WAIMAKARIRI DISTRICT COUNCIL

Council

Agenda

Tuesday 5 April 2022

1pm

This meeting will be held remotely via Zoom and live audio streamed on the Council website

Members:

Mayor Dan Gordon (Chair)

Cr Neville Atkinson

Cr Kirstyn Barnett

Cr Al Blackie

Cr Robbie Brine

Cr Wendy Doody

Cr Niki Mealings

Cr Philip Redmond

Cr Sandra Stewart

Cr Joan Ward

Cr Paul Williams

The Mayor and Councillors

WAIMAKARIRI DISTRICT COUNCIL

A meeting of the **WAIMAKARIRI DISTRICT COUNCIL** will be held **REMOTELY via ZOOM** on **TUESDAY 5 APRIL 2022** commencing at **1pm.**

Sarah Nichols
GOVERNANCE MANAGER

Recommendations in reports are not to be construed as Council policy until adopted by the Council

BUSINESS

Page No

1. **APOLOGIES**

2. **CONFLICTS OF INTEREST**

Conflicts of interest (if any) to be reported for minuting.

3. **ACKNOWLEDGEMENTS**

3.1. **Obituary Air Marshal David Crooks CB OBE Former Chief of the Defence Staff**

4. **CONFIRMATION OF MINUTES**

4.1. **Minutes of a meeting of the Waimakariri District Council held on 22 February 2022** 11 - 13

RECOMMENDATION

THAT the Council:

(a) **Confirms,** as a true and correct record, the circulated minutes of a meeting of the Waimakariri District Council held on 22 February 2022.

4.2. **Minutes of a meeting of the Waimakariri District Council held on 1 March 2022** 14 - 29

RECOMMENDATION

THAT the Council:

(a) **Confirms,** as a true and correct record, the circulated minutes of a meeting of the Waimakariri District Council held on 1 March 2022.

4.3. **Minutes of an extraordinary meeting of the Waimakariri District Council held on 15 March 2022**

30 - 31

RECOMMENDATION

THAT the Council:

(a) **Confirms,** as a true and correct record, the circulated minutes of an extraordinary meeting of the Waimakariri District Council held on 15 March 2022.

MATTERS ARISING (FROM MINUTES)

PUBLIC EXCLUDED MINUTES *(Refer to public excluded agenda)*

4.4. **Minutes of the public excluded meeting of the Waimakariri District Council held on 22 February 2022**

4.5. **Minutes of the public excluded meeting of the Waimakariri District Council held on 1 March 2022**

4.6. **Minutes of the public excluded extraordinary meeting of the Waimakariri District Council held on 15 March 2022**

5. **DEPUTATIONS AND PRESENTATIONS**

Nil.

6. **ADJOURNED BUSINESS**

6.1. **Update on Rural Land Lease and Licence Policy Consultation –**
R Hawthorne (Property Manager)
The initial report on this matter was left to lie on the table at the March 2022 Council meeting.

32 - 33

RECOMMENDATION

THAT the Council

(a) **Receives** Memo no. 220330047906 for information

(b) **Notes** that a report and Policy document will be presented to Council in July 2022.

7. **SHOVEL READY PROJECTS**

Nil.

8. REPORTS

8.1. Canterbury Climate Change Risk Assessment Report – S Markham (Manager Strategic Projects)

34 - 300

RECOMMENDATION

THAT the Council

(a) **Receives** Report No. 220317039337.

(b) **Receives** the Canterbury Climate Change Risk Assessment Report and accompanying Summary Report.

(c) **Notes** the Canterbury Mayoral Forum's Climate Change Steering Group is now moving into action planning on the back of this risk assessment, while the results of it will be used in raising awareness of the climate change risks faced by the region through the "Its Time Canterbury" campaign.

8.2. Update of Backflow Prevention Policy – C Roxburgh (Water Asset Manager) and H Proffit (Water Safety and Compliance Specialist)

301 - 340

RECOMMENDATION

THAT the Council:

(a) **Receives** Report No. 220317039207.

(b) **Notes** that the Council's Backflow Prevention Policy has been updated following the five year anniversary since the Policy was adopted, in response to new legislation that sits above the Policy, and to try to make the Policy more clear and user friendly.

(c) **Notes** that overall obligations of different parties under the Policy have been reviewed and assessed as not changing significantly, and as such a Special Consultative Procedure is not required, with the overall intent of the updated Policy to be renewal of the previous Policy, with improved clarity, and giving effect to new legislation, rather than introducing a new set of obligations to any party.

(d) **Approves** the updated 2022 Backflow Prevention Policy, effective from this date.

8.3. Approval of Council Submission on Draft Ecan Annual Plan 2022/2023 S Markham (Manager Strategic Projects)

341 - 344

RECOMMENDATION

THAT the Council

(a) **Receives** Report No. 220325044452.

(b) **Approves** the draft submission, as may be amended, to ECan's Draft 2022/23 Annual Plan

(c) **Notes** that the submission seeks for the Council to be heard at hearings on 26-29 April 2022.

NOTE: The Submission document will be circulated separately.

8.4. **Commercial Share Scooters Trial Results –** V Thompson (Business and Centres Advisor) and S Hart (Strategy and Business Manager)

345 - 359

RECOMMENDATION

THAT the Council:

(a) **Receives** Report No. 220317038835.

(b) **Notes** the aggregated scooter trial data that has been provided and where aspects of key data is consistent across Flamingo Scooters and Ride Reports data capturing platforms;

(c) **Notes** the community feedback which has been included and is sourced from both Flamingo Scooters and the Waimakariri District Council primarily in the form of surveys and/or direct feedback from affected community organisations;

(d) **Approves** a twelve month permit being offered to Flamingo Scooters to continue commercial scooter services in the Waimakariri District covering a timeframe from 1 May 2022 to 30 April 2023 for up to 300 scooters;

(e) **Approves** an extension of a permit term by an additional twelve months for any selected provider (to conclude 30 April 2024) at the Chief Executive's discretion under Council delegation if the first twelve month operating period continues successfully;

(f) **Approves** a permit fee of up to 10 cents per ride for every ride taken on a commercial share scooter in the Waimakariri District. This fee may be reviewed beyond the initial yearlong permit term at the Chief Executive's discretion;

(g) **Approves** geo-fencing restrictions for the trial continuing across the new permitting period, except access across the Ravenswood/Pegasus roundabout will be permitted;

(h) **Notes** the permit fees are intended to cover any superficial public realm reinstatement costs that would otherwise have come out of Greenspace or Roading Unit operational budgets as a result of scooter misuse/vandalism by members of the public;

(i) **Notes** that Flamingo Scooters or future alternative providers will be responsible for covering all operational costs to ensure the continuity of their business operations and service levels when operating in the Waimakariri District and no financial operating contribution is required from Council.

8.5. **Electoral Candidate Order on Voting Papers**– S Nichols (Governance Manager)

360 - 362

RECOMMENDATION

THAT the Council:

(a) **Receives** Report No. 220325044585.

(b) **Approve**, under regulation 31 of the Local Electoral Regulations 2001, that the names of candidates at the 2022 triennial elections and any subsequent by-elections be arranged in random order.

8.6. **Local Government NZ (LGNZ) Annual Conference Attendance 2022**– S Nichols (Governance Manager)

363 - 372

RECOMMENDATION

THAT the Council:

(a) **Receives** report No.220316038134.

(b) **Approves** Councillor Atkinson attending the Local Government New Zealand Conference from 19 to 22 July 2022 in Papaioea/Palmerston North, accompanying the Mayor and Chief Executive.

9. **MATTER REFERRED FROM COMMITTEES AND COMMUNITY BOARDS**

9.1. **Kaiapoi Riverbank Walkway and Memorial Reserve Update –** V Thompson (Business and Centres Advisor), G MacLeod (Greenspace Manager), and H White (Intermediate Landscape Architect)
(refer to attached copy of report no. 220216020391 to the KTCB meeting of 21 March 2022.

373 - 382

RECOMMENDATION

THAT the Council:

(a) **Defers** the 'Kaiapoi Riverbank Walkway and Memorial Reserve' project from 2021/22 until the 2023/24 Long Term Plan cycle (as per item 4.20 in the report) and that Option C be submitted with a request for the full project budget at that time.

9.2. **Removal of Minimum Car Parking Requirements from Operative District Plan –** N Sheerin (Senior Policy Planner) and G Hackett (Policy Planner)
(refer to attachment copy of report no. 211018168094 to the District Planning and Regulation Committee meeting of 14 December 2021)

383 - 388

RECOMMENDATION

THAT the Council:

(a) **Notes** that the National Policy Statement on Urban Development (NPSUD) requires the amendment of the operative Waimakariri District Plan to remove minimum carparking requirements by 20 February 2022.

(b) **Notes** that the Development Planning Manager was delegated by the Council to amend the operative Waimakariri District Plan where

required by a national policy statement under section 55 of the Resource Management Act.

10. **WELLBEING, HEALTH AND SAFETY**

10.1. **Health, Safety and Wellbeing Report April 2022** – J Harland (Chief Executive)

389 - 401

RECOMMENDATION

THAT the Council:

(c) **Receives** Report No. 220322042010

(d) **Notes** that there were no notifiable incidents this month. The organisation is, so far as is reasonably practicable, compliant with the duties of a person conducting a business or undertaking (PCBU) as required by the Health and Safety at work Act 2015.

(e) **Notes** that the Health & Safety Advisor has developed a plan of activities to support compliance and assist the organisation while the team is under resourced.

(f) **Circulates** this information to Community Boards for their information.

11. **COMMITTEE MINUTES FOR INFORMATION**

11.1. Minutes of a meeting of the District Planning and Regulation Committee of 22 February 2022

402 - 404

11.2. Minutes of a meeting of the Utilities and Roading Committee of 22 February 2022

405 - 413

11.3. Minutes of a meeting of the Audit and Risk Committee of 15 March 2022

414 - 419

11.4. Minutes of a meeting of the Community and Recreation Committee of 15 March 2022

420 - 430

11.5. Minutes of a meeting of the Utilities and Roading Committee of 22 March 2022

431 - 438

RECOMMENDATION

THAT Items 11.1 – 11.5 be received information.

12. **COMMUNITY BOARD MINUTES FOR INFORMATION**

12.1. Minutes of a meeting of the Kaiapoi-Tuahiwi Community Board meeting of 21 February 2022

439 - 448

12.2. Minutes of a meeting of the Oxford-Ohoka Community Board meeting of 2 March 2022

449 - 456

12.3. Minutes of a meeting of the Rangiora-Ashley Community Board meeting of 9 March 2022

457 – 465

12.4. Minutes of a meeting of the Woodend-Sefton Community Board meeting of 14 March 2022

466 - 470

12.5. Minutes of a meeting of the Kaiapoi-Tuahiwi Community Board meeting of 21 March 2022

471 - 481

RECOMMENDATION

THAT Items 12.1– 12.5 be received for information.

13. REPORTS FOR INFORMATION

13.1. **Te Kòhaka ò Tuhaitara Trust - Statement of Intent for the Year ending 30 June 2023 –** J Millward (Manager Finance and Business Support
(Refer to attached copy of report 220218022320 to the Audit and Risk Committee meeting of 15 March 2022)

482 - 491

13.2. **February 2022 Flood Event – Update on Service Requests –** E Klopper (Flood Team Lead), C Fahey (Water Operations Team Leader) and K Simpson (3 Waters Manager)
(Refer to attached copy of report 220310034384 to the Utilities and Roading Committee meeting of 22 March 2022)

492 - 512

RECOMMENDATION

THAT the Council:

(a) **Receives** Items 13.1 – 13.2 for information.

14. MAYOR'S DIARY

14.1 **Mayor's Diary 23 February – 29 March 2022**

513 - 516

RECOMMENDATION

THAT the Council:

(a) **Receives** report no 220329046828.

15. COUNCIL PORTFOLIO UPDATES

15.1. **Iwi Relationships** – Mayor Dan Gordon

15.2. **Greater Christchurch Partnership Update** – Mayor Dan Gordon

15.3. **Canterbury Water Management Strategy –** Councillor Sandra Stewart

15.4. **International Relationships** – Deputy Mayor Neville Atkinson

15.5. **Regeneration (Kaiapoi)** – Councillor Al Blackie

15.6. **Climate Change and Sustainability** – Councillor Niki Mealings

15.7. **Business, Promotion and Town Centres** – Councillor Joan Ward

16. QUESTIONS

(under Standing Orders)

17. URGENT GENERAL BUSINESS

(under Standing Orders)

18. **MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED**

Section 48, Local Government Official Information and Meetings Act 1987.

RECOMMENDATION

THAT the public be excluded from the following parts of the proceedings of this meeting.

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:

Item No	Minutes/Report of	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
18.1	Minutes of public excluded portion of Council meeting of 22 February 2022.	Confirmation of minutes	Good reason to withhold exists under Section 7	Section 48(1)(a)
18.2	Minutes of public excluded portion of Council meeting of 1 March 2022.	Confirmation of minutes	Good reason to withhold exists under Section 7	Section 48(1)(a)
18.3	Minutes of public excluded portion of an extraordinary Council meeting of 15 March 2022.	Confirmation of minutes	Good reason to withhold exists under Section 7	Section 48(1)(a)
REPORTS				
18.4	Report of S Hart (Strategy and Business Manager)	Rangiora BNZ Corner site (70 and 74 High Street) Divestment	Good reason to withhold exists under Section 7	Section 48(1)(a)
18.5	Report of R Hawthorne (Property Manager)	Divestment of van Bree land and closed Road associated with Silverstream Boulevard and adjacent development	Good reason to withhold exists under Section 7	Section 48(1)(a)
18.6	Report of S Hart (Strategy and Business Manager) and R Hawthorne (Property Manager)	Rangiora Bunnings Site	Good reason to withhold exists under Section 7	Section 48(1)(a)
18.7	Mayor Dan Gordon	Chief Executive Review	Good reason to withhold exists under Section 7	Section 48(1)(a)

his 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 which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public are as follows:

Item Nº	Reason for protection of interests	LGOIMA Part 1, Section 7
18.1 – 18.7	Protection of privacy of natural persons; To carry out commercial activities without prejudice; Maintain legal professional privilege; Enable Council to continue with (commercial) negotiation without prejudice or disadvantage Prevent the disclose of information for improper gain or advantage	Section 7 2(a) Section 7 2(b)ii Section 7 (g) Section 7 2(i) Section 7 (j)

CLOSED MEETING

See Public Excluded Agenda.

OPEN MEETING

19. **NEXT MEETING**

The next scheduled ordinary meeting of the Council will occur at 1pm on Tuesday 3 May 2022, held Remotely via Zoom, or in the Kaikanui Room, Ruataniwha-Kaiapoi Civic Centre, 176 Williams Street, Kaiapoi.

MINUTES OF A MEETING OF THE WAIMAKARIRI DISTRICT COUNCIL HELD IN THE COUNCIL CHAMBER, 215 HIGH STREET, RANGIORA, ON TUESDAY 22 FEBRUARY 2022, COMMENCING AT 11.30AM

PRESENT

Mayor D Gordon (Chairperson), Deputy Mayor N Atkinson, Councillors A Blackie, R Brine, W Doody, N Mealings, P Redmond, S Stewart, J Ward and P Williams.

IN ATTENDANCE

J Harland (Chief Executive), C Brown (Manager Community and Recreation), A Coker (Community Facilities Team Leader), and A Smith (Governance Coordinator).

1. **APOLOGIES**

Moved Councillor Redmond Seconded Councillor Williams

THAT an apology for absence be received and sustained from Councillor Barnett.

CARRIED

2. **CONFLICTS OF INTEREST**

There were no conflicts of interest reported.

3. **CONFIRMATION OF MINUTES**

Minutes of a meeting of the Waimakariri District Council held on 2 February 2022

Mayor Gordon advised that confirmation of these minutes would be considered at the Council meeting of 1 March 2022.

4. **REPORTS**

4.1. **Draft Annual Plan 2022/2023 and Consultation Document – J Harland (Chief Executive**

J Harland presented this report recommending the adoption of the Draft Annual Plan 2022/2023 for consultation and the associated Consultation Document. The report was taken as read.

Councillor Stewart sought clarification on wording in the report related to funding for the Kaiapoi Community Hub and it was confirmed by C Brown that this was an additional $618,000 to be spread over two years.

Councillor Stewart referred to the “Community Views” section in the report, pointing out that this Draft Annual Plan is likely to have an effect on Mana whenua, all groups and organisations and the wider community in the district and that this should have been reflected in the report. Mayor Gordon agreed, noting that there would be specific consultation with Ngai Tūāhuriri on the Annual Plan, and communication with other groups and the wider community.

Councillor Doody sought clarification and it was confirmed, that the funding for the Ashley Gorge water supply was $500,000 spread over two years.

Unconfirmed

Moved Mayor Gordon Seconded Councillor Doody

THAT the Council

(a) **Receives** report No. 220210017394;

(b) **Adopts** the Draft Annual Plan 2022/2023 (TRIM No. 211119185725) as the principal document relied on for the content of the Consultation Document;

(c) **Adopts** the Consultation Document 2022/2023 (TRIM No. 220211017589) as the statement of proposal for public participation in decisions on the content of the draft Annual Plan;

(d) **Notes** the Annual Plan Engagement Schedule (Trim 220211017985) with the special consultative procedure to open on 4 March 2022 and close on 4 April 2022;

(e) **Notes** the Draft Annual Plan and Consultation Document refers to further information and reports and this information will be provided on the Council website during the special consultative procedure from 4 March 2022 to 4 April 2023;

(f) **Delegates** to the Mayor and Chief Executive authority to make changes to the Consultation Document following Audit opinion and Council comments.

CARRIED

Mayor Gordon extended thanks to the Chief Executive and staff for all the work that had gone into this Draft Annual Plan and commended it to the community for consultation. The Council had signalled a desire for the rates to be similar to that in the Long Term Plan and were currently slightly ahead of that. With the current Covid-19 pandemic, it was likely that consultation with the community would be undertaken differently than previous years, involving more utilisation of social media such as Facebook and staff were continuing to investigate options.

5. QUESTIONS (UNDER STANDING ORDERS)

There were no questions.

6. URGENT GENERAL BUSINESS (UNDER STANDING ORDERS)

There was no urgent general business.

7. MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED

Section 48, Local Government Official Information and Meetings Act 1987

Moved Mayor Gordon Seconded Councillor Ward

THAT the public be excluded from the following parts of the proceedings of this meeting.

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:

Unconfirmed

Item No	Minutes/Report of:	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
7.1	Minutes of the public Excluded portion of Council meeting of 2 February 2022	Confirmation of Minutes	Good reason to withhold exists under Section 7	Section 48(1)(a)
7.2	Report of A Coker (Community Facilities Team Leader)	Town Hall Cinemas (Tin Man Cinema) – Revenue Forecast	Good reason to withhold exists under Section 7	Section 48(1)(a)

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 which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public are as follows:

Item Nº	Reason for protection of interests	Ref NZS 9202:2003 Appendix A
7.1 – 7.2	Protection of privacy of natural persons To carry out commercial activities without prejudice	A2(a) A2(b)ii

CARRIED

CLOSED MEETING

Recommendation to Resume in open meeting

Moved Mayor Gordon Seconded Councillor Atkinson

THAT the open meeting resumes and the business discussed with the public excluded remains public excluded.

CARRIED

The public excluded portion of the meeting occurred from 11.40am to 11.57am.

OPEN MEETING

8. **NEXT MEETING**

The next scheduled meeting of the Council is on Tuesday 1 March 2022, commencing at 1pm in the Council Chamber, Rangiora Service Centre, 215 High Street, Rangiora.

There being no further business, the meeting closed at 11.58am.

CONFIRMED

_____
Chairperson
Mayor Dan Gordon

_____
Date

Unconfirmed

MINUTES OF THE MEETING OF THE WAIMAKARIRI DISTRICT COUNCIL HELD VIA ZOOM ON TUESDAY 1 MARCH 2022, COMMENCING AT 1PM

PRESENT

Mayor D Gordon (Chairperson), Deputy Mayor N Atkinson, Councillors K Barnett, A Blackie, R Brine, W Doody, N Mealings, P Redmond, S Stewart, J Ward and P Williams.

IN ATTENDANCE

J Harland (Chief Executive), C Brown (Manager Community and Recreation), S Markham (Manager Strategic Projects), M Bacon (Planning Manager), R Kerr (Delivery Manager Stimulus and Shovel Ready), C Roxburgh (Water Asset Manager), R Hawthorne (Property Manager), H Profitt (Water Safety and Compliance Specialist), and K Rabe (Governance Advisor).

1. APOLOGIES

There were no apologies.

2. CONFLICTS OF INTEREST

∑ *Item 8.5 – Rural Land Lease and Licence Policy*

Councillor Blackie as he was leasing land under the Rural Land Lease and Licence Policy.

∑ *Item 17.7 – Proposed District Plan Late Submissions*

Councillors Mealings and Atkinson as they were the Council's representatives on the District Plan Hearing Panel.

3. ACKNOWLEDGEMENTS

3.1 Obituaries

∑ **Bruce McKeague** – former Eyre County Councillor from 1974 to 1989, including the 1987-89 period when the Eyre County Council and the Rangiora District Council met jointly every month.

∑ **Colin Amodeo** – Historian and author who wrote books about Kaiapoi, such as Pattern of the Years: A History of Blackwell's Department Store, that detailed the story of the family's involvement in retailing in Kaiapoi. Also, Taking the Bar: A History of Kaiapoi Port from colonial times, when the Waimakariri/Courtney River flowed both sides of Kaiapoi, until the present.

4. CONFIRMATION OF MINUTES

4.1 Minutes of the meeting of the Waimakariri District Council held on 1 February 2022

Councillor Atkinson requested the following amendment:

8.1 Updated recommendations for Speed Limit Changes throughout the Rangiora-Ashley Ward Area**,** page nine**,** recommendation (d) to reflect his vote against the motion during the Division.

Councillor Barnett requested the following amendment:

6.1 Recommendations for Speed Limit Changes throughout the Kaiapoi-Tuahiwi Ward Area, page six, paragraph two, should read as follows:

UNCONFIRMED

"Councillor Barnett was against the motion as a 30km/h speed limit was setting a precedent, as nowhere else in the district was there a 30km/h limit, other than the beach communities, and the passing of this motion would lead to further requests for 30km/h speed limits."

Moved: Councillor Atkinson Seconded: Councillor Barnett

THAT the Council:

(a) **Confirms,** as a true and correct record, with the amended Minutes of the meeting of the Waimakariri District Council held on 1 February 2022.

CARRIED

4.2 **Minutes of the meeting of the Waimakariri District Council held on 2 February 2022**

Moved: Councillor Redmond Seconded: Councillor Ward

THAT the Council:

(a) **Confirms,** as a true and correct record, the circulated Minutes of a meeting of the Waimakariri District Council held on 2 February 2022.

CARRIED

MATTERS ARISING

There were no matters arising.

4.3 **Minutes of the Public Excluded meeting of the Waimakariri District Council held on 1 February 2022**

These Minutes were considered in the Public Excluded portion of the meeting.

4.4 **Minutes of the Public Excluded meeting of the Waimakariri District Council held on 2 February 2022**

These Minutes were considered in the Public Excluded portion of the meeting.

5. DEPUTATIONS AND PRESENTATIONS

Nil.

6. ADJOURNED BUSINESS

6.1 **RC145540 – Development Contributions at 231 Woodend Beach Road, Woodend. Response to Greg Inwood Deputation** – K LaValley and L Hurley

This report was considered in the Public Excluded portion of the meeting.

UNCONFIRMED

7. SHOVEL READY PROJECTS

7.1 **Stimulus Programme Final Budget Amendments –** C Roxburgh (Water Asset Manager) and R Kerr (Delivery Manager Stimulus and Shovel Ready**)**

R Kerr spoke to this report which sought approval for the final amendments to the scope of the Crown funded Three Waters Stimulus Programme and the final adjustments to budgets to reflect projections for these works.

R Kerr advised that in August 2021, the Council had increased the budget for the Loburn Lea Wastewater Improvements Project by $255,000. However, the tender price for the final stage of the works, Ashley Street Gravity, was more significant than budgeted. Therefore, the final forecast cost was estimated to be $416,000 higher than the budget. The reason for this seemed to be the market's response to the increased economic activity, inflation and supply chain issues which were being reflected in increased tender prices across a range of projects. To affect the required increase, it was recommended that funding be drawn from savings made elsewhere in the programme.

Councillor Ward queried whether this project would be completed in time to enable the Council to access Central Government funding. R Kerr responded that the Government had moved the funding deadline to June 2022, as this project was ahead of schedule, he believed that the project would be completed in time.

Councillor Williams sought clarity on when cost recovery would likely be achieved, given the increases to the budget of this project. In response, R Kerr advised that this would most like be over approximately 10 to 15 years.

Councillor Mealings questioned why the budget had been so underestimated for this project, given the two requests for increases to the original estimate. R Kerr explained that this section of the project was challenging due to a longer than usual pipeline, and the increase in the tender price, also the current market conditions had to be taken into consideration. He further noted that only one tender had been received, reflecting market trends and the ongoing shortage in resources.

Moved: Councillor Brine Seconded: Councillor Atkinson

THAT the Council:

(a) **Receives** Report No. 220214018941.

(b) **Approves** the budget amendments set out in the table below, including:

i. **Remove from scope** the Waterways and Drainage Manager.

ii. **Adjust** the budgets for the Stimulus programme as set out in the table below:

Budget Name	Budget Type	PJ / GL	Aug 2021 Budget	Proposed Budget	Difference
Fernside Sewer Upgrade	LOS (Stimulus)	101671.000.5113	$885,050	$ 953,342	$ 68,292
	Growth	101671.000.5115	$125,000	$ 125,000	$ -

UNCONFIRMED

Budget Name	Budget Type	PJ / GL	Aug 2021 Budget	Proposed Budget	Difference
Poyntzs Road Water Source Upgrade	LOS (Stimulus)	101670.000.5103	$954,300	$ 930,032	-$ 24,268
	Growth	101670.000.5105	$73,100	$ 73,100	$ -
Loburn Lea Sewer Upgrade	LOS (Stimulus)	101672.000.5113	$1,879,200	$ 2,295,271	$ 416,071
	Growth	101672.000.5115	$1,470,000	$ 1,470,000	$ -
Tuahiwi Water Extension Greens Road	LOS (Stimulus)	101673.000.5103	$488,750	$ 211,589	-$ 277,161
	Growth	101673.000.5105	$166,250	$ 166,250	$ -
Tuahiwi Water Extension Tuahiwi Road	Growth	101674.000.5105	$133,000	$ 133,000	$ -
Tuahiwi Sewer Extension Greens Road	Growth	101675.000.5115	$140,000	$ 140,000	$ -
	LOS (Stimulus)	101673.000.5113	$136,000	$ 186,000	$ 50,000
Tuahiwi Sewer Extension Tuahiwi Road	Growth	101676.000.5115	$128,000	$ 128,000	$ -
Central Tuahiwi Sewer Upgrade	LOS (Stimulus)	101677.000.5113	$2,291,000	$ 2,252,582	-$ 38,418
West Eyreton and Summerhill Storage Upgrade	LOS (Stimulus)	101679.000.5103	$140,500	$ 140,500	$ -
Central Rangiora Capacity Upgrade Stage 5A	LOS (Stimulus)	101680.000.5113	$232,000	$ 232,000	$ -
Ohoka Water Storage Upgrade	LOS (Stimulus)	101681.000.5103	$186,000	$ 193,978	$ 7,978
Oxford Sewer Operational Improvements	OPEX (Stimulus)	101702.280.2543	$79,000	$ 92,000	$ 13,000
Oxford WWTP Monitoring Upgrades	LOS (Stimulus)	101851.000.5113	$164,000	$ 118,000	-$ 46,000
Oxford Sewer I&I Investigations	OPEX (Stimulus)	101666.280.2543	$136,000	$ 131,000	-$ 5,000
Three Waters Reform Investigations	OPEX (Stimulus)	101667.280.2543	$100,950	$ 108,760	$ 7,810
Drainage and Waterways Manager	OPEX (Stimulus)	101697.280.2543	$75,000	$ -	-$ 75,000
Headworks Asset Data Management Improvements	OPEX (Stimulus)	101698.280.2543	$261,000	$ 261,000	$ -
Stimulus Programme Management	OPEX (Stimulus)	101665.280.2543	$140,000	$ 180,281	$ 40,281

UNCONFIRMED

Budget Name	Budget Type	PJ / GL	Aug 2021 Budget	Proposed Budget	Difference
Cust Headworks Upgrade	LOS (Stimulus)	101789.000.5103	$220,900	$ 234,743	$ 13,843
Total			**$10,605,000**	**$10,756,429**	**- $151,429**
Benefiting scheme contributions to wider rating			**$ 560,000**	**$408,571**	**$151,429**

(c) **Authorises** the Chief Executive to approve payments under the Stimulus Programme exceeding $1 million up to the total value of each contract.

CARRIED

Councillor Brine stated that the questions asked and answered were relevant, and he had nothing further to add.

7.2 **Kaiapoi Stormwater and Flooding Improvements – Shovel Ready Programme Delegated Authority to enter into construction contracts – Tranche Two –** R Kerr (Delivery Manager Shovel Ready Programme) and K Simpson (3 Waters Manager)

This report was considered in the Public Excluded portion of the meeting.

8. REPORTS

8.1 **Land Acquisition 260 Revells Road –** C Brown (Manager Community and Recreation)

C Brown spoke to the report, which sought permission to utilise the Public Works Act, 1981 to acquire a piece of river margin directly adjacent to 260 Revells Road. This land formed a pivotal linkage to enable the first stage of the Arohatia te awa Project to progress. Following investigations of historical records and survey information, Land Information New Zealand (LINZ) had confirmed that while the historical owners' intention was to have the land classified as Road Reserve there was no evidence that the controlling authority of the time (circa 1875) had formally accepted the land. Therefore to achieve the desired outcomes, it would be necessary to utilise the Public Works Act, 1981 to acquire the land in question.

In response to a question from Councillor Blackie, C Brown confirmed that he had been in conversation with the land's new owners. They were very supportive of the purchase and had offered assistance with the proposed planting in the area.

Councillor Brine enquired if there were other options to achieve the desired outcomes without utilising the Public Works Act, 1981. C Brown explained that other options, such as bridging the Cam River and using the other side of the river, were considered however this would require negotiations with several landowners for access, as well as the expense of the bridge.

Moved: Councillor Stewart Seconded: Councillor Mealings

THAT the Council:

(a) **Receives** Report No. 220218022085.

(b) **Approves** staff utilising the Public Works Act, 1981 to acquire the river margin land directly north of 260 Revells Road currently identified in Deed 8D 12-14.

UNCONFIRMED

(c) **Notes** that should the acquisition be successful this would allow the first stage of the Arohatia to awa Project to be completed and open up a key riverside recreational walking track to the wider community.

(d) **Notes** the legal costs were covered by the existing Arohatia te awa capital code.

(e) **Circulates** this report to the Kaiapoi-Tuahiwi Community Board for information.

CARRIED

Councillor Stewart noted the fascinating nature of the investigations into the land ownership. She reiterated that the strip of land was vital for the Arohatia te awa Project and livestock was currently able to access the river, which was detrimental for the environment. By acquiring this strip of land, the river could be fenced and planted to improve the area for all.

Councillor Mealings agreed that this had been an interesting process and had hoped for a more straightforward solution. However, she supported the motion and noted that the residents had been very supportive. Councillor Doody concurred that this was a fascinating exercise and supported the motion.

Councillor Brine noted that the Council only had to use the Public Works Act, 1981, a few times in the past to acquire land. He believed that it was unfortunate that the Council had to resort to using this process due to a lack of evidence in historical records, however, he supported the motion.

Mayor Gordon also supported the motion and thanked C Brown for his leadership during this process, which the Council could be proud of in the future.

Councillor Redmond stated that this was a comprehensive report detailing a convoluted and time-consuming process.

8.2 **Housing Working Group – Interim Report –** S Markham (Manager Strategic Projects) for the Housing Working Group

S Markham provided an interim report on the progress of the work of the Housing Working Group. He stated that housing was a broad and diverse topic, as there was a growing need for affordable and suitable housing for all, especially for the disabled and the elderly.

Councillor Barnett enquired why the request to bring forward the funding was not made during the 2022/23 Annual Plan process. S Markham explained that all the relevant information had not been available in time for the request to be considered during the Annual Plan process. Also, there was a desire for this work to progress without delay, and the decision had therefore been made to request that the funding for the recruitment of a Property Projects Manager be brought forward at this time.

In response to a query regarding the scope of the Housing Working Group, S Markham advised that a briefing on the Greater Christchurch Partnership's social work-stream, which included social housing, would be held later in the week, which may impact the Council's position on social housing in the future.

Councillor Barnett requested that recommendation (m) be considered separately.

Moved: Councillor Atkinson Seconded: Councillor Doody

THAT the Council:

(a) **Receives** Report No. 220203014217.

UNCONFIRMED

(b) **Notes** the Housing Working Group's propose to continue to consider an (elsewhere proven successful) elderly persons group housing concept, as a possible addition of Elderly Persons Housing accommodation in the District.

(c) **Notes** the Housing Working Group's propose to continue to engage with interested parties in relation to emergency and transitional housing; in order to determine whether more structured partnering involvement was appropriate and beneficial, and what that could look like.

(d) **Requests** the Housing, and the Property Acquisitions and Disposals, Working Groups to liaise and agree for recommendation(s) to the Council to a set of siting criteria for potential release of land for social and affordable housing and a provisional list of candidate sites in Council ownership for this purpose; to take forward into discussions with potential public and community housing providers - along with the Council's expectations about community consultation in relation to any proposals arising.

(e) **Agrees** partnership proposals and expressions of interest from potentially interested parties in the provision of social and affordable housing be received, sought and considered on the basis of the implementation of recommendation (d) above.

(f) **Notes** the Housing Working Group was, at Kāinga Ora's request, considering the basis of a Memorandum of Understanding with Kāinga Ora to guide partnering between that 'Acquiring Agency' and the Council in the release of Council land for social and affordable housing; and, that this would include protocols in relation to siting criteria and community consultation in this regard.

(g) **Notes** the Housing Working Group proposed to further engage with Kāinga Ora with regard to its proposed Memorandum of Understanding with the Waimakariri District Council and provide advice to the Council in this regard.

(h) **Notes** the Housing Working Group would be seeking to engage with Ngāi Tūāhuriri through appropriate forums on its work and issues of mutual interest.

(i) **Agrees** that the Housing Working Group should consider and provide advice to the Council on the approach by the Otautahi Community Housing Trust for support with setting up a 'Sister Trust' as per **attachment vii** to this report (Trim 220203014217).

(j) **Agrees** that the Housing Working Group should consider and provide advice to the Council on the Draft Greater Christchurch Social and Affordable Housing Action Plan that was to be recommended to Council by the Greater Christchurch Partnership Committee for its consideration, as per **attachment xi** to this report (Trim 220203014217)..

(k) **Agrees** that the Housing Working Group should consider and provide advice to the Council on the 'Section 17A' Review of the Council's service delivery approach to Housing for the Elderly that was due this year; coordinated with review of the Elderly Persons Housing Policy (as legislative change had made some provisions of the Policy unworkable and practical functions required greater clarity / direction).

(l) **Requests** the Housing Working Group to draft, for consideration by the Council, a statement of intent to guide both the Council and other parties on the scope of how the Council intended to give effect to its stated housing outcome in exercising its roles as provider, funder, advocate and regulator.

CARRIED

UNCONFIRMED

Moved: Councillor Atkinson Seconded: Councillor Doody

THAT the Council:

(m) **Approves** bringing forward $35,000 in the Property Unit Operational Budget in the Draft 2022/23 Annual Plan to expedite the recruitment of a Property Projects Manager to support the Housing, and Acquisitions and Disposals Working Groups; noting this role would be appointed on a three year fixed term basis.

CARRIED
Councillor Barnett Against

Councillor Atkinson noted that this was an interesting working group to be part of, as it dealt with complex issues, including whether the Council should be involved with the provision of social housing. After doing informal research within the community, he believed that the Council did have a role in ensuring that the disabled and elderly had safe housing in the district. He, therefore, requested the Council to support the work of the Housing Working Group by ensuring the Property Unit had appropriate resources.

Councillor Doody agreed with Councillor Atkinson and stated that the Council should step up and provide suitable and affordable housing for the disadvantaged, and she consequently supported the motion.

Councillor Barnett held the opinion that social housing was not part of the Council's role, which was centred on infrastructure and provision of services. Therefore, she was uncomfortable funding a position to manage issues relating to social housing. However, she did note that the Council did have a role in facilitating interaction between government and social housing providers. Councillor Barnett also believed that the proposal to bring forward the funding should have been included in the 2022/23 Annual Plan to ensure public consultation.

Councillor Brine noted that the Council had a history of investing in housing, and he would consider the funding well spent as it would allow the Council to achieve informed and appropriate outcomes on social housing in the future. He believed that the depreciation reserves should be reinvested in housing for the elderly, and he, therefore, supported the motion.

Councillor Redmond congratulated S Markham and his staff for the work done in compiling a clear and comprehensive report on such a broad and complex subject.

Mayor Gordon acknowledged Councillor Atkinson's leadership of the Housing Working Group. He agreed that there was a requirement for further research into the various social housing options that may be open to the Council in the future. He noted that he was supportive of the Greater Christchurch Partnership's work on urban growth, which may impact social housing delivery in the future, however, it was up to the Council to make the final decision.

Councillor Atkinson reiterated that without proper resourcing the required research could not be done effectively to enable the Council to make an informed decision. He advised that the Council's Property Unit was already under-resourced and could not handle the additional work required.

UNCONFIRMED

8.3 **Submission on The Resource Management (National Environmental Standards for Sources of Human Drinking Water) Regulations 2007 –** C Roxburgh (Water Asset Manager) and H Profitt (Water Safety and Compliance Specialist)

C Roxburgh spoke to the report, which requested the Council's endorsement of the submission on the Propose Update to the Resource Management (National Environmental Standards for Sources of Human Drinking Water).

Moved: Councillor Redmond Seconded: Councillor Atkinson

THAT the Council:

(a) **Receives** Report No. 220214018739.

(b) **Notes** that the Ministry for the Environment had been reviewing the NES-DW, following the Havelock North drinking water contamination event in 2016 and subsequent Inquiry, which highlighted deficiencies with the current version.

(c) **Endorses** the submission prepared by staff to be submitted to the Ministry for the Environment, responding to the questions asked as part of the consultation process, on behalf of the Council.

CARRIED

Councillor Redmond noted the comprehensive report and a well-drafted submission.

8.4 **Update of Resource Management and Association Delegations –** T Tierney (Manager Regulation) and M Bacon (Planning Manager)

M Bacon spoke to this report which sought approval of an update to the Council's Resource Management and Associate Delegations to reflect recent legislative changes and structural changes in position descriptions.

In response to a question from Councillor Redmond, M Bacon explained that should the Council enter into an agreement with another authority, the Greenspace and Development Managers had the delegations to authorise works within their area of expertise.

Councillor Mealings noted that the new delegations had been given to the Project Delivery Unit Manager and enquired if this was not already happening. M Bacon confirmed that it was and that Council approval would thus formalise the amendments.

Moved: Councillor Mealings Seconded: Councillor Redmond

THAT the Council:

(a) **Receives** Report No. 211122186600.

(b) **Delegates** the power, duties and functions listed in the Delegations Plan Implementation and Development Planning Unit to the positions and parties identified within that document.

CARRIED

Councillor Mealings noted that the amended delegations made sense and would formalise and streamline the processes.

Mayor Gordon was also supportive of the changes made to the delegations register.

UNCONFIRMED

8.5 **Rural Land Lease and Licence Policy** – R Hawthorne (Property Manager)

R Hawthorne took the report as read.

Mayor Gordon enquired if the Iwi had been consulted regarding the Rural Land Lease and Licences Policy. R Hawthorne confirmed that the Iwi had not been consulted on this policy, however, there was no urgency for the policy to be adopted and the matter could therefore be delayed while consultation took place if the Council so wished.

Moved: Mayor Gordon Seconded: Councillor Atkinson

THAT the Council:

(a) **Agree** that the Rural Land Lease and Licence Policy lie on the table until consultation with the Iwi was completed.

CARRIED

9. MATTERS REFERRED FROM COMMITTEES/COMMUNITY BOARDS

Nil.

10. WELLBEING, HEALTH AND SAFETY

10.1 **Health, Safety and Wellbeing Report March 2022** – J Harland (Chief Executive)

J Harland took the report as read.

In response to a question from Councillor Redmond, J Harland explained that the epidemic's peak was likely to last for six to eight weeks and to limit the rate of infections, it would be wise to retain current restrictions until the peak had passed. However, the Management Team would be reviewing the situation weekly.

Councillor noted that a staff member slipped on the wet tiled surface outside the Kaiapoi Library, which seemed hazardous. He questioned what action would be taken if a member of the public was to slip on the tiles. J Harland advised that if the incident were reported to the Council, it would be included in the monthly Health, Safety and Wellbeing Report. He would investigate and report back to the Council on what remedial work to be done at the Kaiapoi Library.

Mayor Gordon acknowledged that all meetings involving elected members would be held virtually for the foreseeable future. However, the situation would be monitored, and regular meetings would resume as soon as possible.

Councillor Doody noted the verbal abuse of a lifeguard at a Council Aquatic facility and enquired what was being done to protect staff against such behaviour in the future. J Harland committed to reporting back to Councillors on this matter.

Moved: Councillor Doody Seconded: Councillor Redmond

THAT the Council:

(a) **Receives** Report No. 220216020603.

(b) **Notes** that there were no notifiable incidents this month. The organisation was, so far as is reasonably practicable, compliant with the duties of a person conducting a business or undertaking (PCBU) as required by the Health and Safety at work Act 2015.

UNCONFIRMED

(c) **Notes** that the Safety and Risk team had continued to support the organisation in its response to Covid-19 and that some activities identified on the annual plan would be re-prioritised as a result.

(d) **Notes** that $50,000 would be used from the Covid loan to recover operational costs associated with this event.

(e) **Circulates** this information to the Community Boards for their information.

CARRIED

11. COMMITTEE MINUTES FOR INFORMATION

11.1 Minutes of a meeting of the Audit and Risk Committee of 15 February 2022

Moved: Councillor Atkinson Seconded: Councillor Ward

THAT the Council:

(a) **Receives** Item 11.1 for information.

CARRIED

12. COMMUNITY BOARD MINUTES FOR INFORMATION

12.1 Minutes of a meeting of the Oxford-Ohoka Community Board meeting of 2 February 2022

12.2 Minutes of a meeting of the Rangiora-Ashley Community Board meeting of 9 February 2022

12.3 Minutes of a meeting of the Woodend-Sefton Community Board meeting of 15 February 2022

Moved: Councillor Williams Seconded: Councillor Atkinson

THAT the Council:

(a) **Receives** Items 12.1 to 12.3 for information.

CARRIED

13. MAYOR'S DIARY

13.1 **Mayor's Diary 27 January – 22 February 2022**

Moved: Councillor Ward Seconded: Councillor Atkinson

THAT the Council:

(a) **Receives** report no . 220228027273.

CARRIED

14. COUNCIL PORTFOLIO UPDATES

14.1 **Iwi Relationships –** Mayor Dan Gordon

The Council was working with Ngai Tahu in relation to the Three Waters reform, however, this would require a large amount of work and many more discussions in the future.

UNCONFIRMED

14.2 **Greater Christchurch Partnership Update** – Mayor Dan Gordon

Work was being done on the Urban Growth and Transport Partnerships, which were in a good space. Several working streams were starting to come together.

14.3 **Canterbury Water Management Strategy –** Councillor Sandra Stewart

The Council was working with private well owners with high levels of arsenic and manganese in their drinking water, who had expressed a desire to join the Council's water supply scheme. She was also working with a resident in Sefton who had been effected by recurring flooding.

14.4 **International Relationships –** Deputy Mayor Neville Atkinson

Waimakariri Passchendaele Advisory Group meeting was postponed to March 2022. It had been agreed that the Queen Elizabeth II medals previously housed at the Christchurch RSA building would be relocated to the gardens at the Rangiora RSA.

14.5 **Regeneration (Kaiapoi)** – Councillor Al Blackie

Expressed concern about the ongoing vandalism at Norman Kirk Park. The Mahinga kia project was progressing well.

14.6 **Climate Change and Sustainability** – Councillor Niki Mealings

Significant energy reductions (50% in kilowatt-hours) were made at Rangiora Service Centre. The Council recently advertised a Sustainability Adviser position, which, when appointed, would give a lot more capacity to prioritise the sustainability programme going forward.

14.7 **Business, Promotion and Town Centres** – Councillor Joan Ward

Noted the work being done encouraging New Zealand diversity in the business sector. All events for the foreseeable future had been cancelled. She briefly updated the Council on the appointment of a Safety Officer at the Rangiora Airfield and other CAA requirements. Council's tenders were being impacted by the high demand in industry resources and supplies, which in turn impact costs.

15. QUESTIONS

Nil.

16. URGENT GENERAL BUSINESS

Nil.

The meeting adjourned at 2.48pm and reconvened at 3.06pm.

17. MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED

Section 48, Local Government Official Information and Meetings Act 1987.

Moved Mayor Gordon Seconded Councillor Doody

THAT the public be excluded from the following parts of the proceedings of this meeting.

The general subject of each matter to be considered while the public was 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, were as follows:

UNCONFIRMED

Item No	Minutes/Report of	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
17.1	Minutes of public excluded portion of Council meeting of 1 February 2022.	Confirmation of Minutes	Good reason to withhold exists under Section 7	Section 48(1)(a)
17.2	Minutes of public excluded portion of Council meeting of 2 February 2022.	Confirmation of Minutes	Good reason to withhold exists under Section 7	Section 48(1)(a)
ADJOURNED BUSINESS				
17.3	Report of K LaValley (Project Delivery Manager) and L Hurley (Project Planning and Quality Team Leader)	RC145540 Development Contributions, response to Woodend deputation	Good reason to withhold exists under Section 7	Section 48(1)(a)
REPORTS – SHOVEL READY PROJECTS				
17.4	Report of R Kerr (Delivery Manager) and K Simpson (3 Waters Manager	Kaiapoi Stormwater and Flooding Improvements – Shovel Ready programme Delegated Authority to enter into construction contracts	Good reason to withhold exists under Section 7	Section 48(1)(a)
REPORTS				
17.5	Report of S Fauth (Senior Project Engineer) and C Roxburgh (Water Asset Manager)	Contract 21/35 Mandeville Water Head Works Upgrade Tender Approval Report	Good reason to withhold exists under Section 7	Section 48(1)(a)
17.6	Report of M Buckley (Principal Policy Planner)	Waimakariri District Plan Review – Appointment of IWI Commissioner and Proposed District Plan Updates	Good reason to withhold exists under Section 7	Section 48(1)(a)
17.7	Report of M Buckley (Principal Policy Planner)	Proposed District Plan Late Submissions	Good reason to withhold exists under Section 7	Section 48(1)(a)

This resolution was 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 which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public were as follows:

Item Nº	Reason for protection of interests	LGOIMA Part 1, Section 7
17.1 – 17.7	Protection of privacy of natural persons; To carry out commercial activities without prejudice; Maintain legal professional privilege; Enable Council to continue with (commercial) negotiation without prejudice or disadvantage Prevent the disclose of information for improper gain or advantage	Section 7 2(a) Section 7 2(b)ii Section 7 (g) Section 7 2(i) Section 7 (j)

CARRIED

UNCONFIRMED

CLOSED MEETING

The public excluded portion of the meeting occurred from 3.06pm to 4.02pm.

Resolution to Resume in open meeting

Moved: Councillor Blackie Seconded: Councillor Ward

THAT the Council

17.1 **Confirmation of Minutes of the Public Excluded portion of the Council meeting of Tuesday 1 February 2022**

Resolves that the Minutes remain public excluded.

17.2 **Confirmation of Minutes of the Public Excluded portion of the Council meeting of Tuesday 2 February 2022**

Resolves that the Minutes remain public excluded.

17.3 **RC 145540 – Development Contributions at 231 Woodend Beach Road, Woodend – Response to Greg Inwood Deputation –** K LaValley (Project Delivery Unit Manager), L Hurley (Project Planning and Quality Team Leader)

Resolves that the report and discussion remain public excluded, recommendations (a) and (d) be made available to the public now and recommendations (b) and (c) remain public excluded until such time as all development contributions had been paid.

17.4 **Kaiapoi Stormwater and Flooding Improvements – Shovel Ready Programme: Delegated Authority to enter into construction contracts – Tranche Two** – R Kerr (Delivery Manager – Stimulus and Shovel Ready) and K Simpson (3 Waters Manager)

Resolves that this report and its recommendations were to remain public excluded until such time as the project was fully completed further to section 7(2) of the Local Government Official Information and Meetings Act 1987 as the report contained sensitive budget information for contracts which were to be subject to a competitive tender process.

17.5 **Contract 21/35 Mandeville Water Head Works Upgrade Tender Approval and Request for Further Budget for 2022/23 –** S Fauth (Senior Project Engineer) and C Roxburgh (Water Asset Manager)

Resolves that the recommendations in this report be made publically available, however, that the contents and discussion remain public excluded as it contained commercially sensitive information

17.6 **District Plan Review – Appointment of IWI Commissioner and Proposed District Plan Updates** – M Buckley (Principal Policy Planner)

Resolves that the recommendations in this report be made publically available, however, for the protection of privacy of natural persons, the contents of the report, attachments and discussion remain public excluded.

UNCONFIRMED

17.7 **Proposed District Plan Late Submissions** – M Buckley (Principal Policy Planner)

Resolves that the resolution, report and discussion remain public excluded until such time as the Proposed District Plan submission hearing process commenced.

CARRIED

OPEN MEETING

17.3 **RC 145540 – Development Contributions at 231 Woodend Beach Road, Woodend – Response to Greg Inwood Deputation –** K LaValley (Project Delivery Unit Manager), L Hurley (Project Planning and Quality Team Leader)

Moved: Councillor Barnett Seconded Councillor Redmond

THAT the Council:

(a) **Receives** Report No. 220110001607.

(d) **Notes** that the applicant would be advised that all future Development Contributions relating to RC145540, 213 Woodend Beach Rd would be payable at the amount applicable at the time of application.

17.5 Contract 21/35 Mandeville Water Head Works Upgrade Tender Approval and Request for Further Budget for 2022/23 – S Fauth (Senior Project Engineer) and C Roxburgh (Water Asset Manager)

Moved: Councillor Barnett Seconded Councillor Williams

THAT the Council:

(a) **Receives** Report No. 220211018026.

(b) **Authorises** Council staff to award Contract 21/35 Mandeville Water Head Works Upgrade to G&T Construction Ltd for a sum of $810,423.00.

(c) **Notes** that only one complying tender was received however, following due diligence work undertaken by Council staff, the tendered price was considered to be reflective of current market value, which had increased significantly over recent months based primarily on the cost of key raw materials, and was expected to continue to increase.

(d) **Notes** that this work was anticipated to be completed in the current financial year, however the tendered programme meant that completion would not be possible until the 2022/23 financial year.

(e) **Approves** the carry-over of the existing budgets into the 2022/23 financial year.

(f) **Approves** a $150,000 budget increase on the Mandeville Storage Upgrade budget (PJ 101592.000.5103) for 2022/23 in order to cover the current budget shortfall and allow for contingency.

(g) **Notes** that this project was funded from the Mandeville Storage Budget (PJ 101592.000.5103) and Second UV Budget (PJ 101740.000.5103), which currently had a combined budget of $935,000.

(h) **Notes** that the anticipated total project expenditure was $1,083,000 across the two budgets, which included a $50,000 contingency allowance to cover any unforeseen construction costs.

UNCONFIRMED

(i) **Notes** that no adjustment to the Second UV Budget was requested, as the expected overspend relates solely to the Mandeville Storage Budget.

(j) **Notes** that there would be a modest rating impact within the 2023/24 financial year (the year following the completion of construction when the loan was raised).

(k) **Notes** that in accordance with the Conditions of Tendering, all tenderers would be advised of the name and price of the successful tenderer, and the range and number of tenders received.

(l) **Resolves** that the recommendations in this report be made publically available, however, that the contents remain public excluded as it contained commercially sensitive information.

17.6 **District Plan Review – Appointment of IWI Commissioner and Proposed District Plan Updates** – M Buckley (Principal Policy Planner)

Moved: Mayor Gordon Seconded Councillor Barnett

THAT the Council:

(a) **Receives** Report No. 220113003085.

(b) **Appoints** Megen McKay as the Iwi independent commissioner to the hearings panel for the Proposed District Plan of Council.

(c) **Notes** that the Chief Executive was authorised to enter into contracts with independent commissioners.

(d) **Resolves** that the recommendations in this report be made publically available, however, for the protection of privacy of natural persons, the contents of the report, attachments and discussion remain public excluded.

18 NEXT MEETING

The next scheduled ordinary meeting of the Council would be held at 1pm on Tuesday 5 April 2022.

THERE BEING NO FURTHER BUSINESS, THE MEETING CLOSED AT 4.02PM.

CONFIRMED

_____
Chairperson
Mayor Dan Gordon

_____
Date

UNCONFIRMED

MINUTES OF AN EXTRAORDINARY MEETING OF THE WAIMAKARIRI DISTRICT COUNCIL HELD REMOTELY VIA ZOOM ON TUESDAY 15 MARCH 2022 COMMENCING AT 9.20AM

PRESENT

Mayor D Gordon (Chairperson), Councillors A Blackie, R Brine, N Mealings, P Redmond, S Stewart, J Ward (due to technical difficulties, Councillor Ward was unable to be in attendance for all of the meeting) and P Williams.

IN ATTENDANCE

J Harland (Chief Executive), C Brown (Manager Community and Recreation), T Tierney (Manager Regulation), A Coker (Community Facilities Team Leader) and A Smith (Governance Coordinator).

1. APOLOGIES

Moved: Councillor Williams Seconded: Councillor Blackie

THAT apologies for absence be received and sustained from Deputy Mayor Atkinson, Councillor Doody and Councillor Barnett.

CARRIED

2. CONFLICTS OF INTEREST

There were no conflicts of interest recorded.

3. MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED

Section 48, Local Government Official Information and Meetings Act 1987

Moved: Councillor Mealings Seconded: Councillor Redmond

THAT the public be excluded from the following parts of the proceedings of this meeting.

The general subject of the matter to be considered while the public is excluded, the reason for passing this resolution in relation to the 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:

Item No	Minutes/Report of	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
3.1	Report of A Coker (Community Facilities Team Leader)	Mandeville Domain	Good reason to withhold exists under Section 7	Section 48(1)(a)

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 which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public are as follows:

Unconfirmed

Item Nº	Reason for protection of interests	Ref NZS 9202:2003 Appendix A
3.1	Maintain legal professional privilege.	7 (2) (c, d and g)

CARRIED

CLOSED MEETING

Resolution to resume in Open Meeting

Moved: Mayor Gordon Seconded: Councillor Redmond

THAT the open meeting resumes and the business discussed with the public excluded remains public excluded.

CARRIED

The public excluded portion of the meeting took place from 9.21am to 9.51am.

OPEN MEETING

4. NEXT MEETING

The next scheduled ordinary meeting of the Council will commence at 1pm on Tuesday 5 April 2022.

There being no further business, the meeting closed at 9.51am.

CONFIRMED

_____
Chairperson
Mayor Dan Gordon

_____
Date

Unconfirmed

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO:	CPR-02-01 / 220330047906
DATE:	5 April 2022
MEMO TO:	COUNCIL
FROM:	Rob Hawthorne, Property Unit Manager
SUBJECT:	Update on Rural Land Lease and Licence Policy consultation

Background

Prior to considering the adoption of the proposed Rural Land lease and Licence Policy Council requested clarification of its obligations in relation to consultation with Mana whenua and in particular Te Ngāi Tūāhuriri hapū.

Council owned or administered land subject to common historic and current rural leasing activity have varied land tenure. Many are unformed road with no surveyed legal land parcels, some having freehold status and others being held under varying Reserve land types, classifications or status.

Reserves have a variety of prescriptive requirements associated with the particular Reserve type as well as the history of specific land parcels in relation to the original acquisition and / or vesting.

In addition, some land is not technically owned by Council but is held under administrative control, commonly from the Department of Conservation or land held under the Deeds system with no specific title or clear ownership.

Site Specific Consideration

Staff have considered the statutory obligations further, in response to Council's request.

In some forms of land tenure there are no obligations to consult Iwi or Hapu at all. However, under land held that is subject to the Reserves Act and Conservation Act the requirement for consultation varies, depending on the nature of the specific Reserve status of a site, the lease or license terms proposed and other specific circumstances.

The Policy makes provision for this in the Schedule, Note 1 which states

- *Council holds rural property under various forms of tenure and these may have a bearing on specific clauses within each lease or licence*
- *In all cases the provisions of legislation and associated regulations shall take precedence over specific provisions of the policy or Community requests*

Some elements of the new policy, such as limiting the term to 5 years with no rights of renewal, address historic arrangements that are likely to be non-compliant or would trigger consultation if now proposed. While the policy allows for site specific consultation where required it does not address the question of whether the policy as a whole needs to be consulted on.

Portfolio Consideration

The legislative requirement to consult Iwi and Hapu in relation to an overarching policy, as proposed, is less clear. However, there is an implied intent under Section 4 of the Conservation Act to apply the principles of the Treaty of Waitangi to any decision making in relation Reserve land and this could be interpreted as a requirement to consult on the proposed policy.

The draft Policy specifically refers to Councils stated intent to *'in partnership with Te Ngāi Tūāhuriri Rūnanga, continue to build our relationship through mutual understanding and shared responsibilities'*.

In keeping with our own Community Outcomes further consultation is on reflection considered appropriate, as well as providing best practice in relation to the interpretation of our response to the Treaty of Waitangi.

Next Steps

Council staff are preparing an advisory paper to use in relation to the proposed consultation in which the rationale and approach taken with the proposed policy will be explained. It will also outline the existing properties that are currently intended to be included in the bounds of the Policy, while alluding to the potential for additional land to fall under its guidelines.

The above approach will be caveated as the detailed historic land status of all property owned or administered by Council is not complete or fully understood. Care needs to be taken with such a consultation and some legislative processes are highly specialised.

Accordingly, we are working with The Property Group to document the more detailed process that permanent staff can then follow on a site by site basis. They will also help form the advisory paper used in the upcoming consultation and to inform the future process.

In addition, we are also considering the potential mechanisms by which site specific consultation (where appropriate) is undertaken and how.

Given the intended implementation actions for the proposed Policy it may be that by agreement, with Iwi / Hapu, are consulted on an annual basis i.e. where a list of sites and program of leasing activity is detailed and supplied to the agreed Iwi / Hapu representatives. This would be a similar if not identical list that is circulated to the Community Boards and Council. Iwi and Hapu representatives would be invited to respond in relation to the program for any given year and / or specific sites.

This would potentially reduce the cost of site specific consultations, while achieving the requirements and intent of the various pieces of legislation in play.

It is anticipated that the proposed consultation with Iwi / Hapu is undertaken over the next two months with a revised report and policy document presented to Council in July 2022.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO and TRIM NO:	POL-07-02/220317039337
REPORT TO:	COUNCIL
DATE OF MEETING:	5 April 2022
AUTHOR(S):	Simon Markham, Manager Strategic Projects
SUBJECT:	Canterbury Climate Change Risk Assessment Report
ENDORSED BY: (for Reports to Council, Committees or Boards)	Department Manager / Chief Executive

1. SUMMARY

1.1. The report asks the Council to receive the information contained in the Canterbury Climate Change Risk Assessment (CCCRA) commissioned by the Canterbury Mayoral Forum (CMF) to determine the specific risks the region faces from climate change. The CCCRA follows the Climate Change Risk Screening work undertaken in 2019/20.

1.2 Mayor Gordon Chairs the Canterbury Mayoral Forum's Climate Change Steering Group under whose auspice the report has been prepared and published. Attached to this report is a 10 page summary document and the full 247 page technical report. This Council paper overviews the approach and broad regional findings only. To assist the Council take in the scope, nature and implications of the assessment findings a Council Briefing will be arranged.

1.3 The project reflects the CMF's pioneering approach to its climate change work programme and notably includes a new Ngāi Tahutanga-informed climate change integrated framework for assessing climate change risk, with the Ngāi Tahu gifted name *Te Tūtei o te Hau* – the Surveillance of the Wind.

4. The disruptions of COVID-19 and the 2021 mid-year floods put pressure on the project resourcing and timeline. However, despite the timeline and scope shifts, Climate Change Working Group members and partners are now well set to integrate the technical findings into Waitaha/Canterbury climate change planning and action projects, regionally and locally.

Attachments:

i. Canterbury Climate Change Risk Assessment Summary Report 2022 - 220322041909
ii. Canterbury Climate Change Risk Assessment Report FINAL V5.0 - March 2022 – 220322041913

2. RECOMMENDATION

THAT the Council:

(a) **Receives** Report No. 220317039337.

(b) **Receives** the Canterbury Climate Change Risk Assessment Report and accompanying Summary Report.

(c) **Notes** the Canterbury Mayoral Forum's Climate Change Steering Group is now moving into action planning on the back of this risk assessment, while the results of it will be used in raising awareness of the climate change risks faced by the region through the "Its Time Canterbury" campaign.

3. BACKGROUND

3.1. Since 2017/18 the CMF has sought to take a pioneering approach to understanding climate change risks to Waitaha/Canterbury. The Forum members have invested in a dedicated regional climate change work programme, with delivery led by the Canterbury Climate Change Working Group.

3.2. The CMF and Climate Change Working Group recognise that collaboration is key to building a shared understanding and awareness of climate change risks across the region; this is an essential prerequisite for joint adaptation efforts.

3.3. Ngāi Tahu is an influential regional leader on climate change. They released the Ngāi Tahu Climate Change Strategy: *He Rautaki mō te Huringa o te Āhuarangi: Te Tāhū o te Whāriki*, *Anchoring the Foundation* in 2018, and held their first tribal wānanga on climate change in 2019. Ngāi Tahu Kaiwhakahaere, Lisa Tumahai, has been appointed by the Government as Deputy Chair of the Climate Change Commission.

In delivering the regional climate change work programme, the CMF noted that there was a need to strengthen the Mātauranga Māori and Te Ao Māori worldview into understanding and addressing climate change risk. This has been a focus of the Waitaha/Canterbury approach.

Canterbury Climate Change Risk Assessment (CCCRA)

3.4. In December 2020, Environment Canterbury, on behalf of the Climate Change Working Group, engaged contractor Tonkin + Taylor (T+T) to conduct a detailed climate change risk assessment to identify the priority risks and opportunities from climate change to Waitaha/Canterbury's natural environment, built environment, social, cultural, economic and governance systems.

3.5. This detailed assessment of climate change risks builds on a regional work programme, including the Canterbury Climate Change Risk Screening (2019/2020) which identified a 'long-list' of risks and opportunities for Waitaha/Canterbury. The CCCRA was steered by the Canterbury Climate Change Working Group (Waitaha/Canterbury councils' staff and two Ngāi Tahu representatives) as the Project Steering Group.

3.6. The project deliverables include the technical report, a risk workbook for council staff use and a summary report.

3.7. Objectives of the risk assessment were to incorporate interconnected risks (the first in New Zealand), Ngāi Tahu values, and Mātauranga Māori to support adaptation planning by local authorities and Papatipu Rūnanga in Waitaha/Canterbury.

3.8. It was felt by the project team that the domain-based national guidelines and works by other New Zealand councils did not appropriately incorporate Mātauranga Māori and Te Ao Māori worldview into understanding and addressing climate change risk. This has become a focus for the Waitaha/Canterbury approach to climate change.

3.9. The methodology of the CCCRA followed the international standard of the Intergovernmental Panel on Climate Change practice. It used the overlapping elements of hazard, exposure and vulnerability to develop a qualitative assessment of risk through the criteria of exposure, sensitivity and adaptive capacity, as shown in Figure 1.

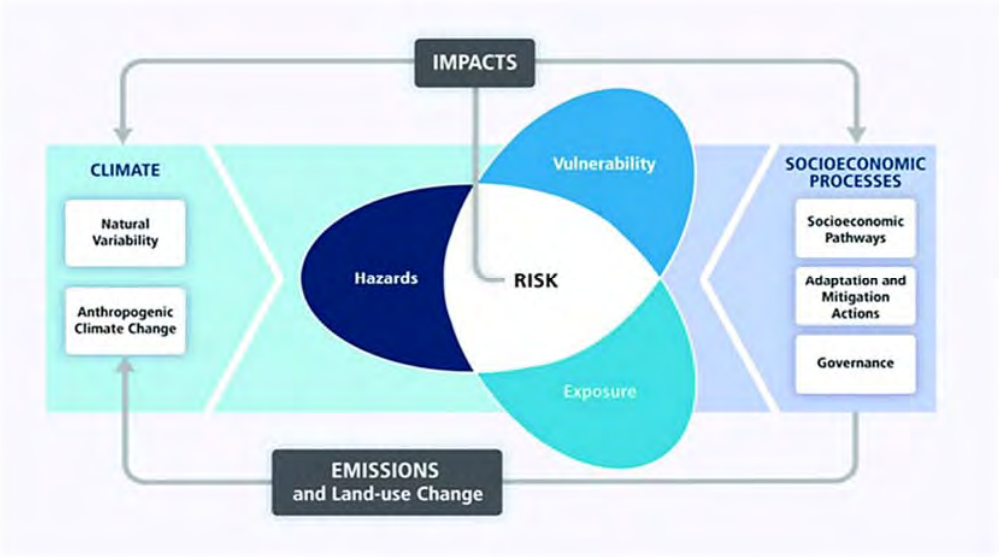


Figure 1: Risk Model used within the CCCRA, based on Intergovernmental Panel on Climate Change (IPCC)

Papatipu Rūnanga involvement in the Canterbury Climate Change Risk Assessment Project

3.10. At the end of 2020, a Papatipu Rūnanga Steering Group was established: Graeme Page (Koukourārata) and Rachel Robilliard (Taumutu) contributed significantly to the project. Benita Wakefield (Wairewa) was an initial member of the group but withdrew towards the end of the project due to reasons not related to the project.

3.11. The Group advised and supported the project team to develop a Te Ao Māori integrated risk assessment framework which is more relevant to Waitaha/Canterbury and Ngāi Tahu than the current national domain-based framework.

Te Tūtei o Te Hau – Surveillance of the Wind Integrated climate change risk assessment framework

3.12. The integrated framework developed during the project has been gifted a Ngāi Tahu name, *Te Tūtei o Te Hau – Surveillance of the Wind.* In this framework, the climate/wind/breath is described as a guardian, an alert system, for the environment, with climate change a warning from the environment to human beings. The framework is visualised in a diagram as a series of rings, shown below in Figure 2.

3.13. The rings in the diagram reflect the cycles and circles of the world, with an inner boundary – visualised as the black ring – of the spiritual and ancestral realm of whakapapa. The green ring depicts the natural world Te Ao Mārama within which human life exists. Lastly, the red ring is the upper limit of the climate system which, as now breached, is threatening the ecosystems, environment and humans through climatic changes – Hā Tuamātangi – our last breath.

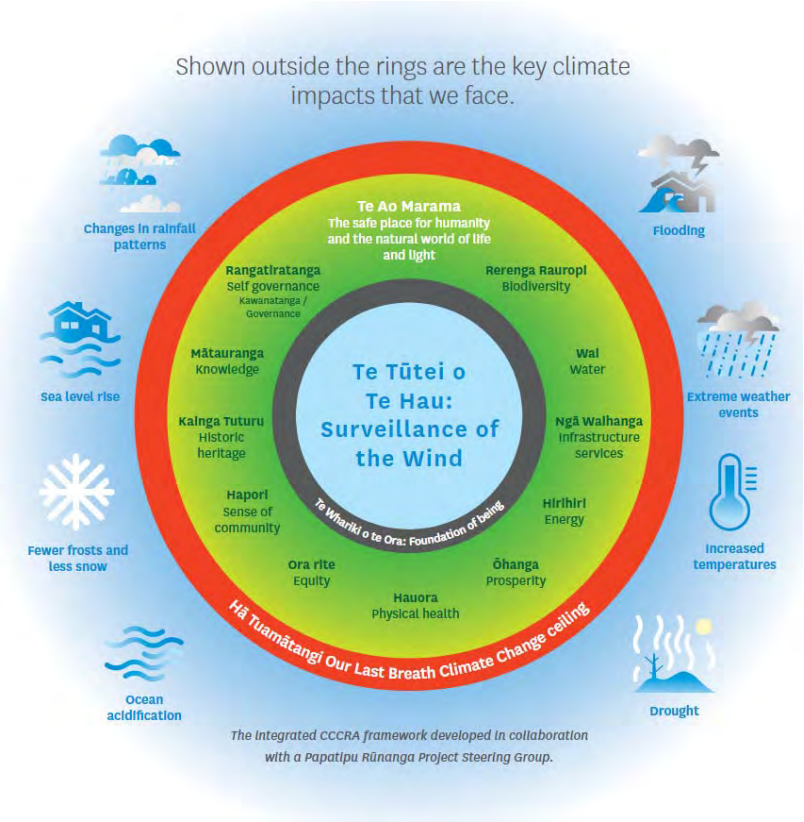


Figure 2:- Te Tūtei o Te Hau: Surveillance of the Wind.

3.14. Climate change in this framework is conceptualised as a revenge or utu due to the lack of balance and harmony within society, due to the destruction and desecration of Te Taiao, the environment. The hazards created or exacerbated by climate change, which are already occurring and will get worse as warming continues, are visualised as white icons outside the limits of Ti Iho Nui (the safe place for humanity), reflecting that the natural world is becoming less safe for humans, and the ngā pono (values of the green ring) are under threat.

3.15. These ngā pono, values, that exist within Te Ao Mārama (the natural world) are identified in the risk assessment as:

- Rerenga Rauropi (biodiversity)
- Wai (water), Ngā Waihanga (infrastructure services)
- Hirihiri (energy)
- Ōhanga (prosperity)
- Hauora (physical health)
- Ora rite (equity)
- Hapori (sense of community)
- Kainga tūturu (historic heritage)
- Mātauranga (knowledge)
- Rangatiratanga and Kāwanatanga (governance).

3.16. These concepts sit within the Te Ao Māori framework of Te Tūtei o Te Hau while also being relevant for all in Waitaha/Canterbury.

