with this focus area.

Limitation on Scope

[34] Under the recommended option, it is not proposed that the FDS will include additional growth areas beyond what might be identified through these focus areas. However, the FDS will include broad strategic direction around growth options, which will help guide how any developer-initiated alternatives that may come through future private plan changes will be assessed.

Approach to Engaging with the Community and Key Stakeholders

[35] The FDS must be prepared using the Special Consultative Procedure (SCP) under the Local Government Act 2002. A draft FDS will be published in early 2024 for public submission and submissions will be considered in a public hearing prior to adopting the strategy.

[36] Authorities are also required to engage with the following stakeholders during the preparation of the draft FDS prior to the publication of the draft for public submissions:

- other authorities with whom there are significant connections relating to infrastructure or community
- relevant central government agencies
- relevant hapū and iwi
- providers of additional infrastructure
- relevant providers of nationally significant infrastructure, and
- the development sector.

[37] At an operational level, Aukaha Consultancy Services are preparing a statement of hapū and iwi aspirations for urban development, on behalf of mana whenua. Aukaha is a mana whenua-owned consultancy on behalf of Te Rūnanga o Ōtākou and Kāti Huirapa ki Puketeraki Rūnaka. Aukaha is also involved in the preparation of all FDS options and content.

[38] At the governance level, in the previous triennium mana whenua were engaged in both Councils 'Committees. Future governance arrangements are being worked through and will include mana whenua.

[39] Engagement with key central government agencies has also started. Some of these will be major contributors to the FDS, including Waka Kotahi and Kāinga Ora. Others may provide targeted feedback based on their level of interest.

[40] Providers of additional infrastructure, and developers will be engaged in the development of the Draft FDS, most likely through advisory group(s). The developer advisory group will focus on providing insight into market conditions, highlighting potential barriers to development and identify wider infrastructure needs required for development in the identifying growth areas.

[41] It is also proposed to undertake targeted stakeholder and community engagement in the development of the Draft FDS based on the key focus areas. This is likely to include:

a) engagement with community and social housing providers and associated services on community and social housing aspirations
b) engagement on land transport infrastructure requirements in growth areas, particularly around public transportation
c) engagement on the green and blue networks strategy and other open space and recreation requirements to service growth
d) holding community workshops in outlying settlements to identify the needs of outlying settlements to support their future resilience, and
e) other local authorities with whom there are significant connections relating to infrastructure or community.

[42] Wherever possible, FDS content and engagement will draw from or be linked into other existing work programmes.

OPTIONS

Option One – Develop the FDS using a medium growth scenario and include additional focus areas (Recommended option)

[43] This option is to use a medium growth scenario as the basis for identifying the housing and business land capacity (minimum) requirements for the FDS. As discussed in this report, no additional housing development capacity is expected to be required, as the current capacity included in the District Plan is above that which is required under this scenario (see Attachment A).

[44] Under this option, in addition to meeting the minimum development capacity and other mandatory requirements of the FDS (see paragraph 8), the FDS would identify strategic opportunities within the following focus areas: community and social housing, resilience of outlying settlements and rural areas, resilience of South Dunedin, green and blue networks, and long-term priority areas for further intensification. It is likely that opportunities identified through these focus areas (particularly around community and social housing and further intensification opportunities) will include new infrastructure requirements as well as additional growth (development capacity) opportunities. This would mean that the final long term capacity after the FDS would support a high growth scenario but the additional capacity would be strategically focused.

Advantages

- A medium growth scenario reflects the most likely scenario for future growth over the 30 years of the FDS.

- Additional long-term capacity will be identified in a way that will most contribute to a well-functioning urban environment and limit the risks from over-supply of development capacity (discussed in Option 3 below).

- The recommended additional focus areas will better support Dunedin to meet its strategic aspirations around biodiversity enhancement, carbon-neutrality, community wellbeing and resilience.

- Given the short time frame for the project, this option will focus work in the areas that best align with existing strategic priorities.

Disadvantages

- If growth is faster than projected, future growth planning may need to be more reactive, which gives less time to plan infrastructure upgrades (if required). It may mean there are challenges with infrastructure budgets and may require DCC to undertake further work to ensure good quality infrastructure.

- If growth is faster than projected and changes are not made in time, housing affordability may decline.

Option Two – Develop the FDS using a medium growth scenario and include mandatory content only (do minimum)

[45] This option is to develop the FDS using a medium growth scenario as for Option One but would limit the scope and focus of the FDS to mandatory content only.

Advantages

- A medium growth scenario reflects the most likely scenario for future growth over the 30 years of the FDS.

- Less resourcing would be required to develop mandatory content only, than if additional focus areas are included.

- Recognises the short time frame for the project.

Disadvantages

- Lost opportunity to better support Dunedin to meet its strategic aspirations around public transport, community and social housing, resilience in South Dunedin and outlying communities.

- Will not add additional long term growth options aligned with national direction on supporting intensification in areas where it is close to services and facilities.

Option Three – develop the FDS using a high growth scenario and expand scope to consider options for greenfield expansion

[46] This option is to develop the FDS using a high growth scenario and expand the scope to consider options for greenfield expansion to address any shortfall in capacity under a high growth scenario.

Advantages

- Likely to be supported by landowners who wish to rezone land in future and parts of the development community who would benefit from different growth options.
- Would signal growth areas that may be required beyond the 30 year time horizon or if identified growth areas weren't brought to market.

Disadvantages

- Significant amounts of greenfield development have recently been provided for through 2GP appeal resolution and notified variation 2 changes. Additional greenfield options would likely to lead to over-supply of growth options and create financial risks if infrastructure is provided but housing uptake is slow as the cost of providing infrastructure cannot be recovered in a timely through development contributions leading to unanticipated costs to ratepayers.
- Low or slow uptake of greenfield areas creates operational risks to infrastructure if development does not occur at a level that infrastructure is designed for (for example, wastewater systems require a minimum flow to perform effectively).
- Over supply of greenfield options may discourage efficient use of land and uptake of intensification opportunities (which perform better in terms of providing for a well-functioning urban environment).
- Greenfield options are more likely to come into conflict with strategic directions around maintenance of highly productive land, minimising risk from natural hazards and protection of landscape and biodiversity values.
- Growth areas may not develop logically or effectively (for example non-contiguous and incomplete development) or housing or infrastructure may remain uncompleted.
- Given the short time frame, additional resourcing would be required to assess greenfield options.

CONSIDERATIONS

Strategic Framework and Policy Considerations

[47] ORC's strategic directions require that we take leadership on issues of significance and importance to our Otago communities. The FDS is also relevant to ensuring sustainable and quality urban development.

Financial Considerations

[48] ORC's involvement in the Dunedin FDS is provided for in the current Long-Term Plan (LTP). Options One and Two can be funded within this budget. Option Three would likely require additional funding.

Significance and Engagement

[49] The consideration of the scope of the FDS is consistent with ORC's Significance, Engagement and Māori Participation Policy.

[50] The NPS-UD emphasises the existing requirements in the Resource Management Act 1991 (RMA) to take into account the principles of the Treaty of Waitangi in planning decisions relating to urban development and decisions on further development strategies and ensure iwi/Māori are engaged in processes to prepare plans and strategies that shape urban environments. These requirements recognise the strong traditional, and continuing, associations iwi/Māori have with urban environments throughout Aotearoa. In the Dunedin context, strategic priorities in the FDS are identified through a range of means including aspirations and expertise of Kai Tahu mana whenua. The FDS is being prepared in partnership with Kā Rūnaka through Aukaha Ltd and will include a clear statement of hapū and iwi values and aspirations for urban development.

Legislative and Risk Considerations

[51] The NPS-UD requires that the FDS is prepared in time to inform, or at the same time as, preparation of the next long-term plan for DCC and ORC. If the FDS is not delivered or does not meet the minimum requirements of the NPS-UD, ORC and DCC may need to explain the reasons to the Ministries for Housing and Urban Development, and the Environment.

Climate Change Considerations

[52] The FDS is required to address several aspects relevant to climate change including examining sustainable modes of transport, reducing greenhouse gas emissions and resilience to the effects of climate change.

Communications Considerations

[53] The FDS is required under the NPS-UD and it must be prepared under the Special Consultative Procedure of the Local Government Act. External engagement to date has included engagement with mana whenua, Waka Kotahi and Kāinga Ora.

[54] The FDS Executive Steering Group will consider opportunities for a joint press release following this decision.

NEXT STEPS

[55] If Council approves Option One, the project will continue to progress work on the FDS using a medium growth scenario and establish workstreams to support the preparation of content on the additional focus areas.

[56] A joint ORC-DCC Councillor and mana whenua workshop is proposed for February 2023 to consider the future governance options for the FDS.

[57] Further Council or Committee reports (supported by workshops) will be used to develop and agree the Draft FDS content in stages.

ATTACHMENTS

1. Business Development Capacity Assessment - Dunedin City [**6.7.1** - 83 pages]
2. Housing Capacity update report [**6.7.2** - 9 pages]

PRINCIPAL ECONOMICS

Business Development Capacity Assessment for Dunedin City

Report to Dunedin City Council

July 2022

www.principaleconomics.com

Contact person

Dr Eilya Torshizian, eilya@principaleconomics.com.

Authors

This report was prepared by Dr Eilya Torshizian, Eugene Isack, and Alina Fehling of Principal Economics.

The authors would like to gratefully acknowledge the contribution to this project from the Dunedin City Council teams and the stakeholders. Particularly, we would like to thank the helpful comments received from Nathan Stocker, Kyle Balderston, Garreth Kyle, and Philip Waters.

Disclaimer

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For details on our work see our website: https://www.principaleconomics.com/.
Address: Level 17, 55 Shortland Street, Auckland 1010, New Zealand.

Summary

Dunedin City Council (the Council) appointed Principal Economics to assess the sufficiency in development capacity of business land within Dunedin. The National Policy Statement on Urban Development (NPS-UD 2020) aims to ensure that the supply of business land within local authorities is sufficient to meet business demand. Our assessment fulfils requirements under sections 3.21, 3.22, 3.28, 3.29 and 3.3 of the NPS-UD, which include an assessment of demand, supply and sufficiency of business land for different sectors.

Demand for business land increases for transport, hospitality, primary industries, and food retailing sectors

Demand for business land is calculated based on the forecasted economic activity of the sectors and the required floorspace by an employee (for each sector). In our assessment of demand for business activities, we account for the followings:

- The locational requirements of business, including shape, size, access and other market factors.
- The external pressures businesses are facing, including the impact of COVID-19 (and the recovery path), the construction of the new hospital, and the climate change (mitigation).
- Impacts on business activities from reverse sensitivities; locational accessibility to labour markets and customers; changes in demand from population growth; changes in residential distribution.

These factors have mixed impacts in the short (2024-2027), medium (2024-2034) and long (2024-2054) term. As shown in Table 1, the overall floorspace requirement is decreasing in the LT. The results are presented for both medium and high population projection scenarios.

Table 1 Summary of forecasted floorspace requirements by sector

Unit: square metre. The presented figures are total (i.e., not change).

	ST (2027)		MT (2034)		LT (2054)	
Sector	Medium	High	Medium	High	Medium	High
Primary industry	137,705	174,929	158,251	194,519	173,422	258,576
Manufacturing-heavy	251,835	309,112	130,138	159,803	127,851	184,518
Manufacturing-light	268,936	334,535	239,425	294,191	237,651	346,673
Electricity, gas, water and waste services	1,310,663	1,613,776	507,160	621,576	440,663	634,665
Construction	416,168	527,032	298,145	366,424	320,935	476,834
Wholesales	546,262	671,882	298,359	365,834	313,634	452,415
Retail-small	103,547	129,394	90,808	111,539	94,907	139,032
Retail-large	127,663	157,612	96,064	118,078	101,080	146,453
Retail-food	66,124	81,379	62,433	76,584	66,199	95,458

Hospitality	36,032	45,122	49,501	60,861	57,351	84,228
Transport	291,971	366,962	146,471	180,136	386,317	569,295
Office	46,924	57,808	36,722	45,117	38,479	55,609
Education	75,882	93,634	71,153	87,394	74,759	108,203
Health	47,515	59,595	43,874	53,902	46,152	67,918
Arts and recreation	332,145	448,702	255,558	313,454	268,612	424,869
Total	**4,059,371**	**5,071,472**	**2,484,063**	**3,049,411**	**2,748,011**	**4,044,746**

Source: Principal Economics

Note: ST, MT and LT stand for Short-term, Medium-term and Long-term, respectively.

Retail and office, industrial, health and education capacity

Table 2 shows the plan-enabled, infrastructure-ready floorspace capacity by broad sectors according to zoning regulations and assumptions on mixed use zoning composition provided by DCC. Accordingly, there is a significant increase in the industrial sector's capacity in the LT, assuming industrial transition areas are realised over the MT and LT. Changes in capacity within other sectors assume an increase in building density where intensification occurs on underutilised land over the MT and LT.

Table 2 Summary of capacity by broad sectors

Unit: square meter.

Broad sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Industrial	351,000	453,850	453,850
Retail large format	1,600	20,600	20,600
Retail and commercial services	179,300	195,200	195,200
Office	108,700	118,900	118,900

Source: Principal Economics

The Ministry of Education's Education Network Plan suggests that the needs of the schooling network are going to be met over the next decade to 2030 (Ministry of Education, 2022). Also, due to the declining school-aged population, and local distribution of school aged-children, there is no additional space expected to be required for schools in the LT.

Our assessment suggests that there is sufficient land for different sectors in the short, medium and long term

Table 3 illustrates results of our sufficiency assessment including a 20 per cent margin over the short and medium term and 15 per cent over the long term. The competitiveness margins have been applied only to sectors which are forecasted to experience growth over the assessment period. Office and retail capacity have been determined based on past land use ratios for Commercial and Mixed-Use zoned land. As shown, there is sufficient space for office activities in ST, MT and LT. For industrial activities, there is a need for 53,894sqm of additional floorspace in the ST. This shortage disappears in MT and LT. For retail activities, there is a shortage in LT under the high population projection scenario.

We have disaggregated office and retail as per the requirements under the NPS-UD, however under DCC's 2GP District Plan, multiple business sectors (and residential development) are typically permitted to occupy the same zoned land. Given the land substitutability of retail and commercial activities, in addition to health (excluding hospitals and residential health

services) and arts and recreation activities, we find that it is only in the LT and under the high growth scenario that there is insufficient business land capacity within commercial and mixed-use zoned land.[1]

Table 3 Summary of sufficiency by broad sectors

The sufficiency analysis accounts for a wide range of features of land, including size and location.
Unit: sqm. The presented figures are change from 2024 (baseline).

	Medium			High		
Industrial floorspace	**ST (2027)**	**MT (2034)**	**LT (2054)**	**ST (2027)**	**MT (2034)**	**LT (2054)**
Demand	337,411	-1,108,179	-885,656	1,112,100	-703,645	36,847
Demand + margin	404,894	-1,093,214	-856,179	1,310,023	-670,473	135,164
Capacity	351,000	453,850	453,850	351,000	453,850	453,850
Sufficiency/Insufficiency	**-53,894**	**1,547,064**	**1,310,029**	**-959,023**	**1,124,323**	**318,686**
Office floorspace	**ST (2027)**	**MT (2034)**	**LT (2054)**	**ST (2027)**	**MT (2034)**	**LT (2054)**
Demand	2,864	-7,338	-5,581	13,748	1,057	11,549
Demand + margin	3,436	-7,338	-5,581	16,497	1,057	13,281
Capacity	108,700	118,900	118,900	108,700	118,900	118,900
Sufficiency/Insufficiency	**105,264**	**126,238**	**124,481**	**92,203**	**117,843**	**105,619**
Retail floorspace	**ST (2027)**	**MT (2034)**	**LT (2054)**	**ST (2027)**	**MT (2034)**	**LT (2054)**
Demand	22,230	-12,330	8,401	102,370	55,925	154,035
Demand + margin	26,676	-9,088	12,574	122,844	67,409	177,141
Capacity	122,209	151,904	151,904	122,209	151,904	151,904
Sufficiency/Insufficiency	**95,533**	**160,993**	**139,330**	**-635**	**84,495**	**-25,236**

Source: Principal Economics

In later sections of this report, we assume that office, retail (excluding large format) and hospitality will compete for land capacity on Mixed Use Zone areas. This means that sufficiency determined in Table 3 may not match those in Section 3.4 where office/retail take up surplus capacity in the other section and excess demand is shared when both sectors have insufficient capacity.

Limitations of our assessment and the next steps

While the focus of the NPS-UD 2020 has been on the lack of capacity, we suggest that an increasingly higher surplus of land over time requires the councils' attention. Therefore, we suggest the Council to:

a) Further investigate their population projections and update for the latest available information in the aftermath of COVID-19.
b) Identify the drivers of the lower population growth in Dunedin, with a causal assessment of the factors of regional location choice.
c) Further investigate the impact of planning policy on price of residential and business land, which are important factors for the location choice of businesses (and labour).
d) Investigate further the historic/existing constraints on regional economic growth and identify the role of infrastructure investments in unlocking economic growth.

1 The DCC Commercial and mixed-use areas permit a range of activities including but not exclusive to office, retail, residential and community services.

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1. Introduction

Dunedin City Council appointed Principal Economics to undertake an assessment of the sufficiency in development capacity of business land within Dunedin to fulfil requirements under sections 3.21, 3.22, 3.28, 3.29 and 3.3 of the NPS-UD.

This report provides a comprehensive assessment of the requirements listed in Table 4 and the corresponding section in the report addressing each requirement.

Table 4 The NPS-UD requirements and our response

Requirements	Relevant section of the report
The locational requirements of business including shape, size, access, reverse sensitivities, and other market factors	Section 3.2.1
The external pressures businesses are facing (such as the uncertainty of COVID-19 pandemic, and the impact of coastal hazards)	Sections 3.1.1
Impacts on business activities from reverse sensitivities; Locational accessibility to labour markets and customers; Changes in demand from population growth; changes in residential distribution	Section 3.2.1
Infrastructure requirements for different business sectors	Section 3.3.2

Source: Principal Economics

Our assessment is informed by all the available information from the Council, and the local expertise. As we present in Chapter 2, our report provides,

- a clear list of assumptions used for each part of the analysis,
- details and sources and justifications for the assumptions,
- a clear communication of the assessment with an appropriate narrative, which will provide useful information for decision-makers, and
- a clear description of the used methodology and the implications of the modelling techniques (and assumptions) for the findings.

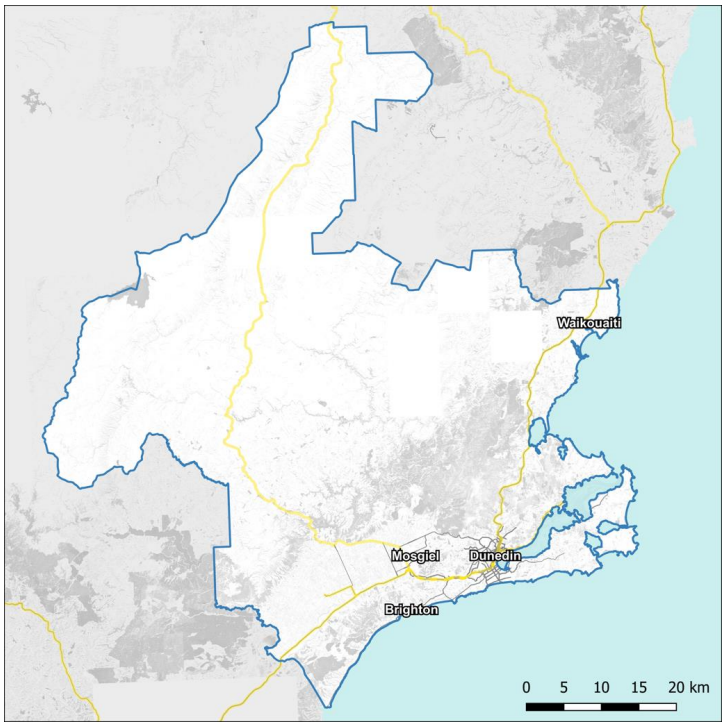
The NPS-UD 2020 approach is to provide the flexibility of choosing the appropriate method for different parts of the Housing and Business Assessment (HBA). In our assessment we provide some further details for the business development capacity assessment (BDCA) than required by the NPS-UD 2020.

To ensure the desired outcomes of attaining a well-functioning urban environment are achieved, it is important to account for (and discuss) the impact of the important events, where possible. This is more important for this round of the BDCA because of the recent disruptions to the economy (from the impact of COVID-19) as well as the expected significant impacts of upcoming significant events. This includes the impact of climate change, and the

recent climate change policy and the impacts from climate change mitigation and adaptation.[2]

The extent of the assessment area, defined as the Dunedin City territorial authority is shown in Figure 1.

Figure 1 Extent of assessment area - Dunedin City territorial authority



Source: Principal Economics, Statistics NZ, Waka Kotahi – NZ Transport Authority, LINZ

1.1.1. Useful outputs for informing decisions

While technical details are important for a robust BDCA, the implications of the findings and their presentations need to be very clear for the use of decision makers. To do this, this the BDCA report:

- Clarifies the underlying assumptions for the models, inputs, scenarios and other related factors and discusses (or preferably evaluating) their implications for the findings of the assessment,
- Provides outputs in a useful format that could be used by different departments across the Council,

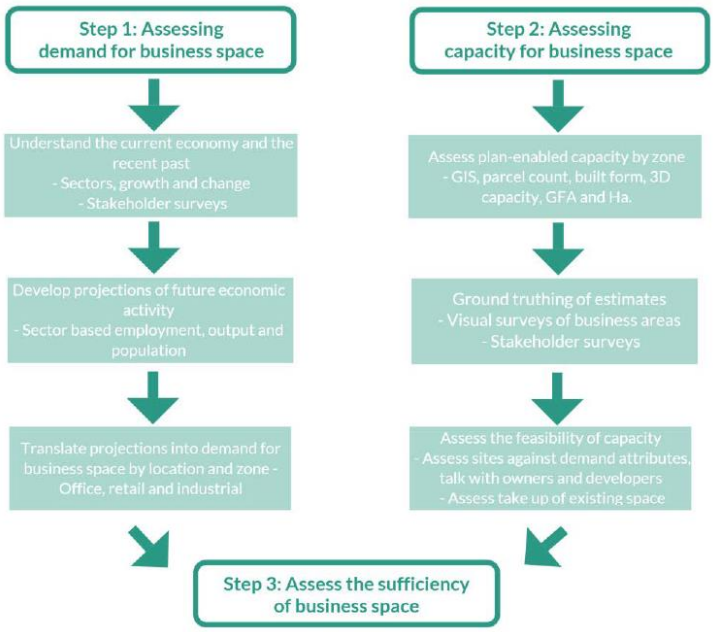
2 On 2 December 2020, the Government declared a climate emergency and committed to take urgent action to reduce emissions. As part of this, legislation sets a domestic target for New Zealand to reduce net emissions by 2050 and requires emission budgets to be set to act as steppingstones towards this long-term budget.

- Provides discussion (and where possible quantification) of the related (local and national) policy issues and their impacts.

2. Our approach for addressing NPS-UD 2020 requirements

MfE & MBIE's (2017) guidance on NPS-UDC identifies 3 steps for the business assessment methodology. These three steps are still the same for the NPS-UD with some minor changes. The three steps are illustrated in Figure 2. We follow these three steps in explaining our approach.

Figure 2 Business assessment methodology overview flow chart NPS-UDC



Source: MfE & MBIE (2017)[3]

Step 1 – Assessing demand for business space – undertaking the following tasks, as required by clause 3.28 of the NPS-UD 2020:

1- Identify business sectors and distinguish between them based on their land use for commercial, retail and industrial uses (Section 3.2.2),
2- Provide the most likely projection of demand for business land (by sector) in the short term, medium term, and long term (Section 3.2),
3- The assumptions and uncertainties associated with the assumptions need to be presented and discussed (Section 2.1)

3 MfE & MBIE, 2017. National Policy Statement on Urban Development Capacity: Guide on Evidence and Monitoring.

Step 2 – Assessing capacity for business space – undertaking the following tasks, as required by clause 3.22 and 3.29 of the NPS-UD 2020:

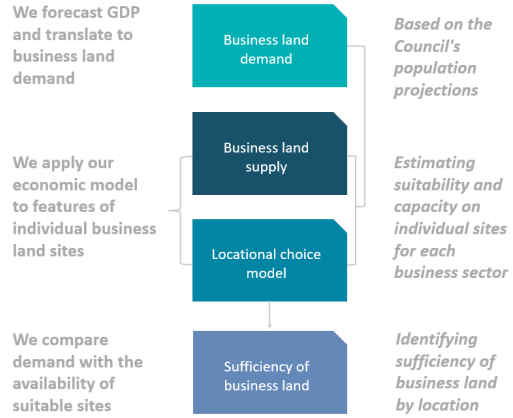
4- Provide estimates of development capacity (i.e., floor areas) to meet the expected demand for business land for each sector (including the competitiveness margins, Section 3.3.1).
5- Provide disaggregation of the development capacity by (i) plan-enabled, (ii) plan-enabled and infrastructure-ready, and (iii) plan-enabled, infrastructure-ready, and suitable for each business sector (We determine plan-enabled development capacity in Section 3.3.1 disaggregated by business sector. Discussions around Dunedin City's infrastructure conditions have been undertaken as part of our stakeholder engagements in our discussions with Council in Section 3.3.2. Apart from Industrial transition areas, all sites assessed in Section 3.3.1 are infrastructure ready). This is because these areas are located next to developed urban areas where developers are required to either fund infrastructure through contributions or self-develop private infrastructure to connect to the city network.
6- For 'suitable' development capacity we will investigate the impact of location, size and shape (Sections 3.13 and 3.3).

Step 3 – Assessing the sufficiency of business space – undertaking the following tasks, as required by clause 3.21, 3.29, and 3.30 of the NPS-UD 2020:

7- Consult with relevant stakeholders including infrastructure providers, large commercial and industrial land developers as other relevant stakeholders that may have material information on the calculation of development capacity (Section 3.3.2),
8- Investigate sufficiency in short, medium and long terms by comparing demand for business land (plus competitiveness margin) with the suitable development capacity (Section 3.4),
9- Provide a clear table at the beginning of the report presenting outcomes of the sufficiency assessment and highlight and discuss any insufficiencies identified. The discussion of potential insufficiency provides details about the location, timing, (affected) sector(s), and timing of the insufficiency (as shown above).

Figure 3 shows the summary of our quantitative workflow. The next sections describe our approach for completing each component of this workflow.

Figure 3 Summary of our quantitative workflow



Source: Principal Economics

2.1. Setting the scene – definitions and assumption for the analysis periods, geographic areas, and the counterfactual scenario

MfE & HUD (2020) note that 'There is no set number of demand projections required. The expectation is for a low-, medium-, and high-growth projection as a minimum. If more projections are useful then local authorities are encouraged to produce more'. Then the guidelines recommend the assessments to pick a preferred population projection scenario and justify that choice of preferred option.

2.1.1. Definition of short-, medium-, and long-term

First, it is important to provide a correct definition for short-, medium-, and long-term.

The problem with an administrative defined timeframe (which is defined based on policy-makers' judgement and available tools) is that they do not provide a flexible enough definition that captures the complex urban life. On the other hand, policymakers need to have a defined timeframe for the purpose of planning.

Conceptually, economic theory provides the following definition for short- and long-term:

- Short-term (ST) is a period during which one factor of production (e.g., location) is fixed.
- Medium-term (MT) is a transition between ST and long-term. During this phase, businesses have further flexibility in relocating to their long-term location.[4]

4 ME is rather an administrative definition of the planning horizon with more immediate impact from the current plans' objectives than the long-term horizon.

- Long-term (LT) is the period when the general price level, contractual wage rates, and expectations adjust fully to the state of the economy.

From the policy perspective, we suggest it is important to have a range of criteria. In our internal meetings with the Dunedin City Council team, we identified the following criteria as important factors for the definition of analysis periods:

- Consistency with other council documents, e.g., Future Development Strategy (FDS).
- Satisfying the requirements of the NPS-UD.
- Availability of population projections.

We combine these two views to specify an appropriate definition of the timeframes. For this, we suggest the definition of time is based on the supply side (planning outcomes) and the demand side of the equation is defined as per the economic concept described above. Hence, we identify the following timeframes appropriate for this analysis, as shown in Table 5. We provide a short description of our solution for evaluating BDCA for different periods, in the last column of the table – this will be discussed further in the next sections.

Table 5 Definition of short-, medium-, and long-term periods

Timeframes	Supply-side considerations	Demand-side considerations	Our solution
Short-term: 2024-2027	Dunedin's FDS is for 2024-2054e	Location of businesses are fixed	In ST, the mismatch between the current location and desired location of businesses captured using regression analysis – see section 3.2 and Appendix C.
Medium-term: 2024-2034	10 years is the standard NPS-UD timeframe for the length of the medium-term	Businesses have further flexibility around their location	The most apparent feature of the MT is the changes in the size and location of economic activities because of different trends identified in section 3.1.1.
Long-term: 2024-2054	The definition is less binding, but important to be consistent with other council documents	Location (and other factors of production) can change	We suggested (and assume) that as a result of ST and MT planning towards supporting businesses, (productive) labour moves to Dunedin in LT.

Source: Principal Economics

2.1.2. Definitions of the baseline and counterfactual scenarios

It is commonly expressed that in the long-term anything could happen. In the context of the BDCA, the lack of certainty is due to the endless possibilities around the factors of production, particularly physical capital (infrastructure), human capital (skilled labour), natural capital (land), technology, and local and central governments' regulations.[5] Amongst

5 There are different definitions of capital stocks. We suggest the current categories provide the most relevant capital stocks for the purpose of the BDCA.

these, natural capital is subject to climate change uncertainties, which the Council is currently working on its assessment.

Changes in physical capital are subject to the findings from the Housing and Business Capacity Assessment (HBCA), including the current BDCA. The level of infrastructural development influences regional (and national) competitiveness, and there is strong evidence that transport infrastructure plays a vital role in economic growth (Holmgren & Merkel, 2017; Sahoo & Dash, 2009). The Council of Economic Advisors estimates that a 10-year, US$1.5 trillion program of infrastructure investment could add between 0.1 and 0.2 percentage point to average annual real growth in gross domestic product (GDP) (CEA, 2018). A simple conversion of this figure to the New Zealand size of GDP implies that a $2.45 billion annual infrastructure investment is associated with an average real GDP growth of between $325.5m and $651m.

Human capital is an important factor for economic growth, and its growth is a function of the rate of natural increase and rate of (regional and national) migration. Migration happens in response to improvements in quality of business and quality of life, both of which are significantly affected by cost of business and housing land.[6] Hence, local government policy affects population growth through improvements in both residential and business opportunities and therefore BDCA has implication for future population growth. More particularly, an efficient allocation of land is associated with lower cost for businesses, which leads to attractiveness of the region to businesses of other regions and eventually an increase in migration (and population growth).

The question that the BDCA intends to answer depends on the definition of the baseline and the counterfactual scenarios. It is agreed that the baseline scenario is the economy (including the urban environment) if it continues based on the current (and historic) trends – i.e., without any changes to any of the factors of economic growth.

For the counterfactual scenario, a BDCA should aim to identify a scenario in which the urban environment enables regional growth, by enhancing the factors of productivity. This approach improves the robustness of our BDCA through reducing its reliance on the status quo (and the historic trends).

We suggest that the counterfactual scenario is significantly related to the timeframes of the (BDCA) assessment, and should consider the factors of production (land, labour, and capital) that could change over time to enhance regional growth. Therefore, we suggest that the appropriate **definition of the counterfactual scenario** is as follows:

> "An urban environment with maximum allocative efficiency, which minimises costs for businesses through providing them with access to locations that minimises their cost of production".

6 There is extensive range of factors affecting quality of life and quality of business. For further details see Maré et al. (2018). Amongst the identified factors, cost of housing has significant impact on the quality of business and the quality of life. This is because of the direct impact of living cost on the location of productive labour force and businesses.

As suggested in our discussion of the timeframes, this long-term equilibrium (i.e., the counterfactual scenario) can be achieved in the long-term. Hence, to provide useful information for planning purposes, this BDCA assumes that "assuming that planning regulations contribute to regional prosperity in short and medium terms, there will be enough capacity for business in long-term". This assumption only has implications on the productivity of labour in the long-term by implying that, in the context of BDCA, a more productive labour could produce the same level of output using a lower floorspace.

2.1.3. Converting business activities to commercial space demand

In our assessment, when we want to convert the estimated demand (in terms of economic activity of each sector) to the square metre (sqm) of commercial space required, we first need to convert the GDP figures to the count of employees and then use some multipliers for converting that to sqm of space. While this could be simplified, these multipliers have significant impact on our assessment, and need to closely relate to the counterfactual scenario.