Canterbury Climate Change Risk Assessment Project - Technical Findings

3.17. The overall finding of the risk assessment, shown in detail in the technical report, is that climate change risks are threatening all the ngā pono/values. Figure 3 visualises an overall summary of the risks identified through this project and show that direct and indirect risks from climate change will increase over time.

3.18. The assessment found that while in the present time many risks are rated as insignificant or low (shown in green and blue in Figure 2), by 2100 there are high or extreme risks (shown in orange and red) predicted against all ngā pono/values.

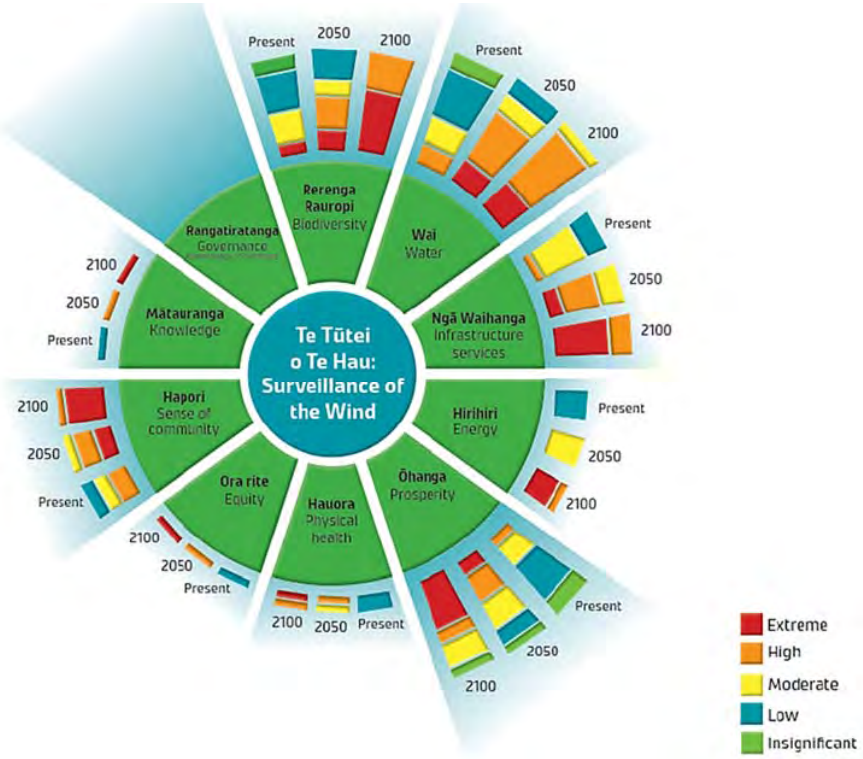
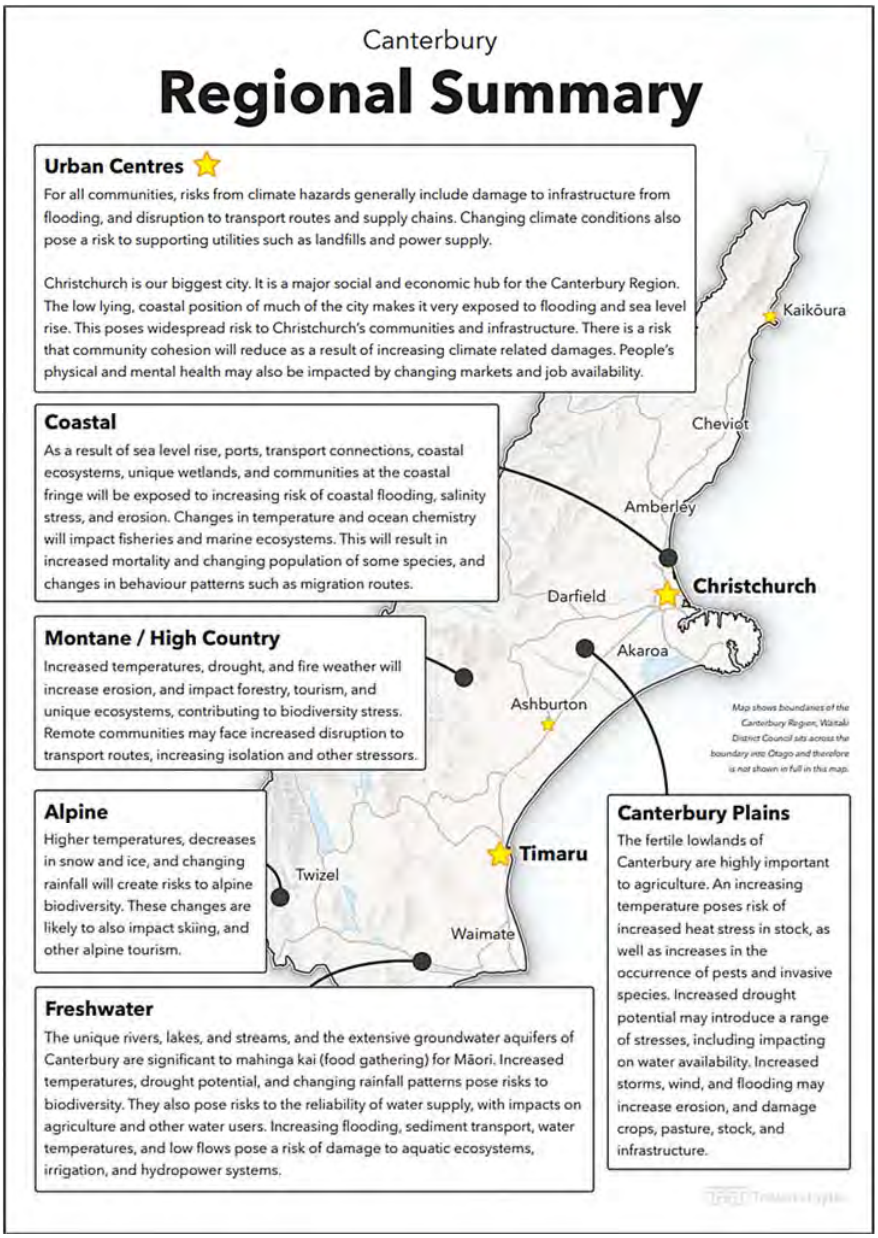


Figure 1 :- Visual summary of risks in the different values to Canterbury in the present, 2050 and 2100. Note, due to the social nature of the ngā pono - Rangatiratanga (Governance) this risks in this category were assessed qualitatively and not ordered as extreme to insignificant

3.19. The highly rated risks by 2100 include those to rerenga rauropi/biodiversity, wai/water, ngā waihanga/infrastructure services, and Hapori/sense of community. Present-day highly rated risks include those relating to water supply (both ground and surface water) and housing and communities due to flooding.

3.20. The technical report also provides case study analysis on interacting risks to Waitaha/Canterbury including indirect, cascading, and second-order risks.

3.21. The challenges that climate change introduces will occur in different ways across the region and the large land area and geographic diversity of Waitaha/Canterbury means that some risks will be more relevant to certain areas. The different impacts of these risks are described in the technical report's narrative and visualised in Figure 4



3.22.

Figure 2:- Regional summary of climate change risks on different environments in Waitaha/Canterbury

Opportunities due to climate change

3.23. At the specific request of the Chief Executives Forum, the risk assessment also includes coverage of opportunities due to the physical effects of climate change. Identified opportunities include increased tourism, new marine fish species, viticulture and reduced transport disruptions.

3.24. It is very important to note that these opportunities cannot be considered in isolation but must be considered as part of the boarder report, as the risks may often outweigh the benefits.

Summary Report

3.25. A deliverable of the CCCRA project was the production of public-facing material, including infographics. Environment Canterbury's Communications and Engagement team, on behalf of the CMF, have worked with T+T to produce a summary report of the impacts of

climate change on Waitaha/Canterbury and the risks identified in the technical report. (Attachment 1).

3.26. This summary report aims to make the information presented in the technical report easier to consume to a wider audience, and has been published alongside the technical report on the Mayoral Forum website.

Project Scope and Timeline Shift

3.27. The CCCRA project team completed an extensive engagement programme including setting up and running a Project Steering Group, Rūnanga Steering Group, Rūnanga risk hui, expert and youth risk workshops. This engagement provided high quality input into the risk assessment, however the extensive engagement program put pressure on the latter stages of the report drafting process.

3.28. The mid-year floods and 2021 COVID-19 Delta Alert Level disruptions further stretched Project Steering Group, Rūnanga Steering Group, council and T+T staff capacity. Due to these pressures, by mutual agreement the urgency assessment was descoped from the project and the timeline for the project extended.

3.29. The delivery of the final report was delayed by approximately four months, with endorsement of the technical report and workbook by the CMF in November 2021 and approval of the final public facing summary material in January 2022 by the Canterbury Climate Change Steering Group.

3.30. The project was due to have a twelve-month timeframe from initiation to public release of the risk assessment, however it was agreed by the CMF due to the above disruptions an extension of the timeline was warranted to ensure the deliverables could be completed to a high standard.

Urgency and Integration into Climate Action and Planning

3.31. An urgency assessment is a significant piece required to support councils, partners, stakeholders and our communities to prioritise action and guide adaptation decisions.

While a region-wide approach to urgency could be developed by the Climate Change Working Group, the descoping of urgency from the technical report opens up the incorporation or delivery of this work as part of other ongoing planning processes. Specifically, regional planning, district planning, sub-regional spatial planning and climate change strategies and action planning. Examples of these ongoing activities are detailed in the Table below.

District/sub-region/ region	**Process ongoing or part of 2021-31 Long-Term Plans (LTP)**
Kaikōura	Kaikōura District Plan Review
Hurunui	Hurunui Coastal Conversations
Waimakariri	Waimakariri Climate Change Response Strategy
Christchurch	Coastal Hazards Adaptation Planning Programme
Selwyn	Selwyn District Plan Review
Ashburton	Ashburton River adaptation planning and management
Timaru	Timaru Climate Change Strategy within the first three years of the LTP
Mackenzie	Mackenzie District Plan Review
Waimate	Waimate Climate Change Strategy within the first three years of the LTP
Waitaki	Waitaki District Plan Review
Waitaha/Canterbury	Canterbury Climate Change Action Plan within the first three years of the LTP
Greater Christchurch	Greater Christchurch Spatial Plan

3.32. These initiatives already include, or will be designed to include, collaborative processes with elected members, Papatipu Rūnanga and Waitaha/Canterbury communities to understand the climate adaptation work already underway and the consequences of risk.

3.33. They also support the collaborative value-judgement required to prioritise adaptation actions to climate change risks, particularly through dynamic adaptive policy pathways/planning. These processes are therefore well placed to develop prioritised lists of climate change adaptation actions according to decision urgency and maladaptation risks.

4. ISSUES AND OPTIONS

4.1. The technical report and summary report were published on the Mayoral Forum website on Friday 11 February 2022. Further engagement with the CCCRA will be undertaken through the It's time, Canterbury platform over the coming year.

4.2. As part of the technical report, T+T provided a gap analysis of the current state of the adaptation planning evidence base for Waitaha/Canterbury and included a list of 23 'next steps' for reducing the identified gaps in the evidence base, as well as an approach for assessing risk urgency.

4.3. The Canterbury Climate Change Working Group and partners will consider the next steps of the CCCRA and take advice to the CMF for consideration this year. This could include further work to understand urgency or detailed analysis of climate change risk at a district level. As part of this advice, the approaches to date of both Christchurch City Council and the Hurunui District Council in engaging communities on coastal hazards will be considered.

4.4. The Climate Change Working Group will develop advice on further engagement with Papatipu Rūnanga on climate change action following the publication of the report and will encourage all councils to use their existing engagement forums to connect with their local Rūnanga directly in advance of the report's release and ask each Papatipu how they wish to be engaged with regarding the report and climate change action planning more broadly. The Environment Canterbury Tuia team has offered to support these conversations.

4.5. Within Canterbury councils there is growing personnel capacity to respond to climate change, with some councils having already established, or are growing in size, sustainability and climate-focused positions and teams. Waitaha/Canterbury local authorities are in a strong position to develop new work programmes focusing on climate change risk management and action planning.

Implications for Community Wellbeing

There are significant implications on community wellbeing by the issues and options that are the subject matter of this report. These will be discussed at the Council briefing on the report and considered in detail in subsequent policy processes in response to the CCCRA.

4.6. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. **Mana whenua**

Te Ngāi Tūāhuriri hapū are likely to be affected by, or have an interest in the subject matter of this report. The project team engaged with Ngāi Tahu via a Rūnanga Steering Group and Environment Canterbury staff briefed Te Rōpū Tuia (Environment Canterbury-papatipu rūnanga governance group) and Te Paiherenga (Environment Canterbury-papatipu rūnanga operational group) in November 2021.

There is a high risk of Papatipu Rūnanga disappointment if the publishing of the technical report is handled poorly as climate change effects directly impact their takiwā and their

mana as mana whenua and mana moana. Additionally, the technical report and the overall project is greatly enhanced by the Mātauranga Māori and Ngāi Tahutanga-informed content and integrated framework, which creates a further obligation on the CMF to honour the relationship.

The Project Steering Group received requests from Papatipu Rūnanga Steering Group members for direct engagement with ngā Rūnanga about the report and the impacts of climate change on their takiwā/territory.

5.2. **Groups and Organisations**

There are groups and organisations likely to be affected by, or to have an interest in the subject matter of this report. As indicated this will be considered closely in advancing actions that follow-up this initial risk assessment

5.3. **Wider Community**

5.4. The wider community is likely to be affected by, or to have an interest in the subject matter of this report. The final technical and summary reports have been published on the CMF website. Available at https://www.canterburymayors.org.nz/canterbury-climate-change-risk-assessment-feb-2022/

The material will also form part of the *It's time, Canterbury* engagement campaign.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. **Financial Implications**

There are not direct financial implications of the decisions sought by this report. The Canterbury Mayoral Forum members funded the CCCRA in line with the agreed cost sharing model and council staff provided support across the region.

The budgeted work and staff time was included in the Annual Plan/Long Term Plan.

6.2. **Sustainability and Climate Change Impacts**

The recommendations in this report do have sustainability and/or climate change impacts. As indicated under implications for community wellbeing these will be dealt with in subsequent processes to this formal receipt of the report.

6.3 **Risk Management**

There are risks arising from the adoption/implementation of the recommendations in this report. The legal risk for releasing the CCCRA is low as the findings cannot be used as an evidentiary base for spatial planning as they are not sufficiently detailed.

6.3 **Health and Safety**

There are not direct health and safety risks arising from the adoption/implementation of the recommendations in this report.

7. CONTEXT

7.1. **Consistency with Policy**

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. **Authorising Legislation**

The Local Government Act 2002 provides the framework for the work of the Canterbury Mayoral Forum of which the CCCRA is part

7.3. **Consistency with Community Outcomes**

A large number of the Council's community outcomes are relevant to the actions arising from recommendations in this report. This relationship will be considered closely in subsequent processes.

The key relevant outcome is *'Climate change challenges are addressed in an appropriate, timely, cost-effective and equitable manner'*

7.4. **Authorising Delegations**

The Council has the discretion to receive/not receive the CCCRA.

Canterbury Climate Change Risk Assessment

Summary Report

Foreword

Climate change is the biggest environmental challenge of our time. It is already affecting us, and although we must take mitigation actions now, it will have broad and ongoing implications for all of Aotearoa New Zealand, across many generations.

Regardless of efforts to reduce emissions, science tells us that some aspects of climate change are already determined for this century, such as the sea level rising.

We need to understand the impact that climate change will have on our environment, and the risks and opportunities associated with it. Doing so now allows us to best plan for the future.

The Canterbury Climate Change Risk Assessment (CCCRA) has been designed to build a shared understanding of climate change risks across Waitaha/Canterbury, and to help us prepare and respond effectively.

The assessment centres around a framework that aligns both a Te Āo Māori worldview, and the National Climate Change Risk Assessment (NCCRA) framework. The NCCRA, released by the Ministry for the Environment in 2020, gave the first national picture of the risks we face from climate change.

The CCCRA was tasked to the Canterbury Climate Change Working Group, which has been set up by the Canterbury Mayoral Forum. This builds on a risk screening undertaken at the Canterbury Mayoral Forum's direction in 2019, which identified priority risks to form the basis of this work.

This project has been supported by a Ngāi Tahu Papatipu Rūnanga Steering Group. This Steering Group advised and supported the project team to develop a Te Āo Māori risk assessment framework to ensure the project was fit-for-purpose and reflected Waitaha/Canterbury and Ngāi Tahu.

Mayor Sam Broughton
Chair, Canterbury Mayoral Forum

Mayor Dan Gordon
Chair, Canterbury Climate Change Steering Group

Te Tīmatanga – Introduction

Kei a te pō te tīmatataka mai o te waiatataka mai o te atua

Nā Te Pō, ko Te Ao

Nā Te Ao, ko Te Ao Mārama

Nā Te Ao Mārama, ko Te Ao Tūroa

Nā Te Ao Tūroa, ko te Kore te whiwhia

Nā te Kore te whiwhia, ko te Kore te rāwea

Nā te Kore te rāwea, ko te Kore te tāmaua

Nā te Kore te tāmaua, ko te Korematua

Nā te Korematua, ko te Mākū Ka moe i a Māhoranuiātea, ka puta ko Raki

Ka moe i a Pokohārua te Pō Ka puta ko Aoraki, ko Rakamamao tāna ko Tāwhirimātea

Ko te aitaka o te takata

Ki te whai ao, ki te ao mārama

Ki te ao tūroa e tū nei

Tihei Mauriora!

Ngāi Tahu values and beliefs define all things from the time of nothingness – Te Kore, through the vast ages of darkness – Te Pō, to the first ever glimmer of light – Te Ao, to the longstanding light – Te Aotūroa, through to the emergence of moisture – Te Mākū.

This shared whakapapa reinforces the tribal philosophy that all things are from the same origin. The welfare of any part of the environment determines the welfare of the people.

It is through whakapapa that all things are intricately linked, as well as having their individual place in the world. Ultimately, it is whakapapa that connects people to each other, to their ancestors, to the land and natural resources. For Ngāi Tahu, it is whakapapa that elucidate their descent from the gods of creation.

Ngāi Tahu lay claim to the same whakapapa as other iwi, through Rakinui and Papatūānuku and connection to their descendants. Whakapapa accounts for the way in which the earth, sky, oceans, rivers, elements, minerals, plants, animals, and people have been created. Whakapapa explains the very origins of everything, past and present, within the Māori world. It is the foundation upon which all things are built, the web that connects all things together, the anchor which holds all things in place and the vehicle by which all things link back to the beginning of time. Whakapapa binds Ngāi Tahu to the mountains, forests and waterways and life supported by them and the Taiao (environment). All things are considered to have a mauri (life force), to be living and to have a genealogical relationship with each other. People are therefore related to the natural world.

Karakia based on 'Te Waiatatanga mai o te Atua: South Island Traditions' original manuscript authored by Matiaha Tiramōrehu in 1849. Translated and edited by Manu Van Ballekom and Ray Harlow in 1987, and published by the University of Canterbury. Te Maire Tau, Anake Goodall, David Palmer, and Rakiihia Tau (1990). Te Whakatau kaupapa: Ngāi Tahu resource management strategy for the Canterbury Region. (Aoraki Press, Wellington)

Measuring climate change projections

The world's climate is changing like we have never seen before due to the effects of increasing greenhouse gas emissions. Within this greater context, Canterbury's climate is also changing.

Changes in our climate are projected to continue into the future, and their severity, impact and frequency will depend on global efforts to curb greenhouse gas emissions.

Currently, climate change modellers use a set of standard scenarios called Representative Concentration Pathways (RCPs) to measure and explain the impacts of climate change.

The CCCRA was developed using RCP 8.5, which indicates the likely outcome of climate change impacts under a high-end scenario where greenhouse gas emissions continue to rise over this century. This is sometimes referred to as a business as usual scenario.

The National Institute of Water and Atmospheric Research (NIWA) has developed national and regional projections based on RCP 8.5, which have been used as a basis for the CCCRA.

These projections show that Canterbury will see warmer temperatures, including an increasing number of hot days and an overall increase in temperature ranges, as well as decreasing frosts and snow days.

The frequency of extreme weather events is also likely to increase, with drought and sea level increases also expected.

These projected changes are likely to cause natural hazards such as flooding, wildfires and wind damage.

Summary of climate change projections for Canterbury by 2100

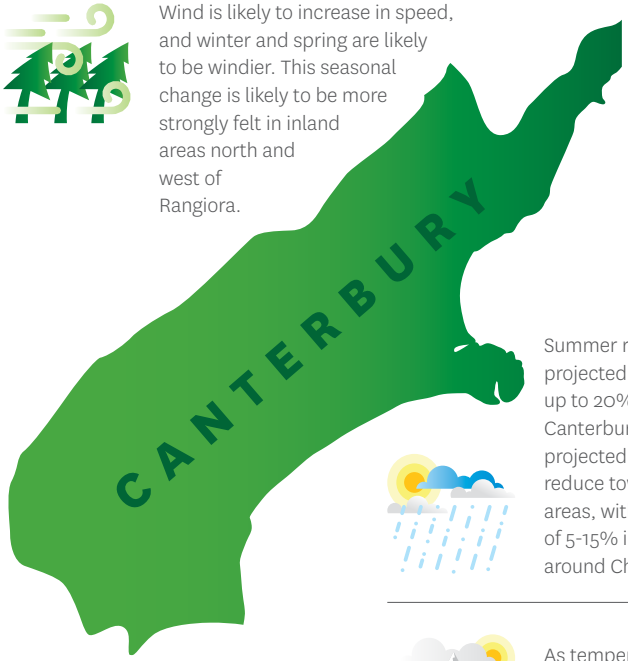
The sea level is projected to rise by about 0.8m above present day levels.

Wildfires will become more likely as hotter, drier summers occur. Rural areas will be more highly exposed.

Drought potential is likely to increase across most of Canterbury.

Hot days are those over 25°C. It is projected that there will be between 20 and 60 more hot days annually by 2100.

Wind is likely to increase in speed, and winter and spring are likely to be windier. This seasonal change is likely to be more strongly felt in inland areas north and west of Rangiora.



Summer rainfall is projected to increase up to 20% in the inland Canterbury Plains. It is projected to gradually reduce towards coastal areas, with a decrease of 5-15% in the area around Christchurch.

As temperatures rise, there will be less snow days across the region.

An increase in winter rainfall of 15-40% is expected in the eastern, western, and southern parts of the region. Winter rainfall has the potential to be more strongly associated with storm events.

It is projected that there will be 20-50 fewer cold days per year, where the temperature is at or below 0°C.

Extreme weather events (e.g., severe storms) are likely to happen more often.

Our annual mean temperature is set to rise by 1 . 5 -3.5°C. Overall, our maximum daytime temperatures will be up 2-5°C. Canterbury's alpine and subalpine areas could be 5-6° warmer.

An integrated climate change framework:
Te Tūtei o Te Hau: Surveillance of the Wind

An integrated framework was developed for the CCCRA, in collaboration with a Papatipu Rūnanga Steering Group, to provide a clear understanding of key climate risks to the Canterbury region and our communities.

The development of this integrated framework is aligned with the NCCRA framework and centres around a Te Āo Māori worldview.

The framework has been gifted the name 'Te Tūtei o Te Hau: The Surveillance of the Wind'.

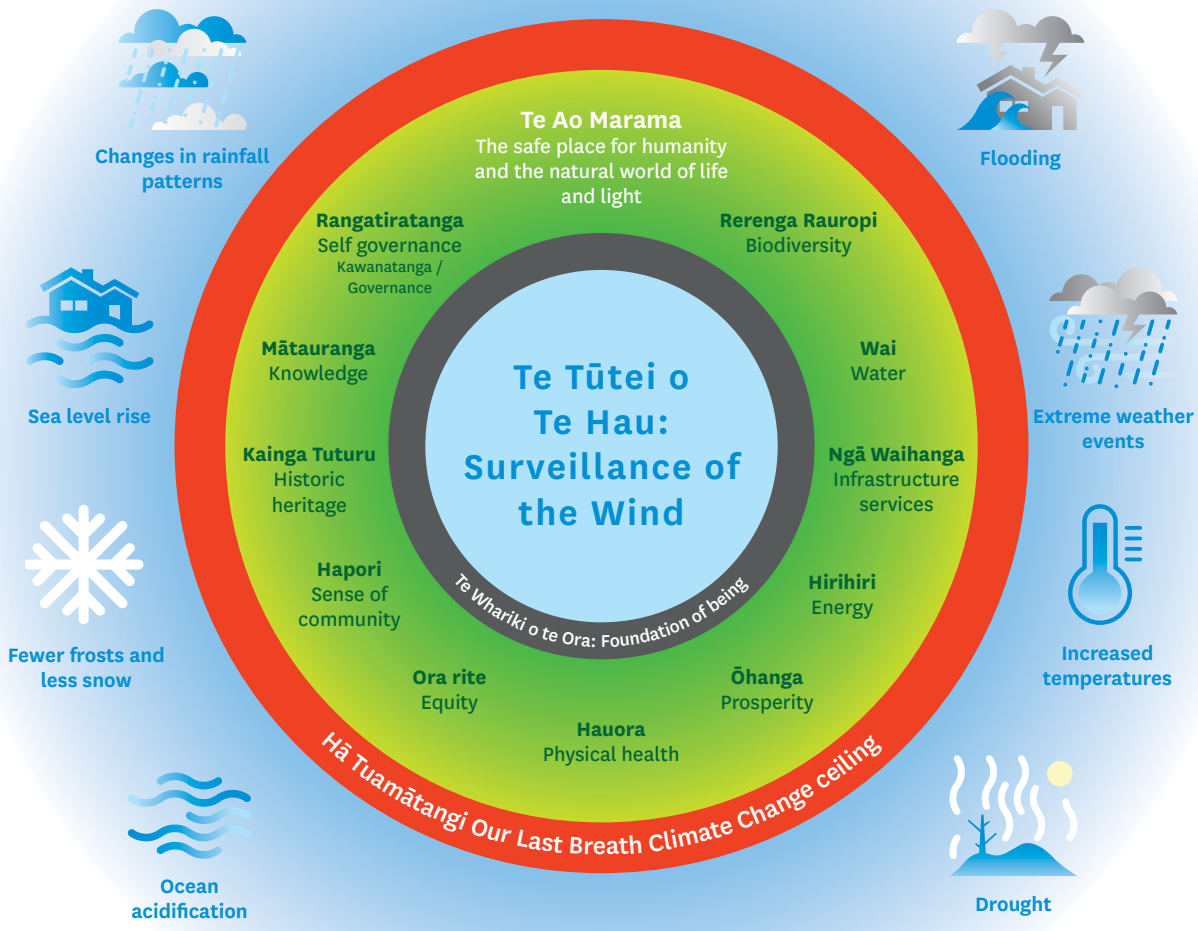
When considering the effects of climate change, observations in the CCCRA have been considered against this framework, our alert system, for understanding climate risk.

Te Whāriki o te Ora: The black ring represents whakapapa, or genealogical connection, that extends from the spiritual realm to that of the human domain. It recognises that humans cannot exist without basic needs and a social foundation.

Te Ao Mārama: The green ring represents the area in which humans can exist when we are functioning within the capacity of our ecosystems. Ngā pono (the values) identified within this circle are critical for us to understand and respond to when considering climate risk.

Hā Tuamātangi: The red ring represents the upper limit in which humans, environments and ecosystems can continue to exist. Beyond this boundary, it is no longer possible to respond to risks proactively.

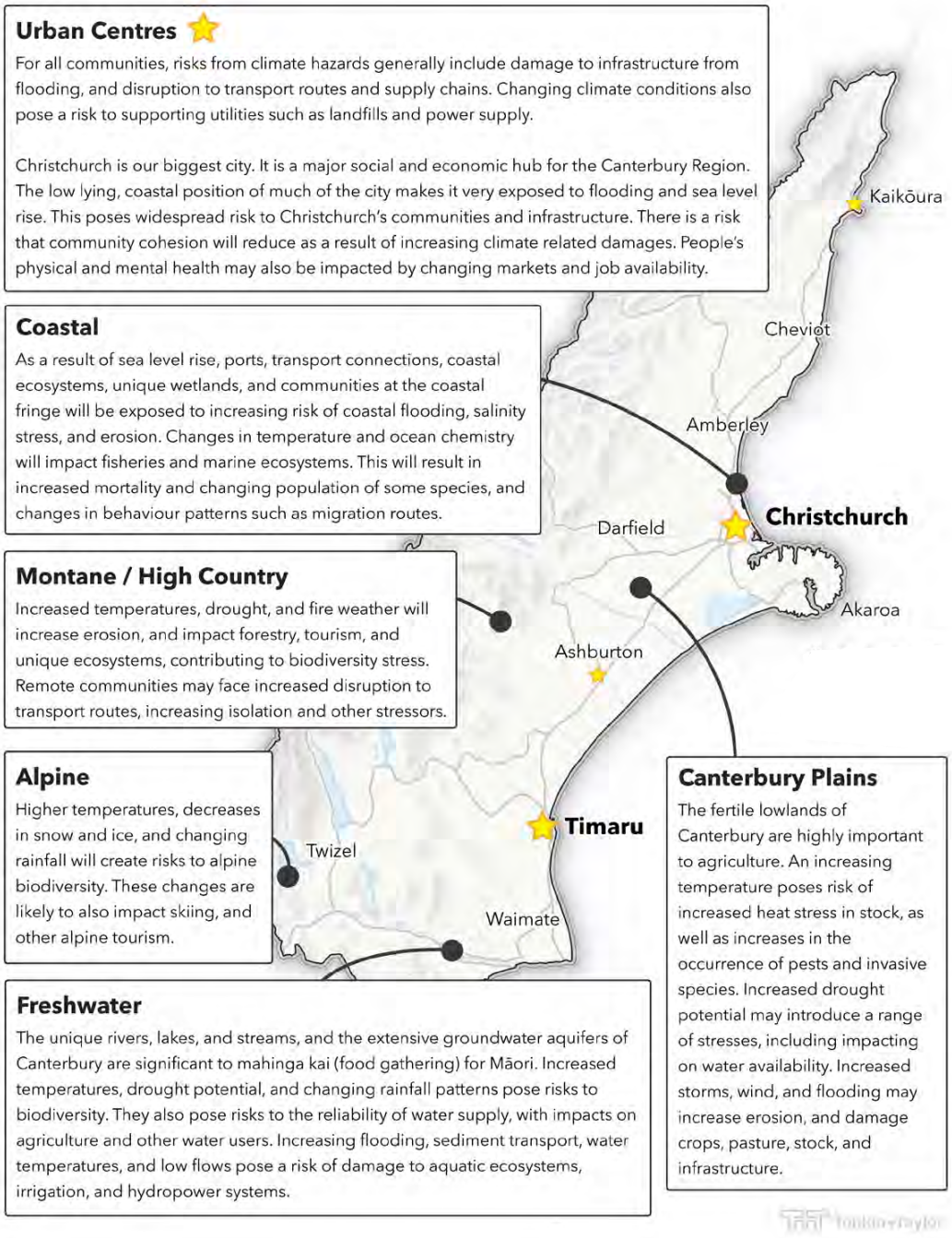
Shown outside the rings are the key climate impacts that we face.



The integrated CCCRA framework developed in collaboration with a Papatipu Rūnanga Project Steering Group.

Impacts of climate change across Canterbury

The challenges of climate change will occur in different ways across the region. The large land area and geographic diversity of Canterbury means that some risks will be more relevant to certain areas.



Map shows boundaries of the Canterbury region. Waitaki District Council sits across the boundary into Otago and therefore is not shown in full in this map.

Overall risk findings

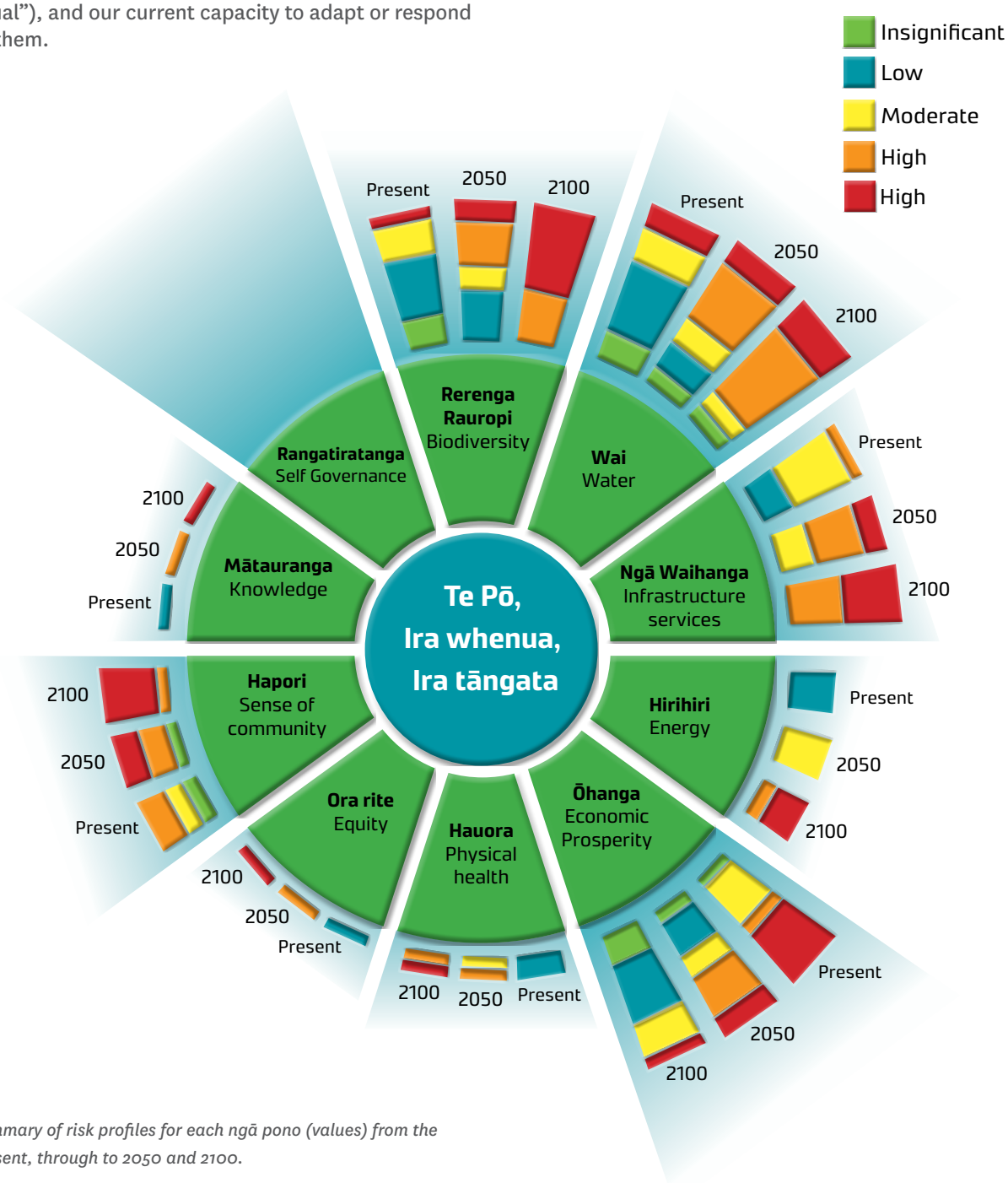
The overall findings in the CCCRA show that climate change risks are threatening all eleven ngā pono (values) in the framework, and that direct and indirect risks will increase over time.

While many present risks are currently rated as insignificant or low, by the year 2100 there are high or extreme risks against all values.

Risks have been rated based on the likelihood of being exposed to hazards under RCP 8.5 ("business as usual"), and our current capacity to adapt or respond to them.

Highly rated risks include those to biodiversity, water and infrastructure services. Present-day risks that are rated extreme include those related to water supply and irrigation.

The CCCRA technical report provides an in-depth assessment of the climate change impacts across each of the eleven values, as well as the potential impacts to individuals, communities and businesses.



Summary of risk profiles for each ngā pono (values) from the present, through to 2050 and 2100.

What are our opportunities?

In addition to the challenges and risks that climate change presents, it may provide us with some opportunities. It's important to note that opportunities cannot be considered in isolation, but must be considered as part of the broader CCCRA, as the risks often outweigh the benefits.

The projected increase in temperature, and reduction in cold days in winter, could provide the following opportunities:

Warmer living conditions in the winter that reduce energy consumption and improve wellbeing.

A longer growing season could present opportunities for the horticultural industry to increase productivity, reduce crop waste, and grow different varieties within new locations.

Increased water storage from winter rainfall.

Less disruption to our transport networks due to less snowfall and icy conditions.

An increase in both air and ocean temperatures may provide a new environment for new marine fish species, potentially providing an opportunity to the fisheries industry.

Where to from here?

The work to understand the climate change risks we face doesn't end here.

The information we now have from the CCCRA gives us an in-depth, technical overview of the risks and opportunities associated with climate change in Canterbury.

The Canterbury Mayoral Forum will continue to work with Papatipu Rūnanga and key stakeholders to consider the risks highlighted in this report, and work to prioritise these risks at a local and regional level to help inform future planning by councils.

Understanding the risks and opportunities from climate change now and into the future is a vital step in our efforts to curb its long-term impact in our region.

Notes section

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Tonkin+Taylor

Canterbury Climate Change Risk Assessment

Prepared for
Canterbury Mayoral Forum

Prepared by
Tonkin & Taylor Ltd

Date
February 2022

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Canterbury Climate Change Risk Assessment

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This report was prepared in collaboration with Councils of the Canterbury Region and representatives from Ngāi Tahu.

Our project partners who have contributed and reviewed sections of the report include:

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Paula Blackett (NIWA)
Nick Craddock-Henry (Landcare Research)
Sam Elder (Climate Navigator)
Stuart Ford (AgriResearch)

This report was prepared in collaboration with Council's of the Canterbury Region and representatives of Te Rūnanga o Ngāi Tahu.

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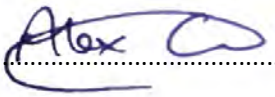	
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Project Manager	Project Director

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Nā te Kore te whiwhia, ko te Kore te rāwea

Nā te Kore te rāwea, ko te Kore te tāmaua

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Ko te aitaka o te takata

Ki te whai ao, ki te ao mārama

Ki te ao tūroa e tū nei

Tihei Mauriora!

- 'Te Waiatatanga mai o te Atua: South Island Traditions' original manuscript authored by Matiaha Tiramōrehu, 1849

1 Executive Summary

Climate change is the biggest environmental challenge of our time. It is already affecting us, and if left unchecked, will have broad and ongoing implications for all of New Zealand, across many generations. Even taking action to reduce emissions, science is now telling us that that some aspects, such as sea level rise, are locked in for the next century. Importantly, the specific impacts of climate change will be felt differently in different places, and the risks and opportunities that result from these impacts will also differ. As a result, there is an urgent need to understand these changes, and their associated risks, so that we can best plan for the future.

In 2019, a regional Climate Change Risk Screening assessment was undertaken by the Canterbury Climate Change Working Group, under the Canterbury Mayoral Forum (referred to as "the Working Group" throughout). This identified 180 climate-related risks that could have the greatest effect across the Canterbury Region, and included over 80 risks that were identified as priority risks. The results of this assessment fed into New Zealand's first National Climate Change Risk Assessment, commissioned by the Ministry for the Environment.

The priority risks identified in the 2019 assessment have now been used as the basis for this more detailed 2021 Canterbury Climate Change Risk Assessment (CCRA). This assessment provides detail about the highest risks[1] and opportunities associated with climate change, now and into the future. The project has involved collaboration with Papatipu Rūnanga representatives, Territorial Authorities and key stakeholder groups.

This report outlines the risks related to physical climate change that the Canterbury Region faces. The report centres around Te Tūtei o Te Hau (an integrated framework) aligned both with a Te Ao Māori worldview, and with the National Climate Change Risk Assessment (NCCRA) framework. It provides decision makers within relevant Councils with the technical information to enable prioritisation of the risks outlined, and to enable them to plan for action through development of strategic and long term plans.

Climate hazards for Canterbury

The global climate system is showing unprecedented changes, which can be attributed to the effects of increasing greenhouse gas emissions. Within this greater context, Canterbury's climate is also changing and these changes are projected to continue over long timescales. The severity and frequency of climate changes will depend on global efforts to curb greenhouse gas emissions. How climate hazards change in response to increasing levels of greenhouse gas emissions is uncertain, due to the complexity within the global climate system and interactions with socio-economic processes that drive emissions. This uncertainty is represented through the adoption of various scenarios that represent futures under different concentrations of greenhouse gases in the atmosphere (Representative Concentration Pathways, RCP). This assessment considers RCP 8.5 – which represents a 'high-end' emissions scenario with high future global greenhouse gas emissions.

Climate projections relating to this scenario are considered at 2050, and 2100. The National Institute of Water & Atmospheric Research (NIWA) have developed national and regional projections based on the IPCC Fifth Assessment Report (2014) which form the basis of this report (Macara et al., 2020).

In general, Canterbury is projected to see warmer temperatures, including an increasing number of hot days (defined as those hotter than 25^{o}C), decreasing frosts, decreasing snow days, and increase in the daytime temperature range. Average annual rainfall shows small changes for most of the Region, but seasonal increases are likely in winter for most parts, and decreases in summer rainfall in some parts of Canterbury. Wind is generally likely to increase in speed. The frequency of extreme weather events is likely to increase (Carey-Smith et al., 2018). Drought potential is projected to

[1] Highest risks relate to those rated 'high' or 'extreme' during the 2020 Canterbury Climate Change Risk Assessment.

increase across most of the Region, and the sea level is projected to rise, with coastal hazards expected from additional influence from weather on storm surges and wave heights.

The projected changes that Canterbury is likely to see can contribute to risk directly by causing physical impacts, like wind damage or hotter temperatures creating heat stress, or by causing natural hazards, such as increasing flooding, landslides, drought, and wildfire.

Method

The risk assessment method is framed by the International Panel on Climate Change (IPCC), and is consistent with that used during the screening stage in 2020. This CCRA involved:

- Establishment of a Papatipu Rūnanga Project Steering Group (RPSG), to guide and advise on engagement and Te Ao Māori content.
- Co-development of the Te Tūtei o Te Hau (integrated framework) with the RPSG.
- Risk rating based on assessment of exposure and vulnerability.
- Refinement and description of human and governance related risks .
- A literature review, including gaps analysis, to build detailed understanding of priority risks.
- Risk aggregation, aligning risks to the new integrated framework, to allow for easier communication and reporting as part of this project.
- Stakeholder engagement, aligned to stakeholder and partner needs, including targeted subject matter workshops, focus groups, kānohi-ki-te-kānohi hui (face to face meetings), insights questionnaires (surveys), and targeted phone calls.
- Five case studies, chosen by participants, to explore interacting risks, recognising that the impacts of climate change will not occur in isolation, and risks will interact propagate through systems, creating multiple pressures across value areas.
- Identification of opportunities.

Summary of risks

The Canterbury Region faces a range of risks to all ngā pono (values) within te Ao Mārama (the safe place for humanity and the natural living world). These include direct physical risks from climate hazards to the natural and physical environment, such as those from climate hazards to many aspects within rerenga rauropi (biodiversity), wai (water), ngā waihanga (infrastructure services), hirihiri (energy), kāinga tūturu (historic heritage), and the natural resources that support ōhanga (prosperity). Climate change also poses direct risks to hauora (wellbeing), such as heat stress and injury from flooding.

From these direct risks, arise a range of indirect risks, as the physical impacts of climate change pose risks to the less tangible ngā pono of the Region. These include risks to hauora, and risks to ora rite (equity), hapori (sense of community), mātauranga (knowledge), and rangatiratanga (governance).

Across all ngā pono, risks from climate change are seen to increase with time. At the present day, the majority of risks are rated as insignificant or low, with 30% rated as moderate, 10% rated high, and 3% rated as extreme. These present-day highly rated risks (i.e. those rated as either ‘high’ or ‘extreme’) mainly include those to rerenga rauropi, wai (water), and ngā waihanga (infrastructure services). The present-day risks that are rated extreme include those relating to water supply and irrigation.

By late 21st century, risks within all ngā pono are rated as extreme, with the vast majority of all identified risks rated either high or extreme.

The challenges that climate change introduces will occur in different ways across the Region. The large land area and high geographic diversity of Canterbury means that some risks will be most

relevant to certain areas. The environments of the Region can be characterised by its alpine/high country environments, montane/hill country, lowlands, coastal and marine habitats, freshwater systems and urban centres. An overview of these challenges is provided in Figure ES 1 below.

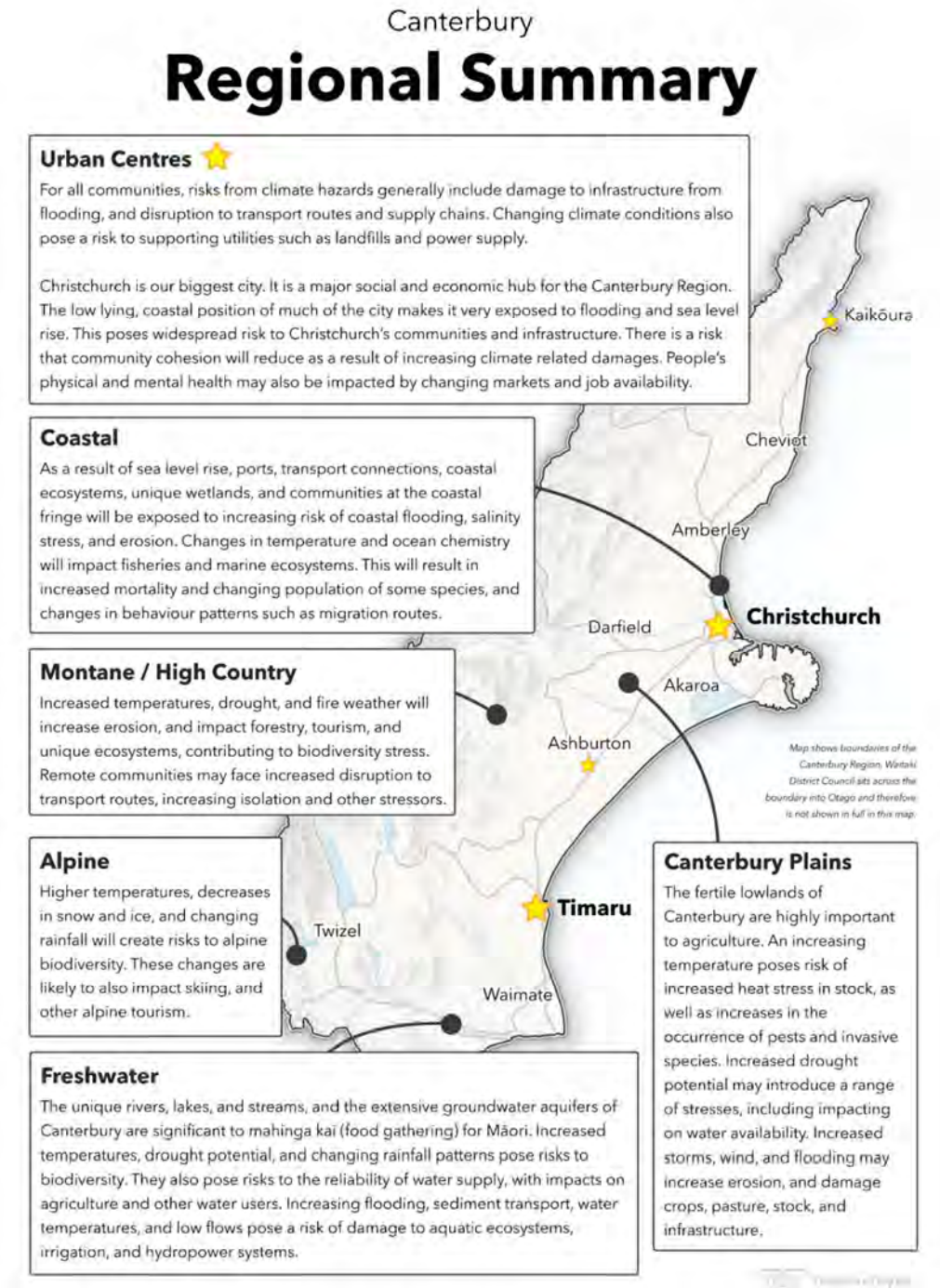

Figure ES 1: Regional summary of climate risks.

The alpine environment of Canterbury acts as an important water source to the Region's alpine rivers, supports unique biodiversity and generates tourism. Increased temperature, reduced snow and changing rainfall patterns pose some of the highest rated risks to these systems.

The Region's water sources play an important role in mātauranga Māori (Māori knowledge), as well as contributing to wider biodiversity and public amenity. They are also important sources of irrigation and stock water for agricultural activity, and support the water demands of towns and industry. Increased temperature and drought, as well as changing rainfall patterns, pose some of the highest rated risks to freshwater systems.

The montane/hill country and forested foothills support unique ecosystems and low-density farming and forestry. Increased temperature, fire weather, and changing rainfall patterns pose some of the highest rated risks to these systems.

The fertile lowlands of the plains are the agricultural powerhouse of the Region, supporting diverse farming activity and many farming communities. Increasing drought potential and related impacts on water availability and agriculture, as well as increased storms, winds, and flooding pose some of the highest rated risks to these systems.

The long coastline of the Region supports diverse ecosystems, including coastal wetlands and abundant marine species. Ports, transport connections, coastal ecosystems, unique wetlands, and communities along the coastal fringe, will all be exposed to increasing coastal flooding, salinity stress and erosion. Temperature and ocean chemistry changes will impact fisheries and marine ecosystems, resulting in changed behaviour patterns, such as migration routes and increased mortality, and changing the population of some species.

Ōtautahi/Christchurch, Canterbury's largest city, is a major social and economic hub for the Region. The low-lying coastal position of much of the city makes it very exposed to flooding and sea level rise, with widespread risks to its communities and infrastructure. Risks from climate hazards on all communities generally include damage to infrastructure from flooding, and reduced community cohesion from increasing climate related damages, disruption to transport routes and supply chains, impacts on physical and mental health and changing markets and job availability. Changing climate also poses risks to supporting utilities such as landfills, and power transmission.

Knowledge gaps and future research

Climate change presents a range of risks to the Region. However, uncertainty in the nature and severity of all aspects of climate risks is generally high. While assessment of these risks has been made using the best available information at the time, some gaps in knowledge can be clearly identified.

Some of the identified knowledge gaps may be filled through additional research into climate change and adaptation, which could build on the large body of established research. Extensive work is underway to gather data at local, national and international scales to further understand climate risks, and develop strategies to adapt to climate change. Research streams and data collection managed through Environment Canterbury, Universities and Crown Researchers, Sector representatives, and the National Science Challenges are of particular relevance to this regional climate risk assessment.

For the Canterbury Region, further assessment would be beneficial for those risks screened in 2019 but not prioritised. Assessing at a local or sector scale those risks which have been assessed at a regional scale, and conducting a detailed climate change risk assessment of built kāinga tūturu (historic heritage) would also be beneficial.

At a high level, these areas would benefit from further research:

- Transition risks – risks associated with a transition to a low-carbon economy, and those associated with equitable transition to climate adapted communities.
- Rerenga rauropi (biodiversity) – ecosystem and specific element responses to climate change.

- Wai (water) – at a regional level: surface water, groundwater, water availability, extreme events and flooding, and flood protection.
- Ngā waihanga (infrastructure services) – asset vulnerability in critical infrastructure sectors.
- Hirihiri (energy) – specific vulnerabilities relating to transmission and supply, beyond hydroelectricity.
- Ōhanga (prosperity) – financial implications and adaptations; sector vulnerability; impacts and interacting economic impacts, including modelling of global markets; sustainable agriculture; agricultural biosecurity; sustainable fisheries and opportunities.
- Hauora (physical health), hapori (sense of community) and ora rite (equity) – implications of gradual climate hazards on mental and physical health; mental wellbeing, equity, and community.
- Mātauranga (knowledge) – impacts and risks from climate change on mahinga kai and taonga.
- Rangatiratanga (governance), kawanatanga (governance) and mana whakahaere (autonomy) – crown and mana whenua (those with territorial rights to the land) relationships; policy, guidance, and coordination; lifeline utilities.

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2 Te Timatanga

Kei a te pō te tīmatataka mai o te waiatataka mai o te atua

Nā Te Pō, ko Te Ao

Nā Te Ao, ko Te Ao Mārama

Nā Te Ao Mārama, ko Te Ao Tūroa

Nā Te Ao Tūroa, ko te Kore te whiwhia

Nā te Kore te whiwhia, ko te Kore te rāwea

Nā te Kore te rāwea, ko te Kore te tāmaua

Nā te Kore te tāmaua, ko te Korematua

Nā te Korematua, ko te Mākū Ka moe i a Māhoranuiātea, ka puta ko Raki

Ka moe i a Pokohārua te Pō Ka puta ko Aoraki, ko Rakamamao tāna ko Tāwhirimātea

Ko te aitaka o te takata

Ki te whai ao, ki te ao mārama

Ki te ao tūroa e tū nei

Tihei Mauriora!

Ngāi Tahu values and beliefs define all things from the time of nothingness – *Te Kore*, through the vast ages of darkness – *Te Pō*, to the first ever glimmer of light – *Te Ao*, to the longstanding light – *Te Aotūroa*, through to the emergence of moisture – *Te Mākū*.

This shared whakapapa, reinforces the tribal philosophy that all things are from the same origin. The welfare of any part of the environment determines the welfare of the people.

It is through whakapapa that all things are intricately linked, as well as having their individual place in the world. Ultimately, it is whakapapa that connects people to each other, to their ancestors, to the land and natural resources. For Ngāi Tahu, it is whakapapa that elucidate their descent from the gods of creation.

Ngāi Tahu lay claim to the same whakapapa as other iwi, through Rakinui and Papatūānuku and connection to their descendants. Whakapapa accounts for the way in which the earth, sky, oceans, rivers, elements, minerals, plants, animals, and people have been created. Whakapapa explains the very origins of everything, past and present, within the Māori world. It is the foundation upon which all things are built, the web that connects all things together, the anchor which holds all things in place and the vehicle by which all things link back to the beginning of time. Whakapapa binds Ngāi Tahu to the mountains, forests and waterways and life supported by them and the Taiao (environment). All things are considered to have a mauri (life force), to be living and to have a genealogical relationship with each other. People are therefore related to the natural world.

Sources:

Karakia based on '*Te Waiatatanga mai o te Atua: South Island Traditions'* original manuscript authored by Matiaha Tiramōrehu in 1849. Translated and edited by Manu Van Ballekom and Ray Harlow in 1987, and published by the University of Canterbury.

Te Maire Tau, Anake Goodall, David Palmer, and Rakiihia Tau (1990). *Te Whakatau kaupapa: Ngāi Tahu resource management strategy for the Canterbury Region*. (Aoraki Press, Wellington).

3 Introduction

Climate change affects communities now, but its full impacts will be felt across generations.

In 2019, the World Meteorological Organization (WMO) released the WMO Statement on the State of the Global Climate (WMO 2020). In it, UN Secretary-General Antonio Guterres commented that "climate change is the defining challenge of our time. Time is fast running out for us to avert the worst impacts of climate disruption and protect our societies from the inevitable impacts to come."

Since then, global concerns about the impact of climate change have only grown. In August 2021, the Intergovernmental Panel on Climate Change (IPCC) released its sixth assessment report, AR6 Climate Change 2021: The Physical Science Basis (IPCC 2021). The report states that "It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred." It goes on to discuss the increasing accumulation of evidence of human-induced climate change, that have become more apparent in the few short years since the fifth assessment report was released in 2014. This includes observed changes in extremes, such as heatwaves, heavy rainfall, droughts, and tropical cyclones, which can be attributed to human influence.

The specific impacts of climate change will be felt differently in different places. The risks and opportunities that result from of these impacts will also differ from place to place.

At a national level, the Ministry for the Environment (MfE) commissioned first National Climate Change Risk Assessment (NCCRA) for Aotearoa New Zealand in 2019 (MfE 2020). The NCCRA helps improve our understanding of the climate change risks and opportunities that New Zealand faces. The assessment covered all aspects of life in New Zealand, including our ecosystems, communities, infrastructure, and economics, and identified 43 priority risks associated with these. The risks were then grouped into five value domains: natural environment, human, economy, built environment, and governance.

At the time that the NCCRA was being developed, a regional Climate Change Risk Screening assessment was undertaken by the Canterbury Climate Change Working Group, under the Canterbury Mayoral Forum (referred to as "the Working Group" throughout). This assessment identified 180 climate-related risks that could have the greatest effect across the Canterbury Region was developed. Of these, over 80 (46%) were identified as priority risks, projected to have a big impact on the Region. A summary of these risks is included in Appendix A. Further detail on the priority risks, and the process undertaken to identify them, can be found in the Canterbury Climate Change Screening Report (2020). The outcomes of this project directly contributed to the development of the NCCRA.

These priority risks have now been taken forward from the screening as the basis for this more detailed 2021 Canterbury Climate Change Risk Assessment (CCRA). This assessment looks to provide detail about the highest risks[2] and opportunities associated with climate change, now and into the future. The project has involved collaboration with Papatipu Rūnanga representatives, Territorial Authorities and key stakeholder groups.

Key objectives in undertaking this Regional CCRA included:

- Alignment with the National Climate Change Risk Assessment (NCCRA) approach.
- Through the Working Group, ensuring project owners and sponsors, partners, stakeholders, communities and groups of people understand common objectives, and how to plan to achieve these.

[2] Highest risks relates to those rated 'high' or 'extreme' during the 2020 Canterbury Climate Change Risk Assessment.

2

- Co-design of rūnanga engagement with Ngāi Tahu, recognising their whakapapa and kaitiakitanga of Canterbury, to ensure meaningful participation in the project.
- Creation of an integrated approach for Te Ao Māori, that would incorporate Ngāi Tahu values and mātauranga, recognising the work that Ngāi Tahu have already undertaken in developing their *He Rautaki mō te huringa o te āhuarangi: climate change strategy.*
- Development of a cohesive report that will serve multiple purposes:
  - To provide information that will aid Canterbury councils' strategic and long-term planning.
  - To form the basis for any Canterbury Climate Strategy - that informs the Long Term Plan (LTP), 30 Year Infrastructure Strategy, Civil Defence Plans, and Regional and District Plans, Strategies and Policy Statements.
  - To act as an 'information toolbox', supporting local authorities in responding to requests from the Minister on effect of climate change risks.
  - To inform Greater Christchurch 2050, which is "setting a vision and plan for Greater Christchurch to achieve intergenerational wellbeing that also responds to climate change; and moving towards a zero-carbon economy...".
  - To support Canterbury engagement with Central Government on the National Adaptation Plan.
  - To inform councils' new climate reporting obligations to Government under the Zero Carbon Act.

Climate change has already changed the way many people think. Within Canterbury, different groups of people will be impacted in different ways. Engagement for this project was by necessity broad, to ensure diverse perspectives were captured.

Ngāi Tahu have already undertaken work to develop *He Rautaki mō te huringa o te āhuarangi: climate change strategy*, to provide direction around the challenges and opportunities that climate change brings and help ensure that their people will be sustained and even thrive in the generations to come.

As our youngest, rangitahi in particular will be particularly impacted by climate change. However, engagement with the Environment Canterbury Youth Rōpū highlights how much of an impact it is already having on them (see Figure 1.1 below).

Figure 3.1: Quotes from the Environment Canterbury Youth Rōpū engagement activities.

Climate change is here, and will continue to be exacerbated well into the future. Even taking action to reduce emissions, science is now telling us that that some aspects, such as sea level rise, are locked in for the next century. There is a need to understand these changes, and their associated risks, so that we can best plan for the future.

This CCRA outlines the risks related to physical climate change that the Canterbury Region faces. Waitaki District Council crosses the boundary between the Canterbury and Otago regions. Climate change does not stop at local government boundaries and its impacts will be felt across all of Waitaki, however the geographic scope of this risk assessment was the Canterbury region boundary, and so risks within the part of Waitaki district that are outside of the Canterbury region have not been assessed. The report encapsulates a holistic view, and is centred around Te Tūtei o Te Hau (an integrated framework) aligned to a Te Ao Māori worldview, and with the National Climate Change Risk Assessment (NCCRA) framework. It is hoped that the report will provide decision makers with the technical information to enable prioritisation of these risks, and subsequent actions. Climate change is here, now. We need strong ownership, today, to best prepare our communities for tomorrow.

4 Climate Hazards for Canterbury

The global climate system is showing unprecedented changes, which can be attributed to the effects of increasing greenhouse gas emissions. These changes are projected to continue over long timescales. The severity of climate changes will depend on global efforts to curb greenhouse gas emissions. Within this greater context, Canterbury's climate is also changing.

How climate responds to increasing levels of greenhouse gas emissions, and the timing of that response is uncertain. This uncertainty is shown through the adoption of various scenarios representing possible futures under different concentrations of greenhouse gases in the atmosphere (Representative Concentration Pathways, RCP). This assessment considers RCP 8.5, which represents a 'high-end' emissions scenario with high future global greenhouse gas emissions.

Climate projections relating to this scenario are considered at 2050, and 2100. The National Institute of Water & Atmospheric Research (NIWA) have developed national and regional projections based on the IPCC Fifth Assessment Report (2014). These assessments form the basis of climate change projections used within this report (Macara et al., 2020). Uncertainty in future projections creates ranges in potential climate changes.

In general, Canterbury is projected to see warmer temperatures, including an overall increase in the daytime temperature range, with an increase in the number of hot days (defined as those hotter than 25^{o}C), decrease in the number of snow days and a decrease in frosts. Average annual rainfall shows small changes for most of the Region. However, seasonal increases are likely in winter for most parts, alongside decreases in summer rainfall in some parts of Canterbury. Drought potential is projected to increase across most of the Region. Wind is generally likely to increase in speed. The frequency of extreme weather events is likely to increase, and events with small annual exceedance probability (i.e. events with a low chance of occurring in any one year) are likewise projected to increase (Carey-Smith et al., 2018). The sea level is projected to rise by up to 0.8 m by 2100 for Canterbury (Macara et al., 2020), with an increase in coastal hazards expected as a result of the additional influence of weather on storm surges and wave heights. Unless otherwise stated, this is the sea level projection used for 2100 timeframe, as requested by Environment Canterbury.

Figure 4.1 provides an overview of climate change projections for the Canterbury Region. These projected changes contribute to risk in two ways:

- By acting as climate hazards to directly cause physical impacts, such as wind damage, increased temperature causing heat stress, sea level rise causing inundation.
- By causing effects that act as natural hazards, such as increased flooding and landslides, drought, coastal inundation and erosion, and increased instances of wildfire.

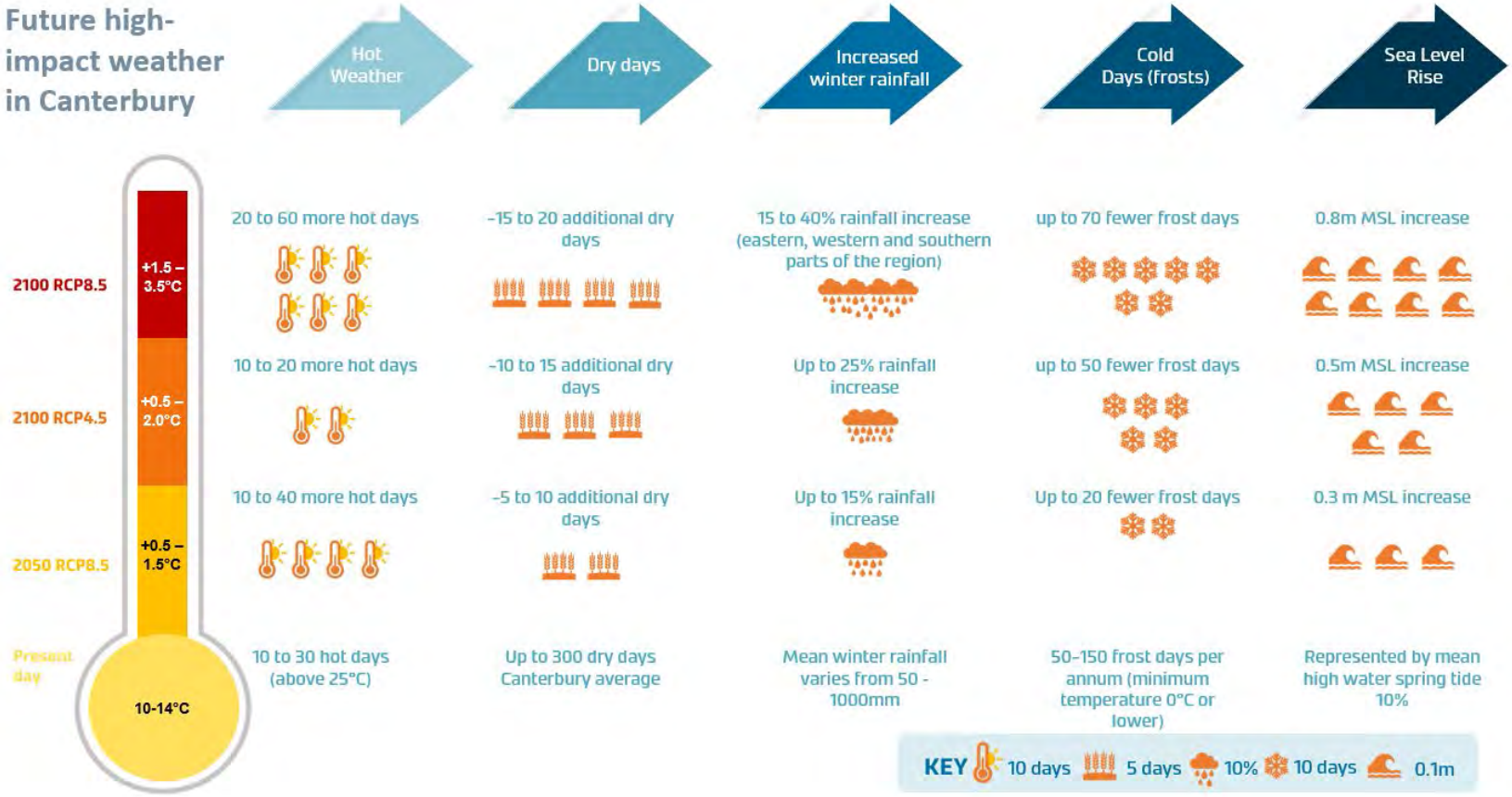


Figure 4.1: Summary of climate hazards in the Canterbury Region (Macara et al., 2020).

6

5 Te Tūtei o Te Hau: Surveillance of the Wind

5.1 The development of an integrated framework

We live in a highly complex and networked world, and as a consequence, there are multiple ways to consider climate risk. Environment Canterbury recognised that considering climate risk in a more holistic manner would provide a more nuanced understanding of priority risks and why these are important to the Region. It would also provide opportunity to better understand the priorities of our communities, and promote more positive interactions with them. To this end, development of the integrated framework used here not only sought alignment with the NCCRA framework, it also sought to centre around Te Ao Māori. It built upon research into existing central and local government frameworks for resilience and climate change, while also building upon established thinking on indigenous framing of sustainability (Bossa Dean, 2019), Māori holistic views on health expressed through Te Whare Tapawhā model(s) (Durie, 1984), and a kaupapa Māori framework for assessing resilience (Landcare, 2019).

From the project outset, a Rūnanga Project Steering Group (RPSG) was formed to advise on and help develop an integrated risk assessment framework. The collaboratively developed framework recognises and incorporates Te Ao Māori from the outset of the risk assessment process, includes kupu (words) and mātauranga (knowledge) from Ngāi Tahu papatipu rūnanga, and enables alignment with wider community and extracted values.

5.2 Te Tūtei o te Hau: Origins

Te Waiatatanga mai o te Atua is an appropriate allegory, which describes story forms, metaphor, and reference to themes such as the realm of Atua (gods), creation of people and the natural world.

When Ranginui (sky father) and Papatūānuku (earth mother) were separated, space was created in the world and Tane then supported other Atua to create the natural world, Te Taiao, the environment.

Tumatauenga and Rongo were envious and tried to desecrate, to destroy what Tane had created, therefore disassociating themselves from the environment. During his ascent to heaven to destroy Tane, Tumatauenga was defeated and weakened by a wind created by Tane forcing him back to Te Ao Mārama. Tumatauenga and Rongo then had to live in the desolation they created, whilst Tane lived in a place of abundance.

The story within has a deeper, hidden meaning, in reference to what happens when disassociation, or disconnection from the environment occurs, as well as intentional destruction. Climate change is the ‘utu’, the revenge for the maintenance of balance and harmony within society. It is like the great wind which usurped Tumatauenga and Rongo who couldn’t control the environment, making the natural world their own creation. The wind which was their undoing forced them to live in the desolation they had created.

In Te Ao Māori. The wind named ‘Te Tūtei o Te Hau: The surveillance of the wind’, is a guardian, an alert system, for the environment.

The name of the Framework has therefore been gifted as ‘Te Tūtei o Te Hau, Surveillance of the Wind’. When considering the effects of climate change, observations are collated and considered against this framework, our alert system, for understanding climate risk.

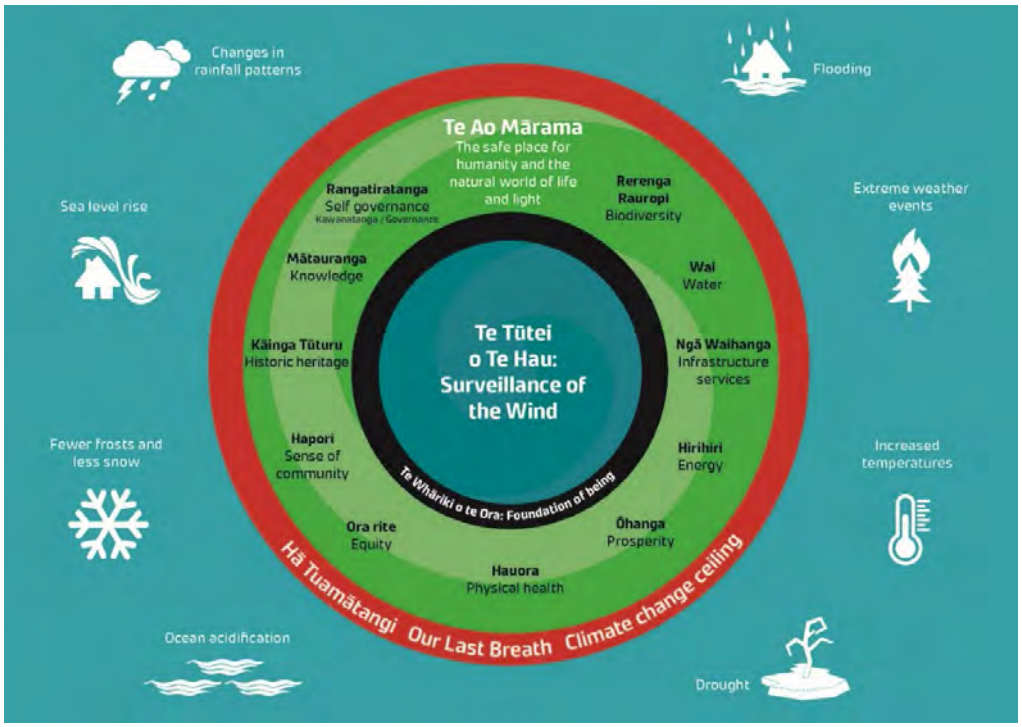


Figure 5.1: Integrated framework developed in collaboration with the Rūnanga Project Steering Group.