Inspired from Preston et al. (2018), Principal Economics has established a model of quality of life and quality of business, which provides extensive information for quantifying local governments' policy objectives and their flow-on impact on labour shortage, for example. Figure 4 shows the relative ranking of Dunedin in terms of quality of life (QL) and quality of business (QB) in comparison with other New Zealand towns.

Maré et al. (2018, p. 3) provide the following description for the implications of QL and QB:

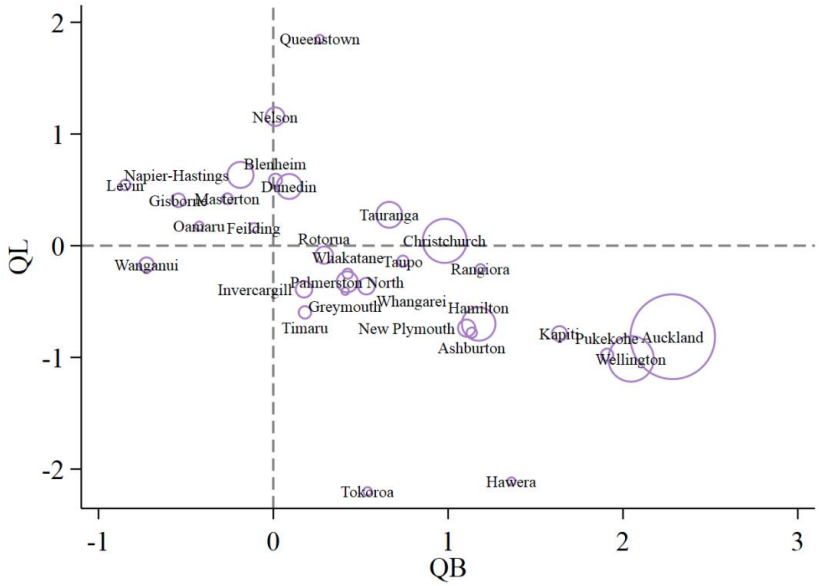
> *"A place with high rents but low wages must have amenities that make it a nice place to live otherwise people would move elsewhere & newcomers would not arrive (sunshine wages)*
>
> *And,*
>
> *A place with high rents and high wages must have amenities that make it a good place to do business otherwise firms would move elsewhere and new firms would not be established (productive)"*

Now the question becomes, what is a reasonable target for the improved quality of business (and quality of life)? It is likely that if the plans lead to improved cost efficiencies for Dunedin businesses and lower housing costs to Dunedin residents, the QL and QB would increase very significantly. However, a reasonable target should consider potential limitations from geographic locations and other fixed features of locations. Hence, we suggest that a conservative outcome of successful improvements in business and housing capacities is to achieve Dunedin's historic high levels of QB and QL.[7]

7 We acknowledge that QB and QL are not solely affected by the availability of land. Our argument only implies that if Dunedin would have to achieve its historic QL and QB, then the city will host more productive businesses and labour force.

Below Figure 4 we illustrate the scores of qualities of life and business for Dunedin over time. Accordingly, the 2013 QB levels could improve to 0.6[8], which the city experienced during 1991. Also, QL could improve to the highest levels of 1996, equal to 0.81. This suggests that in terms of QB, Dunedin could improve to the 2013 levels of Tauranga. We also assume that some towns within that QB range of 0.6 to 1 could be used as a target, and assume Christchurch, Hamilton and Taupo as other towns that Dunedin's QB could be compared with. We use this for our definition of the likely changes in (mixed factor) productivity for our long-term estimates.[9]

Figure 4 Quality of business and quality of life across New Zealand towns



Dunedin	1976	1981	1986	1991	1996	2001	2006	2013
QB	0.49	0.45	0.59	0.6	0.24	-0.03	0.07	0.09
QL	0.31	0.06	0.17	0.7	0.81	0.72	0.74	0.53

Source: Preston et al. (2018)

2.1.4. The definition of location should reflect the dynamic nature of cities

The NPS-UD (2020) and all relevant assessments are based on administrative definitions of geographic areas – such as area units or statistical areas. This does not match the dynamic nature of cities (and planning). It is incorrect to assume that there is a defined location for a business and hence an assessment limited to the administrative boundaries does not provide useful information for BDCA.

8 The QL and QB measures reflect the willingness to pay of workers and firms for a city's local amenities. For further details on these measures see Preston et al. (2018).

9 For this analysis, productivity is important because it affects the space required by an employee to produce a fixed amount of output.

In urban economics, it is known that firms face trade-offs in their choice of location, and they can sum up the features of location such that the overall output stays constant (i.e., there are spatial equilibria). For example, while a large size parcel may fit well for heavy manufacturing activities, a factory may not lose any productivity if it locates closer to the transport network, at the cost of having a smaller parcel.

Therefore, in matching the location of demand with the areas of supply, we will consider a wider range of locations as desired for the business activities.

2.1.5. Applied constraints to our analysis

A limitation of the current NPS-UD assessments (and the current BDCA) is that they treat population projections and business assessments separately. From an economic perspective the production function of different businesses is affected by cost of labour and capital. The cost of capital includes costs of land (lease) and the cost of other machineries. If the improvement in availability of land will lead to a decrease in prices (as a result of competitive land markets) then, assuming other factors fixed, the avoided costs could be allocated to attracting more productive labour to the region.[10,11]

Our analysis is constrained by population projections provided by the Council - sourced from Infometrics (2020)). This is an important constraint for our definition of the counterfactual scenario – as described in section 2.1.2. The implication is that there might have been opportunities for further growth, but because we have constrained our analysis of business demand by population projections, we do not capture any further need for extra capacity to accommodate that growth. This is because population projections are usually a perpetuation of the past (and based on a range of assumptions), and do not capture the possibility of further growth from improved allocative efficiency raised from a permissive planning system. To mitigate the uncertainty due to reliance on population projections, we provide an assessment of sufficiency for both the medium and the high population projection scenarios. We discuss this further in 3.2.

Another constraint of our analysis is the features of parcels. For example, a current parcel may be large, and suitable for large-scale retail activities. However, if that parcel will be divided into ten separate sections, then it may be more suitable for small retail activities and as a result of that the large retail will need to relocate to another parcel, which changes the findings from our business capacity assessment.

2.1.6. Reasons for considering economic activity instead of conventional employment figures

Previous BDCAs use employment in their assessment of demand, to capture the size of demand for each sector of the economy. Conceptually, the advantage of using employment figures is that they provide a *real (i.e., not nominal)* measure of demand while a nominal GDP figure does not provide that information. Technically, however, the employment figures are mainly population driven, based on the growth of the working-age population. In

10 This is assuming population fixed at the levels indicated by the DCC's projections.

11 Principal Economics (2022) also refers to this issue in their view of housing capacity assessment, and recommend the MfE to provide further guidelines.

comparison, the real GDP figures provide more information about the economic factors, such as the productivity of capital. This is important for the BDCA, to account for the impact of economic factors as well as the demographic and population factors.

3. Step 1 – Assessing demand for business space

Forecasting business land demand, particularly long term, should be undertaken with care given the uncertainties around how small changes in the economy may compound over time. For providing a comprehensive and robust solution, we have reviewed the available methods for BDCA's demand analysis with their own strengths and limitations. The methods were identified from the best practice used in the last round of BDCA and our expert knowledge of the available methods. This practice of technical comparisons between the available methods and providing a clear reasoning for choosing one method over the other will improve the reliability of the BDCA.

We listed the available methods against the criteria identified as important to the BDCA and evaluated them using a range of criteria. These criteria were identified based on the requirements of the NPS-UD, the Council's inputs, the discussions we provided on the importance of uncertainty, and our expert technical advice. For further details on each of these models see Appendix B. Based on our evaluation,

- the most useful method for identifying the sectors of the economy is regional Computational General Equilibrium (CGE); and
- the most useful methods for satisfying the requirements for the BDCA's demand analysis are simulation and VAR models, respectively.

Hence, we use our sub-regional CGE model to inform the assessment of demand.

3.1. Sectoral impacts of the international, national, regional and urban area factors

This chapter provides discussions of the combination of the impacts that will improve our understanding of the first task to **'assess the impact of external pressures businesses are facing'** and to **'identify business sectors'**.

Requirement (clause 3.28 of the NPS-UD)

Identify the list of business sectors, and the impact of external pressures businesses are facing.

Our additional analysis

We further investigate the list of business sectors included in our assessment by considering the recent information about the external pressures businesses are facing, including the climate change policy. For business demand, the historic series and the status quo do not provide information about the likely shift in demand for different business sectors as a result of the external pressures.

3.1.1. Assessment of the impact of external pressures facing businesses

There are a range of important factors affecting the economy in short, medium and long terms. These factors are particularly important because of their implications for the sectors that we need to consider in the assessment and their impact on different sectors' activities (and therefore business land demand). To inform our assessment about the impacts of these factors, we have used the best available information and highlight the level of confidence (and the level of uncertainty) with the available information.

Table 6 provides a list of factors affecting GDP and employment in short-, medium- and long-terms.

Table 6 Factors affecting GDP and employment in short, medium and long terms

Factor	Term	ST	MT	LT
COVID-19	Impact	In short terms the economy grows at an average rate of 2.6 percent per annum. That is 0.8 percent lower than our forecasts for this period in absence of COVID-19.	Converge to the rate of growth in absence of COVID-19	Converge to the rate of growth in absence of COVID-19
	Uncertainty	The situation with COVID-19 and its variants evolves constantly. The Treasury's forecasts were based on the latest announcement of the government to open the borders in early 2022. This has already changed to mid-2022 and is subject to further changes. This will increase the uncertainty around the future demand.		
	Source	The Treasury (2021)		
New Hospital	Impact	$42.5 million increase in GDP per annum[12]	$42.5 million increase in GDP per annum	-
	Uncertainty	[Discussed below]		
	Source	Sapere et al. (2021)		
Climate change (impact of mitigation)	Impact	Some ST impacts on employment of specific sectors	Some MT impacts on employment of specific sectors	While there are likely distributional effects, the impact on overall GDP is not material.
	Uncertainty	There are possible uncertainties around implementation and budget impacts of the climate change policy, which are unclear at this stage.		
	Source	Climate Change Commission (2021)		

Source: Principal Economics

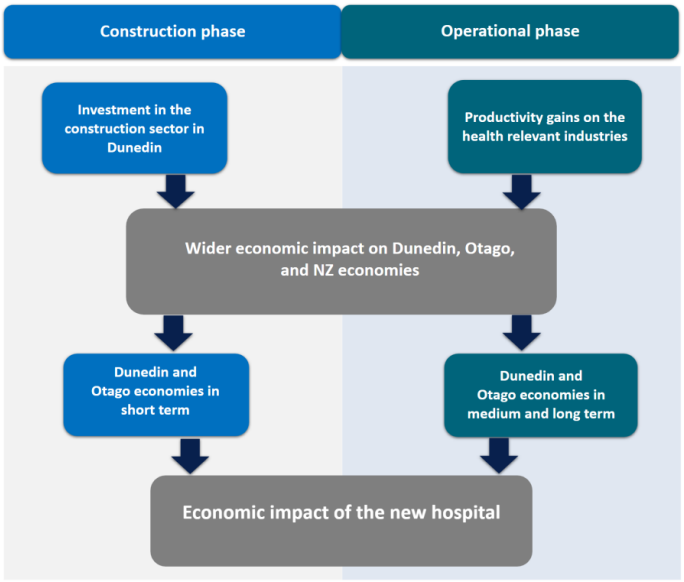
12 These impacts include both direct and indirect (induced) effects.

Note: ST stands for short-term; MT for medium-term; LT for long-term.

An important factor is the impact of the rebuild of the Dunedin Public Hospital and the implications this would have on space both during the build and once the hospital has moved from its current location. As highlighted in Figure 5, the new hospital could potentially increase economic activities both during the construction phase (with significant impacts in short and medium terms) and the operational phase (with significant impacts in medium and long terms). To capture the impacts during the construction phase, we have used the available business case – available here Sapere et al. (2021). The study suggested that the new hospital will boost the economy by $424.9 million over the 10-year construction period. We have used this as an input to our subregional CGE model to investigate which sectors of the economy will benefit the most.

We do not have access to further information about the operational phase. Given that the location of the new hospital is not significantly different from the old hospital, we do not expect major re-distribution of business activities in long-term. We also assume that the economic impacts from the hospital's operation will be the same as the economic activities from the old hospital.

Figure 5 Rebuild of the hospital affects the economy in short, medium and long terms



Source: Principal Economics

In addition to changes from the hospital, there are extensive changes in the roads around the new hospital. There are further discussion of the impacts on the changes in roading transport network provided by Torshizian, as cited in Stantec (2021). Accordingly, there will be likely changes in the desirability of locations for different sectors. Because of overlaps

between these impacts and that captured by Sapere et al. (2021), we do not account for these impacts separately in the current assessment (to avoid double-counting of the effects).

The impact of COVID-19 and the recovery path is another important factor, with more immediate impacts on the short-term and potential medium- and long-term effects. The impacts are particularly important to Dunedin, because of the significant impacts on the education and retail sectors, both of which are amongst the top 5 sectors of the Dunedin economy. We use two sources of information to account for the impacts from COVID-19. To account for the local recovery path, we use the Treasury's 2020 yearly and half-yearly fiscal updates – see here. Our discussions of the international trends and the impacts on the supply chain are informed by the International Monetary Fund's October 2021 World Economic Outlook, which predicted that the world economy grows by 5.9 percent in 2021 and 4.9 percent in 2022.

COVID-19 also may have *potential impacts on online retailing and the wholesale sector*, because of a shift from small retailing (and its implications for business land demand). To capture the impacts on the future of retail, we attempted to use the available information on the impact of COVID-19 on the supply chain and the potential changes in consumers behaviour to inform our analysis of demand. Recent international reports suggest that consumers will be changing their behaviour. Particularly, following the COVID-19 pandemic, consumers will rethink the in-person experience and move towards e-commerce (Yohn, 2020). However, our findings from other countries are mixed. For example, in June 2021, the National Retail Federation reported a significant growth in the United States' retail sector growth and forecasted a return to pre-pandemic levels (Repko, 2021). In absence of further information about the New Zealand retail sector, we have assumed that retail will follow its historic trend.

The impacts of climate change are different across different sectors of the economy. We adopted the findings of the Climate Change Commission's report[13] to inform our assessment by accounting for the impacts on different sectors of the economy. The impacts were provided at ANZSIC level 1 at the 2022-2025, 2022-2030, 2022-2035 and 2022-2050 intervals.[14]

In addition to the factors discussed in this section, we further discussed the impact of following international, national and regional factors to Dunedin's economy in our conversations with the Council's expert team:

- upcoming changes to RMA and their potential impact on location of demand
- technological developments (and their adoption),
- demographic changes and consumption patterns (with increases in affordability of energy saving technologies for lower income groups),
- globalisation & trade (through its impact on industries activities and their consumption),

13 Available here.

14 The outputs are available here.

- natural resources, plus the additional uncertainty driven by households' lack of information about future and their decision making)

Given the high-level of uncertainty with how the situation will evolve in the coming years with respect to each of the additional factors, we decided to exclude them from this assessment for this round of BDCA.

3.1.2. Identifying the business sectors that need to be further investigated in the BDCA

It is important to identify the impacts that are most significant to the economy of Dunedin, with particular focus on the largest sectors of the economy, namely, Wholesale trade, Tourism[15], Tertiary education, Retail trade, and Construction services. To ensure that we capture the impacts with the highest importance to the major sectors of Dunedin's economy, we investigated GDP forecasts for all sectors at the granular ANZSIC level 1 – providing 85 industry classifications.

We then aggregated the industry classifications to the levels that capture a) the important differences in forecasted GDP activities across economic sectors, and b) the industry classifications that matter most for the planning purposes – this was developed in consultation with the Council team. This limited the number of industry sectors included in our analysis to 15 economic sectors – as shown in Table 7. In the rest of this section, we base our analysis on the identified sectors.

Table 7 Sectors of the economy, and the ANZSIC classification

ANZSIC classification	Sector
A Agriculture, Forestry and Fishing	Primary industry
B Mining	Primary industry
C11 Food Product Manufacturing	Manufacturing - light
C12 Beverage and Tobacco Product Manufacturing	Manufacturing - light
C13 Textile, Leather, Clothing and Footwear Manufacturing	Manufacturing - light
C14 Wood Product Manufacturing	Manufacturing - heavy
C15 Pulp, Paper and Converted Paper Product Manufacturing	Manufacturing - heavy
C16 Printing	Manufacturing - light
C17 Petroleum and Coal Product Manufacturing	Manufacturing - heavy
C18 Basic Chemical and Chemical Product Manufacturing	Manufacturing - heavy
C19 Polymer Product and Rubber Product Manufacturing	Manufacturing - light
C20 Non-Metallic Mineral Product Manufacturing	Manufacturing - heavy
C21 Primary Metal and Metal Product Manufacturing	Manufacturing - heavy
C22 Fabricated Metal Product Manufacturing	Manufacturing - heavy
C23 Transport Equipment Manufacturing	Manufacturing - heavy
C24 Machinery and Equipment Manufacturing	Manufacturing - light
C25 Furniture and Other Manufacturing	Manufacturing - light
D Electricity, Gas, Water and Waste Services	Electricity, Gas, Water and Waste Services

15 While Tourism is not categorised as one sector, our model identifies the activities associated with Tourism and categorises that as one sector in the economy. We believe this provides useful information for the BDCA, particularly given the short-term impacts of COVID-19 on Tourism.

E Construction	Construction
F Wholesale Trade	Wholesale
G Retail Trade	Mixed
G39 Motor Vehicle and Motor Vehicle Parts Retailing	Large format retail
G40 Fuel Retailing	Small format retail
G41 Food Retailing	Food retailing
G42 Other Store-Based Retailing	Mixed
G421 Furniture, Floor Coverings, Houseware and Textile Goods Retailing	Large format retail
G422 Electrical and Electronic Goods Retailing	Large format retail
G423 Hardware, Building and Garden Supplies Retailing	Large format retail
G424 Recreational Goods Retailing	Mixed
G424100 Sport and Camping Equipment Retailing	Large format retail
G424200 Entertainment Media Retailing	Large format retail
G424300 Toy and Game Retailing	Small format retail
G424400 Newspaper and Book Retailing	Small format retail
G424500 Marine Equipment Retailing	Large format retail
G425 Clothing, Footwear and Personal Accessories Retailing	Small format retail
G426 Department Stores	Large format retail
G427 Pharmaceutical and Other Store-Based Retailing	Small format retail
G43 Non-Store Retailing and Retail Commission Based Buying and/or Selling	Small format retail
H Accommodation and Food Services	Hospitality
I Transport, Postal and Warehousing	Transport, Postal and Warehousing
J Information Media and Telecommunications	Office
K Financial and Insurance Services	Office
L Rental, Hiring and Real Estate Services	Mixed
L66 Rental and Hiring Services (except Real Estate)	Large format retail
L67 Property Operators and Real Estate Services	Office
M Professional, Scientific and Technical Services	Office
N Administrative and Support Services	Office
O Public Administration and Safety	Office
P Education and Training	Education
Q Health Care and Social Assistance	Health
R Arts and Recreation Services	Arts and Recreation Services
S Other Services	Mixed
S94 Repair and Maintenance	Manufacturing - light
S95 Personal and Other Services	Small format retail

Source: Principal Economics

Data

At the time of preparation of the demand analysis, a range of business data were unavailable for 2021. For example, the National Accounts for ANZSIC06 industry groups was available up to 2020. Hence, 2020 is the start of the forecast period.

3.2. Determine demand for business land

Requirement (clause 3.28 of the NPS-UD)

Determine the most likely projection and demand for business land by business sector clearly outlining assumptions, the uncertainty of those assumptions and their potential effects on our projections.

Further notes on our approach

We provide further details about our modelling approach below. We used different population projection scenarios and different business activity projections to account for a wider range of factors of uncertainty. We also used our stochastic models to improve certainty and account for the widest range of scenarios.

This helps to improve certainty in our estimates, and address the last BDCA's limitation as stated by DCC (2019):

> "[…] the accuracy and reliability of population and economic projections necessarily diminish over these timeframes as uncertainty increases." (DCC, 2019)[16]

Approach

As presented in Table 29, simulation models provide the most appropriate framework for **assessing demand for business activities over time**, which will be converted to demand for space in a next step. For this purpose, we used Principal Economics' Subregional Economic Activity Model (SEAM), which is a stochastic microsimulation model developed based on Stats NZ data. We used the Council's provided information on population forecasts 2020-2068 as an input to our GDP forecasts, which account for the expected impact of COVID-19.[17] The spatial distribution of GDP across SA2 areas is based on the distribution of employment.

We adjusted the regional employment estimates to account for the population projections provided by the Council, as shown in Figure 6 (sourced from Infometrics (2020), shown by dotted lines, and Stats NZ, illustrated using solid lines). The outputs of the SEAM provide details on the economic activities of different business sectors that we identified in the previous section. The timeframes for the outputs of SEAM include the short-, medium- and long-terms (over the 2020-2054 period).

The actual population projections between 2013 and 2018 suggest an annual 0.9 percent (compound) growth rate. The projected population growth rate for 2023 to 2053 (which is an input to the current BDCA), is 0.2 percent. Infometrics (2020) provides the following explanation for the significantly lower projection growth rate:

16 DCC, 2019. Business land capacity assessment Dunedin City. Dunedin City Council. Retrieved from Business-land-capacity-assessment-for-Dunedin-city.pdf.

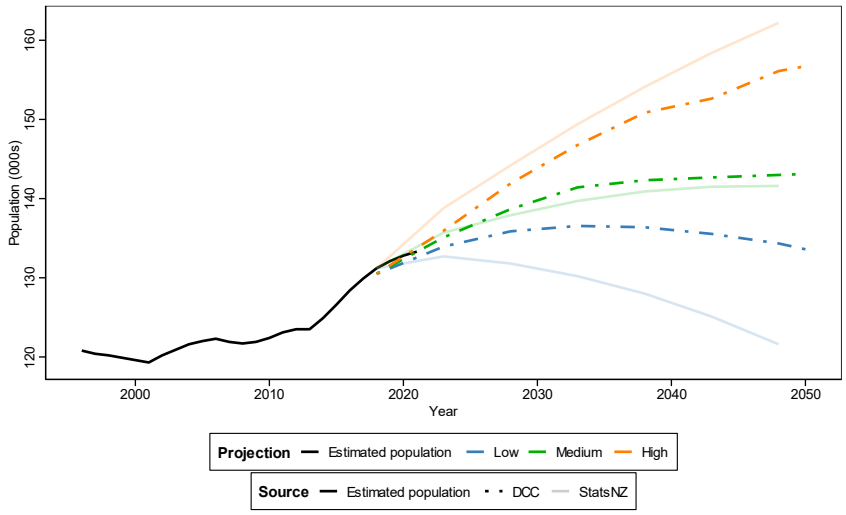
17 By using these projections, we ensure that the outputs of our report will be consistent with the other Council documents, which use the same population projections.

"While the past five years would suggest a high-growth future for Dunedin, this period is too brief to inform the medium (or baseline) scenario of a fifty-year projection. [The medium scenario], based on our national macroeconomic models and the longer-term performance of the city, representing lower growth than has been experienced in the past five years." (Infometrics, 2020, p. 5)

Consistent with other Council documents, and as recommended by Infometrics (2020), we use the medium scenario in this analysis. Given the high sensitivity of the outputs of the BDCA on population projections, we will also account for the high projection scenario in our assessment of sufficiency. For further details on population projections see Infometrics (2020).

Figure 6 Dunedin population projections 2018-2068

Timeframe: 2010-2022



Source: Stats NZ, Russel Jones, Infometrics (2020)

The regional GDP forecasts are shown in Figure 7. Accordingly, there is an initial drop in GDP due to the impact of COVID-19 up to 2025. After that, there is a slow increase in economic activity up to 2034. The reason for that is the dampening effects from the climate change policy. However, in long term, the impact of climate change on economic activity is minimal.[18] The source of uncertainty captured in the illustrated upper and lower bound forecasts is the uncertainties associated with population projections.[19] The outputs presented here are in nominal dollar values. This is because we intend to explain the

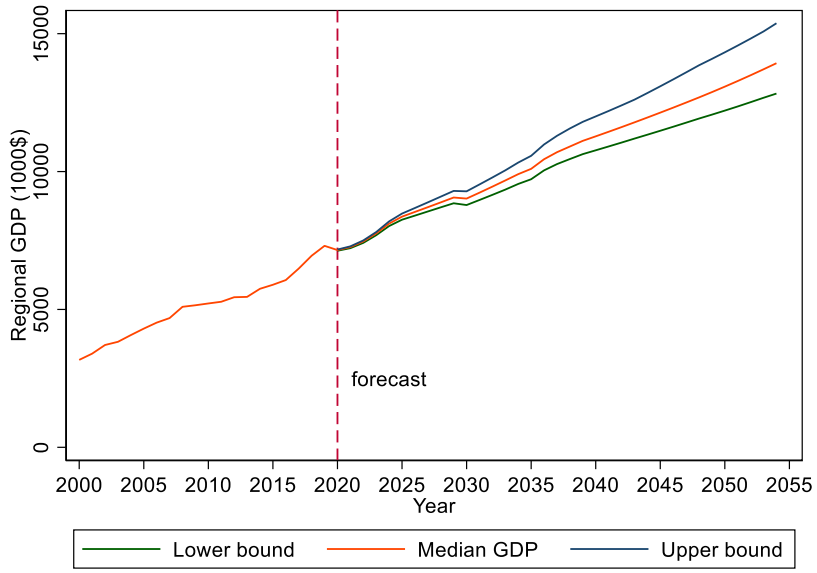
18 The reason for the discontinuous growth path is that the impacts of external factors are not being measured within the simulation model. For example, the impact of climate change on employment is based on Climate Change Commission (2021) report, which is directly summed up with the outputs of our simulation model, and is not an input to our simulation model.

19 For further details on the factors considered in population projections see Infometrics (2020).

captured impact of different external factors listed in Table 6. In the next paragraphs, we will use real dollar values for discussions of economic activities and demand for business land.

Figure 7 Dunedin GDP forecasts by accounting for all identified factors 2020-2054

Nominal (1000$)



Source: Principal Economics

Note: Dashed line represents the available actual data sourced from Statistics New Zealand.

The findings from our demand analysis are shown in Table 8. The provided figures are real GDP (in 2018 prices). Accordingly, there is a moderate increase in real GDP of Dunedin over the LT.

Table 8 Real GDP of different sectors

Unit: million$ - base year: 2020.

Sector	2000	2020	2024	2027	2034	2054
Primary industry	95	121	123	139	160	175
Manufacturing- heavy	160	178	139	200	233	229
Manufacturing- light	687	312	284	380	418	414
Electricity, gas, water and waste services	45	59	61	67	46	40
Construction	254	569	592	609	553	595
Wholesales	226	266	242	258	243	255
Retail-small	318	365	323	349	323	338
Retail-large	258	322	281	300	282	297
Retail-food	235	276	254	271	256	271
Hospitality	419	556	488	521	716	829

Transport	224	299	339	356	179	471
Office	1,035	1,335	1,277	1,360	1,277	1,338
Education	879	947	904	965	905	951
Health	906	1,101	1,061	1,151	1,063	1,118
Arts and recreation	119	170	141	165	141	149
Total	**5,862**	**6,875**	**6,509**	**7,092**	**6,793**	**7,470**

Source: Principal Economics

Note: Consumer Price Index (CPI) sourced from Reserve Bank New Zealand (RBNZ). CPI forecasts sourced from the Treasury's annual economic and fiscal update 2022. For years after 2026, a 2 percent inflation rate assumed, as suggested by the RBNZ.

3.2.1. Assessing the locational requirements of different business sectors

Requirement (clause 3.29(2) of the NPS-UD)

A local authority may define what it means for development capacity to be "suitable" in any way it chooses, but suitability must, at a minimum, include suitability in terms of location and site size.

Our approach

For assessment of land demand and sufficiency, we consider a range of suitability factors including, size, shape, access and reverse sensitivities as well as other market-based factors.

To satisfy these criteria, we identified existing businesses across New Zealand urban areas for each business sector and their locational attributes. We use business sectors' revealed locational preferences to assess the features of land that they have determined as being suitable. The urban areas included in our analysis include Auckland, Wellington, Christchurch, Dunedin and Hamilton.

The output of this analysis provides information about the highest production possibilities of a parcel based on its features. In the next stage, in our analysis of sufficiency, we allocate the land to the forecasted demand based on the most suitability – we will provide more details on the definition of suitability in the next section.

Details on our approach

We use the available information and a transparent methodology to estimate the likely business floorspace, land area and location.

The methodology for this is tailored for Dunedin businesses by comparing each business sector's activity with the location attributes of that business sector in Dunedin. To do this, we used a spatial regression analysis providing us with an estimate of how different spatial factors contribute to where different business activities choose to locate.

We used the 2020 data on GDP distribution across SA2 areas. The geographic disaggregation of GDP is based on ratios derived from highly granular employment counts data (SA2) across New Zealand. Each sector's GDP at SA2 is our dependent variable, which is explained using a

log-log regression analysis using the following features (explanatory variables – the name of variables in our regression result tables are shown in brackets):[20]

- Parcel size (PA1, PA2, PA3) – accounting for land size. We investigate the impact of three (small, medium and large) land size groups.
- Building coverage (Bld coverage) – accounting for parcel shape,[21]
- Distance from arterial roads/state highways (Arterial Road) – accounting for accessibility
- Population density at difference distances (Pop km1, Pop km2, Pop km3) – accounting for reverse sensitivities and labour markets
- Slope – controlling for land attributes
- Distance nearest public transit stop (PT)
- Territorial authority – controlling for regional differences
- Surrounding business sector composition (GDP other)
- Distance from CBD (CBD)
- Distance to ports (Seaport)
- Building heights (Bld height)
- Site rectangularity index (Squareness) – accounting for shape
- Proximity to employment centres (Emp km1, Emp km2, Emp km3, Emp km4) – accounting for agglomeration benefits

In addition to these factors, we investigated the impact of proximity to airport, which was not significant.

The inclusion of population densities at different distances also contributes to our assessment on how encouraging more residential activity in the Central Business District and adjacent commercial zones affect the demand and supply dynamics for commercial space in Dunedin.

As discussed in 2.1.2, the counterfactual scenario needs to enable regional growth. The best empirical solution for identifying the counterfactual scenario, with the available data and resources, is to consider the demand of different sectors for features of land across other urban areas. This provides us with the most likely efficient use of a parcel, with minimum impact of historic trends and planning regulations.[22]

The outcome of this analysis provides us with a detailed understanding of how different factors contribute to the locational choice of each business sector and the most precise definition for a *"suitable"* site for each business sector.

Figure 8 provides a high-level illustration of the 'suitable' location for different sectors. Our regression results, presented in Appendix C, provide further information on the desirability

20 We list the data sources in Appendix D. We test the usefulness of the included variables in explaining the location choice of businesses across different sector. To improve confidence in the estimated parameters (and findings) we include the useful information.

21 We disaggregate the demand and plan-enabled capacity by the location, size and shape. While shape is not a requirement of the NPS-UD, we think that it is an important addition to the criteria. We suggest investigating the importance of shape in explaining the location of the business land using a simple regression analysis. In any case, we provide the required information.

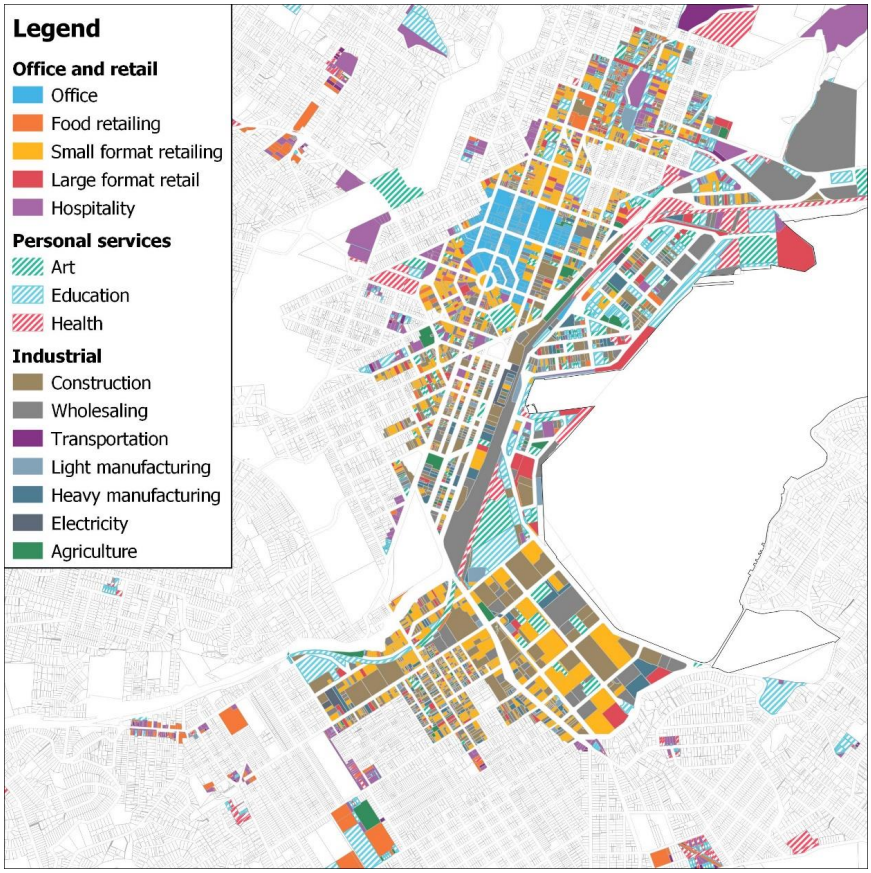
22 We suggest this approach does not (and should not) capture the potential impact of any constraints from central government policies.

of each feature of parcels (and the statistical significance of them) for different sectors of the economy.[23] Based on our definition of suitability, sites are suitable for multiple uses and where a site has a particular 'best use' but that activity doesn't require further land, then the site would be used for the next best use. The desirability of each land for a specific sector is determined using the estimated impacts of the features of that land, using our regression results – as presented in Appendix C. If a land has a higher production capacity for one activity, then it will be allocated to that activity. This continues until the total demand (GDP) of that sector is met. Technically, this is an iterative allocation process for each parcel.

23 One constraint of our results is applying them to the current features of land. For example, a large parcel is more suitable for large-retail activities. However, property sizes can change over time through subdivided or amalgamation with adjacent sites. The model is therefore constrained to current property features. Changes to property features alter the suitability land to different industry sectors. For example, subdivision of a parcel to multiple smaller sites will be more suitable for small retail activities and will require the model to allocate another parcel to the displaced large-retail activity, which will have flow-on impacts on the suitable locations for other activities.

Figure 8 Optimal locations for business sectors based on regression results[24]

Outputs of the regression analysis.



Source: Principal Economics

The caveat of our regression analysis is that we do not have access to firm-level data. Hence, our regression analysis provides information at the Statistical Area 2 level. Then we apply the estimated parameters to the features of parcels. This approach provides us with useful information about the most likely location of a specific business activity. But the shortcoming of this approach is its lack of precision in estimating the levels of economic activity. Therefore, based on the regression results, we know the most likely land use – based on optimising the return on land considering its features. But we do not know how large that economic activity is.

To derive information about the level of economic activities, we calibrate the predicted outputs of all industries (based on the regression results) to the level of regional economic

24 We include land within the Major Facility Zone to account for the locational choices of arts and recreation, educational, and health services.

activity levels in 2018. We should note that, there are still differences between the distribution of economic activities predicted based on our model, and the observed economic activity at the Statistical Area 2 level.

Another caveat of the regression analysis is that it provides estimated outputs at the parcel level. However, as discussed in 2.1.4, there are a range of suitable locations for a business to locate – with no efficiency loss (based on the concept of spatial equilibrium). Hence, we define less restrictive geographic areas, by considering polygons around each parcel, and try to explain the *changes in estimated demand* using the clusters of distance to CBD, port, rail and population centres. If the variations in the efficient demand could be explained using the range of defined polygons, then we suggest the (long-term) demand and (current) supply match.[25] Otherwise, we identify a mismatch.

Our findings suggest mismatches for the following sectors:

1- Heavy manufacturing
2- Retail food
3- Transport
4- Arts and recreation

In addition to these, we also identified mismatches for the primary industry sector. This suggests that in medium- and long-term, there will be a need for improving the availability of land, with the features required for these sectors.

Robustness of our findings from regression analysis

The available data and budget for this work does not allow us to undertake any more detailed analysis of the factors of suitability. Mare and Coleman (2011) used more granular firm-level data to assess the impact of a wider range of factors on the location of businesses. We compared our findings with them and conclude that our current results provide a robust estimate of the significance (and sign) of the impacts of the factors of location choice.

We also compared the findings of our regression analysis with the result from our stakeholder engagement and visual inspection of business zoned land (as will be presented in the next sections). The findings from all these methods were consistent.

3.2.2. Identify the commercial space demand

We use the preferences for the features of land determined in our regression modelling and apply (extrapolate) this to the demand outputs (of GDP and employment counts) over the short, medium, and long terms. This will provide an assessment of aggregate demand of business land sites and their attributes within Dunedin.

As discussed in 2.1.3, the most relevant comparison group for improved quality of business in Dunedin consist of Christchurch, Hamilton, Taupo and Tauranga. A comparison between the production per employee between Dunedin and the average of comparison group is

25 The extent that the variations in estimated demand could be explained using the distance clusters is measured using regression's R-squared measure.

shown in Table 9. Accordingly, the productivity of primary industry, hospitality, transport, education and health should be kept at the current levels. For the other sectors, there is a significant room for improvement. We should note that a lack of increase in productivity does not provide any information about the future demand of the sectors - which we investigated in the previous section.

Table 9 Comparison of productivity between Dunedin and comparable towns

Comparison year: 2018.

Sector	Difference
Primary industry	0.0%
Manufacturing- heavy	125.7%
Manufacturing- light	23.4%
Electricity	76.0%
Construction	26.7%
Wholesales	72.2%
Retail-small	5.7%
Retail-large	24.9%
Retail-food	25.7%
Hospitality	0.0%
Transport	0.0%
Office	20.0%
Education	0.0%
Health	0.0%
Arts and recreation	11.4%

Source: Principal Economics

We use the median floorspace per employee, because the results of using the median are most compatible with the findings from visual inspection and the feedback from the stakeholders. For converting business activity to floorspace requirement, we used a range of available information on floorspace per employee for different sectors from different sources – presented in Appendix E.

The floorspace requirement estimates for medium and high population projection scenarios are shown in Table 10. As illustrated the overall (total) required floor space are decreasing over time. This is because:

1. with improved quality of business (through lowering cost of business land), the productivity of employees (per square metre) increases, i.e., higher production per employee will need less floorspace.
2. with improved desirability of Dunedin (as a result of decreases in cost of business and rent), there will be an increase in migration, and hence and increase in economic activity and further demand for floorspace. As discussed in Section 2.1.5, population is an input to our model. The decrease in floorspace requirement between ST and LT is significantly larger for the medium (population projection) scenario compared to the high scenario.

At the granular sector levels, demand will increase across all sectors. These are driven by increases in population.

Table 10 Summary of forecasted floorspace requirements by sector

Unit: square metre. The presented figures are total (i.e., not change).

Sector	ST (2027)		MT (2034)		LT (2054)	
	Medium	High	Medium	High	Medium	High
Primary industry	137,705	174,929	158,251	194,519	173,422	258,576
Manufacturing-heavy	251,835	309,112	130,138	159,803	127,851	184,518
Manufacturing-light	268,936	334,535	239,425	294,191	237,651	346,673
Electricity, gas, water and waste services	1,310,663	1,613,776	507,160	621,576	440,663	634,665
Construction	416,168	527,032	298,145	366,424	320,935	476,834
Wholesales	546,262	671,882	298,359	365,834	313,634	452,415
Retail-small	103,547	129,394	90,808	111,539	94,907	139,032
Retail-large	127,663	157,612	96,064	118,078	101,080	146,453
Retail-food	66,124	81,379	62,433	76,584	66,199	95,458
Hospitality	36,032	45,122	49,501	60,861	57,351	84,228
Transport	291,971	366,962	146,471	180,136	386,317	569,295
Office	46,924	57,808	36,722	45,117	38,479	55,609
Education	75,882	93,634	71,153	87,394	74,759	108,203
Health	47,515	59,595	43,874	53,902	46,152	67,918
Arts and recreation	332,145	448,702	255,558	313,454	268,612	424,869
Total	**4,059,371**	**5,071,472**	**2,484,063**	**3,049,411**	**2,748,011**	**4,044,746**

Source: Principal Economics

We will use the findings from this chapter to analyse sufficiency in Section 3.4.

3.3. Step 2 – Assessing capacity for business space

Requirement (clause 3.29(1) of the NPS-UD)

Every HBA must estimate the development capacity (in terms of hectares or floor areas) to meet expected demand for business land for each business sector plus the appropriate competitiveness margin. Of that development capacity, the development that is: Plan-enabled; and plan-enabled and infrastructure-ready, and plan-enabled, infrastructure ready, and suitable for each business sector.

A local authority may define what it means for development capacity to be "suitable", but at a minimum suitability must include suitability by location and size.

Note

The NPS-UD detailed a procedure to how business land capacity should be determined. Accordingly, we take a broad approach as outlined in the NPS-UDC in assessing plan-enabled capacity and ground truthing estimates.

As per the NPS-UDC, assessing plan-enabled capacity will entail taking a stocktake of land or space zoned for business activities within Dunedin and the amount of vacant land by zone type. Land that is unable to be developed because of slope, shape and access has been removed from the capacity assessment and only land that is serviced with infrastructure or will be over the next 10-years is included in development capacity.

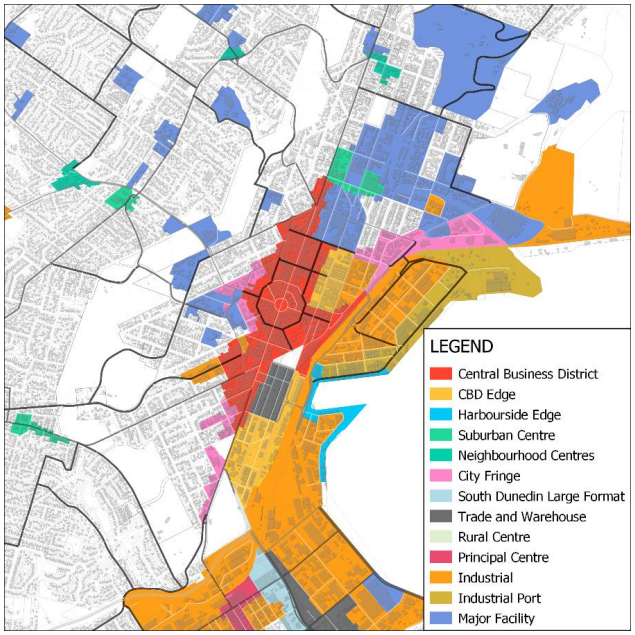
Approach

To determine current business land capacity, we primarily rely on the information provided by the Council on the second-generation district plan. Additionally, we use other relevant information provided, such as resource and building consents, property sales date and price, rating valuation and property and build footprint data to provide us with inputs determining business land capacity within Dunedin.[26]

We determine the plan-enabled business land capacity by first identifying parcels that lie within the business land zones of Commercial and Mixed-use and Industrial as defined under the 2nd Generation District Plan. This is to ensure the assessment includes land available for business use and excludes features such as roading and footpaths that would overestimate the availability business land.

26 See Appendix D for information sources

Figure 9 Dunedin 2nd Generation District Plan



Source: DCC, LINZ

We determine the constraints of planning regulations as per the district plan (and any other council documents) and apply this to individual sites within Dunedin to determine plan-enabled capacity. We rely on qualitative information provided by Dunedin City Council and stakeholder engagement alongside quantitative spatial data on infrastructure provision to assess the infrastructure-readiness of business land.

3.3.1. A stocktake of plan enabled vacant land by location and business zone type

Dunedin has 907,000sqm of industrial land capacity over the long term, assuming that land currently located in transitional industrial areas will be realised over the medium term. Most of this land will be provided in Mosgiel, accounting for 56% of developable industrial land over the long term.

Table 11 industrial zoned land capacity short, medium and long term

Industrial Land area capacity (sqm)			
Area	ST (2027)	MT (2034)	LT (2054)
Mosgiel	501,000	513,400	513,400
Green Island / Fairfield	83,000	169,100	169,100
Burnside	47,000	154,200	154,200

Middlemarch	34,200	34,200	34,200
Port Area North	15,800	15,800	15,800
South Dunedin	6,700	6,700	6,700
Waikouaiti	4,800	4,800	4,800
Sawyers Bay	4,000	4,000	4,000
Bradford	1,800	1,800	1,800
Northeast CBD	1,700	1,700	1,700
Maclaggan Street	1,100	1,100	1,100
Quarry / Ravensbourne	900	900	900
Total	**702,000**	**907,700**	**907,700**

Source: Principal Economics

Office floorspace capacity over the short-term is estimated to be around 108,700sqm assuming that currently undeveloped and underutilised land is developed.[27] Over the medium term we assume that sites within the CBD and surrounds with infill potential are developed to accommodate demand, increasing office capacity to 118,900sqm. While there are potential built sites to increase building heights, we have not estimated additional floorspace to maybe accommodate the redevelopment or construction of additional levels on built sites.

Table 12 Office floorspace capacity short, medium and long term

Office floorspace capacity (sqm)			
Area	**ST (2027)**	**MT (2034)**	**LT (2054)**
CBD and surrounds	51,500	61,700	61,700
Inner suburbs	5,800	5,800	5,800
Mosgiel	13,800	13,800	13,800
Outer suburbs	9,400	9,400	9,400
South Dunedin	2,600	2,600	2,600
Outer urban area	25,600	25,600	25,600
Total	**108,700**	**118,900**	**118,900**

Source: Principal Economics

Retail floorspace capacity over the short term is estimated to be able to accommodate 180,900sqm over the short term. Using the same assumptions for infill potential as office floorspace, this increases to 215,800sqm over the medium term.

27 Note this includes site that are currently being used as council controlled carparking.

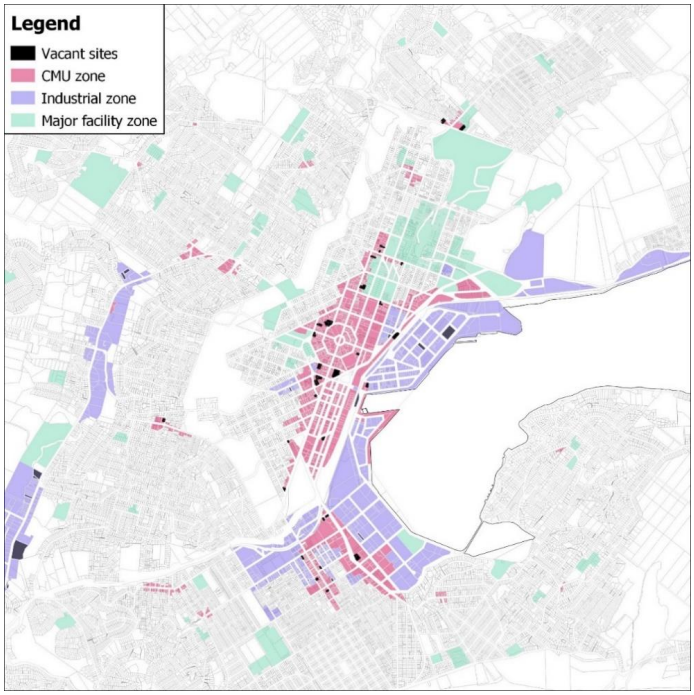
Table 13 Retail floorspace capacity short, medium and long term

	Retail floorspace capacity (sqm)		
Area	**ST (2027)**	**MT (2034)**	**LT (2054)**
CBD and surrounds	16,200	51,100	51,100
Inner suburbs	16,600	16,600	16,600
Mosgiel	39,300	39,300	39,300
Outer suburbs	26,800	26,800	26,800
South Dunedin	9,200	9,200	9,200
Outer urban area	72,800	72,800	72,800
Total	**180,900**	**215,800**	**215,800**

Source: Principal Economics

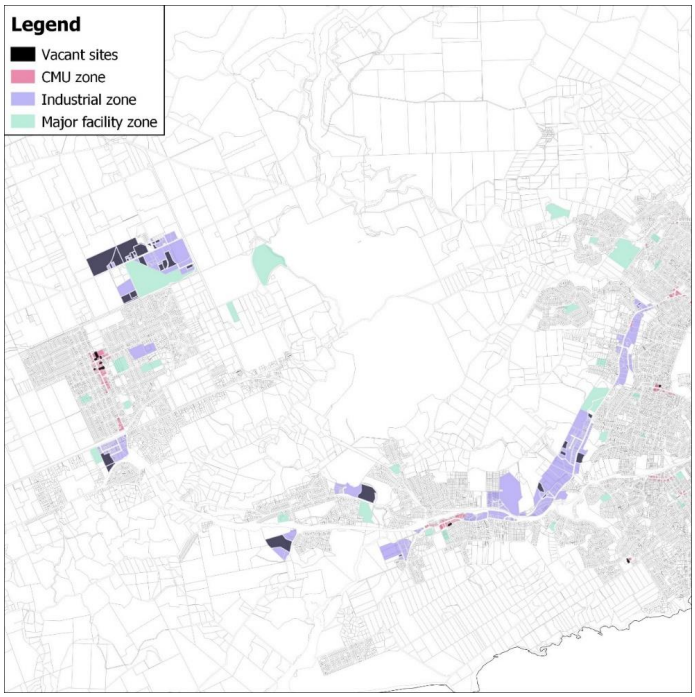
Figure 10 and Figure 11 illustrate the vacant sites identified within the Dunedin's main urban areas, namely the CBD, South Dunedin, Kaikorai Valley, Green Island and Mosgiel.

Figure 10 Identified vacant sites in Dunedin CBD and South Dunedin



Source: Principal Economics, Dunedin City Council, LINZ

Figure 11 Identified vacant sites in Mosgiel, Kaikorai Valley, Green Island



Source: Principal Economics, Dunedin City Council, LINZ

Current industrial land capacity

Using the data available we find that there is an estimated 70.8ha of vacant industrial zoned land within Dunedin City, over 70% of this is located within Mosgiel spanning 24 sites. Much of this land is from 34ha of industrial zoned land established as part of Variation 9B to the Operative District Plan (2006). Vacant sites over 4,000sqm (22 identified) account for 91% of the industrial land identified as vacant within Dunedin City. These larger sites are located within the areas of Mosgiel, Green Island / Fairfield, Burnside, Middlemarch, and Port Area North.

Overall, industrial sites under 4,000sqm account for 73% of vacancies but only 9% of vacant land. In South Dunedin we identify 23 sites as being vacant, with a combined land area of 6,700sqm.

We have identified industrial vacancies using property data provided by DCC and filter for sites that do not have existing building coverage. Vacancy has been confirmed/amended by a site visit undertaken on the week of 23rd May 2022, using property data provided by DCC

and building footprint data provided by DCC and supplementary information sourced from LINZ as the initial base results.[28]

In our assessment of industrial land capacity, we find large variances between what is shown in the data compared to what is occurring on the ground. This manifests in numerous ways, where we find that there are several large sites in Mosgiel that account for most vacant industrial zoned land in Dunedin, sites such as 175 4 Dukes Road are subdivided leasehold properties whose parcel boundaries are not yet defined.[29] Given the site sizes identified in Mosgiel it is highly likely that this is not the only occurrence of such variances between the data reported and actual outcomes. Furthermore, we find that many small sites identified as being vacant using desktop analysis are currently being utilised as carparking.

Where possible we have excluded industrial activity where yard space is required as part of the daily operations and kept general carparking as 'vacant'.[30]

Table 14 Vacant industrial zoned land[31]

	Land area by site size (sqm)					
Industrial zone	**0-500**	**501-1,000**	**1,001-2,000**	**2,001-4,000**	**4,000+**	**Total**
Mosgiel	-	1,000	4,800	14,200	481,100	501,000
Green Island / Fairfield	-	-	-	2,700	80,300	83,000
Burnside	1,100	700	5,200	-	40,000	47,000
Middlemarch	-	-	-	-	34,200	34,200
Port Area North	600	-	-	4,000	11,200	15,800
South Dunedin	4,800	1,900	-	-	-	6,700
Waikouaiti	-	-	1,000	3,800	-	4,800
Sawyers Bay	-	-	1,900	2,100	-	4,000
Bradford	-	800	1,100	-	-	1,800
Northeast CBD	-	1,700	-	-	-	1,700
Maclaggan Street	100	-	1,000	-	-	1,100
Quarry / Ravensbourne	-	900	-	-	-	900
Total	**6,600**	**6,900**	**15,000**	**26,700**	**646,800**	**702,000**

	Number of sites by size (sqm)					
Industrial zone	**0-500**	**501-1,000**	**1,001-2,000**	**2,001-4,000**	**4,000+**	**Total**
Mosgiel		1	4	5	14	24
Green Island / Fairfield				1	1	2

28 We use LINZ to update any new building footprints and supplement the missing areas from the DCC data for areas such as Mosgiel.

29 https://industry-one.nz/For-Lease/20071-Lot_4_Mosgiel_Design-Build_Site

30 This only occurs when the carparking property data is separate from the overarching land parcel. i.e. when the carparking site itself is technically separate from the parcel where a building is located, despite operating in conjunction with the business operating at an adjacent site.

31 A map of industrial areas is attached in Appendix F.

Burnside	3	1	4		4	12
Middlemarch					2	2
Port Area North	2			1	1	4
South Dunedin	20	3				23
Waikouaiti			1	1		2
Sawyers Bay			1	1		2
Bradford		1	1			2
Northeast CBD		2				2
Maclaggan Street	1		1			2
Quarry / Ravensbourne		1				1
Total	**26**	**9**	**12**	**9**	**22**	**78**

Source: Principal Economics

Mosgiel industrial land is likely to be underreported in terms of total land area, alongside a significant difference in the composition of small and large site sizes as aforementioned. Our on-the-ground visit and desktop analysis indicate that there are several large sites that while not technically vacant are currently underutilised small building/site ratios and have little need for yard space as part of business operations.

At Green Island / Fairfield a large 83,000sqm site appears to be vacant, but we are unable to confirm its use. There are large vacant industrial sites in Middlemarch, however given its distance from the central city, it is incompatible with demand for industrial land closer to the city centre.

Two small 300sqm vacant sites that sit adjacent one another in Port Area North are currently being used as carparking by neighbouring businesses. A medium-sized 6,900sqm exists at the boundary of Port Area North and Port Area South adjacent to the railway line and Wharf Street has questionable development potential given its size and proximity to the railway line. Table 14 shows that a large 11,200sqm undeveloped site is present in the middle of the Port Area North industrial zone. Based our discussion with the Council team, this land is owned by Chalmers Properties and while there are potential contamination issues this is likely to be easily remedied for future development

For South Dunedin the majority of sites identified are classified vacant by technicality. These are areas that despite being identified as being individual properties are integrated into operations of other businesses (typically as carparking). We find that there are a handful of sites that do appear to be genuinely vacant which are often adopted by neighbouring businesses for carparking. It is not known if in these cases the site is owned by the adjacent business or being temporarily used while the site remains vacant. This does not include part-vacant land sites whose combined land area is potentially greater than those identified in Table 14.

Smaller industrial areas in Dunedin City such as Sawyers Bay, Bradford and Maclaggan Street are mostly occupied with smaller undeveloped sites remaining vacant.

Future industrial land capacity

The Dunedin 2GP District additionally specifies industrial transition areas adjacent to the industrial areas in Burnside, Green Island / Fairfield and Mosgiel. When and if this land is to be used for industrial purposes, this will increase industrial land capacity in Dunedin by 205,700sqm. It should be noted that industrial transition land shown in Table 15 is not included in Table 14 as it is assumed that in the short term it is yet to be infrastructure ready. In our discussions with the Council the requirements for releasing this land for development are permissive and as such it has been assumed they will be infrastructure ready by the medium term. These areas are included as part of the sufficiency calculations in Section 3.4.

Table 15 Industrial transition

Industrial area	Land area (sqm)
Burnside	107,200
Green Island / Fairfield	86,100
Mosgiel	12,400
Total	**205,700**

Source: Principal Economics, Dunedin City Council

Current commercial and mixed-use capacity

There is 67,900sqm of vacant land area across 81 sites in the commercial mixed-use zone in Dunedin City.[32] Vacancy has been confirmed/amended by a site visit undertaken on the week of 23rd May 2022, using spatial data provided by DCC and building footprint data provided by DCC and supplementary information sourced from LINZ as the initial base results.

Within the CBD and surrounds there is 23,000sqm of vacant land of which 10,800sqm are on sites under 1,000sqm. Within Other Areas we identify 44,900sqm of vacant land across 50 sites.

Similar to industrial land we find large variances in the commercial and mixed-use zone data compared to what is occurring on the ground. Many of the identified 'vacant' sites are adjoined to adjacent business and used as carparks or operate as leased car parks separate and independent from other businesses but defined as separate properties within the property dataset provided. We have excluded sites where carparking is part of a larger area i.e., carparking for supermarkets, and included smaller carparks with individual property titles as they have greater potential for redevelopment.

Within the Central Business District of the seven vacant sites over 1,000sqm within the CBD, four are occupied by pay and display car parking services, including sites on Dowling Street, Filleul Street, Moray Place, and Anzac Ave.

Table 16 shows the total land area and number of identified vacant sites within Dunedin City by commercial mixed-use zone identified by the method noted in Appendix E.

32 See Appendix E for details on the methodology used for determining floorspace capacity within the commercial mixed-use zone.

Table 16 Vacant land in commercial mixed-use sub zones

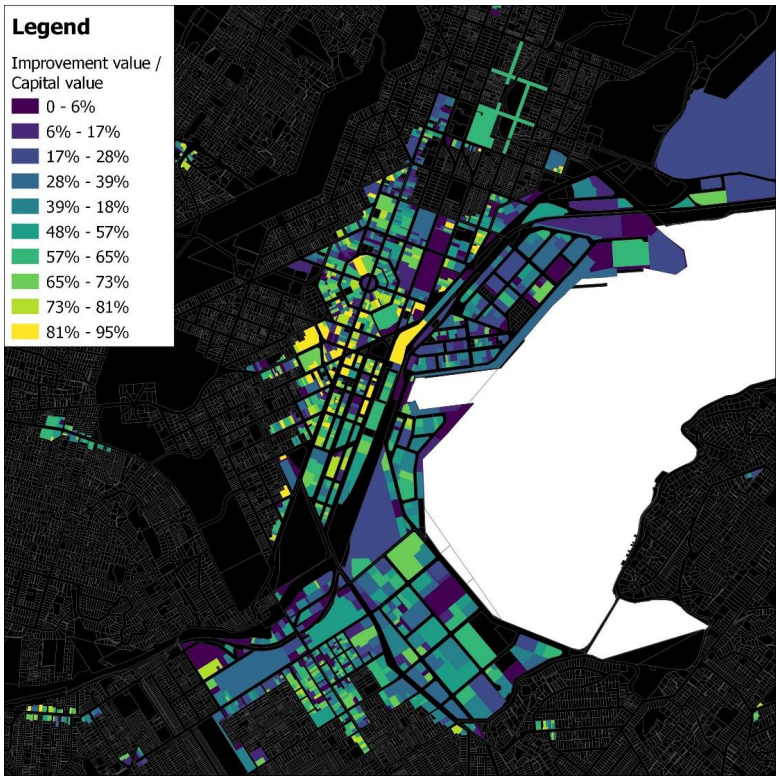
	Land area by site size (sqm)			
Sub zone	**0-500**	**501-1000**	**1000+**	**Total**
Central Business District	2,400	3,500	11,100	17,000
Smith Street and York Place	-	600	1,100	1,700
CBD Edge Commercial North	400	-	-	400
CBD Edge Commercial South	300	-	-	300
Princes, Parry and Harrow Street	700	800	-	1,500
Harbourside Edge	-	800	-	800
Warehouse Precinct	-	1,300	-	1,300
Subtotal - CBD and Surrounds	**3,800**	**7,000**	**12,200**	**23,000**
Neighbourhood Destination Centre	500	800	-	1,300
Principal Centre	3,700	5,300	8,700	17,700
Suburban Centre	1,500	1,800	2,000	5,300
Trade Related	-	900	-	900
Rural Centre	900	4,400	14,400	19,700
Subtotal - Other areas	**6,600**	**13,200**	**25,100**	**44,900**
Total - Dunedin City	**10,400**	**20,200**	**37,300**	**67,900**

	Number of sites by size			
Sub zone	**0-500**	**501-1000**	**1000+**	**Total**
Central Business District	8	6	7	21
Smith Street and York Place	-	1	1	2
CBD Edge Commercial North	1	-	-	1
CBD Edge Commercial South	1	-	-	1
Princes, Parry and Harrow Street	2	1	-	3
Harbourside Edge	-	1	-	1
Warehouse Precinct	-	2	-	2
Subtotal - CBD and Surrounds	**12**	**11**	**8**	**31**
Neighbourhood Destination Centre	2	1	-	3
Principal Centre	11	7	5	23
Suburban Centre	5	3	1	9
Trade Related	-	1	-	1
Rural Centre	2	6	6	14
Subtotal - Other areas	**20**	**18**	**12**	**50**
Total - Dunedin City	**32**	**29**	**20**	**81**

Source: Principal Economics

Figure 12 shows an inconsistent land use pattern with many sites relatively underdeveloped with potential for intensification. The ratio highlights sites with high land productivity (yellow) and low land productivity (purple), effectively illustrating the land leverage ratio across business zoned sites.[33]

Figure 12 Improvement value ratio



Source: Principal Economics, Dunedin City Council, LINZ

Table 17 provides greater detail on the vacant business zoned land within other areas. In South Dunedin there are around 2,900sqm of vacant land located across 8 sites. Rural Centres have ample development potential with 10,700sqm of vacancy across 14 sites. Similarly, Mosgiel has 11 vacant sites with additional development potential of up to 10,700sqm.

As part of the stakeholder engagement, respondents raised the issue of having insufficient sites for large format retail development. This comment is supported by the lack of 1,000sqm and over sites vacant within Dunedin City, and particularly in South Dunedin, where many large format retailers are located.

33 Denne et al. (2016)

Table 17 Vacant land in commercial mixed-use sub zones in other areas[34]

	Number of sites by size (sqm)				Land area by site size (sqm)			
Inner suburbs	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Neighbourhood Destination Centre	1	0	0	1	300	0	0	300
Suburban Centre	5	1	1	7	1,500	600	2,000	4,100
Inner suburbs Total	**6**	**1**	**1**	**8**	**1,800**	**600**	**2,000**	**4,400**

South Dunedin	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Principal Centre	7	0	0	7	2,000	0	0	2,000
Trade Related	0	1	0	1	0	900	0	900
South Dunedin Total	**7**	**1**	**0**	**8**	**2,000**	**900**	**0**	**2,900**

Outer suburbs	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Neighbourhood Destination Centre	1	1	0	2	100	800	0	900
Principal Centre	2	0	3	5	1,000	0	4,200	5,200
Suburban Centre	0	2	0	2	0	1,200	0	1,200
Outer suburbs Total	**3**	**3**	**3**	**9**	**1,100**	**2,000**	**4,200**	**7,300**

Mosgiel	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Principal Centre	**2**	**7**	**2**	**11**	**800**	**5,300**	**4,600**	**10,700**

Outer urban area	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Rural Centre	**2**	**6**	**6**	**14**	**900**	**4,400**	**14,400**	**19,700**

All areas (excl. CBD)	**0-500**	**501-1000**	**1000+**	**Total**	**0-500**	**501-1000**	**1000+**	**Total**
Total	**20**	**18**	**12**	**50**	**6,600**	**13,200**	**25,200**	**45,000**

Source: Principal Economics

Table 18 shows the potential floorspace at the vacant undeveloped sites identified and assuming that they are developed to their maximum height as per the 2GP District Plan. It is unlikely that all this land will be developed nor developed to this extent.

Table 18 shows the development potential at undeveloped sites only and is conservative in that it omits development potential where intensification is feasible on sites with existing buildings.

Table 18 Vacant floorspace potential in commercial mixed-use zones by urban area

	Ground level floorspace (sqm)

34 A map of the urban areas we have used for reporting commercial mixed use vacancy is attached in Appendix G.

Sub zone	Residential	Office	Retail / Other Commercial	Industrial	Total
CBD and surrounds	1,600	3,900	16,200	1,300	23,000
Inner suburbs	-	1,300	12,100	-	13,400
Mosgiel	-	3,200	28,700	-	31,900
Outer suburbs	-	2,200	19,600	-	21,800
South Dunedin	-	600	7,200	1,900	9,700
Outer urban area	-	5,900	53,100	-	59,000

	Above ground level floorspace (sqm)				
Sub zone	Residential	Office	Retail / Other Commercial	Industrial	Total
CBD and surrounds	15,500	47,600	-	-	63,100
Inner suburbs	-	4,500	4,500	-	9,000
Mosgiel	-	10,600	10,600	-	21,200
Outer suburbs	-	7,200	7,200	-	14,400
South Dunedin	-	2,000	2,000	-	4,000
Outer urban area	-	19,700	19,700	-	39,400

	Total floorspace (sqm)				
Sub zone	Residential	Office	Retail / Other Commercial	Industrial	Total
CBD and surrounds	17,100	51,500	16,200	1,300	86,100
Inner suburbs	-	5,800	16,600	-	22,400
Mosgiel	-	13,800	39,300	-	53,100
Outer suburbs	-	9,400	26,800	-	36,200
South Dunedin	-	2,600	9,200	1,900	13,700
Outer urban area	-	25,600	72,800	-	98,400

Source: Principal Economics

Table 19 focuses on floorspace capacity within the CBD and surrounds, it indicates that identified vacant sites can support an additional 51,500sqm of floorspace for office activities, and 16,200sqm for retail. The majority of potential floorspace is located within the Central Business District sub-zone, where if all identified vacant sites, including the large 1,000sqm plus sites, were to be developed the CBD could accommodate an additional 13,600sqm of retail floorspace and over 45,000sqm of above ground level office space.