5.3 Understanding the diagram: Te Tūtei o Te Hau

The framework is presented as a series of circles, reflecting the circular nature of the world in which humans exist. At its core is the name gifted for the framework which draws on the whakapapa above.

The black circle, represents the inner boundary zone. This boundary zone represents the whakapapa, or genealogical connection, that extends from the spiritual realm to that of the human domain. It recognises that humans cannot exist without basic needs (environmental, economic, cultural) and a social foundation.

The green circle is the area within which humans can exist when we are functioning within the carrying capacity of our ecosystems. Ngā pono (the values) identified within this circle are those that are of critical importance to us to understand and respond to, when considering climate risk. They represent broad categories that are inherently interlinked through one central value. Ngā pono are individually explained within their own subsequent chapters.

The red circle represents the upper limit in which humans, environments and ecosystems can continue to exist. Beyond this boundary, it is no longer possible to respond proactively. This provides a transition to the outer components of the integrated framework, which are the climate variables that we face due to climate change. Te Tūtei o Te Hau recognises that in some instances (such as sea level rise) for some areas and communities, we may already be extending through the red circle into the outer extent of the framework. In these instances, more immediate action to respond to risks may be required.

When considered as a whole, Te Tūtei o Te Hau enables discussions that can span temporal, spatial and sectoral boundaries.

8

6 Method

Our risk assessment method is framed by the International Panel on Climate Change (IPCC), and uses the elements of hazard, exposure and vulnerability, with the overlap defining risk (see Figure 6.1). This is consistent with the method used during the screening stage in 2020 (refer 2020 Risk Screening Report).

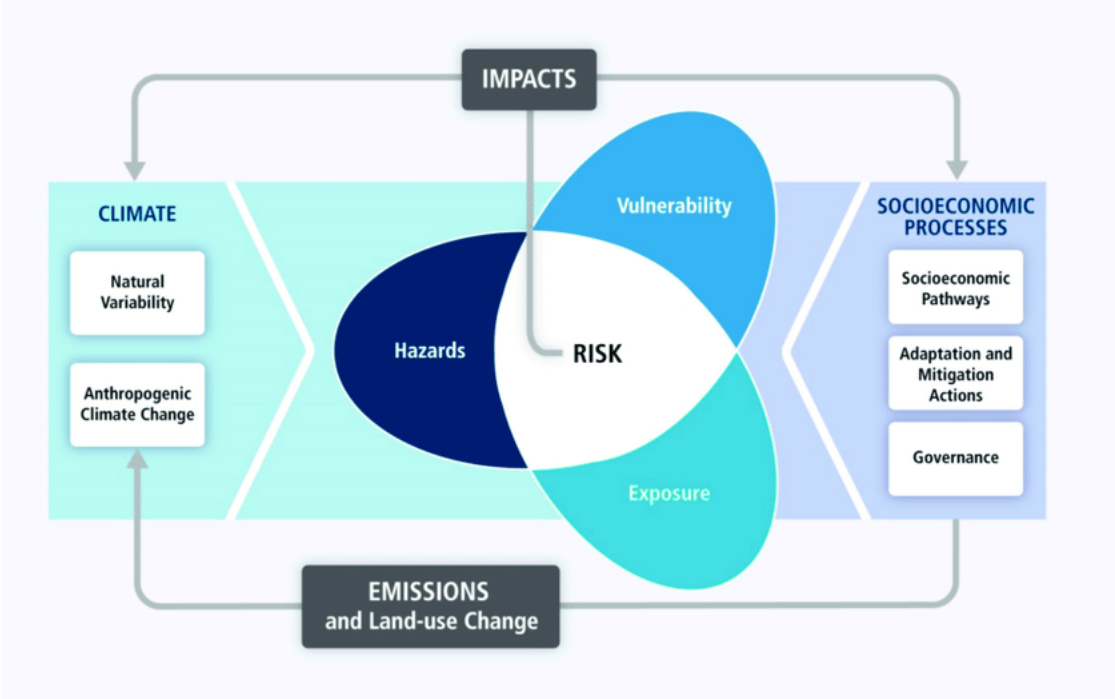


Figure 6.1: International Panel on Climate Change (IPCC) definition of risk.

The method enables a qualitative assessment for risk across specific criteria: exposure, sensitivity and adaptive capacity, discussed below. This allows for more focus on risk prioritisation, including consideration of interactions between differing risks, and any urgency of action that may be required to address specific risks.

6.1 Rating risk

Risk has been rated based on an assessment of exposure and vulnerability (relating to sensitivity and adaptive capacity). This is shown in Figure 6.2 below. Risks were assessed against agreed climate hazards for RCP8.5, for three time-horizons (current, 2050 and 2100). This ensured alignment to the NCCRA approach and subsequent report.

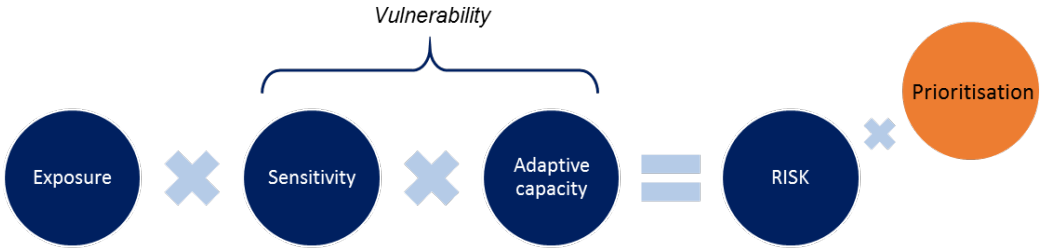


Figure 6.2: Risk equation based on exposure, sensitivity and adaptive capacity.

We recognise that some risks may not suit assessment and subsequent rating of exposure and vulnerability, such as those risks associated with governance matters. Rating human related risks has been undertaken following the above method where possible. Associated assumptions and limitations with both human and governance related risks are discussed below.

6.1.1 Human and Governance related risks

Applying a risk rating to human related risks is difficult due to the range of individual, organisational and universal values and perspectives. The effects resulting from climate change are on a scale. Even within a single event, not all people experiencing the event will necessarily be affected in the same way. For example, people in locations close to coastal areas will be more affected by sea level rise as this will impact their home (they may need to move or they may experience repeated flood or storm events). They may also have strong familial links to the area. By comparison, a person living 40 km inland is far less likely to be impacted by the loss of asset (house) and cultural connection (strong familial links). For them, the personal effect might be limited to access to coastal areas. This variability in lived experience makes quantification of exposure and vulnerability harder than risks within other domains. As seen in Vallance (2011), community involvement after a disaster is complicated by intensity, variety and scale of needs and by the range of those involved. Accounting for this complexity is difficult when looking into the future. It is made harder still by climate change increasing the volume of disasters that our communities are likely to face in future. This is a recognised limitation of projecting into the future, and one that is considered within human related risks.

Applying risk ratings to human risks in the Canterbury Region is challenging due to the diversity of values, complexity of our current society, geographic location, where people live, and the potential uneven distribution of impacts and hazards. Further, the ability to cope with and adapt to risk (adaptive capacity) is variable across individuals, groups, communities. However, broad trends can be teased out for individuals and communities, to provide some indication of the risks. The risks to those living in the Canterbury Region are a result of the settlement histories, demographic characteristics and spatial distribution of people and things of value in the landscape.

Exposure can be measured by a range of indicators, where availability of data is not necessarily sufficient to support a repeatable evaluation. Gaps have been identified in the body of research quantifying the health impacts of climate change for New Zealand, particularly relating to the interactions of climate change, demographic change and social change (RSNZ, 2017). Further consideration at a national scale would be beneficial to supporting qualitative evaluation of human risks at local and regional scales.

Similarly, for governance related risks, assessing risks by rating exposure and vulnerability is problematic. This is because of their nature of being indirect risks, that is, risks that are not directly impacted by physical changes in climate. As such, priority risks for governance that were identified

during the Screening Project (2020) have been refined and described through stakeholder engagement and the literature review (discussed in section 7 below). They remain unrated, but are acknowledged as priority risks.

6.2 Prioritising beyond risk rating

Rating risks provides an initial method of prioritisation, with those risks that are rated 'high' and 'extreme' being of higher priority than those rated 'insignificant' or 'low' for example. Risk prioritisation beyond this is required to best inform decision making. This prioritisation is based on value judgements, which will be different for differing individuals, organisations, and groupings. Following the assessment of risk, further work can be undertaken to understand urgency and consequence, two ways to capture value judgements around risk.

How risks interact can also be considered when looking at prioritisation, with risks that have more interactions being of higher potential priority than those with limited interactions. Following detailed analysis of the priority risks, we explored the interrelationship between risks during stakeholder engagement, in order to assist prioritisation as described above. Participants were asked to connect priority risks to each other in a dot-to-dot exercise, identifying where they saw connections between risks. Given that most risks have some level of connection, participants were asked to focus on those connections they felt were most prominent, or noteworthy (i.e. worth paying attention to, interesting, or significant). This activity was undertaken using the priority risks, which were within the five value domains of the NCCRA Framework.

Beyond this, five case studies were taken forward to consider interactions across differing risks. These case study topics are reference points used to develop and document interactions, and may not denote risks in their own right. The five case studies are:

- Electricity outages.
- Community flooding.
- Mahinga kai.
- Tourism.
- Heat-stress related illnesses.

To assess interacting risks, a qualitative approach was used that involved stakeholder consultation and literature review. In the interacting risks engagement workshop, an activity was undertaken using bow-tie analysis principles. Bow-tie analysis allows for visualisation and depiction of direct 'upstream' and 'downstream' risks, often referred to as 'causes' and 'effects' respectively.

Based on the outputs of this session (bow-tie diagrams), a literature review was undertaken to:

a Investigate non-climate related risks which can compound the upstream climate risks.

b Investigate the values and frameworks which these direct effects impact.

c Consider the complex flow-on and feedback effects of the cascading risks.

The results of this analysis are captured within section 20.

6.2.1 Opportunities

Opportunities that result from physical changes in the climate for the Canterbury Region have been documented and agreed. A narrative has been provided to understand the impact of each identified opportunity for the Region. However, these opportunities have been neither rated in a quantitative way, nor assessed.

7 Approach

As discussed in the method section, priority risks formed the starting point to this CCRA, albeit recognising that the first phase, the 2020 Canterbury Climate Change Risk Assessment Project, was undertaken by a subset of stakeholder groups for the Canterbury Region (i.e. predominantly local government). On this basis, our approach for the method and engagement included:

- **A literature review:** to provide a robust evidence base to understand risks in greater detail and to identify any gaps from the first phase screening process.
- **Subject Matter Expert Engagement:** to elicit information specific to a particular value (e.g. rerenga rauropi – biodiversity, wai – water, ngā waihanga – infrastructure services, etc). See Appendix B for a list of stakeholders.
- **Ngāi Tahu ngā rūnanga Engagement:** to elicit information specific to Te Ao Māori and Ngāi Tahu values.

7.1 Literature review

A literature review was undertaken to build on the first phase screening process and inform a detailed understanding of each risk. To account for the narrower scope of stakeholder engagement in the 2020 Canterbury Climate Change Risk Assessment Project, we undertook a high-level gap analysis during the literature review stage. This was further complemented by the engagement activities undertaken during the 2021 domain workshops.

As part of the literature review, we also aggregated risks, as this provides easier communication of risks during engagement and subsequent reporting. The risk aggregation has been aligned to the new integrated framework, identified above in Figure 4.1.

7.2 Engagement overview

Our engagement for the CCRA sought to be a reciprocal process, allowing for a mutually advantageous exchange of information. This is particularly important for climate change, as it is a complex and sometimes overwhelming topic for stakeholders. Such an engagement approach is intended to foster meaningful long-term relationships, and to engender support for future work in identifying and adapting to climate change risks.

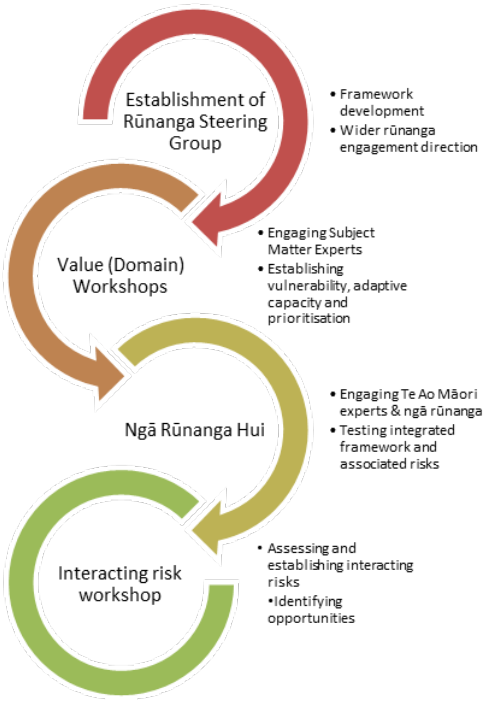
All engagement activities were underpinned by:

- Building awareness and understanding of the project amongst stakeholders so they would understand the final report and the process used to achieve it.
- Building an integrated approach for Te Ao Māori in understanding climate risk, and incorporating the values of Ngāi Tahu throughout.
- Providing a strong, broad, and representative evidence base to develop the CCRA report.
- Providing critical and informed input into the risk assessment, including risks, opportunities and gaps for further consideration.

7.2.1 Engagement method

Our engagement used a broad range of methods to achieve the project objectives and are aligned to stakeholder and partner needs. These are shown in the diagram to the right, detailed below, and include:

- Targeted subject matter workshops.
- Focus groups.
- Kānohi-ki-te-kānohi (face to face) hui.
- Insights questionnaires (surveys).
- Targeted phone calls for gap analysis.



7.2.2 Rūnanga Project Steering Group

Our focus for rūnanga engagement has been to enable co-design of Ngāi Tahu engagement alongside rūnanga representatives, in order to test and validate the framework and engagement prior to implementation.

Establishment of the Papatipu Rūnanga Project Steering Group (RPSG) has been critical to this engagement. A mandated representative from each papatipu rūnanga was sought to act as an overarching interface for the project. We recognised that due to a combination of capacity and interest restrictions, many rūnanga indicated a preference to maintain a “for information only” watching brief of the project by way of receiving minutes and information and updates from the RPSG as appropriate. However, regular hui of the RPSG were held to develop the framework, with consistent representation from three rūnanga.

7.2.3 Wider Rūnanga Engagement

A series of three hui across the Region was considered to provide for greater representation across ngā rūnanga as part of the project. However, through critical enquiry by the RPSG it was determined that a targeted focus group hui would achieve a greater level of participation, as well as providing depth into the kōrero for understanding climate risks within Te Ao Māori. This hui occurred on 30 April 2021.

7.2.4 Domain focused workshops

The domain focused workshops sought a broader group of attendees than those of the 2020 Screening, reaching out to subject matter experts beyond local government, to best capture views within the Canterbury Region. See Appendix B for a list of stakeholders included in this project. These were undertaken throughout March 2021. The focus of these workshops was on risk prioritisation, including consideration of interactions between differing risks, and urgency of action required.

The key objectives for the domain focus workshops included:

- Increasing knowledge and understanding of participants about each priority risk within the Canterbury Region.

- Providing ratings for the individual criteria of risk (where possible).
- Further identifying information that could assist with prioritisation.

7.2.5 Interacting risks workshop

The interacting risks (also known as “cascading” risks) workshop sought to enable a cross-domain (cross-values) approach to understand the interacting risks. Understanding these risks is important given their foundational nature, as, left unaddressed, this could lead to maladaptation and lock in. Inclusion of interacting risks has not been undertaken as part of a climate change risk assessment in New Zealand before, therefore the key objectives for this workshop included:

- Increasing the knowledge and understanding of interacting risks in the Canterbury Region.
- Gaining specific examples for inclusion in the final report as case studies.
- Further identify information around prioritisation.

8 Summary of Risks

The Canterbury Region faces a range of risks to all ngā pono (values) within te Ao Mārama (the safe place for humanity and the natural living world). These include direct physical risks from climate hazards to the natural and physical environment, such as those from climate hazards to many aspects within rauropi (biodiversity), wai (water), ngā waihanga (infrastructure services), hirihiri (energy), kāinga tūturu (historic heritage), and the natural resources that support ōhanga (prosperity). Climate change also poses direct risks to hauora (physical health), such as heat stress and injury from flooding.

From these direct risks, arise a range of indirect risks, as the physical impacts of climate change pose risks to the less tangible ngā pono of the Region. These include risks to hauora (wellbeing), and risks to ora rite (equity), hapori (sense of community), mātauranga (knowledge), and rangatiratanga (governance).

Across all ngā pono, risks from climate change are seen to increase with time. At the present day, the majority of risks are rated as insignificant or low, with 30% rated as moderate, 10% rated high, and 3% rated as extreme. These present-day highly rated risks (i.e. those rated as either 'high' or 'extreme') mainly include those to rauropi (biodiversity), wai (water), and ngā waihanga (infrastructure services). The present-day risks that are rated extreme include those relating to water supply and irrigation.

By late century, risks within all ngā pono are rated as extreme, with the vast majority of all identified risks rated either high or extreme.

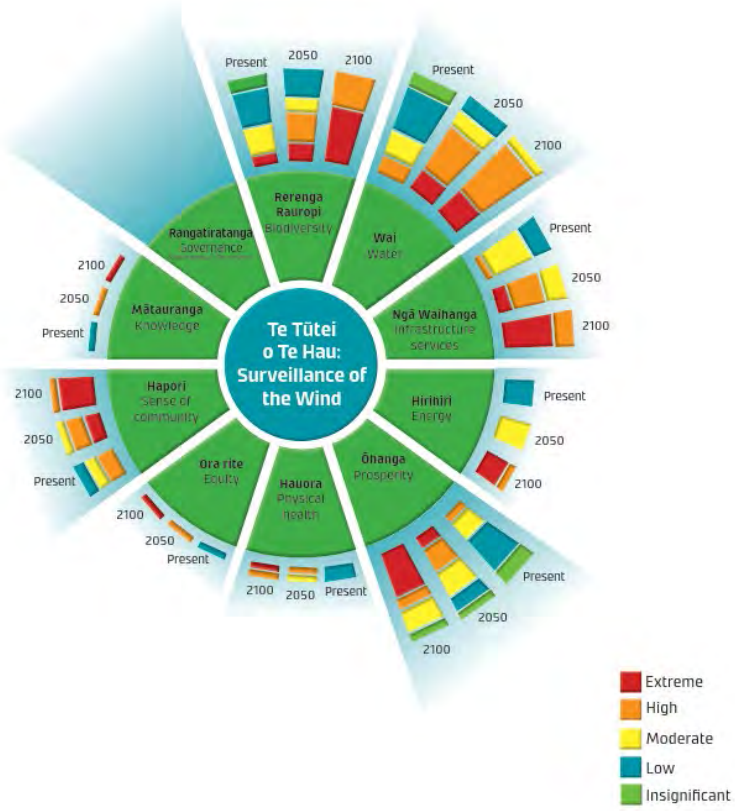


Figure 8.1: Summary of risk profiles for each of ngā pono (the values) across present, 2050 and 2100 timeframes, noting some risks are not rated, leading to blank values (e.g. rangatiratanga – governance, which, as an indirect risk is not directly impacted by physical changes in climate so cannot be rated using the same assessment of vulnerability, but nevertheless remains a priority risk).

The challenges that climate change introduces will occur in different ways across the Region. The large land area and high geographic diversity of Canterbury mean that some risks will be most relevant to certain areas. The environments of the Region can be broadly categorised into alpine/high country environments, montane/hill country, lowlands, coastal and marine habitats, freshwater systems and urban centres, as are summarised in Figure 8.2.

The alpine environment of Canterbury acts as an important water source to the Region's alpine rivers, supports unique biodiversity and generates tourism. Increased temperature, reduced snow and changing rainfall patterns pose some of the highest rated risks to these systems.

The Region's water sources play an important role in mātauranga Māori (Māori knowledge), as well as contributing to wider biodiversity and public amenity. They are also important sources of irrigation and stock water for agricultural activity, and support the water demands of towns and industry. Increased temperature and drought, as well as changing rainfall patterns, pose some of the highest rated risks to freshwater systems.

The montane/hill country and forested foothills support unique ecosystems and low-density farming and forestry. Increased temperature, fire weather, and changing rainfall patterns pose some of the highest rated risks to these systems.

The fertile lowlands of the plains are the agricultural powerhouse of the Region, supporting diverse farming activity and many farming communities. Increasing drought potential and related impacts on water availability and agriculture, as well as increased storms, winds, and flooding pose some of the highest rated risks to these systems.

The long coastline of the Region supports diverse ecosystems, including coastal wetlands and abundant marine species. Ports, transport connections, coastal ecosystems, unique wetlands, and communities along the coastal fringe, will all be exposed to increasing coastal flooding, salinity stress and erosion. Temperature and ocean chemistry changes will impact fisheries and marine ecosystems, resulting in changed behaviour patterns, such as migration routes and increased mortality, and changing the population of some species.

Ōtautahi/Christchurch, Canterbury's largest city, is a major social and economic hub for the Region. The low-lying coastal position of much of the city makes it very exposed to flooding and sea level rise, with widespread risks to its communities and infrastructure. Risks from climate hazards on all communities generally include damage to infrastructure from flooding, and reduced community cohesion from increasing climate related damages, disruption to transport routes and supply chains, impacts on physical and mental health and changing markets and job availability. Changing climate also poses risks to supporting utilities such as landfills, and power transmission.

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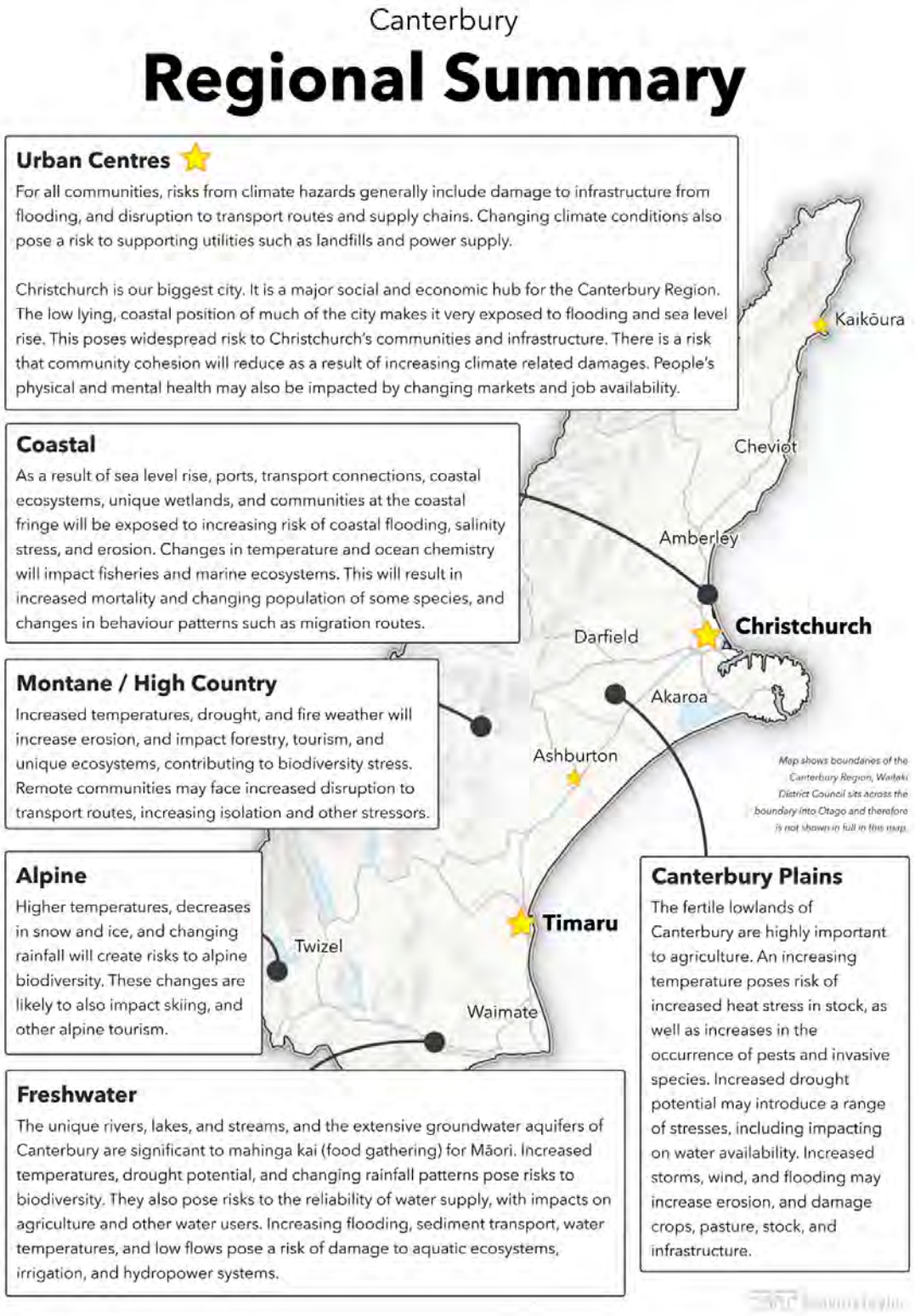

Figure 8.2: Regional summary of climate risks.

9 Rerenga Rauropi | Biodiversity

The biodiversity of Canterbury provides the life supporting systems that enable all organisms, including humans, to survive. It forms a fundamental part of the cultural identity and heritage of Ngāi Tahu, of subsequent settlers, and of the Canterbury community today.

The Region has many unique and precious ecosystems, from the majestic alpine slopes of the Main Divide to the vast and abundant Canterbury plains, as well as diverse and rugged coastal margins. Connecting all of these are the unique braided river systems – vital habitats and corridors that connect and nourish the land, ki Uta ki Tai (from the mountains to the sea). The biodiversity within these ecosystems includes taonga species, many of which are endemic to New Zealand and the Canterbury Region (Canterbury Biodiversity Strategy, 2008).

Protection of biodiversity values within Canterbury is the legal responsibility of the Department of Conservation, Environment Canterbury, and District Councils. Nationally 'Threatened' and 'At Risk' species within the Region are protected under the New Zealand Wildlife Act 1953. Many other organisations also work to protect local biodiversity, including the territorial authorities of the Region, iwi, and community and conservation groups.

Canterbury's ecosystems are part of large interconnected systems, playing a central role in supporting biodiversity. They are intrinsically linked to many other aspects of social and ecological systems. Rauropi (biodiversity) links to many other ngā pono (values). Its link to wai (water) is particularly strong, for example where wetlands purify water, regulate flood flows and drought. Indigenous forests purify the air, and provide spaces that can be both peaceful and exhilarating for recreation. Canterbury's fertile lands are fundamental to supporting the Region's ōhanga (prosperity) through agriculture, fisheries and corridors that connect and nourish the land.

These diverse ecosystems are fundamental to hapori (sense of community) and kāinga tūturu (historic heritage), including through gathering mahinga kai (food). As the traditional Māori concept of gathering food, mahinga kai is related to the concepts of caring for the land and ecosystems that support and sustain life.

9.1 Summary of risks

The biodiversity of Canterbury is threatened by a changing climate. Towards the late 21st century, native terrestrial biodiversity faces extreme risk due to drought, increased fire weather and reduced snow and ice. Projected temperature increases for Canterbury indicate average warming of 1.5-3.5°C by 2100 under RCP8.5. This is likely to be accompanied by an increased annual range, with maximum summer temperature increases projected up to 5°C warmer than present, and minimum increases in (winter) temperatures around 1-2.5°C. Changes in annual average rainfall across Canterbury are expected to vary only by a small margin of +/- 5% by 2100 under RCP8.5. However, seasonal rainfall is projected to have higher variability. By 2100 increases of 15-40% in winter rainfall are projected for many eastern, western and southern parts of Canterbury, while small decreases up to 10-15% in inland/western Canterbury and about Banks Peninsula are projected for summer. These projections indicate increasing seasonality of annual rainfall, potentially with winter rainfall more strongly associated with storm events.

As per Environment Canterbury (2008), unique ecosystems/biomes particular to Canterbury include:

- Extensive alpine tussock-lands/herb-fields.
- Limestone areas in north and south Canterbury.
- Large tracts of beech.

- Pockets of mixed podocarp and podocarp/hardwood forests in the montane/hill country.

Terrestrial native species are generally grouped into altitudinal zones in the Canterbury Region, spanning the alpine zones of the western mountains, the inland and montane hill-country, and the lowlands, which include the Canterbury Plains and coastal margins.

Indigenous vegetation over the majority of Eastern Canterbury is threatened. Already, as at 2021, less than 10% has been retained from the northern Canterbury Plains to around Waimate, and less than 30% on Banks Peninsula. Pockets of higher vegetation cover remain around the Waitaki River, Lakes Pukaki and Tekapo, around the Seaward Kaikōura Range, and in the montane/hill and alpine/high country west of the frontal/eastern ranges.

In ecosystems that consist of fragmented pockets of habitat (as is the case in much of Canterbury, shown in Figure 9.1) there is less stability in individual habitat pockets. This leads to compounding losses of biodiversity across the Region. Sensitivity of native terrestrial biodiversity is linked to population sizes for key support species (i.e. the predominant habitat vegetation species), and the size and continuity of habitats. Areas where native habitats are highly fragmented have a high degree of sensitivity to both slow changes in climate and to event-type disturbances. Small/fragmented habitats can only support small populations of different species. This means that even where the biodiversity in a given ecosystem area is currently high, if there are small population sizes of many species, they have a high sensitivity to change. The loss of a small number of individuals or reduced reproductivity within these populations can have a proportionally larger impact on their success and overall survival.

Rerenga rauropi (biodiversity) is also important from a rūnanga perspective, as mahinga kai has significant value to Ngāi Tahu. The ability to collect mahinga kai contributes to physical, spiritual, social, and economic well-being. It is important for mahinga kai to be managed and gathered as was done by Ngāi Tahu ancestors. Mahinga kai enables the values of mana and manaakitanga (respect and hospitality) to be demonstrated, empowering Ngāi Tahu to thrive (Environment Canterbury, 2021). Mahinga kai or mahika kai (alternate local dialect term for mahinga kai) areas can include species (such as manu – birds, kai moana – seafood, rākau – plants, etc), natural habitats, materials and practices for harvesting food, and places where food or resources are, or were, gathered (Environment Canterbury, 2017).

Risks to he kura taiao (living treasures) are identified for each of the Canterbury environments (alpine/high, montane/hill, lowland, wetlands, freshwater and coastal), as well as a separate discussion on the threat to biosecurity from pests and diseases. The highest rated risk in each of the ecosystem and environment types is listed in Table 9.1.

Table 9.1: Summary of highest rated risks to biodiversity

Using RCP8.5	Higher mean temperatures			Change in mean annual rainfall			Drought			River and surface flooding			Coastal flooding			Increased coastal erosion			Sea-level rise and salinity stresses			Storms and wind			Increased fire-weather			Increasing landslides and soil erosion			Extreme weather events			Reduced snow & ice			Ocean chemistry changes			Marine heatwaves			Climate change		
	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L
Terrestrial, freshwater, and marine ecosystems from pests and diseases		M	E	E	M	H	E																										L	H	E									
Natural coastal habitats (dunes, estuaries, rocky shores)																																												
Native marine biodiversity - flora & fauna																																											
Water quality in marine, estuary and harbour environments																																											
Native freshwater biodiversity - flora & fauna	I	M	E	I	L	H				L	L	H																																
Native terrestrial biodiversity - flora & fauna																																											
Coastal wetlands										M	E	E				M	H	E	L	H	E																						
Alpine / high country environments	L	M	H	I	L	H																											L	H	E									
Lowland and coastal environments													L	L	H				L	M	E				M	H	E																
Montane/hill country environments	I	L	H				L	L	H													H	E	E	H	E	E																

Key

I	Insignifcant	P	Present day
L	Low	M	Mid (2050)
M	Moderate	L	Long (2100)
H	High		
E	Extreme		

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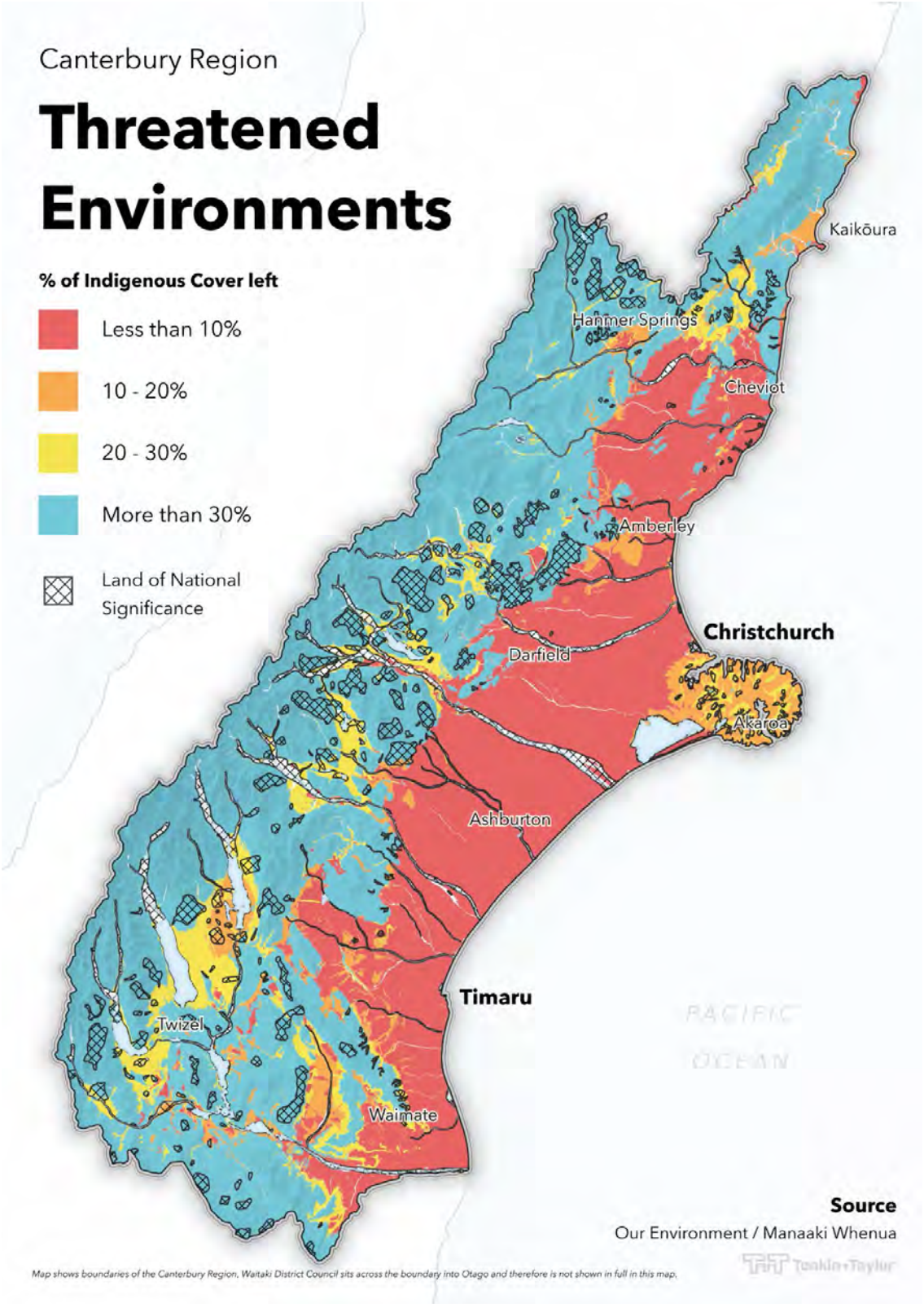

Figure 9.1: Threatened indigenous land cover and land of national significance in the Canterbury Region.

9.2 He Kura Taiao (living treasures) in alpine environments

The highest risks to flora and fauna in alpine environments from climate change include those from changes in snow and ice (both spatial and temporal extent), temperature rise, and changes in rainfall (Table 9.2). Reduced snow and ice combined with increased temperatures will reduce and fragment habitat suitable for alpine species. This, combined with increased competition from montane species, will lead to reduced alpine species population sizes and potential local extinction.

Table 9.2: Summary of risks to alpine environments

Risk statement	Risk				High level description
	Present	2050 (RCP8.5)	2100 (RCP4.5)	2100 (RCP8.5)	
Risk to alpine / high country environments due to reduced snow & ice	Low	High	Extreme	Extreme	Alpine and high country environments are projected to be exposed to reduced snow and ice as temperatures warm. Alpine ecosystems are likely to be adversely affected as alpine adapted flora and fauna change elevation tolerance, suffer from a reduction and loss of habitats and face increased competition from low-land species. Alpine adapted species often have a low capacity to adapt due to a limited range, geographic isolation and slow reproductive rates and dispersal mechanisms.
Risk to alpine / high country environments due to higher mean temperatures	Low	Moderate	High	High	Projected increases in mean temperature are likely to change the elevation tolerance of alpine species, cause reduction and loss of habitat, and cause increased competition from low-land species. Many alpine adapted species have a low capacity to adapt due to a limited range, geographic isolation and slow reproductive rates and dispersal mechanisms.
Risk to alpine / high country environments due to change in mean annual rainfall	Insignificant	Low	Moderate	High	Projected changes in rainfall patterns may cause increased dry periods and drought. This may lead to reduced water availability causing plant stress, leading to reduction or loss of alpine habitat and increased competition from species adapted to the lower altitudinal zones (e.g. montane), and possible changes of alpine ecosystems to montane ecosystems. Many alpine adapted species have a low capacity to adapt due to a limited range, geographic isolation and slow reproductive rates and dispersal mechanisms.

Alpine environments are located in western Canterbury in high-elevation areas above the treeline and below the permanent snow line along the Main Divide. The Seaward Kaikōura Ranges also support alpine environments outside of the Main Divide ranges. Most of these environments contain more than 30% native vegetation, and much of the land is included in public conservation land (Figure 9.1).

Alpine environments support ecosystems that comprise cold-adapted species characterised by tussock and herbfield species (Landcare Research, 2020). These areas support a wide range of highly specialised native plants including the native daisy (*Celmisia)*, speargrass *(Aciphylla)*, buttercup *(Ranunculus)*, and vegetable sheep *(*species of *Raoulia),* as well as native grasshoppers, lizard species

(up to at least 1800-1900 m), invertebrates, and birds (such as kea, pipits, and rock wren) that are only found in these parts of New Zealand (Department of Conservation, 2021).

Alpine ecosystems support high biodiversity due to the large number of specialist species adapted to these environments. There is an inherent limit on the available habitat areas for alpine species due to the unique geographical nature of the alpine environment. Alpine species are directly exposed to projected decreasing snow and ice resulting from increasing temperatures, which directly impact their primary ranges. Water availability and seasonality are also likely to change as a result of reduced snow and ice and increasing temperatures. Although NIWA project a reduction in annual snow days, there is also a projected increase in winter rainfall. The implications of this for permanent snow fields and snow melt-run-off are uncertain (Macara et al., 2020).

Additionally to warming temperatures shifting alpine habitats to ever higher elevations, the elevation tolerance of more competitive low-land species will shift upwards (Halloy & Mark, 2003). This will likewise force alpine species into smaller geographic areas and may result in a tendency for alpine species to become “islanded” (Triantis & Matthews, 2020), leading to a slow loss of biodiversity in these ecosystems.

Many alpine plant species have slow reproductive rates and dispersal mechanisms, which contribute to a low adaptive capacity. Range limitations and geographic isolation of individual alpine terrestrial communities also contribute to a low adaptive capacity for many alpine species. This means that isolated pockets of alpine species are vulnerable to mortality/loss. For example, the Canterbury knobbled weevil (Figure 8.2) was assumed extinct, but was rediscovered in 2004 and is now considered one of New Zealand’s rarest species. Such species are specifically adapted to alpine environments, with limited adaptive capacity ,and are extremely sensitive to habitat degradation from fires and rodent predation (Hayward, 2018).

Figure 9.2: Canterbury knobbled weevil (left) and its natural habitat speargrass, Aciphylla aurea (right) (Source: New Zealand Conservation Authority, 2021, Shaun Barnett/Black Robin Photography, Wilderness Magazine, 2014).

9.3 He Kura Taiao (living treasures) in montane/hill country ecosystems

Risks to terrestrial montane/hill country ecosystems environments from climate change include those from drought, increased fire weather, storms, wind and higher mean temperatures. Exposure of montane/hill country to fire, storms and wind is rated to rise to extreme by late century. These hazards will contribute to erosion, damage to the ecosystem and species loss. The adaptive capacity of montane/hill country species is rated low due to slow recovery rates.

Table 9.3: Summary of risks to montane/hill country environments

Risk statement	Risk				High level description
	Present	2050 (RCP8.5)	2100 (RCP4.5)	2100 (RCP8.5)	
Risk to montane/hill country environments due to increased fire-weather	High	Extreme	Extreme	Extreme	Projected increases in wind, temperatures, and number of dry and hot days may increase the likelihood of wildfire in montane/hill country environments. Montane ecosystems within hill country environments are highly prone to species and habitat loss during fires. Wildfires can cause widespread mortality from which there can be long recovery times.
Risk to montane/hill country environments due to storms and wind	High	Extreme	Extreme	Extreme	Projected increases in storms and wind may damage montane/hill country environments. The erodible soils within these environments are particularly sensitive when bare. Depletion of native vegetation associated with grazing, pests and other hazards contributes further to erosion. These factors are likely to cause degradation of montane/hill country ecosystems.
Risk to montane/hill country environments due to drought	Low	Low	High	High	The occurrence of drought in montane/hill country environments is projected to increase over time. Ecosystems within these environments are currently relatively tolerant of hot dry conditions, however drought may cause water shortages stressing ecosystems, and contributing to species mortality. The slow recovery of ecosystems may lead to increasing establishment of exotic species.
Risk to montane/hill country environments due to higher mean temperatures	Insignificant	Low	High	High	Temperatures are projected to increase in montane/hill country environments over time. Ecosystems within these environments are currently relatively tolerant of hot dry conditions, however the adaptive capacity of species may reduce once temperature tolerance thresholds are reached.

Montane/hill country ecosystems occur in the hill country east of the Main Divide, including the high elevation basins such as the Mackenzie, Fairlie and Castle Hill basins. The foothills around the Seaward Kaikōura ranges and the inland Clarence River basin are also considered in the Montane/hill country group. In Canterbury these ecosystems are dominated by tussock and exotic grasslands and shrublands, with more than 30% native vegetation remaining. Rare species with habitats in these ecosystems include the great spotted kiwi, geckos, and skinks.

Climate projections indicate increasing drought by 2100, with projections of up to 15 more dry days per year, 60-85 more hot days and increases in accumulated potential evapotranspiration deficit (PED) across most of inland Canterbury. These changing climatic conditions will increase the frequency and severity of year-on-year droughts throughout the Region (Macara et al., 2020).

Montane/hill country ecosystems are currently relatively tolerant of hot dry conditions and have moderate adaptive capacity to changes such as temperature increases (Jentsch & Beierkuhnlein, 2008). As temperatures and the frequency of hot days and drought conditions increase, ecosystem sensitivity may increase over time as plants and animals suffer prolonged stress from decreased rainfall (Innes & Kelly, 1992). This is likely to lead to a lowering of the survival of montane/hill country species over time, ultimately reducing biodiversity which may reduce the adaptive capacity of the ecosystem.

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Decreasing biodiversity (species loss) is likely to be observed following severe event scale disturbances such as fire and sustained/frequent/severe droughts. These types of events are expected to have a greater impact on ecosystems than gradual shifts in mean temperature and rainfall (Jentsch & Beierkuhnlein, 2008; Rogers et al., 2005). For event-type disturbances, native biodiversity can be considered to have a low adaptive capacity if sufficient individuals in the area affected by the event perish, and habitats are fragmented reducing the potential for seed distribution.

Native vegetation, particularly montane/hill-country ecosystems and some terrestrial plant species, typically have naturally slow self-recovery mechanisms following event type disturbances (Perry et al., 2014). In addition, some terrestrial animal species, such as some lizard and bird species, have naturally low reproductive output. Combined with small homing ranges and a reliance on the availability of specific and/or continuous habitat, this reduces their ability to recover from natural disturbances (Cree, 1994).

Without intervention by people, the populations of many native terrestrial species are likely to suffer from habitat loss and/or be displaced by exotic species during succession phases (e.g. native coloniser species are outcompeted by exotic coloniser species). This greatly prolongs – and in some cases even prohibits – the succession and recovery of native species, leading to potential species extinction.

There is likely to be an increase of effects resulting from increased exposure to seasonal extremes (wetter winters, severe storms, increased wind, and drier, hotter summers). For example, the Mackenzie Basin is a characteristic montane/hill-country ecosystem that is particularly susceptible to these extremes (Figure 9.3). Its sandy soil is susceptible to erosion, which is triggered by high wind and overland flow. This is most severe where bare soil is exposed, due to loss of vegetation associated with over grazing and damage from rabbits and other pest species (Basher and Webb, 1997).

Figure 9.3: The Mackenzie Country soils are prone to erosion, particularly when left bare due to fire or pest damage (Source – LINZ, 2021).

9.4 He Kura Taiao (living treasures) in lowland and coastal environments

Risks to lowland and coastal environments from climate change include those from sea level rise and salinity stress, fire weather, and flooding. Exposure of lowlands and coastal environments to fire and flooding is rated to rise to high by late century, and exposure to sea level rise is rated to rise to extreme. Coastal erosion may cause environments to become degraded or compressed if they cannot adjust and retreat inland in response to erosion. Flooding and fire will degrade habitats further, which may disrupt ecosystems.

Table 9.4: Summary of risks to lowland and coastal environments

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to lowland and coastal environments due to increased fire-weather	Moderate	High	Extreme	Extreme	Projected increases in wind, temperatures, and number of dry and hot days may increase the likelihood of wildfire. Lowland environments are sensitive to event type disturbances such as wildfire which may cause high rates of mortality and habitat destruction from which local ecosystems may not easily recover.
Risk to lowland and coastal environments due to sea-level rise and salinity stresses	Low	Moderate	High	Extreme	Projected sea level rise is likely to cause inundation, erosion and salinity stress. Sea level rise and erosion may compress or degrade coastal habitats, eventually leading to habitat or species loss. Coastal environments can adapt to sea level rise by shifting inland, however this is often limited by geographical constraints or existing land use.
Risk to lowland and coastal environments due to coastal flooding	Low	Low	High	High	Projected sea level rise is likely to contribute to increased coastal flooding which may cause erosion, salinization and degrade coastal habitats.

Lowland and coastal environments comprise the largest land area in Canterbury. They include the whole of the Canterbury Plains, Amuri Plains, Kaikōura, and Banks Peninsula, as well as the coastal margins along the east coast. These environments are typified by highly modified vegetation – less than 10% of native vegetation remains over most of this area. The lowland plains have the highest level of land-use intensification, and hence the lowest percentages of remaining indigenous vegetation. They consequently also have the lowest proportion of land in protected public conservation areas. Vegetation is dominated by exotic grassland or crops, with very small and fragmented pockets of native and exotic forests. There are very few connections between lowland refuges. Some larger forest remnants are present around hill margins such as Mt Peel and Mt Somers, the Mount Thomas forest, the Hundalees, and in the coastal hills to the south and north of Kaikōura.

Coastal environments will be exposed to a projected sea level rise of 0.8 m above the current level by the late century. The increasing mean sea level leads to large tides and greater inundation of coastal environments during storm events. It also creates higher salinity pressures on the coastal margin. Coastal margins naturally adapt to sea level rise and salinity stress by migration inland. There are generally physical barriers to this adaptation, in the form of geographic (e.g. sea cliffs) or man-made constraints (e.g. land development or coastal protection). In many cases, these prevent the inland migration of coastal dunes/marginal environments, causing these ecosystems to be

compressed and therefore degraded. Eventually, this may lead to the complete loss of the coastal margin environment in these areas, and the associated loss of these ecosystems.

As intertidal habitats are reduced, the populations of many species traditionally relied upon for mahinga kai are likely to decline. Examples of these species include the threatened and declining population of kanakana/piharau (lamprey) that occupies freshwater and coastal habitats (Figure 9.4), as well as the dune vegetation pingao (golden sand sedge), and tororaro (wiggy wig) (Environment Canterbury, 2021, NIWA, 2021; New Zealand Plant Conservation Network, 2021).

Sea level rise will also likely lead to the loss and/or reduction of foraging and breeding habitat for some endemic coastal marine populations in the Canterbury Region. Those likely to be impacted include, but are not limited to, the pohowera (banded dotterel, *Charadrius bicinctus*), tōrea pango (variable oyster catcher, *Haematopus unicolor*), hoiho (yellow-eyed penguin – *Megadyptes antipodes*) and New Zealand fur seal (*Arctocephalus forsteri*).

High rates of erosion and sea level inundation will adversely affect near-shore marine environments as habitats are lost, and breeding areas for sea birds and marine mammals such as seals disrupted. River mouths, estuaries, and lagoons will also be inundated or eroded and degraded. This will impact the species inhabiting them, some of which include the world's rarest bird species, such as the tītī (Hutton's shearwater, *Puffinus huttoni),* black stilt (*Himantopus novaezelandiae)* and kororā (white-flippered penguin, *Eudyptula minor albosignata)*.

The increasing risk of fire weather relates to the projected increases in temperature and numbers of hot days in eastern Canterbury, alongside decreasing summer rainfall, particularly about Banks Peninsula. Lowland environments typically display tolerance to slow/ongoing changes in climate, but have a low tolerance for event type disturbances. Fires and floods causing high loss of individuals from local ecosystems lead to destabilisation of local habitats and subsequent collapse of these areas, unless human measures are taken to encourage regrowth/re-population following the events.

Figure 9.4: Kanakana/Piharau (lamprey) is an important mahinga kai resource and prized delicacy. It is a threatened species within Canterbury that is found in coastal and freshwater habitats that may be threatened further by loss of coastal margins (NIWA, 2021) (Source - Environment Canterbury 2021).

9.5 He Kura Taiao (living treasures) in wetland environments

Risks to wetland environments from climate change include those from sea level rise and salinity stress, coastal erosion, and flooding (refer Table 9.5). Inland wetlands are also exposed to increasing temperature, changes in rainfall and event type disturbances associated with flooding and fires. However, the screening of risks identified that coastal wetlands were a priority, and they are therefore the focus of this assessment. Exposure of coastal wetlands to erosion, sea level rise and flooding is rated to rise to extreme by late century. These systems are sensitive to salinity and sedimentation which can lead to changing species, and habitat loss.

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Table 9.5: Summary of risks to coastal wetlands

Risk statement	Risk: Present	Risk: 2050 (RCP8.5)	Risk: 2100 (RCP4.5)	Risk: 2100 (RCP8.5)	High level description
Risk to coastal wetlands due to river and surface flooding	Moderate	Extreme	Extreme	Extreme	Projected increases in rainfall intensity is likely to increase the occurrence of flooding. This may cause sediment deposition within wetlands from upstream which can make wetlands shallower, smother habitats and carry additional nutrients or contaminants. Many wetland species are specifically adapted and may suffer from habitat degradation and loss.
Risk to coastal wetlands due to increasing coastal erosion	Moderate	High	Extreme	Extreme	Low-lying coastal wetlands are at risk from coastal erosion which may degrade habitats and cause sediment deposition.
Risk to coastal wetlands due to sea-level rise and salinity stresses	Low	High	High	Extreme	Sea level rise and coastal inundation are projected to increase, which will lead to increasing salinity stress to coastal wetlands. Species composition and biodiversity (species richness) is expected to change as a result of periodic or permanent salination of coastal wetlands. Mobile species (some plants and birds) can relocate however, many species of invertebrates, some species of plants, and fish species are specifically adapted to coastal wetland conditions and cannot tolerate large changes in salinity.

Wetlands comprise <10% of land area in Canterbury (Environment Canterbury staff personal communications, 2021). Consistent with other areas of New Zealand, they are drastically reduced relative to their extent pre-human settlement. A large number of current wetlands are found around inland lakes and post-glacial landscapes (e.g. in the Lake Coleridge area, and Upper Rangitata). Coastal wetlands make up a small proportion of current wetlands. In the Canterbury Region, these include those between Ōtautahi/Christchurch and Amberley, the Te Waihora/Lake Ellesmere wetlands, and minor marshes/wetlands south of Timaru and around Kaikōura.

Coastal wetlands naturally occur in the lowest coastal areas or in low-lying depressions. They are therefore particularly at risk to sea level rise and consequent salination. With projected late century increase in mean sea level of 0.8 m, coastal wetlands will be exposed to more frequent inundation from large tides and storm events and consequently flooding and erosion. Some wetlands may become more estuarine in nature as a result of sea level rise. Changes in wetland salinity have a large impact on the types of vegetation supported by coastal wetlands due to the tolerance of wetland species for these conditions. Species composition and biodiversity (species richness) is expected to change as a result of periodic or permanent salination of coastal wetlands.

Increased sedimentation in coastal wetlands is expected from coastal erosion, coastal flooding and surface water flooding. Sediment can smother habitats and carry additional nutrients or contaminants from nearby areas (depending on land uses). This not only has the potential to reduce the area of wetlands, but can also compound the effects of drought and increasing temperature if wetlands become shallower. Changing groundwater properties may also compound or alter the response of wetlands, as drought and reduced rainfall lower freshwater recharge, while sea level rise raises coastal groundwater levels and further contributes to salinisation (Department of Conservation, 2013).

Some types of wetland species (some plants and birds) are mobile and have a high tolerance to local changes in salinity and sedimentation. However, many species adapted to coastal wetland conditions are not mobile and cannot tolerate large changes in salinity or sediment volumes, these include invertebrates, some species of plants (e.g. the New Zealand mouse tail) and fish species such as the Canterbury kowaro (mudfish) (NZFOA, 2021). These species are likely to rapidly decline in coastal wetlands affected by these projected changes. Additionally, many species that are specifically adapted to wetlands, such as the Australasian Bittern (Figure 9.5), are rare and threatened and therefore have very little adaptive capacity (Environment Canterbury, 2021).

Figure 9.5: Australasian bittern (Environment Canterbury, 2021).

9.6 He Kura Taiao (living treasures) in native freshwater biodiversity

Risks to native freshwater biodiversity from climate change include those from higher mean temperatures, changes in mean annual rainfall, and fluvial and surface water flooding (refer Table 9.6). Freshwater ecosystems are rated to be highly exposed to raised temperatures, and changes in rainfall may result in both increased flooding and extended periods of low or no flow. While some species are highly adaptive, many others are specifically adapted to their environments, and have a low tolerance for change. Some aquatic species are sensitive to temperature increases, changes in water quality, and habitat loss associated with low flows.

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Table 9.6: Risk to native freshwater biodiversity - flora & fauna

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to native freshwater biodiversity - flora & fauna due to higher mean temperatures	Insignificant	Moderate	Extreme	Extreme	Projected increases in temperatures are likely to raise the temperature of waterbodies, particularly shallower lakes and rivers and streams that are not fed by snowmelt. Many native species are sensitive to temperature increases and are adapted to a narrow range of water temperatures, while others are highly adaptive. Warmer temperatures can further alter water quality by contributing to algal blooms.
Risk to native freshwater biodiversity - flora & fauna due to fluvial and pluvial flooding	Low	Low	Moderate	High	Projected increases in high flows and extreme events may cause increasing disruption to river systems. High flows may cause erosion, sedimentation and damage from storm debris which can degrade habitats.
Risk to native freshwater biodiversity - flora & fauna due to change in mean annual rainfall	Insignificant	Low	Moderate	High	Projected increases in seasonal extremes are likely to stress freshwater ecosystems. Increased frequency of low flows can cause stress due to includes reduced flushing flows and can lead to the formation of stagnant pools and shallower waters which are more prone to temperature increases, which are harmful to aquatic ecosystems. The effect of reduced summertime rainfall in some river systems will be buffered by snowmelt.

Freshwater environments in Canterbury are characterised by large, braided rivers, alpine lakes and numerous hill-fed and lowland or spring-fed streams and rivers. Canterbury has the highest number of braided rivers in New Zealand, with 88 % of flow within the Region sourced from seven main alpine rivers (Clarence, Waiau, Hurunui, Waimakariri, Rakaia, Rangitata and Waitaki Rivers). Braided rivers are important biodiversity hotspots, providing habitat for many threatened or regionally endemic bird, fish, plant and invertebrate species (Environment Canterbury, 2011), some of which are important mahinga kai. The Region also holds more than 400 lakes throughout the coastal, lowland, and high-country environment. These lakes are a mixture of glacial, riverine, reservoirs and lagoons. Of note is Te Waihora (Lake Ellesmere), New Zealand's fifth largest lake and a unique coastal wetland/brackish lake environment (LAWA, 2021). Smaller streams and rivers throughout the Region provide important spawning habitat for species, including whitebait species (e.g. īnanga (*Galaxias maculatus*) at the tidal wedge river mouth etc).

Increasing temperatures mean that Canterbury's rivers and lakes will be exposed to wider temperature variations. High temperatures will be more common, and will particularly affect those rivers and lakes with low vegetation shading. Many of Canterbury's large alpine fed lakes will have a strong buffering capacity to moderate temperature increases due to their large volume and inflow, which is primarily sourced from snowmelt. Reduced rainfall and associated low lake volumes are likely to reduce this buffering. However, the effect of changing snow melt patterns is uncertain, as the lakes are typically fed by snowmelt during summer months (Kerr, 2013).

Many native aquatic species and their life history (e.g., spawning, migration periods) are particularly sensitive to changes in water temperature and have adaptations for a narrow range of water

temperatures and flow regimes. Example species include, but are not limited to, the kāmana (Southern crested grebe) (Figure 9.6), Canterbury kowaro (mudfish), Southern kōura (*Paranephrops zealandicus*) and some non-migratory galaxiids such as Lowland longjaw galaxias, Canterbury galaxias, and alpine galaxias, as well as some migratory galaxiids such as īnanga (*Galaxias maculatus*) (NZFOA, 2021).

Changes in water temperature can also alter water quality by contributing to algal blooms, which act as a contaminant. These can in turn impact aquatic ecosystems (Young, et al., 2013).

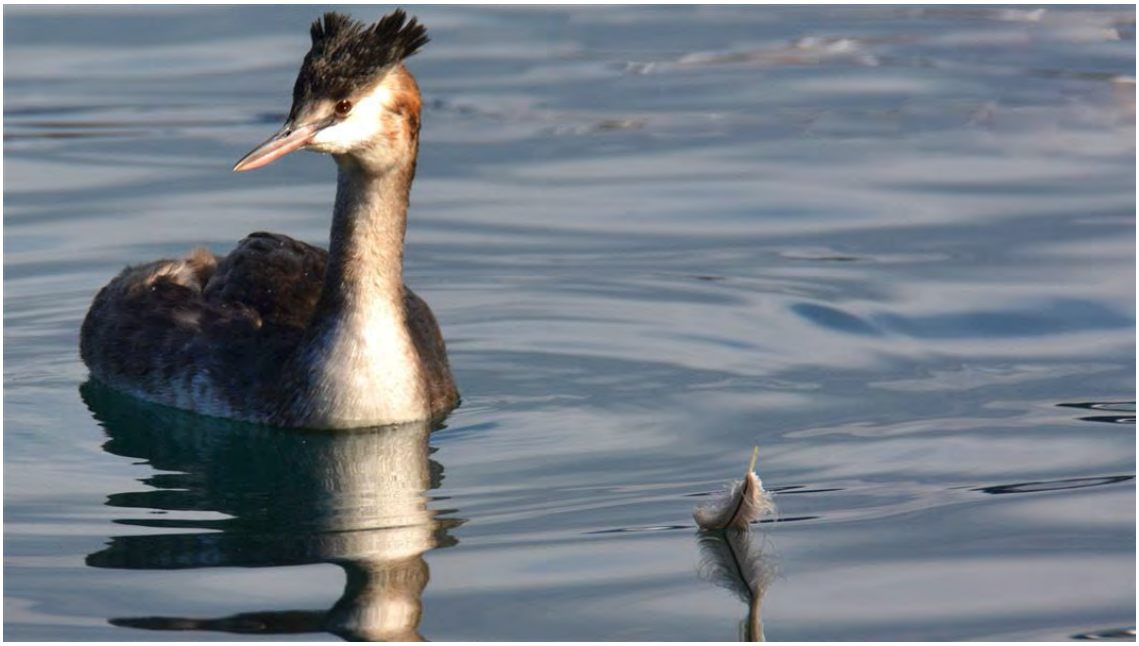

Figure 9.6: The kāmana (Southern crested grebe). The southern crested grebe is only found in New Zealand and Australia. Most breeding occurs in Canterbury and Otago, with breeding numbers observed to be increasing on the Canterbury Coast. Grebes thrive in rushes, sedges and reeds within wetlands and surrounding lakes. Their habitats are threatened and are sensitive to further degradation.

The projected increase in rainfall seasonality and storm-related flow changes in Canterbury rivers will increase the exposure of freshwater ecosystems to both high and low flows (floods and droughts).

Increased frequency of low flows can cause stress due to reduced flushing flows. They can lead to the formation of stagnant pools and shallower waters which are more prone to temperature increases, which are harmful to aquatic ecosystems (Jowett and Richardson, 1989). Summer flows in many of Canterbury's major braided rivers may be buffered by snow melt. However, the shorter Rakahuri (Ashley), Waikirikiri (Selwyn) and Hakatere (Ashburton) rivers originate in the montane/hill country, and are projected to experienced reduced summer flows (Department of Conservation, 2013).

High flows can be damaging to river systems as they disrupt habitats and can carry debris which both clog and restructure habitats. Ecosystems must then recover and re-establish. An increase in intense rainfall events will increase erosion rates, as well as the rate of sedimentation into rivers and lakes. This will lead to an accumulation of nutrients which may contribute to eutrophication, or contribute to water bodies becoming shallower and ephemeral. It may also increase habitat disturbance, meaning that repopulation and recolonisation must occur over a shorter timescale. If this repopulation cannot occur species will be lost from the area (Kelly, 2010).

A loss of source populations due to increased mortality from temperature stress, habitat degradation and storm damage will also hamper recolonisation. This would affect the Canterbury mudfish, for example, which is the most threatened species of the five mudfish species found in New Zealand (Figure 9.7). It is found in a limited number of waterways, primarily between the Rakahuri (Ashley) River (in the north) and the Waitaki River (in the South). The Canterbury mudfish is also threatened by other factors, including habitat loss from bank erosion and drying out of pools (NZFOA, 2021).

Some freshwater species may have a moderate level of adaptability to changes in water temperatures and flow regimes depending on the degree of connection between suitable river reaches and lake habitats. For example, the tuna/hao (shortfin eel) is relatively tolerant to changing temperatures and can thrive in a range of environments (NIWA, 2021). Other species are already at the limits of their suitable ranges. These will have low tolerance to further changes in these climate related parameters. Examples include the threatened kēwai/waikōura (freshwater crayfish) and kākahi (freshwater mussel) (Environment Canterbury, 2021). Diadromous species occupy different habitats during different stages of their lifecycle and may be affected more strongly by the projected climate changes as habitats are altered during each stage of their life-cycle. Lifespan may also affect the adaptive capacity of species. Īnanga (*Galaxias maculatus*) generally only live for two years, so may have increased adaptive capacity, as it will take multiple generations to see effects from climate change. By contrast, eels can live for decades, and may be significantly affected during a single life-cycle (Ofori et al., 2016).

Figure 9.7: The kōwaro (Canterbury mudfish) is threatened, with a nationally critical status (Source- Department of Conservation, 2018).

9.7 He Kura Taiao (living treasures) in aquatic coastal and marine ecosystems

Risks to aquatic coastal and marine ecosystems from climate change include those from increased temperature and ocean chemistry changes. Exposure of aquatic marine ecosystems to ocean chemistry changes and temperature increases is rated to increase to high by late century. Aquatic species are highly sensitive to these changes, and species mortality and reduced condition is likely. The adaptive capacity of species is low, although migratory species may relocate to cooler waters.

Table 9.7: Risk to aquatic coastal and marine ecosystems

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to native marine biodiversity - flora & fauna due to marine heatwaves	Low	Low	High	High	Sea temperatures and marine heatwaves are projected to increase with climate change as sub-tropical currents penetrate further south. Marine species are sensitive to temperature changes which can cause physiological and behaviour changes, such as reduced phytoplankton abundance and alterations to species migration routes in fish, immobile species are likely to be particularly sensitive. Mobile species may adapt through migration to new habitats which may also see new species entering Canterbury's cooler waters.
Risk to native marine biodiversity - flora & fauna due to ocean chemistry changes	Low	Low	Moderate	High	Ocean acidification is occurring as oceans absorb excess CO2 from the atmosphere. These changes to ocean chemistry are projected to increase as atmospheric greenhouse gas concentrations rise. Ocean acidification may result in reduced availability of calcium carbonate, which impacts on the life cycle of calcifying organisms such as molluscs and echinoderms. Wider ecosystem disruption may result in increased mortality and population decline.

Sea temperatures are increasing (Sutton et al., 2019) and the frequency of marine heatwaves is increasing, resulting in instances of extremely high sea surface temperatures lasting for days to months (Ministry for the Environment & Statistics New Zealand, 2016). As global marine temperatures increase, the Canterbury marine environment is likely to experience increasing ocean temperatures through seasonal shifting of ocean currents (Boyd & Law, 2011). Over the next century sub-tropical currents will penetrate further south than the present bringing warmer ocean water along the Canterbury coast (Law et al., 2018). Marine species are generally very sensitive to temperature changes bringing about both physiological and behaviour changes, such as reduced phytoplankton abundance and alterations to species migration routes in fish (Ministry for the Environment & Statistics New Zealand, 2016; Dunn, et al., 2009).

Marine heatwaves are defined as warm water anomalies occurring for up to months in duration, that are thousands of kilometres in size (Hobday et al., 2018). They are becoming increasingly common and can impact the life history and overall health of immobile marine species (such as kelps – macroalgae and coralline algae, sponges, sea squirts and bivalves) (Boyd & Law, 2011). This could lead to a reduced abundance of such species within Canterbury waters. For example, macroalgae, which are primary producers and habitat formers in coastal ecosystems in Canterbury and throughout New Zealand, may be more vulnerable to increases in temperature. Recent research in Canterbury observed elimination of the bull kelp species *Durvillaea* during heatwaves in 2017/2018 in one bay in Lyttelton Harbour, with replacement by the invasive kelp *Undaria Pinnatifida* (Thomsen et al., 2019).

Ocean acidification is occurring as oceans absorb excess CO_2 from the atmosphere. This is expected to continue until atmospheric GHG concentrations stabilize (Ministry for the Environment & Statistics New Zealand, 2016). As the absorption happens, carbonic acid forms, contributing to a

lower pH in oceans and a decreased availability of calcium carbonate. This fundamental shift in ocean chemistry may influence a variety of biotic, as well as abiotic, processes (Law et al., 2018). Reduced calcium carbonate is particularly detrimental for the early life history stages of calcifying organisms such as molluscs and echinoderms, calcifying algae/coralline algae (Tait et al., 2014), as well as coral species (not present within Canterbury). Species present within these groups are predicted to decline in response to these disrupted biotic processes (Hepburn et al., 2011) with flow on food web (Law et al., 2017) and economic (aquaculture) effects. For some non-calcifying phytoplankton and macroalgae, ocean acidification may provide benefits in the form of increased CO_2 for photosynthesis. However, for most marine species the resultant change in their acid-base balance will impact survival (mortality, reproduction, fitness), and condition (growth, biomass, fecundity). This has potential ramifications for foodwebs, ecosystem stability, services, and economic value (Doney et al. 2009) (refer to Section 13.4).

Marine foraging and breeding habitats and near-shore marine environments are also likely to be adversely affected or altered by the conjunction of changes in pH levels and sea temperatures with predicted increased rates of erosion and sea level rise from climate change.

The adaptive capacity for the marine and coastal environment is primarily dependent on the availability and utilisation of new habitats (Doney et al., 2012). As erosion and sea level rise occur and existing habitats are damaged or destroyed, other parts of the coast or river mouths are likely to become more favourable. For some species, south-wards range shifts are expected to occur as a result of climate change (Lundquist et al., 2011) as relatively high levels of coastal phytoplankton are observed in the inshore marine environment of Canterbury (Ministry for the Environment & Statistics New Zealand, 2019) and poleward shifts of flora and fauna species are observed internationally (Poloczanska et al., 2013). However, the availability of new habitat may not match the rate at which existing habitats are damaged, for example, there is a projected decline in coastal kelp forests and reduced intertidal zones. This would lead to a reduction in adaptive capacity over time for many species (Lundquist et al., 2011). This is likely to most strongly impact those species with long lives and slow reproductive rates (e.g., many of the most iconic native marine and coastal species such as pākirikiri (blue cod), moki (blue moki, *Latridopsis ciliaris*), tarakihi and hāpuku (groper)).

9.8 Biosecurity - safety from pests and diseases

Risks to terrestrial, freshwater, and marine ecosystems include those from increased pests and diseases resulting from a change in mean annual rainfall, increased temperature, and reduced snow and ice. As these prevail, the range and occurrence of pest species is likely to increase. Many exotic plant species have higher temperature tolerances than natives, and therefore may out-compete them where changed habitat conditions occur.