Table 19 Floorspace capacity by sector within the CBD and surrounds

	Ground level floorspace (sqm)			
Sub zone	Residential	Office	Retail / Other Commercial	Industrial
Central Business District	-	3,400	13,600	-
Smith Street and York Place	900	-	900	-
CBD Edge Commercial North	-	-	300	100

CBD Edge Commercial South	-	-	200	100
Princes, Parry and Harrow Street	800	-	-	800
Harbourside Edge	-	-	400	400
Warehouse Precinct	-	500	800	-
Subtotal - CBD and Surrounds	**1,600**	**3,920**	**16,200**	**1,300**

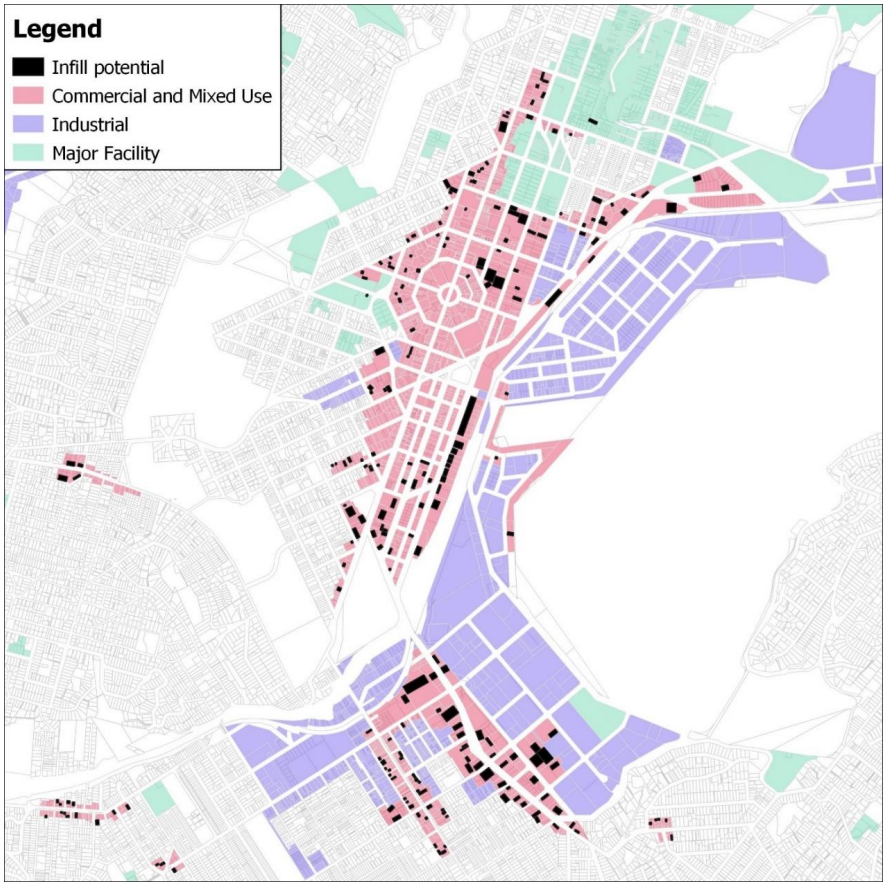
	Above ground level floorspace (sqm)			
Principal Centre	**Residential**	**Office**	**Retail / Other Commercial**	**Industrial**
Central Business District	5,000	45,100	-	-
Smith Street and York Place	3,500	-	-	-
CBD Edge Commercial North	-	-	-	-
CBD Edge Commercial South	-	-	-	-
Princes, Parry and Harrow Street	3,000	-	-	-
Harbourside Edge	2,000	500	-	-
Warehouse Precinct	2,000	2,000	-	-
Subtotal - CBD and Surrounds	**15,500**	**47,600**	**-**	**-**
Total floorspace	**17,100**	**51,500**	**16,200**	**1,300**

Source: Principal Economics

Infill potential

We have assessed the potential for infill within the Dunedin CBD and surrounds and find that it has potential infill floorspace of 60,500sqm, at ground level, following findings from our site visit suggesting that many sites are partly developed and have potential for intensification. Details on how infill capacity has been determined can be found in Appendix E.

Figure 13 Infill ground level floorspace potential within the CBD and surrounds[35]



Source: Principal Economics

Table 20 Infill ground level floorspace potential within the CBD and surrounds

	Ground level infill floorspace potential (sqm)			
Sub zone	0-500	501-1000	1000+	Total
Central Business District	6,000	3,500	8,300	17,800
Smith Street and York Place	2,500	0	0	2,500
CBD Edge Commercial North	1,100	1,200	4,000	6,300
CBD Edge Commercial South	5,400	3,800	9,900	19,100
Princes, Parry and Harrow Street	4,700	5,900	3,400	14,000
Harbourside Edge	800	0	0	800

35 We have not reported infill potential within South Dunedin given its focus on large format retailing and industrial activity has a greater reliance on carparks.

Total	**20,500**	**14,400**	**25,600**	**60,500**

Source: Principal Economics

Applying the same activity ratios as used for identified vacancies from partially developed lands, there is an estimated 10,200sqm of additional office space and 34,900sqm of retail / other commercial floorspace that can be potentially accommodated on new infill developments within the CBD.

Table 21 Infill floorspace potential within the CBD and surrounds

	Total infill floorspace potential (sqm)				
Sub zone	**Residential**	**Office**	**Retail / Other Commercial**	**Industrial**	**Total**
Central Business District	1,700	10,200	14,200	0	26,200
Smith Street and York Place	6,300	0	1,300	0	7,500
CBD Edge Commercial North	0	0	4,700	1,000	5,700
CBD Edge Commercial South	0	0	14,300	2,500	16,800
Princes, Parry and Harrow Street	12,600	0	0	1,700	14,300
Harbourside Edge	1,900	0	400	0	2,300
Grand Total	**22,500**	**10,200**	**34,900**	**5,200**	**72,800**

Source: Principal Economics

3.3.2. Engaging with the development sector, experts, and stakeholders

Requirement (clause 3.21 of the NPS-UD)

Contact the development sector and engage the development experts or experienced people in the development sector; and providers of development infrastructure and additional infrastructure; and anyone else who has information that may materially affect the calculation of the development capacity.

Approach

We engaged with providers of development infrastructure through a series of virtual meetings to discuss any information that may materially impact the estimate of development sufficiency within Dunedin City over the BDCA assessment period. As part of this process, we undertook meetings with individuals within DCC related to the provision and management of transport and 3-waters infrastructure.

We also surveyed with a range of industry stakeholders including infrastructure providers, commercial and industrial operators, business land developers and investors, large retail operators, real estate agents, other local experts and users of business land to account for perspectives from both suppliers and users of business land.

For the stakeholder engagement, we sent out 21 questionnaires and we received 9 responses.[36] We suggest that a response rate of 43 percent is a reasonable response rate for this type of analysis (in comparison with other BDCA reports that we are aware of). We also had 4 in-person meetings with the Council's departments.

Response from infrastructure providers

DCC's Transport infrastructure team noted that there were not any capacity issues related to the transport network that would hinder business land development capacity over the foreseeable future. Commercial mixed use, industrial, zoned land are serviced by the roading network and are infrastructure ready. It was noted there are issues with congestion however they broadly meet the needs of the city.

While traffic modelling is undertaken for Dunedin City its use is limited and excludes Mosgiel which is projected to be a significant area of growth for Dunedin.

Several roading issues were identified as needed to be addressed including key congestion areas and improvements in accessibility and road safety.

- Congestion when travelling from Mosgiel to Dunedin CBD
- Safety improvements along Three Mile Hill Road
- Improved bus access to Mosgiel
- Improved cycling network

Potential improvements to Dunedin City transport noted by the transport infrastructure team include:

- Business zoning closer to where households reside (Mosgiel being a key area identified)
- Shifting of inner harbour industrial zoning to the south of the city alongside development of an inland port alleviate inner city transport issues.
- Increase use of the freight at Port Charmers
- Increase usage of the rail network.
- Increased mixed-use planning

Challenges faced by DCC's infrastructure team include:

- Contention around public/private funding for infrastructure
- Lack of integrated land use and transport planning
- Transport planning constraints owing to constraints of the 3-waters network

In November 2021, the Shaping Future Dunedin Transport Programme was endorsed by Waka Kotahi NZ Transport Agency. The programme relates to the relocation of Dunedin Hospital to be adjacent to SH1, triggering a review of the section SH1 that crosses

36 The information was collected via email or virtual meetings – using the questionnaire.

Dunedin's central city. Details of the programme are not yet finalised, both the speed and flow direction of SH1 in the central city still be discussed (Stantec, 2021).

Additionally, the Shaping Future Dunedin Transport Programming includes a range of other amendments to the Dunedin transport network, we list these in Table 22 below.

Table 22 Transport amendments in the Shaping Future Dunedin Transport Programme

State Highway Works
Interim SH1 Safety Improvements
Lower SH1 Speeds
Relocate SH88 to Frederick Street
Pine Hill Intersection Upgrade
Targeted SH1 Amenity Improvements
Queens Gardens to Oval Cycleway

Public Transport Improvements
Central Bus Hub and Superstop Upgrades
Frequency and Fare Review
Southern Bus Priority

Harbour Arterial Upgrade
Directional Signage and Wayfinding
Major and Minor Intersection Upgrades
Corridor Improvements
Ward Street Overbridge Upgrade

Parking Management Improvements
Demand Responsive Pricing
Smart Prioritisation of Parking
Parking Wayfinding System
Upgrade Payment Technologies
Occupancy Sensors
Consolidate Existing Off-Street Parking

Active Mode Improvements
Slow Speed Zone
Princes Street Improvements
Albany Street Cycleway
St Andrew Street Improvements
Bicycle Hubs
Behaviour Change Programme
Sustainable transport programme
Demand management

Park and Ride
Mosgiel Park and Ride
Burnside Park and Ride

Source: Principal Economics, Stantec (2021)

The outcome of Shaping Future Dunedin Transport is expected improve safety, multi-nodal accessibility to and within the central city, walkability, accessibility between key destinations for active modes and help reduce carbon emissions.

Response from 3-Waters

Dunedin's 10-year plan 2021-2031 infrastructure Strategy indicate significant capacity issues within the Mosgiel stormwater systems, with frequent nuisance flooding in small rainfall events, and deep flooding in others. This aligns with comments from developer comments in our stakeholder discussions where development on industrial land is occurring even in areas with constrained infrastructure capacity, albeit this comes at a cost to the developer. The stormwater network in South Dunedin is also notable as an area with having capacity issues leading to flooding of roads, homes, and properties. The 10-year plan notes that DCC

is working with ORC and GNS Science to development a hydraulic model for the area with significant capital works proposed to improve infrastructure standards.

Response from stakeholder survey

As part of the engagement with the development sector we contacted 22 individuals/organisations to undertake a survey on business land development. Respondents were contacted via email survey form in conjunction with interviews conducted by telephone. In total there was a 40% response rate from a mix individuals/organisations ranging from planners, landowners, developers, commercial and industrial real estate agents, investors, construction operations and large format retail operators. The survey form sent to stakeholders has been attached in Appendix D.

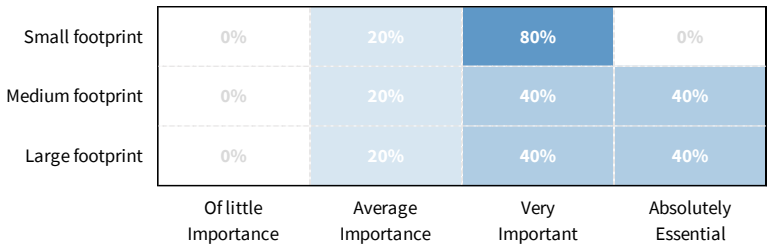
Overall survey responses indicate that there is an insufficient provision of industrial land, particularly larger sites. There seems to be a shortage of sites for large format retailing which competes against industrial business for larger sites within industrial zoning. Dunedin South is noted as needing more strategic direction from council to incorporate the emerging large format retailing sector with existing industrial activity. Respondents indicate sufficient small retail and office land, however, would like greater integration (both in terms of land use and business/council interaction) with the Otago University. Storm and wastewater issues are also noted as being common problems with business land development.

More general notes from respondents, include a wanting council to conduct greater engagement with landlords, consent issuance taking up to 20-working days adding to cost of development, maintain reasonable development levies and increasing investment in the city.

In asking about the importance of different building space requirements, it more notable that for many respondents that medium and large footprints buildings were identified as 'Absolutely Essential'. In contrast small footprint sites were reported as being very important but not essential to most respondents.

This aligns with response to open-ended questions where numerous respondents mentioned a lack of medium and large sites for both large format retailing and industrial activities. We discuss this more later in this report.

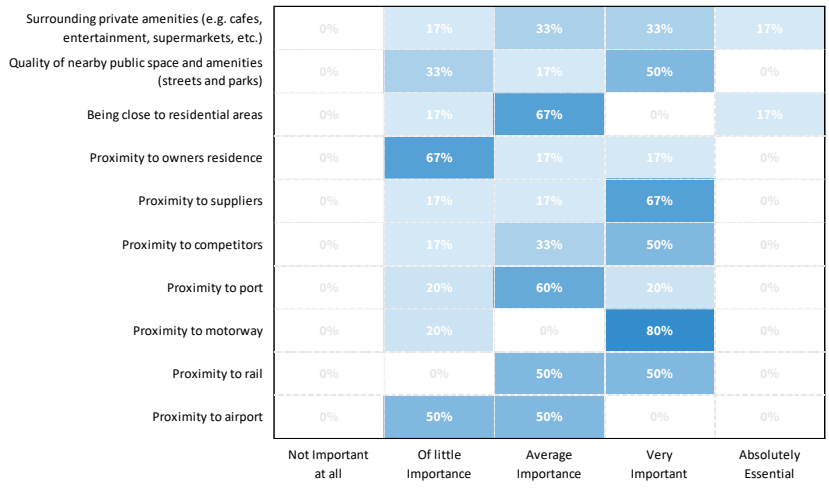
Figure 14 Stakeholder rating of building space requirements[37]



Source: Principal Economics

Regarding the surrounding environment, respondents had a mix of preferences. Private amenities such as cafes, entertainment and supermarkets were generally rated being average to very important. Parks and green spaces were important to some but not others. Importance of distance to residential areas is dependent on business sector i.e., smaller retail businesses prefer to be close to their customers while industrial activities are concerned with issues around reverse sensitivity. Proximity to owners' residences was generally noted as being of little importance, while proximity to supply was very important. Similarly, the importance of proximity to transport infrastructure such as Dunedin Port, railway line and airport was highly dependent on industry sector. Signage opportunities for buildings was noted by one respondent as being an important site attribute.

Figure 15 Stakeholder rating of surroundings / environment



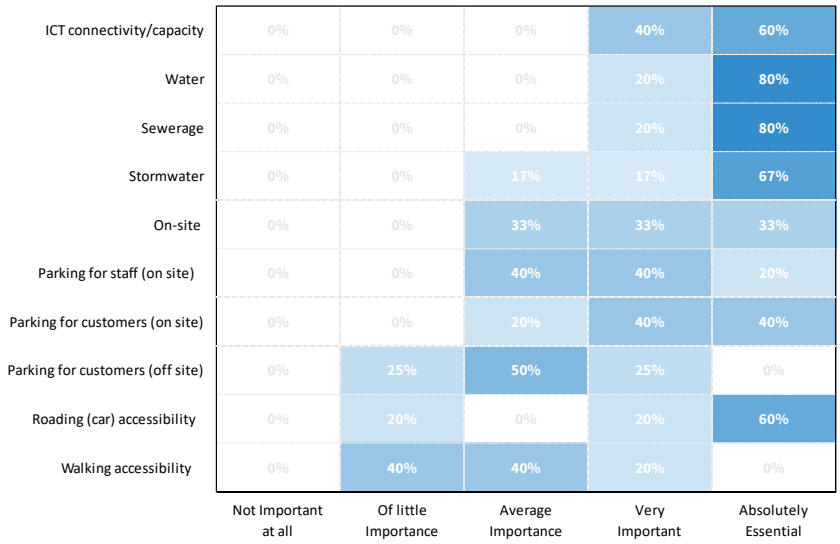
Source: Principal Economics

37 It should be noted that while multi-choice questions provide use comparable metrics from stakeholders, they suffered from low response rates even from those that engaged. As such caution should be used when reading these results.

Building and site infrastructure requirements such as ICT connectivity and 3-Waters are 'very important' to 'absolutely essential'. Often respondents expect the provision of this infrastructure to be present. The exception being stormwater infrastructure which is a known issue for some sites during periods of severe weather. One respondent noted that the lack of adequate land (particularly industrial) has led to development on less-than-ideal sites with known stormwater issues at high cost to developers.

Roading and site access was noted as being important attribute for site selection. Parking within the harbour edge industrial zone is a concern as individuals will occupy carparks within the harbour edge zone and walk to the CBD. One respondent commented that with the property sector looking at using sustainability credibility frameworks, it is important that surrounding amenities and public transport networks to service industrial areas. Hotel services were also reported as having difficulty finding suitable sites with carparking potential.

Figure 16 Stakeholder rating of infrastructure and accessibility



Source: Principal Economics

A lack of land availability particularly for larger sites was commonly noted by many respondents. Respondents mentioned a lack of supply for a range of larger sites from those with 500sqm building footprints, medium and large sites, and freehold sites over 5,000sqm. Specific sectors noted as having insufficient site locations include large format retailing, warehousing, logistics, manufacturing, engineering, and industrial workshops, which typically require large sites.

There is demand for a response to the lack of appropriate sites for large format retailing. Several respondents suggested that are thinking of the zoning strategy at South Dunedin is needed to better revealed preferences for large format retailing in the area. Greater flexibility for industrial, large format retailing and trade activities was suggested. One

respondent suggested that the centres hierarchy framework was not working as intended to accommodate demand for large format retailing. Another indicated that while they had no plans to move, they were considering redevelopment of their site for greater efficiency and facilitate large format retailing.

Insufficient supply of large sites, freehold sites, greenfield sites, unsuitable land typology, liquefaction and flooding issues, and a general undersupply of zoned industrial land were all issues identified for by respondents. While some simply report that industrial sites were lacking everywhere, specific locations identified include Dunedin CBD, Kaikorai Valley, Mosgiel, Harbourside, Fairfield, and Green Island.

Poor subterranean land quality and site slopes were cited as leading to difficulty in finding financially efficient stormwater management solutions on industrial sites. It was noted that there is ongoing development on these sites despite these issues and higher costs involved in development due to a lack of alternate options for industrial land. While these issues are site dependant, stormwater and wastewater are noted as being common. South Dunedin specifically noted as having infrastructure issues.

A lack of availability of industrial land was cited as increasing costs for expansion for business looking to move from older cheaper premises to new sites. This is compounded by the comments that there is a lack of freehold sites available for development within Dunedin. Rezoning of land to industrial in Milton and Mosgiel were suggested for alleviating industrial land constraints, with improvements to road linkages between Mosgiel to Dunedin CBD suggested to help grow the Dunedin business market.

Commentary around retail and office land market was very different than industrial sectors. Supply of retail and commercial space is generally thought as being sufficient. Landowners noted that decision making around intensification in the CBD concerned whether to develop offices or residential on top of existing developments.

Issues around retail and commercial land focused more on the layout and interaction between sectors in Dunedin. A lack of clustering and agglomeration opportunities, and zoning that allowing for a range of business sectors, and integration with Otago University and the wider business market was noted. The 4-storey limit defined in the 2GP was mentioned as being a constraint for Dunedin. Some retail services noted that zoning rules made it difficult to service customers within their local catchments.

3.4. Step 3 – Assessing the sufficiency and competitiveness margin of business space

Requirement (clause 3.30 of the NPS-UD)

Every HBA must clearly identify for the ST, MT and LT, whether there is sufficient development capacity to meet demand for business land.

The determination of sufficiency must be based on a comparison of demand for business land and development capacity as determined under the NPS-UD.

If there is any insufficiency, the HBA must identify where and when this will occur and the extent to which RMA planning documents, a lack of development infrastructure, or both, cause or contribute to the insufficiency.

Note

As discussed above, there are a range of factors affecting the supply and demand of business land. Some factor's impacts could be more significant in medium and long terms. For example, the climate mitigation policies have higher impacts in medium term and will be most significant in long term. The impact of climate adaptation will be most significant in the long term. We discussed the factors that we suggested to take into account for short, medium and long terms' assessment of sufficiency with the Council teams and stakeholders at our team meetings. There are a range of assessments currently being completed by DCC to address uncertainties associated with climate change.

Approach

With a robust forecast of business land, determination of business land capacity and the application of locational factors to determine suitability, a direct comparison will satisfy the NPS-UD requirements and provides a detailed understanding of the dynamics of supply and demand of business land in Dunedin.

We apply our modelled locational requirements (section 3.2) to sites located in business zoned land that we identify as having capacity to determine the suitability of individual sites. This will provide a score for each land parcel and the level and weight of suitability for each attribute to different business sectors. We use the total to determine sites that are most suitable to meet demand within a sector. Another way of thinking about this is that the modelling estimates the contribution of individual locational factors of a site that contribute to the total economic return of a site for each business sector.

By comparing the suitable land area capacity against forecast demand by business sector we estimate the short-, medium- and long-term sufficiency of business land capacity. We aggregate the results from our highly granular analysis by zone type, location, and size. We apply the appropriate competitiveness margins of 15 and 20 per cent to sufficiency estimates as per the NPS-UD requirements.

Where there is any insufficiency, we identify where it will occur and the factors that contribute to the insufficiency. As per the NPS-UD requirements we focus on the extent to which RMA planning documents and development infrastructure contribute to insufficiency.

In this report, we discuss any other factors that contribute to insufficiency both citywide and locational as informed by the qualitative and quantitative analysis outlined in this proposal. We use outcomes from stakeholder engagement, resource and building consent data analysis and aggregate business land demand and supply to inform our citywide assessment.

It is also possible to have sufficient business land at a city level while insufficient at a localised level. This can occur when there is sufficient business zoned land across there city but not where it is demanded. Similarly, increased residential intensification can lead to reverse sensitivities changing the distribution of demand for types of businesses within the local area. i.e., increased population within an area leads to higher demand for retail activities that operate at higher productivity to industrial land uses. We use comparisons of granular SA2 level demand forecasts against site level suitability of zoned business land across a range of factors listed in Section 3.2.1, including size and location, to identify the factors contributing to location insufficiency.

Approach

We provided details on the conversion of economic activities to floorspace in Section 3.2.2. Table 10 provides estimates of changes in floorspace required by sector for ST, MT and LT. Accordingly, while there will be more demand for floorspace in the ST, the required floorspace will decrease significantly in MT and LT (both for the medium- and high-growth scenarios). One main driver of the decrease in demand is the electricity demand, this is because of a combination of the forecasted changes in the industry's activities based on the Climate Change Commission (2021) report.[38] Most importantly, with decreases in other sectors' activities (including construction, wholesales, retail, office and transport sectors), the demand for the electricity sector will decrease.

Table 23 Summary of change in floorspace required by sector, for medium and high population projection scenarios

Unit: square metre. The presented figures are change from 2024 (baseline).

	Medium			High		
Sector	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Primary industry	19,021	43,676	59,302	63,690	87,197	157,230
Manufacturing-heavy	92,172	-44,887	-47,174	160,904	-15,222	10,916
Manufacturing-light	81,530	46,117	42,155	160,249	111,836	167,531
Electricity, gas, water and waste services	140,847	-686,130	-752,627	504,582	-571,715	-558,625
Construction	13,941	-106,406	-83,616	122,482	-38,127	83,126
Wholesales	40,652	-214,026	-198,751	191,396	-146,551	-59,971
Retail-small	9,257	-5,025	-926	40,274	18,847	49,679
Retail-large	9,702	-23,513	-18,497	45,641	-1,500	30,907
Retail-food	4,978	548	4,857	23,283	17,529	38,505
Hospitality	2,739	18,901	27,141	13,646	32,533	58,050
Transport	16,731	-131,557	124,531	106,720	-97,892	334,957
Office	3,436	-7,338	-5,581	16,497	1,057	13,281
Education	5,756	82	4,225	27,059	19,570	42,685

38 The marginal increase in floorspace required for the electricity sector is driven by the floorspace required per employee.

Health	4,458	90	2,706	18,954	12,123	27,736
Arts and recreation	57,974	-28,276	-15,221	197,842	35,546	162,191
Total	**503,195**	**-1,137,744**	**-857,477**	**1,693,219**	**-534,768**	**558,198**

Source: Principal Economics

Table 24 summarises infrastructure ready floorspace capacity by broad sectors according to zoning regulations and assumptions on mixed use zoning composition provided by DCC. Industrial land capacity assumes a 50 per cent floorspace to land area ratio. Industrial transition areas and potential infill capacity within are assumed to be infrastructure ready by the medium term.

Table 24 Summary of capacity by broad sectors

Unit: square meter.

Broad sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Industrial	351,000	453,850	453,850
Retail large format	1,600	20,600	20,600
Retail and commercial services	179,300	195,200	195,200
Office	108,700	118,900	118,900

Source: Principal Economics

Table 25 provides summary of sufficiency by sectors under medium and high (population projection) scenarios. Under the medium scenario there is generally enough capacity to meet sufficiency except for large retailing. This is due to the limited number of areas where bulky goods retailing is permitted under the DCC 2GP. As part of our assumptions include the intensification of zoned land, Table 25 shows that this insufficiency is alleviated over the medium term. It is important to note there is significant uncertainty in this assumption as this depends on the intensification of currently occupied but underutilised land, which is particularly scarce given the land area typically used for large format retailing.

Under the high scenario there will be insufficient industrial land over the short-term. This aligns with comments from the stakeholder engagement where many express concerns over the supply of industrial land in Dunedin. This insufficiency is likely to alleviate with the uptake of industrial transition areas, such as those in Green Island / Fairfield and Burnside. Retail and commercial services is projected to have enough capacity under the medium scenario. Under the high scenario insufficiency across these sectors is estimated to be around 77,878sqm over the short term due to higher population growth. This may be partly mitigated by shifts in use from residential to commercial purposes (of which we assumed 17,100sqm to be adopted within commercial Mixed Use zone over the short-term and a total of 39,600sqm over the long term) but will require further intensification of business land through the redevelopment of existing sites (we have not assessed the potential of redevelopment in this report).

We assume that any surplus capacity or insufficiency is experienced by each sector relative to the current composition of floorspace within Dunedin City. We estimate this composition using current employment counts converted to floorspace based on the ratios provided in 0Appendix E .

Zoning constraints (particularly for large format retailing corresponding closely with bulky good retailing within the DCC 2GP) have been applied to reflect the effects of the 2nd Generation District Plan. We disaggregate sufficiency for education and health to exclude activities such as hospitals and schools given that these activities do not generally locate within business land zones. We discuss the sufficiency of these sectors in Section 3.4.1.2.

Table 25 Summary of sufficiency by sectors – Medium scenario

Unit: square meter.

Industrial sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Primary industry	-2,315	66,447	56,266
Manufacturing- heavy	-6,093	174,891	148,095
Manufacturing- light	-5,466	156,911	132,870
Electricity, gas, water and waste services	-2,139	61,388	51,983
Construction	-16,794	482,075	408,214
Wholesales	-11,966	343,483	290,856
Transport	-9,122	261,868	221,746
Industrial Total	**-53,894**	**1,547,064**	**1,310,029**

Retail and commercial sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Retail-small	33,468	64,568	59,402
Retail-large	-8,102	44,113	39,097
Retail-food	10,043	19,375	17,825
Hospitality	18,758	36,189	33,294
Office	53,485	103,185	94,930
Adult Education	72	139	128
Health (excl. Hospitals and residential health services)	19,558	37,732	34,713
Arts and recreation	30,302	58,459	53,782
Retail and commercial Total	**157,584**	**363,760**	**333,171**

Source: Principal Economics

Table 26 Summary of sufficiency by sector – High scenario

Unit: square metre.

Industrial sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Primary industry	-41,191	48,290	13,688
Manufacturing- heavy	-108,415	127,102	36,027
Manufacturing- light	-97,269	114,034	32,323
Electricity, gas, water and waste services	-38,055	44,614	12,646
Construction	-298,838	350,346	99,305
Wholesales	-212,925	249,625	70,755
Transport	-162,332	190,312	53,943
Industrial Total	**-959,023**	**1,124,323**	**318,686**

Retail and commercial sectors	ST (2024-2027)	MT (2024-2034)	LT (2024-2054)
Retail-small	-12,438	39,403	-3,695
Retail-large	-7,687	29,044	-21,669
Retail-food	-3,732	11,824	-1,109
Hospitality	-6,971	22,085	-2,071
Office	-19,877	62,970	-5,905
Adult Education	-27	85	-8
Health (excl. Hospitals and residential health services)	-7,268	23,026	-2,159
Arts and recreation	-19,877	62,970	-5,905
Retail and commercial Total	**-77,878**	**251,407**	**-42,520**

Source: Principal Economics

3.4.1.1. Education and health sufficiency

The Ministry of Education identifies three catchments within Dunedin, North, South, and Taieri. All three areas have been identified as being steady and stable with the Education Network Plan with needs of schooling network being meet over the next decade to 2030 (Ministry of Education, 2022). As noted in the previous Dunedin BDCA, no additional net space is expected to be required for schools due to the declining school-aged population, and local distribution of school aged-children is more likely to be a factor.

Under the population projections used for this assessment individuals aged 0-14 is projected to peak in 2023 at 20,844 and decrease steadily to 19,817 by 2043. Similarly, population projections for individuals aged 15-24 peaked in 2018 with 28,558 people and projected to decrease to 27,774 by 2043.

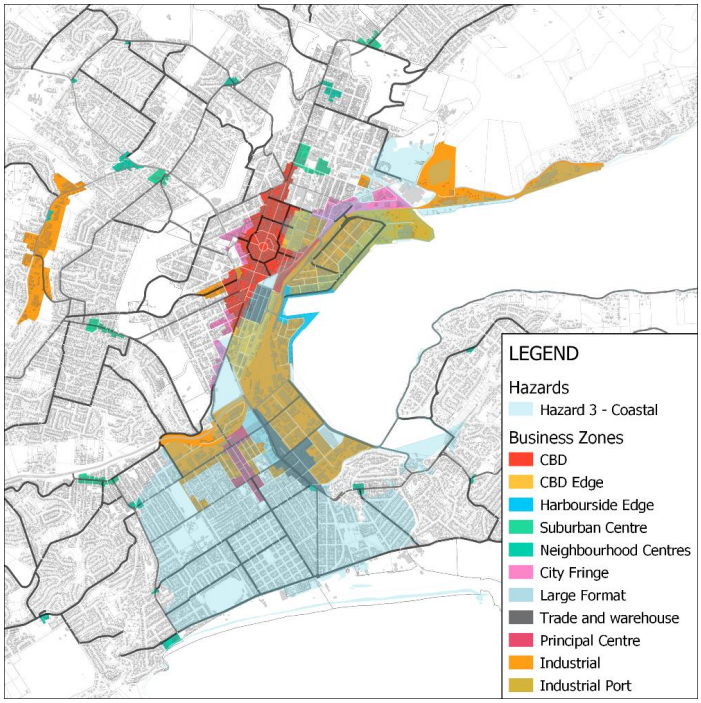
As noted in the Dunedin BDCA 2019, planning for the Dunedin Hospital rebuild was based on demand modelling for Otago and Southerland regions out to 2043 (DCC, 2019). This is further elaborated on in the detailed business case for the New Dunedin Hospital (Sapere et al., 2021).

3.4.1.2. Dunedin specific supply uncertainty

We are aware of the uncertainty that climate change poses to Dunedin City particularly regarding Coastal Hazards and liquefaction. We accounted for the impact of climate change on business demand using the findings from the Climate Change Commission report. Given the uncertainty of events occurring we propose reporting on amount of business land capacity identified as being at risk and their hazard likelihood i.e., 1:100-year storm surge levels. This will provide clarity to readers as to the potential loss in business land capacity within Dunedin if such an event were to occur.

We are aware that the Council are undertaking an assessment of the climate change impacts using Adaptive Decision Policy Pathway (DAPP).[39] This is a useful approach for assessing climate change uncertainties, which supports flexibility in decision making. We suggest the Council should use the outputs of the options (pathways) and use that as an input for the BDCA. This will provide the Council with more information on the plausible sufficiency outcomes in MT and LT.

Figure 17 Uncertainty of climate change in Dunedin – Coastal Hazards



Source: DCC, LINZ

39 Principal Economics (2022) provided suggestions on how an adaptive decision-making (ADM) approach to climate change can be used for evaluating economic land transport activities in New Zealand and be incorporated into Waka Kotahi's Investment Decision Making Framework (IDMF).

4. Further discussion and future research

This report provides a comprehensive assessment of business development capacity in Dunedin and includes references to a range of supporting documents (and analyses). There are wider discussions relevant to this report, which we cover in this chapter.

The recent New Zealand Productivity Commission report discusses that the existing infrastructure deficit has led to a failure to align investment rates with population growth. The report suggests that it is important to build the assets needed to support more people in the community ahead of time: "The inability or unwillingness in the past to fund this infrastructure suggests that pre-pandemic rates of inwards migration will not be sustainable in the future." (NZ Productivity Commission, 2021)

The NZPC report also discusses that "Policy reforms such as better planning, land use regulation, and improved funding and building of infrastructure would have significant wellbeing and productivity benefits for New Zealanders, and should be pursued regardless of immigration levels." (NZPC, 2021; p. 38).

An important constraint in our analysis is the population projections, which is an input to our assessment. The medium projections suggested a lower growth over the coming years, for ST, MT and LT, in comparison to the growth over the last years. Infometrics (2020) provided a range of reasons for this, after accounting for the impact of COVID-19 and the likely recovery path. Infometrics recommended to consider future updates of the population projections to inform the impact of COVID-19 – this is a useful suggestion. In our assessment, we investigated the high-growth scenario in addition to the medium population growth scenario. Our results show significant impacts on our sufficiency assessment when we consider the high-growth scenario. In addition to these scenarios, we suggest that there will be a need for a scenario analysis of 'what if Dunedin's economy would not be constrained by its population growth – i.e., what if Dunedin will provide the living and business environments which will lead to economic (and population) growth?' This is an important question, because we think that an enabling planning regulation could decrease costs of living and business.

The focus of our assessment was on the requirements of the BDCA. We suggest the Council to consider further assessment of the followings:

1- The drivers of the lower population growth in Dunedin, with a causal assessment of the factors of location choice.
2- The impact of planning policy on price of residential and business land. For this assessment a robust methodology will be required.
3- Relevant to the two previous questions, the Council should further investigate the historic/existing constraints on regional economic growth and identify the role of infrastructure investments in unlocking economic growth.

Another issue to raise with the Ministry for the Environment (MfE) and the Ministry of Housing and Urban Development (HUD) is the need for providing further guidelines for the modelling of BDCA. This analysis is very sensitive on the parameters used. It is important to:

- clarify the correct definition of the counterfactual scenario.
- provide a list of criteria, which are important for identifying an appropriate population projection, and short list the important criteria.
- as discussed, the requirement of the NPS-UD 2020 to provide outputs by location requires further clarification on the relevance of administrative boundaries to business demand by taking into account the concept of spatial equilibrium.

Further identification of the shortcoming of the current guidelines provided by the NPS-UD (2020) is beyond the scope of our assessment.

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Appendix A Impacts of climate change policy

The Climate Change Commission report notes that "Our assessment of the impact on GDP provides some useful insights but it does not include these benefits and opportunities, nor the costs related to not acting. It is difficult to fully quantify the benefits of action on the economy and society with any accuracy as there is significant uncertainty in how and when the benefits will be realised." Table 27 provides a description of climate policy's targets in short-, medium-, and long-terms. These impacts are captured in our assessment.

Table 27 Climate policy – description of targets and timing

		Budget 1	Budget 2	Budget 3
Transport	Lower-emissions vehicles	Accelerate uptake of electric and zero-emissions cars, buses and trucks Improve efficiency of vehicles and freight movement		Phase out imports of internal combustion engine light vehicles
	Reducing vehicle trips	Encourage switching to walking, cycling and public transport Reduce demand for travel, for example through smart urban development and increased working from home Increase use of rail and coastal shipping for freight		
	Aviation and shipping	Improve efficiency	Start electrifying ferries and coastal shipping	Start electrifying short-haul flights
	Low carbon liquid fuels		Increase use of biofuels	
Energy, industry and buildings	Buildings	No new fossil gas heating systems installed after 2025 Improve thermal efficiency		Start phasing out existing fossil gas use in buildings
	Electricity	Phase out fossil base-load generation	Transmission and distribution grid upgrades Expand renewable generation	Achieve ~95% renewable generation
	Industrial process heat	Replace coal with biomass and electricity		Replace fossil gas with biomass and electricity
Land	Agriculture	Adopt low-emissions practices on-farm	Adopt low-emissions breeding for sheep	Encourage new low biogenic methane technologies to be adopted when available
	Native forests	Ramp up establishing new native forests		Establish 25,000 ha per year
	Exotic forests	Average 25,000 ha per year of new exotic forests		Ramp down planting new exotic forests for carbon storage
Waste and F-gases	Waste	Divert organic waste from landfill Improve and extend landfill gas capture		
	F-gases	Increase end-of-life recovery of F-gases		

Source: Climate Change Commission (2021, p. 103)

Appendix B Data sources

Table 28 contains information about the data sources used for different parts of the BDCA. This information will be complemented with the information from Statistics New Zealand (Stats NZ) on employment and capital and labour productivity of different sectors, which are inputs to our models.

Table 28 Data sources

Input	Comments	Source
Employment counts	Business demographic data at SA2 and ANZSIC06 Level 3 disaggregation.	Statistics NZ Business Demographics
Business concentration	Businesses tend to cluster for agglomeration benefits which impacts their locational choice.[40]	Statistics NZ Business Demographics and Principal Economics analysis
Parcel sizes	NZ Primary Parcels	LINZ or provided by DCC
Building coverage	NZ Building Outlines	LINZ or provided by DCC
Distance from arterial roads / state highways	Roading network	Open Street Map, LINZ and Principal Economics analysis
Population density	Census 2018, Geographic boundaries	Statistics NZ and Principal Economics analysis
Average site slope	NZ Contours	LINZ and Principal Economics analysis
Territorial authority boundaries	Geographic boundaries	Statistics NZ
Distance from CBD	We use commercial employment concentration as a proxy for determining the centre of CBD.	Statistics NZ and Principal Economics analysis.
Distance from ports	We use the boundary ports land and measure the distance using GIS analysis.	Ministry of Transport and Principal Economics analysis
Distance from nearest public transit stop	We use GTFS data from public transport providers for different urban areas and measure the distance using GIS analysis.	Various providers.
Building heights	To be used in compare planned capacity against existing development.	3DBuildings
Rectangularity index	We determine the "rectangularity" of a site using GIS analysis.[41]	LINZ and Principal Economics analysis.
Exposure and visibility index	We determine level of visibility a site has from the road using GIS analysis.[42]	LINZ and Principal Economics analysis.

40 Maré, David C. and Graham, Daniel J., Agglomeration Elasticities in New Zealand (June 1, 2009). Motu Working Paper No. 09-06

41 Marzeh, Z., Tahmasbi, M., & Mirehi, N. (2019). Algorithm for finding the largest inscribed rectangle in polygon. 1, 13.

42 We define a proxy value of exposure and visibility based on the proportion of a site perimeter that faces the road.

Fibre network connectivity	While we can assess the locational requirements for fibre connection, a scan of the data indicates that nearly all sites in Dunedin are included.	Commerce commission
Resource and building consent data	We use to inform our analysis as a potential existence of business land constraints	DCC
Property sales data	We use this as an input to our assessment of business land demand.	DCC
Capital value, land value and improvement value	We use rating value data as part of our assessment for determining business vacant land in Dunedin.	DCC
Zoning from 2nd Generation District Plan	We use land zoning data to determine the classification of business zone land sites.	DCC
Structural plans for 2nd Generation District Plan	We use structural plans for the 2GP to determine the extent of floorspace permitted on business zoned land sites.	DCC
Population projections	We use population projections from DCC as part of our inputs for forecasting business land demand.	DCC

Source: Principal Economics

We provide a list of the available methods for the required business demand outcomes in Table 29 and evaluate their usefulness based on a range of criteria.

Table 29 Available methods for estimating business activity (and projections/forecasts)

Criteria	Importance for BDCA	Simulation (SEAM)	VAR	IO	Subregional CGE
Exogenous population base	H	✓	✓	✓	
Times series output (forecasts)	H	✓	✓	✓	
Granular business sectors	H	✓*	✓		✓
Granular geographic outputs (SA2)	M	✓	✓		✓*
Uncertainty of parameters	M	✓	✓		
Uncertainty of inputs[43]	M	✓*			✓
Scenario modelling	L	✓		✓	✓
Inter industry relationships	L	✓	✓	✓	✓
Usefulness for identifying the sectors	H				✓

Source: Principal Economics

Notes: L, M and H in the importance for BDCA represent Low, Medium and High importance.

✓ represents the possibility of using the method.

✓* represents the possibility of using the method with some extra steps.

Empty cells suggest the unsuitability of the method for a criterion.

43 This includes accounting for the changes in productivity of land and labour (for different sectors) that may influence future trends – which is important for medium and long terms.

Appendix C Regression results on factors of land demand

Table 30 shows our estimated impact of different factors on choice of location of different sectors. Sectors are labelled as follows:

(1) Agriculture (Primary industry), (2) Manufacturing heavy, (3) Manufacturing light, (4) Electricity, (5) Construction, (6) Wholesales, (7) Retail-small, (8) Retail-large, (9) Retail-food, (10) Hospitality, (11) Transport, (12) Office, (13) Education, (14) Health, (15) Art.

The employed regression method is a linear log-log method, and therefore all explanatory variables are in logarithmic form. For capturing the impact of size, we grouped the parcel areas (PA) to three equal groups in each area, namely PA1, PA2, and PA3. We include three variables of population at 1km, 2km and 3km distance to the parcel.[44] We also include four variables of employment in 1km, 2km and 3km distance. For understanding the significance of these variables, we need to consider their joint significance – as presented in the bottom of the table (those with statistically significant effects are bolded).

44 We have identified the appropriate distance km variables based on their explanation for the output variable – using AIC and adjusted R-squared measures.

Table 30 Regression results on the factors of location choice for different sectors

Method: log-log regression analysis; the output is the logarithm of the GDP of each sector – presented on different columns.

Sector:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
PA1	0.083	0.105	0.107**	-0.197*	0.017	0.040	0.009	-0.023	-0.122*	-0.082*	0.084	-0.067*	-0.095**	-0.019	0.070
	(0.06)	(0.07)	(0.05)	(0.12)	(0.03)	(0.05)	(0.04)	(0.04)	(0.07)	(0.04)	(0.05)	(0.04)	(0.04)	(0.06)	(0.06)
PA2	-0.007	0.045	0.072***	-0.080	0.007	-0.001	0.027	0.017	0.010	-0.003	0.080***	0.015	-0.022	0.085**	0.017
	(0.04)	(0.05)	(0.03)	(0.06)	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.04)	(0.04)
PA3	0.079**	0.004	-0.054**	0.048	-0.007	0.003	-0.024	-0.057**	-0.026	-0.026	-0.030	-0.044**	0.019	-0.011	0.077**
	(0.03)	(0.05)	(0.02)	(0.05)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)
Bld coverage	-0.146**	0.217**	0.184***	-0.154	0.032	0.086*	0.009	0.029	0.173**	0.025	0.248***	-0.040	0.004	0.016	0.247***
	(0.07)	(0.11)	(0.06)	(0.18)	(0.04)	(0.05)	(0.05)	(0.05)	(0.08)	(0.06)	(0.07)	(0.06)	(0.05)	(0.09)	(0.08)
Arterial road	0.094*	0.166***	0.045	0.102	0.036	0.132***	-0.076**	-0.018	-0.196***	-0.168***	0.032	-0.068**	0.038	-0.085*	-0.018
	(0.05)	(0.06)	(0.04)	(0.09)	(0.03)	(0.05)	(0.03)	(0.04)	(0.05)	(0.04)	(0.05)	(0.03)	(0.04)	(0.05)	(0.05)
Pop km1	-0.070	-0.203***	-0.186***	-0.224**	-0.131***	-0.248***	0.006	-0.087*	0.041	0.060	-0.186***	-0.095***	0.048	-0.050	-0.116**
	(0.05)	(0.07)	(0.05)	(0.10)	(0.05)	(0.05)	(0.04)	(0.05)	(0.08)	(0.05)	(0.05)	(0.03)	(0.05)	(0.07)	(0.05)
Pop km2	-0.118	0.179*	0.025	0.000	0.062	0.125	0.046	-0.130	0.033	-0.060	0.157*	-0.102**	0.036	0.120	-0.040
	(0.07)	(0.10)	(0.08)	(0.17)	(0.06)	(0.08)	(0.08)	(0.08)	(0.10)	(0.07)	(0.08)	(0.05)	(0.06)	(0.09)	(0.08)
Pop km3	0.027	0.026	-0.035	0.350**	0.014	-0.017	-0.032	0.136*	-0.257***	-0.098	-0.091	0.091	-0.129*	-0.298***	0.067
	(0.07)	(0.10)	(0.09)	(0.15)	(0.06)	(0.09)	(0.07)	(0.08)	(0.09)	(0.07)	(0.08)	(0.06)	(0.07)	(0.10)	(0.08)
Emp km1	0.018	-0.049*	-0.007	-0.040	-0.045***	-0.014	0.030**	0.023	-0.009	0.030**	-0.030*	0.015	0.006	0.020	0.005
	(0.02)	(0.03)	(0.02)	(0.04)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Emp km2	-0.019	-0.016	0.004	-0.022	0.002	0.019	-0.028	0.027	0.022	-0.066*	-0.059	0.029	0.071***	0.088**	0.072**
	(0.04)	(0.05)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.03)
Emp km3	-0.085*	-0.028	0.075	-0.062	0.010	0.129***	0.052	0.029	0.077	0.095**	0.052	0.065*	0.133***	0.286***	0.041
	(0.05)	(0.05)	(0.05)	(0.08)	(0.03)	(0.05)	(0.03)	(0.04)	(0.06)	(0.04)	(0.05)	(0.04)	(0.04)	(0.06)	(0.04)

Emp km4	0.000	0.123**	0.063	0.051	0.096***	0.046	0.029	0.001	0.031	0.063*	0.036	0.052*	0.025	-0.003	-0.051
	(0.04)	(0.05)	(0.04)	(0.06)	(0.03)	(0.04)	(0.03)	(0.04)	(0.06)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)
PT	0.046	-0.086	-0.035	-0.094	-0.020	-0.077	0.019	-0.045	0.031	-0.148***	0.032	-0.056	-0.080	-0.083	-0.156**
	(0.07)	(0.07)	(0.05)	(0.13)	(0.04)	(0.05)	(0.04)	(0.04)	(0.08)	(0.04)	(0.05)	(0.04)	(0.05)	(0.05)	(0.06)
Seaport	-0.005	-0.021	0.004	-0.004	0.061	-0.184***	0.088**	-0.046	0.099	-0.027	-0.117*	-0.189***	0.090*	0.098	-0.006
	(0.08)	(0.09)	(0.05)	(0.15)	(0.05)	(0.06)	(0.04)	(0.06)	(0.06)	(0.05)	(0.07)	(0.04)	(0.05)	(0.06)	(0.07)
Airport	-0.133	-0.126	-0.098	0.135	0.091	0.086	0.111*	-0.009	0.085	0.153**	-0.315***	0.231***	-0.045	0.023	-0.090
	(0.14)	(0.10)	(0.08)	(0.22)	(0.06)	(0.08)	(0.06)	(0.08)	(0.10)	(0.08)	(0.11)	(0.07)	(0.07)	(0.08)	(0.10)
Bld height	0.074	-0.189*	-0.102	-0.146	0.127	-0.096	-0.021	-0.006	0.106	0.065	-0.138	0.181**	-0.196***	-0.218**	-0.105
	(0.09)	(0.11)	(0.07)	(0.22)	(0.08)	(0.09)	(0.07)	(0.07)	(0.12)	(0.08)	(0.08)	(0.09)	(0.07)	(0.10)	(0.12)
Slope	-0.148	-0.358***	-0.002	-0.202	-0.078	-0.064	-0.015	-0.102	-0.227**	-0.021	0.033	0.121**	0.011	-0.133	0.059
	(0.10)	(0.12)	(0.07)	(0.17)	(0.06)	(0.07)	(0.05)	(0.07)	(0.09)	(0.06)	(0.08)	(0.06)	(0.07)	(0.08)	(0.09)
GDP others	0.333***	0.790***	0.833***	0.511***	0.458***	0.817***	0.779***	0.943***	0.495***	0.557***	0.700***	0.864***	0.190***	0.146*	0.335***
	(0.08)	(0.09)	(0.07)	(0.14)	(0.05)	(0.07)	(0.05)	(0.06)	(0.08)	(0.06)	(0.06)	(0.06)	(0.06)	(0.09)	(0.07)
Squareness	0.599	-0.967*	-0.328	0.547	-0.126	-0.422	0.464**	0.384	-0.404	0.116	-0.966***	0.260	-0.093	-0.238	-0.727
	(0.37)	(0.50)	(0.40)	(0.80)	(0.25)	(0.28)	(0.22)	(0.24)	(0.32)	(0.25)	(0.31)	(0.27)	(0.26)	(0.56)	(0.48)
CBD dist	0.046	0.305***	0.229***	-0.128	0.184***	0.126	0.011	0.146**	0.251***	-0.098*	0.138*	-0.068	0.069	-0.125	-0.247***
	(0.09)	(0.10)	(0.06)	(0.18)	(0.06)	(0.08)	(0.06)	(0.07)	(0.10)	(0.06)	(0.07)	(0.07)	(0.06)	(0.08)	(0.09)
Constant	-0.040	-5.966***	-3.801***	-1.962	-3.735***	-4.021***	-4.433***	-3.231**	-2.519*	1.035	0.438	-0.632	-0.400	0.853	1.999
	(1.74)	(1.82)	(1.28)	(3.18)	(1.03)	(1.40)	(1.01)	(1.27)	(1.48)	(1.10)	(1.55)	(1.03)	(1.14)	(1.45)	(1.53)
R2_adj	0.415	0.472	0.517	0.283	0.364	0.572	0.596	0.575	0.298	0.476	0.455	0.655	0.206	0.306	0.242
R2	0.458	0.500	0.531	0.382	0.380	0.587	0.606	0.588	0.323	0.490	0.474	0.664	0.227	0.326	0.274
Log likelihood	-382.164	-616.364	-1067.124	-231.206	-1075.749	-885.895	-986.343	-985.396	-932.185	-1046.590	-870.906	-1085.571	-1131.595	-1169.002	-737.131
Pop Wald	**0.05**	0.36	**0.01**	0.24	0.93	0.857	0.59	0.11	0.25	0.232	**0.04**	0.14	**0.10**	**0.07**	**0.01**

Pop margin	0.156	0.154	0.125	-0.229	0.017	0.042	0.012	-0.064	-0.139	-0.111	0.134	-0.095	-0.097	0.054	0.164
Emp Wald	0.21	**0.04**	0.18	0.44	**0.00**	**0.01**	**0.07**	0.32	0.36	**0.01**	0.13	**0.03**	**0.01**	**0.00**	**0.08**
Emp margin	-0.086	0.031	0.135	-0.073	0.063	0.180	0.084	0.079	0.121	0.123	-0.001	0.161	0.235	0.391	0.068

Source: Principal Economics

Note: Standard errors reported in parentheses; * p < 0.10, ** p < 0.05, *** p < 0.01; The significance level for joint Pop terms (Pop Km1, Pop Km2, Pop Km3) are jointly reported in the "Pop Wald" row. Similarly, the joint significance levels are reported for Emp km terms. The Pop margin provides information about the impact of all Pop terms. The Emp margin provides information about the impact of all Emp km terms.

Appendix D Stakeholder engagement survey

Business land development capacity assessment
Stakeholder survey

The purpose of this survey is to seek input from anyone who has information that may materially affect the calculation of development capacity as per clause 3.12(1)(c) if the NPS-UD. We have interpreted this clause to include providers, developers, local experts and users of businesses land, accounting for both the supply of business land and demand from users of business land.

Your views will be incorporated in our assessment of business land capacity for Dunedin City Council and how we define the suitability of business land as it relates to its users. This is an important input to the future of business land supply in Dunedin.

All individual responses to this survey are confidential and will not be shared to anyone else.

Your details	Please fill in your details below
Name:	
Organisation:	
Contact email:	

1) Which of the following best describes your role?

Select one - Place an X in the cell you feel applies to you.

Role types	Pick one or more
Investor	
Developer	
Owner occupier	
Leasee	
Property Broker	
Real estate agent	
Other (please specify)	

If other please specify here:

2) What sort of properties do you mainly deal with?

Select one - Place an X in the cell you feel applies to you.

Property types	Pick one or more
Office	
Retail	
Industrial	
Other (please specify)	

If other please specify here:

3) How important are the following criteria to you?

Please fill out each row - Place an X in the cell you feel applies to you.

3a) Building space	Not Important at all	Of little Importance	Average Importance	Very Important	Absolutely Essential
Floorspace - Small footprint					
Floorspace - Medium footprint					
Floorspace - Large footprint					

3b) Surroundings / Environment	Not Important at all	Of little Importance	Average Importance	Very Important	Absolutely Essential
Surrounding private amenities (e.g. cafes, entertainment, supermarkets, etc.)					
Quality of nearby public space and amenities (streets and parks)					
Being close to residential areas					
Proximity to owners residence					
Proximity to suppliers					
Proximity to competitors					
Proximity to port					
Proximity to motorway					
Proximity to rail					
Proximity to airport					

3c) Infrastructure and accessibility	Not Important at all	Of little Importance	Average Importance	Very Important	Absolutely Essential
ICT connectivity/capacity					
Water					
Sewerage					
Stormwater					
On-site					
Parking for staff (on site)					
Parking for customers (on site)					
Parking for customers (off site)					
Roading (car) accessibility					
Walking accessibility					
Public transport accessibility					

3d) Are there any other significant site / building characteristics that are important?

Please specify, if your answer is yes.

4) Is there anything you feel that is limiting the growth of business markets that could be improved by Council?

Please specify, if your answer is yes.

5) Do you feel there is anything the Council could do to help grow business markets?

Please specify, if your answer is yes.

6) What are the challenges you face regarding business land development?

Please specify, if your answer is yes.

7) Do you feel there are insufficient sites in any specific locations?

Please select one - Place an X in the cell you feel applies to you.

	Pick one
Yes	
No	

7a) If so, what specific locations?

If yes, please specify.

For example, Dunedin CBD, Mosgiel, Port Area, Harbourside, Green Island and etc.

7b) If yes, are there specific business sector locations that this applies to?

If yes, please specify.

For example, restaurants and cafes, retail shopping, warehousing, logistics, financial services and etc.

7c) How about for specific site characteristics?

If yes, please specify.

For example, site size, maximum building heights, site slope, etc.

8) Are there any infrastructure constraints worth noting?

If yes, please specify.

For example infrastructure such as Freshwater, Waster water, Stormwater, Electricity, Internet connection, Roading network, Public Transport, Telecommunications and etc.

9) If you are an owner occupier or leasing a commercial/industrial property do you have any plans to move?

Please select one - Place an X in the cell you feel applies to you.

	Pick one
Yes	
No	

9b) If yes, where are you planning to move to?

If yes, please specify.

This is end of the survey, thank you.

Appendix E Employee to floorspace ratios

Table 31 Employee to floorspace ratios

Sector	Floorspace per employee (sqm)	Source
Primary industry	73	Provided by DCC.
Manufacturing - light	60	Market Economics (2021) - Other built industrial
Manufacturing - heavy	138	Market Economics (2021) - Factory
Electricity, Gas, Water and Waste Services	167	Market Economics (2021) - Warehouse
Construction	136	Provided by DCC.
Wholesale	167	Market Economics (2021) - Warehouse
Large format retail	47	Based on Market Economics (2015) floorspace to employee ratios, weighted average of employees in aggregated sectors.
Small format retail	47	Based on Market Economics (2015) floorspace to employee ratios, weighted average of employees in aggregated sectors.
Food retailing	18	Based on Market Economics (2015) floorspace to employee ratios, weighted average of employees in aggregated sectors.
Hospitality	15	Based on Market Economics (2015) floorspace to employee ratios, weighted average of employees in aggregated sectors.
Transport, Postal and Warehousing	136	Provided by DCC.
Office	20	Based on Market Economics (2015) floorspace to employee ratios, weighted average of employees in aggregated sectors.
Education	32	Provided by DCC.
Health	17	Provided by DCC.
Arts and Recreation Services	90	(Home and communities agency, 2015)

Table 32 Employee to floorspace ratios for the health sector

Health sector	Floorspace per employee (sqm)	Source
Q840100 Hospitals (Except Psychiatric Hospitals)	60	DCC HQ Health
Q840200 Psychiatric Hospitals	60	DCC HQ Health
Q851100 General Practice Medical Services	17	DCC MQ Health
Q851200 Specialist Medical Services	17	DCC MQ Health
Q852000 Pathology and Diagnostic Imaging Services	60	DCC HQ Health
Q853100 Dental Services	17	DCC MQ Health
Q853200 Optometry and Optical Dispensing	17	DCC MQ Health
Q853300 Physiotherapy Services	17	DCC MQ Health
Q853400 Chiropractic and Osteopathic Services	17	DCC MQ Health
Q853900 Other Allied Health Services	17	DCC MQ Health
Q859100 Ambulance Services	60	DCC HQ Health

Q859900 Other Health Care Services n.e.c.	17	DCC MQ Health
Q860100 Aged Care Residential Services	60	DCC HQ Health
Q860900 Other Residential Care Services	60	DCC HQ Health
Q871000 Child Care Services	17	DCC MQ Health
Q879000 Other Social Assistance Services	17	DCC MQ Health

Appendix F Determining commercial mixed use land vacancy

To determine current business land capacity, we primarily rely on the information provided by Dunedin District Council on the second-generation district plan. Additionally, we use other relevant information including rating valuation and property and build footprint data.

We determine the plan-enabled business land capacity by first identifying parcels that lie within business land zones as defined under the 2nd Generation District Plan. This is to ensure the assessment includes land available for business use only and excludes features such as roading and footpaths that would overestimate the availability business land. This is to ensure the assessment includes land available for business use only and excludes features such as roading and footpaths that would overestimate the availability of business land.

As part of the capacity assessment, we undertook a visual inspection of business zoned land to ground truth our capacity estimates. Where we found anomalies that did not match our initial outputs, we have adjusted our estimates accordingly.

While there may be cases where development occurs that do not fit the criteria used to determine capacity, we have opted to maintain a level of consistency with the previous Dunedin City Business land capacity assessment to provide comparable results.

Commercial and mixed-use capacity

We have defined vacant land within the zoned area using a range of parameters including:

- Site lies within the Commercial and mixed-use zone boundaries
- Site has less than 10% building footprint coverage
- Total site size is larger than 100sqm
- Site is wider than 8m
- Freehold land title
- Only site areas that lie within the zone boundaries are included
- Improvement value is less than 30% of capital value
- Is not subject to District Plan designation
- Is not used for community, utility services or recreational purposes
- Improvement value is less than $100,000

To determine infill potential, we first determine the land area that is not occupied by an existing structure alongside other limitations including:

- Scheduled heritage sites and structures
- Approximate scheduled tree driplines (assuming a 4m radius from trunks)
- National grid setbacks
- High-risk hazard areas (Hazard 1 overlays)

We omit the constraint of having improvement values less than 30% of capital as this does not require the demolition of existing structures.

A spatial algorithm is used for approximating the largest rectangular building footprint that could potentially fit in the likely 'developable' land area. This method is adopted as rectangle buildings are generally easier to construct, and the most common layout adopted by business land developers.

We apply the maximum height limit based to identified sites and infill development areas based on the sub zone / height overlays defined in the Dunedin 2GP District Plan. Where maximum storey information is unavailable, we use building height limits and assume each building storey requires 4m. The results of these estimates are show in Table 7.

Table 33 Dunedin City 2GP District Plan height limits

Sub zone / height overlay	Building height limit	Estimated number of storeys
Central Business District	16	4
Central Business District - Adjoining George Street	12	3
Smith Street and York Place	12	3
CBD Edge Commercial North	16	4
CBD Edge Commercial South	16	4
Princes, Parry and Harrow Street	12	3
Harbourside Edge	16	4
Warehouse Precinct	16	4
Neighbourhood Destination Centre	12	3
Principal Centre	12	3
Suburban Centre	12	3
Trade Related	16	4
Rural Centre	12	3

Source: Principal Economics

We adopt the activity composition ratios by zone and floor level from the 2019 business land capacity assessment for Dunedin City (DCC, 2019) to estimate potential development capacity by activity. These ratios are attached in shown in Table 34.

Table 34 Ground level and above ground level activity ratios

	Ground level floorspace activity ratio %			
Sub zone	Residential	Office	Retail / Other Commercial	Industrial
Central Business District		20%	80%	
Smith Street and York Place	50%		50%	
CBD Edge Commercial North			75%	25%
CBD Edge Commercial South			75%	25%
Princes, Parry and Harrow Street	50%			50%
Harbourside Edge			50%	50%
Warehouse Precinct		40%	60%	

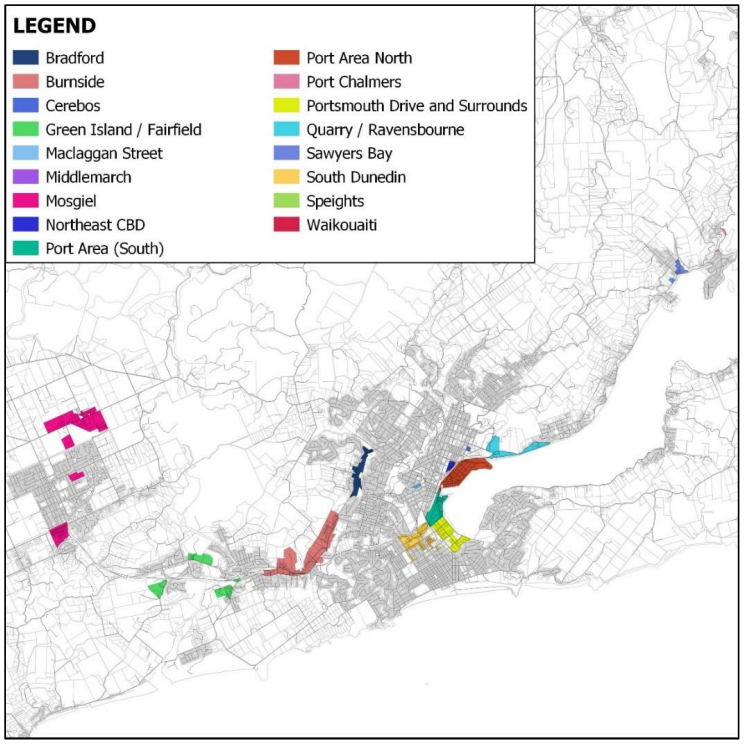
Neighbourhood Destination Centre	10%	90%	0%
Principal Centre	10%	90%	0%
Suburban Centre	10%	90%	50%
Trade Related	0%		
Rural Centre	10%	90%	

	Above ground level floorspace activity ratio %			
	Residential	Office	Retail / Other Commercial	Industrial
Central Business District	10%	90%		
Smith Street and York Place	100%			
CBD Edge Commercial North				
CBD Edge Commercial South				
Princes, Parry and Harrow Street	100%			
Harbourside Edge	80%	20%		
Warehouse Precinct	50%	50%		
Neighbourhood Destination Centre	50%	50%		
Principal Centre	50%	50%		
Suburban Centre	50%	50%		
Trade Related				
Rural Centre				

Source: Dunedin City Council

Appendix G Industrial areas

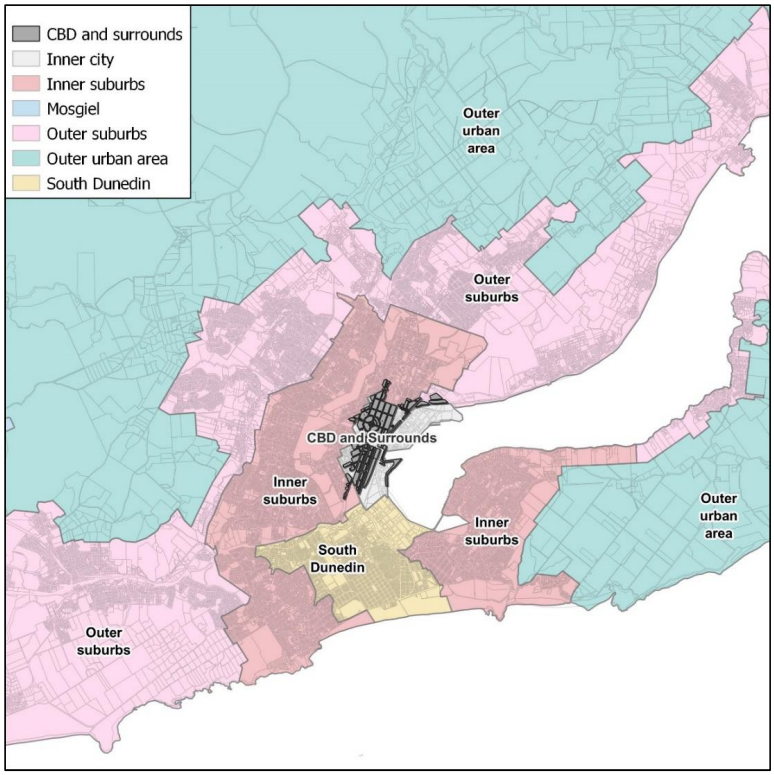
Figure 18 Industrial areas



Source: Dunedin City Council, Principal Economics

Appendix H Urban area catchments

Figure 19 Dunedin commercial and mixed-use zone catchments



Source: Dunedin City Council, Principal Economics

Housing Capacity Assessment

Dunedin City

DRAFT November 2022 update

DUNEDIN CITY COUNCIL | kaunihera a-rohe o Ōtepoti

BACKGROUND

1. This report outlines the current level of projected demand for residential development and the sufficiency of the development capacity enabled through the Second Generation District Plan (2GP).