Table 9.8: Risk to terrestrial, freshwater, and marine ecosystems from pests and diseases

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to terrestrial, freshwater, and marine ecosystems from pests and diseases due to higher mean temperatures	Moderate	Extreme	Extreme	Extreme	Risks to biosecurity are likely to increase in response to projected rising temperatures. This may result in an increased range of invasive species, particularly where exotic species have higher temperature tolerance relative to indigenous species. Native species are often specifically adapted to the environment and climate, and may be out-competed by versatile invasives.
Risk to terrestrial, freshwater, and marine ecosystems from pests and diseases due to change in mean annual rainfall	Moderate	High	High	Extreme	Risks to biosecurity are likely increase in response to projected changes in rainfall. Increasing peak flows in rivers may disturb habitats resulting in opportunities for exotic species to establish. Reduced rainfall or drought may further contribute to habitat loss and provide conditions for drought tolerant exotic species. Native species are often specifically adapted to the environment and climate, and may be out-competed by versatile invasives.
Risk to terrestrial, freshwater, and marine ecosystems from pests and diseases due to reduced snow & ice	Low	High	High	Extreme	Risks to biosecurity are likely to increase in response to projected decreasing snow and ice. Reducing occurrence of frosts mean that frost sensitive invasive species may have an increased survival rate.

Due to its geographical isolation, New Zealand's unique biota and ecosystems are particularly vulnerable to the impact of non-indigenous pest species and diseases. The introduction of non-indigenous pest species and diseases has occurred only over the last ~300 years, through human activity. This has been either through intentional release (e.g. trout and possums) or accidental introduction (e.g. ship rats, mice, and numerous marine species). This has already resulted in the decline or displacement of many native plant and animal species.

The success of introduced species is largely attributed to their 'invasive' traits. These include their ability to tolerate varying abiotic conditions, high fecundity, multiple reproductive strategies, rapid growth potential, long-distance natural dispersal potential, wide environmental tolerances, and a tendency to be habitat generalists; they are often also opportunistic feeders. The absence of predators in their new regions also contributes to their success. As a result, many invasive species are better equipped than native species to survive in changing environmental conditions. Introduced species will often out-compete native species in stressed environments, and are likely to more rapidly occupy habitat left vacant by the mortality of native species. This threat has in part been reduced by conservation efforts to control pest populations in some areas of Canterbury (Department of Conservation, 2016).

There are over 100 native terrestrial and aquatic species (flora and fauna) categorised as "threatened" or "at risk" in the Canterbury Region (NZFOA, 2021). While loss of habitat due to human land-use changes is a major cause for the decline of many native species, competition and predation from pest plant and animal species is another important factor. The projected changes in temperature, drought, rainfall, and snow and ice extent across the Canterbury Region (discussed in

Section 9.2 above) are expected to increase the exposure of terrestrial, freshwater and marine ecosystems to pest plants and species.

The tolerance of native species to both predation by and competition from invasive pest species is low. New Zealand native species are generally highly specialised, whereas pest species are typically more generalist. Further, the predation mechanisms of invasive mammals (e.g. scent hunters) are outside the biological adaptations to predation evolved by most native species, as the traditional predators were birds or other invertebrates (which do not hunt using scent). Likewise, mammal browsers were absent from terrestrial ecosystems until the last ~150 years, therefore native plant species (particularly young seedlings) have few defence mechanisms for these.

9.8.1 Terrestrial

Increasing temperatures will allow range expansion of many pest plant and animal species, such as wilding pines, into higher elevation areas with reduced snow and ice. Pests and diseases such as myrtle rust, which are presently limited to the North Island/northern South Island, are likewise projected to migrate their ranges further southward. Pest and weed species most likely to have greatest impact in Canterbury include increasing populations of established species such as rabbits moving into higher altitude regions as temperatures rise (Figure 9.8), as well as lowland and woodland species such as possums, mustelids, rats, goats, deer, tahr, chamois, pigs and wasp. These may all outcompete native species, and damage flora and habitats. Existing pest plants, including banana passionfruit, bell heather, boneseed, wilding conifers, Mexican daisy, grey willow, broom and gorse, are likely to continue to outcompete and smother native plants (Environment Canterbury et al., 2008). Frost sensitive species, such as Argentine ants and the passionfruit vine, may also become better established as frost days reduce (Ministry of Agriculture and Fisheries, 2010). Warmer temperatures can also support higher pest populations and influence complex biological systems such as the mast[3] response (McGlone & Walker, 2011) thus creating more pressure on native species.

9.8.2 Freshwater

Many types of invasive algae, invertebrates, and freshwater plants thrive in warmer water temperatures. When combined with the high sensitivity of many native species to warm temperatures, water stagnation during low flows and disturbed habitats during high flows, invasive species are likely to out-compete native species in freshwater environments. Weed invasion of riverbeds, animal pests predating on native fauna and invasive exotic species such as didymo (*Didymosphenia geminata*, or rock snot) are likely to continue to threaten native freshwater ecosystems (Environment Canterbury et al., 2008).

9.8.3 Marine

Regional port marine pest surveys for Canterbury are undertaken by Environment Canterbury (Palmer, 2021). An annual survey of Lyttelton Harbour is done as part of the Ministry for Primary Industries (MPI) Marine High Risk Site Surveillance programme (since 2002) (Woods et al., 2019). Across these areas, non-indigenous bivalve, sea squirt, crustacea, nudibranch and macroalgae species have been detected and reported. Many of these are range extensions from other New Zealand locations (Woods et al., 2019), but some are newly discovered invaders (Inglis et al., 2006). Surveys of Canterbury ports and harbours has identified Mediterranean fanworm (*Sabella spallanzanii*), the clubbed tunicate (*Styela Clava)* (Figure 9.8), and wakame Asian kelp (*Undaria Pinnatifida*) (Palmer, 2021; Woods et al., 2019). These are among invasive species listed on the MPI

[3] A mast response describes the tendency for trees across large areas to synchronously flower, causing abundant fruits and seeds. This increase in food availability can support increased breeding and population surges of native and non-native species.

unwanted marine organisms list. Being highly fecund, these invasive species can reach high densities in a short timeframe, resulting in an ability to outcompete or displace other species. They can also decrease the productivity of cultured species, and increase aquaculture processing and harvesting costs. As changes within the marine environment due to climate change take place, it is predicted that these and many other marine pests will be able to tolerate and, in some cases, thrive under new environmental conditions compared to their native predecessors. This leads to higher competitive strength within introduced marine pests, and potentially a depleted availability of resources and space for their native counterparts. For example, a study from Tauranga Harbour comparing the salinity and temperature tolerance of wakame Asian kelp (*Undaria Pinnatifida*) to two native kelp species (*Lessonia variegata*, *Ecklonia radiata*) showed that the introduced species had a broader tolerance to the experimental salinity and temperature conditions than the native species (Bollen et al., 2016).

Figure 9.8: Invasive species of Canterbury include the clubbed tunicate (Styela clava) – a type of invasive sea squirt (left, source – MPI, 2013), and rabbits (right).

10 Wai | Water

Wai (water) is important to communities for spiritual and cultural wellbeing, biodiversity and supporting human systems and industry. Water nurtures the growth of Canterbury's native fauna and flora, and gives life to the diverse agricultural activity of the Region. The Region's lakes and rivers are home to unique birds and aquatic life, they support recreation and are fundamental to the spectacular visual landscape of the Region. Wai holds cultural significance to Ngāi Tahu, where the mountains are connected through rivers, lakes, streams and springs, to the coast, and thereby the oceans, seas, and all things. The rivers of Canterbury act as corridors for the sediment and life within to migrate. Within te Ao Māori, each river and mountain is a living being, which has its own mana, where the small and the large streams that flow into one another are part of the whole. Upholding te mana o te wai (the health and wellbeing of water) is an important priority not only for Māori, but for the wider community. It is a fundamental concept of the National Policy Statement for Freshwater Management 2020 (New Zealand Government, 2020). Within this concept, the first obligation is to protect the health of water and its mauri, then to provide for essential human health needs such as drinking water, and finally to support other consumption, provided it does not affect the mauri of water.

Wai (water) is interconnected with many other aspects of the natural and physical world of Canterbury. Water is an integral part of the rerenga rauropi (biodiversity of the Region), as the life giver to all natural systems, and as habitat to the array of freshwater and marine aquatic species. The irrigation networks and other water supply systems are crucial elements in the ōhanga (prosperity of agriculture), and the supply of clean water supports the hauora (health and wellbeing) of Canterbury.

10.1 Water in Canterbury

The three main types of river within Canterbury are the alpine fed rivers, rain-fed foothill rivers, and spring-fed lowland streams. The alpine rivers have upper reaches in the Ka Tiritiri o te Moana (Southern Alps), which are snow-fed and alpine rain-fed, so have early summer peak flows. The rain-fed foothill rivers have winter peak flows. Finally, lowland streams are spring-fed from groundwater and therefore have depressed seasonal responses. The seven alpine rivers (Figure 10.2) contribute 88% of the flow from Canterbury's rivers, and are much greater in volume than its foothill rivers and lowland streams.

Canterbury also has an extensive groundwater system, with aquifer depths ranging from shallow surface level to over 300 metres (Figure 10.1). These aquifers are recharged from rainfall infiltration with contributions from the alpine and foothill rivers and from other surface water. They eventually discharge into surface water such as lowland springs, wetlands, streams, lakes or directly into the sea.

Canterbury has the country's largest amount of water-related infrastructure assets by asset value. This represents 30% of New Zealand's total water related asset value, which is double that of the next highest Region. Assets include flood control structures, pump stations, erosion protection structures, river structures and dams. New Zealand's flood protection was in the most part built between the 1930's and 1980's, and includes stopbanks, pump stations and river control works. The land that benefits from these systems has been fully utilised across much of New Zealand. Canterbury is no different, using areas of benefit for primary production or urban development (Giberson, 2019).

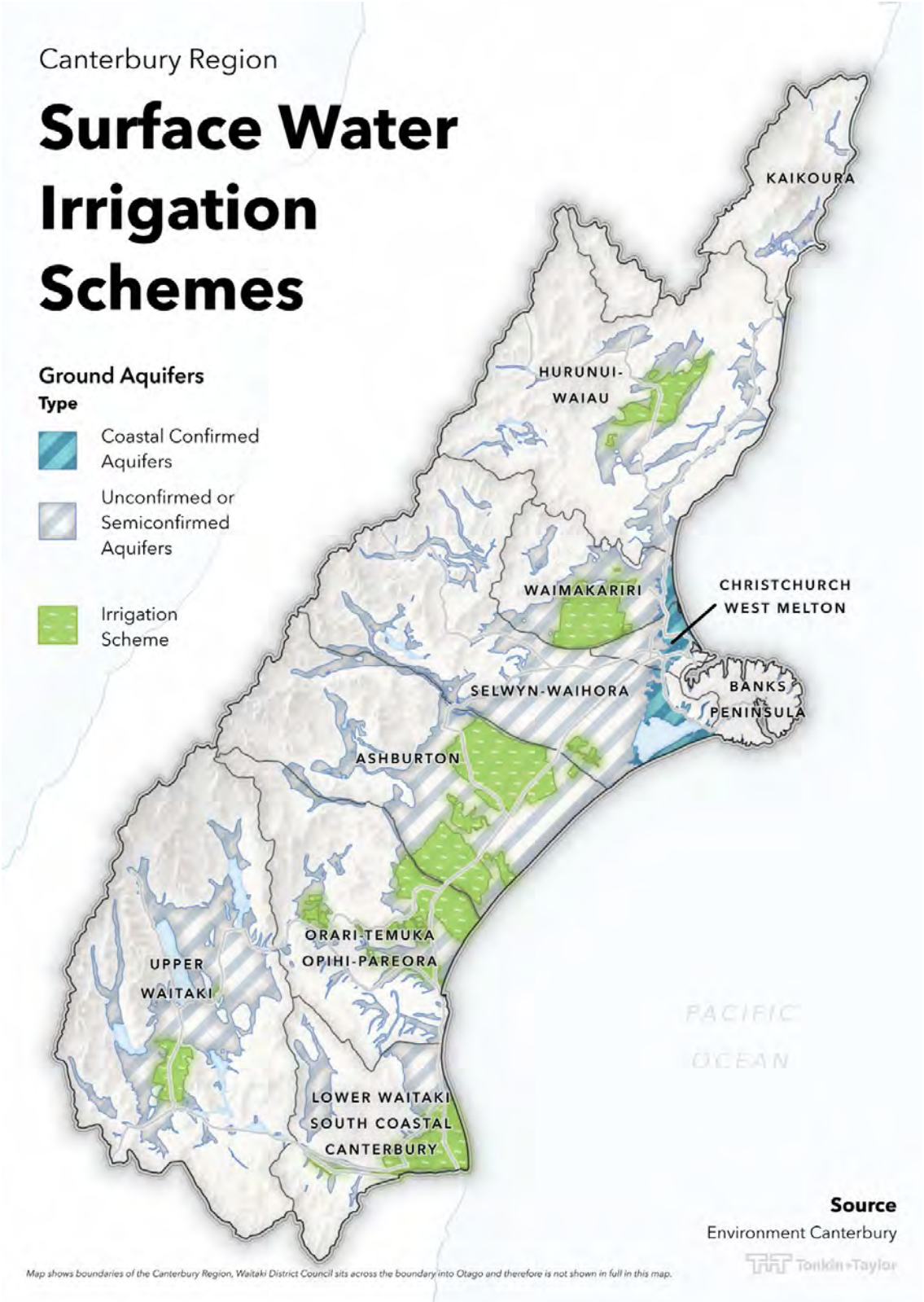

Figure 10.1: Canterbury water management zones (Environment Canterbury, 2009), irrigation schemes and aquifers.

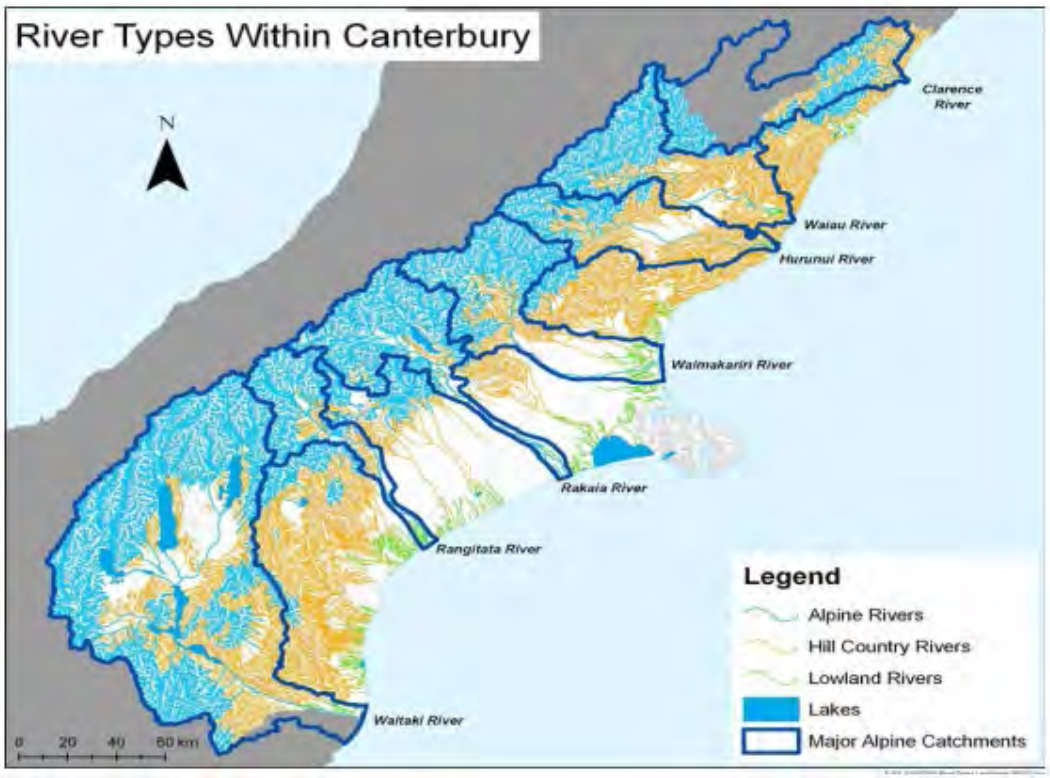

Figure 10.2: River types within Canterbury (Source ECAN, 2009).

10.2 Summary of risks

Risks to wai (water) are identified through consideration of surface water availability and quality, groundwater availability and quality, water supply infrastructure and flood defences. The highest rated risk relating to these aspects of water are listed in Table 10.1. These, and other highly rated risks, are presented below, with discussion of the main issues supporting the rating of the risks.

Table 10.1: Summary of highest risks to wai (water)

Using RCP8.5	Higher mean temperatures			Change in mean annual rainfall			Drought			River and surface flooding			Coastal flooding			Increased coastal erosion			Sea-level rise and salinity stresses			Storms and wind			Increased fire-weather			Increasing landslides and soil erosion			Extreme weather events			Reduced snow & ice			Ocean chemistry changes			Marine heatwaves			Climate change		
	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L
Coastal barriers and sea walls													L	H	H	L	H	H	L	H	H	L	H	H																				
Stopbanks and flood management schemes										M	H	E							L	M	M																								
Groundwater - availability and quality				H	E	E	H	E	E										H	E	E																								
Water quality (lakes and rivers)	L	H	E	I	L	H				L	L	H							I	L	H							M	H	H				I	L	H									
Stormwater assets										M	H	H																																
Wastewater treatment plants																M	H	H	M	H	H																								
Surface water availability and supply				M	H	H	H	E	E																									L	M	H									
Water supply infrastructure										L	M	H										L	M	H																				

Key

I	Insignifcant	P	Present day
L	Low	M	Mid (2050)
M	Moderate	L	Long (2100)
H	High		
E	Extreme		

10.3 Surface water quality in major lakes and rivers

The highest rated risks to surface water (lakes and rivers) availability and quality include those from changes in mean annual rainfall, snow and ice, flooding, erosion, sedimentation, higher mean temperatures and sea level rise/salinity stress.

Lakes and rivers will experience decreased water quality as the occurrence of low flows and warm temperatures increase. Water quality may also decrease as a result of sedimentation associated with increased peak flows and flooding.

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Table 10.2: Summary of risks to surface water availability and supply

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to surface water availability and supply due to drought	High	Extreme	Extreme	Extreme	Projected increases in drought are likely to impact water availability and supply. Water supply is highly sensitive to drought due to extensive water abstraction. Reduced availability due to drought is likely to coincide with increasing demand. Strategies are currently in place to monitor and manage water sources to adapt to climate change. Further, measures to reduce demand may be adopted.
Risk to surface water availability and supply due to change in mean annual rainfall	Moderate	High	High	High	Projected changes in rainfall are likely to impact water availability and supply, with reductions in surface water availability in some parts of the region. Reduced availability due to low rainfall and river flows is likely to coincide with increased demand. Strategies are currently in place to monitor and manage water sources to adapt to climate change. Further, measures to reduce demand may be adopted.
Risk to surface water availability and supply due to reduced snow & ice	Low	Moderate	Moderate	High	Projections of reduced snow and ice are a component of complex hydrological changes that may contribute to reduced water availability. Reduced snow and ice may result in lower summer flows in the headwaters of many major Canterbury rivers.

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to water quality (lakes and rivers) due to river and surface flooding	Low	Low	High	High	The frequency and intensity of storms are projected to increase over time, which may cause increased flooding. Erosion and scour resulting from flooding may result in increased sediment in waterways, reducing water quality and disturbing habitats. Runoff entering rivers may also introduced increased nutrient and other contaminants. Modified rivers with constrained floodplains may be particularly sensitiveto degradation from flooding, and have limited adaptive capacity to adjust with changing flows.
Risk to water quality (lakes and rivers) due to change in mean annual rainfall	Insignificant	Low	Moderate	High	Projected changes in rainfall are likely to result in increased frequency of low flows in most rivers. Increased frequency of low flows may reduce flushing flows and compound the effects of warmer temperatures, promoting the growth of algae and macrophytes.
Risk to water quality (lakes and rivers) due to reduced snow & ice	Insignificant	Low	Moderate	High	Projected changes to snow and ice are likely to contribute to the increasing occurance of low flows. Increased frequency of low flows may reduce flushing flows and compound the effects of warmer temperatures, promoting the growth of algae and macrophytes.
Risk to water quality (lakes and rivers) due to higher mean temperatures	Low	High	Extreme	Extreme	Projected increases in temperature are likely to be detrimental to water quality in lakes and rivers. Warmer temperatures can be harmful to native frehwater biodiversity and promote the growth of algae and macrophytes. Smaller, shallow waterbodies, and those that are not snowmelt fed are likely to be most sensitive to warming temperatures.
Risk to water quality (lakes and rivers) due to increasing landslides and soil erosion	Moderate	High	High	High	Increased erosion and sediment from landslides may result in increased sediment in waterways, reducing water quality and disturbing habitats.
Risk to water quality (lakes and rivers) due to sea-level rise and salinity stresses	Insignificant	Low	High	High	Projected sea level rise may cause salinization and flooding or coastal rivers and lakes with increasing frequency. Saltwater intrusions have a profound impact on the water quality of lakes and rivers changing the types of ecological communities they can support.

Lakes and rivers will be exposed to projected increased intensity and frequency of storm events, leading to increased peak river flows and flooding. These events increase the risk of erosion and have the potential to change river and lake morphology.

Canterbury has many large, braided rivers which historically have large flood plains associated with them. Many flood plains have been developed and constrained for human land use and flood protection. Rivers with modified or constrained channels and flood plains are likely to be highly sensitive to projected climate changes, as there is limited capacity to convey increased flow. These

are often also rivers with existing abstraction schemes providing water for drinking and/or irrigation. (refer to Section 10.5). Constraints on permanent riverbank morphology will limit the adaptive capacity of rivers to respond to changing flow conditions, and extreme weather events are likely to cause more damage to the river environment when the flood plain is cut off from the river. Conversely, those rivers with fewer (natural or anthropogenic) constraints may have a higher tolerance for changes, with new channels forming naturally. Increased erosion results in increased sediment in waterways, reducing water quality and disturbing habitats. The injection of sediment into rivers (and subsequently into lakes or into the sea) from large floods thus can mobilise large volumes of nutrients (and potential contaminants), affecting water quality in the receiving environment.

Increased projected low flow conditions in rivers contribute to warmer water temperatures due to reduced velocity and volume of water. The lack of flushing flows contribute to the build-up of sediment and nutrients (Jowett et al. 1990). Warm temperatures and reduced flushing flows favour the growth of algae and macrophytes, which lower water quality.

Projected temperature increases are likely to affect the water quality in lakes by increasing the likelihood of thermal stratification during summer months. Maximum temperatures are projected to rise by up to 6°C under RCP8.5 in inland areas. This strong summer warming will lead to higher water temperatures in lakes and rivers, particularly those in the low country with little or no shading of water bodies. Small or shallow lakes have a low tolerance of prolonged high summer temperatures. This increases the chance of prolonging thermal stratification. These types of lakes are likely to be sensitive to poor or reducing water quality measures earlier than larger/deeper lakes (Hamilton et al. 2013). Deeper lakes, and lakes in locations more exposed to the wind (such as some of the large hydro-lakes in inland Canterbury) will have a lower sensitivity to projected changes than shallow, sheltered lakes such as some of the inland lakes (e.g. Lake Lindon) and small shallow coastal lakes (Hamilton et al., 2013).

Coastal rivers and lakes are also likely to be exposed to rising sea level and subsequent salinisation through intrusion of saltwater. This is likely to be ephemeral at first but become more frequent towards the end of the Century as mean sea level increases, and storm events increase the inland intrusion of saltwater up rivers and into low-lying coastal lakes. Saltwater intrusions have a profound impact on the water quality of lakes and rivers changing the types of ecological communities they can support.

10.4 Groundwater availability and quality

The highest risks to groundwater availability and quality from climate change include those from changes in rainfall, drought, and salinity stress. Exposure of aquifers to reduced rainfall and drought may lower recharge rates, leading to reduced volume and potential water quality deterioration. Exposure of coastal aquifers to increasing sea levels may cause salinisation. Impacts on aquifer recharge rates and salinisation are not well understood, so are presented with a high level of uncertainty.

Table 10.3: Summary of risks to groundwater availability and quality

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to groundwater - availability and quality due to sea-level rise and salinity stresses	High	Extreme	Extreme	Extreme	Projected sea level rise may cause salinization of coastal aquifers which may be compounded where abstraction occurs near the coastal edge. The adaptive capacity of aquifers is considered low as most have reached the upper limit of the allowable allocation.
Risk to groundwater - availability and quality due to change in mean annual rainfall	High	Extreme	Extreme	Extreme	Changes in rainfall patterns are projected, with wetter winters and drier summers. Wetter winters may cause higher groundwater tables in winter, with dry summers and increasing evapotranspiration contributing to lower water tables in summer.
Risk to groundwater - availability and quality due to drought	High	Extreme	Extreme	Extreme	The occurrence of drought is projected to increase with climate change. This will lower water and reduce rates of recharge. Increased water demand is likely to coincide with extended dry periods and drought, placing further pressure on aquifers.

Large aquifers are present within the Canterbury Plains, particularly south of Timaru, the Amuri Plains, the Kaikōura Plains and the Mackenzie Basin. These aquifers are predominantly unconfined or semi-confined aquifer systems, located in the gravel outwash plains from the Ka Tiritiri o te Moana (Southern Alps) (Environment Canterbury, 2021). Coastal confined gravel aquifer systems have also been identified around Ōtautahi/Christchurch City. These extend from the Rakahuri (Ashley) River in the north to the surrounds of Te Waihora (Lake Ellesmere), and exclude most of Banks Peninsula. The impacts of climate change on aquifers, groundwater resources and dependent ecosystems have a high degree of uncertainty, due to the lack of detailed studies both in New Zealand and globally (Klove et al., 2014).

Groundwater availability in Canterbury will be exposed to increasing seasonality of rainfall, which can be characterised by wetter winters and drier summers. This will have consequential changes in river flows and lake levels. These hydrological changes, and increased evapotranspiration associated with warmer drier summers, are likely to result in higher water tables during winter, and lower water tables in summer (Unsal et al., 2014). Shallow aquifers, and those with naturally fast responses to rainfall, are likely to be most sensitive. Overall, reduced rates of recharge during summer months is likely, as the Canterbury plains experience lower rainfall and become drier (Painter, 2018).

Raised groundwater levels are likely to occur as a response to increased winter rainfall or rising sea level at the coast. Aquifers with a shallow groundwater table, such as those in the coastal aquifers and parts of Ōtautahi/Christchurch, will be most sensitive to these changes. This can increase flooding and liquefaction risk, cause infiltration into buried services and basements, contribute to buoyancy effects, or damage roading and landscaping .

For aquifers with significant volumes of summer abstraction, the increased drawdown during the time of least groundwater recharge may lead to a deterioration of water quality (as well as quantity), by increasing the rate at which water moves through the aquifer sediments (Klove et al., 2014). This effect will vary depending on the age of aquifers and the groundwater residence time.

Coastal aquifers may be sensitive to salinisation as sea level rises. This effect may be compounded by groundwater abstraction in coastal zones, which is also a significant contributor to salinisation (Ferguson, 2012). The degree to which these aquifers are prone is unknown and will likely depend on the nature of the aquifer sediments and the degree of aquifer confinement in coastal areas (Ingham et al., 2006).

In general, the adaptive capacity of groundwater aquifers (both coastal and inland) is based on the available volume, recharge rates, degree of interconnectivity between aquifers, and residence time of water in the aquifer systems. For coastal aquifers, the adaptive capacity is related to the extent that the aquifer extends inland, making it less prone to the effects of salination. For Canterbury aquifers, the adaptive capacity is considered low as most aquifers have reached the upper limit of the allowable allocation (Environment Canterbury, 2009). The Canterbury Region has a high dependency on groundwater to meet its water supply demands, limiting the ability of the region to manage any reduction in water availability.

10.5 Water availability and supply

The highest risks to water availability and supply from climate change includes those from changes to drought, flooding, and storms and wind (refer to Table 10.4).

Most parts of Canterbury are exposed to a high level of risk from drought, which will increase over time. Water supply systems, including irrigation schemes, are extremely sensitive to drought due to the compounding effects of both reduced water availability and the effects of warm temperatures causing increased demand. A degree of adaptive capacity is demonstrated through established water supply management practices within the Region. Strategies have been developed to manage water reliability, with consideration for the risks of climate change. A medium potential for adaptive capacity exists, particularly relating to town supply, where there is scope to reduce demand.

Table 10.4: Summary of risks to water supply and associated infrastructure

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to water supply infrastructure due to river and surface flooding	Low	Moderate	Moderate	High	The frequency and intensity of storms are projected to increase over time, which may cause increased flooding. High flows, sediment and debris may cause damage and disruption to water supply facilities, particularly above ground infrastructure such as intakes. Poor condition or ageing components may be upgraded to improve resilience. However, the potential to adapt water supply infrastructure may be limited by the need to draw water from exposed locations, and service existing communities.
Risk to water supply infrastructure due to storms and wind	Low	Moderate	Moderate	High	The frequency and intensity of storms are projected to increase over time. High flows, sediment and debris may cause damage and disruption to water supply facilities, particularly above ground infrastructure such as intakes. Poor condition or ageing components may be upgraded to improve resilience. However, the potential to adapt water supply infrastructure may be limited by the need to draw water from exposed locations, and service existing communities.

Canterbury's extensive braided alpine rivers provide the water to the groundwater aquifers that together provide fresh drinking and irrigation water to the Region's population and economy. (Environment Canterbury, 2021). Regulation of water supply within the Region is managed by Environment Canterbury. The management of water availability and quality is achieved through 10 water management zones, with boundaries reflecting the natural hydrological systems (Figure 10.1).

Throughout the Region, water is sourced from both groundwater and surface water, for both town supply (Figure 10.5), and irrigation (Figure 10.6). Most stock water is sourced from surface water, although this is dominated by the high volume of surface water consented in the Ashburton Zone (Figure 10.7). There are 34 irrigation schemes in Canterbury over 500 hectares (Figure 10.1). They are relatively small, and were established with the needs of particular catchments and localities in mind. Currently, all of the Region's surface water is fully allocated, and 94% of groundwater is allocated (Land Air Water Aotearoa, 2021).

Regionally, irrigation demands the highest water use, followed by stock water (Figure 10.3). These water uses translate to a high demand for water in rural areas, with consented water takes highest in the water management zones of Lower Waitaki South Coastal Canterbury, Ashburton and Selwyn-Waihora (Figure 10.4). Town water supply is a relatively small proportion of the regional water demand, with only 4% of the Region's consented water allocated to this use (Figure 10.3) (Land Air Water Aotearoa, 2021).

Surface water availability will be exposed to complex hydrological changes, including changing rainfall intensity, duration, and timing, and changing snowfall and snowmelt, as well as changing temperature, which impacts on evaporation and evapotranspiration, and complex groundwater interactions.[4] Projections show differing responses of surface water availability between inland and coastal areas (Macara et, al., 2020). Under RCP8.5, the mean annual discharge from rivers in eastern Canterbury is projected to increase by late century, while decreases are projected for rivers in inland areas. High flows are projected to increase in eastern areas by 50% by late century (RCP8.5), while decreases of 20% are projected for inland areas east of the main divide. This decrease in high flows within montane/hill country appears counter-intuitive when considering the significant increases in high flows in eastern (downstream) areas. These changes are thought to be associated with a projected decrease in the duration of large rainfall events, where although the rainfall intensity is increasing, the reduced rainfall duration results in a decrease in high flows (Macara et, al., 2020).

While some increases are projected for river flows in the alpine headwaters, flows are likely to become more seasonal due to a reduction in snow and ice. Snowmelt-fed rivers are sourced from alpine snow and ice that is stored through winter and released as spring and summer snowmelt. Ongoing reductions in the extent of snow and ice will reduce spring and summer snowmelt volumes, leading to lower summer flows in the headwaters of many major Canterbury rivers and their tributaries.

Mean annual low flows are projected to decrease across most of Canterbury under RCP 8.5 by late century, with reductions of over 20% in many parts of the Region. The notable exception is the south-eastern catchments, along the Waimate and southern Timaru coast. These are projected to see a 20% increase in low flows. In the montane/hill country, low flows typically occur during winter months. There is some uncertainty relating to how these low flows will be affected, where projected increases in winter rainfall could reasonably be expected to increase low flows during this time. However current models suggest that this is not the case, and that flows will remain unchanged (Macara, et al., 2020).

[4] Hydrological modelling using a water balance model provides an indication of surface water availability in Canterbury (Macara et al., 2020). This projection of surface water availability considers projections of rainfall, temperature, and other weather elements where available. The model simulates storage in the snowpack, plant canopy, rooting zone, shallow subsurface, lakes and rivers, taking into account approximate land cover and land use.

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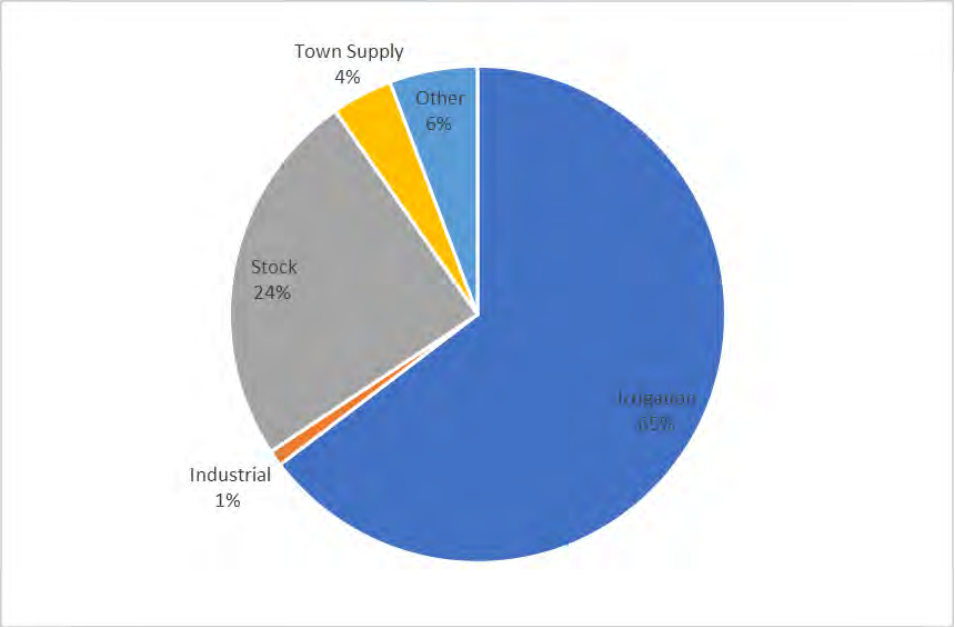

Figure 10.3: Consented water demand by type of use in Canterbury (Land Air Water Aotearoa, 2021).

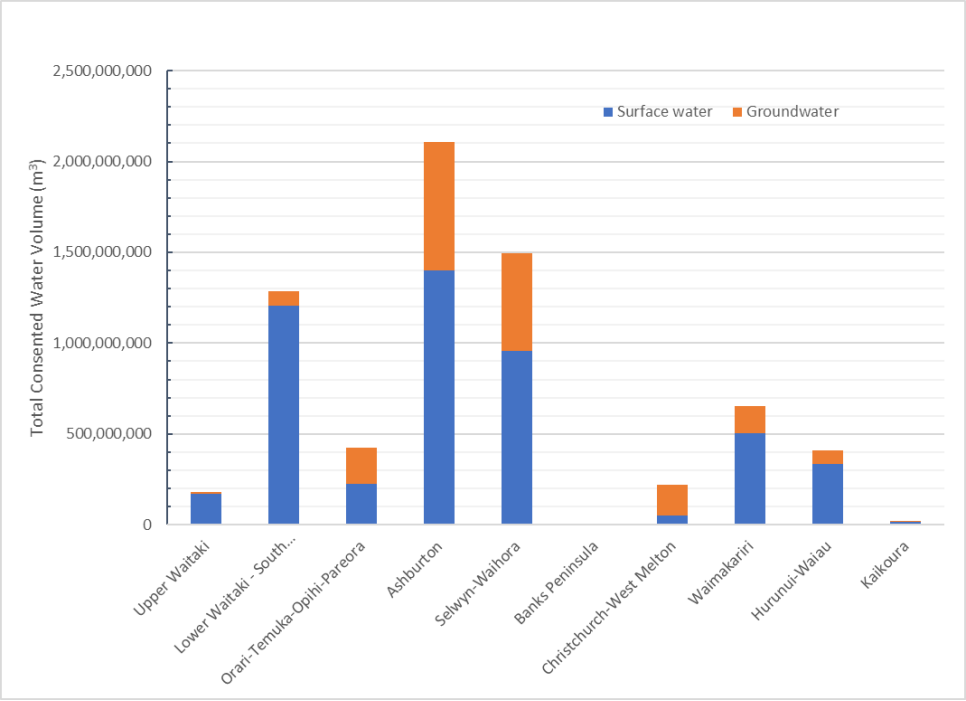

Figure 10.4: Consented water volume according to source by water management zone in Canterbury (Land Air Water Aotearoa, 2021).

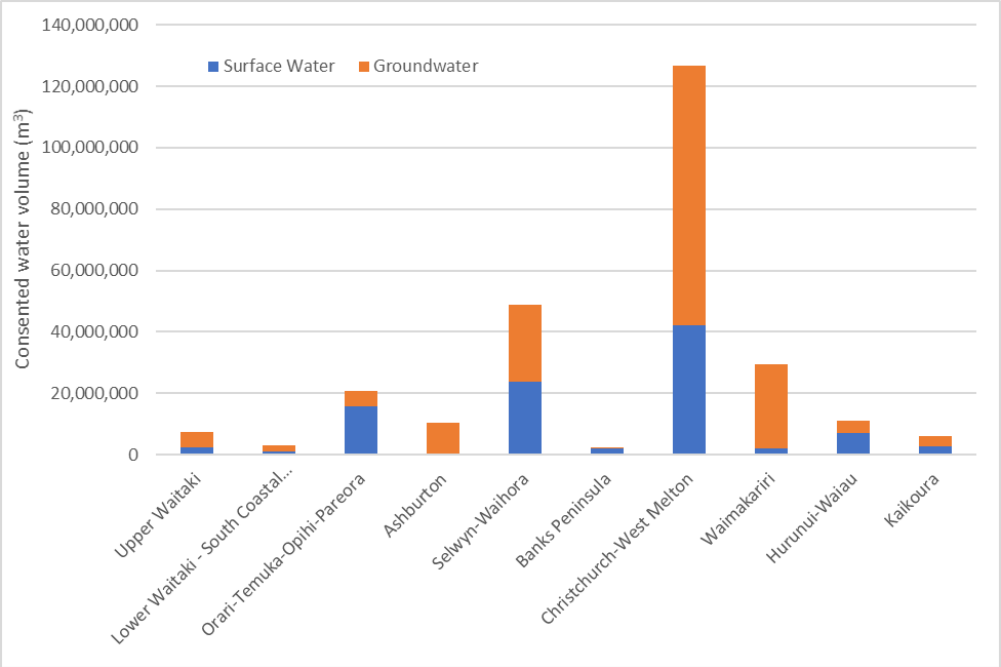

Figure 10.5: Consented water volume, by source and district, for use in town supply (Land Air Water Aotearoa, 2021).

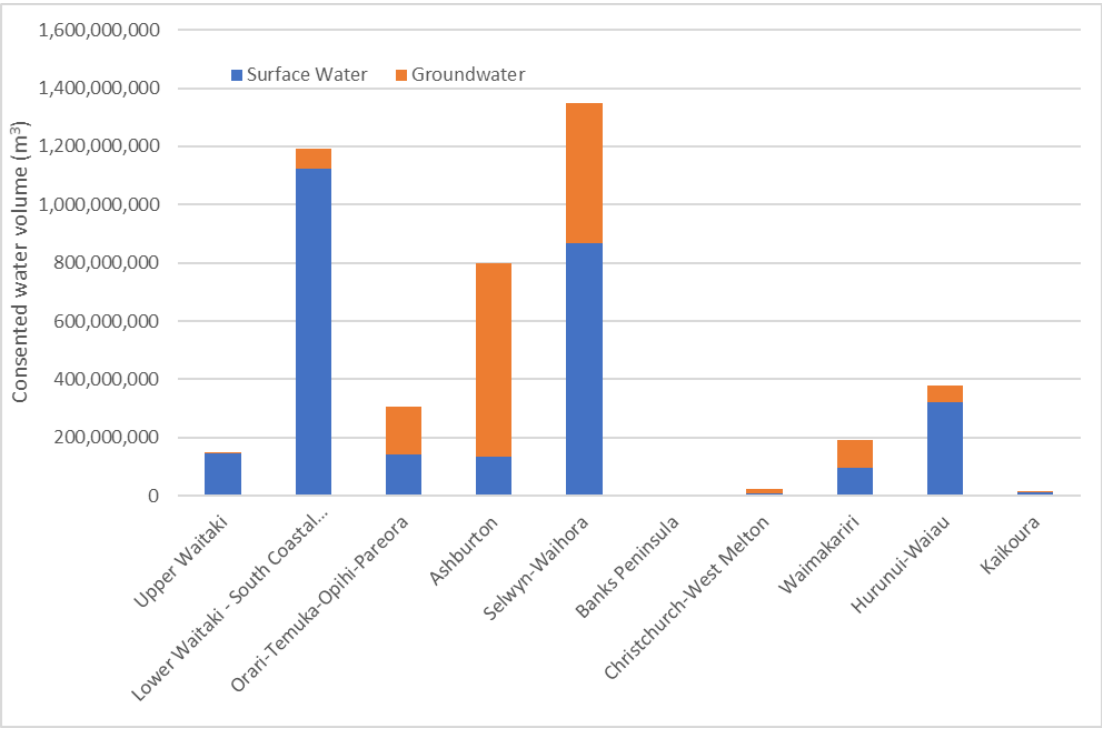

Figure 10.6: Consented water volume, by source and district, for use in irrigation (Land Air Water Aotearoa, 2021).

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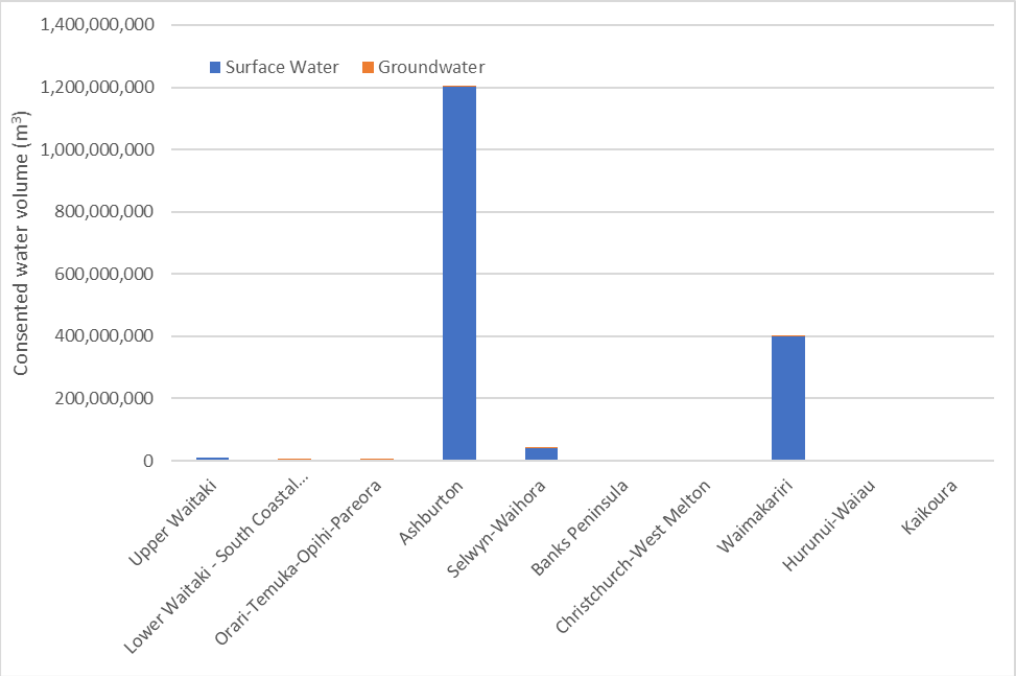

Figure 10.7: Consented water volume, by source and district, for use in stock water (Land Air Water Aotearoa, 2021).

10.5.1 Irrigation and stock water supply

Climate change will place pressure on surface water and groundwater sources. This is due to a range of projected changes, particularly, changing rainfall patterns, decreases in summertime low flows, decreases in mean annual flows in inland areas, and increasing drought potential. These are likely to reduce irrigation water supply reliability, with potential for a reduced ability to support the current level of supply. Reduced availability is likely to coincide with increased demand for irrigation, as high temperatures or increased drought potential may impact optimum pasture growth. Further increased water demand is likely to be required to cope with heat impacts on stock (Environment Canterbury, 2009).

Sensitivity of the Region to drought is currently rated as extreme. The 2016 droughts in Canterbury were the worst since those of the 1980s, with 86% of water bores across the Region affected. This caused unreliable water supply to farmers, with a range of impacts for agriculture. Until recent regulation changes, increasing numbers of wells were being sunk for irrigation purposes in the upper parts of the Canterbury catchments, because of the unreliability of flows in the foothill rivers. This type of groundwater abstraction reduces the flow of water through the groundwater system down to aquifers in lowland areas. This in turn reduces flows into spring-fed streams in lowland areas, a problem which is then further compounded by surface water abstraction in lowland areas.

In recent years, improved coordination of water consents and a shift toward water storage has been established through the Canterbury Water Management Strategy (CWMS). Use of stored water instead of groundwater for irrigation purposes in the upper part of the catchment supports the restoration of healthy flows in lowland streams (Environment Canterbury, 2009).

For over a decade, Environment Canterbury has been aware of, and actively addressing, the risks from climate change to the Region's water supply. The CWMS was established in 2009. A major consideration in the formation of this approach was ensuring reliability of water supply under climate change. The strategy's integrated management approach, combined with the reform of water use regulations, was intended to address ongoing water availability and quality issues that

were expected to worsen with climate change. Management of the 10 zones established under the CWMS includes a collaborative community-led approach to sustainable water resources management (Environment Canterbury, 2009).

10.5.2 Town supply

Town supply water demand generally increases during periods of warmer temperatures when water availability is at its lowest. Summer peaks in demand often occur due to increased shower use, outdoor watering, and increased demand in fire fighter services (Stakeholder Engagement, 2021).

At a regional scale, current sensitivity of town supply is low. Most districts report that their residential water demand is well within current allocations. For example, Christchurch City Council is allocated 82 billion litres of water each year for household supply and to keep parks and gardens green. It currently uses about 70 percent of that allocation. However, water supply in some locations is very restricted. For example, Banks Peninsula is supplied by surface water from small local streams and is therefore very drought sensitive. Relative to the demand for irrigation and stock water, the volume of water required for town supply is extremely low. In this regard, water availability for town supply is likely to be less sensitive to the pressures that drought and increasing seasonality introduce, as the volumes required to meet demand are a small fraction of regional water availability.

Measures to reduce water consumption in urban areas may be more easily achieved, by improving efficiency through fixing leaks, and applying typical water saving measures, such as metering, water charges, and education, and other demand management initiatives. These may be particularly effective in areas with high water usage. Current average daily residential water usage for Ashburton and Ōtautahi/Christchurch is slightly below the national average of approximately 280 litres/person/day. All other districts have relatively high consumption rates, with over double the national average in Mackenzie (Figure 10.8), and therefore these districts may have a higher capacity to adapt.

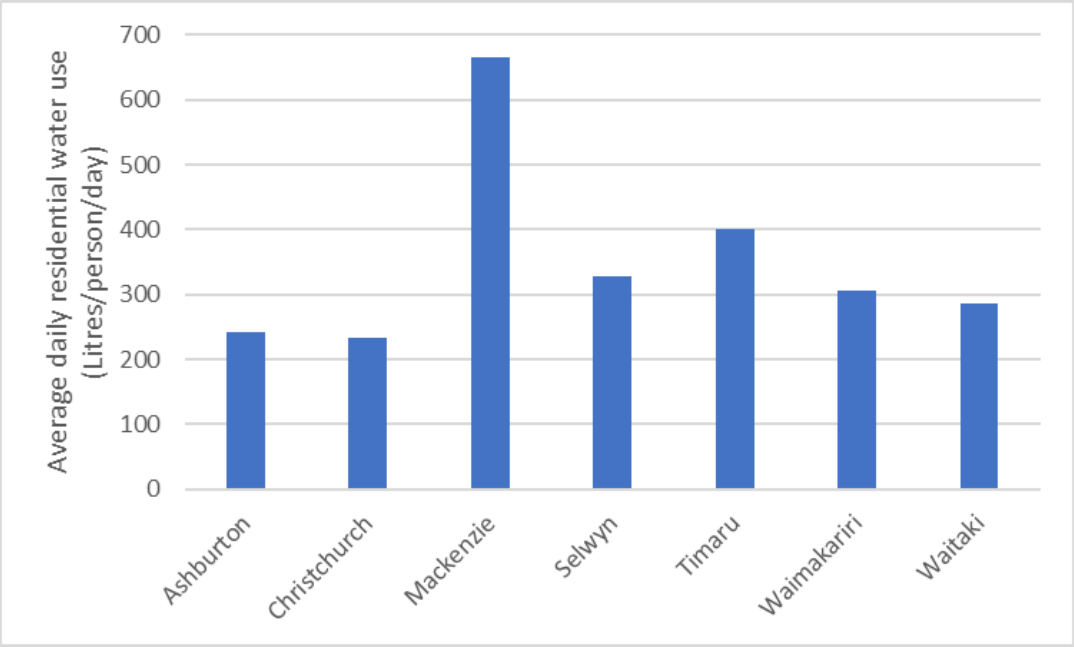

Figure 10.8: Average daily residential water use by district in Canterbury, 2019 (no data available for Hurunui, Waimate, and Kaikōura) (Water New Zealand, 2020).

10.6 Risks to water supply infrastructure

The highest risks to water supply and infrastructure from climate change includes those from changes to storms and flooding.

Exposure of water supply infrastructure to coastal, fluvial and surface water flooding is rated as extreme, particularly in Ōtautahi/Christchurch City where a large proportion of the water supply network is exposed to flooding. The sensitivity of these systems is influenced by the condition, age and type of water supply infrastructure. In particular, treatment facilities and other exposed infrastructure are at risk of damage from erosion and flood water ingress. The adaptive capacity of infrastructure is rated as medium, as components of these systems can be upgraded to improve resilience, but the capacity to relocate is usually limited.

Local councils are responsible for the supply, distribution, and treatment of safe drinking water. Most districts manage numerous small water supply schemes to deliver water to urban and rural communities (Figure 10.9). As the city with the highest population, Ōtautahi/Christchurch has the largest town supply demand, and the largest network of supporting infrastructure (

Table 10.5). Water supply to Ōtautahi/Christchurch City serves close to two thirds of the Region's population, through 160,000 connections. As such, quality and security of supply is critical for the health and wellbeing of a large proportion of the Region's population. Collectively, Councils manage over 10,000 km of water supply pipe, along with associated supply, treatment and distribution facilities. Water supply is sourced through the means of river intakes, infiltration galleries, storage reservoirs, dams, and bores. Facilities to distribute water include water treatment plants, storage reservoirs, tanks and pump stations.

Table 10.5: Urban water and rural water supply and distribution infrastructure

District	Number of on-demand water scheme	Connections	Water supply pipe (mains) (km)
Ashburton	12	9685	371
Ōtautahi/Christchurch	7 urban and 6 rural	160000	>3000
Hurunui	7 urban and 12 rural	7000	2,145
Kaikōura	5	less than 4000	210
Mackenzie	6	2580	242
Selwyn	30	17,394	1,300
Timaru	12 (6 urban, 4 rural drinking and stockwater, 2 stockwater)	17570	1853
Waimakariri	7 on demand, 3 semi restricted and 5 fully restricted	19,215	935
Waimate	7	6000	914
Waitaki	15	1,689	11,103

Source: WaterNZ, 2020; Ashburton District Council, 2018; Christchurch City Council, 2021; Hurunui District Council, 2021; Kaikōura District Council, 2021; Mackenzie District Council, 2018; Selwyn District Council, 2018; Waimakariri District Council, 2021; Waimate District Council, 2018; Waitaki District Council, 2021.

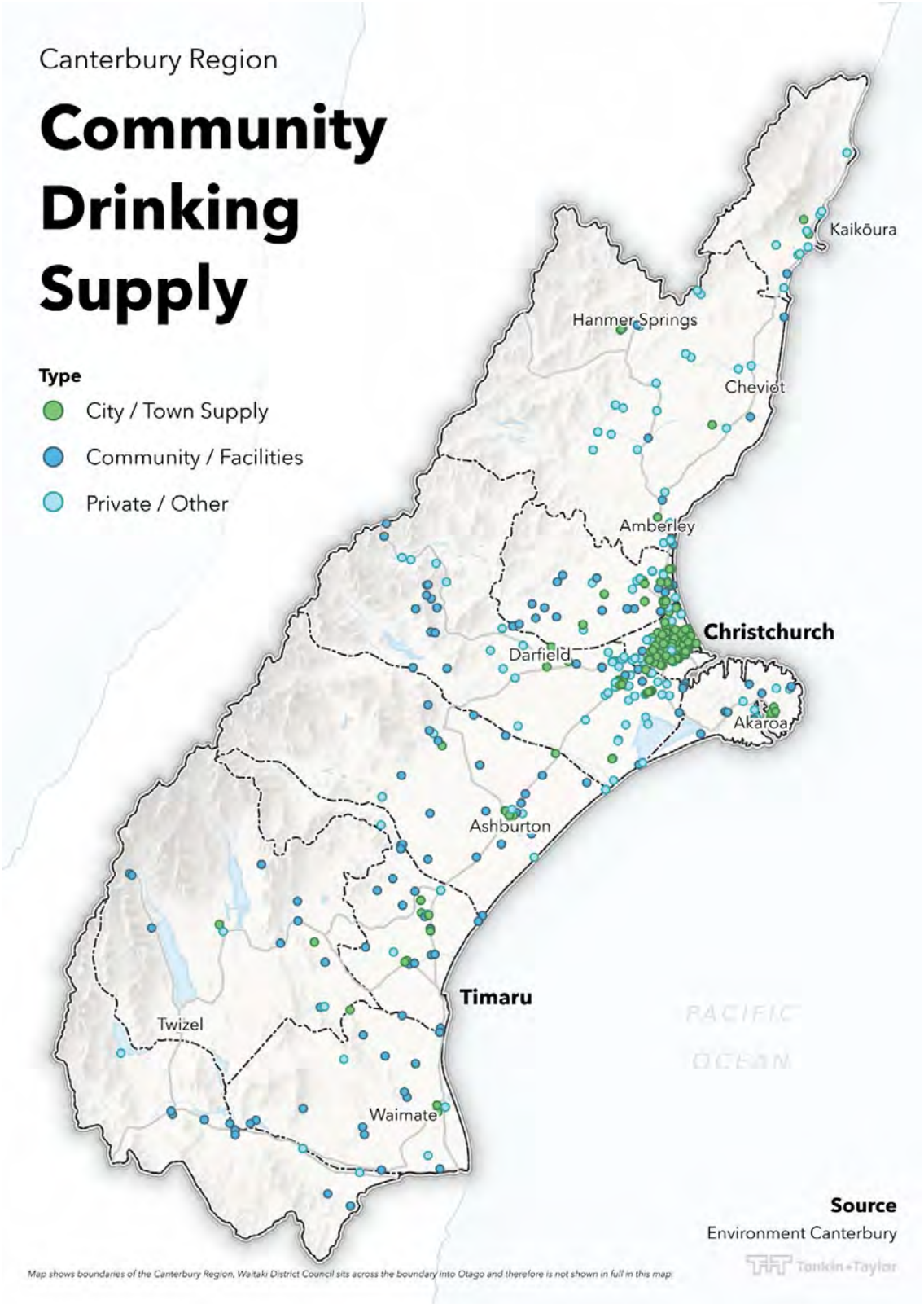

Figure 10.9: Water supply bores and community drinking water supply points.

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Water supply infrastructure within Canterbury is highly exposed to coastal, fluvial and surface water flooding in New Zealand. This is primarily due to populous areas within Ōtautahi/Christchurch City residing in both coastal and low-lying areas. A total of 2,204 km of water supply pipe is exposed to inland flooding in the Canterbury Region, with nearly 80% of that located in the Ōtautahi/Christchurch district alone (totalling 1,742 km). Lower flood exposure occurs outside of Ōtautahi/Christchurch, with 105 km of water supply pipe exposed in the Waimate District and 80 km in the Hurunui district (Figure 10.10) (Paulik, Craig, & Collins, 2019).

Approximately 285 km of water supply pipe is exposed to coastal flooding related to extreme weather at 1% Annual Exceedance Probability (AEP) + 0.0 m sea level rise. This increases to 378 km of exposed water supply pipe with 0.3 m sea level rise, and 543 km with 0.8 m sea level rise. The largest proportion of this exposure is in Ōtautahi/Christchurch, with 256 km at 0.0 m sea level rise, 343 km at 0.3 m sea level rise and 499 km at 0.8 m sea level rise. The district with the next highest exposure is Timaru with around 15 km of pipe exposed at 0.0m sea level rise (Figure 10.11) (Paulik, et al., 2019).

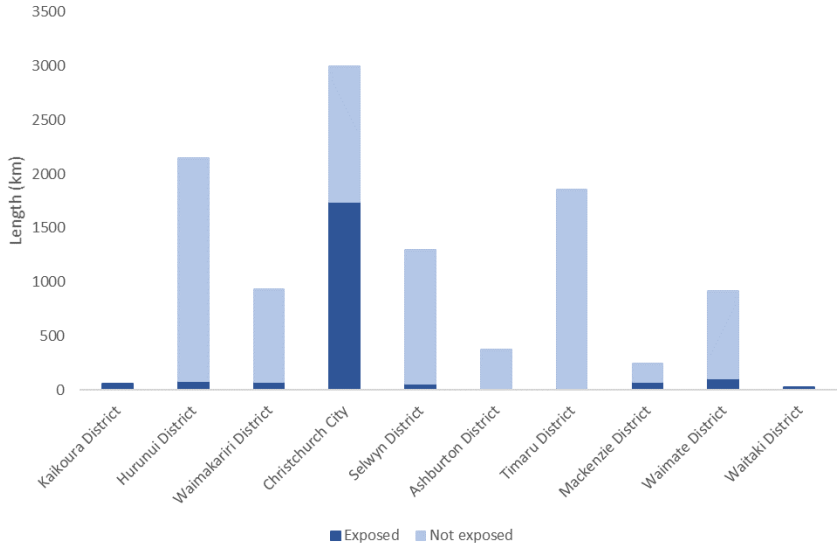

Figure 10.10: Exposure of water supply pipes to present day river and surface water flooding by district (Paulik et al., 2019).

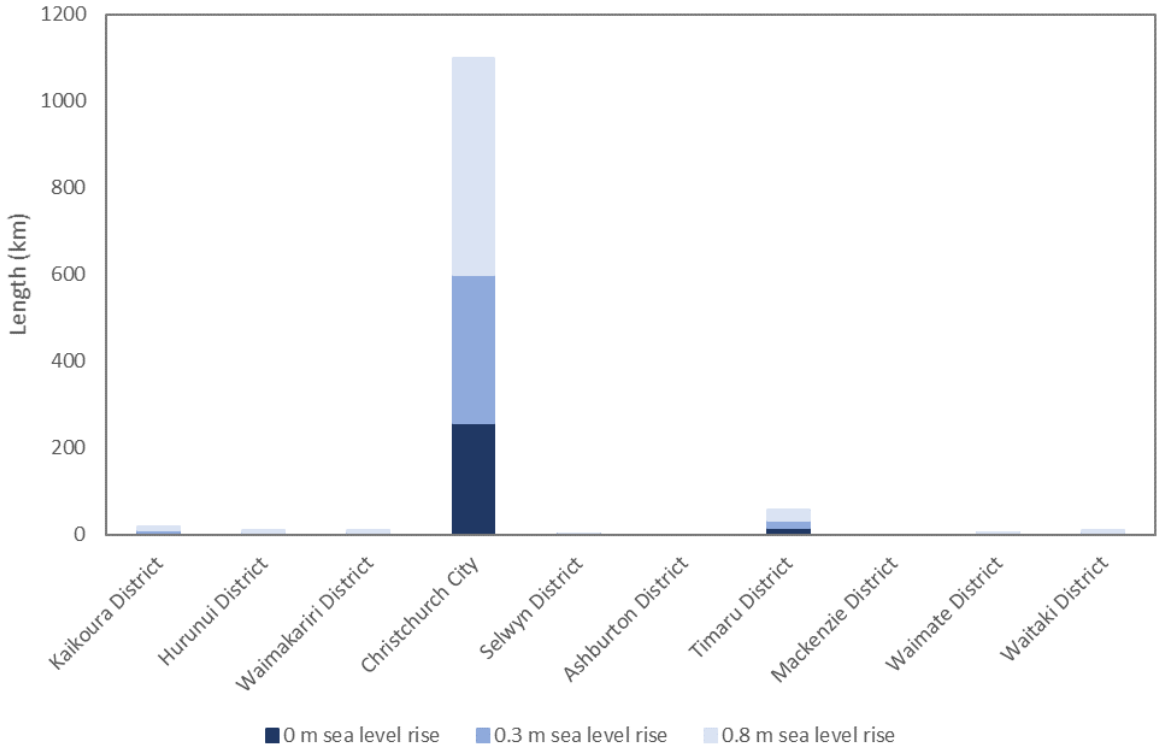

Figure 10.11: Exposure of water supply pipes to present day coastal flooding and incremental sea level rise by district (Paulik et al., 2019).

Flooding and extreme events can cause damage and disruption to water supply facilities, particularly above ground infrastructure such as intakes. Water supply intakes must be located within the water body, therefore those that are located within rivers are highly exposed to storms and flooding. This can cause damage from high flows, debris, scour and high sediment loads (CDEM, 2021). Water supply treatment facilities are often located near intakes, so may be exposed to damage, or ingress of flood water. Water supplies may be compromised due to ingress of flood water, resulting in a need for boil water notices, or broader community disruption (Environment Canterbury, 2021). Some of Canterbury's water supply systems are sourced from secure groundwater systems, so are not treated (Kaikōura District Council, 2021). This can introduce a level of risk in relation to contamination, particularly during flooding events where sediment, debris and contaminants can enter systems.

Pipe networks are rated to have a low sensitivity to storms and flooding. Water supply pipe networks are generally buried and sealed, so are protected from surface flooding. Shallow or exposed components of the water supply system may be prone to erosion or storm damage. Many of the Region's networks have a high proportion of aged infrastructure, which may have a higher sensitivity to damage from flooding. However, some parts of the water supply infrastructure in Ōtautahi/Christchurch and Waimakariri have been extensively replaced following the Canterbury Earthquake Sequence (commenced 2010). This may provide an increased resilience in these parts of the system.

The ability to upgrade components of the system provides some adaptive capacity. However, many components, such as intakes and urban networks, are limited in their capacity to relocate away from flood exposure as they must remain in place.

10.7 Stormwater and wastewater infrastructure

The highest rated risks to stormwater and wastewater infrastructure include those due to sea level rise, coastal erosion, and river and surface water flooding. Stormwater and wastewater systems are discussed together, as assets within these systems face many similar impacts from climate change.

The risk to both stormwater and wastewater assets due to coastal, river, and surface water flooding, sea level rise and salinity stress is rated as extreme by late century. This is due to the high and increasing exposure of stormwater and wastewater assets to coastal and river flooding, a high sensitivity to a range of impacts from flooding, and a low adaptive capacity.

Table 10.6: Summary of risks to stormwater and wastewater infrastructure

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to stormwater assets due to river and surface flooding	Moderate	High	High	High	The frequency and intensity of storms are projected to increase over time, which may cause increased flooding. Overloading of stormwater systems are likely to cause flooding of surrounding communiites, damage to components of the stormwater network, and have consequences for the water quality of recieving waterbodies. Older systems are likely to be particularly sensitive as these are often in poorer condition with smaller capacities.
Risk to wastewater treatment plants due to sea-level rise and salinity stresses	Moderate	High	High	High	Projected sea level rise may cause erosion damage, and increased occurance of inundation resulting in overflows. Rising groundwater may introduce flotation of buried components, and increased infiltration to wastewater pipelines, causing increased loading on pumping stations. Salinization of wastewater may cause corrosivity and have implications for wastewater treatment plant operations.
Risk to wastewater treatment plants due to increasing coastal erosion	Moderate	High	High	High	Projected sea level rise may cause erosion damage to components of the wastewater system that are located near the coastal edge. Wastewater assets can be expensive to upgrade, and options to relocate are limited as these systems perform best when located at the downstream point of the network.

10.7.1 Wastewater infrastructure

Wastewater assets within Canterbury include piped networks (including gravity, pressure and vacuum), treatment plant pumps, on-site systems, and a range of treatment and disposal systems. Most small-scale systems provide treatment to wastewater using oxidation ponds, with larger centres providing UV disinfection. Final disposal of effluent is typically by way of soakage trenches, and basins to land, or irrigation to land. The largest centres (Ōtautahi/Christchurch and Ashburton) manage tertiary wastewater treatment plants, with treated wastewater discharging to the coast (Table 10.7).

The scale of service provided by districts reflects their populations. Ōtautahi/Christchurch, Ashburton and Waimakariri operate the highest number of connections. As the largest system, Ōtautahi/Christchurch wastewater infrastructure includes eight treatment plants, 2,679 km of public

wastewater pipes, 30,817 manholes, and 239 pumping, lift, and vacuum stations. The flat, low-lying topography of Christchurch contributes to wastewater network challenges, with flat grades and significant pumping requirements. Where grades are flat and flows lower (for example during times of drought), it is sometimes necessary to flush extra water down the line to prevent blockages.

Table 10.7: Wastewater infrastructure

District	Towns serviced	Connections (population)	Sewerage Pipe length (km)
Ashburton	3 (Ashburton (including Lake Hood), Methven Rakaia)	8,993	171
Ōtautahi/ Christchurch	9 (Ōtautahi/Christchurch, Lyttelton, Diamond Harbour, Governors Bay, Akaroa, Duvauchelle, Tikao Bay and Wainui	160,000	1,622 (gravity) 253 (pressure) 61 (vacuum)
Hurunui	7 (Amberley, Amberley Beach, Leithfield, Leithfield Beach, Greta Valley, Motunau, Cheviot, Waikari, Hawarden and Hanmer Springs)	no data	141
Kaikōura	2 (Kaikōura and Ocean Ridge)	approximately 3,000 (winter) - 4500 (summer)	61
Mackenzie	4 (Fairlie, Tekapo, Twizel (and Burkes Pass))	2,786	78
Selwyn	14	63% of population	300
Timaru	4 (Timaru, Geraldine, Pleasant Point and Temuka)	30,000	354
Waimakariri	12	17,083	240
Waimate	1 (Waimate)	1,730	67
Waitaki*	4 (in Region) Lake Ohau, Omarama, Otematata, Kurow	(785)	27

* For Waitaki, table 10.7 shows only the infrastructure located in the Canterbury region. Infrastructure in the Otago region will be under similar climate stress, and this should be factored-in during future climate change response activities.

Source: Ashburton District Council, 2018; Christchurch City Council, 2021; Hurunui District Council, 2021; Kaikōura District Council, 2021; Mackenzie District Council, 2018; Selwyn District Council, 2018; Waimakariri District Council, 2021; Waimate District Council, 2018; Waitaki District Council, 2021; Timaru District Council, 2021.

In Canterbury, wastewater networks are highly exposed to coastal, surface water and river flooding. Wastewater networks are prone to exposure from coastal and river flooding because the discharge points of these assets are generally at the lowest elevation of a populated area (White, et al., 2017). Over 1,000 km of wastewater pipe in Canterbury crosses flood-prone land (Figure 10.12) (Paulik, et al., 2019). Exposure of wastewater assets to coastal flooding (including 0.8 m sea level rise) may affect around 345 km of pipe. Of this, 297 km is located within Ōtautahi/Christchurch City and 32 km in Timaru (Figure 10.13) (Paulik, et al., 2019).

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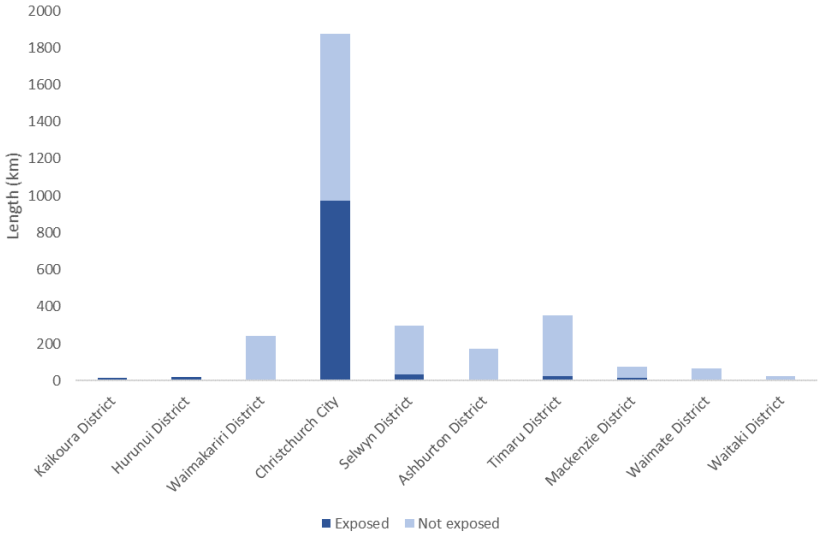

Figure 10.12: Exposure of wastewater pipes to present day river and surface water flooding by district (Paulik et al., 2019).

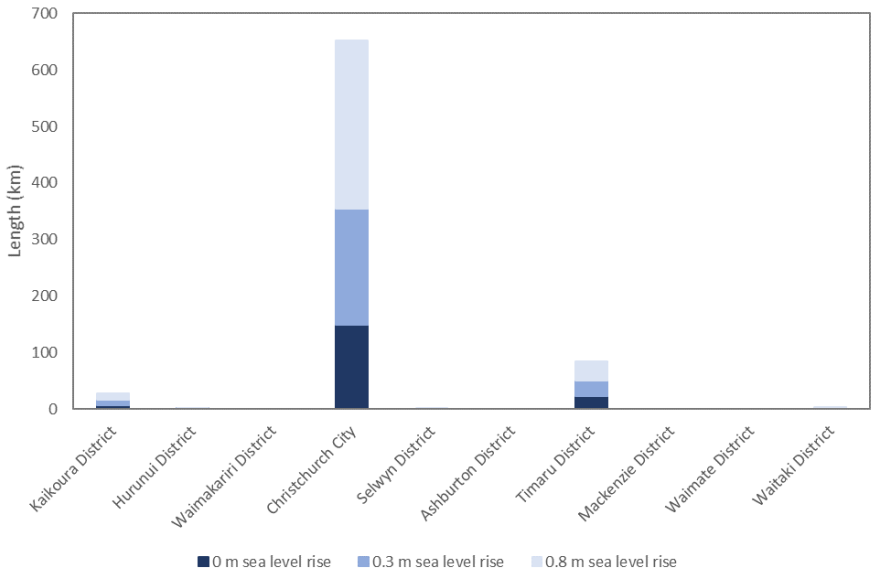

Figure 10.13: Exposure of wastewater pipes to present day coastal flooding and incremental sea level rise by district (Paulik et al., 2019).

Wastewater networks are sensitive to flooding due to a range of impacts (Hughes, et al., 2019):

- Sea level rise may lead to the stranding of some services or communities, particularly in the low-lying areas of Ōtautahi/Christchurch.
- Infiltration from floodwater into wastewater pipelines can cause blockages and damage, or overload pump stations and wastewater treatment plants. This can cause uncontrolled discharges to waterways, with consequential water quality implications.
- Infiltration of sea water can increase salinity of wastewater flows, altering treatment plant processes, or it can contribute to deterioration of pipe condition. It can also have negative

consequences for the mechanical and biological integrity of these systems and higher operating and maintenance costs. (Flood & Cahoon, 2011).

- Higher groundwater tables can further increase infiltration, introduce issues relating to flotation, or reduce the performance of land disposal (Hughes, et al., 2019).

The design, age, and location of the wastewater system can influence the sensitivity of a wastewater network. Many older systems are not designed to accommodate increased flows that may occur from flooding, and therefore will lack capacity, having potential to overflow more frequently (White, et al., 2017). They may also be in worse condition, so will be more susceptible to corrosion or damage from erosion. Newer assets, such as those replaced following the Canterbury Earthquake Sequence (commenced 2010), may have reduced sensitivity to these types of damages.

Wastewater treatment plants and assets have a low adaptive capacity because they are generally constrained by the network they serve. The systems are generally complex in nature and are designed for permanent serviceability. The potential replacement of wastewater assets provides some adaptive capacity, as these can be designed to consider future climate conditions. Wastewater infrastructure is, however, expensive to upgrade. It is hard to relocate into areas that are not exposed to climate related hazards, as this type of infrastructure performs best when located at the downstream point of the network (Stakeholder Engagement, 2021).

10.7.2 Stormwater infrastructure

Stormwater systems include piped networks, manholes, inlets, outfalls, pumping stations, soakage pits, wetlands, bioretention devices and detention dams. Additionally, there is an extensive network of rural drains, swales, and channels, some of which are serviced as part of the road network. As with the wastewater network, the scale of stormwater assets reflects the size of the town or city. The vast majority of stormwater assets are located in Ōtautahi/Christchurch City (Table 10.8).

Table 10.8: Stormwater infrastructure

District	Towns serviced	System length (km)
Ashburton	3	42.2
Ōtautahi/Christchurch		935
Hurunui	22	12
Kaikōura	2	17
Mackenzie	3	18
Selwyn	21	80
Timaru	4	145
Waimakariri	5	107
Waimate	1	13.5
Waitaki*	4 (in Region)	5

* For Waitaki, table 10.8 shows only the infrastructure located in the Canterbury region. Infrastructure in the Otago region will be under similar climate stress, and this should be factored-in during future climate change response activities.

Source: Ashburton District Council, 2018; Christchurch City Council, 2021; Hurunui District Council, 2021; Kaikōura District Council, 2021; Mackenzie District Council, 2018; Selwyn District Council, 2018; Waimakariri District Council, 2021; Waimate District Council, 2018; Waitaki District Council, 2021.

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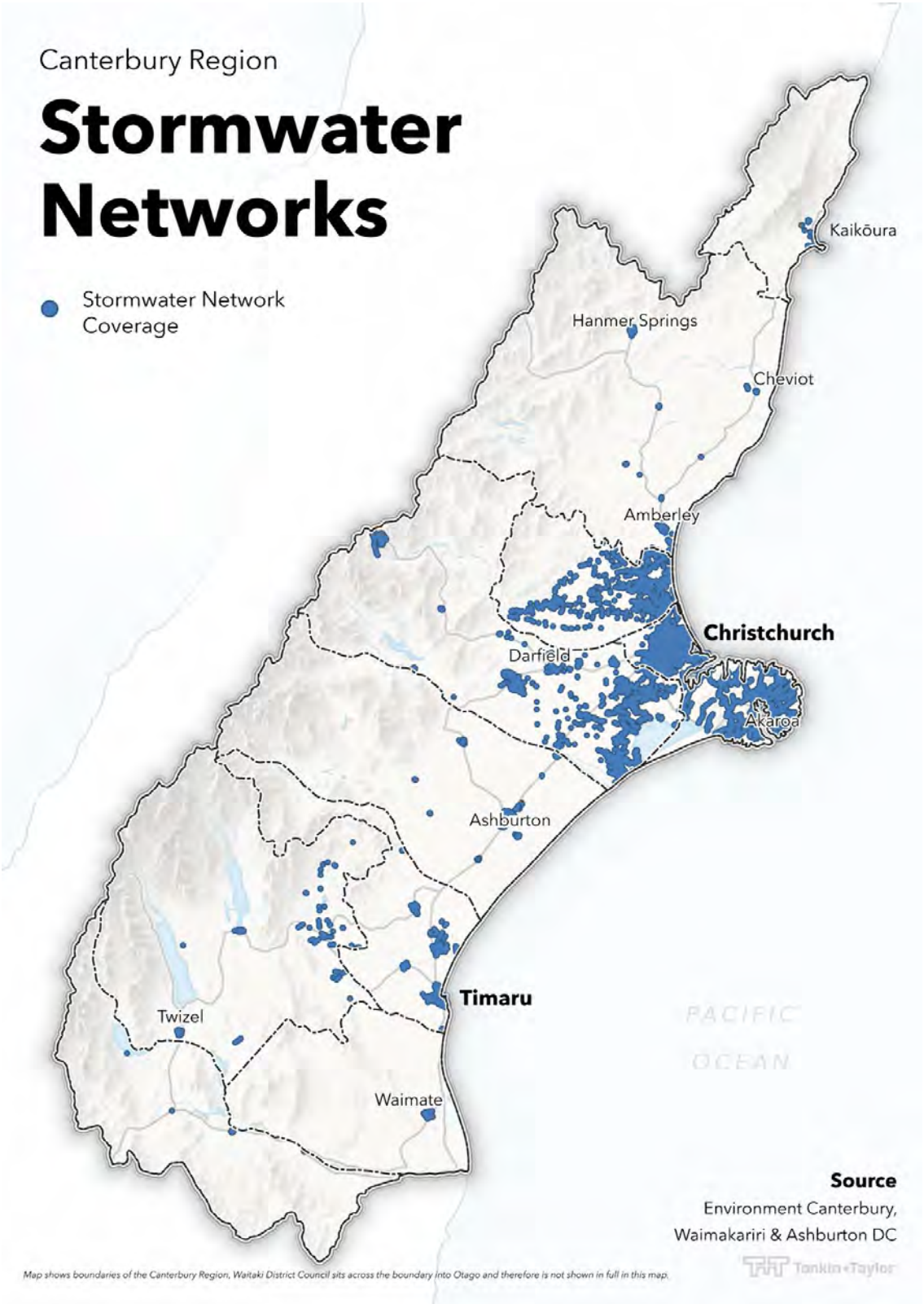

Figure 10.14: Stormwater networks in the Canterbury Region.

In Canterbury, stormwater systems are highly exposed to coastal, surface water, and river flooding. Ōtautahi/Christchurch City has more than 700 km of stormwater pipelines situated within floodplains (Figure 10.15). A further 207 km of stormwater pipelines will be exposed to coastal flooding under RCP8.5 with 0.8 m sea level rise (Figure 10.16) (Paulik, et al., 2019).

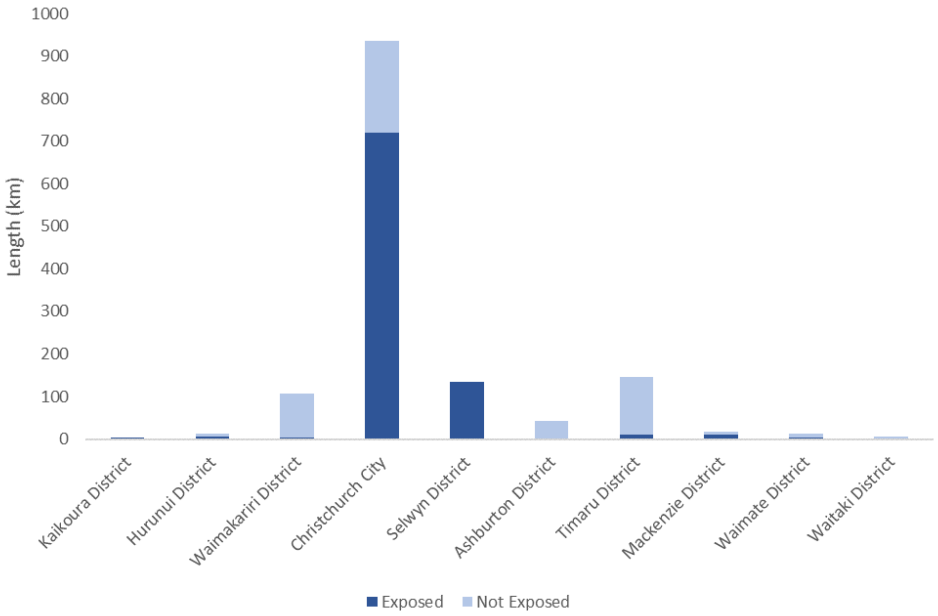

Figure 10.15: Exposure of stormwater pipes to present day river and surface water flooding by district (Paulik et al., 2019).

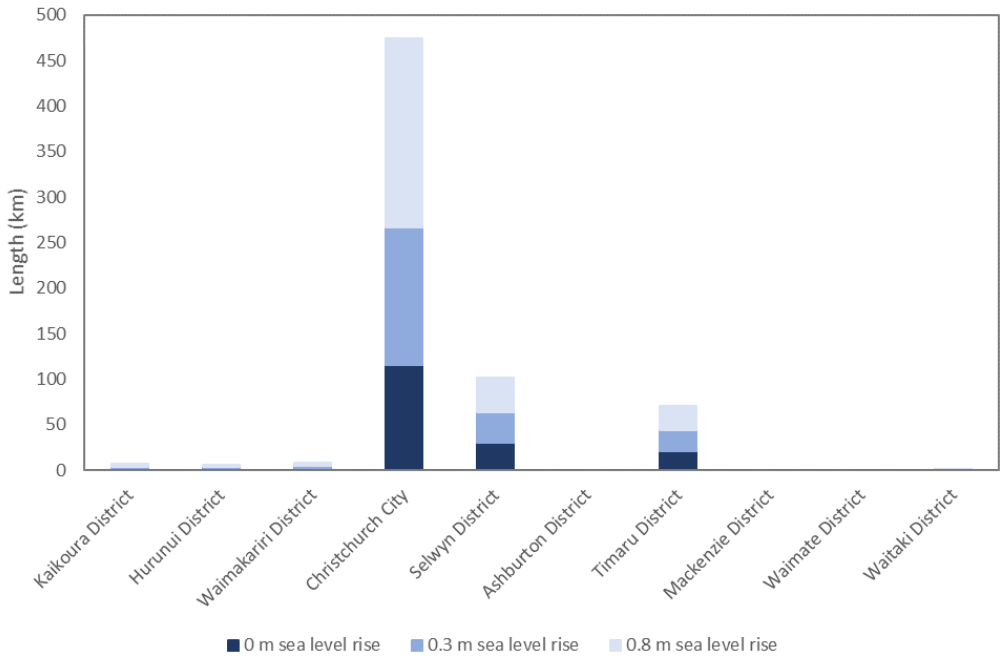

Figure 10.16: Exposure of stormwater pipes to present day coastal flooding and incremental sea level rise by district (Paulik et al., 2019).

Stormwater systems are sensitive to flooding and due to a range of impacts (Hughes, et al., 2019):

- Coastal and river flooding is likely to result in erosion. This can damage outfall structures located near rivers or the coast.
- High water levels (due to flooding) at outfall locations are likely to reduce the capacity for drainage, which may compound surface flooding in urban areas.
- Flooding may overload stormwater systems, causing inflows to combined wastewater systems, with consequential water quality implications.
- Raised groundwater levels may contribute to infiltration, further reducing the capacity of the network, or introducing issues relating to flotation, particularly in pump stations.

Many of these issues also contribute to water quality issues within the receiving waterways.

As with wastewater networks, ageing infrastructure has increased sensitivity to many of these impacts. Most councils have identified that their stormwater infrastructure is ageing, and so are taking action to upgrade the network. Some areas of new infrastructure within Ōtautahi/Christchurch may have increased resilience to some of these issues, as councils require that new stormwater infrastructure must be designed to accommodate climate change. Areas within Kaikōura have recently benefited from seismic uplift, providing benefits for drainage that are likely to reduce the exposure of the town to flooding.

Stormwater systems have a low adaptive capacity because they are generally constrained by the connection to the broader network, and rely on gravity to convey flows.

10.8 Flood defences

The highest rated risks to flood defences are those due to sea level rise, coastal erosion, and flooding.

Coastal flood defences and stopbanks near the coast will be exposed to increasing sea level rise and coastal erosion. River flood protection schemes will be exposed to increased magnitude and frequency of extreme rainfall, which may contribute to increased erosion and scour, overtopping or failure. Older stopbanks generally have lower levels of protection, and those in poor condition will have the highest sensitivity to erosion. The adaptive capacity of stopbanks is limited by high costs and limited land availability.

Table 10.9: Summary of risks to stopbanks and flood management schemes

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to stopbanks and flood management schemes due to river and surface flooding	Moderate	High	Extreme	Extreme	Projected increases in the size and frequency of flood events may effectively lower the level of service currently provided by stop banks and increase the occurrence of overtopping or flood damage. Although the structures are designed to convey floods, exceeding the design capacity or frequent exposure to high flows may cause damage or failure. is exceeded, or increasing damage may occur with high flows. Options to adapt or upgrade may be limited by high construction costs and limited land availability.
Risk to stopbanks and flood management schemes due to sea-level rise and salinity stresses	Low	Moderate	Moderate	Moderate	Projected increases in sea-level rise will increase the exposure of stopbanks located near the coastal edge to related flooding and erosion damage. A relatively small portion of schemes may be exposed to coastal hazards relative to fluvial flooding, with sensitivity, to damage influenced by the condition and age of the structure. Options to adapt or upgrade may be limited by high construction costs and limited land availability.

Table 10.10: Summary of risks to coastal barriers and sea walls

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to coastal barriers and sea walls due to increasing coastal erosion	Low	High	High	High	High exposure is rated at present day due to location along coastal edge, increasing to extreme by late century. Moderate sensitivity as structures are designed to protect against coastal hazard, but design capacity may be exceeded, or increasing damage may occur with increasing exposure. Medium adaptive capacity reflects the ability to upgrade, which is limited by high costs and limited land availability.
Risk to coastal barriers and sea walls due to coastal flooding	Low	High	High	High	Projected increases in sea-level rise, storms and wind and coastal flooding will increase exposure of sea walls and barriers as these are located along the coastal edge. These structures are designed to protect against coastal hazards, however damage may occur if the design capacity is exceeded, or due to sustained and increasing exposure. High costs and limited land availability limit the capacity to adapt.
Risk to coastal barriers and sea walls due to storms and wind	Low	High	High	High	Projected increases in sea level rise, storms and wind and coastal flooding will increase exposure of sea walls and barriers as these are located along the coastal edge. These structures are designed to protect against coastal hazards, however damage may occur if the design capacity is exceeded, or due to sustained and increasing exposure. High costs and limited land availability limit the capacity to adapt.
Risk to coastal barriers and sea walls due to sea-level rise and salinity stresses	Low	High	High	High	Projected increases in sea level rise, storms and wind and coastal flooding will increase exposure of sea walls and barriers as these are located along the coastal edge. These structures are designed to protect against coastal hazards, however damage may occur if the design capacity is exceeded, or due to sustained and increasing exposure. High costs and limited land availability limit the capacity to adapt.

For the purpose of this assessment, flood defences are defined as stopbanks and sea walls. Environment Canterbury manages 59 river control and drainage schemes from Kaikōura to Waitaki (shown in Figure 10.17), protecting a total asset value of $691 million. A drainage bylaw is in place to manage, regulate, and protect these assets from inappropriate modification, damage or destruction (Environment Canterbury, 2021b).

Across Canterbury, flood protection and drainage works are carried out in dedicated rating districts. Management of rating districts is split over three geographical engineering areas: Northern, Central and Southern Canterbury (Environment Canterbury, 2021b). The Northern District covers the Waimakariri-Eyre-Cust Scheme to the Kaikōura Rivers and Kaikōura Drainage Schemes. The Central

District covers the Halswell Drainage and Te Waihora to Ashburton Hinds Drainage Scheme. The Southern District covers the Rangitata River to the Lower Waitaki River (Figure 10.17).

The level of service provided in each flood protection scheme varies across the 59 schemes. Currently, levels of protection are agreed with the benefitting community through a public meeting process. A flood protection and drainage bylaw is established to manage, regulate, and protect flood protection assets from damage, and to support monitoring of maintenance requirements (Environment Canterbury, 2021).

Twenty-five of the largest flood protection schemes have representative river rating district liaison committees. These committees are the voluntary eyes and ears on the ground for their local river flood and erosion protection and drainage works, and influence the overall direction of flood and erosion protection and drainage works.

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Canterbury Region
Transport
Road
Rail
Airport
Aerodrome
Kaikōura
Hanmer Springs
Cheviot
Amberley
Christchurch (CHC)
Lyttelton Port
Darfield
Akaroa
Ashburton
Mt Cook (MON)
Timaru (TIU)
Timaru Port
Twizel
Waimate
PACIFIC
OCEAN
Source
Waka Kotahi / KiwiRail / LINZ
Map shows boundaries of the Canterbury Region, Waitaki District Council sits across the boundary into Otago and therefore is not shown in full in this map.
Tonkin+Taylor

Figure 10.17: Flood defences in the Canterbury Region.

Stopbanks in Canterbury will be exposed to increasing size and frequency of flood events. This is due to projected increase in rainfall events with small annual exceedance probabilities throughout the country (Carey-Smith et al., 2018). As a result, flood flows are likely to increase in magnitude and frequency, effectively lowering the level of service currently provided by stopbanks. This may increase the occurrence of overtopping and cause flooding. Overtopping or flows that exceed the design capacity can lead to stop bank failure (Stakeholder Engagement, 2021).

The condition of stopbanks influences their sensitivity to climate change impacts. Older stopbanks generally offer a lower level of protection, as modern design standards account for changes in flows due to climate change (Stakeholder Engagement, 2021). Schemes that are in poorer condition may have an increased likelihood of scour or breach (Environment Agency, 2006). In these cases, failure threshold may be less than design standards, meaning that breach of the stopbank could occur before overtopping. Discussion with Environment Canterbury Flood Engineers suggest that this is likely the case for many of the stopbanks across Canterbury (Stakeholder Engagement, 2021).

Vegetation alongside flood defences is integral to design. It takes a long time to establish and grow back if damaged by fire weather or flooding. Depending on the type of vegetation, these can also act as a fire starter/enabler.

The majority of flood schemes in Canterbury (including but not limited to: Waitaki, Waihao, Otaio, Pareroa, Opihi, Orari and Waimakariri), contain sections located within close proximity to the coast. These schemes will have increasing exposure to sea level rise, coastal erosion and coastal inundation.

Stopbanks have a limited adaptive capacity due to the permanent nature of these assets. Earth stopbanks can be upgraded, but land availability for significant increases in size and extent of protection is often limited. Resistance from communities to having infrastructure in their back yard can be a further barrier to upgrades (Stakeholder Engagement, 2021). The cost of stopbank upgrades can be high. For example, cost of upgrades to the Waimakariri Flood Protection Scheme was $40 million. This project was implemented to reduce the risk of flooding in Ōtautahi/Christchurch City, Waimakariri, and Selwyn districts, by increasing the overall scheme capacity to 6,500 m^3/s. It included repair of earthquake damage, and added strength and resilience to the flood protection system already in place, as well as significantly lowering the risk of break-out during major flood events (Environment Canterbury, 2021).

As sea level rise and coastal hazards increase, coastal defences will be exposed to increasing damage and erosion, and the level of protection they provide will reduce. Integrated flood management planning uses both hard and soft approaches, which can provide some adaptive capacity. Ensuring both hard and soft defences (such as coastal wetlands) are designed for future climate conditions supports adaptation, which is important for continued community protection (Stakeholder Engagement, 2021). In some areas of Canterbury, an adaptive approach to coastal defences has been applied. For example, in Caroline Bay dunes have been created to protect communities and assets from coastal flooding. Dune restoration has also occurred throughout the Region, following erosion after large storms hitting the coast, particularly in Pegasus Bay (Orchard, 2014). Dunes and coastal wetlands are exposed to coastal storms, and subsequent flooding due to their location along the coast. These factors are likely to cause increasing erosion.

11 Ngā Waihanga | Infrastructure Services

Our communities rely on the infrastructure that serves them. Ngā waihanga (infrastructure services) describes these critical services. Our roads, rail, ports, and airports allow our people to connect with each other physically. They also provide critical corridors for our supply chains and services. Solid waste management keeps our communities functioning safely by protecting them from contaminated land and waste. Some infrastructure services are discussed in other sections, including three waters infrastructure within Section 8 Wai (Water).

Canterbury is the largest of New Zealand's Regions by area, spanning a significant length of the South Island. Many critical transport routes cross the Region, which is also home to the country's second largest airport and two major ports (Figure 11.1).

Ngā waihanga (infrastructure services) is interconnected with many other aspects of the natural and physical world of Canterbury. These critical aspects of our infrastructure are integral to hapori (sense of community). By managing our solid waste carefully, we can contribute to protecting wai (water), rerenga rauropi (biodiversity), and hauora (physical health).

11.1 Summary of risks

Risks to ngā waihanga (infrastructure services) are identified through consideration of transportation routes, ports and airports, as well as solid waste and energy supply and transmission. The rated risks relating to these aspects of ngā waihanga (infrastructure services) are identified in Table 11.1 below.

Table 11.1: Risks to Ngā waihanga (infrastructure services)

Using RCP8.5	Higher mean temperatures			Change in mean annual rainfall			Drought			River and surface flooding			Coastal flooding			Increased coastal erosion			Sea-level rise and salinity stresses			Storms and wind			Increased fire-weather			Increasing landslides and soil erosion			Extreme weather events			Reduced snow & ice			Ocean chemistry changes			Marine heatwaves			Climate change		
	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L
Airports										M	H	E																																
Marine facilities																			L	M	H	M	H	E																				
Rail	L	M	H													H	H	E	L	M	H							M	H	E														
Roads and bridges										L	H	E				M	H	E	L	M	H																							
Solid waste management and contamination sites										M	M	H				M	E	E	M	E	E																							

Key

I	Insignifcant	P	Present day
L	Low	M	Mid (2050)
M	Moderate	L	Long (2100)
H	High		
E	Extreme		

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11.2 Linear transport

Risk to linear transport includes risks to roads, bridges, and rail networks. The highest rated risks from climate change include those due to changes in rainfall and sea level rise, with associated flooding, and coastal erosion.

Risk to linear transport due to inland flooding and erosion is rated to increase to extreme by late century. This is because exposure to flooding is projected to increase, and is also due to the high sensitivity of these assets to erosion. There is currently a moderate sensitivity to flooding, which is likely to increase to high over time. Linear transport generally has a medium adaptive capacity to flooding. There is a low rated adaptive capacity of linear transport to coastal erosion, with retreat or abandonment of assets being the likely feasible options. Linear transport is also at risk from increased temperature as pavements can melt, rails can warp, and maintenance of unsealed roads made more difficult at high temperatures. Specific assets have differing levels of adaptive capacity. For rail, risk resulting from increased temperatures and landslides is rated as extreme by the end of the century. This is due to its extreme exposure and extreme sensitivity to these hazards at 2100. However, the adaptive capacity for rail assets is rated as moderate, as increased maintenance is likely to decrease the risk. Bridges are rated to have a low adaptive capacity to risk, due to their permanent nature and the high cost of replacement

Table 11.2: Summary of risks to linear transport

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to rail due to increasing coastal erosion	High	High	Extreme	Extreme	Coastal erosion is likely to increase with projected sea level rise and increasing storminess. Sections of rail are exposed to coastal erosion, particularly along the Kaikoura Coast. Coastal erosion may damage tracks severely, and cause disruption to services. Some coastal routes have limited options for alternative inland routes, and are required to continue to serve existing communities.
Risk to rail due to increasing landslides and soil erosion	Moderate	High	Extreme	Extreme	A large section of the Kaikoura rail line is located adjacent to coastal cliffs. Coastal erosion may erode or destroy the track causing disruptions and damage. There is potential for strengthening of these sections of cliff face or improved coastal defences.
Risk to rail due to higher mean temperatures	Low	Moderate	High	High	Projected increasing temperatures may increase the occurrence of buckling of tracks. Maintenance can be done to avoid buckling i.e. destressing
Risk to rail due to sea-level rise and salinity stresses	Low	Moderate	High	High	Projected sea level rise may cause inundation and increase salinity stress for coastal rail routes such as those along the Kaikoura Coast. This may cause coastal erosion, disruption to services and increase corrosion due to salt water intrusion. Some coastal routes have limited options for alternative inland routes, and are required to continue to serve existing communities.
Risk to roads and bridges due to increasing coastal erosion	Moderate	High	Extreme	Extreme	Coastal erosion is likely to increase with projected sea level rise and increased storminess. Coastal roads and bridges may be exposed to erosion which can damage bridge footings, road foundations, and erode surfaces. Options to adapt include retreat or abandonment.
Risk to roads and bridges due to river and surface flooding	Low	High	Extreme	Extreme	Projected increases in extreme rainfall events are likely to result in increased surface and riverine flooding. Bridges exposed to flooding may be damaged through erosion, debris strike or washout. Flooding can cause disruption and damage to roads, which is influenced by material, type of structure, condition and age. Improved resilience can be achieved though maintenance and provision of alternative routes.
Risk to roads and bridges due to sea-level rise and salinity stresses	Low	Moderate	High	High	Projected sea level rise is likely to increase exposure of roads to inundation and salinity stress. Roads exposed to inundation may be damaged and travel routes disrupted.

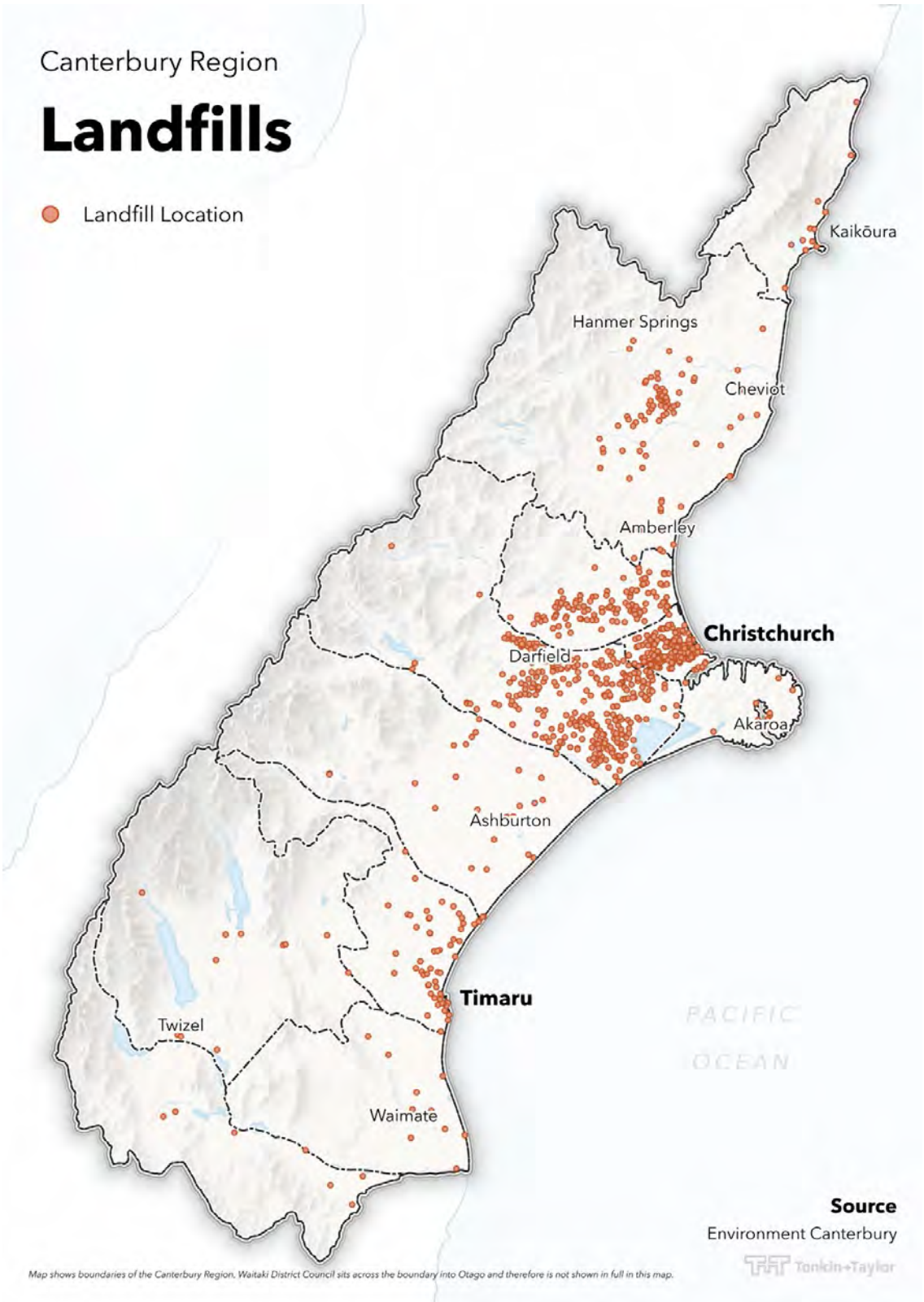

Canterbury Region
Landfills
Landfill Location
Kaikōura
Hanmer Springs
Cheviot
Amberley
Christchurch
Darfield
Akaroa
Ashburton
Timaru
Twizel
Waimate
PACIFIC
OCEAN
Source
Environment Canterbury
Tonkin+Taylor
Map shows boundaries of the Canterbury Region. Waitaki District Council sits across the boundary into Otago and therefore is not shown in full in this map.

Figure 11.1: Major transport routes in the Canterbury Region.

The Canterbury Region has 9,904 km of sealed road and 6,218 km of unsealed roads. Of the total 16,122 km of road, 13,188 km is categorised as rural, and 2,916 km as urban (Figure NZ, 2021). Ashburton and Selwyn have the longest networks of rural roads, and Ōtautahi/Christchurch the greatest length of urban roads (Table 11.3).

Table 11.3: Length of road and bridges within each district (Figure NZ, 2021)

District	Rural roads (km)	Urban roads (km)	Bridges (number)
Ashburton	2410	202	181
Christchurch	731	1677	353
Hurunui	1361	80	280
Kaikōura	157	27	47
Mackenzie	677	62	95
Selwyn	2296	303	no data
Timaru	1481	240	280
Waimakariri	1312	267	288
Waimate	1286	52	185
Waitaki*	1627	171	121

* For Waitaki, table 11.3 shows only the infrastructure located in the Canterbury region. Infrastructure in the Otago region will be under similar climate stress, and this should be factored-in during future climate change response activities.

Canterbury has the second largest rail route length in New Zealand at 611 km (2017 data, Figure NZ).

The rail route and State Highway 1 (SH1) provide an important connection along the length of the Region. State highways provide an important connection to many of the communities in the Region. In some cases, the State highway is the main, or even the only, connection serving the town. Both rail and State highway routes are generally located in the flat lowlands along the coastal fringe of the Canterbury plains, in some cases adjacent to the coastline. The Region's many rivers cross these routes (Figure 11.1). The damage to SH1 sustained during the Kaikōura Earthquake (2016), along with more recent flooding during May and June 2021, highlighted the importance of state highways in connecting communities.

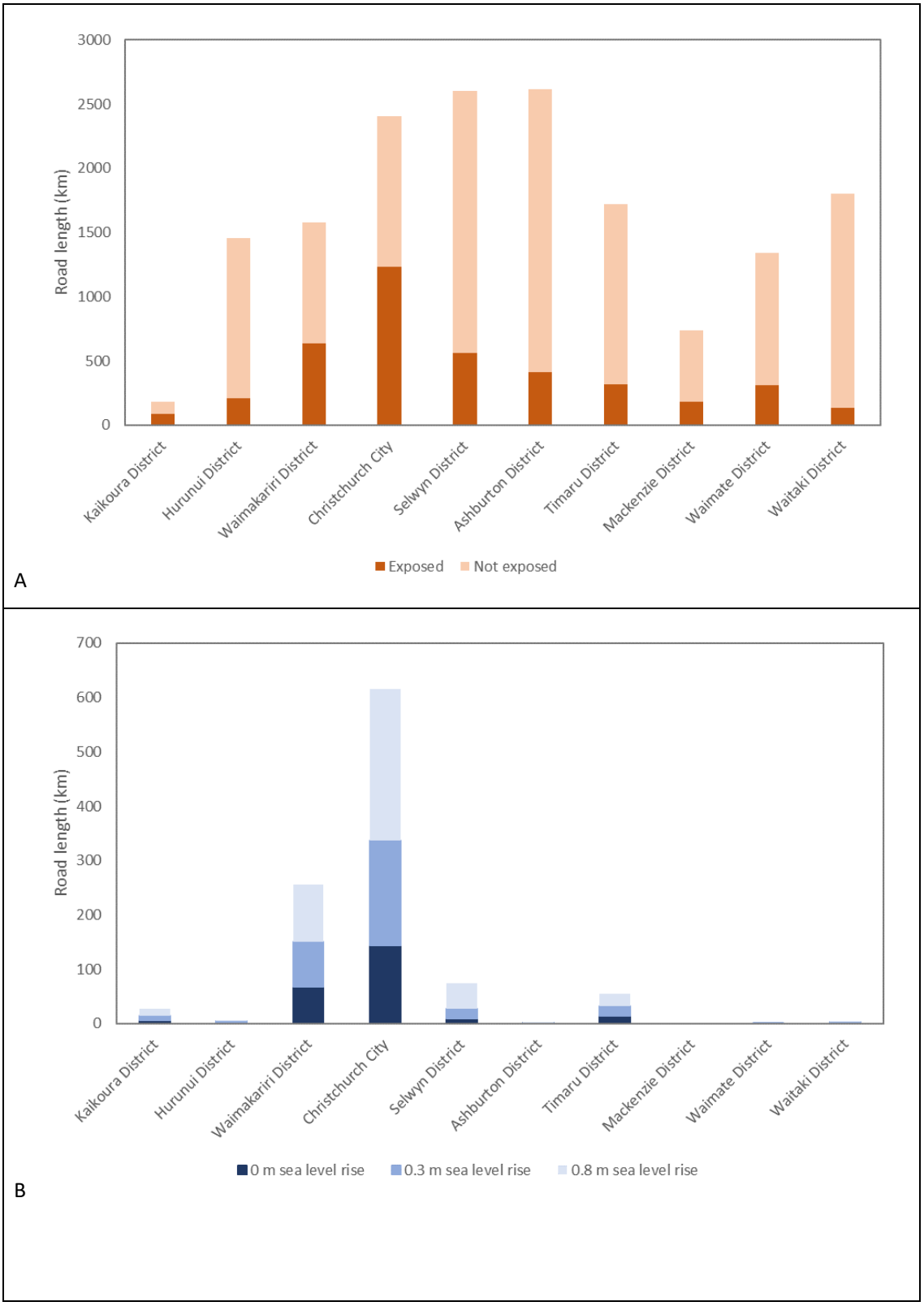
Canterbury's roads and rail have high exposure to surface water flooding, with 3,947 km of road, and 156 km of railway exposed. Of the exposed roads, 1,232 km are located within Ōtautahi/Christchurch City, followed by 637 km in the Waimakariri District and 415 km in the Ashburton District (Figure 11.2). Of the rail lines exposed, 28 km are located within the Waimakariri District, 25 km are located within Selwyn, and Waimate and Ōtautahi/Christchurch each have 22 km exposed (Figure 11.2).

Canterbury's roads have extensive exposure to coastal flooding. There is 243 km of road exposed to at the 1% AEP + 0.0 m sea level rise. This increases to 321 km with 0.3 m sea level rise, and 469 km with 0.8 m sea level rise. Of those roads exposed at 0.0 m sea level rise, 144 km are located in Ōtautahi/Christchurch City, 67 km are located within the Waimakariri District and 14 km are located within Timaru. This increases to 279 km, 104 km and 23 km with 0.8 m sea level rise for Ōtautahi/Christchurch, Waimakariri and Timaru Districts respectively (Figure 11.2).

There is 8 km of rail exposed at the 1% AEP + 0.0 m sea level rise within the Canterbury Region. This increases to 10 km with 0.3 m sea level rise and 17 km with 0.8 m sea level rise[5]. Of the rail exposed

[5] Sea level rise is projected to be up to 0.8 m under RCP 8.5. Exposure data relative to 0.9 m sea level rise is included in this assessment as this is the available information.

at the 1% AEP + 0.0 m sea level rise scenario, 3 km is located within each of the Waimakariri and Kaikōura Districts (Figure 11.2) (Paulik, et al., 2019).



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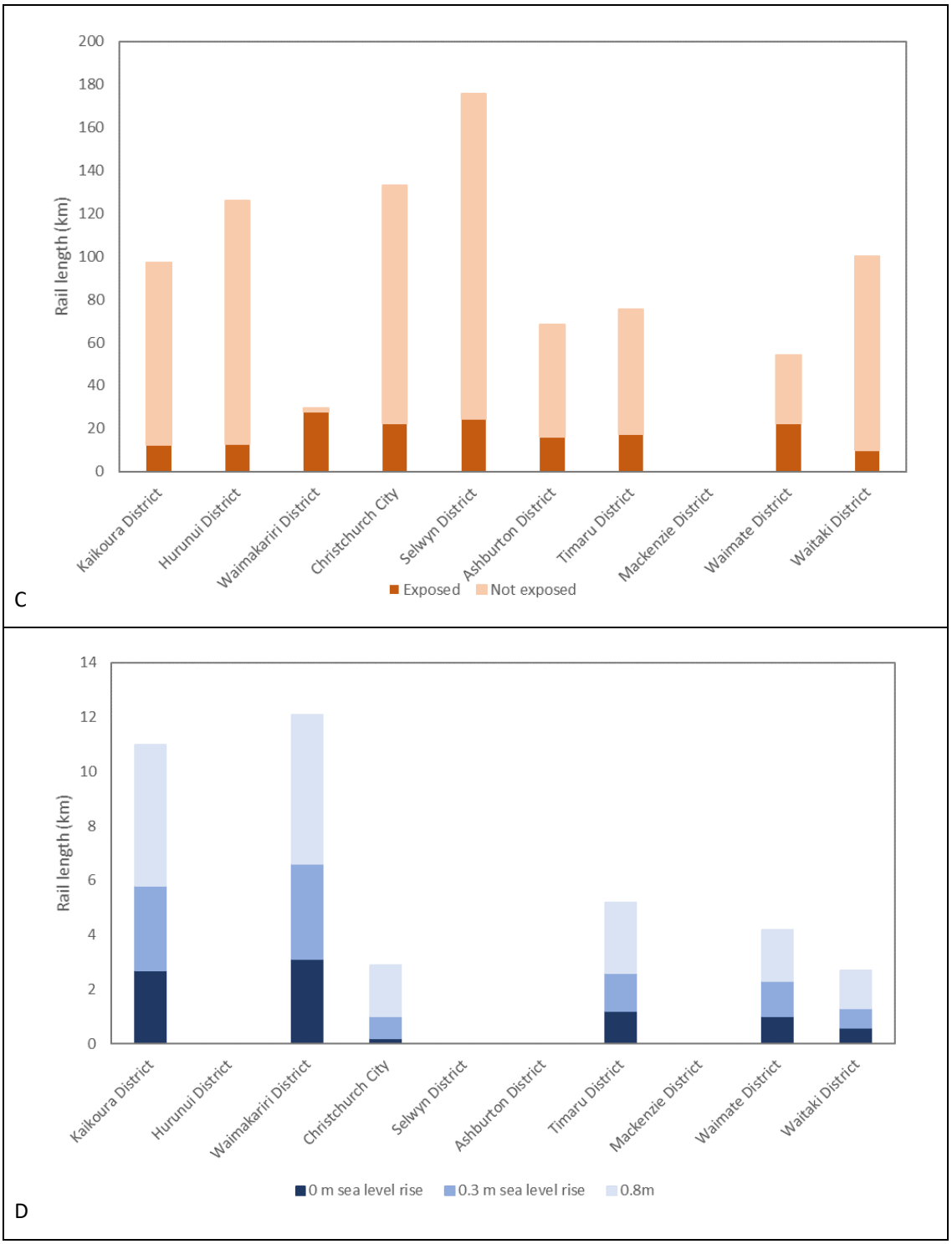

Figure 11.2: Exposure of roads and rail to present day flooding (A and C respectively) and coastal flooding (B and D) by district in Canterbury (Paulik et al., 2019).

The numerous rivers and coastal routes within Canterbury mean that many of the Region's transport connections are exposed to flooding and erosion. Many bridges also serve as critical connections, as was highlighted during recent Canterbury floods, during which flooding and debris caused damage

to the Ashburton Bridge on SH1. The bridge provides a critical connection, disruption of which impacted the supply chain, affecting the lower South Island (Stakeholder Engagement, 2020).

The sensitivity of roads and bridges to flood damage such as erosion is influenced by both road condition and material type. Rural roads and unsealed roads are often in poorer condition than urban roads, as they have less frequent maintenance. Increased rainfall and flooding events can cause washouts of roads, leading to extensive disruption and a high cost for repair. For example, the April 1951 flooding in Canterbury caused $7.7 million (measured in equivalent 2009 dollars) in damage to roads. Slips and washouts blocked major railway lines, with several slips on the line between Craigieburn and Avoca, and Darfield and Springfield. Three major washouts occurred between Hanmer and Lewis Pass, with heavy surface flooding in many locations. (New Zealand Historic Weather Events Catalogue, 2021). The South Canterbury floods in 1986 caused $30 million (measured in equivalent 1991 dollars) in rail and road damage, with floods, slips, washouts and surface flooding occurring. Many roads were scoured out. (New Zealand Historic Weather Events Catalogue, 2021)

Coastal erosion, increased rainfall, and flooding can all cause scouring of bridge foundations, which can lead to foundation failure. Sea level rise can cause saline incursion, increasing the rate of material deterioration. (Gardiner, et al., 2009a)

Rail sensitivity to flood and heavy rainfall is influenced by ballast material and construction. Ballast can be susceptible to washout during flood events, causing delays and reducing speeds. (Network Rail, 2020).

The adaptive capacity for State highways and main trunk lines is generally limited due to their permanent nature, need to connect to the communities that they serve, and limited alternative geographic corridors. However, some actions can be taken, through increased maintenance or strategic planning, to reduce impact from climate related hazards. These include:

- Raising road and rail levels, and increasing redundancy within the network (Byett, et al., 2019).
- Destressing tracks to ensure buckling does not occur in increased temperatures.
- Managed retreat.
- Technical and operational solutions, e.g. change in design standards to ensure alignment with flood risk strategies. (Gardiner, et al., 2009b).

11.3 Marine facilities and airports

The highest rated risks to marine facilities from climate change include those from sea level rise, increased storms and wind, and flooding. Marine facilities will be exposed to sea level rise and increasing severity of storms and wind.

Risk to marine facilities due to extreme weather events is rated as extreme by late century, with the risk due to sea level rise increasing to high by the end of the century. Sensitivity of marine facilities to both hazards is high, and they have a limited capacity to adapt through relocation.

Additional risks were raised during the 2021 Stakeholder Engagement, however these have not been rated or assessed as they were not identified during the 2020 Screening stage. One risk is that, as with other pavements, airport runways are also at risk from increased temperature as pavements can melt. Another identified risk is that reduced air density associated with warmer temperatures can lead to a need for longer take-offs, requiring longer runways, and reduced passenger capacity (Coffel et al., 2017).

Table 11.4: Summary of risks to marine facilities and airports for differing hazards

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to marine facilities due to storms and wind	Moderate	High	Extreme	Extreme	Sea level rise and increased storminess is projected to increase with climate change. This may cause disruption to port operations as storm surge and severe weather prevents normal operation and increases the risk of damage to cranes. The capacity for ports to adapt is limited by the need to remain at coastal locations, however these facilities can be upgraded to provide improved protection to sensitive equipment
Risk to marine facilities due to sea-level rise and salinity stresses	Low	Moderate	High	High	Sea level rise is projected to increase with climate change and may cause inundation of some facilities. The capacity for ports to adapt is limited by the need to remain at coastal locations, however low lying and sensitive parts of these facilities may be upgraded or raised.

There are four harbours within the Canterbury Region, including the two large commercial ports of Lyttleton and Timaru, as well as Akaroa and Kaikōura Harbours (which each have some commercial activities). Commercial vessels include all cargo vessels, cruise ships, fishing vessels, ferries and tourism operators throughout the Region (Environment Canterbury, Commercial Shipping, 2021). There are 31 airfields within the Canterbury Region, with one main international airport- Ōtautahi/Christchurch.

There is low exposure of airports to coastal flooding and sea level rise. After 1.4 m of sea level rise, only one airport will be exposed (Paulik, et al., 2019). Two airports, located in Ōtautahi/Christchurch City and Mackenzie District, are exposed to flooding. The nature of port facilities requires that they are located at the coastline, therefore all port facilities in the Region will be exposed to increasing sea level rise and coastal hazards.

Sea level rise and increased coastal flooding and storms have the potential to impact port facilities. Facilities will have increased risk of damage to surfaces, buildings, and electrical equipment as flooding increases. Disruption to operations will occur more regularly as storm surge and severe weather prevents normal operation and increases the risk of damage to cranes. The capacity for ports to adapt is limited by the need to remain at coastal locations. However, these facilities can be upgraded to provide improved protection to sensitive equipment.

Airports are sensitive to increased rainfall and flooding, which can cause damage to airport buildings, runways, and underground infrastructure. Increased rainfall can also require increased separation between planes during take off and landing, where airports with limited space will have a greater sensitivity (Burbidge, 2016). Increasing northwest wind events may increase runway usage, leading to an increase in upgrades and maintenance of assets. Increasing extreme weather events may change operational aspects of airports, impacting on planning. It may also drive an increased need for north-west runways and flight patterns, leading to an impact on noise contours (Stakeholder Engagement, 2021). Smaller airports have a moderate capacity to adapt, as they may be able to relocate or reconfigure runways. Christchurch Airport has limited capacity to relocate or reconfigure, due to the high costs and permanence of the facilities. Remodelling of the Waimakariri river is

critical for understanding surface water flooding effects for the Christchurch International Airport, and will support mitigation measures.

11.4 Landfills and contaminated sites

The highest rated risks to solid waste management infrastructure include those from coastal erosion, sea level rise, and river and surface water flooding.

Risk to landfills and contaminated sites due to coastal erosion and sea level rise is presently rated moderate, increasing to extreme by late century. This is due to both increasing exposure over time from high to extreme, combined with a high sensitivity and low adaptive capacity. Risk to landfills and contaminated sites due to flooding is lower relative to erosion and sea level rise, due to a greater capacity for protective works to be effective against riverine erosion.

Table 11.5: Risks to solid waste management and contamination

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to solid waste management and contamination sites due to increasing coastal erosion	Moderate	Extreme	Extreme	Extreme	Coastal erosion is likely to increase with projected sea level rise and increased storminess, which may expose some coastal landfills to erosion. Old landfills are particularly sensitivity to erosion due to often poor lining and capping protection. Increased leachate my be produced, or the integrity of landfill may be compromised. Landfills have a low adaptive capacity as they are permanent features that are expensive and complex to remove. Remedial works may increase protection against erosion and leachate.
Risk to solid waste management and contamination sites due to sea-level rise and salinity stresses	Moderate	Extreme	Extreme	Extreme	Projected sea level rise may expose some coastal landfills to salinity stress and inundation. Old landfills have high sensitivity due to likely poor lining and capping protection. Water ingress may cause Increased leachate to be produced, which may be a contaminant if the integrity of the landfill is compromised. Landfills are permanent features that are expensive and complex to remove, however remedial works may increase protection against erosion and leachate.
Risk to solid waste management and contamination sites due to river and surface flooding	Moderate	Moderate	High	High	Projected increases in extreme rainfall events are likely to increase riverine and surface flooding, increasing the number and frequency of landfills that are exposed. Flooding can cause erosion and cause floodwater to enter the cap. This is of particular concern for old landfills due to the often poor lining and capping protection. Landfills have a low adaptive capacity as they are permanent features that are expensive and complex to remove. Remedial works may increase protection against erosion and leachate.

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For the purpose of this assessment, solid waste management infrastructure includes landfills (open and closed), and contaminated sites. A high-level risk screening identified 902 landfills located throughout the Canterbury Region (Figure 11.3) (Tonkin & Taylor, 2020).

The main active landfill within the Region is Kate Valley Regional Landfill. Smaller landfills are located at Redruth, and the Municipal landfill at Kaikōura Resource Recovery Centre. Districts operate numerous waste management facilities, including water transfer centres and resource recovery centres. With the exception of Kaikōura, where a trial on kerbside collection was established to minimise waste (Kaikōura District Council, 2020), districts typically offer urban kerbside collection. The extent of disposal of waste on private farms is unknown but acknowledged to be likely in some districts (Mackenzie District Council, 2018). Councils are still managing the legacy of historic landfills (waste dumps). Since 1991, 52 dumps in Canterbury have been closed, with the Kate Valley Landfill established to manage regional waste (Transwaste Canterbury, 2021).

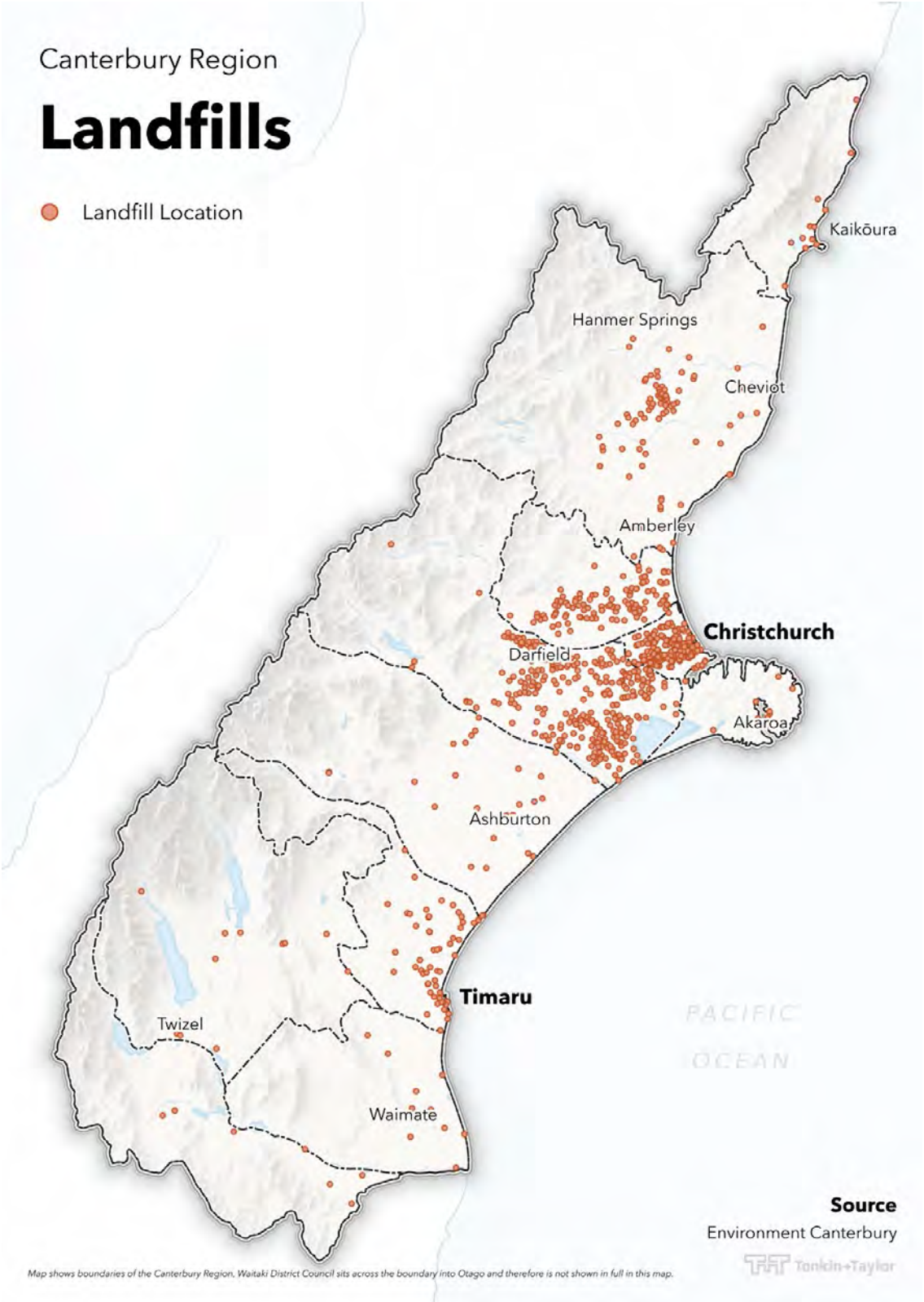


Figure 11.3: Location of landfills in Canterbury.

Of the 902 landfills within the Canterbury Region, 38 are exposed to river flooding. A further 34 are located within 150 m of the coast, meaning they are likely to be exposed to coastal erosion. There are 68 landfills exposed to the 1% AEP + 0.0 m sea level rise event, increasing to 77 with 0.3 m sea level rise, and 91 with 0.9 m sea level rise (Figure 11.4) (Tonkin & Taylor, 2020).[6]

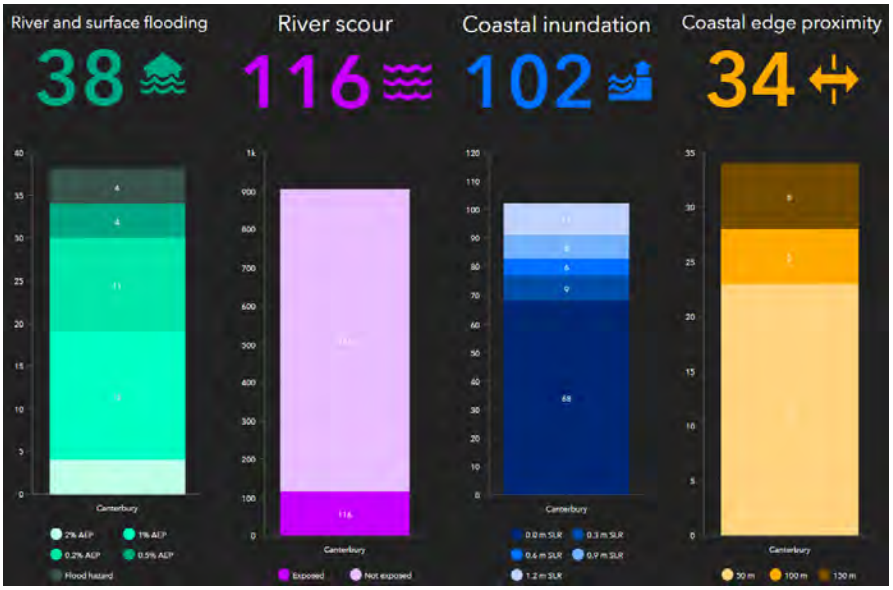


Figure 11.4: Exposure of landfills in Canterbury to flooding, scour and coastal inundation (Tonkin & Taylor, 2020).

Design characteristics can influence a landfill or contaminated site's sensitivity to climate related hazards. Characteristics such as a liner, cap, thickness of the cap, and whether there are any known issues with the landfill site can all influence its sensitivity to climate related hazards. Landfills with no liners have a greater sensitivity to sea level rise and coastal flooding, as water can cause leachate to escape and the mobilisation of contaminants (Beaven, et al., 2020). This is typically more common in older landfills that were not designed to modern standards. Many old landfills were formed from unlined old quarries, shingle pits, or areas that needed to be filled such as gullies or depressions. Many have been abandoned or capped, so are hard to detect. The full extent of landfills in Canterbury is unknown, as these include private dumping, farm waste sites, and historical capped pits, for which there are no records (Environment Canterbury, n.d).

Landfills with known issues have increased sensitivity due to the likelihood of their integrity failing. Open landfills have a greater sensitivity to flooding as materials can be mobilised more easily. They are also more sensitive to increased rainfall as storm water infiltration increases leachate generation, which has consequences for the receiving environment.

Landfills are permanent features, therefore adaptive capacity is relatively limited, as relocation is generally very costly. Closed landfills located away from river and coastal flooding are generally at lower risk from climate change. Those that are exposed to flooding and coastal inundation have increased risk of erosion, as older landfills were often not designed with suitable lining to protect against erosion. Canterbury Region is actively working to identify and manage the risk of climate change to landfills in the Region. District councils are also working to reduce risks to landfills, for example through improved capping or erosion protection (Timaru District Council, 2018).

[6] A measurement of 0.9 m sea level rise is used here for 2100 timeframe as per the Canterbury Landfills project (Tonkin & Taylor 2020).

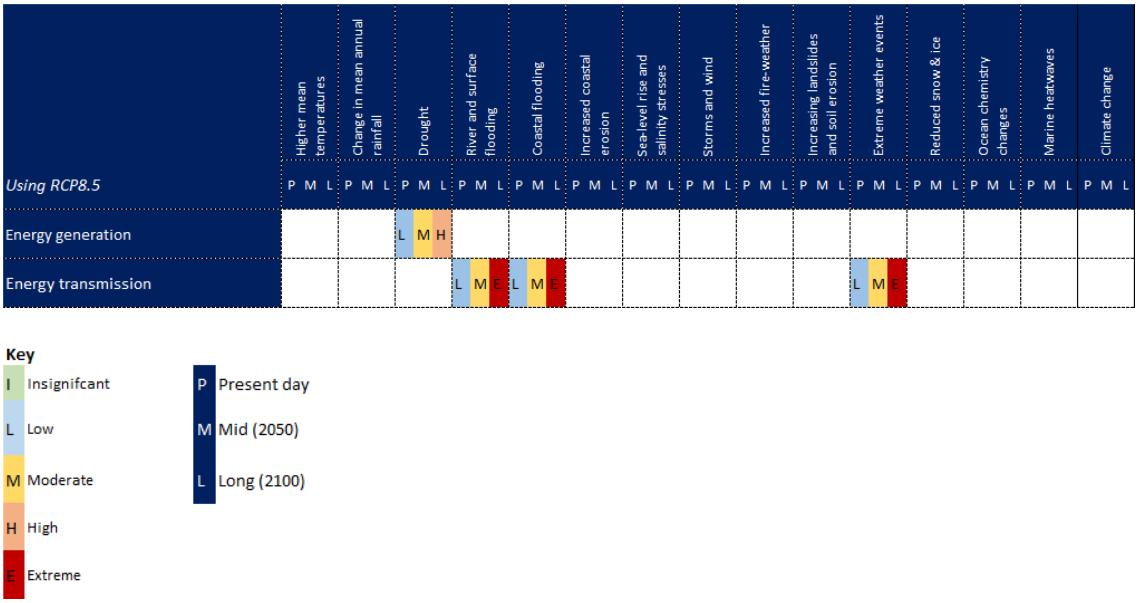
12 Hirihiri | Energy

Hirihiri (energy) is a lifeline service supporting the economy and wellbeing of all communities within Canterbury. The Region provides a significant contribution to the national electricity grid through its major power schemes in and around the Waitaki River (Figure 12.1), creating a relatively high proportion of renewable energy for the nation. Current energy usage also relies on sources outside the electricity grid. These are mainly non-renewables, such as petrol, diesel, and other fossil fuels. Typically, 33% of energy consumption in Ōtautahi/Christchurch is sourced from renewable energy (Greater Christchurch Partnership, 2021).

Hirihiri (energy) is interconnected with many other aspects of the natural and physical world of Canterbury. It is fundamentally integrated into the way communities operate. It supports hauora (physical health), through powering healthcare facilities and homes. It supports ōhanga (prosperity) by powering businesses, machines, supply chains and many aspects of our food supply. It supports hapori (sense of community) and ngā waihanga (infrastructure services) by powering much of the infrastructure that our communities rely on to function, including transport and waste management systems, as well as powering systems that deliver water supply, and wastewater systems designed to protect our wai (water).

12.1 Summary of risks

Risks to Hirihiri (Energy) are summarised by energy generation and energy transmission infrastructure.



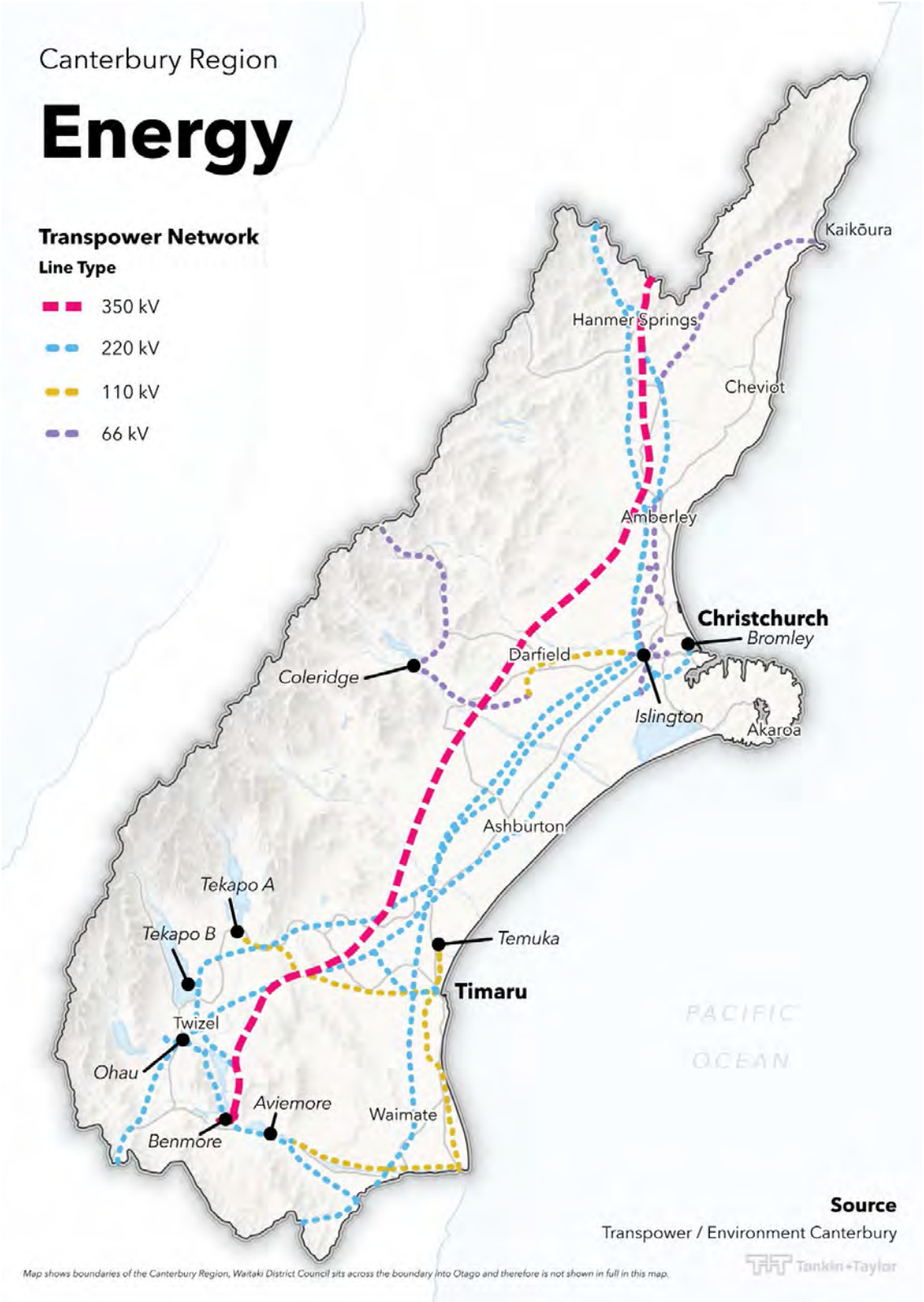


Figure 12.1: Energy and power distribution networks in the Canterbury Region.

12.2 Energy generation and transmission infrastructure

The highest rated risks to energy generation and transmission infrastructure include those from fire, drought, extreme weather events, and river, surface, and coastal flooding.

Energy generation in Canterbury is primarily sourced from hydropower schemes. The risk from drought to hydropower generation is rated to increase to high by late century, as exposure to increasing drought potential rises. Hydro power generation has high sensitivity to reduced water availability, as water is the primary resource from which energy is generated. Existing schemes have low capacity to adapt, but as a sector, there is a moderate adaptive capacity due to the potential for development of diverse renewable energy sources.

The risk to energy generation from other extreme events is rated to increase to extreme by late century. This is due to present low exposure levels increasing to extreme by late century, alongside high sensitivity of lines and structures to damage from winds and flooding, and a medium adaptive capacity limited primarily by cost.

The risk to power transmission from fire is likely to increase, conversely, power transmission can also contribute to fire. These risks were acknowledged in the Stakeholder Engagement (2021), however as they were not identified as priority risks in the 2020 Screening stage, they have not been fully assessed.

Table 12.1: Risks to energy generation and transmission infrastructure

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to energy generation due to drought	Low	Moderate	High	High	The potential for drought is projected to increase over time, which may impact water availability. Hydropower generation is the dominant source of energy generation in region, and is highly dependent on water availability. The adaptive capacity of hydropower generation is low for existing schemes, however there is potential for increased establishment and uptake of diverse energy sources regionally and nationally.
Risk to energy transmission due to river and surface flooding	Low	Moderate	Extreme	Extreme	Extreme weather events are projected to increase, with increasing exposure of transmission lines to wind, rainfall and flooding. Overhead transmission lines are particularly sensitive to damage from wind and flooding. Measures to reduce exposure of transmission lines include burying lines, however this can be prohibitively expensive for existing infrastructure.

Hydropower in Canterbury generates over 1,800 MW, providing over one third of the national hydro generation capacity. This contributes around 55-60% of the national energy supply. Canterbury's generation sites include major power stations at Benmore (540 MW) and the Upper Waitaki Scheme (848 MW), both operated by Meridian Energy. The majority of regional electricity generation occurs in these schemes, which are located on the Waitaki River and its tributaries (Tekapo, Pukaki, and Ohau) (Figure 12.2).

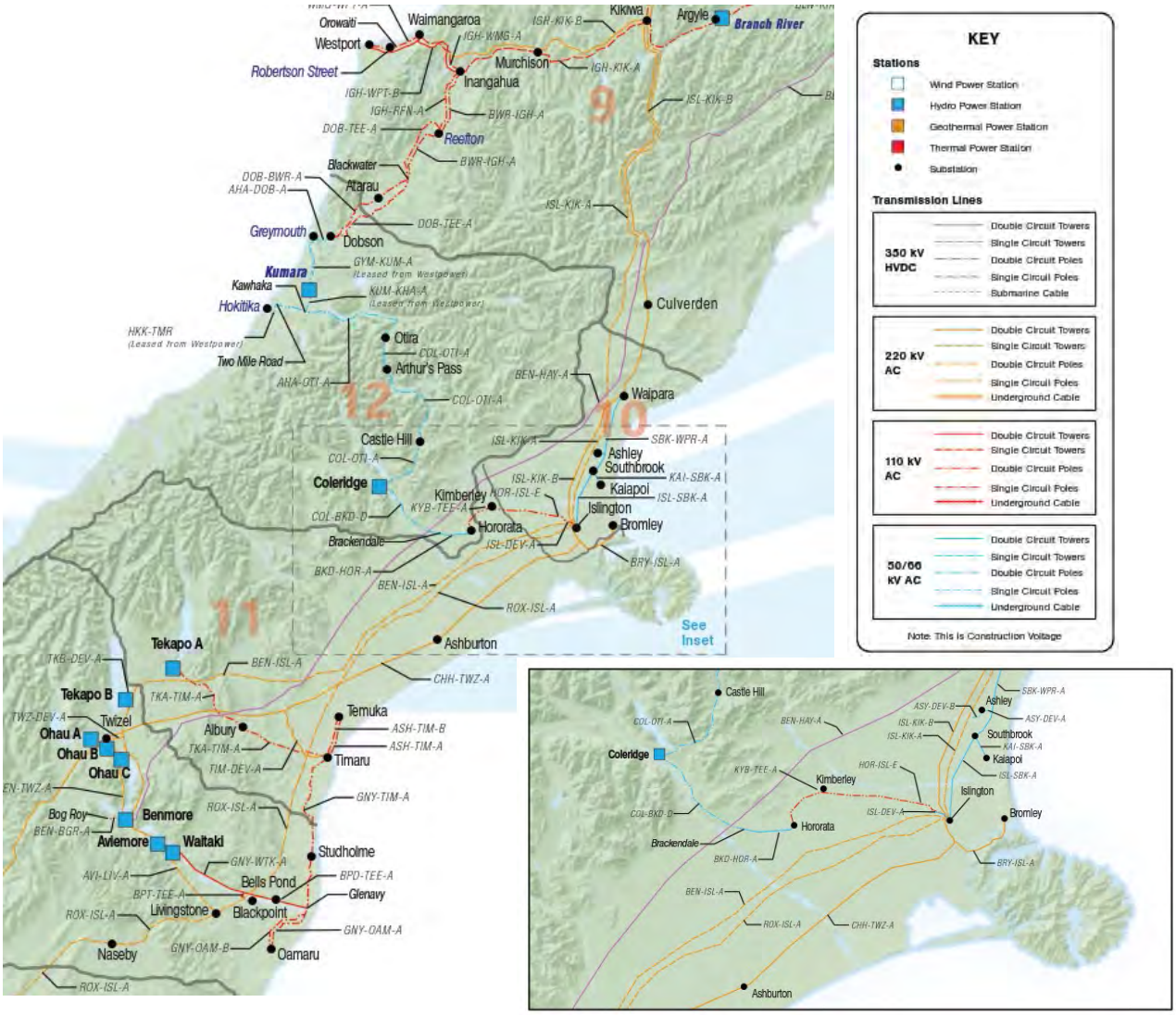


Figure 12.2: Substation and transmission locations (Adapted from Transpower (2020)).