2. This report should be read alongside the Dunedin City Housing Capacity Assessment (July 2021)[1]. It is not a full assessment and is instead intended to provide an update based on recent changes to key inputs.

DEMAND FOR HOUSING

3. Dunedin is expected to grow by an average of 430 homes per year over 2024-27, dropping to 370 per year over 2027-34 and 80 per year over 2034-54.

4. Table 1 below outlines the total amount of demand for new homes and the capacity that is required to service this demand. The demand for new homes is derived from a combination of population projections, expected demographic changes, and housing preferences. The capacity required to meet demand also incorporates a 15-20% competitiveness margin required by the National Policy Statement on Urban Development (NPS-UD), which aims to ensure the development market operates efficiently.

Table 1: Projected demand for new dwellings

Timeframe	Demand[2]	Capacity required
Short-term (2024-27)	1,290	1,540
Medium-term (2024-34)	3,900	4,680
Long-term (2024-54)	5,560	6,590

5. Dunedin's estimated population growth peaked at 1,800 new residents (a 1.4% growth rate) over the year to June 2016 and has been declining since, reinforced by the altered migration patterns resulting from the Covid-19 pandemic (see Figure 1). Dunedin lost an estimated 2,400 residents over July 2020 – June 2022.

[1] Available at https://www.dunedin.govt.nz/__data/assets/pdf_file/0009/831744/Housing-capacity-assessment-for-Dunedin-City-2021.pdf

[2] Based on Dunedin City 10 year plan 2021-31 significant forecasting assumptions.

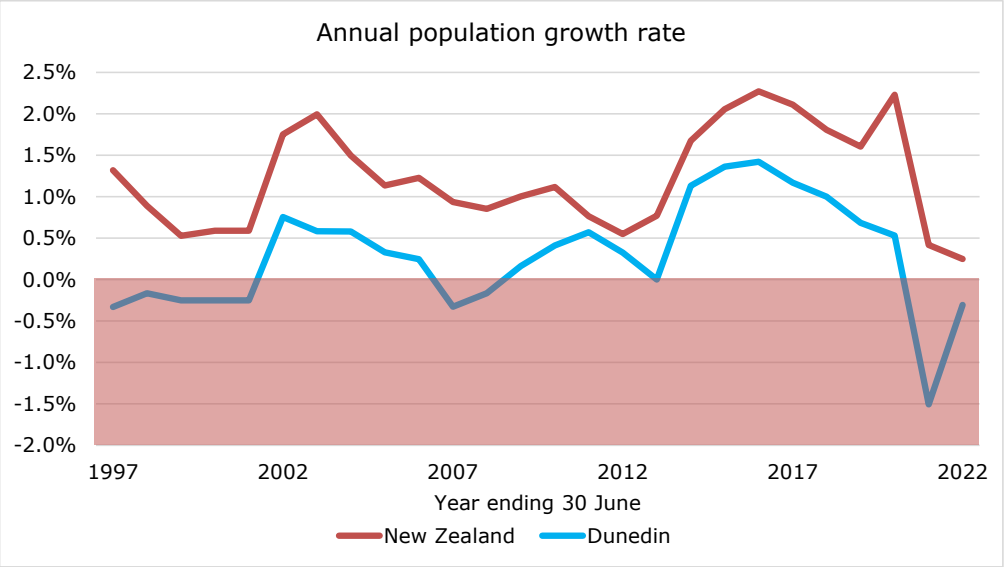


Figure 1: Recent population trends

6. Dunedin's current population projections[3] show a declining growth rate over time. The impacts of Covid-19 are also likely to result in less growth over the short to medium term than previously expected.

7. Dunedin's current population projections are based on projections by Statistics New Zealand released in 2017[4]. Statistics New Zealand have released subsequent updates to their projections in 2020[5] and 2022[6]. The Statistics New Zealand 2022 projections suggest that New Zealand's population growth will be lower than previously expected over the short to medium term due to the ongoing impacts of Covid-19. Longer-term projected growth rates (from approximately 2033 onward) are largely unchanged from their previous 2020 projections, although slightly higher than the 2017 projection used to inform Dunedin's population projections.

8. The demand for housing will be reassessed after the next release of Statistics New Zealand's subnational population projections in December 2022. Based on an analysis of the latest national population projections (which are used to derive the subnational projections) and advice from Statistics New Zealand staff, it is expected that the new projections for Dunedin will be similar to the blue '2022 rebased projection' shown in Figure 2, although with lower growth over the next 5-10 years. This rebased projection replicates the 2021 10 year plan projection but reflects the lower starting point caused by recent declines.

[3] Adopted in the Dunedin City 10 Year Plan 2021-31 significant forecasting assumptions.

[4] Subnational population projections: 2013(base)–2043 update (Statistics New Zealand, February 2017).

[5] National population projections: 2020(base)–2073 (Statistics New Zealand, December 2020).

[6] National population projections: 2022(base)–2073 (Statistics New Zealand, July 2022).

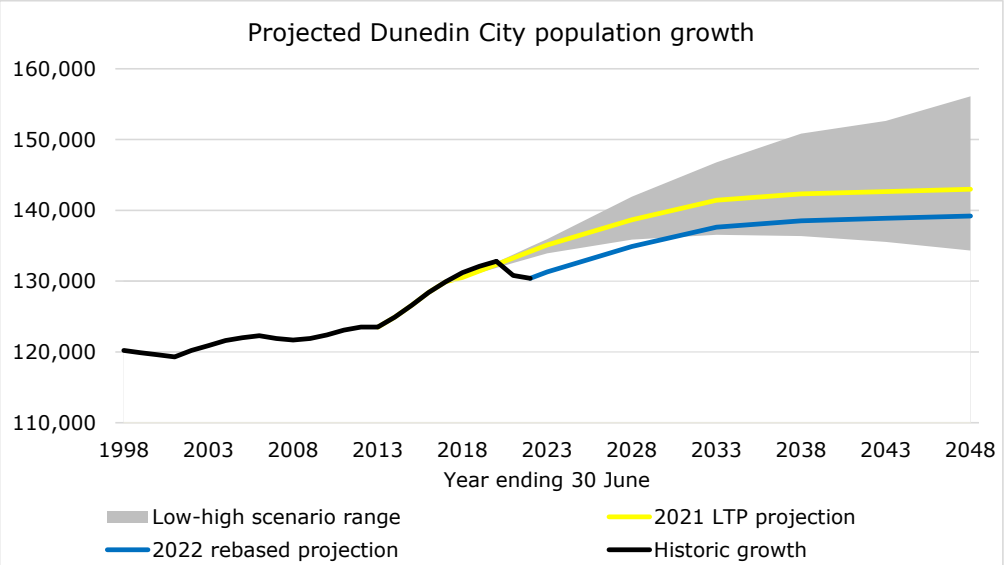


Figure 2: Projected population growth[7]

9. The current calculations of housing demand include the following changes from the 2021 Housing Capacity Assessment:

   - Use of a 2024 base year to align with FDS timeframes.
   - Use of an adjusted ratio of dwellings to households to align with the significant forecasting assumptions in the 2021-31 10 year plan.
   - Removal of the previously assessed latent demand of housing resulting from housing construction falling behind household growth. The 2021 Housing Capacity Assessment included a latent demand of 1,060 dwellings, which was added to future demand for new housing. However due to the continued high number of newly constructed homes and a decline in population, the recent shortfall of built homes has changed into a surplus (i.e. a greater number of homes have been constructed than required to respond to growth).

DEVELOPMENT CAPACITY

10. There is sufficient development capacity to meet demand for housing over all timeframes. The amount and sufficiency of enabled development capacity is outlined in Table 2 below.

[7] The low-high scenario range is sourced from the review of the DCC growth projections by Infometrics (*Dunedin City Growth Projections - Infometrics, June 2020*).

Table 2: Sufficiency of housing development capacity[8]

Timeframe	Short-term[9] (2024-27)	Medium-term[10] (2024-34)	Long-term[10] (2024-54)
Capacity required[11]	1,540	4,680	6,590
Enabled development capacity (surplus)	2,180 (+640)	5,400 (+720)	12,950 (+6,360)

11. A comparison of the enabled capacity (by planning status) with the capacity that would be required under different growth scenarios is presented in Figure 3.

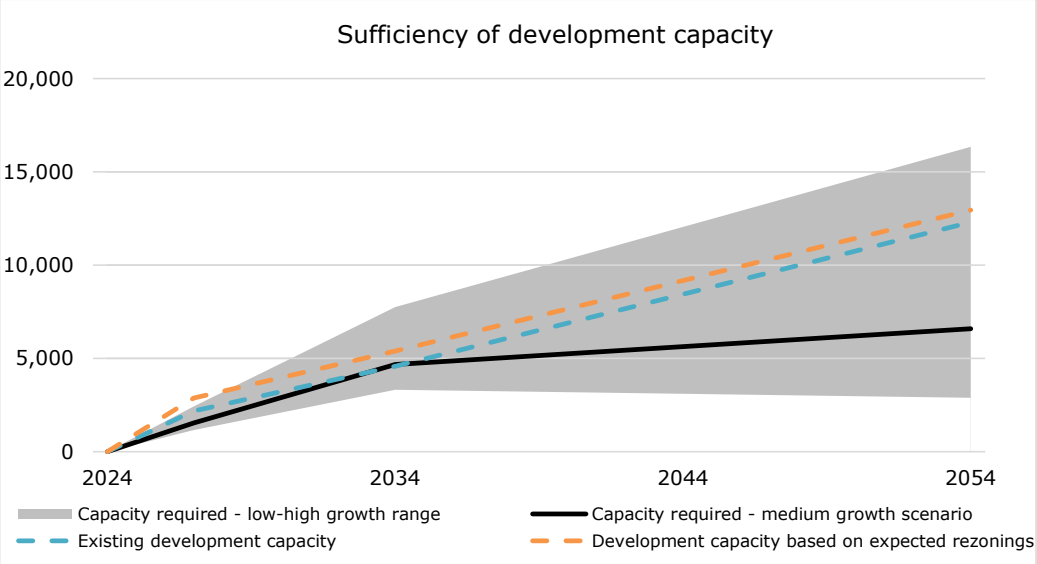


Figure 3: Sufficiency of housing development capacity

12. Development capacity is calculated through the following assessment stages, based on NPS-UD requirements:

    a. The amount of plan-enabled capacity
    b. The proportion of plan-enabled capacity that is infrastructure-ready
    c. The proportion of infrastructure-ready capacity that is commercially feasible

[8] All capacity figures in this section are based on capacity that is plan-enabled, infrastructure-ready, feasible, and reasonably expected to be realised.

[9] Short-term capacity is based on operative zoning and provisions.

[10] Medium and long-term capacity is based on notified zoning and provisions (which includes additional greenfield land notified through Variation 2).

[11] This is based on the growth assumptions adopted in the 10 year plan 2021-32 and incorporates a 20% competitiveness margin over 2024-34 and 15% over 2034-2054, as required by the NPS-UD.

d. The proportion of commercially feasible capacity that is reasonably expected to be realised

13. The following section will outline how each stage is defined and assessed.

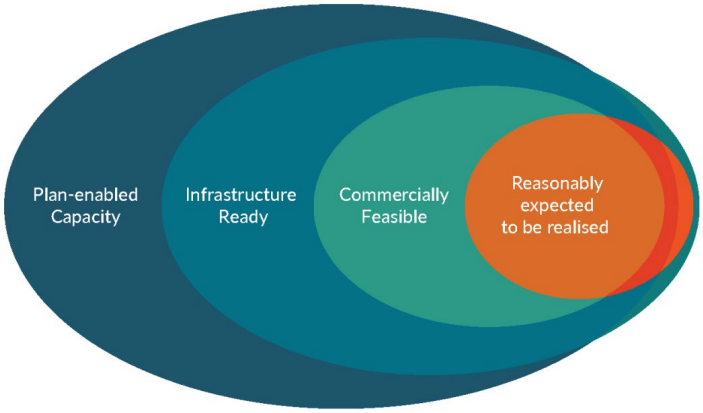


Figure 4: Relationship between capacity concepts[12]

14. **Plan-enabled capacity** – this is the number of additional homes that could be built under planning instruments (such as the 2GP) without regard for financial feasibility or likelihood of take-up. It encompasses developments that are either permitted (i.e. do not require resource consent) or that would require resource consent but be assessed as either a controlled or restricted discretionary activity. Total plan-enabled capacity would include demolition of almost all existing buildings and the full redevelopment of almost all residential-zoned properties in an area.

15. **Infrastructure-ready capacity** – this is the subset of plan-enabled capacity that meets the following criteria:

Timeframe	Requirement
Short-term (0-3 years)	There is adequate existing development infrastructure[13]
Medium-term (3-10 years)	(as above, or) Funding for adequate development infrastructure is identified in the 10 year plan.
Long-term (10-30 years)	(as above, or) Development infrastructure is identified in the Infrastructure Strategy.

16. **Feasible capacity –** this is the subset of infrastructure-ready capacity that would deliver an adequate return on investment. The Dunedin residential capacity model calculates feasible capacity on residential zoned properties by estimating development costs and potential revenue and assessing whether developments would meet a specified profit margin. If more than one development option for a site would meet the profit margin

[12] Diagram taken from Guidance on Housing and Business Development Capacity Assessments (HBAs) under the National Policy Statement on Urban Development (Ministry for the Environment, 2020).

[13] Development infrastructure covers three waters and land transport, to the extent they are controlled by local authorities

tests, the most profitable option is deemed to be the feasible one. The amount of feasible capacity will fluctuate based on market conditions (which influence land costs as well as sale prices) and construction costs (which are influenced by supply chains and demand on the construction industry). The rates of growth for construction costs and land costs can fluctuate considerably depending on local, national, and international factors. Assumptions are made about future changes to development costs and sale prices, but only apply for calculations of long-term capacity. These changes are based on historic trends with amendments to reduce reliance on continued house price increases.

17. **Capacity that is 'reasonably expected to be realised'** – this is the subset of feasible capacity that could reasonably be expected to be developed over a certain timeframe. The Dunedin residential capacity model calculates this by applying an annual probability of development (based on recent trends) to each feasible development, as well as ensuring that total city-wide capacity is not unrealistically concentrated in certain areas or housing types. Knowledge of developer and landowner intentions is also incorporated through manual changes to model results. Alterations are made to some large greenfield sites to avoid reliance on sites that may not come to market, for example the St Clair and Balmacewen golf courses.

18. A proportional representation of development capacity that meets each criterion is shown in Figure 5. The amount of infrastructure-ready capacity is not shown, as almost all plan-enabled capacity meets the criteria to be classified as infrastructure ready.

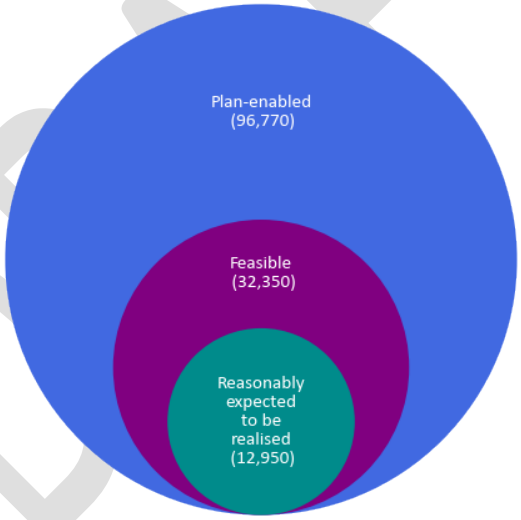


Figure 5: Proportional representation of long-term development capacity by criteria

19. Changes in the capacity modelling methodology made since the Housing Capacity Assessment 2021 include:

    - Use of a 2024 base year to align with FDS timeframes.
    - Updated information on the infrastructure-readiness of growth areas[14].

[14] As of 18 October 2022.

- Use of a newer property dataset[15], incorporating recently completed subdivisions and construction of new homes.
- Updated property values (based on property sales data[16]) and construction costs (based on building consent data[17]).
- Updated zoning[18] to reflect recently resolved appeals.
- Updated development density assumptions for sites zoned Central Business District, Inner City Residential, or General Residential 2 (based on data from recent developments).

20. A high-level outline of the capacity modelling methodology is provided in Appendix 1.

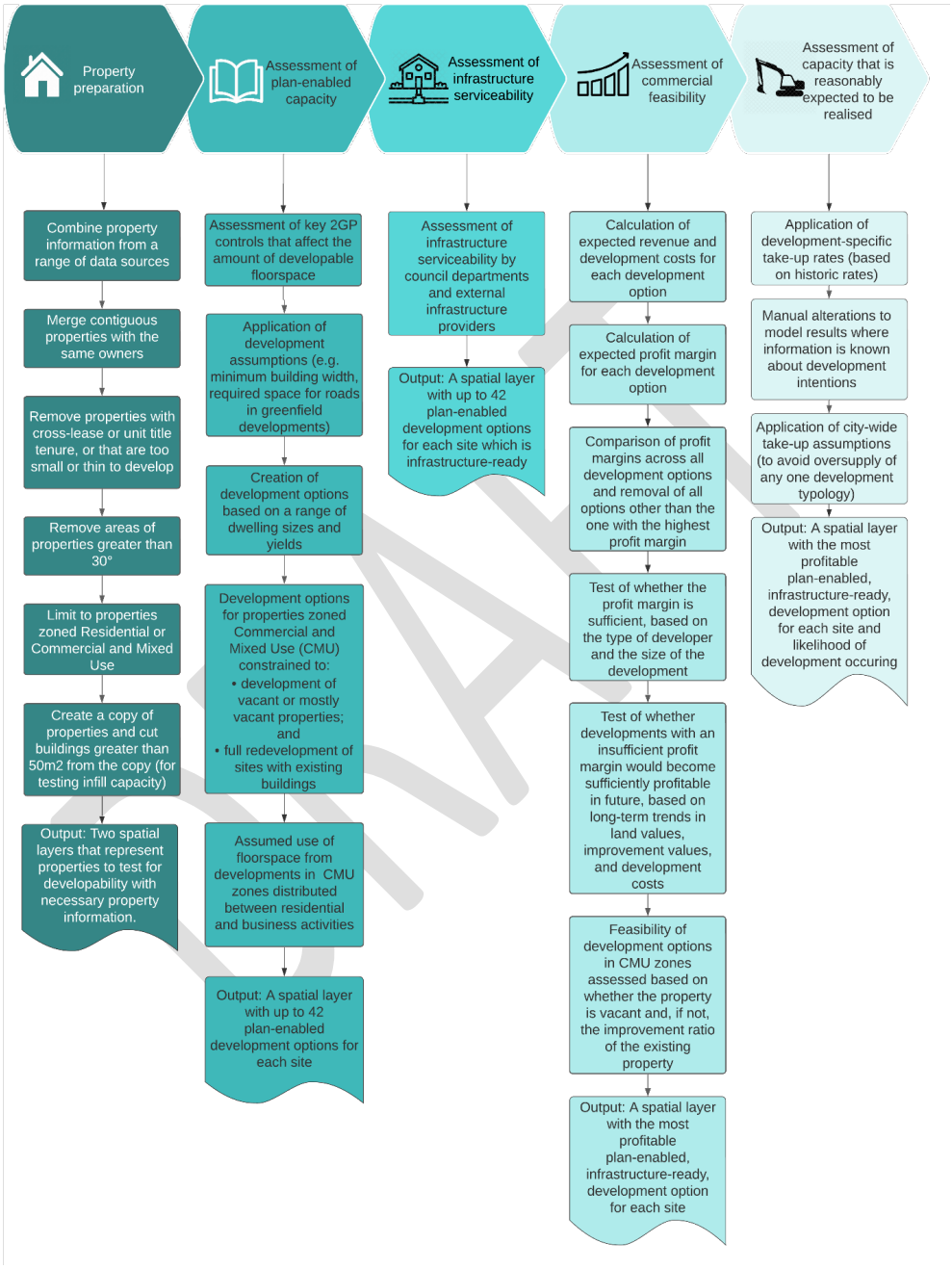
[15] As of 14 October 2022.

[16] As of 28 April 2022

[17] As of 31 December 2021

[18] As of 14 October 2022.

APPENDIX 1 Capacity model methodology diagram



6.8. Update on Consultations for Natural and Built Environment Bill, Spatial Planning Bill, and Review into the Future for Local Government

Prepared for:	Council
Report No.	SPS2255
Activity:	Governance Report
Author:	Warren Hanley, Senior Resource Planner Liaison, Andrea Howard, Manager Executive Advice
Date:	7 December 2022

PURPOSE

[1] To provide an update and options to Council on three consultations open for submission: the Natural and Built Environment Bill (NBE Bill), the Spatial Planning Bill (SP Bill), and the Review into the Future for Local Government.

EXECUTIVE SUMMARY

Natural and Built Environment, and Spatial Planning Bills

[2] The Government Resource Management Reform proposes three new Acts to replace the Resource Management Act 1991 (the RMA). These are:

1. Natural And Built Environment Act 2022 (NBA)
2. Spatial Planning Act 2022 (SPA, and originally titled Strategic Planning Act)
3. Climate Adaptation Act

[3] Bills have been introduced to Parliament for the NBA and SPA and referred to the Environment Select Committee.

[4] The NBA is to be the main replacement for the RMA, to protect and restore the environment while better enabling development. The SPA will require the development of long-term Regional Spatial Strategies (RSSs) to help coordinate and integrate decisions made under relevant legislation[1], and integrate priority actions for each region for at least 30 years.

[5] The Climate Adaptation Bill is expected to be introduced to Parliament in 2023.

[6] Submissions for the NBE Bill and SP Bill close on 30 January 2023.

[7] This paper provides options for Council to consider the consultation information and the form of submissions it may wish to have made on the Bills, and the process for their approval.

Review into the Future for Local Government

[8] The Future for Local Government Review was established in April 2021 to consider how New Zealand's system of local democracy and governance will need to evolve to improve the wellbeing of New Zealanders, and actively embody the Treaty partnership.

[1] Local Government Act 2002, Land Transport Management Act 2003, Climate Change Response Act 2002

[9] The scope of the Review included the functions, roles, and structures of local government; relationships between local government, central government, Māori, businesses, communities, and other organisations that contribute to local wellbeing; how the local governance system might better embody the Treaty partnership; whether current funding arrangements are sustainable; and what changes may be required to ensure local government effectively reflects and responds to the communities they serve.

[10] Submissions on the draft report are due before 28 February 2023.

[11] This paper briefly summarises the key shifts proposed, with a submission to be drafted for further Council input at its first meeting of 2023, following a workshop with Councillors.

RECOMMENDATION

That the Council:

1) ***Notes** this report.*
2) ***Approves** and directs the Chief Executive to coordinate appropriate submission(s) to the Environmental Select Committee on the Natural and Built Environment Bill, and the Spatial Planning Bill by 30 January 2023.*
3) ***Notes** consultation on the draft report, He mata whāriki, he matawhanui, Review into the Future for Local Government, is open for public consultation until 28 February 2023.*
4) ***Notes** that a Council workshop to inform a submission on the Review into the Future for Local Government to be held in early February 2023, with the final submission coming to Council for approval in late February.*

BACKGROUND

Natural and Built Environment Bill, and Spatial Planning Bill

[12] The NBA exposure draft released in June 2021 outlined key aspects of the proposed Act. The exposure draft covered the purpose of the Natural and Built Environments Act, the Te Tiriti o Waitangi clause and related provisions, the National Planning Framework, and Natural and Built Environments plans. Submission on the exposure draft were considered by the Select Committee. The committee released its recommendations on 1 November 2021.

[13] The Select Committee report noted that the environmental outcomes sought by the NBA were comprehensive, applying across the natural environment, cultural values, climate change, natural hazards, and urban and rural areas. The report also provided ideas for making the resource management system more efficient and cost effective.

[14] While not included in the exposure draft of the NBA, the Select Committee noted a number of recommendations to ensure the NBA and SPA would interact effectively and efficiently. It also noted other matters not yet covered in the exposure draft such as how limits and targets would be implemented via RSSs.

[15] The exposure draft consultation and Select Committee recommendations have informed both the NBE Bill and SP Bill.

Review into the Future for Local Government

[16] The Future for Local Government Review was established in April 2021 to consider how New Zealand's system of local democracy and governance will need to evolve over the next 30 years, in order to improve the wellbeing of New Zealanders, and actively embody the Treaty partnership.

[17] The Review Panel prepared an interim report in September 2021 establishing the broad direction of travel and identifying priority questions for the review in order to support engagement about the future of local governance and democracy.

[18] Council had a session with the Review Panel on 22 March 2022 to discuss and share views on those priority questions. This session was informed by a prior Council workshop.

[19] A final draft report, released in October 2022, signalled five key shifts that are needed to reform local government. Councillors will have the opportunity to attend a forum on 8 December to hear the key findings from the Review, and their recommendations from the draft report. This will assist with the development of a submission in February 2023.

[20] Given the timing of the feedback and Council meeting schedule between now and February, a workshop will be scheduled for the new year which will be used to inform the submission for Council to consider. Submissions are due by 28 February 2023.

DISCUSSION

Natural and Built Environment Bill, and Spatial Planning Bill

[21] The bills were released on 23 November 2022 with the NBE Bill being the larger and more complex of the two, with a different structure to the RMA. The NBE Bill contains a number of schedules which contain important principles and procedural information such as Schedule 8 which directs the composition, responsibilities and functions of Regional Planning Committees.

[22] The NBE Bill proposes significant changes to resource management in New Zealand. Of particular note, Regional Planning Committees will be responsible for the processes of policy and plan making, as well as regional spatial strategies.

[23] While many sections of the Bill will be of interest and relevance to regional authorities, the following sections are of particular interest:

Section	Function
Part 1 – Sections 3 – 6	Purpose of Act and related matters
Part 2 – Sections 17-30	Restriction on activities using natural resources

Part 3 Subpart 2	Environmental limits and targets
Part 3 Subpart 7, Part 5 Subpart 1 and 6, 7	Consents and permits
Part 4	Natural and built environment plans
Part 10 Section 644	Regional council responsibilities
Part 11	Compliance and enforcement
Part 12 Section 804, 805	Procedural and information principles
Schedule 7	Plan making process
Schedule 8	Regional Planning Committee provisions

[24] While the smaller of the two Bills, the SP Bill is an important bill as its purpose is to assist the NBA being effectively implemented, including the NBA system (natural and built) outcomes. It will also influence regional land transport plans and future Long-Term Plans (LTPs).

NBE and SP Bill Consultation Challenges

[25] Due to their recent release, there is not sufficient time for ORC staff to review the Bills and provide any detailed assessment with this report. Submissions close on 30 January 2023, with the first full Council meeting not scheduled to be held until early February 2023.

[26] ORC staff been coordinating and engaging with other sector staff, and attending workshops, to build up an understanding of significant issues of these Bills.

[27] ORC staff have identified three opportunities for Council to be kept informed during the consultation process;

1. A summary of both Bills has been prepared by Taituara – Local Government Professionals Aotearoa and is appended to this report as Attachment 1 ('*SPA NBA Overview*').

2. The New Zealand Planning Institute, along with the Resource Management Law Association, will be running roadshows to discuss the proposed bills. The roadshow will visit Dunedin on 13 December at 10am. Depending on the venue, the Dunedin roadshow may be accessible via livestreaming.

3. ORC staff will circulate any further assessments to Councillors prior to the 7 December Council meeting should they be available.

[28] Additional options to meet the challenges of this consultation's timeframe are set out in the Options section of this paper.

Review into the Future for Local Government

[29] The Future for Local Government Review is an independent Ministerial evaluation established in April 2021 to consider how New Zealand's system of local democracy and governance will need to evolve over the next 30 years, in order to improve the wellbeing of New Zealanders, and actively embody the Treaty partnership.

[30] The Review was initiated to consider what might need to change to maximise wellbeing and prosperity for all communities, with specific drivers including:

1. Increased local government responsibilities and demands since the 1989 reorganisation and the Local Government Act 2002, resulting in significant funding and capability challenges.
2. The implications of wide reforms (e.g., resource management and three waters) on the broader functions and roles of local government.
3. The relationship between local government and Māori as Aotearoa/New Zealand moves towards a new phase in the Treaty of Waitangi relationship.

[31] The scope of the Review included the functions, roles, and structures of local government; relationships between local government, central government, iwi, Māori, businesses, communities, and other organisations that contribute to local wellbeing; how the local governance system might authentically embody the Treaty partnership; whether current funding arrangements are sustainable, equitable, and maximise wellbeing; and what might need to change so that local government and its leaders most effectively reflect and respond to the communities they serve.

[32] The Review is taking place in three stages, with a report presented to the Minister of Local Government following each stage. These reports are the interim report (completed in September 2021), the draft report (October 2022) and recommendations, and the final report (due June 2023).

[33] The interim report, Ārewa ake te Kaupapa[2], published in September 2021 articulated the broad direction and priority questions for the review in order to support engagement about the future of local governance and democracy.

[34] ORC had the opportunity to present context and viewpoints to the Future for Local Government Review panel in March 2022 (see Attachment 2 for an overview).

[35] The final draft report[3], published on 22 October 2022, (see Attachment 3 for a summary report), is intended to be 'provocative' in order to prompt debate and shape the final report. The Review Panel have signalled five key shifts that are needed to reform local government:

1. Strengthened local democracy.
2. Authentic relationships with hapū/iwi and Māori.
3. A focus on wellbeing.
4. Genuine partnership between central and local government.
5. More equitable funding.

[2] https://www.futureforlocalgovernment.govt.nz/assets/Uploads/DIA_16724_Te-Arotake-Future-of-Local-Government_Interim-report_22.pdf

[3] https://www.futureforlocalgovernment.govt.nz/assets/Reports/Draft-report-final.pdf

[36] The draft report details each of these five key shifts and proposes questions to each of these shifts (alongside other elements of reform) to guide the submission process. It also proposes a reconsideration of system design and stewardship.

[37] Councillors have been invited to participate in the Review into the Future for Local Government Regional Tour on 8 December in Dunedin. The forum will present key findings and recommendations from the draft report and attendees will have the opportunity to ask questions to clarify thinking before making a formal submission.

[38] Feedback and submissions on the draft report is open until 28 February 2023.

OPTIONS

Form of Submission/s on NBE and SP Bills

[39] The NBE and SP Bills will have significant implications for how ORC operates – its purpose, function and responsibilities, and operations. Therefore, staff recommend that Council consider options for how to make a submission, given the time constraints.

[40] There are two options for ORC to make a submission.

[41] Staff consider that it is highly likely the regional sector will lodge a submission. This is usually managed through the Special Interest Groups (SIG) and/or Te Uru Kahika. Te Uru Kahika has already commissioned a think piece on the reform which is likely to provide a good starting place. This submission is likely to focus on submission points addressing challenges, opportunities that most local authorities will experience if the Bills are passed. Given the time and resource constraints, being party to a sector led submission is likely the most effective and efficient approach for regional authorities.

[42] The second option is to develop an ORC submission. If a sector led submission is an available option, this would allow ORC to both further endorse the sector submission and provide any additional feedback that is of specific concern within an Otago context. However, feedback from ORC staff is that their assessments to date align with the positions other regional authorities are taking and that will likely be represented in the sector submission.

Approval of Submission/s on NBE and SP Bills

[43] Submissions on the Bills close on 30 January 2023 which is a tight and challenging timeframe, due to Christmas shut down and summer holidays.

[44] Staff resourcing is manageable to ensure considerations of submissions can be achieved.

[45] To ensure a regional sector and/or ORC submission can be signed off, staff have identified two practical options for Council to consider:

1. Nominate a small panel of Councillors with authority to review and approve an ORC submission to be lodged with the Environment Select Committee. Any submission would be reported to the next full Council meeting; or
2. Delegate approval of any Regional Sector lead submission and/or ORC submission to the Chief Executive and/or the ORC Chairperson.