12.2.1 Energy Generation

Within Canterbury, 8.35 billion m³/year of water is consented for hydro-electricity. This makes up 55% of the total water volume consented in the Region (LAWA, 2021). Exposure to drought throughout the Region is projected to increase, as warming temperatures and changing rainfall patterns increase drought potential. While mean discharge of river flows in the Region are generally projected to decrease, increases are projected for many headwaters of the hydro lakes under RCP8.5. Low flows across the Region are projected to decline, however inflows to the Waitaki catchment may be less affected. Hydrology of the inflows to alpine lakes is complex due to changing snow and rainfall patterns. The full effect of climate change on hydropower generation warrants further research (Caruso et al., 2017).

The majority of energy generation within the Region is sourced from the hydropower schemes, particularly those in the Waitaki catchment. Hydropower generation is dependent on water availability, and is therefore highly sensitive to drought and reduced water availability. Increased drought and reduced low flows are likely to impact the reliability of water availability for water generation (Caruso et al., 2017). Increasing mean flows in the Waitaki catchment may benefit power generation in the short term, and storage of this increased water availability may support increased

resilience to low flows on an annual cycle. However, the capacity of the lakes to achieve longer term storage and provide some resilience to drought may not be sufficient. Increased inflows may present challenges relating to flooding and management of the lakes (Caruso et al., 2017).

Changing regulatory and consumer demands are likely to occur as New Zealand transitions to a lower carbon economy. The importance of hydropower generation within a national context is likely to increase as a result of these changes. Transition risks are not addressed within this assessment, but it is likely that these changes will increase demand for hydroelectric power generation, in addition to developing alternative energy sources.

Changing climate variables are also likely to alter existing demand patterns. For example, warmer temperatures are likely to increase summer electricity demands for cooling. Increased wet days may drive demand for clothes dryers, however, this may be balanced by a reduction in winter heating needs due to warmer winters. The importance of hydro-electric power generation to the national electricity supply makes it extremely sensitive to reduced reliability of water availability.

The adaptive capacity of power generation is considered moderate. Existing hydro-electric power schemes have limited capacity to improve drought resilience. There is capacity for the sector to develop diverse generation sources, and uptake of distributed private generation such as solar is increasing. Increased adoption of distributed energy generation increases resilience by diversifying energy sources, reducing reliance on major transmission lines. Security of energy supply is managed at a national scale, with potential for diverse generation options throughout the country.

12.2.2 Transmission infrastructure

Transmission through Canterbury is critical to wider national energy supply, as the national 'grid backbone' passes through the Region. This supplies all major load centres in New Zealand through the HVAC transmission network, and consists of:

- A 'grid backbone' of 220 kV transmission lines stretching nearly the full length of each Island.
- A network of 110 kV lines running roughly parallel to the 220 kV system.

The HVDC Inter-Island link transmission line originates at Benmore Power Station, continues north, and crosses the Cook Straight to connect the North and South Islands. Power typically flows northwards from the South Island to the North Island, but during dry periods with low hydro generation can flow from north to south (Transpower, 2020).

Transpower manage and operate the National Grid within the Region, supplying electricity to three main distribution companies. These are shown in Table 12.2, along with their asset distribution and supply.

Table 12.2: Distribution companies in the Canterbury Region and their asset distribution

Distribution company	Customer supply	Network
Orion	207,500 customers in Ōtautahi/Christchurch and Selwyn	Approximately 11,350 km of lines and cables
MainPower	41,000 customers in Hurunui, Waimakariri, Kaikōura	Approximately 5,100 km of lines and cables
Alpine Energy	33,500 customers in Timaru, Mackenzie and Waimate Districts	Approximately 3,900 km of lines and cables

Sourced from (Orion, 2021; MainPower, 2018; Alpine Energy 2020).

Exposure of transmission lines to severe weather is projected to increase with climate change. By late century, mean spring and winter wind speed is projected to increase by 5-15%, and up to 25% north of Rangiora (Macara et al., 2020).

Winter rainfall is projected to increase across most parts of the Region, with the intensity and frequency of extreme rainfall events projected to increase. This is likely to increase the occurrence of flooding (Carey-Smith et al., 2018). There are currently over 800 km of Transpower transmission lines, with over 1400 structures, and 10 sites located on land that is exposed to inland flooding in the Canterbury Region (Paulik et al., 2019). Of these, Waimate has the highest exposure at 18%, while Kaikōura is not recorded as having any (Figure 12.3) (Paulik et al., 2019).

Exposure of transmission lines to coastal flooding and sea level rise in Canterbury is among the highest within the country. Canterbury has approximately 13 km of transmission lines exposed to present day coastal flooding, rising to 19 km under 0.8 m sea level rise. The Region has 28 sites exposed at present day, rising to 39 sites by late century. Exposure of lines is spread across Ōtautahi/

Ōtautahi/Christchurch City, Waimakariri, Waimate and Waitaki Districts (noting that some of Waitaki exposure is within the Otago Region). Timaru District is also exposed to a lesser extent (Figure 12.4) (Paulik et al., 2019).

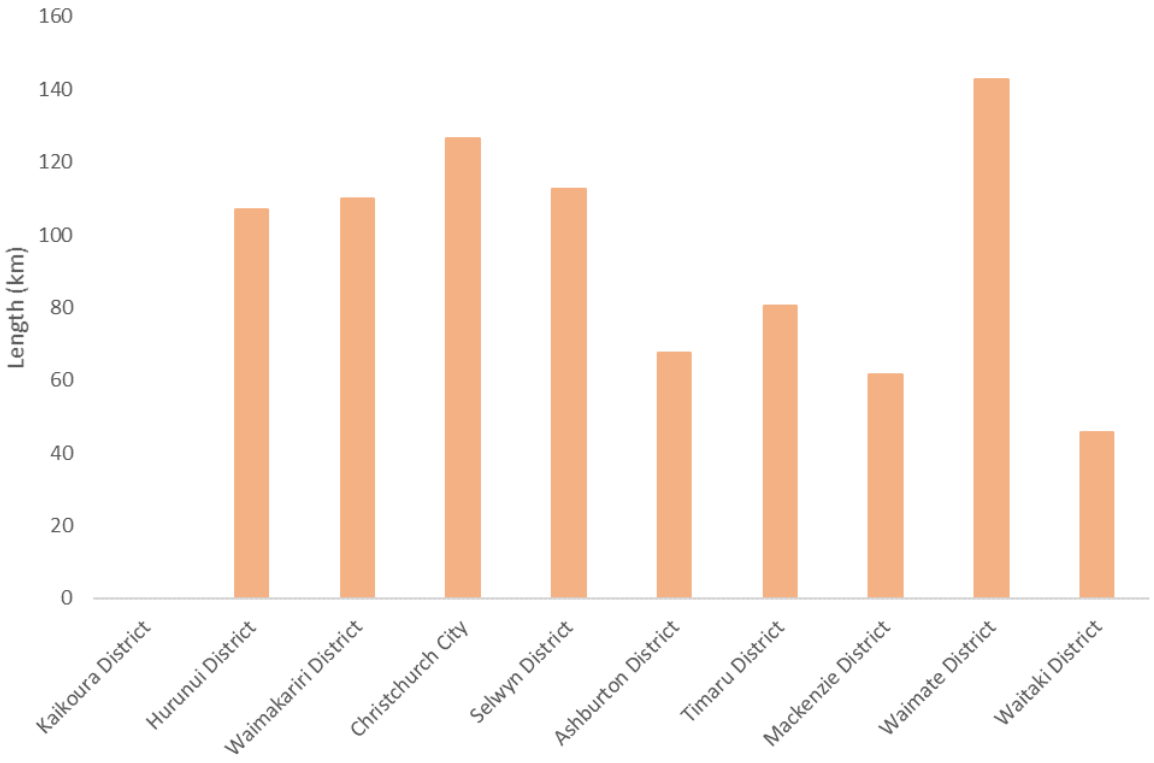


Figure 12.3: Exposure of electricity transmission lines to present day river and surface water flooding by district (Paulik et al., 2019).

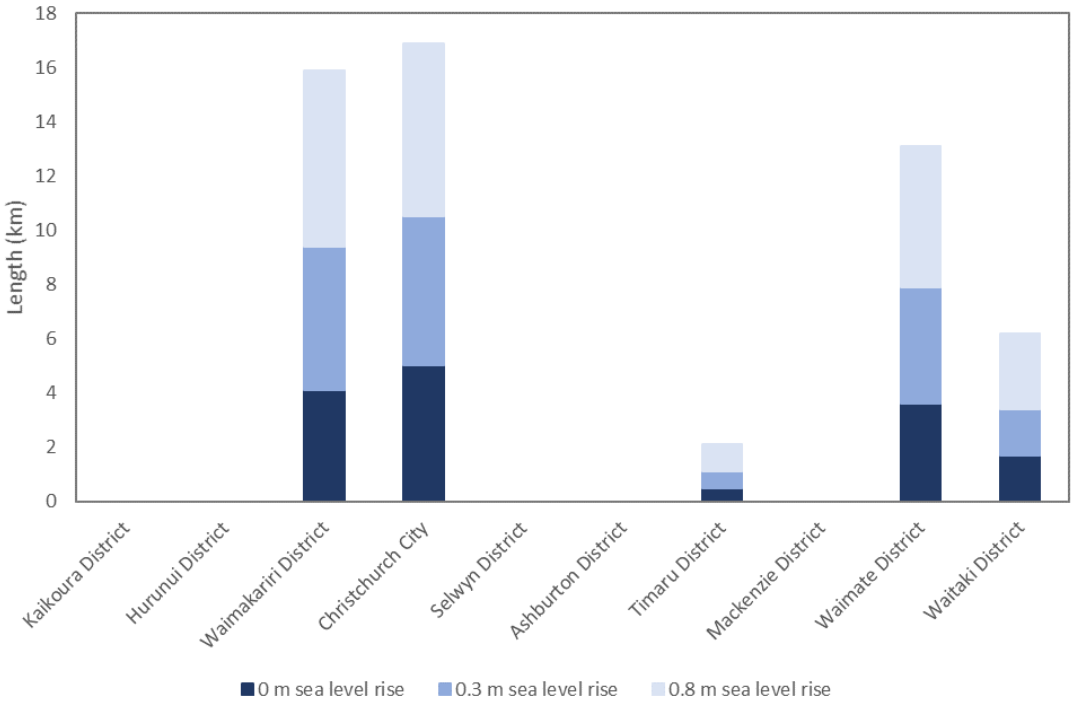


Figure 12.4: Exposure of electricity transmission lines to present day coastal flooding and incremental sea level rise by district (Paulik et al., 2019).

Transmission and distribution infrastructure are highly sensitive to weather extremes, including strong wind, heavy rain, flooding, snow and lightning. Performance reporting from Orion indicates that weather extremes are a common cause of faults by incident (Figure 12.5, Top), and are the highest contributing factor to power outages by minutes of power supply lost (Figure 12.5, bottom) (Orion, 2021). Factors affecting sensitivity to severe weather include:

- Presence of surrounding vegetation: This can contribute to wind damage, as falling trees or branches may damage lines during extreme events. Vegetation also contributes to fire risk.
- Age and condition: Older assets and those in poorer condition are more likely to sustain damage. For example, the reliability performance of the Orion network worsened after the Canterbury earthquake sequence (commenced 2010). Since then, unplanned interruptions have increased, with weather and asset failure the biggest contributors. The large horizontal ground movement and ongoing shaking from the earthquakes put some equipment under stress, causing increased sensitivity to damage.
- Overhead versus underground cables: Overhead cables typically suffer more faults than underground cables because they are exposed to weather, tree, and animal related damage and other interference such as traffic accidents. However, when underground cables do have a fault, repairs can take much longer. Lower customer density in rural areas make installation of underground wires uneconomical, hence outages are often higher in rural areas (Orion, 2021).
- Wind damage beyond design loading: Transpower's transmission towers, poles, and lines are designed to 200 km/hr winds and can typically withstand higher wind speeds. Local distribution networks are typically designed for around 900-1200 Pa or 160 km/hr (Hexamer, 2018). Outages due to wind were uncommonly frequent during the 2014 financial year, due to four wind storms (occurring during July 2013, September 2013 and March 2014).

- Flood damage: Flooding can cause severe damage to assets, including direct flood and debris damage, scour and erosion, and damage to electrical equipment. For example, during the December 2019 Rangitata floods, a Transpower 22kV tower collapsed, two power poles were damaged, one transformer submerged under water and an underground cable was exposed in a washout (Alpine Energy, 2020). These damages hampered emergency management, and were a potential health and safety risk.

Transmission and distribution infrastructure can both contribute to fire risk (acting as a cause of fire), and be severely damaged by wildfire. Areas of high vegetation cover, such as scrub and forestry, in locations with transmission and distribution lines, will generally be of highest risk.

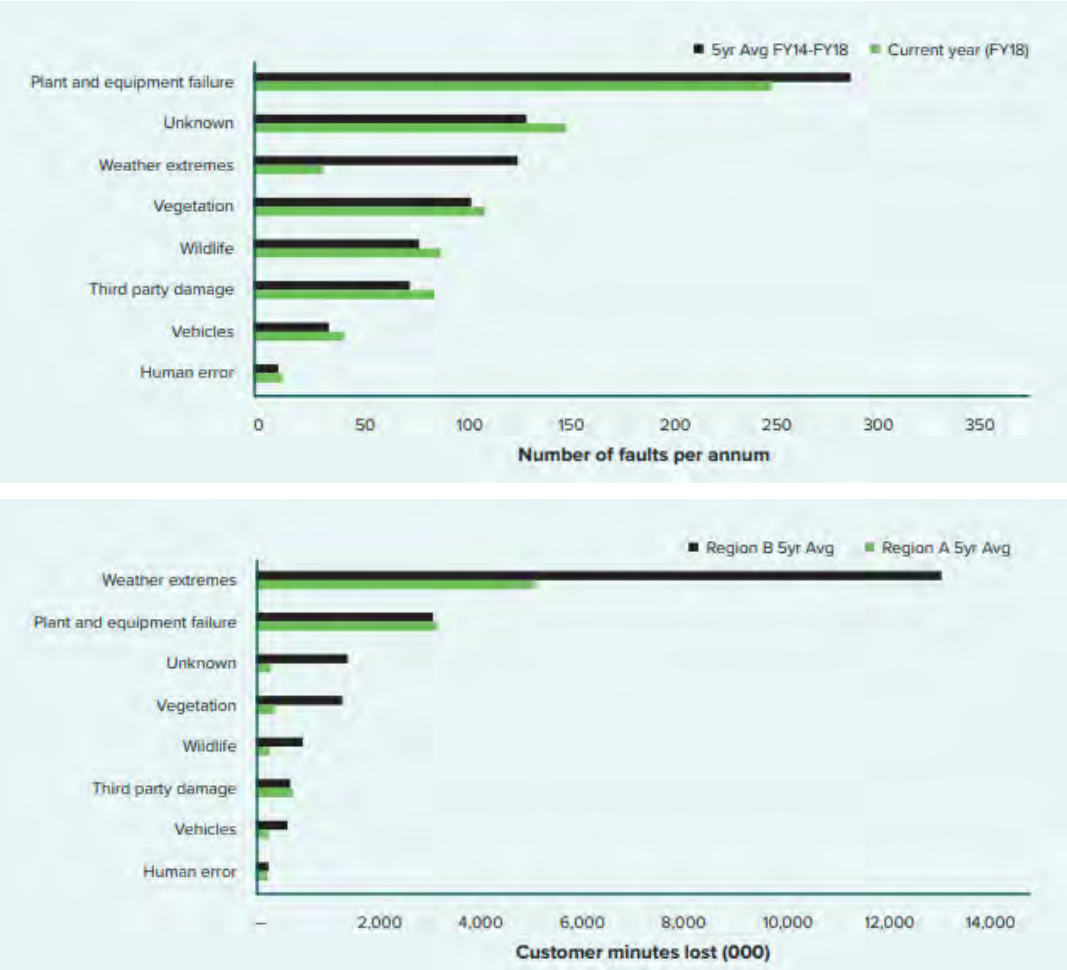


Figure 12.5: Orion number of faults by cause (top). Causes of unplanned interruptions for urban (Region A) and rural (Region B) customers (Financial Year 14 – Financial Year [FY] 18 only) (bottom) (source Orion, 2021).

The adaptive capacity of existing distribution infrastructure is considered medium. Opportunities exist to relocate lines away from areas prone to flooding, or to underground lines that are currently overhead. However, these options are often prohibitively expensive. Increased maintenance is an effective strategy to minimise sensitivity to damage. This has been demonstrated by Orion, with fewer outages reported following their improved maintenance routine. Changing legislation and other increasing drivers to reduce carbon emissions are likely to support the growth of renewable energy demand and innovation. Increased use of distributed energy sources such as solar and wind can increase resilience by adding alternative sources and transmission, providing redundancy within the system.

13 Ōhanga | Prosperity

The ōhanga (prosperity) of Canterbury is important to livelihoods within the communities of the Region. Prosperity allows communities to thrive, and is an important contributor to the quality of living. Canterbury employs 13% of the national workforce, contributing 13% of the national Gross Domestic Product (GDP).

Canterbury has many natural advantages supporting a strong, innovative economy that contributes to building resilient, connected communities. Its economy includes significant industry in agriculture, forestry and fishing, and manufacturing, and a diverse range of trades and services as shown in Figure 13.1 (Infometrics 2020). The extensive fertile soils of the Canterbury Plains support a diverse agricultural activity, while its abundant coastal and offshore waters support a thriving fishery. The stunning natural beauty and resources of Canterbury supports the country's second largest tourism industry. Containing over half the Region's population, Ōtautahi/Christchurch City is a major economic driver for the Region. Its services, university, and industries generate 71% of the Region's GDP (MBIE 2020).

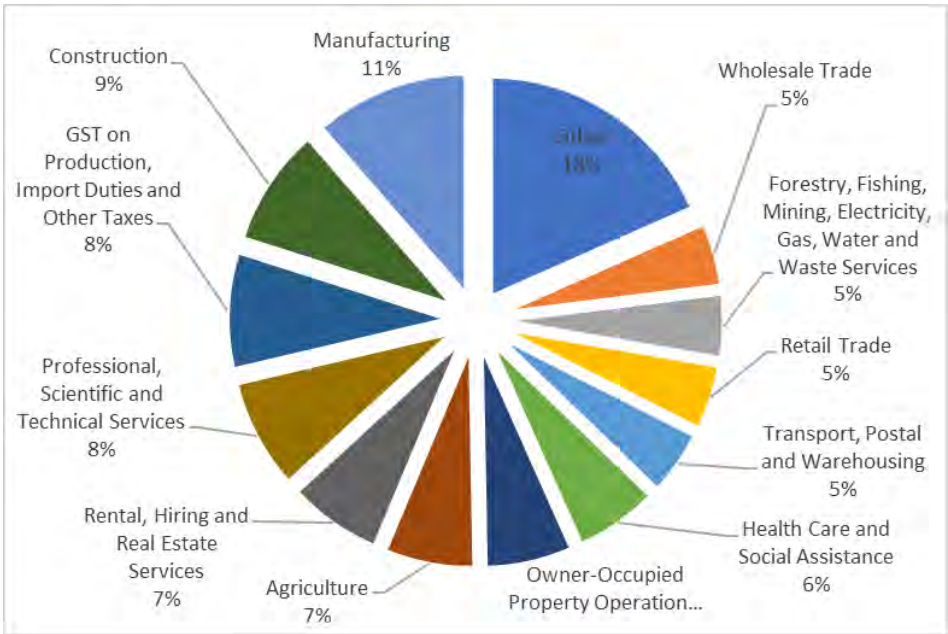


Figure 13.1: Economic profile of Canterbury 2018. Tourism is not represented as a standalone industry in this figure. Tourism accounts for 16% of GDP, and is spread across many industries (Infometrics, 2020, MBIE, 2021).

The prosperity of the Region is influenced by numerous industry and governance groups. Initiatives such as The Canterbury Mayoral Forum and Christchurch NZ provide valuable direction, development and resources to the economy. Industry associations such as Dairy NZ, Horticulture New Zealand, and NZ Winegrowers provide advocacy, and support to help businesses thrive.

Canterbury's prosperity is an integral part of the region's natural and social systems. The wai (water) and rauropi (biodiversity) of the Region contributes to much nature-based tourism, and is the foundation upon which the agriculture, fisheries and forestry industries are built. These primary industries contribute to the wider prosperity of the Region through value-chain flow on to industries such as manufacturing, transport and services. From these industries, income to workers contributes to ora rite (equity), by providing income to workers and communities, and building hapori (sense of community). Supporting the businesses of Canterbury is the built infrastructure including hirihiri (energy), the roads and connections (ngā waihanga – infrastructure services) and buildings (kāinga tūturu – historic heritage).

13.1 Summary of risks

The prosperity of Canterbury is at risk from climate change. The sectors that derive income from land-based activity such as agriculture, forestry, fisheries and tourism will primarily face direct impacts from climate change. Insurance, business and the cost of living will face a range of impacts from climate change. Many of these are indirect, and stem from climate impacts on the people and environment of Canterbury.

The risks presented in Table 13.1. are rated based on the projected climate hazards, known sensitivities, and adaptive capacity of these systems as they presently exist. The effects of a transition to a low carbon economy and climate resilient community are not assessed as part of this assessment. It is acknowledged that investment and innovation is likely to occur as a product of this transition, and that this may lower sensitivity to these risks.

Risks to ōhanga (prosperity) are identified for the agriculture, forestry, fisheries and aquaculture, and tourism sectors. More general risks to insurance, business and the cost of living are also identified. The highest rated risk in each of the identified sectors are listed in Table 13.1. These, and other highly rated risks, are presented in the sections that follow, with discussion of the main issues supporting the rating of the risks.

Table 13.1: Summary of risks to ōhanga from differing hazards

Using RCP8.5	Higher mean temperatures			Change in mean annual rainfall			Drought			River and surface flooding			Coastal flooding			Increased coastal erosion			Sea-level rise and salinity stresses			Storms and wind			Increased fire-weather			Increasing landslides and soil erosion			Extreme weather events			Reduced snow & ice			Ocean chemistry changes			Marine heatwaves			Climate change		
	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L
Crops	I	L	M				H	E	E													M	M	H																				
Livestock	I	L	M				H	E	E																																				
The cost of business																						L	M	E																				
Supply chains																												L	L	M														
Insurance																			L	H	E																								
Climate exposed debt																																												
Residential insurance																																												
Fisheries and aquaculture																						L	M	M													M	E	E	L	H	E			
Exotic forestry	I	I	L																			L	M	H	M	H	E																
Tourism sector										L	H	E																					M	H	E									

Key

I	Insignifcant	P	Present day
L	Low	M	Mid (2050)
M	Moderate	L	Long (2100)
H	High		
E	Extreme		

13.2 Agriculture (crops and livestock)

The highest identified climate change risks to agriculture include risks to livestock farming due to higher temperatures and drought, and risks to crops due to higher temperatures, drought, storms and wind. The exposure of agricultural land to drought and warmer temperatures will increase over time. Livestock farming is extremely sensitive to the reduction in water availability that is likely to be associated with drought. Livestock are sensitive to temperature increases, as these can cause heat stress.

The adaptive capacity of livestock to increased drought is rated as low. However, agriculture is rated as having a higher adaptive capacity to increased temperatures, as farmers have the potential to change stock breed or adjust farm management practices (e.g., shade) to suit a changing climate.

Crops are sensitive to damage from storms, wind, flooding and increased pests, and are extremely dependant on water availability. The potential to change crop cycles and adjust timing or varieties will provide some adaptive capacity.

Table 13.2: Summary of risks to agriculture

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to crops due to drought	High	Extreme	Extreme	Extreme	Projected increase in drought potential is likely to impact crops. Crops are extremely dependent on water availability for irrigation.
Risk to crops due to storms and wind	Moderate	Moderate	High	High	Projected increases in storms and wind will increase exposure of crops to flooding, wind and storm damage. Crops are highly sensitive to damage from flooding and storms which can destroy crops. Change of crop cycle, timing or varieties may provide some adaptive capacity, also changing management measures such as wind shelter breaks
Risk to crops due to higher mean temperatures	Insignificant	Low	Moderate	Moderate	Projected increase in temperatures may increase pests and irrigation demand. Change of crop cycle, timing or varieties may provide some adaptive capacity or increased use of pesticides.
Risk to livestock due to drought	High	Extreme	Extreme	Extreme	Projected increase in drought potential is likely to impact livestock farming. Livestock farming is extremely dependent on water availability to sustain optimum grass growth and for stock drinking water. Relocation of stock or feed supplementation may reduce impacts of drought on stock.
Risk to livestock due to higher mean temperatures	Insignificant	Low	Moderate	Moderate	Projected increase in temperature are likely to impact livestock farming. Livestock are moderately sensitive to temperature, which can lead to heat stress and lower milk production. The impacts of temperature on herds may be reduced through breeding for temperature resilience.

Canterbury's expansive fertile soils support an extremely active agricultural sector (Figure 13.3). Agricultural activity (measured by GPD) is highest in Ashburton and Selwyn districts. Relative to the

district population and percentage of total GDP, Waimate, Hurunui, and Mackenzie are strong agricultural producers (Figure 13.4, Table 13.3) (MBIE 2020). Canterbury is the largest producer of vegetables in New Zealand, with the country's largest production of peas, carrots and potatoes, and significant production of most other vegetables (Fresh Facts, 2017). Fruit production is also strong in Canterbury, with wine grapes and berryfruit the dominant fruit crops grown (Fresh Facts, 2017). The Region has some of the highest density cattle farming within New Zealand, particularly within the Waimakariri, Selwyn, Ashburton and Timaru Districts (Figure 13.2) (EHINZ, 2017).

Table 13.3: Agricultural GDP in Canterbury, 2018 (MBIE 2020)

Area	GDP($m)	GDP per capita($)	% of district Total GDP
Canterbury	2,392	3,841	7%
Ashburton District	642	18,548	29%
Ōtautahi/Christchurch City	247	642	1%
Hurunui District	236	18,214	36%
Kaikōura District	20	4,994	14%
Mackenzie District	63	12,344	27%
Selwyn District	489	7,722	22%
Timaru District	226	4,757	8%
Waimakariri District	165	2,692	10%
Waimate District	175	21,608	51%

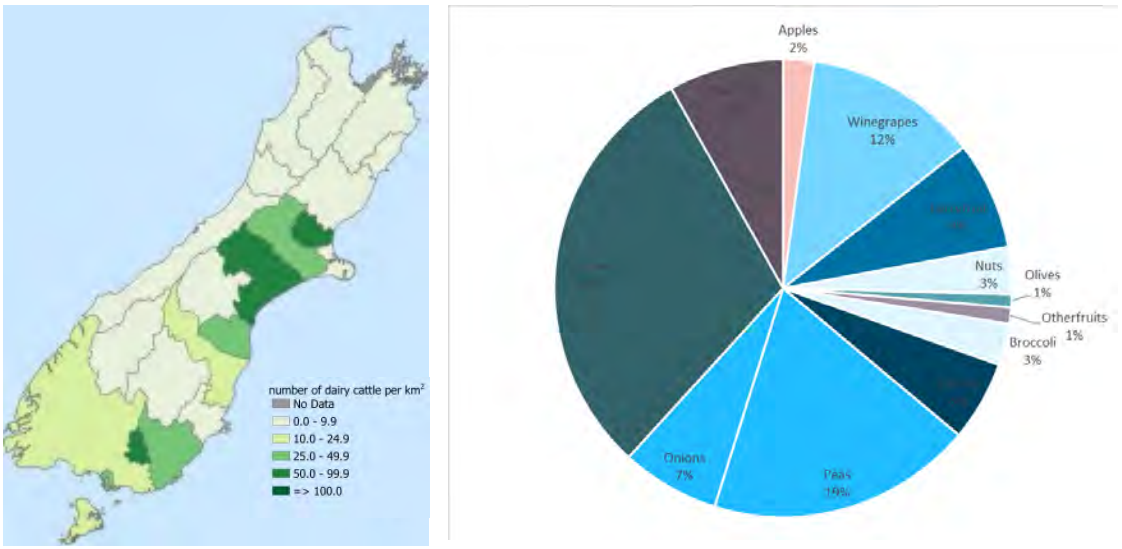


Figure 13.2: Density of dairy cattle by territorial authority in the South Island of New Zealand, 2012 - Left (EHINZ, 2017). Fruit and vegetables grown in Canterbury, % by planted area, 2017 – Right (Fresh Facts, 2017).

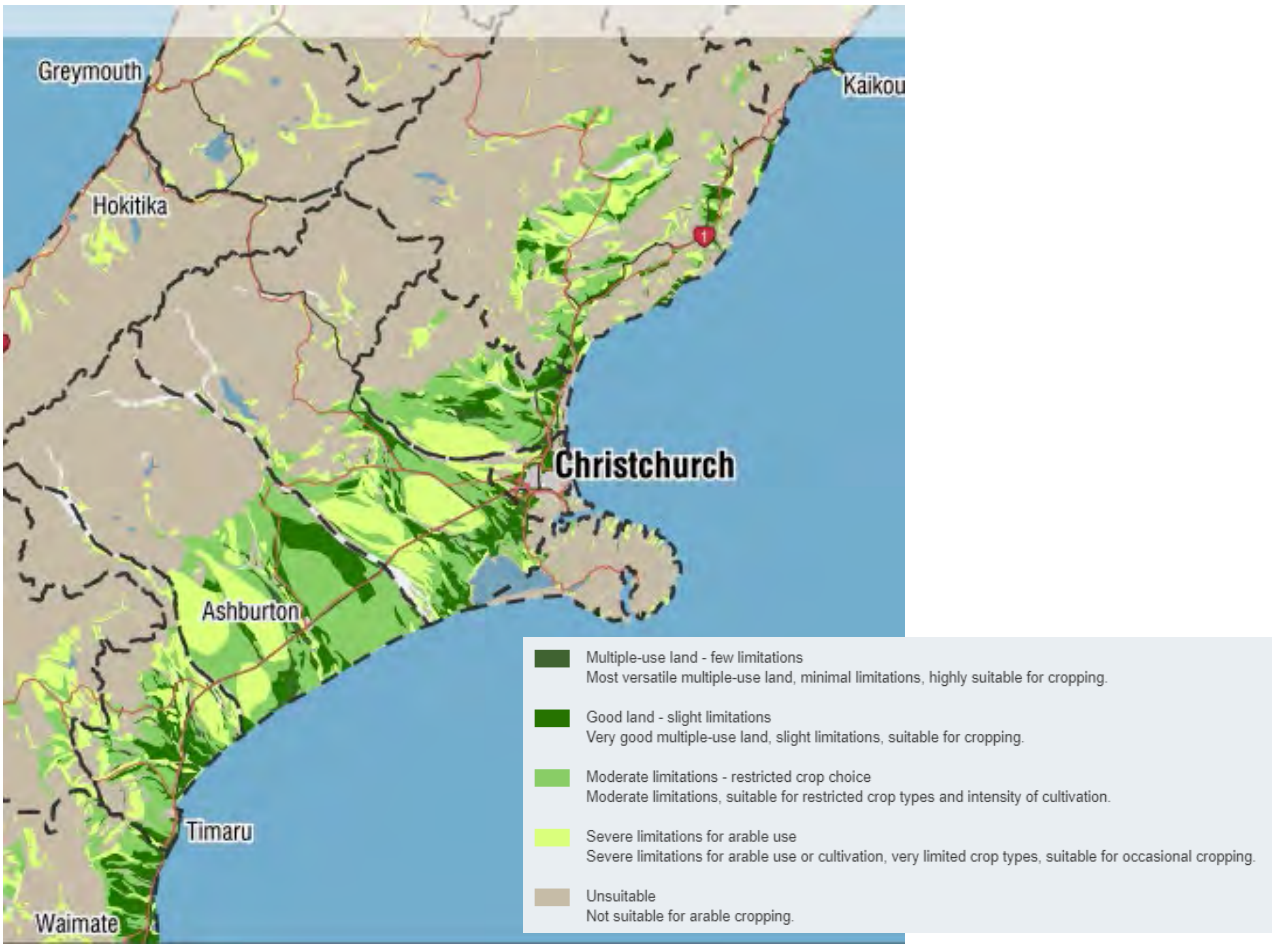


Figure 13.3: Land suitability for arable cropping in the Canterbury Region (Landcare Research 2021).

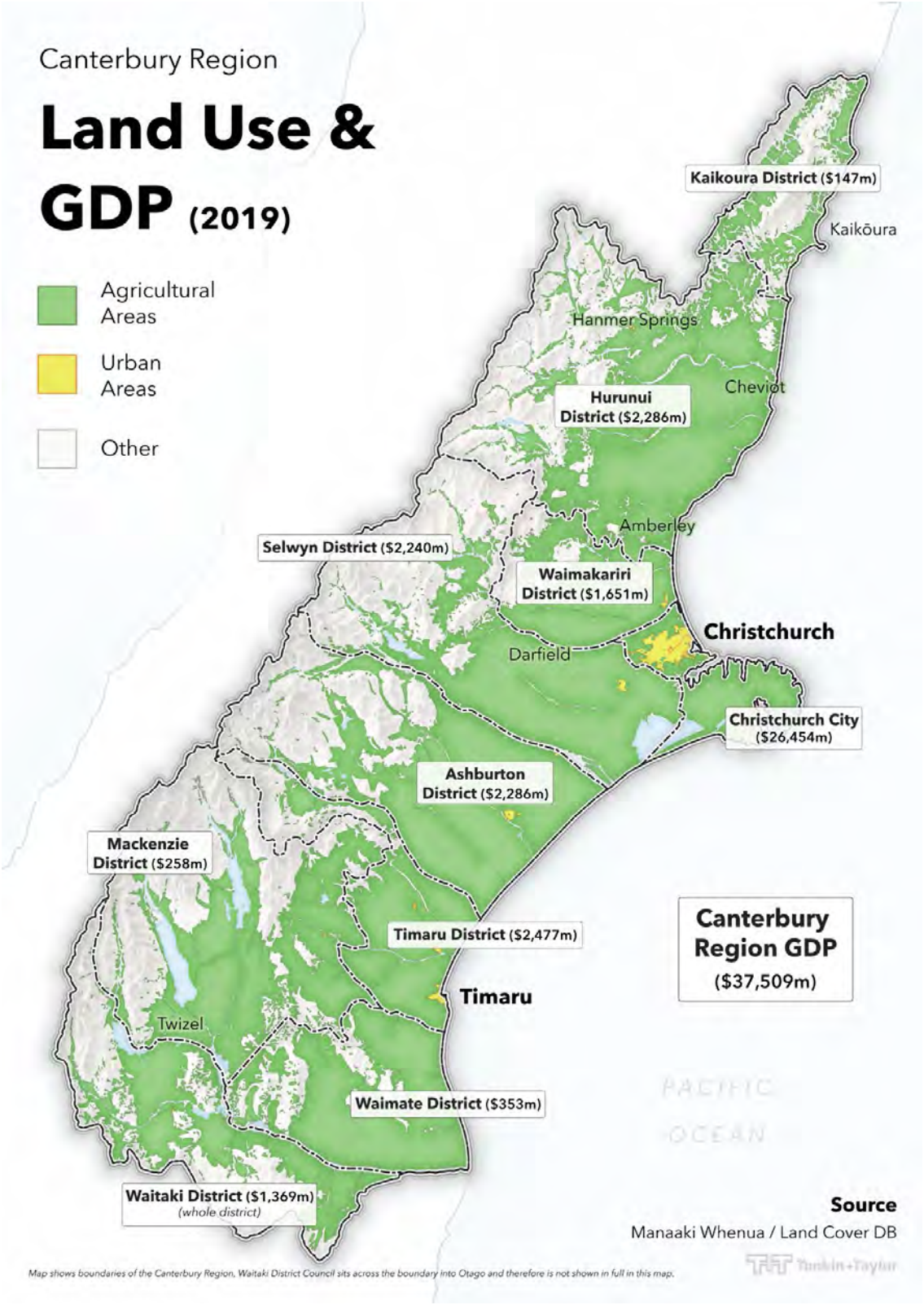


Figure 13.4: Land use in the Canterbury Region showing GPD by District (2019).

The Canterbury Region contains multiple large braided rivers, notably those in the plains such as Waitaki, Opihi, Rangitata, Hakatere (Ashburton) River, Rakaia, Waimakariri, Rakahuri (Ashley), and their tributaries. Those in the northern catchments include Kowai, Waipara, Hurunui, and Waiau Uwha. Land use surrounding these rivers is predominantly agricultural, with large areas of short-rotation crop land, orchards and other perennial crops (Landcare Research, 2020). Livestock and horticultural farming are largely based within the cropland and exotic grasslands within the Canterbury Plains, mainly around river valleys and lower plains, and also along the coastal fringe (Landcare Research, 2020).

The main agricultural areas of Canterbury are projected to be exposed to increasing temperature and reduced frosts. Annual hot days (>25 ^{o}C) are projected to increase by 20-60 days for much of Canterbury, and up to 85 days in some inland areas under RCP8.5. Over the same timescale, reduction in frosts of 10-30 days across much of the Canterbury Plains are projected, with decreases of up to 50 days in inland areas under RCP 8.5. Temperatures at present typically include 10-40 hot days and 10-50 frost days per year in the Canterbury Plains (Macara et al., 2020).

The potential for drought is projected to increase across most of Canterbury as the accumulated Potential Evapotranspiration Deficit (PED) increases by 100-200 mm per year by late century under RCP8.5. As the growing season advances, the amount of water lost from the soil through evapotranspiration typically exceeds rainfall, giving rise to an increase in soil moisture deficit. As soil moisture decreases, pasture production becomes moisture constrained (Macara et al., 2020).

Water availability is likely to become more variable across most of the Canterbury Plains. Winter rainfall is projected up to 40% in coastal southern areas by late century under RCP8.5. Summer rainfall is projected to increase by up to 20% in inland Canterbury Plains, while gradually reducing towards coastal areas, with up to 5-15% deficit in projected summer rainfall surrounding Ōtautahi/Christchurch. Although there is likely to be increasing rainfall in some areas, climate change is projected to reduce water availability across most rivers in Canterbury, through reductions in mean annual discharge and low flow in many areas (Macara 2020). Further impacts on groundwater will also contribute to the decreased reliability of water supply for irrigation, as discussed further in Section 8 Wai | Water.

Flooding is expected in Canterbury, with projected increases in mean annual flood flows as winter rainfall is projected to increase considerably in many eastern, western and southern parts of the Region. Existing flood exposure of productive land is extremely high, with close to one quarter of all productive land in Ōtautahi/Christchurch and Waimakariri exposed to flooding, and higher areas (over 500 km^2) exposed in Selwyn and Ashburton Districts (Figure 13.5) (Paulik et al., 2019). Increases in floodplain depth and extent are likely to result from the increasing intensity of extreme rainfall events across the Region (Macara, 2020; Trevor Carey-Smith, 2018). Farms on the coastal fringe are also likely to be exposed to increasing coastal flooding, with many already at current risk of coastal erosion (Figure 13.6). Flood and related damages pose significant risk to buildings, access roads, assets and livestock, which would result in significant financial losses to farmers.

Flooding and other sudden extreme events pose a risk of disruption to supply chains through disruption to transport routes (refer to Section 11.2). The dairy industry is particularly vulnerable to disruption in the supply chain, as dairy cows typically require regular twice daily milking, and stored milk must be transported within 1-2 days for processing (Welth & Marshall, 2017).

Pasture and vegetable crops are sensitive to changes in temperature, rainfall, and sunshine hours. Livestock wellbeing and productivity is dependant primarily on sufficient water availability, pasture, and locally grown feed crops (Morris, 2013). Increased temperatures and rainfall will have both positive and negative impacts on agriculture. Warmer winters are likely to benefit survival rates of lambs, and improve growth rates of pasture (MPI, 2014). However, the changing temperatures and increasing drought potential may influence optimum pasture varieties suitable to the Region.

Changing rainfall, temperature, and drought are likely to drive increasing growth rate variability of pasture, which may contribute to increased feed deficit as well as higher surpluses (MPI, 2014).

Livestock are highly sensitive to temperature and suffer from heat stress. Increased temperatures may pose a risk to animal health, particularly in parts of Canterbury where stock are already at risk due to regular exposure to high summer temperatures, (Ausseil et al., 2020). Livestock are known to respond to heat stress by reducing their feed intake, with consequences for animal condition and milk production (Verkerk et al., 2007). Increasing temperatures may shift the timing of fruit setting, or drive a change in harvest and planting dates (Clark et al., 2012). A range of other potential impacts from increased temperature and drought identified at a high level may apply to Canterbury, including changes to wool quality and higher potential for spoilage during supply chain logistics (Frame et, al. 2018).

Pests and diseases are likely to increase with temperature, drought, and reduced frosts. The incidence of existing diseases in Canterbury, for example the grapevine downy mildew, is expected to increase with increasing temperature and rainfall (Beresford & McKay, 2012). Temperature increases may also aggravate stock related illness such as mycotoxins, and prevalence of flies (Verkerk et al., 2007). Disruption to complex natural systems, for example, the mast response, are likely to further contribute to pest populations. The range of many exotic pests, weeds and diseases will likely gain an advantage under projected climate changes (McGlone & Walker, 2011). Existing control measures may be less effective, as climate change may impact upon the ecology of existing biological control agents used in New Zealand to supress pests and weeds. The decreased occurrence of frosts may further raise the potential for pests (McGlone & Walker, 2011; MPI, 2019)

Warmer temperatures and drought are likely to result in increased water demand. This includes increased irrigation to compensate for soil moisture loss through evapotranspiration, and increased stock water for thirsty stock under increased temperature. Irrigation is widespread in Canterbury, and many farmers will be affected by further pressure on water storage, water regulation, water storage access and irrigation availability (Stakeholder 2021). Reduced availability will contribute to the significant existing regulation challenges that farmers face in Canterbury (Kalaugher, 2015).

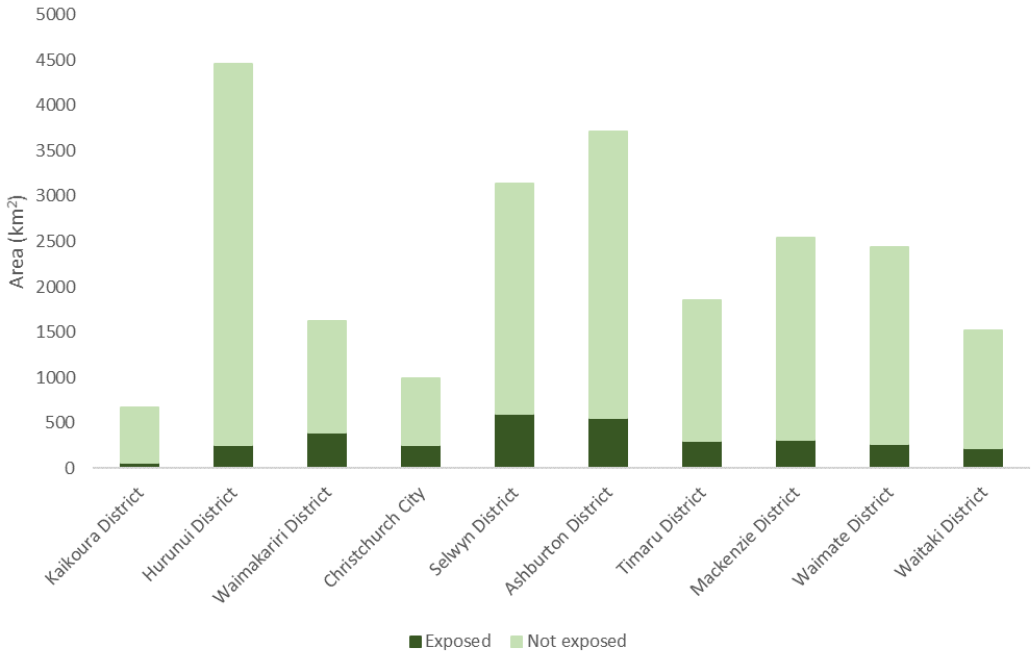


Figure 13.5: Exposure of productive land to river flooding relative to total productive land area by district (Paulik et al., 2019).

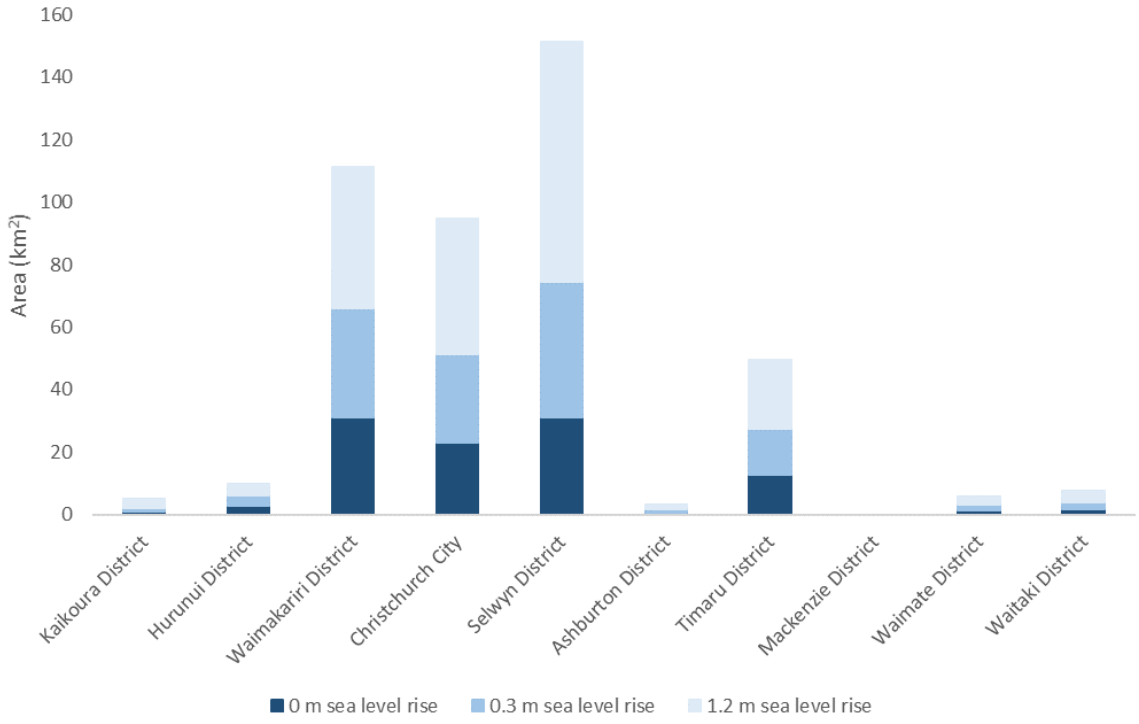


Figure 13.6: Exposure of productive land to coastal flooding under incremental sea level rise (Paulik et al., 2019).

The extensive coverage of suitable agriculture soil types in Canterbury supports the adaptive capacity of agriculture (Figure 13.3). The Region's fertile soils can support a diverse range of crops, and may support varieties that cope well with wetter winters and warmer climate, with fewer frost days and lower humidity. A large body of research is underway to investigate suitable adaptation strategies for agriculture in Canterbury and the rest of the country (Clark et al., 2012).

Gradual changes in the climate may occur in a way that allows farmers to adapt, for example by planting weather tolerant native species for shelter, fire resilience, and waterway protection, or retiring marginal land that is vulnerable to flooding or erosion (MPI, 2019). The history of agriculture is based on adaptation, where farming practices have evolved to adapt to new territories and climates for centuries. Droughts and other climatic challenges pose a constant threat to farmers, and the knowledge gained from previous methods of adaptation may be a valuable key to future adaptation in the face of unprecedented change (AgResearch, 2008).

13.3 Forestry

The highest identified climate change risks to forestry include those due to storms and wind, higher temperatures, and fire. The exposure of forestry to temperature and fire weather is presently rated as low, but this is projected to increase with time. Sensitivity is high, as forests are highly sensitive to damage and have increased maintenance requirements related to fire and storms. Temperatures can also change productivity and cause increased pests and disease.

Table 13.4: Summary of risks to agriculture

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to exotic forestry due to increased fire-weather	Moderate	High	Extreme	Extreme	Pockets of exotic forestry spread across the region will be exposed to increasing fire weather, due to projected increases in temperatures, dry periods and wind. Forestry is highly sensitive to wildfire damage which can case substantial economic losses. Measures to reduce fire risk include pruning, weed control, undergrowth maintenance, fire breaks and off-season burning.
Risk to exotic forestry due to storms and wind	Low	Moderate	High	High	Storms and wind are projected to become more severe, which will increase the exposure of forestry, where young forests are particularly sensitive to damage. Storm damage can cause windthrow, erosion and damage to related infrastructure, with costly repairs and health and safety risks associated with clearing damaged branches. Frequent exposure to high winds can result in sturdier trees of lower grade timber.
Risk to exotic forestry due to higher mean temperatures	Insignificant	Insignificant	Low	Low	Forests will be exposed to projected increases in temperature, particularly in inland areas where temperatures are highest. Temperatures can change productivity (which may increase in many areas) and cause increased growth of weeds and higher rates of pests and disease.

Pockets of exotic forestry are located throughout the Canterbury Region, particularly in the plains and lower foothills of the Ka Tiritiri o te Moana (Southern Alps) and Banks Peninsula (Landcare Research, 2020). These are in similar areas to the agriculture sector, typically on harder, steeper country. As such, they are exposed to similar climate changes, including increased storms and wind and temperatures. Exotic forestry has a moderate adaptive capacity to changing temperature, due to the physiological response of plantation species to a changing climate. Exotic forestry has a limited capacity for changes in plantation species or location, at 25+ year cycles.

Increased temperature can limit growth rates and reduce wood density. The ideal average annual growth temperature for *Pinus radiata* has been estimated at 12°C, with an upper limit of 18°C (Frame et, al., 2018; Whitehead et al., 1992). Present day temperatures within the plains and lowlands are well within this range, sitting around 10-12°C. Late century mean temperatures within these areas are projected to increase by up to 3°C. This may increase productivity, or push some plantations towards the higher limit of optimal growing temperature. Increased temperature is also

expected to increase the prevalence of exotic weeds, including wilding pines, which thrive in hot, dry climates (Wyatt, 2018). Increased temperature can also influence mast responses in native forests, which can in turn stimulate growth in the surrounding ecological community, and spur on exotic pests, weeds and disease (McGlone & Walker, 2011).

Increased temperature, reduced drought, reduced summer rainfall, and increased wind all contribute to increased fire risk. This is highest in inland Canterbury where temperature increases are projected to be greatest. Wildfire can lead to significant economic losses in forestry, which can arise from insurance liability and increased fire management requirements. Measures to reduce fire risk and prevent spread include weed control, undergrowth maintenance, inclusion of fire breaks, pruning and controlled off-season burning (NZ Forest Owners Association, 2018).

High winds and floods will increase windthrow and other physical damage related to wind. This has consequences for the quality and volume of harvested timber. Operations to salvage damaged logs can be dangerous, time consuming, and costly. Exposure to frequent high winds often results in sturdier trees with properties such as larger knots, which make them a lower grade timber (Moore, 2014).

Young forests have the highest sensitivity to storm damage. Damage to younger crops may mean that the wood is only useable as pulp, or may not be economically viable at all and must be written off. Young forests and newly harvested slopes are also at increased risk of erosion, which may lead to loss of land, or land instability.

Plantation forestry typically has a crop cycle of 25+ years. Historically, plantation species have been selected to favour the most desirable production qualities. It can therefore be argued that this provides continued adaptation to any changes in climate with each new generation of tree that is planted. Within a crop cycle the adaptive capacity of plantations is limited, however, over longer timespans it may be possible to change the location of new plantations, or adopt climate tolerant species. Such species may have different and more beneficial qualities than *Pinus radiata*, though they may be potentially less productive. Ongoing research initiatives, such as the use of genetic modification, may provide further adaptive capacity for issues such as biosecurity, prevention of wilding pine spread, genetic resistance to pests and pathogens, and improved yield (NZIER, 2017).

13.4 Fisheries and aquaculture

The highest identified climate change risks to fisheries and aquaculture include those from marine heatwaves, ocean chemistry changes, and storms and wind. The exposure of fisheries to marine heatwaves and ocean chemistry changes is rated to increase to extreme towards late century. Water quality impacts in nearshore environments are rated as low, increasing to moderate beyond mid-century. Studies of shellfish and other aquatic ecosystems indicate that fisheries are extremely sensitive to changes in these indicators, and may suffer increased mortality and impacts on condition. Fisheries have potentially high adaptive capacity due to the relatively cool temperatures off the Canterbury coastline, which may be a favourable destination for species from warmer climates.

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Table 13.5: Summary of risks to fisheries

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to fisheries and aquaculture due to ocean chemistry changes	Moderate	Extreme	Extreme	Extreme	Changes in ocean chemistry changes are likely to occur with projected temperature increases. Studies of shellfish and aquatic ecosystems indicate that fisheries are extremely sensitive to heat waves and ocean chemistry changes. Mortality is likely to increase and condition reduce, with potentially high consequences for fisheries.
Risk to fisheries and aquaculture due to marine heatwaves	Low	High	High	Extreme	Sea temperatures and marine heatwaves are projected to increase with climate change, with potential loss in marine species and biodiversity. Fisheries may adapt as the relatively cool temperatures off the Canterbury coastline, may act as a favourable destination for affected species from warmer climates.
Risk to fisheries and aquaculture due to storms and wind	Low	Moderate	Moderate	Moderate	Projected increases in storms and wind may cause increased sediment runoff in nearshore environments. Reduced water quality in inshore environments may impact the health of some major fish species and shellfish, and may smother habitats. Continued efforts to improve stormwater runoff water quality will support improved nearshore water quality.

Fisheries and aquaculture include farmed fish and shellfish such as salmon, mussels, and oysters, as well as wild fish. Canterbury forms part of the Southeast Fishing Region, alongside Otago. The Southeast Region contains New Zealand's second and third largest fishing ports (Lyttleton and Timaru), which service regional inshore trawling and deep-sea trawlers (Fisheries New Zealand, 2020). The Canterbury Region is a dominant player in the seafood processing industry, contributing an average 30% ($388 million) per year to the national revenue from seafood processing across the five years to 2015, and an overall GDP of $132 million (Berl, 2017).

The aquatic coastal environment and ecosystems are at a high risk of temperature increase and chemistry changes towards the late century, as discussed in Section 9.7. Sea temperatures are increasing throughout New Zealand, however measured sea surface temperatures show a relatively lower increase off the coast of Canterbury (Figure 13.7), (Sutton et al., 2019).

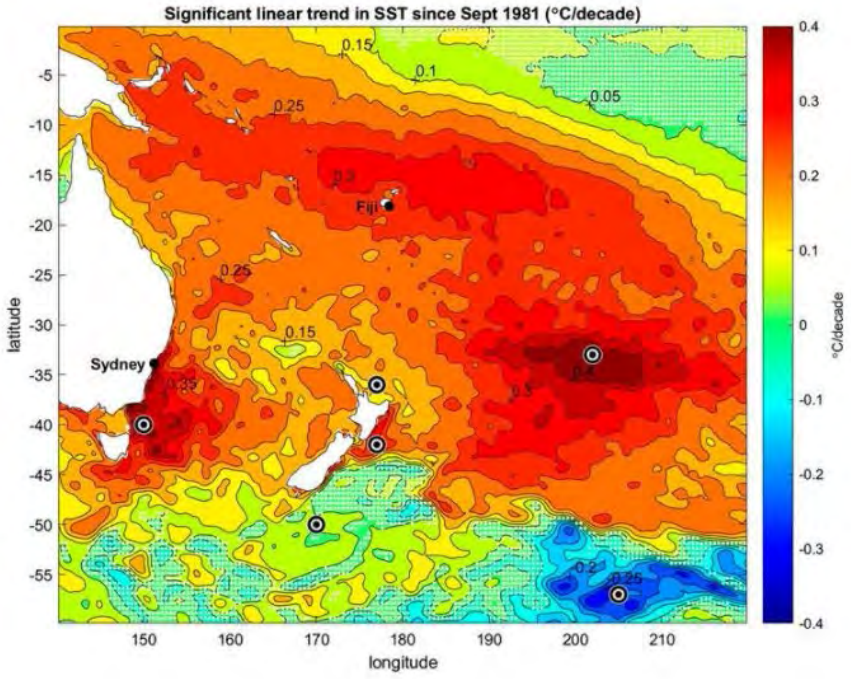

Figure 13.7: Sea surface temperature trend in °C per decade since 1981 (Sutton et al., 2019).

Aquatic species are generally very sensitive to temperature changes. Ocean acidification and warming cause widespread harm to aquatic ecosystems. This is expected to occur throughout New Zealand's coastal waters. The cumulative effects of ocean climate change and other anthropogenic stressors on aquatic ecosystems, likely to be seen in the next 20-30 years, are predicted to be high (MPI, 2017). Ocean acidification is particularly detrimental to calcifying organisms, such as molluscs and echinoderms, which are predicted to decline within Canterbury's marine communities (Hepburn et al., 2011; Tait et al., 2014). The change in ocean chemistry and temperature will also impact the survival and condition of most other marine species, with impacts on the food web and wider ecosystems.

Water quality of nearshore coastal environments can be impacted by storms and wind, due to the harmful impacts of stormwater runoff. Increased frequency and intensity of rainfall events is projected to occur throughout Canterbury. The magnitude of increase in stormwater runoff will vary according to the hydrology of catchments, as well as land use and stormwater management practices. Increasing runoff is likely to cause increased erosion, which often contains contaminants from urban stormwater runoff, and nutrients from agriculture runoff (Hughes et al., 2019). This can smother habitats and rapidly kill most benthic macrofauna, while thin deposits lead to a reduction in species diversity and abundance. The physiological condition and survival rate of marine species is expected to decline as suspended sediment concentrations increases (Kelly, 2010). This is likely to impact fisheries and aquaculture that operate in nearshore environments, impacting species such as snapper, blue cod, tarakihi, lobster and paua, which account for over half of national fisheries GDP. However, increased suspended sediment concentration is unlikely to impact deep sea fisheries, such as Southern bluefin tuna, hoki, ling, arrow squid, Southern blue whiting and orange roughy.

The decline in species along with wider ecosystem changes pose an extreme risk to the fisheries and aquaculture industry, with flow on effects to the seafood processing industry. There may be potential adaptive capacity within the ecosystem to cope with changes associated with temperature and chemistry. Marine species will vary in sensitivity to ocean acidification. Species that currently reside in warmer temperature regions may migrate south to the relatively cooler climates off the

Canterbury Coast (MfE, 2019). Higher CO_2 levels may also provide some adaptive capacity to existing ecosystems, for example, some species, such as seagrasses, may benefit from this. Finally, monitoring and chemical intervention may be a viable management strategy for aquafarming during times of high acidification. This is currently being trialled in the U.S. Pacific Northwest (Capson & Guinotte, 2014).

13.5 Tourism

The highest identified climate change risks to tourism include those from river and surface water flooding, and reduced snow and ice. The exposure of this sector to flooding and reduced snow and ice is currently rated as low, which is expected to rise to extreme by late century. Alpine sports tourism is highly sensitive to warming temperatures, due to the resultant reduced snow base for ski field operation, and safety issues relating to avalanche risks. Tourism may be impacted by more general changes to the natural environment, as well as reduced consumer confidence resulting from increased frequency of climate related issues such as flooding related cancellations.

Table 13.6: Summary of risks to tourism

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to tourism sector due to reduced snow & ice	Moderate	High	High	Extreme	Projected reductions in snow and ice are likely to impact the tourism sector, particularly winter sports such as skiing, and related attractions. Alpine sports tourism is highly sensitive to warming temperatures which can reduce snow base and the length of the ski season. Tourism may also be impacted by more general changes to the natural environment. Alpine sports tourism has low adaptative capacity to reduced snow and ice, however measures exist to compensate for reduced snow such as snow machines.
Risk to tourism sector due to river and surface flooding	Low	High	Extreme	Extreme	Projected increases in extreme rainfall are likely to result in increased flooding. Low lying and riverine attractions are likely to be exposed to flooding, which may also disrupt access routes and change the natural character of the region. The tourism sector is sensitive to flood damage to coastal and riverine attractions and amenities, which can be costly to repair and disrupt services. Related cancellations can reduce consumer confidence, particularly if frequent or recurring. The tourism sector may adapt to climate change as the market is likely to continue to seek tourism destinations. There is potential for increased tourism in Canterbury relative to other destinations that may suffer more severe damage.

Canterbury based tourism spending was over $3 billion in 2020. This contributes to roughly 10% of national tourism spend, and is the second highest regional contribution behind Auckland (MBIE, 2021). The Region supports a diverse range of tourist activities, including (Figure 13.8):

- Hanmer Springs Thermal Pools and Spa.

- Christchurch Adventure Park.
- Tekapo Springs and Hot Pools.
- Natural features and adventure tourism – Aoraki Mackenzie International Dark Sky Reserve, Tasman Glacier and Aoraki Mt Cook Village, Akaroa, Arthurs Pass, Alps 2 Ocean Cycle Trail Kaikōura.
- TranzAlpine Rail Journey.
- Waipara Valley Wineries.
- Ski fields: Mt Hutt, Roundhill – Lake Tekapo, Ohau, Mt Dobson, Porters, Fox Peak, Briken River Ski Field, Cragieburn, Temple Basin, Mount Cheeseman, Hanmer Springs, Awakino, as well as wilderness skiing and heliskiing.

As the transport and economic centre for the Region, Ōtautahi/Christchurch acts as a major hub for tourists travelling to the Region. Annual spending on tourism (Figure 13.9) shows that Ōtautahi/Christchurch has the highest tourism spending within the Region, accounting for almost two thirds of regional tourism spend (MBIE, 2021). These figures are likely to be artificially depressed, as tourism spending has been significantly impacted by the outbreak of COVID-19 and associated lock-down and travel restrictions. This impact is demonstrated in the historical spending pattern from tourist activity in Ōtautahi/Christchurch (Figure 13.10), which shows a sharp drop in early 2020, and lower average spend for the remainder of the year (MBIE, 2021).

Figure 13.8: Tourist attractions of Canterbury, clockwise from top left: Hanmer Springs Thermal Pools and Spa; Waipara Valley Wineries; Aoraki Mackenzie International Dark Sky Reserve; TranzAlpine Rail Journey; Aoraki Mt Cook; Mt Hutt Ski Field.

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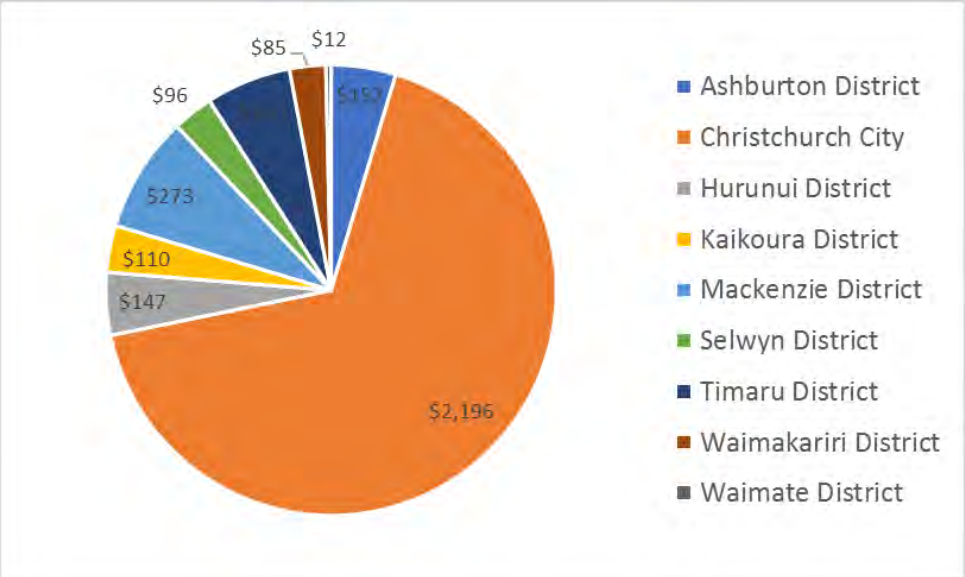

Figure 13.9: Annual tourist spend ($m) by district in the year to October 2020 (right) (MBIE, 2021).

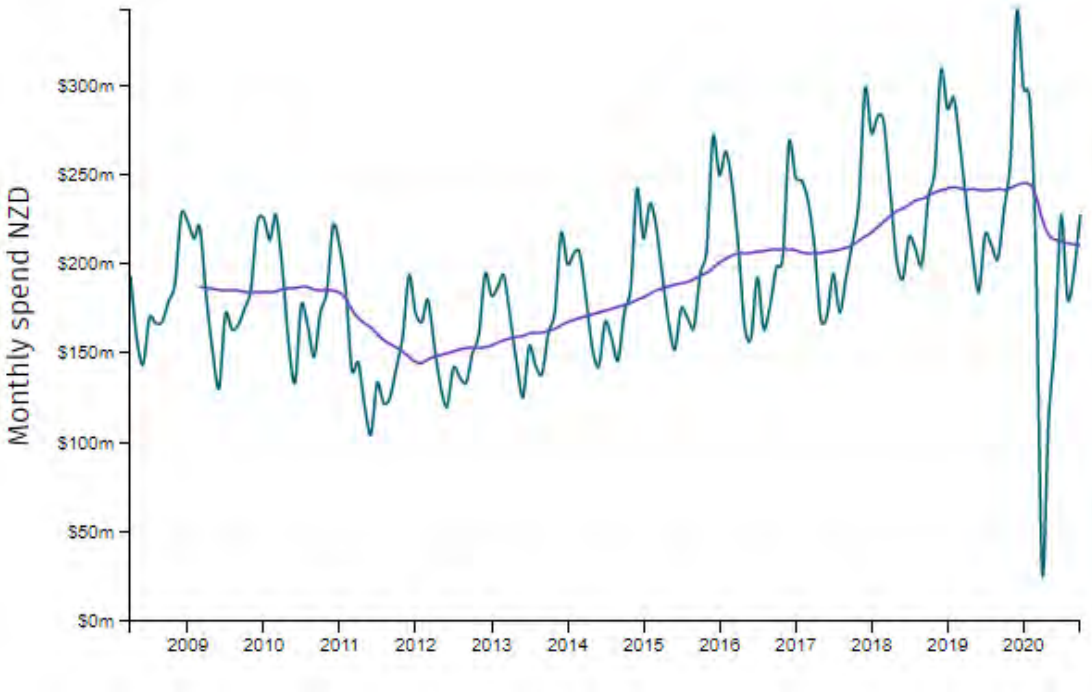

Figure 13.10: Monthly regional tourism spending (turquoise) and annual average tourism spending (dark blue) (MBIE, 2021).

Temperature increases are expected to be associated with rising snow lines and glacial retreat, more frequent hot extremes, and increasing extreme weather events. The number of snow days is projected to reduce an all parts of the Region, with the largest reduction in high alpine areas, where there are a relatively large number of snow days in the baseline climate (Macara 2020).

Nature based winter tourism, including skiing, glacial exploration and other mountain adventuring, is likely to experience adverse effects from warming temperatures. Reduced snow will impact on the duration of the operating season, the extent of operational ski fields, and raise the risk of avalanches and crevasses. In New Zealand, glaciers have retreated significantly over the last 50 years, as climate warming has led to rapid melting and retreat of glacier landscapes. Some glacial landscapes will decline in aesthetics, and may face the prospect of sustained decline and disappearance. Rapid glacial retreat will bring a loss of tourism revenues (Wang & Zhou, 2019). Globally, scientists predict that mountain glaciers could almost disappear by 2100 (PCE, 2019).

Changing avalanche and glacier properties, as well an increasing likelihood of fire, flooding, and extreme events may expose other supporting infrastructure and tourism activity to damage. This may result in increased maintenance costs, increased difficulty of access, and increased skill level requirements for tourists. For example, six huts removed from Aoraki (Mt Cook) National Park due to the impact of retreating glaciers. Hooker Hut alone has been relocated four times since its construction in 1910. It was moved from the crumbling moraine wall three times, having been inaccessible since 1994 after a flood washed out a track. It was then hit by an avalanche in 2005 before finally being removed from the valley in 2015 (Wilderness 2018).

Ski fields may adapt to reduced snow by increasing the use of snow machines. These carry their own economic impacts relating to increased running costs, and a high water demand. There is also a risk that, in an attempt to adapt to changes triggered by climate change (such as glacial retreat), the sector could 'maladapt' to climate change. A maladapted response is one in which the impacts of climate change lead to increased investment in emissions-intensive activities. These in turn not only exacerbate climate change, but also entrench an unsustainable path dependency (PCE, 2019).

Tourism destinations along coastal areas such as Akaroa, Banks Peninsula, and Kaikōura will be exposed to increased sea level rise, and associated coastal flooding and erosion. Lowland and riverine attractions will also be exposed to increased flooding. This increased exposure to flooding and erosion is likely to cause damage to infrastructure (e.g. roads), buildings (e.g. accommodation and other businesses), and recreational sites and activities (e.g. tracks and beaches). As the frequency of extreme weather events increases, causing cancellations of events and temporary closures, confidence in tourism may be affected.