Approval of Submission on the Future for Local Government

[46] It is proposed that a workshop is held to gather Council input in early February, with a draft submission provided to the first Council meeting of 2023. A final submission will need to be lodged on, or before, 28 February 2023.

CONSIDERATIONS

Strategic Framework and Policy Considerations

[47] ORC's strategic directions require that we take leadership on issues of significance and importance to both our Otago communities and national direction. Making a submission on the changes promoted under the proposed NBE and SP legislation, and potential changes to local governance, that will have a direct and ongoing impact on Otago's interest, is part of regional leadership.

Financial Considerations

[48] A number of significant changes are promoted in the NBE and SP Bills. Any legislative change will undoubtably result in costs for changes to existing processes, new processes, and their implementation. These costs will be subject to the annual and long-term planning process.

[49] Submitting on national consultations is a funded activity.

Significance and Engagement

[50] The consideration of this consultation, and any subsequent submission is consistent with ORC's Significance, Engagement and Māori Participation Policy.

Legislative and Risk Considerations

[51] Both the NBE and SP Bills, and Future for Local Government are about legislative change. Change comes with risk which government is seeking to manage through consultation. Staff consider engaging in both submission processes to advocate for changes it considers necessary for the proposals to successfully achieve their purpose and outcomes is important to ensure risk is minimised.

Climate Change Considerations

[52] While the NBA and SPA will have a role in implementing responses to climate change, this consideration will be more appropriately informed at the time the Climate Adaptation Bill is introduced to Parliament in 2023.

Communications Considerations

[53] Any submissions made by ORC would be publicly available via the Environment Select Committee, or the Future for local government websites.

NEXT STEPS

[54] Staff will continue to review the various consultation materials to discuss with Council at the 7 December meeting.

ATTACHMENTS

1. SPA NBA Overview [**6.8.1** - 9 pages]
2. ORC presentation to Ff LG panel [**6.8.2** - 12 pages]
3. Executive Summary He mata whāriki, he matawhanui [**6.8.3** - 24 pages]

Taituarā
Local Government Professionals Aotearoa

Spatial Planning Act (SPA) and Natural and Built Environment Act (NBA) overview

November 2022

Spatial Planning Bill

The Spatial Planning Bill will introduce mandatory spatial planning – this has the potential to be a game changer for the sector and our communities.

Up to fifteen[1] Regional Spatial Strategies (RSSs) will set out the vision, objectives, strategic direction, and priority actions for each region for at least 30 years.

The Strategies must consider areas that require protection and enhancement, areas that are appropriate for development, resource use and land use change, areas that are vulnerable to hazards and climate change, areas of cultural heritage, areas with resources that are of significance to Māori and key infrastructure including the co-ordination of infrastructure between providers.

Regional Planning Committee

RSSs will be developed by Regional Planning Committees with a minimum membership of six. Central government will be at the table, with councils and iwi, hapū, and Māori (a minimum of two Māori appointments). All councils can be represented (at least one appointment per council), but do not have to be. The process for Māori appointments is contained in the Natural and Build Environment Bill, with iwi and hapū running their own processes via a committee set up for this purpose.

The overall composition of the committee is flexible subject to these minimums, however effective representation (urban, rural, regional, district, Māori) and effective and efficient decision making[2], the purpose of local government and populations served are to be considered. Existing relationships with and between iwi, hapū, and other Māori groups also need to be considered. The Local Government Commission receives the proposed composition, considers it in light of the requirements, and confirms it. If composition decisions cannot be reached there is a role for the Local Government Commission in determining the composition. Facilitation support is available from the Crown (funding support for six weeks).

There is a role for the Māori Land Court should iwi and hapū appointments and resolution processes be disputed.

Sub-committees are allowed. Within the Natural and Built Environment Bill there is specific provision for a freshwater subcommittee to be established on the recommendation of the Minister for the Environment.

Retaining local voice and accountability in the regionalised system was a key concern for the sector. In addition to enabling all councils to be represented on the Committee, the Government has taken up the Local Government Steering Group's proposal to include Statements of Community Outcomes and Statements of Regional Environmental Outcomes

[1] Nelson and Tasman will prepare one combined strategy and a combined plan. Cross regional spatial strategies may also be prepared.
[2] Lessons might be drawn from Auckland's experience.

in the Bills. There are concerns that this will not be sufficient to ensure democratic accountability.

The Committee will have a Secretariat to support it to carry out its functions, and the arrangements for the Secretariat are provided for in the Natural and Built Environment Bill (see below).

Implementation of Regional Spatial Strategies

Each strategy will be accompanied by an agreed implementation plan and will influence regional land transport plans and future local government long-term plans.

A key issue is how to guarantee delivery of RSSs. The Taituarā Resource Management Reform Reference Group will be carefully looking at the non-binding nature of the proposed optional implementation agreements.

Strategic role for Māori participation.

Both the Spatial Planning Bill and the Natural and Built Environment Bill provide a greater, more strategic role for Māori participation as well as requiring decision makers (and the strategies and plans in the Bills) to give effect to the principles of Te Tiriti o Waitangi.

Natural and Built Environment Bill

The Natural and Built Environment Bill is the main replacement for the Resource Management Act 1991 (RMA). It will regionalise plan making, replacing over 100 district and regional plans with up to 15 NBE plans that aim to provide an integrated framework for use and development within environmental limits. It is expected that by reducing the number of plans and fronting decisions at the plan-making stage, the system will become more efficient. This is something our Taituarā Resource Management Reform Reference Group will be especially focused on.

The Bill proposes a system of non-hierarchical positive outcomes that will guide strategies, plans and ultimately resource consents, with the intent of resolving conflicts between outcomes at the highest appropriate level. Guidance will be needed on how these conflicts should be resolved, and potentially more should be resolved at the national level than is obvious from the Bill. We note there is still limited (but slightly more) information on outcomes for the built environment.

The Bill also provides for limits and targets (to improve, including "minimum level targets") and management units. This has proven difficult (if not unworkable) at the regional level and will need to be carefully worked through if previous issues with national direction are to be resolved.

While the legislation is touted as moving away from effects-based management to managing for outcomes, the Bill maintains a general duty to avoid, remedy, offset or redress adverse effects on significant biodiversity areas and specified cultural heritage, and introduces a new pathway for "trivial effects".

National Planning Framework

In addition to this, the Bill introduces a National Planning Framework (which will be a regulation under the Act) to give consistent and stronger national direction to the plans and a framework for allocating resources (for example market-based mechanisms – with the exception of freshwater). There are new provisions in the Bill for freshwater allocation, including the Establishment of a Freshwater Working Group and short-term consents during the transition phase.

The National Planning Framework (NPF) can set limits and targets. Some limits are mandatory e.g. air, indigenous biodiversity, coastal water, estuaries, freshwater and soil. Limits on other aspects of the natural environment may be set, and there may be exemptions (if approved by the Minister). These limits may be set directly in the NPF, or the NPF may require that they are set out in NBE plans. Targets are either set directly in the NPF or prescribed to be set out in NBE plans made under the NBA.

The NPF can also apply the effects management framework, provide for standards and methods, processes and exemptions. It may give directions to Regional Planning Committees or local authorities on monitoring and reporting, or direct a plan to use an adaptive management approach. It may also direct NBE plans to make rules that will affect existing rights and land use consents when there is harm to the natural environment or risks associated with natural hazards, climate change, or contaminated land.

The NPF is required to provide direction on each system outcome and direction to help resolve conflicts. Without a draft NPF being produced alongside the Bills, it is impossible to assess how successful it will be on these matters.

The NPF will be rolled out in stages. At this stage we think the first iteration will largely consolidate and reconcile existing policy statements and standards (and include the recent medium-density residential standards for housing) with additional content on infrastructure and natural hazards. It is unlikely that mātauranga Māori will be incorporated. This appears to be a lost opportunity.

It will be critical that the first and next iterations involve significant local government input and co-design, and it is a negative that a draft NPF has not been published alongside the Bills to enable alignment and scrutiny.

Plans

NBE plans will be developed by the Regional Planning Committee (minus the central government representative). Plans must give effect to the NPF and be consistent with the Regional Spatial Strategy. Plan evaluation reports will occur earlier and be simpler than existing section 32 RMA reports and plans will be audited by the Ministry for the Environment.

An Independent Hearing Panel (IHP) will hear submissions on an NBE plan and make recommendations to the Regional Planning Committee on the proposed plan. If the Regional

Planning Committee agrees, appeals are limited to points of law. If it does not, merits-based appeals can occur.

Plans can be more restrictive than the NPF (as can bylaws if the NPF expressly allows this).

Despite the provision for Statements of Community Outcomes (SCOs) and Statements of Regional Environmental Outcomes and representation on the Committee (including the reference to section 10 of the LGA) there are concerns that local democracy is not sufficiently provided for.

Secretariat

To assist the Committee and Independent Hearing Panel the Bill provides for a Secretariat, with a director appointed by the Committee.

The director must appoint employees to carry out the functions of the Secretariat and both the director and these employees are legally employees of the host council, although the Bill makes it explicit that the host council must be treated as having delegated their employment rights and obligations. That said, the host council is responsible for ensuring that the director's legal obligations in that role are met.

We will obtain specific legal advice on this point to clarify legal obligations, liabilities, and the practical effect of this arrangement.

The Secretariat is empowered to enter contracts etc within the scope of an agreed budget.

The host council is chosen by the councils in the region in consultation with iwi and hapū and must provide administrative support for the Committee and Secretariat, including financial management.[3] A simple majority of councils can make the decision about the host council, with the default being the regional council if there is no decision. The matter is simpler for unitary authorities and in the case of Nelson and Tasman they need to agree the matter between themselves.

Funding

Funding for the Committee and the Secretariat comes from the councils in the region jointly. The Committee prepares its budget (a draft statement of intent, SOI) and submits it. The SOI must provide funding for Māori participation in the development, implementation, and monitoring of the regional spatial strategies and plans. The councils must work together in good faith to agree the amount of funding and the share each will pay. There is a dispute resolution process (using a Ministerially appointed independent person) if agreement cannot be reached. The councils cannot direct how this funding will be spent, nor can they reduce an agreed budget.

[3] Note the host must be a council at this stage.

We are working with LGNZ to get legal advice around funding arrangements, including where funding is required from councils to defend appeals (where the council may also be the appellant).

Functions of councils

Councils will have an important role in ensuring local voices are heard by producing Statements of Community Outcomes and Statements of Regional Outcomes. Councils will also contribute to Plan development both through membership on RPCs but also providing resource and expertise to the RPC's process.

The functions and areas of responsibility of regional councils (section 30 of the RMA, new clauses 643 and 644) and territorial authorities (section 31 and clauses 645 and 646) remain broadly the same, with the necessary amendments to reflect the preparation of SCEOS, SREOS and participation with the RPC. Unitary authorities of course get both sets. There may be some difficulties in seeing these areas of responsibility sitting with councils, when the content of the plans has been developed by a different body (the RPC) and non-regulatory tools need to be embedded in other council processes (such as the Long-Term Plan). An example might be environmental education which is traditionally resourced through the LTP process.

With the RPC responsible for policy decisions and others responsible for implementation there is an inherent tension. This is less complicated in the unitary council structure.

We suspect pan-regional issues will also be complex.

Councils will retain their current consenting, compliance monitoring and enforcement roles, for now at least. While not referred to in the Bills there is the potential for some or all of these roles to move to a permanent regional hub or a future Environmental Protection Agency structure. Given the significant changes that lie ahead for local government (three waters and local government review and potential reform), the significant investment that is needed to transform the resource management system, and current capacity constraints the institutional structures, functions and funding for the future would, ideally, be addressed holistically (potentially post the developed of all Regional Spatial Strategies as initially suggested in the Taituarā submission on exposure draft).

Consents

As has been widely signalled there are four activity categories proposed – permitted, controlled, discretionary and prohibited and rules for determining which category applies (clause 154). Types of consent appear the same (land use, subdivision, coastal permit water permit, discharge permit). There are alternative consenting pathways for proposals of national significance and communications, energy housing, transport, water and other central and local government assets. There is no longer a need to hold a hearing on a notified consent.

Processing timeframes have changed.

- Non-notified consent without hearing is 20 working days.

- Non-notified consent with hearing is 50 working days.
- Limited notified consent without hearing is 60 working days.
- Limited notified consent with hearing is 100 working days.
- Publicly notified consents without hearing is 60 working days.
- Publicly notified consent with hearing is 130 working days.

There are interim limits within the overall processing timeframe. There are excluded periods too. There are a number of clauses that detail the mechanics (of notification, approvals, mediation, hearings etc) that will be reviewed as soon as possible. As for conditions, adaptive management conditions are explicitly proved for. At first glance several RMA provisions have been rolled over. Financial contributions are now "environmental contributions". Alternative Dispute Resolution is provided for (mandatory if required by a plan or voluntary).

A rule in a proposed plan has immediate legal effect if the rule protects, or relates to, water, air, or soil (for soil conservation); protects areas of significant indigenous vegetation; protects areas of significant habitats of indigenous animals; protects cultural heritage or provides for, or relates to, aquaculture activities. The Environment Court can set a different date, as can a Regional Planning Committee. All other rules take effect after decisions are made and are treated as operative if the time for making submissions or lodging appeals on the rule has expired (and there are no submissions, opposing submissions or appeals are determined or withdrawn (or dismissed). This may cause issues for councils running parallel plans. Something that could cause further issues for councils will be that, where a rule has immediate effect, applicants will need to apply for all consents required and will not be allowed to bundle consents across the RMA and NBA.

There are a couple of alternative processing pathways included in the Bill. In addition to retaining the direct referral to the environment court, proposals of national significance can be consented in a process akin to the COVID-19 fast-track consenting process.

Designations

Designations will be available through a two-stage process. Firstly, securing the spatial footprint through a notice of requirement, then secondly, Construction and Implementation Plans will identify and authorise the works. Requiring authority eligibility will also now include fire and emergency services and port operators.

Allocation Framework

The NBE proposes an allocation system where RPCs must set allocation approaches for freshwater and may set allocation approaches for geothermal resources, discharges to air, discharges to coastal water or the taking or use of heat or energy from open coastal water using the principles of sustainability, equity, and efficiency. While a range of allocation methods will be available only non-market based mechanisms can be used for freshwater.

Short transitional consents will be issued while the new system is being implemented to mitigate the risk of allocations being locked in for the long term. Post-transition the maximum consent duration will be 35 years.

Compliance, Monitoring, and Enforcement

The reforms also propose changes which will enable better compliance monitoring and enforcement. This includes prohibiting the use of insurance for infringement fines, allowing an applicant's compliance history to be considered, and broadening cost recovery provisions which will now allow:

- Costs to be recovered for compliance monitoring of permitted activities.
- Substantial increase in financial penalties.
- Increased range of offences subject to fines.
- Statute of limitations extended to 24 months.
- Regulators to apply to have a consent revoked.

Councils will also be required to publish a compliance, monitoring, and enforcement strategy which will outline how they will deliver their functions, duties, and powers.

System Monitoring and Oversight

Councils will continue to monitor the efficiency and effectiveness of processes, plans and consents. Each RPC will be responsible for developing a regional monitoring and reporting strategy to coordinate the work of local councils and will be required to produce a five-yearly assessment.

A new National Māori Entity will be established to provide proactive monitoring of Te Tiriti o Waitangi performance. In addition to this, the ongoing operation and effectiveness of the system will be monitored and reported on by government, and the Parliamentary Commissioner for the Environment will review the government's reporting on system performance.

Implementation of the new system

Transitioning to the new system will be a significant undertaking, especially in light of the capacity constraints the sector is already facing. As such, the Government is proposing to implement the reforms in three tranches. Select model regions will begin transitioning immediately and it is expected that lessons and templates from the model regions will be shared with later tranches. Given the pace of transition however the opportunity for a learning system is likely to be reduced.

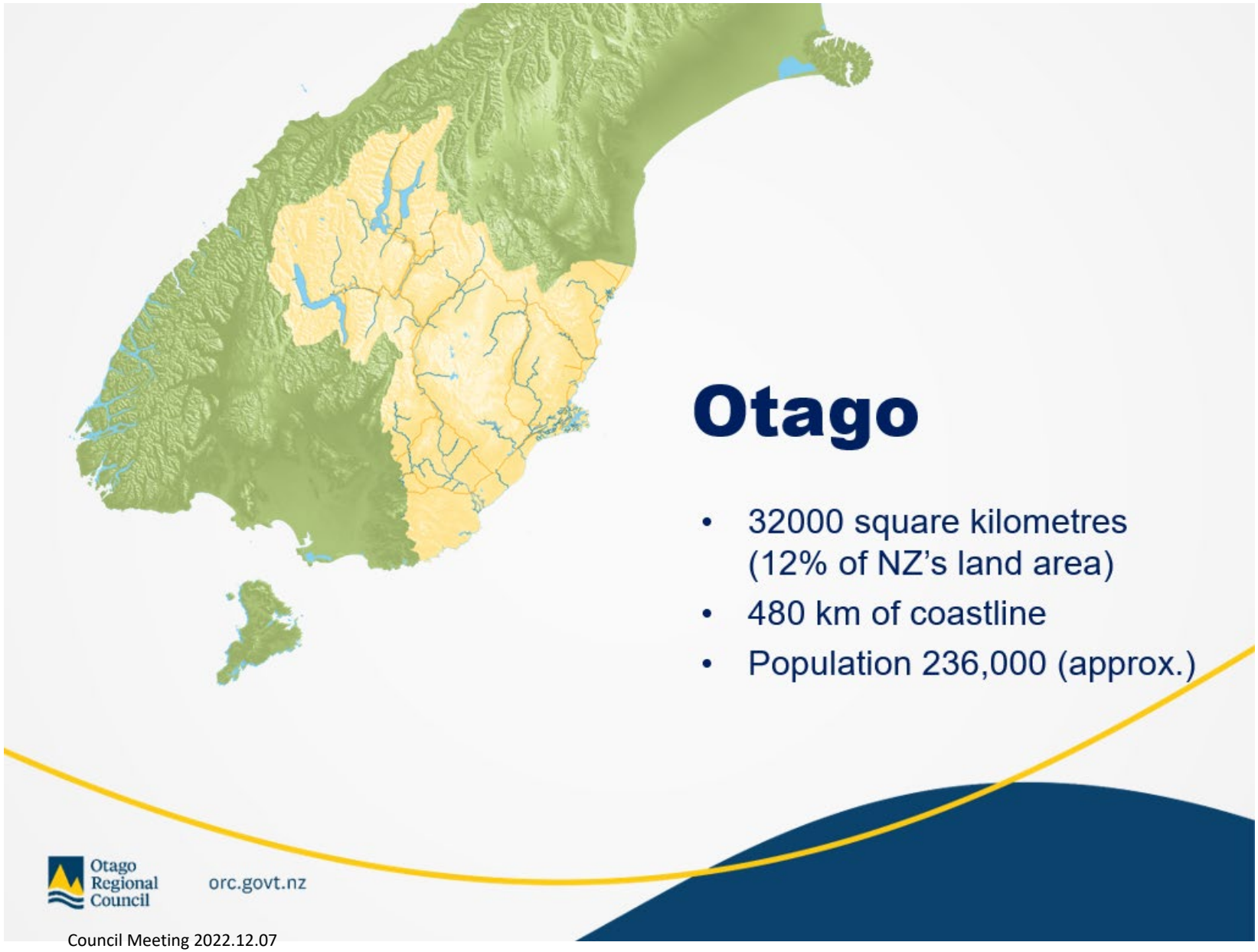
For those regions who will transition later, the Government expects that current RMA plans will continue to be amended to incorporate national direction and respond to changing circumstances. This could drain already stretched resources and we will review the Bills with a view to submitting ideas to reduce the burden.


Taituarā
Professional excellence in local government
Taituarā — Local Government Professionals Aotearoa
Level 9, 85 The Terrace, Wellington
PO Box 10373, Wellington 6143
T 04 978 1280
E info@taituara.org.nz
W taituara.org.nz

Otago Regional Council's Future for Local Government

Otago Regional Council

www.orc.govt.nz


Otago
• 32000 square kilometres (12% of NZ's land area)
• 480 km of coastline
• Population 236,000 (approx.)
Otago Regional Council
orc.govt.nz

Population by district

*Total population **245,300** as at June 2020 – Statistics NZ*

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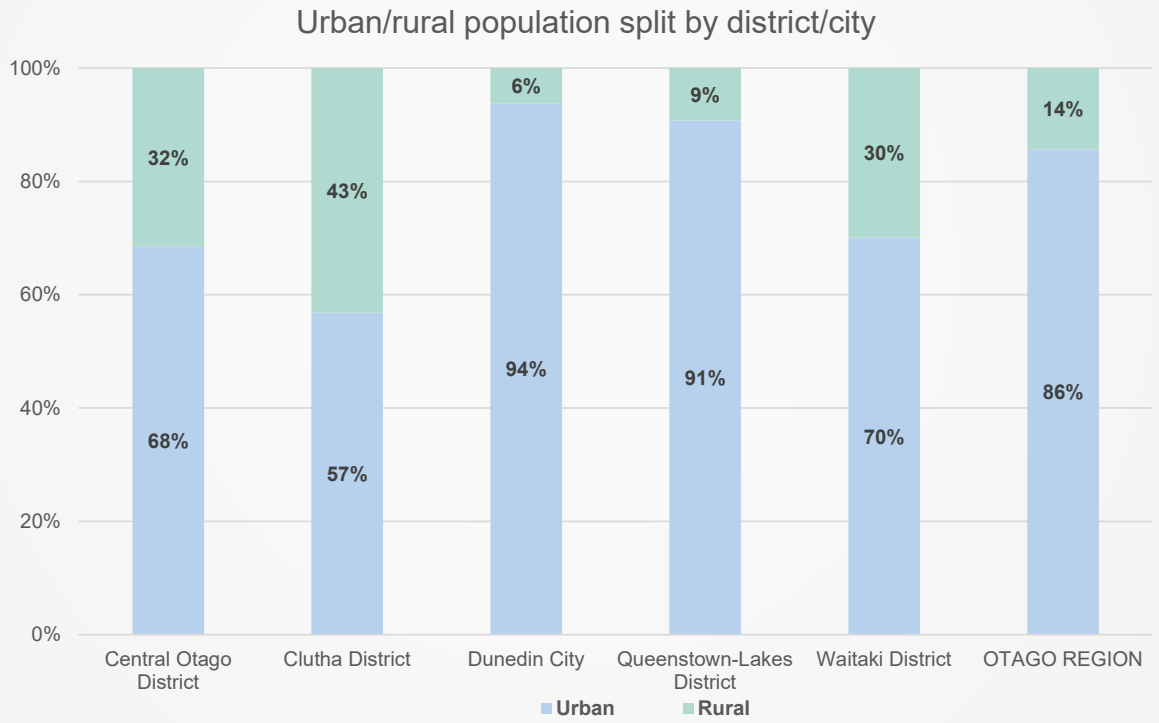
Council Meeting 2022.12.07

Otago urban and rural split by district



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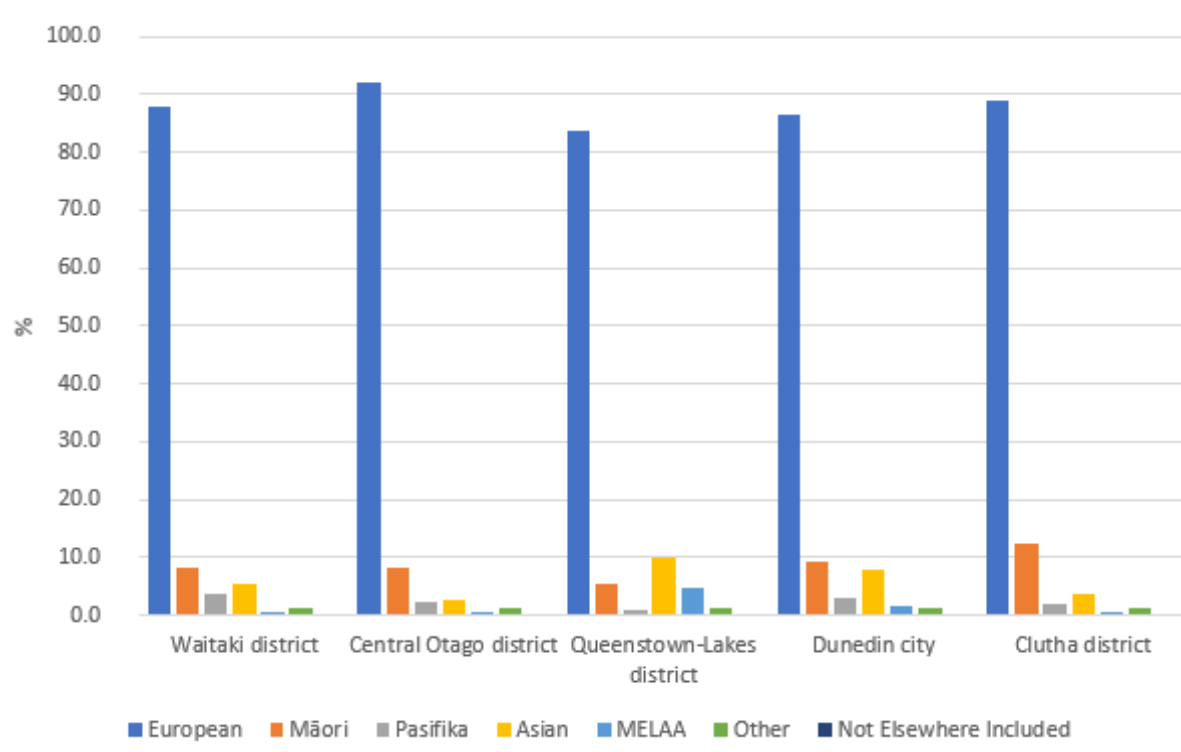
- Statistics NZ, 2018 Census

Otago population ethnicity by district



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- Statistics NZ, 2018 Census

ORC people

- An elected council (the Chair plus 11 councillors)
- Staff spread across Otago, with offices in:
  - Dunedin (head office – 2 locations)
  - Alexandra
  - Queenstown
  - Balclutha (depot)
  - Taieri (depot)
  - Oamaru
  - Palmerston (depot)
  - Cromwell (depot)
  - Wanaka (depot)

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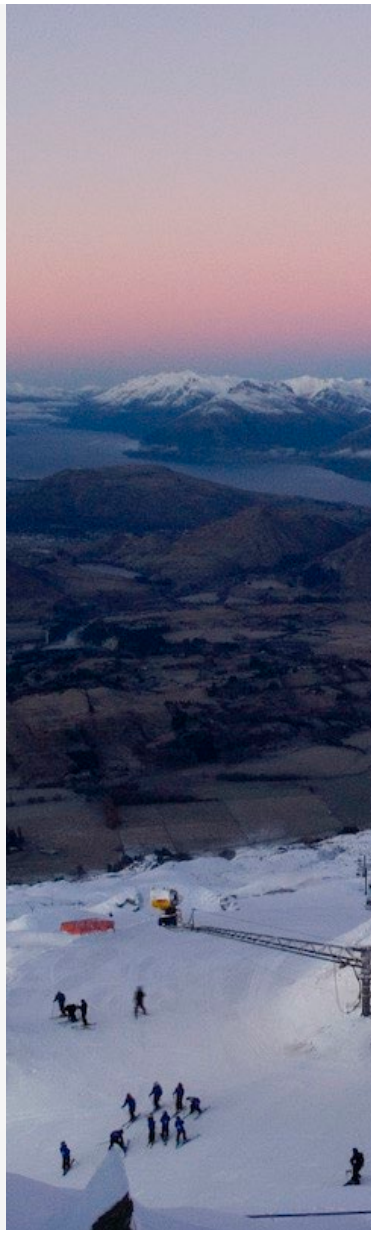
How could we strengthen local democracy in Otago?

- We need the very best people to do the job – that's the bottom line.
- Bureaucracy should never overtake the will of the people.
- Democracy is also how we involve others throughout the term.
- Role clarity for governors and officers is essential.
- Four-year terms are highly-desirable.



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How could we strengthen local democracy in Otago (continued)?

- Some of us value STV as it's more representative, but you don't necessarily get who you vote for.
- Some of us value FPP: you get who you vote for.
- Representation might improve with:
  - Minimum two representatives under 30
  - Three terms maximum tenure
  - Higher remuneration – especially for younger, 'career-age' representatives

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Council Meeting 2022.12.07

How could we create a stronger focus on wellbeing in Otago?

- We are audited for financial accountability at present; why not outcomes and wellbeings?
- Health, wellbeing and local government go well together...
- ...but local government should not be responsible for roading
- It is efficient for central government to make 'framework' rules which are then localised (e.g. insulation).

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How could we create an authentic relationship with hapū/iwi/Māori in Otago?

- Council has a limited ability to respond without iwi/Māori in the room.
- Te ao Māori adds a lot of value.
- Representation can be tribal or democratic: we need to choose one.
- Tangata whenua are New Zealand and they should be at the table.
- Genuine partnership needs to be an ultimate goal.

How could we create a genuine partnership between central government and Otago local government?

- We seek clarity on the decisions Government and local authorities can each make. The best structure then follows.
- This acknowledges that there are multiple roles within each system – housing is a good example.
- Our impression is that Government's aim is to reduce taxes and shift costs to ratepayers.

How could we shift to more equitable funding in Otago?

- For Otago's small populations, cost (and cost-equity) is an important issue.
- Contestable funding pits communities against each other – we have seen this for turfs, stadiums and velodromes.
- The principle should be that taxes fund national decisions and initiatives, and rates fund local decisions and initiatives.

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Te Arotake i te Anamata mō Ngā Kaunihera
Review into the Future for Local Government

Draft report
October 2022

He mata whāriki, he matawhānui

Executive summary

Draft report executive summary

He mata whāriki is a term used to describe a harakeke bush that can be used for making special mats for people to sit on. This variety of harakeke is long and durable.

He matawhānui is a term for a broad vision that is inclusive of the diversity of views. Mata denotes the eyes, being watchful and prophetic, and whānui is an inclusive term for everyone, a broad view. It also relates to the star Vega, so has a celestial connotation of looking distantly.

Together, he mata whāriki, he matawhānui is a metaphor for a welcoming place for people to gather and set a broad vision.

This document may be cited as: Review into the Future for Local Government (2022) *He mata whāriki, he matawhānui: Draft report*, Wellington: New Zealand.

ISBN (print): 978-1-99-118520-4
ISBN (online): 978-1-99-118521-1

Review into the Future for Local Government

Today's communities face a host of challenges – climate change, pandemics, biodiversity loss, and growing social and economic inequity.

We are at a time of change, a moment in history where we need to shift to new ways of working, to living our lives more sustainably, to transition to a greener economy, to utilise new technologies and to fully acknowledge our social and Te Tiriti responsibilities.

Through the Panel's research and engagement, it is clear that significant change is required to many aspects of the local government system to maximise the wellbeing and resilience of communities now and into the future and strengthen local democratic decision-making. Facing these challenges, combined with the pace of change, is causing many of our communities to lose trust in democratic institutions and to disengage. As the layer of government closest to community, local government holds the key to rebuilding trust and confidence in civil society. The challenge is that the current system does not support local government to take full advantage of the important role it holds.

Fit for the future local government

While the 'unfunded mandate' of additional responsibilities continues to grow, compounding funding pressures, the potential impact of proposed reforms is creating further uncertainty for the role of local government in communities.

Engagement in local government is declining, with low levels of voter turnout. There is limited representation and an undervaluing of hapū/iwi and Māori as a critical partner, in the absence of a fit-for-purpose legislative framework inclusive of Te Tiriti o Waitangi in local governance.

The wellbeing challenges facing Aotearoa New Zealand are too big for central government to address alone – local government has an important role to play. We need to see shifts in mindsets and approaches with greater collaboration and innovation so that communities and local and central government have the tools, funding, and resilience to face the challenges ahead.

A future system of local governance will need agility and capacity to evolve and respond to an ever-changing environment, drawing on the capabilities of local authorities, central government, hapū/iwi and Māori, business, communities and citizens as needed, and adapting as new challenges and issues arise, from social cohesion to new patterns of work, migration, and travel.

Local government has a fundamental role in responding to these increasingly complex issues and raising the wellbeing of communities. Renewal and change are required to ensure that the sector is ready and able to play this critical role.

The pathway ahead

The Panel, in its lead up to this draft report, has signalled five key shifts that are needed to make this change: strengthened local democracy; authentic relationships with hapū/iwi and Māori; a focus on wellbeing; genuine partnership between central and local government; and more equitable funding. In addition, system design and stewardship will also need reconsideration.

When thinking about these shifts, the Panel has had to grapple with many complex and challenging issues. Exploration of these issues has been aided greatly by the knowledge, expertise, and experience shared by the many contributors to our review so far. Because our thinking is still evolving, this report is not a 'draft' of our final report. Rather, it reflects our thinking to date, and acts as a provocation, posing questions that, with further input from others, will help the Panel shape our final report.