Tourism is likely to be indirectly affected by the impacts of climate change on the wider Region. These include changes in natural landscapes due to changing temperatures, resulting in the loss of native wildlife, increased exotic species, increased pest species, changing water quality, and reduced snow cover. Changing ocean chemistry may impact ocean-based tourism, like whale watching. Biosecurity risks may also increase, such as with the introduction of didymo (*Didymosphenia geminata*) into the South Island. These changes may decrease the appeal of an attraction, particularly if the sight people came to see is no available. At some locations, tourism may increase in the short term, as people exhibit a 'last chance to see' mentality (PCE, 2019).

Canterbury tourism may also see a benefit from climate change. If climate impacts in New Zealand are relatively modest compared to many other countries, New Zealand may become a more attractive destination (PCE, 2019).

13.6 Insurance, business and the cost of living

The highest identified climate change risks to insurance, business, and the cost of living include those from sea level rise, flooding, and extreme weather events. As the climate changes, damages to businesses and services resulting from climate change impacts will cause an increase in cost. Businesses and communities are extremely sensitive to increased costs and will face a range of interrelated risks, including increased insurance premiums or insurance withdrawal, and the

potential loss or reduction of support services. The adaptive capacity of businesses is moderate, as changing investment opportunities arise from a transition to a low carbon economy.

Table 13.7: Summary of risks to business and the cost of living

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to the cost of business due to storms and wind	Low	Moderate	Extreme	Extreme	Damages from increased severe weather and sudden events such as fire may lead to various types of costs for individuals, businesses, government (link to governance), and the whole economy. Costs are likely to include those associated with loss or stranding of property and assets (including land), cost of repairing, rebuilding or replacing assets, and the cost of preventative measures. Investment opportunities may arise from the transition to a low carbon economy.
Risk to increase inequalities and cost of living due to climate change	Low	High	Extreme	Extreme	Risks to inequality and living costs are likely to arise from a range of climate hazards, and continue to increase as widespread effects of climate change are felt. Communities with current inequity are likely to be impacted first and most severely in the long term, and have a low capacity to adapt to change.

13.6.1 Business and the cost of living

Business activity is diverse across the Region. Manufacturing, professional services, and construction are dominant in Ōtautahi/Christchurch City, while agriculture, forestry, fishing, and mining are dominant outside of cities (MBIE 2021). Economic activity is most densely concentrated in Ōtautahi/Christchurch City, which generates 71% of the Region's GDP (MBIE 2020).

Financial costs of climate change are expected to increase significantly, and manifest in complex ways across both private and public sectors (Frame et al., 2018). Damages from increased severe weather and sudden events such as fire may lead to various types of costs for individuals, businesses, government (refer to Section *19*), and the whole economy. These costs are likely to include those associated with loss or stranding of property and assets (including land), cost of repairing, rebuilding or replacing assets, and the cost of preventative measures. Other indirect costs relate to foregone production, lower efficiency of production, increased medical costs, and higher insurance premiums (Hughes et al., 2019). Repairs from major damages often result in significant disruption to communities and businesses, albeit often over shorter timespans. Repairs to minor damages, or increased maintenance, may be delayed as major works are prioritised, leading to longer periods of impaired service, or loss of service from other types of infrastructure (Hughes et al., 2019). Ongoing disruption from maintenance or lack of progress on repairs may lead to a loss of consumer confidence in service providers. Over the long term, ongoing disruption to business districts creates an unstable environment for investors, thus asset values in these areas are likely to fall (Hallegatte, Bangalore et al, 2016).

General equilibrium effects can occur when a local extreme event is significant enough to change some important relative prices in the economy. For example, flood damage to crops might lead to (temporary) produce shortages, causing an increase in food prices throughout the whole economy –

not just in the directly affected area. This could lead to equity implications for households that spend a relatively high proportion of their income on food (Hallegatte, Bangalore et al, 2016).

Sudden onset hazards can impact business supply chains, making business continuity difficult and potentially resulting in loss of stock or increased costs. Adopting a 'just-in-time' production and delivery model means that businesses have limited back up stock, and are therefore affected by the smallest delays (Dillingham, 2019). This is particularly important in the supply chain of perishable items, where small delays can equate to loss of stock and have flow on consequences for food security (Yang et al., 2017). Parallels can be drawn with the impacts of COVID-19 on supermarket supplies, where increased demand meant supply chains could not keep up. This resulted in significant low stock across the country for certain items such as flour, pasta and rice (Oshri & Kotlarsky, 2020). Supply chain issues were identified as one of the factors which reduced household spending, impacting the broader Canterbury economy during COVID-19 (Deloitte, 2020).

Slow onset climate change hazards such as sea level rise and increasing temperatures will drive gradual increases in costs of living and doing business. Changes in property availability are likely to increase rent. The costs of utilities and taxes may likewise increase, as suppliers cope with increased maintenance and repair costs. Worker availability may decline, as increased temperatures make some working environments challenging. Alternatively, workers may demand increased wages for operating under harsher conditions. Increased costs may impact the profitability or viability of some businesses, and ultimately, business closures could impact whole communities (Lawrence et al., 2018).

Businesses may decide to invest in resilience or adaptation measures to reduce the impacts of climate hazards. This might be in the form of increased physical protection, such as increased drainage, raised building platforms, or physical barriers. It may also be in the form of changed business practices, such as adopting online services or changing to locally sourced products to reduce supply chain disruption.

Some businesses may have the opportunity to take advantage of a changing business environment due to climate change. This might include adoption of activities suited to warmer climates in agriculture (Kean et al., 2015), or business ventures related to collaborative innovation, adaptation, sustainable practices, and the transition to a low-carbon economy. Businesses that consider and embed climate risks within decisions, incorporating agility, innovation, and adaptation as part of business plans and systems are likely to cope better than those that do not (RBNZ, 2018).

13.6.2 Insurance

Insurance is commonplace in New Zealand. Residential home and business insurance is a requirement for bank lending, and New Zealand has high rates of car insurance, contents, and other types of private insurance. New Zealand is also serviced by government insurance schemes such as the Earthquake Commission (EQC) for natural disasters and the Accident Compensation Corporation (ACC) for accidental injury (New Zealand Now, 2021).

Asset owners, including homeowners, residents, and business owners, are likely to face increasing insurance premiums and excesses due to increased and/or ongoing damage (Surminski and Hankinson, 2018). Homes exposed to coastal flooding in Ōtautahi/Christchurch which currently have a 1% probability of coastal inundation are expected to face a partial insurance retreat from 2030 (Storey et al., 2020). Similar problems with insurability are likely to occur in response to an increased likelihood of extreme events, inland flooding, and fire. Increased insurance premiums or reduction in insurance availability may result in a loss of property value, which has wider economic implications (RBNZ, 2018) and ultimately may affect the viability of some businesses. These risks may impact consumers, increase the cost of living, or result in increased inequities in the economy.

14 Hauora | Wellbeing

Hauora (wellbeing) is fundamental to human life. As described by the Whare Tapa Whā model of health, Māori wellbeing encompasses taha wairua (spiritual health), taha tinana (physical health), taha hinengaro (mental/emotional health) and taha whānau (family health). This holistic model recognises the interrelated nature of wellbeing and identifies that impacts on physical health can extend to spiritual, mental and family health. Physical health is also connected to other aspects of wellbeing, including cultural identity, community, and equity, as well as being strongly linked to the condition of the natural and physical world.

Climate change will result in a range of physical and mental health impacts, some of which are already being experienced in Canterbury. As summarised in Table 14.3, these include trauma and physical injury from large events, impacts from changes to food production and nutrition, increased heat stress, increased stress and anxiety, increases in chronic diseases in older people, changes to disease transmission (for example, increases in animal to human transmission, i.e. mosquito transfer), changes to food and water borne diseases through contamination and temperature changes allowing parasites and diseases to establish and flourish, and increases in allergies through natural environment changes. Additionally, additional pressures on housing supply due to an increase in climate refugees, and impacts on housing resulting from higher humidity and moisture, will have subsequent health impacts for people (Bennett et al 2014).

14.1 Background

The health and wellbeing of Canterbury's population is influenced by its population demographics. The Region has undergone a period of unprecedented population change following the Canterbury Earthquake Sequence (commenced 2010), as Ōtautahi/Christchurch residents have moved from the city to adjacent greater Ōtautahi/Christchurch areas in Selwyn and Waimakariri (CDHB, 2021). Despite this, Canterbury's population is significantly higher in Ōtautahi/Christchurch than any other district, as shown in Figure 14.1 (Statistics New Zealand, 2021). In the 2018 census, 82.4% of Cantabrians identified as NZ European, 11% as Asian, 9.4% as Māori, and 3.2% as Pacific Island (Statistics New Zealand, 2021). Overall, the Māori population of the Region sits lower than the national average of 16.5%, however Kaikōura District has a Māori population of 18% (Statistics New Zealand, 2021). Of Canterbury residents over the age of 15, 18.9% have no formal qualification, while 22.5% hold a Bachelor's degree or higher qualification. 32% of households do not own their own home (Statistics New Zealand, 2021).

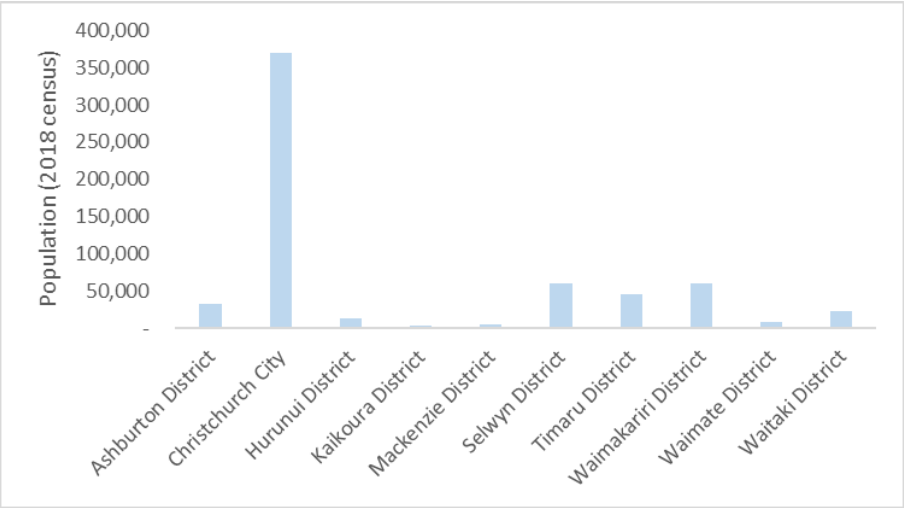

Figure 14.1: Population of Canterbury, by District (Statistics New Zealand, 2021).

In 2015/16, 16% (or 1,772 people) of New Zealand's Skilled Migrant Category principal applicants (permanent migrants) found employment in the Canterbury Region. This is an increase of 21% on the previous year. The Philippines, India, and the United Kingdom were the top source countries of skilled migrants for the Region. The most common occupations of these migrants in Canterbury were Carpenters and Joiners (15%), Painting Trades Workers (6%) and Registered Nurses (4%). Historically (pre-COVID-19), Canterbury was home to the second largest number of international students in the country. In 2015/16, this figure sat at 7,512 (MBIE 2017).

Resilience is often higher in physically and socially active people. Through a study of community resilience following the Canterbury Earthquake Sequence (commenced 2010), it was identified that participation in programmes such as Girl Guides, the Duke of Edinburgh Award, or similar outdoor leadership development programmes, or those involved with voluntary organisations such as St John or the Volunteer Fire Brigade, are generally more resourceful and resilient (MCDEM, 2012).

Māori are disproportionately exposed to adverse social and economic conditions, with consequently higher morbidity and mortality. Nationwide studies suggest that life expectancy for Māori is already seven years lower than for non-Māori, and that Māori have significantly higher rates of most major diseases. These factors are likely to increase vulnerability to the health effects of climate change for Māori in Canterbury (Jones, et al., 2014).

Table 14.1: Summary of risks to hauora (wellbeing) from differing hazards

Using RCP8.5	Higher mean temperatures			Change in mean annual rainfall			Drought			River and surface flooding			Coastal flooding			Increased coastal erosion			Sea-level rise and salinity stresses			Storms and wind			Increased fire-weather			Increasing landslides and soil erosion			Extreme weather events			Reduced snow & ice			Ocean chemistry changes			Marine heatwaves			Climate change		
	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L
Mental wellbeing																																										L	H	E
Physical health																																										L	M	H

Key

I	Insignifcant	P	Present day
L	Low	M	Mid (2050)
M	Moderate	L	Long (2100)
H	High		
E	Extreme		

14.2 Risks to wellbeing

Risks to physical and mental health due to climate change will vary depending on where people live and what they are exposed to, as well as their ability to cope with these events. Age, education, income and livelihood type, housing type and quality, social networks, and cultural relationships all contribute to resilience and vulnerability. It is likely that the impacts of climate change will be felt most strongly by those already marginalised in society.

Table 14.2: Risks to hauora (wellbeing)

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to mental wellbeing due to climate change	Low	High	Extreme	Extreme	Risks to mental health may arise from a range of climate change related issues, and exposure may be widespread across all sections of the community. Some groups within the community already experiencing negative mental health impacts related to climate change stresses. Further mental health issues are likely to stem from a wide range of factors and compound with other physical and cultural health impacts.
Risk to physical health due to climate change	Low	Moderate	High	High	Risks to physical health from climate change are likely to be widespread across all communities. Physical health impacts are likely to be driven by direct exposure to climate hazards such as flooding and fire, which is likely to increase as slow moving climatic changes such as high temperatures begin to impact health. Health impacts may also arise through a range of indirect causes, such as damp housing caused by high groundwater or increased flooding. Medical intervention and public health measures can support communities to adapt, however this may be limited by the capacity for health services to respond effectively.

14.2.1 Risk to physical health due to climate change

Exposure of Canterbury's population to any particular climate hazard will vary throughout the Region. While most hazards will only impact some of the community at any one time, most of the Region will be exposed to hazards from climate change in some form. Those who reside at the coastal fringe will be the most likely to be exposed to sea level rise and storm surges, and those in low-lying or flood prone areas will be most likely to be exposed to harm from flooding. The largest temperature increases are projected to occur inland, and these areas may also be exposed to increased fire risk and drought.

Climate change impacts on physical health can be through direct exposure to hazards (Table 14.2), as extreme, sudden events such as flooding, fires, storm surge and high intensity rainfall pose immediate risks. For example, injury and loss of life can result from being swept away when walking through floodwater or landslides, or being burnt in a fire (Royal Society, 2017). For example, during the June 2021 Canterbury floods, a man was tragically killed when a tree fell on his truck during the storm (NZ Herald, 2021). Direct health impacts can also be categorised into two categories. Acute health impacts are those related to sudden or extreme events, such as include storms, flooding, fire and drought. Chronic health impacts are those related to gradual climatic change, where hazards such as temperature and sea level rise will emerge slowly over decades.

Climate change also impacts physical health indirectly, through consequences and changes that may occur as a result of exposure to climate hazards. These include issues such as water availability and quality, diseases, supply chain disruption, air quality deterioration, and lifestyle and behavioural changes (Table 14.3).

With both temperature extremes and the number of hot-days expected to increase, there will likely be an increase in heat-related illnesses and mortality (Royal Society, 2017). Increasing temperatures pose an increased risk of heat stress, as well as increased occurrences of gastrointestinal infections, infectious diseases, respiratory problems and cardiac problems. Populations that are more vulnerable to these increasing risks are older adults, those with chronic disease, young children, and those who are on low incomes or predominantly work outdoors (Environmental Health Indicators Programme, 2019).

Air quality may be expected to generally improve in areas that experience increases in wind speeds, due to air mixing rates and the more rapid dispersal of pollutants. However, increasing temperature and water vapour (linked to increasing rainfall) are associated with worsening air quality. Changes in climate may also lead to an increasing amount of pollen, and may extend the duration of pollen season, having an impact of allergic disorders such as rhinitis, conjunctivitis, asthma, and hay fever (AAAAI, 2020).

Living and working in damp indoor environments associated with increased rainfall, flooding, and rising groundwater levels may result in an increase in respiratory diseases such as asthma, hypersensitivity pneumonitis, rhinosinusitis, bronchitis and respiratory infections (WHO, 2013; Zang, 2010; The National Institute for Occupational Safety and Health, 2012). Māori, Pacific Island, and low-income groups are identified as being at a greater risk of adverse health impacts from climate change through poor housing quality and overcrowding, as discussed in Section 15.1 below. Low-income groups are also more likely to experience housing supply issues, as climate refugees enter New Zealand (Bennett, et al., 2014).

Loss of recreational opportunities and facilities may occur due to a range of hazards. These include changes to access of coastal areas through erosion and destruction of access such as steps or ramps, loss of tracks to coastal areas due to erosion or flooding, and loss of erosion protection infrastructure such as seawalls. Reduction in snow and ice, as well as increases in landslides, flooding, and fires, may damage inland parks, alpine areas, and ski fields. This will impact recreational amenities, resulting in a reduction in the type of exercise available to people. Lower levels of engagement in physical exercise leads to adverse health outcomes such as weight gain, increases in diseases including heart disease, and/or reduced mobility. Risk to life from pursuing these activities may become too great for some people to engage in them. This may happen as more frequent extreme weather events such as severe storms reduce access to mountainous areas ,and increase the difficulty of maintaining tracks and backcountry facilities.

Potential benefits to physical health may arise from increased adoption of active transportation modes. Communities may increase walking and cycling in response to emissions reduction measures, and through a rise in recognition of other benefits, including cost savings. This benefit is generally limited to individuals who live close to their employment and local amenities (Bennett et al., 2014).

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Table 14.3: Summary of wellbeing impacts from climate change (adapted for Canterbury context from Table 1. Western Australia Department of Health (n.d.))

	Hazard/Cause of health impact	Health impact	Commentary
Direct	Flooding	Fatalities, injuries Respiratory illnesses	Direct physical injuries and fatalities from flooding including exposure to contaminated floodwater, being washed away, and related accidents such as electrocution and falling trees. Also, indirect impacts due to ongoing respiratory illnesses and related impacts due to damp and damaged housing.
	Landslides	Fatalities, injuries	Direct physical injuries and fatalities from landslides.
	Fire	Fatalities, injuries	Direct physical injuries and fatalities from burns.
	Temperature increases and heatwaves	Heat stress	Heat stress can cause mild to severe health impacts.
Indirect	Deteriorated water quality	Gastro-intestinal diseases, diarrhoea, vomiting	Run-off from heavy rainfall into recreational swimming areas and untreated water supply can increase exposure to pathogens. Contamination of water supplies from drought related algal blooms, wildlife and stock deaths may increase risks to health.
	High groundwater table	Respiratory illnesses	High groundwater tables can increase dampness in housing. This can result in increased or ongoing respiratory illnesses and related impacts due to damp housing.
	Vector borne illness	Rate of exposure likely to increase	Limited information relating to the impact of climate change on vector borne illnesses for Canterbury. However, these may increase as temperatures increase.
	Food production and storage	Food & seafood poisoning Change in nutritional content and exposure to pesticides	Increased temperatures may increase the rate of food spoilage, posing increased occurrences of food poisoning. Changes in agriculture may change the availability of some types of food, nutrient content and result in increased use of insecticides, pesticides and other chemical treatment.
	Air quality	Respiratory effects	Wildfires may cause reduced air quality. Temperature increases may change air quality due to increased dust, pollen, changes in airflow impacting smog.
	Lifestyle/behavioural	Loss of recreational opportunities and behaviour changes related to a changing climate	Environmental damage reducing exercise based recreational opportunities e.g. damage to coastal walkways and reserves, reduction in ski field operation, snow adventure opportunities, and increased temperatures limiting time outside may result in decreased physical activity and mental health impacts.

14.2.2 Risk to mental wellbeing and health from climate change

Increased risk to mental wellbeing and health from climate change is expected to occur in Canterbury. As with physical health, impacts on mental health and wellbeing may occur throughout the Region, and are unlikely to be spatially linked to exposure to any particular hazard. The level of risk is dependent on a range of factors, including exposure of people, infrastructure, and environment, and demographics including age, income, education, livelihood, housing type, social networks, and cultural relationships. The occurrence of mental health impacts is strongly linked to socio-economic factors. Following the Canterbury Earthquake Sequence (commenced 2010), a study showed that an individual's physical health, physical mobility, mental health, attitude, sociability, and connectedness with others were the most significant factors in determining individual resilience (MCDEM, 2012).

Mental health impacts may arise from a range of climate change related factors, including event related trauma such as from floods or storms, slow onset physical hazards, environmental degradation, erosion of community and culture, loss of livelihood, reduced personal autonomy, and anxiety relating to the occurrence of climate change. These mental health impacts may range from minimal stress and distress symptoms through to clinical disorders such as anxiety, depression, post-traumatic stress and suicidal thoughts.

Other consequences include effects on everyday life, perceptions, and experiences of individuals and communities attempting to understand and respond appropriately to climate change and its implications (Royal Society, 2017). Climate anxiety can also exhibit as a more generalised fear for the future, of global climate crisis and of the threat of environmental disaster (Wu, et al., 2020). This is likely a significant issue occurring at present throughout New Zealand, particularly in youth (RSNZ, 2017; Newsroom, 2019; NZCCP, 2021).

Examples of pathways for impacts on mental health include:

1. Sea level rise and coastal retreat requiring people to leave their homes may cause uncertainty for vulnerable populations (Royal Society of New Zealand, 2017). This can lead to mental health issues from the trauma of leaving familiar situations, breaking social ties, and difficulties of resettlement. Vulnerable populations, such as the elderly or impaired, may struggle to cope with change, or to trust new people in new communities, and take a long time to establish relationships. Moving to larger centres may also mean a support network is less consistent, with a team of people providing support rather than one or two regular support workers. This may in turn lead to physical health impacts through mistrust and reluctance to seek health support when needed (Thornley et al., 2015).
2. The impacts of leaving a community may also impact mental health, as individuals cope with financial impacts (affordability of housing, land values, costs of leaving), loss of family connections to an area or community, and uncertainty for the future.
3. Mental wellbeing can be associated with longer term uncertainty and the cumulative impacts of climate change, such as job losses, reduced housing availability, changes to community fabric, and reduced cultural support.
4. Māori understanding of health emphasizes a holistic perspective incorporating spiritual, intellectual, physical, social and emotional dimensions, and includes relationships with the environment (Jones, et al., 2014). Changes to landscapes and waterways may adversely impact on wāhi tūpuna and marae, cultural practices such as mahinga kai, and access to resources. This could weaken cultural values and connections to whakapapa, and may add to the existing higher rates of mental illness and suicidal behaviour experienced by Māori (Jones, et al., 2014).

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Additional mental health support services are likely to be required to support a diversity of needs across a range of age groups. This will range from children suffering increased fear of the unknown, to elderly struggling to cope with the concept of climate change and any potential impacts it has on their lives. Stressors may build to the point where the individual's ability to cope is significantly reduced, requiring greater support from the health system. When a large number of people are experiencing a similar mental health break down, the support system may also be stressed and less able to provide the support required.

Following sudden, extreme events, the capacity for mental health support to respond to short-term wellbeing impacts may be impacted. Overloading of services post-event may prevent the health system from responding quickly, pushing waiting times beyond the period where an individual may need help.

15 Ora rite | Equity

The concept of equity supports fairness and equal opportunities for whānau to thrive and be potent. It is particularly important when addressing basic needs such as healthcare, employment, and education. It also recognises differences between individuals, supports inclusion of diversity, recognises the right to self-determination, and advocates against discrimination. In recent decades the diversity of Canterbury's population has increased significantly in terms of ethnicity, culture, gender identities, religion, values, languages spoken, ages, sexual orientation and whānau structure. New Zealand's founding on firm values of honesty and egalitarianism, as well as its remote location and relatively small size may contributed to a persistent striving for a sense of fairness throughout the community (Royal Society of New Zealand, 2020). The achievement towards women's suffrage made by Cantabrian Kate Sheppard is a leading example of the commitment to equality that New Zealand represents.

Equity through healthcare is a long-established principle of the New Zealand healthcare system. The Ministry of Health acknowledges that in New Zealand, people have differences in health that are not only avoidable, but unfair and unjust. It strives to achieve equity, by recognising that different people with different levels of advantage require different approaches and resources to get equitable health outcomes.

Table 15.1: Summary of risks to ora rite from differing hazards

Using RCP8.5	Higher mean temperatures			Change in mean annual rainfall			Drought			River and surface flooding			Coastal flooding			Increased coastal erosion			Sea-level rise and salinity stresses			Storms and wind			Increased fire-weather			Increasing landslides and soil erosion			Extreme weather events			Reduced snow & ice			Ocean chemistry changes			Marine heatwaves			Climate change		
	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L
Increase inequalities and cost of living																																										L	H	E

Key

I	Insignifcant	P	Present day
L	Low	M	Mid (2050)
M	Moderate	L	Long (2100)
H	High		
E	Extreme		

15.1 Risk of increased inequalities and cost of living due to climate change

Climate change introduces an additional complexity to maintaining equity, where climate change is likely to exacerbate existing inequalities and increase the cost of living. Social inequity will be impacted by many interrelated climate risks, including risks to health, community, culture, community connections, built heritage, prosperity, water, biodiversity and governance. As the impacts of climate hazards increase, communities with current inequity are likely to be impacted first, and most severely over the long term.

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Table 15.2: Risks to ora rite |equity

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to increase inequalities and cost of living due to climate change	Low	High	Extreme	Extreme	Risks to inequality and living costs are likely to arise from a range of climate hazards, and continue to increase as widespread effects of climate change are felt. Communities with current inequity are likely to be impacted first and most severely in the long term, and have a low capacity to adapt to change.

Communities and individuals that are exposed to climate hazards will experience the same impacts, however, the ability to respond, adapt or cope with these impacts is uneven, due to existing inequalities (Ellis, 2018). The impacts of climate change will be felt most strongly by those already marginalised in society, by those with higher levels of inequity, or with lower socioeconomic status.

Those experiencing marginalisation due to demographic factors such as age, race, ethnicity, socioeconomic status, gender, literacy or health may be unable to access resources to respond to climate risks (Ton, Gaillard, Adamason, Akgungor, and Ho, 2019). Climate change is likely to exacerbate existing inequities, and create new inequities which can have cascading implications for livelihoods and wellbeing.

The New Zealand Index of Social Deprivation provides one example of a measure of social vulnerability across communities. The Index ranks locations on a scale of decile 1 (least deprived) to decile 10 (most deprived) based on prescribed criteria by Statistical Area 2[7] using averaged data. Using this index, the most deprived populations (i.e. those with a score of 9) reside within Ōtautahi/Christchurch City, particularly in the southern and eastern suburbs, and in pockets surrounding the fringes of the city. Many of these suburbs are located within low-lying or coastal areas, and include the areas of Woolston, Bromley, Linwood, Wainoni, Aranui, Avondale and Bexley. Outside Ōtautahi/Christchurch City, many rural centres have high deprivation scores, including Waimate, Geraldine, Ashburton, Rangiora, Amberley, and the coastal suburbs of Timaru (Figure 15.1).

Other key groups that may experience inequity as a result of climate change impacts include:

- Older adults: This group tends to be less mobile, and is more likely to be physically impaired, with ailments such as hearing or vision loss. The distribution of adults in the Canterbury Region is shown in Figure 15.2. The median age of the population of Canterbury is projected to rise over coming decades. It is projected to increase from 38 years in 2018 to 45 years in 2048. In 2048, one in four people in Canterbury is project to be aged 65 years or over (Environment Canterbury, 2021). Older adults are more likely to have chronic health conditions such as heart disease and diabetes, making them more susceptible to health impacts related to heat stress, or during and after a flood (Environmental Health Indicators Programme, 2019). They may have limited social networks and be socially isolated, particularly if they live alone. They are also likely to need more help to evacuate during a flood, and during the clean-up phase after a flood (Mason et al., 2019).
- The socially isolated: This group includes people living in rental housing and recent immigrants. Both groups may be new to an area, and as such are unlikely to have strong social networks within a community. New members of the community may not know where to go to access information, support services, and other important services. They may also be more

[7] Statistical area geographies are aggregations of meshblocks optimised to be of similar population sizes to enable the release of low-level data (StatsNZ, 2018).

vulnerable to changes in community governance and structure, as they often have relatively high dependence on these support systems (Manning et al, 2015). Migrant communities may have an increased vulnerability due to climate differences from their home nations. They may be more likely to accept poorer quality housing, and less likely to seek medical help if needed, due to barriers such as language, and the inability to use traditional medicine or healthcare practices with which they are comfortable (Bennett et al, 2014). These communities may include the Ashburton-based Filipino community working in the dairy industry, and the South Canterbury Pacific community working in fruit picking industry.

Climate hazards, including exposure to extreme weather events such as flooding or heatwaves, or to ongoing gradual changes such as inundation of low-lying areas, will have a range of impacts on community facilities and housing. The condition of housing may degrade, for example due to improper repairs following floods, leading to increased moisture and less weather tightness, resulting in health impacts. This lower quality housing is more likely to be rented out, or be lower cost purchase options. However, it will probably lead to greater health impacts, such as respiratory disease and chronic preventable illnesses. This was demonstrated in post-earthquake Ōtautahi/Christchurch, and is still prevalent where housing repairs have not been carried out properly or at all, leading to housing conditions exacerbating preventable diseases such as respiratory illness and pneumonia. Lower rents are attractive to those on lower incomes, as they appears to provide greater flexibility in weekly costs. In reality, more income may go on heating or healthcare costs.

Existing socio-economic disparities between Māori and non-Māori communities are likely to be exacerbated with climate change. This is likely to arise from the sensitivity of Māori communities to impacts on ecological systems, their dependence on primary industries for livelihoods, and the impacts of climate change on cultural and spiritual wellbeing, as well as on mahinga kai, food security, and proximity of housing and infrastructure (Ministry for the Environment, 2020; Stephenson et al, 2018; Ministry for the Environment, 2020; Manning, Lawrence, Ngaru King and Chapman, 2015).

Exposure of housing to hazards may force relocation or retreat, forcing communities to move to more expensive or remote areas. This may lead to reductions in the ability to afford rent or land, and may also by accompanied by rising costs of utilities (i.e. water and electricity). Overcrowding of dwellings is likely to be a commonly adopted strategy to reduce cost. A similar situation emerged during post-earthquake Ōtautahi/Christchurch, where a large portion of older housing stock was severely damaged, and classified as the uninhabitable Red Zone (Potter et al 2014). This housing was located in areas typically categorised as lower income, with lower rental value. The residents in this zone were forced to shift to areas dominated by newer housing, with higher rental, or to more distant suburbs such as Rolleston to find cheaper accommodation. Additionally, damaged housing was rented more cheaply, providing worse living conditions arising from damp and cold housing, such as mould, draughts, and insufficient heating, and contributing to respiratory diseases such as asthma, hypersensitivity pneumonitis, rhinosinusitis, bronchitis and respiratory infections (WHO, 2013; Zang, 2010; The National Institute for Occupational Safety and Health, 2012, see also Section 14.2.1).

Increased pressure on housing supply as climate refugees arrive also has the potential to lead to overcrowding and displacement from communities. Low-income groups are likely to be competing for these same properties (Bennett et all., 2014). Groups may be forced to shift away from traditional centres, and there may be an increase in multi-family households.

Relocation to more remote areas may raise transportation costs, and reduce access to support and opportunities such as employment and education. In many small rural townships within the Region (for example Omarama, Fairlie, Oxford), service providers such as doctors, nurses, and teachers do not necessarily reside within the town. This results in additional travel costs and time to access

services. For those on lower incomes, access to these services may become compromised as costs to travel are diverted towards meeting their basic needs.

Further increases in the cost of living may arise from changes to rental and property markets. These could come about through increases in insurance costs, or erosion of industries that support real estate and provides jobs. For example, an industry may be unable to maintain profitability in the face of climate change impacts, and eventually close. The resulting job losses might leave workers unable to rent, or force them to move away. Changing hazard profiles may result in in insurance retreat, or unaffordable premiums, and may increase difficulties in selling or buying a property. This may lead to situations where there is household debt against the property, yet to service a mortgage, banks require insurance.

Frequent relocation or upheaval as a result of climate change impacts may result in lower engagement with education providers due to regular movement between institutions. Children and young people in particular may struggle to keep up with education when moving between providers. Resulting gaps in education could lead to longer term impacts, and a cycle of low engagement due to educational limitations and understanding or literacy (UNESCO report 2020).

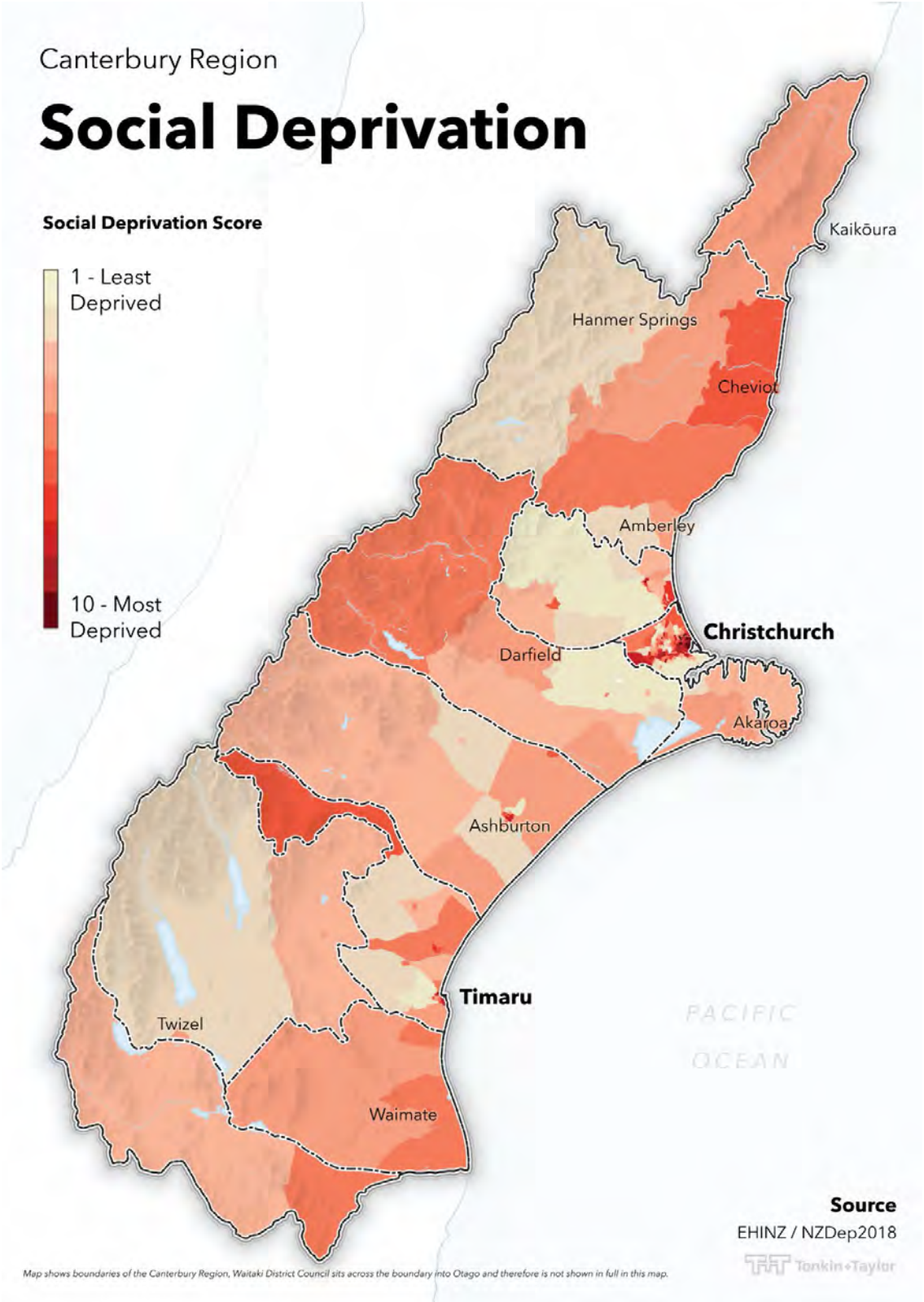

Figure 15.1: Map showing deprivation index score within Canterbury Region.

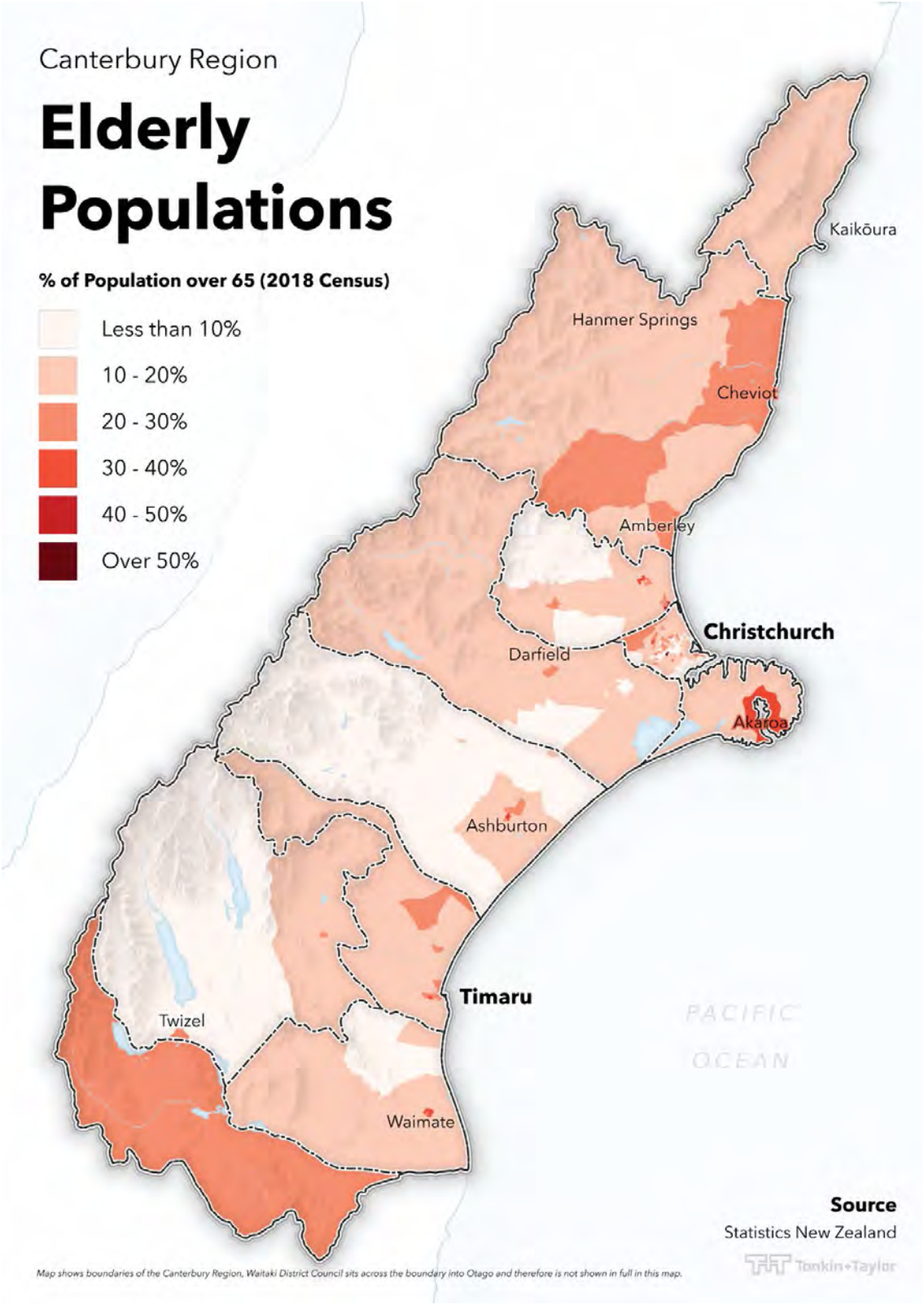

Figure 15.2: Elderly adult populations in Canterbury Region.

16 Hapori | Sense of Community

A sense of community is important, it provides a basis for social cohesion, and is a foundation for a safe and inclusive society. Hapori (a sense of community) can be developed through a range of channels, including neighbourhoods, shared community interactions, iwi, religious groups, cultural groups, and refugee resettlement groups. In a Te Ao Māori world view, community is important in supporting the reciprocal obligations to safeguard and protect the health of the environment and the health of people. It is also important for honouring inter-relationships between Te Ira-Atua, (the spiritual realm) Ira Tangata (people) and Ira Whenua (natural world).

Community networks are important to building resilience. Many outstanding examples of the importance of community cohesion have been observed through the actions of Cantabrians in response to the Canterbury Earthquake Sequence (commenced 2010). Community cohesion and resilience was demonstrated during the immediate responses, when community members worked to support one another during a period where official resources were unavailable. Existing residents' associations were used to form a communication network between local authorities and individual streets (CanCERN, Vallance). This was an effective model, demonstrating the effectiveness of sharing community information as well as connecting residents, including reaching those without telephone or internet. Strong community networks also provided immediate wrap around support to iwi/hapū members. Over time, this support spread to other vulnerable communities, such as refugee groups. These can be viewed as 'informal' networks. There is potential to undervalue these sorts of networks during decision making processes and distribution of support.

Table 16.1: Key risks to Hapori | Sense of community

Using RCP8.5	Higher mean temperatures			Change in mean annual rainfall			Drought			River and surface flooding			Coastal flooding			Increased coastal erosion			Sea-level rise and salinity stresses			Storms and wind			Increased fire-weather			Increasing landslides and soil erosion			Extreme weather events			Reduced snow & ice			Ocean chemistry changes			Marine heatwaves			Climate change		
	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L
Rural housing and communities										H	E	E													M	H	E																	
Settlements and urban communities										H	E	E	H	E	E	M	H	E	L	M	H																							
Community cohesion																																										L	H	E

Key

I	Insignifcant	P	Present day
L	Low	M	Mid (2050)
M	Moderate	L	Long (2100)
H	High		
E	Extreme		

16.1 Risks to settlements and urban communities

The highest risks to settlements and urban communities from climate change include those from inland, surface water, and coastal flooding, and increased fire weather. The frequency and intensity of coastal and inland storms and flooding is projected to increase over time. The exposure of Canterbury buildings to flooding is the highest nationally. The majority of exposed buildings are located in the low-lying parts of urban Ōtautahi/Christchurch City, with older buildings most

vulnerable to flood and storm damage. The adaptive capacity of settlements is generally complex and expensive, with high social costs. Exposure to wildfire will also increase as hotter drier summers occur. Rural areas will be most highly exposed, due to larger areas of fallow land and vegetation cover.

Table 16.2: Summary of risks to urban communities

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to settlements and urban communities due to coastal flooding	High	Extreme	Extreme	Extreme	Projected increases in sea level rise and storminess are likely to lead to increased coastal flooding and erosion. Urban communities will be increasingly exposed to flooding, as many are located in low lying coastal areas. Buildings are sensitive to flood damage which can destroy interiors and cause loss of property. Older buildings, and those with timber construction are particularly sensitive. Adaptation options are available including sea walls, sand dune remediation and retreat.
Risk to settlements and urban communities due to river and surface flooding	High	Extreme	Extreme	Extreme	Projected increases in extreme events are likely to cause increased flooding to which some urban communities are highly exposed. Buildings are sensitive to flood damage which can destroy interiors and cause loss of property. Older buildings, and those with timber construction are particularly sensitive. Adaptation options are available including stop banks and retreat.
Risk to settlements and urban communities due to increasing coastal erosion	Moderate	High	Extreme	Extreme	Projected increases in sea level rise and storminess are likely to lead to increased coastal flooding and erosion. Urban communities will be increasingly exposed to flooding, as many are located in low lying coastal areas. Buildings are sensitive to flood damage which can destroy interiors and cause loss of property. Older buildings, and those with timber construction are particularly sensitive. Adaptation options are available including sea walls, sand dune remediation and retreat.
Risk to settlements and urban communities due to sea-level rise and salinity stresses	Low	Moderate	High	High	Projected increases in sea level rise and storminess are likely to lead to increased coastal flooding and erosion. Urban communities will be increasingly exposed to flooding, as many are located in low lying coastal areas. Buildings are sensitive to flood damage which can destroy interiors and cause loss of property. Older buildings, and those with timber construction are particularly sensitive. Adaptation options are available including sea walls, sand dune remediation and retreat.

Table 16.3: Summary of risks to rural communities

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to rural housing and communities due to river and surface flooding	High	Extreme	Extreme	Extreme	Projected increases in extreme events are likely to cause increased flooding. Relatively low density of dwellings in rural communities mean that there are lower numbers of exposed rural buildings. However, the condition of these buildings may be lower due to age and overall lack of maintenance meaning a higher sensitivity to flood damage.
Risk to rural housing and communities due to increased fire-weather	Moderate	High	Extreme	Extreme	Projected increases in temperature, wind and dry days are likely to increase the fire weather exposure particularly in inland rural communities. Warmer temperatures, increased areas of barren land and high vegetation cover make rural communities sensitive to fire. Defences and strategies can be put in place to increase resilience, such as scrub clearing, pruning and planting of fire resistant trees i.e. deciduous.

Housing and buildings within Canterbury include commercial and public buildings, and rural and urban housing. 27,821 hectares of land is classified as urban within the Canterbury Region (Land Air Water Aotearoa, 2021). This includes 226,806 occupied private dwellings, and 1,293 occupied non-private dwellings (Statistics New Zealand, 2021).

Canterbury's large coastline, many rivers, and high population living within low-lying coastal urban contribute to extreme exposure to surface water and coastal flooding, erosion and sea level rise. Within the national context, Canterbury Region has the most extensive built land area exposed to coastal flooding. The exposed area is just under 15 km^2, most of which is within Ōtautahi/Christchurch City (14.7 km^2). This area is home to New Zealand's highest regional population of 18,122 people exposed to coastal flooding. Of these, 11,941 reside in Ōtautahi/Christchurch City, predominantly within the suburbs of Burwood, New Brighton, Southshore, Woolston, Bromley, Hillsborough, Redcliffs and Sumner. By late century, 9,506 buildings within the Region are projected to be exposed to coastal flooding from the 1% AEP. This increases to 14,338 buildings when including 0.3 m sea level rise, and 25,038 buildings at 0.8 m sea level rise. Ōtautahi/Christchurch City has the highest exposure within the Region, with 6,653 buildings exposed at 0.0 m sea level rise. This is followed by Waimakariri, with 2,293 exposed buildings at the same level. At 0.8 m sea level rise, exposure of buildings in Christchurch increases to 20,068, and in Waimakariri to 3,646 (Figure 16.1) (Paulik, et al., 2019).

Exposure to river and surface water flooding is also highest in Canterbury compared to the national context. A total of 116,713 buildings within Canterbury have been assessed as currently exposed to flooding. Of these, 95,354 are in Ōtautahi/Christchurch City, followed by 11,186 in Waimakariri and 1,654 in Ashburton (Paulik, Craig, & Collins, 2019). Mean annual flood flow and extreme events are projected to increase with climate change. National flood exposure modelling indicates that within Canterbury, 7,481 buildings are located within floodplains that will experience a mean annual flood increase of 20% under RCP 8.5 (Figure 16.2) (Paulik, et al., 2019).

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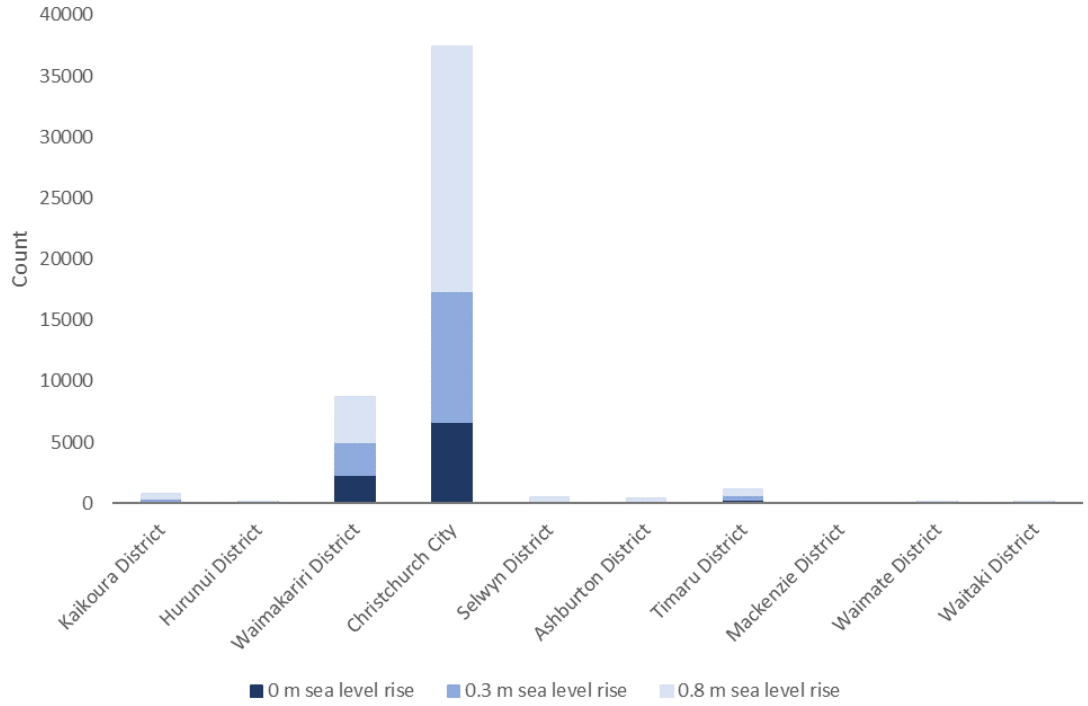

Figure 16.1: Exposure of buildings[8] to coastal flooding and incremental sea level rise by district (Paulik et al., 2019).

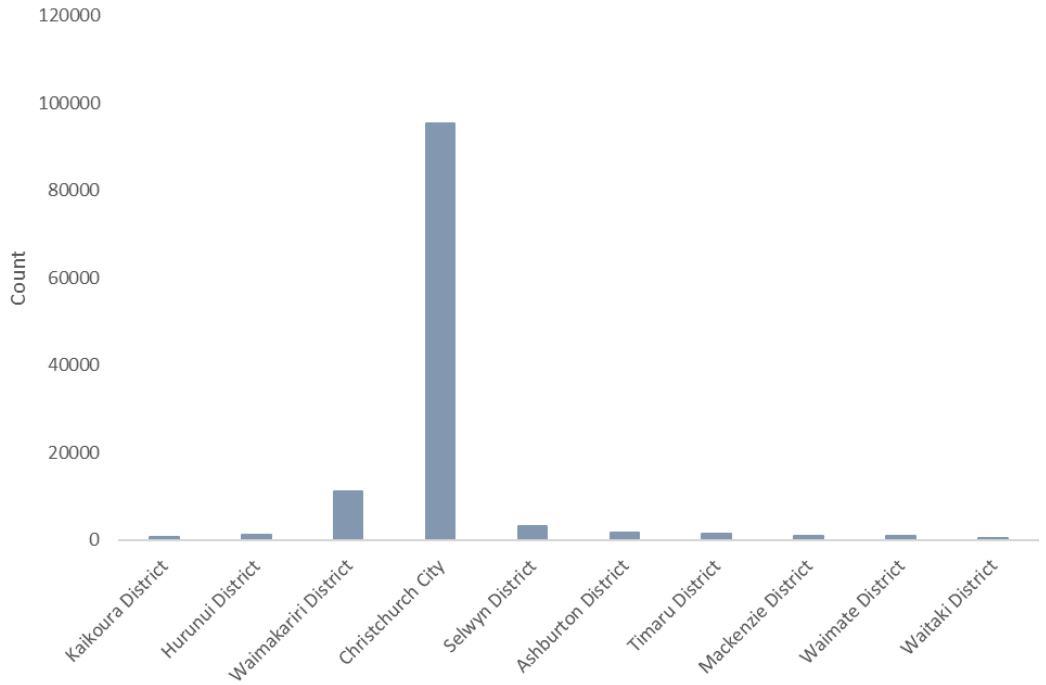

Figure 16.2: Exposure of buildings[8] to present day flooding by district (Paulik et al., 2019.

[8] Building types include residential, commercial, industrial (includes primary production), critical facility, community and other (e.g. out-buildings, garages).

Building design, age and condition can influence sensitivity to climate hazards (Buckett, Marston, Saville-Smith, & Jowett, 2011). Building age is typically around 50 years (based on the national average). Older buildings are likely to be found in rural districts such as Mackenzie, Waimate and Hurunui, where there is generally a lack of maintenance and repair (Jacques, Jones, Marston, Saville-Smith, & Shaw, 2015). However, pockets of newer buildings are likely within Ōtautahi/Christchurch and the surrounding districts, due to high growth and reconstruction following the Canterbury Earthquake Sequence (commenced 2010) (Buckett, Marston, Saville-Smith, & Jowett, 2011; Uma, Bothara, Jury, & King, 2008). Newer buildings are likely to have increased resilience to weather and seismic hazards following seismic strengthening and improvements. These relate to a range of regulatory changes enacted in response to the New Zealand leaky home crisis (BRANZ, 2020). The changed regulatory requirements and professional practice relate to design principles, cladding, weathertightness and construction methods. Unfortunately, despite these improvements, due to a range of complex and related issues, weathertightness of New Zealand buildings remains an ongoing issue (BRANZ, 2020).

Housing stock is typically made from wooden and masonry. Heavy rainfall, coastal, and inland flooding can cause damage to wood and masonry buildings, due to the swelling and damage that can occur to plasterboard wall linings. This problem is exacerbated with older houses, or those in poor condition (Reese & Ramsay, 2010; Jacques et al., 2015). Buildings that have underground car parks and are located in the floodplain are likely to have an increased exposure to surface water/river flooding due to their elevation (Stakeholder Engagement, 2021).

Exposure of rural settlements to fire is projected to increase as wind and the number of hot days increase, and summer rainfall decreases. Wooden houses have a higher sensitivity to increased fire weather compared to concrete houses, due to the higher flammability of that material type (Stakeholder Engagement, 2021). Inland rural communities may be most exposed to fire, where temperatures are projected to rise most severely. Rural communities have large areas of fallow land, and greater vegetation cover. These factors contribute to increased likelihood of generating and sustaining wildfire under the right conditions. However the Port Hills fire of 2017 demonstrates that devastating fires can occur throughout the Region. Recent wildfire at Lake Ōhau (April 2020) highlighted the devastating and expensive impact of wildfire to rural communities (Figure 16.3). During this fire, 48 homes and holiday homes were destroyed, with insurance claims costing nearly $35 million (NZ Herald, 2020).

Generally, existing buildings have low adaptive capacity to flooding, coastal hazard and fire risks, although risk of exposure to river flooding can be reduced with hard defences, such as stopbanks. Adaptive capacity is particularly constrained in urban communities, where complex and expensive intervention is required to relocate settlements and the associated support services. Actions to adapt are likely to have a significant impact on individuals and communities. Catastrophic events and planning legislation can shape the resilience of the Region by influencing where future settlements are built or rebuilt. For example, the Canterbury Earthquake Sequence (commenced 2010) was a catalyst in improving the resilience of the built environment to earthquakes within the Region.

Figure 16.3: Fire damage at Lake Ōhau (source: RNZ, 2020).

16.2 Risk to community cohesion and resilience from climate change

Climate change presents risks to community cohesion and resilience. As climate change impacts take effect, exposure will be widespread across Canterbury in both rural and urban settings. Loss of key community members is a likely result, as stressors build and necessitate movement to less exposed or more prosperous areas. Is likely to be difficult for communities to recover from the loss of key members, or a change in the social fabric. Risks to community cohesion are interrelated with risks to ōhanga (prosperity), rangatiratanga (governance), rerenga rauropi (biodiversity) and kāinga tūturu (historic heritage) and connections.

Table 16.4: Risks to community cohesion

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to community cohesion due to climate change	Low	High	Extreme	Extreme	Community cohesion with Canterbury may be affected by climate change in both rural and urban settings. Community disruption may be caused by event based hazards such as fire, extreme events, and flooding, or slow-moving hazards, such as sea level rise and temperature. Exposure to hazards may motivate individuals or groups to relocate, where the loss of key community members can have a range of consequences for community cohesion, particularly in small communities. It is likely to be difficult for communities to adapt and recover from the loss of key members or a change in the social fabric. Some opportunities may exist for towns that are less exposed and may see population growth or increased cohesion in the face of adversity, and individuals may find new opportunities to show leadership.

Canterbury is home to a diverse population, ranging from dense urban city living to small urban communities, surrounded by rural communities. These communities differ in nature, from coastal, through to a range of inland geographies. Community disruption may be caused by event based or sudden hazards such as fire, extreme events, and flooding, or slow-moving hazards, such as sea level rise, and warming temperatures. Climate drivers that contribute to community hardship will be specific to individual communities, and there will be a range of circumstances that may contribute to the loss of community cohesion.

The ongoing impacts of climate change may erode the resilience of individuals, or the whole community, as key members move away. Communities may be eroded as individuals move in response to their personal capacity to cope with climate risks or ongoing impacts, or may result from the relocation of whole communities, through managed retreat (discussed further in Section 15, ora rite/equity). Evidence from the Canterbury Earthquake Sequence (commenced 2010) illustrates how some people will move away from areas when they can no longer tolerate the risks. In the two years following the start of the sequence, the population of Ōtautahi/Christchurch City fell by 18,000 people (CDHB, 2021).

The Canterbury Region has a wide range of rural production, including viticulture, dairy, sheep, beef, crops and forestry. Changes to the climate and land availability are projected to affect these primary industries, which feed and support local communities. Communities such as Amberly are supported by viticulture, dairy, sheep and beef, while Ashburton is primarily supported through cropping and dairy. Coastal communities of Canterbury may be primarily concerned with sea level rise, and are also likely to face other related challenges. For example, productive land may be lost due to the rising sea level, or groundwater resources may be lost due to increased salinity. In contrast, a community located further away from the coast may be more concerned about the impacts of lower rainfall and a warmer climate, which may change or reduce the traditional crop types grown in the area (Manning et al, 2014).

Some members of the community, particularly the elderly or disabled, rely on others living nearby or members of a church congregation or iwi or hapū to help with accessing services such as healthcare and supermarkets. This reliance could result from aspects such as limited mobility or access to public transportation, the prohibitive cost of private transport such as taxis, or language barriers. These

relationships can be linked to trust of a person, and are not easily rebuilt with another person less well known. When people move away, this impacts on those who are dependent on them for support. Movement or break down of a community may reduce support networks and the ability for some people to access necessary resources, including medical services, food, and suitable housing etc.

Loss of community members, organisers, and key people may impact cultural character and structures, leading to greater challenges in organising the community. This could lead to tension and create changes to a community's sensitivity and ability to adapt. This has been observed in Arowhenua Pā, where in the space of one to two generations, rapid transformations in the character and structure of the community has made it harder to meet the increasingly complex array of challenges facing this hapū-based community (Manning et al., 2015).

A shortage of key community members who have the time (and relevant expertise) to represent and take responsibility or provide leadership for community-related affairs can undermine decision-making or governance. For example, local authorities are often required to 'consult' and 'engage' with Māori on resource management issues. The loss of such community members diminishes their ability to carry out this requirement. Such key community members are also critical as they are more likely to have the understanding and ability to help communities develop resilience and plan for climate change.

The effects of climate change on governance, including lack of official support or engagement, and slow decision making, are identified barriers to social cohesion. They can result in a community feeling less empowered to make a decision or contribute positively, ultimately reducing resilience (Thornley et al., 2015). The uncertainty related to the scale of effects from climate change adds complexity and increased difficulty for communities when developing plans for coping with change.

A range of factors underpins adaptive capacity, and the impacts of climate change will generate differing outcomes for various communities. Throughout Canterbury, the impacts of climate change are likely to alter the social fabric, with impacts also on the adaptive capacity of communities. These changes are expected to arise from tensions and challenges surrounding greatly altered living arrangements, loss of exposed Māori-owned land holdings to inundation, flooding and landslides, a growing reliance on modern services and markets, and increasing individualism. Alteration of the physical environment and increased competition for resources are likely to affect the way community members can engage with traditional lands, waters and other resources. Together, these conditions are recognised as creating new tensions, increasing the sensitivity of a community to climatic risks and undermining certain aspects of adaptive capacity (Manning, et al., 2015). Changes to the social fabric of a community are often negative, as they remove knowledge, relationships or resources. However, there can also be positive impacts, such as introducing new ways of thinking, or perspectives to a community, or providing avenues for leadership from people who otherwise would not normally step into such roles.

17 Kāinga tūturu | Historic Heritage

Settlement within Canterbury was founded by Ngāi Tahu 600-700 years ago, following migration of Māori from the east coast of the North Island. The initial territories inhabited by Ngāi Tahu were around the coastal wetlands and Te Waihora. European discovery of the Canterbury Coast occurred in 1770 with Captain James Cook. The first European landing occurred around 1815-1816, and whaling activities commenced in the 1830s around the Banks Peninsula area. Large scale European migration from England commenced in 1850, with over 3,500 settlers arrived in the area by 1853. As the settlement established, Canterbury connected with the rest of the South Island by 1850-1860, with routes through the Ka Tiritiri o te Moana (Southern Alps) to Nelson, Marlborough and the West Coast.

Canterbury has an extensive network of heritage sites, reflecting the Region's centuries of settlement, exploration, development, transport and defence of the area. Churches, homesteads, early industry, and battlements are spread throughout the Region, with many located in coastal areas. Some of the Region's most fragile historic places were damaged during the Canterbury Earthquake Sequence (commenced 2010) and Kaikōura Earthquake (2016). These included the Provincial Council Chambers, Lyttelton's Timeball Station, the Anglican Christchurch Cathedral and the Catholic Cathedral of the Blessed Sacrament. The loss of these types of landmarks is considered significant, with large investment and public discussion entered into, to find suitable ways to reinstate or compensate for the loss of cultural heritage. The Region also holds sites of archaeological significance, including Monck's Cave, which is of significance to Māori as one of the oldest and rarest taonga (treasures) from their earliest settlement in New Zealand.

The risks to historic heritage from climate change were not prioritised as part of the risk screening process, as their risk ratings were moderate or lower. Therefore, these risks have not been identified and rated. However, climate change will pose a range of hazards to heritage sites, which may damage and degrade these structures and places. Changes in landform associated with climate change, such as increased coastal erosion and landslides, may expose new sites, and risk damaging existing sites. Sea level rise and inland flooding may also damage built heritage and other significant sites.

18 Mātauranga | Knowledge

Mātauranga (knowledge) is a fundamental concept underpinning all aspects of society. Access to information and education is an important component in maintaining an equitable society. It contributes to building a fair and prosperous society by providing opportunities for individuals ,and breaking down barriers to equitable outcomes. In addition to improving opportunities for financial gain, education can broaden an individual's outlook, thereby improving their resilience (Shared Prosperity, 2021). Access to early childhood, primary, and secondary education is freely available to all New Zealanders.

Mātauranga (knowledge) also arises from traditional, cultural and indigenous practices. Mātauranga Māori is an important aspect of Māori culture, embedded in the whakapapa (genealogy) of Māori people and the interconnected relationship of all living things. It is etched into Māori language, genealogies, songs, dance, art and storytelling, and embodies a worldview that is intended to be passed down to future generations. Mātauranga Māori is important to natural resource management, conservation, and biodiversity protection, and may provide important approaches to overcoming challenges related to climate change.

Table 18.1: Summary of risks to mātauranga (knowledge) from differing hazards

Using RCP8.5	Higher mean temperatures			Change in mean annual rainfall			Drought			River and surface flooding			Coastal flooding			Increased coastal erosion			Sea-level rise and salinity stresses			Storms and wind			Increased fire-weather			Increasing landslides and soil erosion			Extreme weather events			Reduced snow & ice			Ocean chemistry changes			Marine heatwaves			Climate change		
	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L	P	M	L
Cultural identity																																										L	H	E

Key

I	Insignifcant	P	Present day
L	Low	M	Mid (2050)
M	Moderate	L	Long (2100)
H	High		
E	Extreme		

18.1 Risk to cultural identity and practices due to climate change

Risks to mātauranga (knowledge) due to climate change are identified as those relating to cultural identity and practices. Many cultural and heritage sites in Canterbury are located in low-lying or coastal areas, and thus will be exposed to climate change hazards. Māori culture also holds a deep connection to place, a value which cannot be transferred to other 'like' places.

Table 18.2: Risks to mātauranga (knowledge)

Risk statement	Risk				High level description
	Present	2050 *(RCP8.5)*	2100 *(RCP4.5)*	2100 *(RCP8.5)*	
Risk to cultural identity due to climate change	Low	High	Extreme	Extreme	Māori have a deep connection to turangawaewae, and hold a strong significance regarding 'place'. Many cultural heritage sites and Marae are located in coastal and low lying areas and may be exposed to flooding, erosion and related issues such as loss of access. Other changes are also likely to undermine cultural practices, including reduced connectivity, dispersal/relocation of communities and degradation of the natural environment.

Māori communities have strong connections to their tūrangawaewae[9] (place of belonging, through kinship or genealogy), through whakapapa (genealogical connections) that include physical and spiritual connections. Throughout Canterbury, Ngāi Tahu have strong ties to the Region, particularly to the coastal environment. Their whakapapa linkages are widely maintained through whānau (families) and marae (communal gathering places for iwi/tribes or hapū/sub-tribes) and are integral to Māori life. These strong connections help communities to respond and recover from adverse climate impacts and stresses (Manning et al, 2015). However, the loss of access to, and quality of, cultural sites may result in a loss of cultural identity for Māori communities. This is particularly significant given their deep connection to their tūrangawaewae (Koppel Maldonado et al., 2013; Royal Society, 2017).

Many urupā (burial grounds) and marae are located in exposed coastal and low lying locations. They are particularly vulnerable because of the location of valued infrastructure and sacred sites on exposed, erosion-prone coastal lands (Royal Society, 2017). Māori occupation sites around the Banks Peninsula Region and coastal Canterbury cover such areas as Kaiapoi, Sumner, Southshore, New Brighton and Brooklands. These sites include urupā, Pā (fortified village) sites, traditional settlement areas, and traditional migration pathways along the coast. The Kaiapoi Pā (Turakautahi) was a key settlement area and trading post for pounamu (greenstone or jade) sourced from the West Coast (Te Ara, 2021). The Kaikōura coastline is another example of an area of importance to Ngāi Tahu that is highly exposed. Hundreds of sites of cultural significance were identified along the Kaikōura coastline through the reinstatement of the road corridor following the 2016 earthquake, confirming historical high use of this coastal area.

Reduced access to or complete loss of wāhi tapu (sacred sites) and other historic heritage sites may occur due to coastal inundation, erosion, flooding or landslides. Access to remote sites may be further reduced due to increased travel distances and transportation costs (due to people moving further away), or damage to access routes. These losses are likely to damage spiritual and physical connections to the land, reduce knowledge sharing due to spread of key members of iwi (tribes) or hapū (sub-tribes), and erode community connectivity and support networks, ultimately reducing community resilience.

Changes in water quality will impact the mauri (lifeforce/essence) of water, which has special significance in Māori culture as the sustenance of all life. Reduced mauri of water is linked with other biodiversity degradation and habitat loss. This reduction will impact on traditional cultural practices such as mahinga kai (food gathering), and change the availability of other natural resources such as harakeke (New Zealand flax) used in traditional building and weaving (Sesana et al., 2018).

[9] Home grounds through rights of kinship and whakapapa, place to stand.

Cultural heritage may be further threatened by gradual shifts in weather patterns and extreme events. An increased temperature and changed rainfall, humidity, and wind, can negatively impact on the materials that cultural heritage assets are made of. These changes may affect the biological, chemical, and physical properties of traditional construction materials, leading to degradation of the assets (Sesana et al, 2018).

Tourism is often an important resource for the prosperity of iwi. Damage from climate change to cultural and natural heritage may impact tourism. This may lead to reduced revenue, which may then impact the ability for the marae to fund activities that conserve their cultural heritage. This also carries an additional loss, where reduced visitor numbers would result in a lost opportunity to educate visitors and share tikanga Māori (Māori customs) (see also: Section 13.5).

More broadly, cultural heritage sites (including buildings, infrastructure and landscapes) provide a sense of identity and continuity for a place (UK Essays, 2018). Cultural heritage can also play a significant role in economic development for an area or community. If impacted by climate change, can result in a number of economic, mental health and social cohesion impacts (Alexandrakis et al, 2019).

19 Rangatiratanga|Governance

Rangatiratanga (governance) for the purpose of this assessment encompasses the relationships, coordination and processes undertaken to address collective issues that are relevant to the Canterbury Region. These issues are managed primarily through the Regional, City and District Councils, as well as Ngāi Tahu, Kāwanatanga (governance institutions), whānau institutions (family institutions or relationship networks), Nga papatipu rūnanga, Te Tiriti (Treaty of Waitangi) Partnerships, government/local government institutions, other political voice and public service agencies, and public service providers such as Canterbury District Health Board, Canterbury Civil Defence and Emergency Management, the fire service, and the police.

Rangatiratanga (governance) is the value and practice of people exercising self-determination, their independence and determining their choices for governing themselves. Rangatiratanga (governance) is the basis of one of the Articles of Te Tiriti o Waitangi (The Treaty of Waitangi, 1840), the founding document of Aotearoa New Zealand. In relation to political decision makers in Canterbury, Rangatiratanga (governance) reflects the democratic processes that are followed through local government, where locally elected members represent their communities and make decisions on their behalf. We recognise the nuanced distinction of Rangatiratanga from Kawanatanga, which is derived from the English word ‘governor’ and now broadly used to refer to the concept of governance. However, Rangatiratanga recognises an individual’s autonomy, and their interconnectedness with all aspects of social and physical systems within the region.

Rangatiratanga (governance) is connected to the management and protection of rerenga rauropi (biodiversity) and is critically important in the management of the region’s precious wai (water). These flow on to the upholding of cultural knowledge, mātauranga Māori. Rangatiratanga (governance) is connected to the Region’s lifeline services, including the transport connections and waste management systems that enable people and communities to connect and function safely, represented through ngā waihanga (infrastructure services). The public services that are provided in the region support the hauora (physical health, which in Te Ao Māori also incorporates mental health and wellbeing) of communities, and contribute to ora rite (equity), and hapori (sense of community).