While some of the Panel's recommendations can be implemented without a major reform agenda, we do not think that one piece of the puzzle can be executed in isolation and expect it to achieve all the change we need to see. For example, when considering the roles and responsibilities of local government, the reform agenda will need to take account of many things, such as how central and local government intend to partner with each other, funding implications, organisation form and associated strengths and resources of partners, and importantly, the local and regional context.

Delivering on the recommendations contained in our final report will require a well-considered and well-supported reform and implementation plan that is resourced appropriately, so that action is taken in a logical, sustainable, and agreed manner.

Revitalising citizen-led democracy

Local government is responsible for facilitating democracy – ensuring that it reflects our increasing diversity, embodies Tiriti-based partnerships, and seeks out innovative ways of ensuring the voices of the whole community are heard and reflected in local decisions. Internationally, citizens' participation in local government decision-making has evolved considerably and practices should be improved and updated.

We see the opportunity for local government to utilise innovative participatory and deliberative practices to advance meaningful opportunities for community-led decision-making. While all of the mechanisms and initiatives are important, building capability and capacity is vital for councils to facilitate citizen-led democracy. Both central and local government need to invest in building the skills and experience to make this a 'business as usual' way of working.

Being well informed and connected to decisions that impact us, our whānau, and our whole community can help sustain and grow resilience and trust. However, the local government sector, the community, and Māori have expressed some frustration at the challenges that prevent everyone from having the ability to participate authentically in local decision-making. We believe councils need to be the 'enablers' of local democracy, not the 'holders' of it.

There are opportunities to review statutory provisions for enhancing the use of deliberative mechanisms, and to review, align, and improve the requirements for engaging with Māori across all local government legislation. In addition, we see the need for local government, in conjunction with hapū/iwi, to incorporate expressions of tikanga in council protocols.

There is a need to consider ways in which we might, through the amplification of digital tools and civics education, increase community understanding about the role of local government that leads to greater civic participation.

Recommendations

1. That local government adopts greater use of deliberative and participatory democracy in local decision-making.
2. That local government, supported by central government, reviews the legislative provisions relating to engagement, consultation, and decision-making to ensure they provide a comprehensive, meaningful, and flexible platform for revitalising community participation and engagement.
3. That central government leads a comprehensive review of requirements for engaging with Māori across local government-related legislation, considering opportunities to streamline or align those requirements.
4. That councils develop and invest in their internal systems for managing and promoting good quality engagement with Māori.
5. That central government provides a statutory obligation for councils to give due consideration to an agreed, local expression of tikanga whakahaere in their standing orders and engagement practices, and for chief executives to be required to promote the incorporation of tikanga in organisational systems.

Question

? What might we do more of to increase community understanding about the role of local government, and therefore lead to greater civic participation?

Tiriti-based partnership between Māori and local government

In the Panel's Interim Report, *Ārewa ake te Kaupapa*, we asked ourselves and others the question 'How might a system of local governance embody an authentic partnership under Te Tiriti o Waitangi, creating conditions for shared prosperity and wellbeing?' We have explored this question broadly and deeply, meeting with hapū/iwi, Māori organisations, and rōpū to listen and to learn.

One of the first responses to this was 'how can there be a partnership where there is no authentic relationship to build on?' We have heard, and agree, that the current local government–Māori relationship falls short of expectations and importantly, its potential.

We have heard from both local government and Māori an acknowledgment of the need for change. Change to the way the system mandates, supports, drives, and ensures opportunities for the relationship to be successful. Change in the actions and behaviours of all those involved to be mana-enhancing and reflect a sharing of values and priorities of place and people.

This report considers the current state of the overall local government–Māori relationship, summarises what we heard about the issues and opportunities, and makes proposals for change. It proposes a framework as the basis for the future relationship and an architecture for change that is woven throughout this report that:

- creates a new legislative framework for Te Tiriti in local governance
- establishes a strategic role for Māori alongside local and central government in identifying and addressing the priority outcomes that will drive community wellbeing
- establishes and embeds specific mechanisms for partnership and co-governance
- improves Māori participation in local government processes
- improves Māori representation in council governance
- builds local government and Māori capability and capacity to strengthen and maintain a Tiriti-based relationship.

Together, we consider that the framework and architecture for change provides a path towards a stronger Tiriti-based partnership, one that results in mutually beneficial outcomes for each other and importantly, for local communities.

Recommendations

6. That central government leads an inclusive process to develop a new legislative framework for Tiriti-related provisions in the Local Government Act that drives a genuine partnership in the exercise of kāwanatanga and rangatiratanga in a local context and explicitly recognises te ao Māori values and conceptions of wellbeing.
7. That councils develop with hapū/iwi and significant Māori organisations within a local authority area, a partnership framework that complements existing co-governance arrangements by ensuring all groups in a council area are involved in local governance in a meaningful way.
8. That central government introduces a statutory requirement for local government chief executives to develop and maintain the capacity and capability of council staff to grow understanding and knowledge of Te Tiriti, the whakapapa of local government, and te ao Māori values.
9. That central government explores a stronger statutory requirement on councils to foster Māori capacity to participate in local government.
10. That local government leads the development of coordinated organisational and workforce development plans to enhance the capability of local government to partner and engage with Māori.
11. That central government provides a transitional fund to subsidise the cost of building both Māori and council capability and capacity for a Tiriti-based partnership in local governance.

Allocating roles and functions in a way that enhances wellbeing

Compared to other OECD countries, the scope of responsibilities for local government in Aotearoa New Zealand is relatively small, as is its proportion of government expenditure.

We know that many councils are struggling to effectively deliver their current roles, functions, and obligations due to limited capacity and capability, financial pressures, and conflicting responsibilities.

While some roles and functions have been added in recent times, major reforms underway will see the removal of some significant roles and functions through greater centralisation and regionalisation. As councils grapple with that uncertainty, there is also a lack of clarity about their roles in the more complex problems we face. Climate change is a key example. Local government has an essential role to play in supporting local mitigation and adaptation efforts and promoting environmental wellbeing and sustainability.

We consider there is a much deeper role for councils to expand beyond the current infrastructure focus to facilitate and deliver wellbeing.

Any discussion about roles and functions at a local level must also consider the role of hapū/iwi entities, building on the many examples of mana whenua entities adding significant value.

It is time to take a fresh look at how roles and functions are allocated and how the strengths of different actors can be realised. We don't think it's about binary allocation (local or central), but rather how the design, accountability, influence, and delivery could sit across many actors.

Recognising local government's role in wellbeing, we have proposed a framework that could be used when allocating roles and functions – one that is underpinned by the subsidiarity principle and te ao Māori values.

At the heart of the framework is the notion that local comes first, with local government showing leadership in shaping the conditions for communities to thrive, being an important connector, harnessing its role as anchor institution, and creating space for hapū/iwi to pursue self-determination.

The framework also reflects our acceptance that there are justifications for departing from the local-first approach, including effectiveness of scale, access to skills, risks and liability, consistency, and equality.

Using the framework, we consider that local and central government, in a Tiriti-consistent manner, should review the future allocations of roles and functions.

Recommendations

12 That central and local government note that the allocation of the roles and functions is not a binary decision between being delivered centrally or locally.

13 That local and central government, in a Tiriti-consistent manner, review the future allocations of roles and functions by applying the proposed approach, which includes three core principles:

- the concept of subsidiarity
- local government's capacity to influence the conditions for wellbeing is recognised and supported
- te ao Māori values underpin decision-making.

Questions

? What process would need to be created to support and agree on the allocation of roles and functions across central government, local government, and communities?

? What conditions will need to be in place to ensure the flexibility of the approach proposed does not create confusion or unnecessary uncertainty?

? What additional principles, if any, need to be considered?

Local government as champion and activator of wellbeing

Local government has a crucial role in championing and activating local wellbeing due to its assets, influence, and proximity to communities. Local government has a systems leadership role within the wider interconnected system that includes social networks, workplaces, community institutions, community spaces, and conditions that interact to affect and foster the local wellbeing of people, place, and the environment.

Hapū/iwi and Māori organisations are fundamental to the Kaupapa of wellbeing. Councils must develop sustainable partnerships with hapū/iwi and Māori organisations. This will require councils to take a more holistic, tikanga-based approach that considers intergenerational outcomes when solving complex problems.

The Panel has identified three ways councils can enhance and champion wellbeing: as an anchor institution, as a place-maker, and as a systems networker and convenor.

We have seen a number of examples where councils are already putting wellbeing at the core of their purpose and shifting the way they work in and with their communities. However, this is not consistent or implemented sustainably across all councils. It will require a significant shift in councils' mindset, investment, capability, and relationships with central government. Competing demands and budget constraints make it challenging to fully realise this enhanced role without the other changes in the report. Having said that, there are a range of ways councils can take action now.

Recommendations

14 That local government, in partnership with central government, explores funding and resources that enable and encourage councils to:

a. lead, facilitate, and support innovation and experimentation in achieving greater social, economic, cultural, and environmental wellbeing outcomes

b. build relational, partnering, innovation, and co-design capability and capacity across their whole organisation

c. embed social/progressive procurement and supplier diversity as standard practice in local government with nationally supported organisational infrastructure and capability and capacity building

d. review their levers and assets from an equity and wellbeing perspective and identify opportunities for strategic and transformational initiatives

e. take on the anchor institution role, initially through demonstration initiatives with targeted resources and peer support

f. share the learning and emerging practice from innovation and experimentation of their enhanced wellbeing role.

Questions

? What feedback do you have on the roles councils can play to enhance intergenerational wellbeing?

? What changes would support councils to utilise their existing assets, enablers, and levers to generate more local wellbeing?

A stronger relationship between central and local government

The Panel has heard clearly that the current relationship ranges from strained to broken, with a lack of trust in both directions being a common theme. Communities are not benefiting from a cohesive, mutually reinforcing relationship that harnesses the strengths of both local and central government.

Both central and local government need to reset the relationship. Tackling the wellbeing challenges of the 21st Century requires partnering at place with a strong focus on agreed outcomes and priorities.

While the people relationships will always trump systems and models, we are concerned that there is system fragility and reliance on individuals. We believe that the optimal combination is strong leadership and relational practice, backed up by a strong system that creates a more sustainable and predictable environment for everyone. This will require a mindset shift from both central and local government, acknowledging the value and strength that each brings.

A key element of any future model must be an approach and a process for identifying shared priority outcomes and commitment to co-invest for community outcomes. Within this process there is an explicit role for Māori alongside local and central government in identifying and addressing the priority outcomes that will drive community wellbeing. Understanding the nature and extent of funding and spending is critical to determine where there are opportunities to reprioritise and ensure resources are applied to best effect.

Our report outlines examples of collective/interdependent models that provide for co-investment, underpinned by a focus on building and maintaining productive relationships.

Questions

As we work towards our final report, we want to consider the merits of the different examples. We are interested in your views as to how to rewire the system of central and local government relationships through developing an aligned and cohesive approach to co-investment in local outcomes.

? To create a collaborative relationship between central and local government that builds on current strengths and resources, what are:

a. the conditions for success and the barriers that are preventing strong relationships?
b. the factors in place now that support genuine partnership?
c. the elements needed to build and support a new system?
d. the best options to get there?
e. potential pathways to move in that direction and where to start?
f. the opportunities to trial and innovate now?

? How can central and local government explore options that empower and enable a role for hapū/iwi in local governance in partnership with local and central government? These options should recognise the contribution of hapū/iwi rangatiratanga, kaitiakitanga, and other roles.

Replenishing and building on representative democracy

Local government needs to ensure that diverse voices are heard. The most effective way to do this is to make sure that every effort is made to reflect diversity around the council table.

Key to this is ensuring that diversity is reflected and that members of council have the necessary skills, experience, and support to lead with confidence, help develop solutions to complex intergenerational problems, and facilitate inclusive and effective participatory democracy.

However, there are still significant barriers to more diverse representation on councils. Participation in local government has continued to decline over the past three decades and a significant proportion of people, due to a number of factors, do not see the value of standing for a position or even voting in local body elections, which limits engagement and confidence in local government decision-making.

Māori wards and constituencies (whilst a positive way of providing representation for Māori as citizens) were not designed to provide for Tiriti-based representation of mana whenua or significant Kaupapa-based groups at the council table. People in councils need to build their capability and understanding of Te Tiriti o Waitangi and te ao Māori.

To promote innovative, strategic, and future-focused leadership, support and capacity building for elected members is recommended. With this in mind, the Panel is also exploring the merits of models for democracy that enable both capability-based and mana whenua appointments to supplement elected members. The Panel is interested in your feedback on this concept.

The Panel has received and considered a lot of ideas about how to strengthen representation and electoral processes. Accordingly, our draft report promotes a number of changes. This includes looking at more proactive support for representation reviews, centralised administration of local electoral processes, stronger direction on the choice of electoral system, the voting age, and the electoral term.

The Panel has considered conditions that could promote success, such as remuneration and workplace support for elected members, as well as mechanisms to promote a healthy relationship between council and staff, transparency and continuous improvement in democratic processes.

Recommendations

15 That the Electoral Commission be responsible for overseeing the administration of local body elections.

16 That central government undertakes a review of the legislation to:

a. adopt Single Transferrable Vote as the voting method for council elections

b. lower the eligible voting age in local body elections to the age of 16

c. provide for a 4-year local electoral term

d. amend the employment provisions of chief executives to match those in the wider public sector, and include mechanisms to assist in managing the employment relationship.

17 That central and local government, in conjunction with the Remuneration Authority, review the criteria for setting elected member remuneration to recognise the increasing complexity of the role and enable a more diverse range of people to consider standing for election.

18 That local government develops a mandatory professional development and support programme for elected members; and local and central government develop a shared executive professional development and secondment programme to achieve greater integration across the two sectors.

19 That central and local government:

a. support and enable councils to undertake regular health checks of their democratic performance

b. develop guidance and mechanisms to support councils resolving complaints under their code of conduct and explore a specific option for local government to refer complaints to an independent investigation process, conducted and led by a national organisation

c. subject to the findings of current relevant ombudsman's investigations, assess whether the provisions of the Local Government Official Information and Meetings Act 1987, and how it is being applied, support high standards of openness and transparency.

20 That central government retain the Māori wards and constituencies mechanism (subject to amendment in current policy processes), but consider additional options that provide for a Tiriti-based partnership at the council table.

Questions

? How can local government enhance its capability to undertake representation reviews and, in particular, should the Local Government Commission play a more proactive role in leading or advising councils about representation reviews?

? To support a differentiated liberal citizenship, what are the essential key steps, parameters, and considerations that would enable both Tiriti- and capability-based appointments to be made to supplement elected members?

Equitable funding and finance

Local government has been under significant funding pressure for several years, with many suggesting to the Panel that the system is 'broken' and that we have reached 'peak rates'.

Concerns about growing community expectations, unfunded mandates being passed down from central government, along with meeting the impacts of growth, tourism, and significant infrastructure failures have placed huge rate pressures on councils.

Successive funding reviews have highlighted the problems and proffered solutions; however, few have been enacted.

To move from the currently constrained funding system, there needs to be a meaningful change in the way local and central government address issues of sustainable funding, and that also enables councils to establish new funding mechanisms.

While the Panel considers that rates are still the best means of funding council activities, they need better support from central government. The continuing impact of unfunded mandates, the significant future challenges of climate change, environmental restoration, and matters of social and economic inequity are all going to be felt locally, but need central government funding support.

As mentioned earlier, the Panel believes central and local government must partner more effectively and co-invest in community outcomes and priorities. It will require central government to commit funding to those priorities and work with local government in the application of that funding.

The Panel also considers that central government needs to assess the impacts of proposed regulatory changes on local government and then provide funding for them. Only then will the issue of unfunded mandates be addressed. We also think central government needs to start paying rates and other charges on its property, as well as creating a significant intergenerational climate change fund.

Local government will also benefit from long-term planning and rate-setting processes being more flexible and from having greater ability to establish new funding tools, such as congestion charging and bed taxes.

Recommendations

21 That central government expands its regulatory impact statement assessments to include the impacts on local government; and that it undertakes an assessment of regulation currently in force that is likely to have significant future funding impacts for local government and makes funding provision to reflect the national public-good benefits that accrue from those regulations.

22 That central and local government agree on arrangements and mechanisms for them to co-invest to meet community wellbeing priorities, and that central government makes funding provisions accordingly.

23 That central government develops an intergenerational fund for climate change, with the application of the fund requiring appropriate regional and local decision-making input.

24 That central government reviews relevant legislation to:

a. enable councils to introduce new funding mechanisms

b. retain rating as the principal mechanism for funding local government, while redesigning long-term planning and rating provisions to allow a more simplified and streamlined process.

25 That central government agencies pay local government rates and charges on all properties.

Question

? What is the most appropriate basis and process for allocating central government funding to meet community priorities?

System design

The success and sustainability of local government requires a system design that can support the needs of our communities and foster wellbeing both now and in the future.

The issues that councils face are increasingly challenging and complex, and the current structures and systems need to be strengthened and enhanced to ensure that they are fit for the future.

A successful future system and structure for local government will enable communities to have their voices heard and their needs met locally, while leveraging strong regional connections and resources.

The Panel has developed a set of design principles against which future structures should be evaluated. Our draft report contains examples of structures that could give effect to the principles. As we develop our final report we are very interested in your feedback on the principles and structural examples.

Following our review, local and central government will need to work together to determine the best structural options to give effect to the design principles and that also take account of the best way various roles and functions are delivered.

No matter what the future system design looks like, there needs to be greater collaboration across local government and increased use of shared services. The Panel considers that there are significant opportunities to deliver better value and ensure resources are applied to best effect, especially having shared information systems and support services in place. The Panel also believes there is great potential for central and local government to work more closely together to create a more joined-up public sector.

Recommendations

26 That central and local government explore and agree to a new Tiriti-consistent structural and system design that will give effect to the design principles.

27 That local government, supported by central government, invests in a programme that identifies and implements the opportunities for greater shared services collaboration.

28 That local government establishes a Local Government Digital Partnership to develop a digital transformation roadmap for local government.

Questions

? What other design principles, if any, need to be considered?

? What feedback have you got on the structural examples presented in the report?

System stewardship and support

The sum of all the changes proposed in this draft report requires us to consider what is needed at a system stewardship level to embed, drive, and support the system of local government to successfully navigate and adapt to change over the next 30 years.

System stewardship can be defined as holding the responsibility for the long-term quality, sustainability, and outcomes of the wider system of local government. It's about guiding and supporting local government to be the very best it can be. It includes a focus on the relational (people) aspects of a system, as well as the processes and enabling conditions needed to ensure all actors are aligned towards the system outcomes.

Local government stewardship is currently provided by people and organisations in central and local government. At a central government level, this primarily includes the Minister of Local Government, the Department of Internal Affairs (along with the Secretary of Local Government), and the Local Government Commission. At a local government level, membership organisations Local Government New Zealand and Taituarā have important roles.

While there are strengths in the current approach, we consider there are gaps and limitations, and that significant change is needed to support the shifts proposed in this report. In particular, we consider that a specified stewardship function is required that can support the system holistically in the long term, including driving the capabilities, processes, actions, and legislation that will lift performance across local government and maximise its strengths and resources and collective impact.

As such, we recommend that central and local government consider which entities are best placed to play system stewardship roles in a revised system of local government that proactively promotes and cares for the health of the local government system, including:

- oversight and monitoring of relevant legislation administered by agencies
- care for the system's long-term capability and people
- maintenance and enhancement of institutional knowledge and information
- supporting partnerships, co-design, and innovation.

We also seek feedback on how we embed Te Tiriti in local government system stewardship.

Recommendations

29 That central and local government considers the best model of stewardship and which entities are best placed to play system stewardship roles in a revised system of local government.

Questions

? How can system stewardship be reimagined so that it is led across local government, hapū/iwi, and central government?

? How do we embed Te Tiriti in local government system stewardship?

? How should the roles and responsibilities of 'stewardship' organisations (including the Secretary of Local Government (Department of Internal Affairs), the Local Government Commission, LGNZ, and Taituarā) evolve and change?

Share your thoughts

This report is the culmination of more than a year of engagement, research, and thinking about how to build a local government system to serve communities now and into the future. With your feedback, we will be able to robustly test our thinking and improve our proposals.

You can share your thoughts on our recommendations and the future for local government by participating in our consultation.

Submissions close 28 February 2023.

To hear more about the draft report, please check the Review into the Future for Local Government website for details of upcoming engagement opportunities and sign up for our newsletter.

Stay connected with the Review by joining the conversation on social media and our mailing list.

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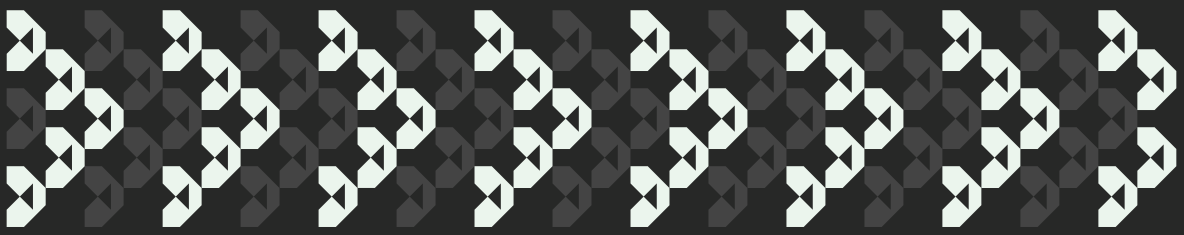

7.1. Chairperson's Report

Prepared for: Council

Activity: Governance Report

Author: Cr Robertson, Chairperson

Date: 7 December 2022

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[1] Firstly, I wanted to acknowledge the very positive start we have had to the 2022-25 Triennium. We have done some very constructive groundwork bringing our ORC governance team together and appointing committee leadership roles for the Triennium ahead.

[2] The Co-Chair structure adopted, recognises that each Councillor is equal. We are all democratically elected by our communities for the skills and contributions we can and will make. We have a mix of highly experienced governors and new Councillors bringing enrichment through their valued skills and experience. Diversity brings different ideas, balance, creativity, greater understanding of community, and ultimately better solutions.

[3] At times we will have robust debate. This is healthy. Each of us brings our own cultural/family heritage, our technical and practical knowledge, our real-life experience, and our own way of saying and doing things. We will see problems from different angles. I am confident that ORC Councillors enter an environment where all of our voices will be heard and valued.

[4] It's been a pleasure to work with each and every one of you since our induction meeting. It's been fantastic to find everyone wanting to work together, to collaborate, to recognise the skills of others and to put their hands up with a can do attitude. I have been really pleased to see initial briefings with Committee Co-Chairs and Executive Leadership Team staff happening and scheduled. We look forward to committee meetings early in 2022.

[5] Thank you to all Councillors, but also thank you to Pim Borren and all ORC staff who have put in many hours supporting the new ORC Council with the information, administrative support, encouragement and organizational leadership needed to set us up so well for the triennium ahead.

[6] Noteworthy Meetings and Events since the Cromwell Council Meeting:

- Meetings with CE and Deputy Chair – Weekly Chair/CE, as well as further CE/Chair/Deputy Chair meetings. Thank you to Pim Borren for our regular meetings to go over upcoming topics of note and assist in our preparation for upcoming events/work.
- Armistice Day – Service for Remembrance, Queens Gardens Cenotaph, Dunedin 11/11/22. Wreath lain as an official ceremony guest on behalf of the people of Otago (Otago Regional Council).

- Submissions lodged – NES-PF Afforestation Submission, Taumata Arawai Performance Measures, Agricultural Emissions. As resolved during the Cromwell meeting.
- LGNZ Zone 5 and 6 Conference, Richmond, Tasman 13-15 November 2022.
- The conference focused on 3 Waters Reform, Future for Local Government, South Island Economic Update, AF8 impact and resilience, Assistant Minister for Local Government (Hon Kieran McAnulty), and some leadership, vision, consultation/engagement skills sessions. Slides are available for Councillors if you would like a copy.
- To note the following LGNZ National Council Members have been appointed (at relevant recent Zone and Sector Meetings). There are still a couple more appointments to be made.

  Zone 1: Mayor Vince Cocurullo
  Zone 2: Deputy Mayor Angela O'Leary
  Zone 3 co-chairs: Mayor Andy Watson and Mayor Craig Little
  Zone 4: Mayor Janet Holborow
  Zone 5: Mayor Dan Gordon
  Zone 6: Mayor Bryan Cadogan
  Metro sector: Mayor Grant Smith
  Rural Sector: Mayor Alex Walker
  Provincial sector: Mayor Sam Broughton
  Regional sector: Chair Doug Leeder (with deputy co-chairs being Mayor Rehette Stoltz and Chair Rachel Keedwell)
- 18 November 2022: Regional Sector Meeting, Greater Wellington Regional Council:

  Regional Sector Chair (Doug Leeder) and Co-Deputy Chairs (Mayor Rehette Stoltz and Chair Rachel Keedwell) Elected. Initial discussion on topic areas for focus during the triennium were put forward. These are yet to be determined.
- 23 November 2022: Dunedin Future Development Strategy Joint ORC/DCC Workshop.
- 23 November 2022: ORC Staff Induction Presentation.
- 24 November 2022: Otago Access Radio Interview.
- 24 November 2022: Otago Regional Leadership Group Meeting.
- 25 November 2022: Whare Runaka Internal Steering Group Meeting.
- 18 November and 28 November 2022: Land and Water Regional Plan Governance Group – Regional Topics Meetings.
- Freshwater Management Units, Community Consultation Meetings:

  I attended Taieri in Mosgiel, Middlemarch, Ranfurly (28, 29, 30 Nov). Thank you to all those Councillors, staff, Iwi and especially community who have been attending these meetings right across Otago.

Correspondence

- Letter from Cr Noone to Hon Damien O'Connor re ORC Biosecurity Operational Plan 2022-23.
- Letter from Hon Damien O'Connor re ORC Biosecurity Plan Summary of Performance.

RECOMMENDATION

That the Council:

1) ***Notes*** *this report.*

ATTACHMENTS

1. Letter from Cr Noone to Hon Damien O Connor re ORC Biosecurity Operational Plan 2022-23 - Oct 22 [**7.1.1** - 1 page]
2. Letter from Hon Damien O'Connor re ORC Biosecurity Plan Summary of Performance [**7.1.2** - 1 page]

Otago Regional Council

From the Office of the Chairperson

Our Ref: A1706500

6 October 2022

Hon Damien O'Connor
Minister for Biosecurity
Parliamentary Office
Freepost PO Box 18 888
Parliament Buildings
Wellington 6160

Email: damien.oconnor@parliament.govt.nz

Dear Minister

Otago Regional Council Biosecurity Operational Plan 2021-22

On behalf of Otago Regional Council (ORC), I am pleased to provide you with a copy of ORC's report on Biosecurity Operational Plan 2021/2022 Summary of Performance and the Biosecurity Operational Plan 2021 - 22 Report that went to Council's Implementation Committee on 14 September 2022.

I look forward to your response.

Yours sincerely

Cr Andrew Noone
Chairperson

Attached: ORC Council Paper: Biosecurity Operational Plan 2021/2022 Summary of Performance
ORC Biosecurity Operational Plan 2021 - 22 Report

Hon Damien O'Connor

MP for West Coast-Tasman

Minister of Agriculture
Minister for Biosecurity
Minister for Land Information
Minister for Rural Communities
Minister for Trade and Export Growth

MIN22-0708

28 NOV 2022

Cr Andrew Noone
Chairperson
Otago Regional Council
Kim.Wainscott@orc.govt.nz

Dear Andrew

Thank you for your correspondence of 6 October regarding the Otago Regional Council Biosecurity Plan Summary of Performance. Please accept my apologies for the delay in responding.

I would like to congratulate you on the progress that Otago Regional Council is making on your Regional Pest Management Plan. It is particularly pleasing to see your engagement with, and progress in the wallaby and wilding conifers programmes.

I also note your progress in addressing the rabbit issue in Otago, and your success in gaining community engagement with rabbit control. I have been informed that Otago Regional Council representatives attended and provided valuable input into the recent meeting organised by Biosecurity New Zealand on rabbits and Canada geese. I would like to thank you for your input and encourage the council to continue to engage on improvements in managing these pests.

As I mentioned regarding the Operational Plan, the *Biosecurity Act 1993* does not require you to send these reports to my office. However, I greatly appreciate the insight that they provide into regional pest management.

Yours sincerely

Hon Damien O'Connor
Minister for Biosecurity

Private Bag 18041, Parliament Buildings, Wellington 6160, New Zealand
+64 4 817 8715 | d.oconnor@ministers.govt.nz | beehive.govt.nz

7.2. Chief Executive's Report

Prepared for: Council

Activity: Governance Report

Endorsed by: Pim Borren, Interim Chief Executive

Date: 7 December 2022

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[1] It has been a long, tiring year for staff at ORC with a lot of change, an election, as well as the various government reforms and changes in national policies. ELT discussed the concern for staff and the importance for them to refresh over the holiday season by taking their annual leave.

[2] I am very pleased to report the ratification of our collective employment agreement with the PSA. The result in terms of remuneration increases is fair given the environment we find ourselves in (inflation and staff shortages). I am also very pleased we have managed to incorporate a performance component into our remuneration system which clearly recognises our highest performers.

[3] I have attended the Taituara CE forum and annual conference being held in Wellington this week. I have not attended this event for three years and it has been great reconnecting with local government chief executive colleagues.

[4] I met with the Minister of Local Government, Hon Nanaia Mahuta. It has become clear from my conversation with her, as well as letters from both our Minister of the Environment and the Minister of Biosecurity, that ORC is now held in much higher regard than it was six months ago. This is largely because we are getting on with our work programmes and making excellent progress across the board.

[5] Our significant FMU public consultations across Otago continue to progress well. We have been particularly pleased that our staff are working in public meetings with the clear support of our elected members. It is great that our community is seeing staff and governance working well together.

[6] I continue to be pleased with the improvement of media coverage and the excellent work we are doing in sharing our work across Otago. We appreciate that there still are many challenges, but I hope our communities are recognising the role we play especially in assisting in improving the environment.

[7] We are partnering closely with both Dunedin City Council on our combined future development strategy and with QLDC on a similar project. Each district/city has different challenges as they support our joint ratepayers plan for future growth and economic development, without risking negative impacts on our environment.

RECOMMENDATION

That the Council:

1) ***Notes** this report.*

ATTACHMENTS

Nil

The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution are as follows:

General subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Ground(s) under section 48(1) for the passing of this resolution
Confidential minutes of the 9 November 2022 Council Meeting	To protect information where the making available of the information— would be likely unreasonably to prejudice the commercial position of the person who supplied or who is the subject of the information – Section 7(2)(b)(ii) To maintain legal professional privilege – Section 7(2)(g) To enable any local authority holding the information to carry out, without prejudice or disadvantage, commercial activities – Section 7(2)(h) To enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations) – Section 7(2)(i)	Section 48(1)(a): Subject to subsection (3), a local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.
Review of Open Actions (Confidential) from resolutions of 2019-2022 Council and Committees	To protect the privacy of natural persons, including that of deceased natural persons – Section 7(2)(a) To protect information where the making available of the information— would be likely unreasonably to prejudice the commercial position of the person who supplied or who is the subject of the information – Section 7(2)(b)(ii) To enable any local authority holding the information to carry out, without prejudice or disadvantage, commercial activities – Section 7(2)(h) To enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial	Section 48(1)(a): Subject to subsection (3), a local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.

	negotiations) – Section 7(2)(i) To prevent the disclosure or use of official information for improper gain or improper advantage – Section 7(2)(j)	
Amendments to Non-Freshwater Hearings Panel Appointment - pORPS Sch 1 Process	To protect the privacy of natural persons, including that of deceased natural persons – Section 7(2)(a) To protect information where the making available of the information—would be likely unreasonably to prejudice the commercial position of the person who supplied or who is the subject of the information – Section 7(2)(b)(ii)	Section 48(1)(a): Subject to subsection (3), a local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.
Port Otago Resolution in Lieu of Annual Shareholders Meeting	To protect the privacy of natural persons, including that of deceased natural persons – Section 7(2)(a) To enable any local authority holding the information to carry out, without prejudice or disadvantage, commercial activities – Section 7(2)(h)	Section 48(1)(a): Subject to subsection (3), a local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.
Appointment of independent member of Audit and Risk Subcommittee	To protect the privacy of natural persons, including that of deceased natural persons – Section 7(2)(a)	Section 48(1)(a): Subject to subsection (3), a local authority may by resolution exclude the public from the whole or any part of the proceedings of any meeting only on 1 or more of the following grounds: (a) that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of

		information for which good reason for withholding would exist.

This resolution is made in reliance on section 48(1)(a) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 or section 7 of that Act or section 6 or section 7 or section 9 of the Official Information Act 1982, as the case may require, which would be prejudiced by the holding of the whole or the relevant part of the proceedings of the meeting in public.