19.1 Summary of risks and relationship to NCCRA

Governance risks were identified as part of the National Climate Change Risk Assessment (NCCRA) (MfE, 2020). Many of these national scale risks are relevant to Canterbury, along with others that are

uniquely specific to the Region. Nationally identified governance risks were considered when developing the Canterbury specific risks. A summary of the governance risks identified through the engagement process, and how they link to NCCRA risks, is presented in Appendix A. Of the eight NCCRA risks, Risk G7 is the only risk that is not directly relevant to a regional context, as it specifically relates to parliamentary agreement. Summary risks to Governance identified in the NCCRA report are as follows:

1. G1 – Risk of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes.
2. G2 – Risk that climate change impacts across all domains will be exacerbated because current institutional arrangements are not fit for climate change adaptation.

Institutional arrangements include legislative and decision-making frameworks, coordination within and across levels of government and funding mechanisms.

3. G3 – Risks to governments and businesses from climate change-related litigation, due to inadequate or mistimed climate change adaptation.
4. G4 – Risk of a breach of Treaty obligations from a failure to engage adequately with and protect current and future generations of Māori from the impacts of climate change.
5. G5 – Risk of delayed adaptation and maladaptation due to knowledge gaps resulting from under-investment in climate change adaptation research and capacity building.
6. G6 – Risks to the ability of the emergency management system to respond to an increasing frequency and scale of compounding and cascading climate change impacts in New Zealand and the Pacific region.
7. G7 – Risk that effective climate change adaptation policy will not be implemented and sustained due to a failure to secure sufficient parliamentary agreement.
8. G8 – Risk to the ability of democratic institutions to follow due democratic decision-making processes under pressure from an increasing frequency and scale of compounding and cascading climate change impacts.

Table 19.1: Summary of risks to rangatiratanga (governance) with relevance to risks identified in the NCCRA

Risk from climate change	Sub-risk	Relevant NCCRA risk
Funding and public service provision	Ability to fund and maintain public services.	
	Availability and access to funding (including availability of insurance, banking etc).	
	Climate adaptation funding.	G5
Governance structures, planning rules and policies	Effectiveness of planning rules and policies.	G1, G2
	Exacerbation of the challenges associated with different jurisdictional boundaries.	G1, G2
	Short election cycles.	G1

Risk from climate change	Sub-risk	Relevant NCCRA risk
Risk of legal liability, reputational damage and effective decision making to councils and public organisations	Legal liability.	G3
	Reputational risk.	
	Inability to make effective decisions.	G1, G2, G8
Risk to co-governance (including Te Tiriti (Treaty of Waitangi) Partnerships) from climate change	Co-governance (including Te Tiriti Partnerships).	G4
Risk to emergency management and policing from climate change	Emergency management and policing (including planning, response, and recovery).	G6

19.2 Funding and public service provision

Climate change presents a range of additional challenges to funding and the provision of public services, which will exacerbate existing challenges. Specific examples are discussed below.

19.2.1 Risk to the ability to fund and maintain public services

In order to continue operating effectively, Councils need to ensure that funding mechanisms are in place. These must provide for growth, operations, renewals, and maintenance across the range of services they provide to communities (including transport, three waters, community facilities, flood control infrastructure etc). The ability to fund and maintain public services may be at risk as climate hazards increase damage and maintenance costs, reduce levels of service, and potentially lead to renewals being required earlier than planned.

The increasing funding pressures likely to result from climate change can be likened to the impact of the COVID-19 crisis on Christchurch City Council's finances. While Council is recovering from this, it has been forced to make savings to reduce operational spending, and reprioritise its capital works programme, while also increasing borrowing. The council is mindful of the need to support the city's recovery without putting too much added financial pressure on residents and businesses (CCC, 2021).

Increased pressures on council funds will create challenges for decision makers in determining priorities. For example, councils will need to balance increasing costs, with consideration of income from taxes and rates, while maintaining public service quality and coverage. This challenge is exacerbated by evolving community expectations and priorities as climate impacts and risks become increasingly evident. What people are willing to pay for during an emergency is different to what they will support under 'normal' circumstances. This can be seen through increased support for additional (alternate) transport routes, which is often only gained after severe disruption is caused to communities by failure of the primary (and only) access route. Examples of this type of investment occurred following the June 2021 flooding in Canterbury, and the 2016 Kaikōura Earthquake.

Delivery of some critical services is highly dependent on strong governance and management to maintain continuity of supply. These include reticulated services such as water and wastewater, which are connected in networks across communities. This makes them particularly sensitive to disruption, as breakages in critical locations can have widespread impacts for users. Responsibility for service operability is held by the local authority, who must carefully manage and maintain all aspects of these systems to ensure an appropriate level of service. The capacity for councils to manage these systems may come under increasing pressure during both long term events related to climate change (e.g. drought), and event based or sudden hazards (e.g. floods, severe storms),

where service disruption amplifies other pressures faced during response and recovery. Damage and disruption to services can have significant impacts on communities, who are reliant on these services and have no alternative options.

19.2.2 Reduced access to insurance

The ability to access insurance may be at risk as a result of climate change. As risks related to climate change become clearer, insurers will likely adjust their products. This is likely to result in higher insurance excesses and premiums, or unavailability of insurance altogether (Storey et al., 2020). Council owned assets, property owners and lenders are all likely to be impacted by changing insurance premiums or insurance retreat (Reserve Bank of New Zealand, 2018).

Many public assets are insured for damage for larger events; however, frequent or regular damages are typically not insured, with repairs funded under Council operational budgets. The reduced availability of insurance may widen the gap between damages that Councils cover through operational budgets, and those covered by insurance. Where insurance is still available, the effects of climate change may also impact on premiums, insurability and reinsurance (and wider underwriting).

With increased risk from climate change, mortgage access for homeowners may also be affected. The misalignment between insurance and mortgage timeframes exacerbates risk to homeowners. Most insurance contracts are renegotiated annually, yet mortgage timeframes can be decades. It has been reported that some insurers in New Zealand have begun adjusting their products and pricing to reflect emerging climate risks. Some existing properties could ultimately become uninsurable. While this supports the efficiency and stability of the insurance sector, it poses widespread challenges for society. The flow on effect of insurance impacts on mortgage access for homeowners may consequently impact their ability to pay rates, turn putting significant stress on wider communities.

The occurrence of insurance retreat and/or managed retreat is expected to increase with increasing exposure to coastal hazards (Storey et al., 2020). Reduction in insurance could lead to cost transfer of uninsurable property to councils. Similar cost transfer occurred in the Red Zone following the Canterbury Earthquake Sequence (commenced 2010), where homeowners were given the option to sell their homes to the Crown at 2007 rating valuations (Noy, 2018).

19.2.3 Risk to the ability to fund climate adaptation

Councils are likely to face an increasing need for climate adaptation funding to develop climate resilience within Canterbury's communities. Climate change presents significant future risks that are generally beyond the typical planning horizon for many Councils. Councils raise much of their funding through rates, investments, fees and charges, and borrowing. Central government also provides some funding or subsidies towards particular activities.

Canterbury regional and local councils face significant and increasing costs to respond and adapt to climate change, in relation to both infrastructure adaptation, and supporting community adaptation. In particular, Canterbury has been identified as having the highest exposure of infrastructure assets to sea level rise (LGNZ, 2018).

Council's levels of funding are effectively linked to their rating base and borrowing limits. These are already stretched to cover current and mid-term issues, and do not necessarily include the investments required to adapt to climate change. Some retrospective contribution is available from government for severe natural hazard impacts on infrastructure (i.e. an 'essential infrastructure recovery programme'), but this is not available for preventative adaptation works which would reduce damages from extreme events (Boston & Lawrence, 2018).

Existing funding structures do not provide for equitable distribution of climate adaptation costs across the population, or intergenerationally (Boston & Lawrence, 2018). Further clarity is needed on how funding may be made available to address adaptation planning, particularly in a way that avoids exacerbating existing or creating new inequities. Additionally, lack of clarity on the responsibility for, and source of, funding for adaptation may result in inaction. Some existing examples that may provide guidance on how adaptation funding challenges may be overcome. For example, small-scale adaptation funding is currently in place for flooding within the region. The experiences from the Ōtautahi/Christchurch Residential Red Zone (RRZ) may also be used as an example of how retreat may be managed.

19.3 Effectiveness of rules and policies, jurisdictional boundaries and election cycles

Risks to governance include those relating to the adequacy and effectiveness of planning rules and policies, exacerbation of the challenges associated with different jurisdictional boundaries, and the impacts of short election cycles.

19.3.1 Risk to the effectiveness of planning rules and policies

Current planning objectives, rules and policies are, generally speaking, inadequate and ineffective in dealing with effects of climate change. They therefore require review, alignment and updating. There is a risk that this does not occur, or does not occur in a timely manner, and in turn exacerbates the effects of climate change. There is further risk that should existing planning rules and policies not accurately reflect the risks from climate change, development or funding using these rules and policies may contribute to maladaptation.

Climate risk reporting is becoming standard practice in both the public and private sectors, and elsewhere. This creates an increasing opportunity to address climate risks and support adaptation. It also presents a risk of misalignment in understanding of and management of climate risk between central government, local government, and other sectors. This can be mitigated by developing planning and policies that facilitate co-ordination at different levels.

At a national level, Aotearoa New Zealand's policy frameworks as they currently stand are poorly equipped to address the nature, magnitude and duration of the problems posed by climate change. Issues include currently restrictive legislation under the Resource Management Act (RMA), and poor alignment of policies and legislation/statutes relevant to the effects of climate change. This results in little coordination or alignment of priorities (Boston & Lawrence, 2018; Climate Change Adaptation Technical Working Group, 2017; Lawrence, 2016; Lawrence, 2015; Hana et al., 2018). Action is being taken by central government to improve the RMA process, this includes consideration relating to the impacts of climate change.

Relevant statutes include but are not limited to the following:

- The Resource Management Act 1991 (RMA). To be repealed and replaced with:
  - The Natural and Built Environments Act (NBA), which as the main replacement for the RMA, aims to protect and restore the environment while better enabling development;
  - The Strategic Planning Act (SPA), which requires the development of long term regional spatial strategies to help coordinate and integrate decisions made under relevant legislation; and
  - The Climate Adaptation Act (CAA), to address complex issues associated with managed retreat.
- The New Zealand Coastal Policy Statement 2010 (NZCPS).
- The Climate Change Response (Zero Carbon) Amendment Act 2019.

- The National Policy Statement on Urban Development 2020 (NPS-UD).
- The Local Government Act 2002 (LGA).
- The Soil Conservation and Rivers Control Act 1941.
- The Civil Defence Emergency Management Act 2002.
- The Building Act 2004.

As an example of misalignment, the Building Act requires a 50 year design life, with no explicit consideration of climate change effects. Meanwhile, the NZCPS uses a timeframe of at least 100 years, and for infrastructure plans, the LGA requires planning for only 30 years. There is also an emphasis on short term planning over long term planning, such as the need for councils to only work under 10 year long term plans or 30 year infrastructure strategies (Climate Change Adaptation Technical Working Group, 2017; Boston & Lawrence, 2018).

The impacts of climate change may also expose or compound problems relating to planning rules. For example, under the NPS-UD rules, there is a requirement that 'significant' plan change requests be considered by councils. This raises the potential for development to override planning boundaries that have been developed to account for natural hazard risk (among other things). Further, climate change is likely to place increasing pressure on Canterbury's resources. Existing planning structures relating to these resources, such as existing use rights for water allocation and land use, may impact the Region's ability to undertake a coordinated approach to climate adaptation. The projected increase in drought and seasonal changes are likely to increase demand for water, and reduce availability (as discussed in Sections 10.4, and 10.5). This will place further pressure on water management catchments that are presently at their allocation limits. Equitable allocation of water may require councils to revisit some existing use rights, particularly in upper catchments that feed into downstream catchments.

19.3.2 Risks relating to the misalignment of jurisdictional boundaries

The many challenges that climate change may bring to governance agencies are likely to exacerbate existing issues, including misalignment of jurisdictional boundaries. During the workshops, examples were identified relating to health and social services, and emergency services.

Different jurisdictional boundaries of councils and public agencies (such as those for District Health Boards relative to other agencies) can make integration between social service agencies difficult. There is a current lack of clarity relating to the roles and responsibilities of existing agencies, particularly between different jurisdictional boundaries. Climate change is likely to increase demand for these services, which will exacerbate existing difficulties. This may undermine processes to provide wellbeing support to those who need it, resulting in increased inequities.

Differences in organisational structures and reporting between public services may also worsen communication issues within emergency services. For example, regional representatives of police and ambulance report to and are directed by national headquarters. In contrast, Civil Defence, District Health Boards and local government report to and are directed locally within the region. Differences in structure and channels of communication mean that different information and processes may be followed under a state of emergency, even when all agencies are operating in the same geographic area. As event based or sudden hazards such as floods and storms occur more regularly, this may lead to increased communication issues between public services and with affected communities.

Increasing climate change risks and effects may ultimately threaten organisational sustainability as agencies struggle to manage increasing climate challenges. The need for long term consistency of governance may lead smaller agencies to amalgamate across different jurisdictions, to gain efficiencies in both cost and institutional operations. While integrating approaches between

different localities to tackle seemingly common problems may create efficiencies, it may also result in reduced granularity of knowledge and evidence to support action at a local level, and may inadvertently undermine local values.

Current action at central government level may create a jurisdictional risk through misaligned climate risk management at a local level, due to lack of guidance or mechanisms for the integration of national climate risk assessment and adaptation planning at a local scale. This further highlights the importance of achieving coordination between local governments and central government.

19.3.3 Risks relating to short election cycles

Timescales relevant to the governance of climate change issues do not align well with election cycles. Actions to address the effects of climate change require planning over timeframes that span decades and centuries. The short terms of local and national election cycles may impact on the ability to develop and implement consistent plans and strategies to mitigate and adapt to climate change. Cyclic changing of governance can disrupt policies that require multiple election cycles to be effective.

Processes to reduce this risk have begun at a national level through the Climate Change Commission, however, further action to embed climate action is also required at local government level.

19.4 Legal liability, reputation and decision-making

Risks to governance include those relating to legal liability, reputational damage and effective decision making.

19.4.1 Risks relating to legal liability

Climate change presents legal liability for councils and public agencies. Its evolving nature is introducing new responsibilities, and public opinion on how climate change should be managed is quickly evolving. This rapid change introduces risks to governance, as demonstrated elsewhere in New Zealand. Some recent examples include:

- The Hauraki Coromandel Climate Action group, which recently took legal action against the Thames-Coromandel District Council over its decision not to sign the local government climate change declaration.
- Nelson City Council, where Lawyers for Climate Action and local community groups have expressed concern over a decision to construct a new Library adjacent to the Maitai River. They claim the decision may breach both the Local Government Act 2002, and the Council's own commitments under its Declaration of a Climate Emergency.
- Lawyers for Climate Action in Auckland are challenging the construction of a new highway, due to its potential impact on carbon emissions.

Hodder (2019) in his report for LGNZ, canvassed a wide range of potential climate-related legal issues for local government. He found that *"Without the appropriate national standards and legislation, the government is at risk of allowing a situation where the courts will develop legal rules, which would likely result in ever-changing requirements and tensions that would hinder proper planning and implementation of adaption measures."*

The report also found that without clearer direction from central government, "*increased climate change litigation has potential to consume councils' - and ultimately ratepayers' – resources and time, which would be better spent on ensuring the well-being and prosperity of their communities*."

As local government becomes aware of increasing risks from climate change, they may also be exposed to liability for inaction. There is also risk related to decisions based on rapidly changing

information under high levels of uncertainty, over long timeframes, using emergent risk assessment methods, tools and decision supporting information. Decisions related to climate change are generally subject to some or all of these constraints. While they may be considered the best available information at the time, but ultimately be viewed as sub-optimal.

Councils should strive for a full knowledge of liability through understanding of risk, across all levels of governance. This may include ensuring good communication and transparency of information between central and local government, together with a climate risk management framework which supports aligned, robust decision making at all layers of government.

19.4.2 Reputational risk

Canterbury Regional Council demonstrated its commitment to taking action on climate change by declaring a climate change emergency in 2019. Since then, a program of work has been implemented. This assessment is part of that program.

In general, there is a strong community interest and desire for action, however this will vary significantly between individuals. As climate risks and damages grow, there is a risk that public opinion will shift. "Climate emergency" language implies immediate action, which may lead to increased frustration within the community over lack of visible progress. The ability of councils to be able to react quickly may play a significant role in an increased reputational risk. The Office for the Auditor General is also closely monitoring Council actions relative to their commitments, following widespread deferral on action in 2018 Long Term Plans (OAG, 2019).

19.4.3 Risks relating to effective decision making

Alongside the potential for legal liability, ineffective and poorly aligned decision making could lead to increased risk and maladaptation. Navigating climate change risk management, adaptation and mitigation is extremely complex, for which much of local government does not currently have appropriate tools or capability. Some guidance is available, for example the Coastal Hazards and Climate Change Guidance (Ministry for the Environment, 2017), and A Guide to Local Climate Change Risk Assessments (Ministry for the Environment, 2021). However, further tools and guidance will be required to help address the complexities relating to climate change adaptation. This will include support to ensure a holistic approach is applied, and that decisions are not made in isolation.

Avenues for communication on climate change issues between local authorities within Canterbury are well established. The Mayoral Forum's Canterbury Climate Change Steering Group (CCSG) provides a forum for discussion of Region-wide governance issues. This forum is valuable to governance at a local government level, but is limited in scope as there is no systematic mechanism to engage or collaborate with other sectors on climate change.

The Greater Christchurch Partnership (GCP 2050) initiative has also been established to connect agencies with significant governance roles in the Greater Christchurch Region. Participating agencies include Environment Canterbury, Te Rūnanga o Ngāi Tahu, Canterbury District Health Board, Christchurch City Council, Waimakariri District Council, Selwyn District Council, Waka Kotahi New Zealand Transport Agency, and the Department of Prime Minister and Cabinet (Greater Christchurch Group). The GCP 2050 will help inform development of partners' long term work programmes and budgets, in order to recover from the impacts of COVID-19 and position the area for a prosperous, inclusive, sustainable and resilient future. The initiative provides an opportunity to engage the community on values and priorities related to climate change, and to inform integrated response planning across relevant agencies. However, it does not yet have a strong focus or mandate to progress with this aspect.

Decision making regarding flood and water management within the region is also complex, and includes local committee oversight, as well as scheme, district and regional considerations. Specific

roles and responsibilities are potentially unclear – particularly in terms of ensuring water supply and infrastructure resilience under increasing exposure to drought, flooding and other hazards.

19.5 Co-governance (including Te Tiriti Partnerships)

Climate change presents risks relating to co-governance (including Te Tiriti (Treaty of Waitangi) Partnerships), which will require innovative, coordinated solutions to manage. In addition to the importance of honouring Te Tiriti o Waitangi (the Treaty of Waitangi), partnership with Māori may support the development of integrated adaptation planning by drawing on the holistic perspectives of Te Ao Māori.

Broad and profound differences in the nature of and approach to governance between Māori and non-Māori are at risk of being exacerbated by the impacts of climate change. This may result in departure from existing or planned co-governance structures, and may risk voices being lost or marginalised.

Māori communities at an iwi or hapū level are already identified as having greater socio-economic disadvantage. They may be further disadvantaged through any loss of representation within governance structures. Within the Region, there has been significant investment by Māori in climate-sensitive industries (e.g. forestry, dairying, and fisheries), making their ōhanga (prosperity) vulnerable both to climatic changes, and to broader decisions taken within those sectors.

Within Canterbury there is currently a relatively strong relationship between local government and Ngāi Tahu. Iwi partnership and involvement in the climate change risk assessment has been an important step to identify risks that are of relevance to their hapū. Further establishment or leveraging of co-governance partnerships within governance structures (e.g. with mana whenua (those with territorial rights to the land), youth, etc) are likely to support action to address climate change matters.

19.6 Emergency management and policing

The impacts of climate change are likely to place increasing demands on existing emergency management and policing services. The increasing frequency, severity, and nature of natural hazard events will demand more time from staff, and existing systems and resources may not be adequate. Funding for improving emergency management capability and capacity is also limited. When the capacity of emergency services is exceeded, this places additional demands on Council business-as-usual services. Climate hazards are also likely to impact on the capacity of communities to recover, as increasing frequency and/or severity of events, or repeated events, may make recovery difficult.

The effectiveness and coordination of emergency services planning is also at risk from increasing climate change. As discussed in Section 19.3.2 above, the handover of governance during a declared emergency to a regional Controller can cause uncertainty and confusion in responsibilities.

A further risk to emergency services planning is that the regional response to the National Disaster Resilience Strategy duplicates or misaligns with the outcomes and actions relating to this Regional Climate Change Risk Assessment.

20 Interacting Risks

The impacts of climate change will not occur in isolation, with risks interacting and propagating through systems, creating multiple pressures across value areas (Pescaroli & Alexander, 2018). Given the nature of this assessment, the term *interacting risks* has been used to represent the broad categories of indirect, cascading, and second order risks.

There can be feedback loops and complex interactions between risks due to broader systemic changes, for example, as a response to government policies or concurrent events. The connections and interdependencies mean that these effects occur across sectors and values, and can be felt across communities, governments, and the private sector (Lawrence et al., 2018). Interactions of risks were mapped during early engagement activities such as the domain focused workshops. Analysis was done using the NCCRA value domains, and, while it is indicative only, and strongly dependent on those participating, Figure 20.1 provides an initial picture of the types of interactions that can be seen across risks. The strongest interactions are visible with the largest segments for each risk, and include interactions with agriculture, houses and buildings, cultural identity and practices, community cohesion, and resilience to name a few. The interactions intersect both within and beyond domains, with the complexity of interactions demonstrating how individual climate change risks cannot be viewed in isolation.

Figure 20.1: Interacting risks (chord) diagram – noting that this has been produced based on participant outputs throughout engagement activities for this project, and therefore relate to the NCCRA value domains. The connections depicted reflect a sub-set of the Region, and as such should not be relied upon.

20.1 Methodology

Following detailed analysis of the priority risks, we also looked to identify how these risks interrelate with each other. This was initially achieved by looking at the level of interconnection, or interrelationships, between each of the priority risks, within the five NCCRA value domains. Completed during stakeholder engagement, participants were asked to connect priority risks to each other, demonstrating a strength of connection. Given that all risks have some level of connection, participants were asked to focus specifically on those connections they felt were most prominent, or noteworthy.

Beyond this, five case studies, chosen by participants, were taken forward to consider interactions across differing risks. These case studies are reference points to enable development of interactions, and may not denote risks in their own right. The five case studies are:

- Electricity outages.
- Community flooding.
- Mahinga Kai.
- Tourism.
- Heat-stress related illnesses.

To assess interacting risks, a qualitative approach was used, involving both stakeholder consultation and a literature review. In the interacting risks engagement workshop, an activity was undertaken using bow-tie analysis principles. Bow-tie analysis allows for visualisation and depiction of direct 'upstream' and 'downstream' risks, often referred to as 'causes' and 'effects' respectively.

The bow-tie analysis and related literature review summarises the following information on the selected interacting risk case studies:

a Climate hazards.

b Upstream drivers related to climate hazards.

c Upstream external factors which can act to compound risks.

d Downstream impacts.

The results of this analysis are captured below.

20.2 Electricity outages case study

20.2.1 Context

The provision of electricity is a lifeline service in the Canterbury Region. A continuous power supply is critical for the functioning of modern society and economic activity. Power outages can be caused at different points in the electricity network, including power stations, distribution lines and substations, and transmission lines. Outages can create cascading risks which propagate to other value areas.

Changes in climate could lead to a risk of increased incidence and duration of electricity outages. As discussed in Section 10, this is due to electricity infrastructure being exposed to increased fire weather, extreme weather events (e.g. wind and storms), temperature rise, coastal erosion, and sea level rise. Distribution and transmission infrastructure located near vegetation is also highly sensitive to extreme wind and storm events, as vegetation may damage the lines. Electricity infrastructure also presents a risk to the surrounding environment, as fire may start from sparking infrastructure operating in higher temperatures.

Furthermore, the Canterbury Region has several hydroelectric power stations which would be affected by changes in temperature and rainfall.

The upstream hazards, drivers and external factors and downstream impacts of the risk of increased electricity outages are illustrated in a bow-tie diagram in Figure 20.2.

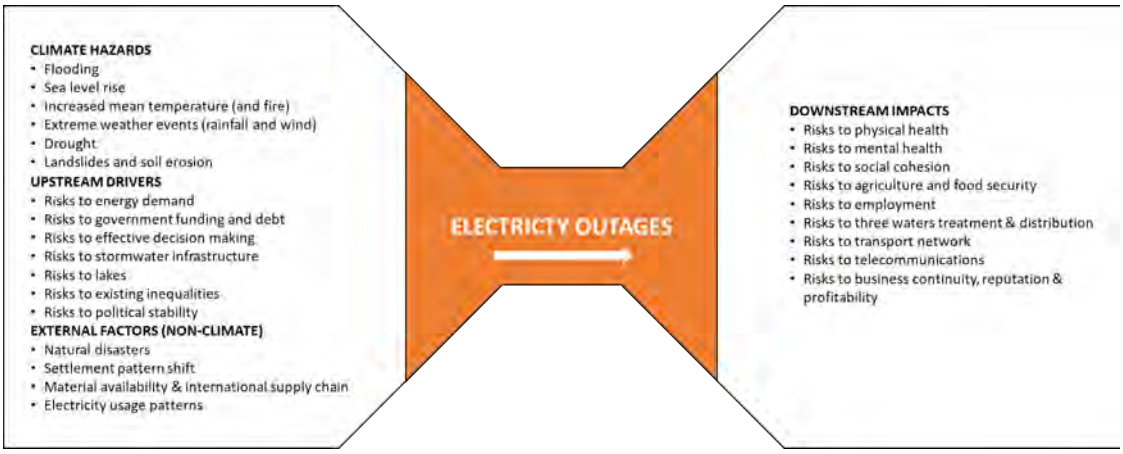

Figure 20.2: Bow-tie analysis of risk to increased electricity outages.

20.2.2 Upstream climate hazards, climate drivers and external factors

The risk of increased incidence of electricity outages can be attributed to a combination of climate hazards and upstream drivers. These may be further exacerbated by non-climatic factors.

Climate hazards which cause risk to increased incidence of electricity outages are further detailed in Table 20.1.

Table 20.1: Climate hazards impacting electricity infrastructure

Climate Hazard	Cause of risk to increased incidence of electricity outages
Extreme weather events (e.g. wind and storms)	• Projected increase of wind speed of 2-10% in 2100 (RCP 8.5 scenario). – Wind and storm events cause objects (such as fallen trees) to be in contact with power lines, causing outage.
Temperature and fire	• Drought potential is expected to increase. • The average temperature is expected to increase by 1.5-3.5°C by 2100 (RCP 8.5 scenario). • Increased temperatures and fires will cause failure and power infrastructure destruction.
Sea level rise and coastal erosion	• 0.8 m of sea level rise is projected. – Low-lying electricity infrastructure is at risk from sea level rise and coastal erosion.
Seasonal rainfall variability and flooding	• There is a projected 15-40% in winter rainfall for many eastern, western and southern parts of Canterbury. – Increased risk of flooding can cause damage to above and below ground power infrastructure.
Landslides and soil erosion	• Projected increase in landslides and soil erosion. – Landslides and soil erosion may cause damage to above and below ground infrastructure.

Electricity infrastructure interacts with several ngā pono (values). Upstream risks that can relate to increased power outages are shown in Figure 20.3. The arrows in the figure indicate that in some cases, there can be a bi-directional relationship between the risks. For example, risks to stormwater infrastructure may cause flooding, potentially leading to risks to electricity outages. The risk of electricity outages can also cause risks to the functioning of stormwater infrastructure, such as pumps.

Figure 20.3: Upstream risks to increased electricity outages. Arrows indicate direction of risk interaction, colours indicate ngā pono (values).

Upstream risks mentioned in Figure 20.3 are across different ngā pono. Table 20.2 provides further details on these risks.

Table 20.2: Ngā pono (values) areas and upstream drivers

Ngā pono (values)	Upstream drivers
Ōhanga | Prosperity	• **Risks to funding** may cause risk of increased incidence of electricity outages. This may be due to inadequate funding allocation available for electricity network upgrades and maintenance to meet the more variable climate conditions. Similarly, increased electricity outages and maintenance of electricity infrastructure may also result in risks to funding availability and allocation, which in turn could lead to increased risk in other value areas.
Hirihiri | Energy	• **Risks to energy demand** from climate hazards, resulting for example, from increased temperatures causing an increase in the use in air conditioning devices (Mideska & Kallbekken, 2010). This may cause surges in the electricity network and can cause unusually high electricity demand, leading to outages. Risks of increased incidence of electricity outages can also cause risks to critical medical customers.
Wai | Water	• **Risks to the stormwater network** from increased rainfall and sea level rise resulting in flooding may cause damage to above and below ground electricity infrastructure. This leads to a risk of increased incidence of electricity outages. • **Risks to lakes** due to an increase in temperatures (affecting runoff from snow and ice) could impact **hydroelectricity generation** in the Canterbury Region (Caruso et al., 2017). This could exacerbate risks to incidences of electricity outages.
Rangatiratanga | Self governance	• **Risks to effective decision making** around asset management, maintenance and operations of the electricity networks due to climate hazards. • **Risks to political stability** from climate hazards may cause delay in asset decisions, causing increased vulnerability of electricity infrastructure to outages.

Climate risks to electricity supply infrastructure have potential to be amplified and compounded by other non-climate factors. These include:

- Changes to electricity usage (due to non-climate reasons, such as technology changes) may also cause unusually high demand, placing stress on the network.
- Natural disasters (such as earthquakes and tsunamis) will exacerbate the risk of increased incidents of electricity outages, as they cause electricity infrastructure to be more vulnerable, or could directly cause an outage.
- A shift in urban development patterns may also cause an increased likelihood in buildings and new vegetation being near existing electricity infrastructure. This can contribute to wind damage, as falling trees or branches may damage lines during extreme events; vegetation also contributes to fire risk.
- Risks to supply chains (especially to the international supply chain links for materials manufacturing and transportation), in combination with increased carbon emissions regulations (Dasaklis and Pappis, 2013), may lead to risks to electricity supply infrastructure maintenance and renewal. These risks could also contribute to increased outage duration, for example, through material shortages and lack of labour availability.

20.2.3 Downstream Impacts

An increase in incidences of electricity outages can cause a wide number of cascading risks, which can propagate into other value areas. Table 20.3 details a range of potential downstream impacts on other ngā pono (values).

Table 20.3: Downstream impacts of electricity outages on ngā pono (values)

Ngā pono (values)	Downstream impacts of increased incidents of electricity outages
Ōhanga | Prosperity	• Electricity asset owners may face **risks to business continuity and profitability** if there is an increased incidence of electricity outages. This could lead to *difficulties in servicing debt, reduced shareholder returns, inability to retain staff* and the *need for increased public intervention* in privately owned electricity infrastructure assets. • There will be **risks to business continuity** as businesses depend on electricity to operate and provide their services. Electricity outages could lead to *reduced supply of goods/services, and for example, food wastage within supermarkets*. There could also be **reputational risks** and **profitability risks** to businesses from disruptions to electricity supplies. • Agricultural business operations are also at risk, leading to **risks to food security and employment**.
Hauora | Physical health	• Increased electricity outages could increase **risks to physical health** through impacts on electrical home medical equipment (Mango et al., 2021), heating and cooling devices, and food preparation and storage equipment. Electricity outages *will be more severe for medically vulnerable households*. • Electricity outages may also lead to **risks to mental health**, especially as a result of physical health impacts and economic losses.
Ora rite | Equity	• **Inequities could be exacerbated**, and **communities could be isolated** due to certain areas experiencing higher incidents of electricity outages. This can also lead to **risks to social cohesion.**
Wai | Water	• There are **risks to the three waters' networks (treatment and distribution).** Although some networks may have backup generators, there are increased risks to continuity in operation and asset maintenance and management.
Ngā Waihanga | Infrastructure services	• There will be **risks to transport infrastructure** (such as trains, trams, traffic lights, level crossing barriers and alerts, and electric vehicle charging), which may cause *disruption and stress to transport networks*. • There will be **risks to the telecommunications network**, as many parts of the network (such as residential fibre) rely on electricity.

The effects to ngā pono (the values) above will also interlink with other risks. For instance, the risk to telecommunications networks from increased outages may result in additional risks to businesses, education, healthcare, community connection, and the provision of public services etc.

Figure 20.4 illustrates an example showing risks of electricity outages to the agricultural sector, illustrating the interrelationships between ngā pono (the values). The effects of these risks to agriculture compound across ngā pono (the values).

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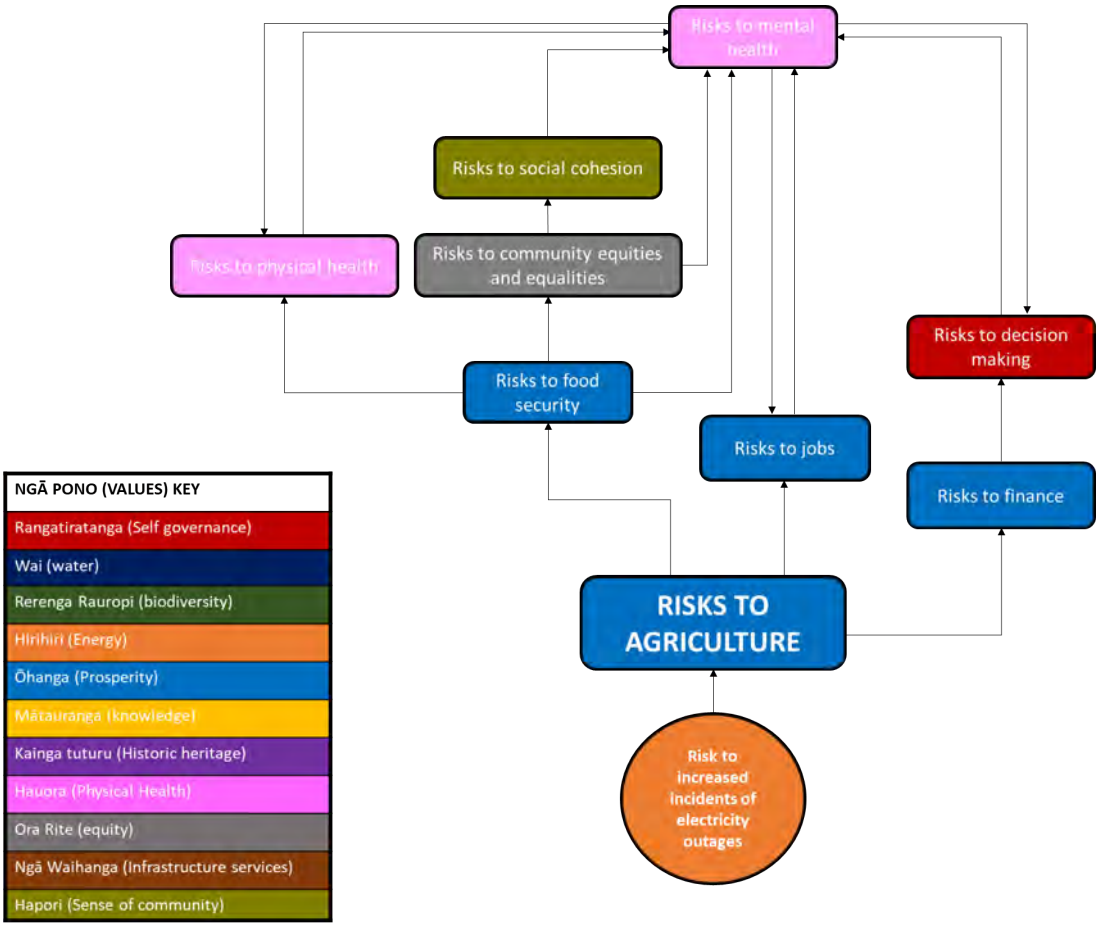

Figure 20.4: Case study of the risks interacting with the risk to agriculture from risks to electricity outages case study

Figure 20.4 shows that electricity outages can cause risks to agricultural businesses, as these operations often depend on electricity, for example, irrigation, milking, milk pasteurising, and milk cooling machines. Although most businesses will have back up electricity generators, duration of generation is limited by the amount of fuel. As a result, risk to food security may be exacerbated as commercial agricultural businesses may struggle to maintain production levels as electricity outages combine with other climate hazards. An inability to maintain production levels may reduce profitability, causing business owners to reduce staff or default on loans for assets. Financial hardship for agricultural businesses may lead to government intervention, causing risk to government decision making. Risk to food security may exacerbate existing inequities and inequalities due to price instability, impacting social cohesion and civil order (UK-US Taskforce on Extreme Weather and Global Food System Resilience, 2015). Negative effects on health and nutrition are also associated with food insecurity (Gunderson and Ziliak, 2015). Risks to mental health are interwoven across all these risks in different ways.

20.3 Community flooding case study

20.3.1 Context

Canterbury faces some of the highest levels of community flood risk in the country, with a high population exposed to surface water and coastal flooding, erosion, and sea level rise (Tonkin + Taylor, 2018; Giberson, 2019). For many of Canterbury's coastal communities, there is a projected increase of exposure to sea level rise towards the end of the century (Paulik, et al., 2019). Exposure to river and surface water flooding is high at present, with mean annual flood flow and extreme events projected to increase over time as a result of climate change. The majority of exposed buildings are in Ōtautahi/Christchurch City, however, Waimakariri and Ashburton also have high exposure levels (Paulik, Craig, & Collins, 2019). Increasingly severe and frequent community flooding risks may result in complex interactions across multiple ngā pono (values).

Figure 20.5: Bow tie diagram showing upstream hazards, drivers and external factors which lead to community flooding risk, and the downstream impacts of this risk.

20.3.2 Upstream climate hazards, climate drivers and external factors

The climate hazards that will directly lead to increasingly severe and frequent community flooding events are increased rainfall and associated river flow increases, extreme weather events, and sea level rise, with associated coastal flooding and storm surges (refer to Table 20.4).

Table 20.4: Climate hazards impacting community flooding

Climate Hazard	Description of climate hazards impacting the risk of community flooding
Extreme weather events (e.g. wind and storms)	• Projected increase of wind speed of 2-10% in 2100 (RCP 8.5 scenario): – Extreme weather events can contribute to storm surges and coastal flooding.
Sea level rise and coastal inundation	• 0.8 m of sea level rise is projected: – Coastal communities are at risk due to sea level rise, and associated coastal flooding and storm surges.
Seasonal rainfall variability and flooding	• There is a projected 15-40% in winter rainfall for many eastern, western and southern parts of Canterbury: – Increased risk of surface water and river flooding for communities.

Increased community flooding events are also driven by *upstream* risks, as these can cause, amplify, and exacerbate flooding impacts, as well as by *compounding* risks from multiple climate hazards,

which exacerbate and amplify the risk posed by climate change. For instance, coastal communities may be impacted by both sea level rise and surface water and river flooding simultaneously. Existing conditions may also increase impacts, for example the projected increased number of dry days may result in reduced permeability of soil.

The interactions between community flooding with other ngā pono (values) is shown in Figure 20.6 and detailed in Table 20.5.

Figure 20.6: Upstream risks to community flooding. Arrows indicate direction of risk interaction, colours indicate ngā pono (values).

Table 20.5: Upstream risk drivers

Ngā pono (values)	Description of upstream risk drivers
Wai | Water	• **Risk to flood defences.** The Region's communities are protected by a network of flood defence assets, including stopbanks and pump stations, and coastal barriers and sea walls, which are vulnerable to deterioration and degradation as a result of climate hazards. In addition, flood defence assets that were designed for historical flood levels will be subject to more overtopping events, and therefore reduced levels of service. • **Risk to stormwater systems**. Community flooding risk may also be exacerbated by undersized or poorly designed stormwater systems, blockages due to debris, or increased sedimentation of stormwater pipe networks, which is itself caused by climate-related factors including increased incidences of community flooding and further sedimentation in rivers.
Rerenga Rauropi | Biodiversity	• **Risk to coastal wetlands.** Flood risk in coastal communities may be exacerbated by a loss of coastal wetlands, which can provide flood protection services (Narayan et al, 2017). • **Risk to terrestrial native biodiversity.** Loss of terrestrial native biodiversity in flood plains, especially trees and vegetation along rivers, could also result in increased community flooding events in both rural and urban communities across Canterbury (Dixon et al, 2016).
Rangatiratanga | Self governance	• The **risks to institutions and governance frameworks** could also result in an increased risk of community flooding. Key risks include impacts on running and maintaining public services, particularly flood defence mechanisms, and poor availability of climate adaptation funding.

Community flood risk in the future will be primarily driven by climate change, but flood risk will also be influenced by external factors such as land use changes and urban development. For example, a focus on increased urban density (through a range of market and policy drivers), has the potential to increase the population and assets exposed to flooding. Future development of greenfield areas may also contribute to increased flooding risk, as these will reduce the permeability of catchments and thereby increase flood risk.

20.3.3 Downstream Impacts

As shown in Table 18.6, risks as a result of community flooding will have downstream impacts on a number of ngā pono (the values).

Table 20.6: Downstream impacts

Ngā pono (values)	Description of downstream impacts
Wai | Water	• **Risk to water supply infrastructure** from community flooding could include contamination of drinking water sources, particularly in rural communities (MfE, 2020). Potential drinking water contamination could lead to health impacts. • **The risk to wastewater infrastructure** could be amplified by coastal and inland flooding, which could result in reduced performance, damage, and overflows (White et al, 2017). The exposure of communities to wastewater could result in poor health outcomes.
Ngā Waihanga | Infrastructure services	• **The transport system is at risk** due to increasingly severe and frequent community flooding events, which could result in damages to roads, bridges and vehicles (Pregnolato et al, 2017). Frequent and severe flooding could also lead to reduced access to public services, including emergency services, particularly for

Ngā pono (values)	Description of downstream impacts
	rural communities. In the 2021 floods in Canterbury, access to a number of communities was disrupted (Stuff, 2021).
Ōhanga | Prosperity	• Increasingly frequent and intense flood events could result in **risks to financial stability**. Communities at high risk may experience house price devaluations and difficulties accessing insurance, which could result in home loan defaults (Lawrence et al, 2016). Extreme flooding events could impact the financial robustness of banks, and other systemic economic consequences (Klomp, 2014).
Hauora | Physical health	• Increased incidence of community flooding may increase **the risk to community cohesion**, particularly if people are required to move away from their communities (MfE, 2020). Impacts on community cohesion could result in reduced resilience and adaptive capacity, which could further amplify community flood risk (Jakes and Langer, 2012). • Community flooding may result in a **higher risk of poor mental health outcomes**. This could as a result of mental trauma from experiencing flooding, and long-term psychological distress from associated social and economic impacts (World Health Organization, 2019). • Community flooding events will result in **risks to physical health** through potential injury and mortality, and reduced water quality and other impacts on health determinants (Royal Society | Te Apārangi, 2017; MfE, 2020). Impacts on health services, such as disruption to roads, could also result in increased risk to physical health. • Damaging flood events could amplify **the risk to increased inequality and cost of living**, particularly for communities with high rates of socio-economic deprivation. Inequality could be increased as households with more economic resources may voluntarily relocate to less exposed communities (MfE, 2020).
Rangatiratanga | Self governance	• Increased community flooding could result in **increased legal liability of regional and territorial authorities**. Councils may face increased litigation from households that incur costs due to a variety of factors including: the lack of, inadequacy of, or failure of flood management infrastructure (e.g. defences), or the provision of flood hazard information that property owners feel is overly conservative. Local authorities in New Zealand have previously faced lawsuits from households seeking compensation for flood damage (RNZ, 2017). • There are range of other governance risks that may result from increased community flooding (MfE, 2020): – There could be increased risk to decision making processes, as present day central and local government regulatory and policy frameworks are insufficient for managing climate risks and implementation of adaptation actions. – Increasingly severe floods may also result in **risks to planning rules and policies**, as present frameworks characterise risks as static and rely on historical parameters. – Financial impacts on councils from increased community flooding may result in **risks to the ability to maintain and run public services**. – Impacts on transport networks may increase the **risks to emergency management and policing**, and reduce community access to these services.

As outlined in Table 20.6, there are complex interactions between and across risk frameworks that need to be understood and managed. A case study of these interactions is also illustrated in Figure 20.7, which shows the impact of community flooding events on housing and the cascading risks that emanate from this interaction. These risks can cascade across the ngā pono (values), impacting communities and the Canterbury Region in a number of ways.

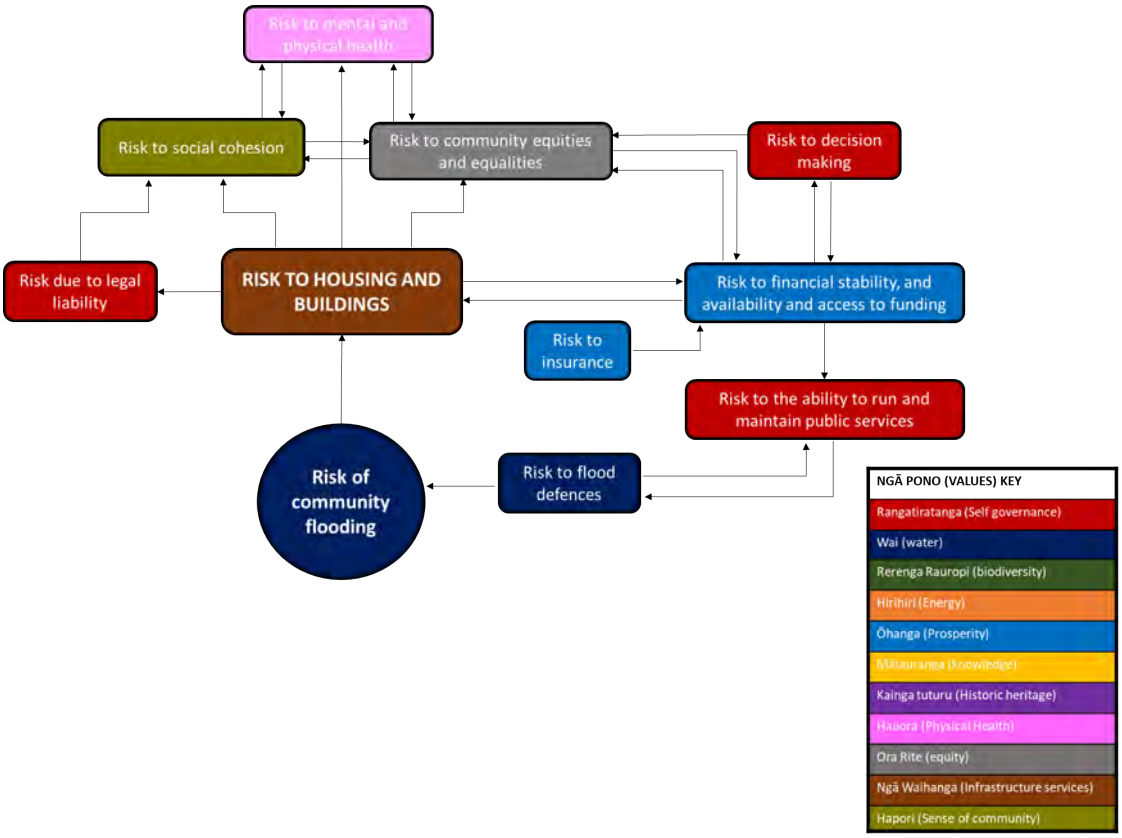

Figure 20.7: Case study of risk interactions with the risk to housing and buildings from the risk of community flooding.

The damage caused to housing from increasingly frequent and severe flooding events could impact on rangatiratanga (governance) through local authorities facing an increased risk of litigation and impacts on the availability of adaptation funding. Adaptation finance will be necessary for responding to flood events and reducing long-term risk, but there may be insufficient funding for maintaining key public services such as flood protection assets. Households may also seek compensation for flood damage. These risks may impact on decision making as the roles and responsibilities of central and local government may require clarification (MfE, 2020).

Increasing flood risk in communities could also result in insurance impacts. High-risk areas may experience insurance retreat, which would result in financial impacts on households and the broader financial system (Lawrence et al, 2016). Major flooding events could also result in impacts to the insurance sector, which could include distress or failure of insurance companies (French et al, 2015).

The risk to housing and buildings from community flooding could also lead to cascading risks across the Hapori ngā pono. Damaging flood events could result in reduced social cohesion and impacts on vulnerable communities, which may result in poor mental and physical health outcomes (Brydsten et al, 2018; BERL, 2020). Impacts on social cohesion will also result in a number of cascading risks to governance and economic frameworks, which are not assessed in Figure 20.7. Lastly, there may be *direct* impacts on mental and physical health, such as the trauma associated with extreme flood events (World Health Organization, 2019).

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20.4 Mahinga kai case study

20.4.1 Context

Te toto o te tangata, he kai; te oranga o te tangata, he whenua

Food supplies the blood of people; their welfare depends on the land.

Mahinga kai has significant value to Ngāi Tahu. The ability to collect mahinga kai contributes to physical, spiritual, social, and economic well-being. It is important for mahinga kai to be managed and gathered as was done by Ngāi Tahu ancestors. Mahinga kai enables ngā pono (the values) of mana and manaakitanga (respect and hospitality) to be demonstrated, empowering Ngāi Tahu to thrive (Environment Canterbury, 2021). Mahinga kai, or mahinga kai areas, can include species (such as manu (birds), kai moana (seafood), rākau (plants), natural habitats, materials and practices for harvesting food, and places where food or resources are, or were, gathered (Environment Canterbury, 2017).

Due to the connection which mahinga kai has with other values areas, climate risks to mahinga kai can initiate interacting risks that propagate, spread, and influence other ngā pono (values). Risks to mahinga kai can also originate from upstream risks.

Major climate hazards which affect mahinga kai include flooding, sea level rise, increasing temperatures, change in rainfall, fire and drought weather.

The upstream hazards, drivers and external factors and downstream impacts of the risk to mahinga kai are illustrated in a bow-tie diagram Figure 20.8.

Figure 20.8: Bow tie analysis of the risk to mahinga kai.

20.4.2 Upstream climate hazards, climate drivers and external factors

The risk to mahinga kai can be caused by a combination of climate hazards and upstream risks. These can then be exacerbated by non-climatic factors.

Further explanation of how climate hazards (identified in Figure 20.8) cause risk to mahinga kai is detailed in Table 20.7.

Table 20.7: Climate hazards causing risk to mahinga kai

Climate Hazard	Description of climate hazards causing risk to mahinga kai
Sea level rise and salinity stresses	• 0.8 m of sea level rise is projected, affecting coastal ecosystems: – Higher salinity pressures on the coastal margins, eventually leading to the complete loss of coastal margin environments and their associated ecosystems. – Intertidal habitats reduction, leading to the endangerment of species traditionally relied upon for mahinga kai (e.g. Kanakana/Piharau/Lamprey).
Seasonal rainfall variability and floods	• There is a projected 20-40% increase in winter rainfall by 2100 for eastern Canterbury: – Resulting high flows (floods) in Canterbury rivers stressing freshwater mahinga kai species. – Increasing erosion and sedimentation rates from high flows, potentially contributing to river and lake eutrophication and/or shallower waters. – High flows potentially leading to habitat and breeding displacement. – Erosion of urupā on river banks can create a tapu (sacred/prohibited) mahinga kai environment. • There is a projected rainfall decrease of up to 10-15% in inland/western Canterbury and Banks Peninsula in the summer by 2100: – Resulting low flows (floods) in Canterbury rivers stressing freshwater mahinga kai species. – Montane/hill country experiencing increased frequency of low flows. This will cause river temperature rises due to reduced flushing flows, formation of stagnant pools, and shallower waters (Jowett and Richardson, 1989). – Increasing river temperatures affecting the habitats and metabolism of mahinga kai species.
Increase in mean temperature, fire and drought	• Drought potential is expected to increase: – Decline of mahinga kai species in these inland, montane/hill country areas after severe events due to: typically slow self-recovery mechanisms, displacement by exotic species, and habitat loss. • Projected increase in average temperature of 1.5 – 3.5°C by 2100 (RCP 8.5 scenario): – Some mahinga kai water species are sensitive to water temperature changes. Lakes and rivers with less shading will experience the most fluctuation in water temperature.
Decrease in ocean pH	• Surface water pH is projected to decrease by 0.33 under the RCP8.5 scenario. • Acidification from the increase in carbon dioxide uptake from oceans will cause risks to hard shelled mahinga kai species (MfE, 2020).

The interdependencies between mahinga kai and other ngā pono (values) can cause upstream risks to compound. These will impact the availability and accessibility of mahinga kai, for example due to

increased exposure and vulnerability to disease, or unfavourable growing or habitat conditions, leading to the decline of species and usability of species as a food/medicine source. Figure 20.9 shows the upstream risks and relationships with mahinga kai.

Figure 20.9: Upstream risks to mahinga kai. Arrows indicate direction of risk interaction, colours indicate ngā pono (values).

As mahinga kai is found in a range of aquatic and terrestrial environments it is exposed to a multitude of risks. Mahinga kai can be found in in alpine/high country, montane/hill country, lowland and coastal, wetland, native freshwater, and aquatic coastal and marine ecosystems. Table 20.8 details the causes of risks to mahinga kai from different ngā pono (values).

Table 20.8: Upstream risks to mahinga kai across different ngā pono (values)

Ngā pono (values)	Description of causes
Wai | Water	• **Risks to wastewater infrastructure** due to excessive rainfall and flooding can cause discharge of poorly treated or untreated wastewater to rivers. This will affect Mauri and subsequently, mahinga kai near these bodies of water.
Kāinga tūturu | Historic heritage	• **Risks to settlements and communities** due to flooding, coastal erosion and sea level rise may displace people, reducing the ability and availability to source mahinga kai as people may be less familiar with the area or unable to get to mahinga kai areas.
Ngā Waihanga | Infrastructure services	• **Risks to roads and bridges** due to increasing coastal erosion, flooding (river and surface water), and sea level rise may cause permanent road closures and may impact the accessibility of certain mahinga kai areas.
Ōhanga | Economy	• **Risks to crops and livestock** due to drought may cause an excessive increase in demand for mahinga kai. Concurrently, the link between these areas mean that an increase in risk to mahinga kai could lead to increase in pressure on the primary industries.
Rerenga Rauropi | Biodiversity	• **Risks to terrestrial, freshwater, and marine pests and diseases** due to higher mean temperatures, mean annual rainfall and reduced snow and ice will cause risk to mahinga kai. This is due to a change in biodiversity, which may impact mahinga kai.

These upstream risks may lead to increased demand, reduced favourable growth conditions, and decreased accessibility, exacerbating the risk to mahinga kai.

Other non-climate factors may also influence and exacerbate risks., these include:

1. Cultural identity – mahinga kai contributes to the cultural identity of Ngāi Tahu. Risks to cultural identity, such as loss of knowledge of mahinga kai through the legacy effects of colonisation, can be a risk to mahinga kai. Conversely, the decline of mahinga kai species and areas may lead to risk in cultural identity and mahinga kai knowledge.
2. Excessive groundwater pumping – this may cause saltwater intrusion, exacerbating the effects of sea level rise and salinity stresses. This may also lead to the stream depletion effect (Environment Canterbury, 2000).
3. Land ownership and land-use planning – this may reduce the availability or the accessibility of mahinga kai.
4. Natural disasters – habitats and planting may be damaged by natural disasters such as tsunamis.

Moreover, as discussed in Section 8, exotic species can exacerbate risks by displacing mahinga kai, where native species are slower to regrow.

20.4.3 Downstream impacts

Risks to mahinga kai will cause interacting risks to propagate across other ngā pono (values) due to the relationships and dependencies between ngā pono (values). Table 20.9 details these risks.

Table 20.9: Downstream impacts of risks to mahinga kai

Ngā pono (values)	Downstream impacts
Hauora | Physical health and wellbeing	• **Risks to physical health** could occur due to an increase in food and water-borne diseases found in mahinga kai. • **Physical health** could also be impacted if accessibility to mahinga kai is reduced due to food insecurity. • There may be **risks to mental well-being and health** due to reduced self-determination and loss of a significant aspect of cultural identity.
Mātauranga | Knowledge	• There may be **risks to cultural identity** due to the potential loss of intergenerational knowledge if it becomes increasingly difficult to find or access mahinga kai (which can cascade to creating risks to mental health). Further risks to cultural identity may arise through the values of manaakitanga (hospitality) and kaitiakitanga (guardianship) as Māori are less able to source mahinga kai to provide for manuhiri (guests) and are unable to active protection for natural resources.
Ōhanga | Prosperity	• There may be **risks to agriculture, horticulture and fisheries** caused by risk to mahinga kai. These increased pressures will also add pressure to infrastructure for the primary industries (such as irrigation, roads and buildings).
Rerenga Rauropi | Biodiversity	• Mahinga kai, biodiversity and biosecurity are closely related and risk to one will lead to risks to another.
Hapori | Sense of community	• **Risks to social cohesion** may occur due to the exacerbation of existing inequities and reduction of natural resources. Sense of belonging may be impacted with reduced accessibility to mahinga kai.
Ora rite | Equity	• **Risks to exacerbating existing inequities** due to a reduction in mahinga kai (leading to food insecurity).

The interaction between mahinga kai and the other areas identified in Table 20.9 is complex. For instance, risks to physical health could be impacted by an increase in water-borne diseases. For communities already experiencing health inequalities, water-borne diseases could create further health issues, which then reinforce these inequalities (Levy et al., 2018).

Figure 20.10 illustrates a case study on the risk interaction between different ngā pono (values) by analysing the effects of the risks to mahinga kai on the risks to Māori cultural identity.

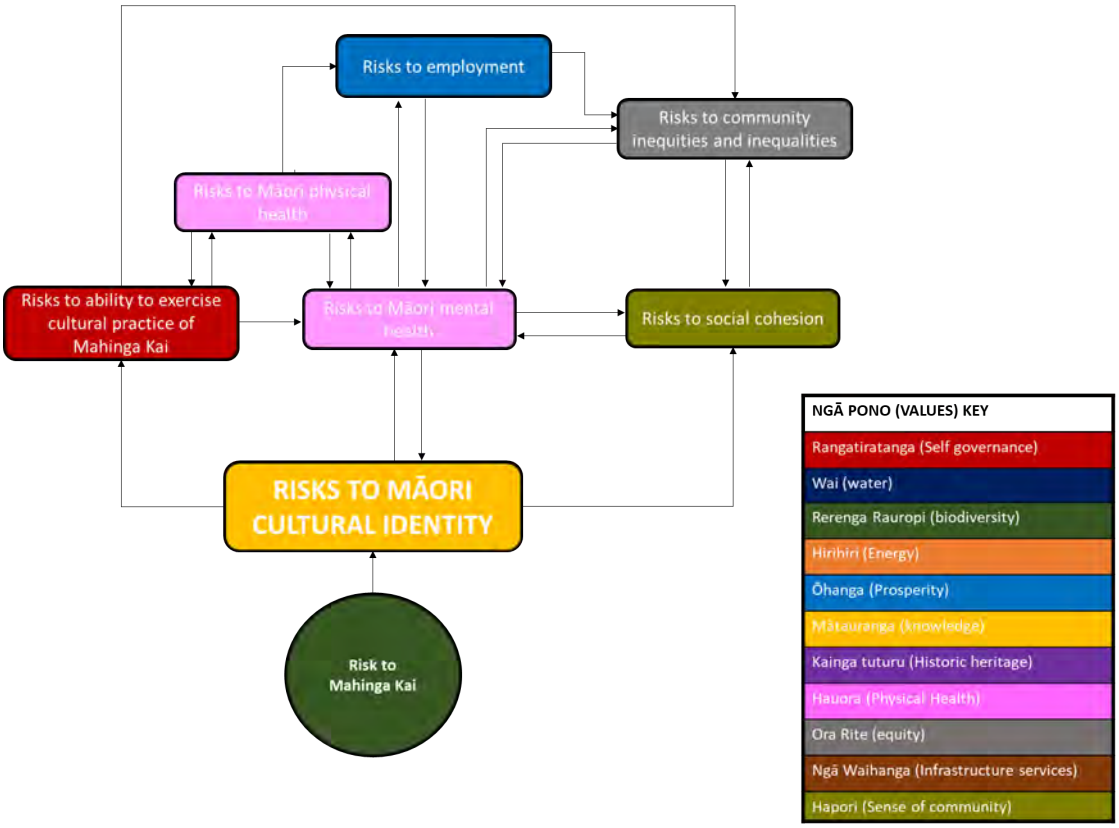

Figure 20.10: Case study of interactions across ngā pono (values) from risks to Māori cultural identity from the risk to mahinga kai

Figure 20.10 demonstrates that risks to mahinga kai can cause risk to Māori cultural identity. In the Te Whare Tapa Whā model of wellbeing, there are four 'walls' of wellbeing – taha wairua (spiritual health), taha tinana (physical health), taha hinengaro (mental/emotional health) and taha whānau (family health). Risks to one of these walls will reduce overall wellbeing. Risks to cultural identity could lead to risks to the ability of Māori to exercise the practice of mahinga kai. Risks to cultural identity are also known to lead to poor mental health (taha hinengaro) outcomes (Williams et al., 2018) and reduced sense of belonging (Shepherd et al., 2017). Poor mental health outcomes can also lead to employment risk, as people may voluntarily or involuntarily leave their employment (Greenwod et al., 2019). It can also result in increased risks to physical health. Poor mental and physical health outcomes not only reduce overall wellbeing (as the four walls are not equal), they can contribute to the exacerbation of community inequities, and also compound mental health risks. For example, inequities are worsened as Māori are less likely to have access to appropriate healthcare (Poulter, 2019). Growing inequities can cause risks to social cohesion (Khambule & Siswana, 2017), which when undermined, can further compound into poor mental health outcomes.

20.5 Tourism case study

20.5.1 Context

Canterbury based tourism spending was over $3 billion in 2020, with Ōtautahi/Christchurch having the highest tourism spending within the Region (MBIE, 2021). The tourism sector is also an important driver of the economy for coastal towns such as Kaikōura, and inland areas including Lake Tekapo and Mt Hutt.

The highest identified climate change risks to tourism include those from reduced snow and ice, sea level rise and associated coastal flooding, and river and surface water flooding. Alpine tourism sites, such as the Mt Hutt Ski Area, are highly sensitive to warming temperatures. This is expected to lead to a reduced snow base and changing natural landscapes. Tourism destinations along coastal areas such as Akaroa, Banks Peninsula, and Kaikōura are at risk due to ongoing sea level rise, and associated coastal flooding and erosion. Tourism attractions and operations in lowland and riverine areas are also at risk from increased flooding.

The upstream hazards, drivers and external factors and downstream impacts of the risk to tourism are illustrated in a bow-tie diagram Figure 20.11.

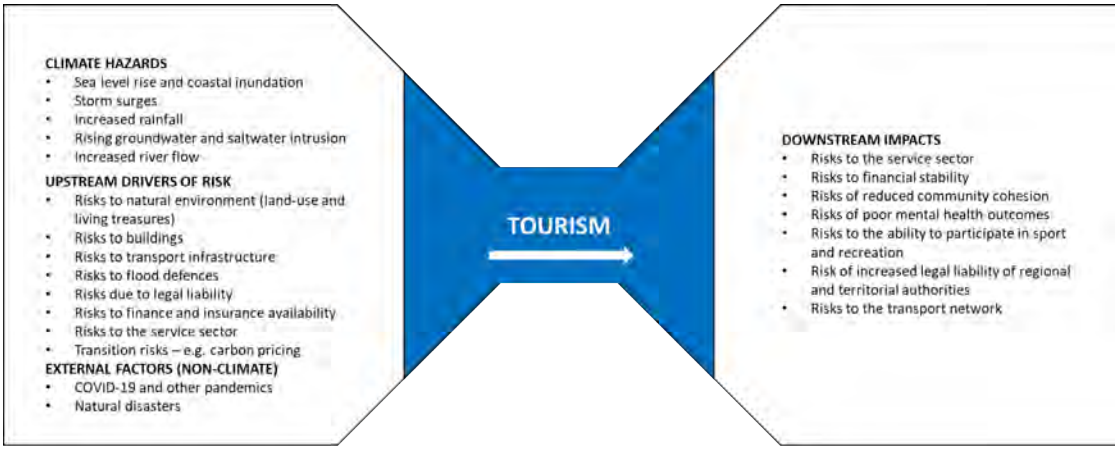

Figure 20.11: Bow tie diagram of the risk to tourism.

The climate risks faced by the tourism sector may result in complex interactions across the ngā pono (values) in the integrated framework.

20.5.2 Upstream climate hazards, climate drivers and external factors

The primary climate risks to the tourism sector are from reduced snow and ice, river and surface water flooding, and coastal flooding. Temperature increases will result in particularly high risk to alpine areas, which are expected to face rising snow lines and glacial retreat, more frequent hot extremes, and increasing extreme weather events. Reduced snow will impact on winter tourism operations, especially skiing and glacier tourism. Tourism activities, assets and infrastructure are also at risk due to river and surface water flooding, and coastal flooding.

Table 20.10: Climate hazards impacting tourism

Climate Hazard	Cause of risk to increased incidence of power outages
Temperature	• Reduced snow and ice will impact ski fields and alpine tourism.
Sea level rise and coastal erosion	• 0.5 – 0.7 m of sea level rise is projected. • Coastal tourism sites, assets and operations are risk.
Seasonal rainfall variability and flooding	• There is a projected 20-40% increase in winter rainfall by 2100 for eastern Canterbury • Inland tourism sites, assets and operations are risk due to surface water and river flooding.

The tourism sector may also be impacted by compounding risks from multiple climate hazards, which exacerbate and amplify the risk posed by climate change. For instance, the operation of ski fields may be impacted by multiple physical risks simultaneously, including reduced snow and ice cover in winter affecting profitability of ski fields, the operation of chairlifts impacted by extreme weather events, and access disruptions due to flooding of roads.

The tourism sector is also at risk due to its interdependencies with other value areas, as shown in Figure 20.12 and Table 20.11. This could result in the compounding of risk to tourism assets and operations. These risks could be described as upstream risks, as the tourism sector is the risk receptor in these cases.

Figure 20.12: Upstream risks to tourism. Arrows indicate direction of risk interaction, colours indicate ngā pono (values).

Table 20.11: Upstream risk drivers

Ngā pono (values)	Description of upstream drivers
Ngā Waihanga | Infrastructure services	• **Risk of damage to transport infrastructure**, particularly rural roads, are a major source of risk to the tourism sector through disruption of access to tourism sites. • The **risks to tourism-related buildings**, **and the flood defences** that protect tourism assets and infrastructure, will compound and amplify the risk faced by the tourism operators. • **Risks to roads and bridges** due to increasing coastal erosion, flooding (river and surface water), and sea level rise may cause permanent road closures and may impact the accessibility to tourism sites.
Ōhanga | Economy	• **Risks to service sector and its supply chains.** Impacts on service sector, including the supply chains, could reduce the availability of goods consumed by tourists. • **Risk to insurance availability** for tourism providers, particularly commercial property insurance. If the risks to tourism businesses from climate change are deemed as being both probable and costly, insurers may no longer be willing to provide insurance to tourism businesses, particularly for property impacts as result of flooding.
Rerenga Rauopi | Biodiversity	• **Risk to Region's landscape and flora and fauna.** Tourism is also reliant on the natural environment, and a number of tourism sites derive value from the region's landscape and flora and fauna. The risks to the natural environment could result in compounding risks to the tourism sector, as it could impact the "clean and green" reputation of the Region.
Rangatiratanga | Self governance	• **Increased legal liability from climate impacts on tourism operations.** Tourism businesses may be at risk due to increased legal liability from climate impacts, as tourism businesses may face increased legal liability if they fail to protect their customers from climate risks, e.g. flooding causing injury.

The tourism sector will also be subject to a range of other risks in future, including:

- Transition risks as a result of carbon pricing and a reduced demand for carbon-intensive forms of transport, particularly aviation (The Royal Society of New Zealand, 2016).
- Global pandemics, such as the COVID-19 pandemic, which may become more likely as a result of climate change (Gossling et al, 2020).
- Natural disasters (such as earthquakes and tsunamis) - which could damage tourism infrastructure.
- Economic recessions and financial crises (Munshi et al, 2020).

20.5.3 Downstream impacts

As shown in Table 20.12, the risks to the tourism sector will also result in risks to other ngā pono (values) areas. Given the interconnectedness of the tourism sector, the climate risks to tourism businesses may increase and amplify risks across ngā pono (the values).

Table 20.12: Downstream impacts

Ngā pono (values)	Description of downstream impacts
Ōhanga | Economy	• Potential economic impacts on the tourism sector would also affect other sectors of the economy, particularly the service sector which is highly dependent on expenditure from tourists. • Insurance withdrawal from at-risk tourism business may contribute to cascading risks to financial stability, as these businesses may face increasing difficulties in servicing loans (MfE, 2020). • Climate risks to the tourism sector may result in stranded tourism assets, as businesses, such as ski fields, close down. This could also result in economic risks, as tourism businesses could default on debt and face asset revaluations (Semieniuk et al, 2020).
Hauora | Physical health	• The climate risk to the tourism sector could also amplify the **risk of reduced community cohesion**, as economic impacts on tourism businesses could exacerbate social inequities and reduce social capital. • Reduced wellbeing and a higher **risk of poor mental health outcomes**, particularly for tourism dependent communities. For example, the tourism sector may experience job losses, which could result in reduced wellbeing and a higher risk of poor mental health outcomes, particularly for tourism dependent communities (Stuff, 2020). • There could be **risks to the ability to participate in sport and recreation** as a result of climate risks faced by the tourism sector – in particular, the risk to alpine sports due to reduced snow cover.
Rangatiratanga | Governance	• **Increased legal liability of regional and territorial authorities** from damages to tourism infrastructure and assets. Tourism businesses may sue councils for not providing sufficient protection from climate change risks – for example, in 2019, the Scenic Hotel Group sued West Coast councils for losses from a flood stopbank failing (Stuff, 2019).
Ngā Waihanga | Infrastructure services	• **Risk to transport infrastructure** from decreased tourism revenue. For example, declining tourist visitor numbers could reduce airport revenues and lead to reduced flight routes, as shown by COVID-19 (IFC, 2020).

As outlined in Table 20.12, there are complex interactions between and across risk frameworks that need to be understood and managed. A case study of these interactions is also illustrated in Figure 20.13, which shows the impacts from tourism risks to the broader service sector. The climate risks in the tourism sector could impact the broader service sector, including hospitality, retail and transport, which are all closely interlinked (UNCTAD, 2020). This example could be applied to any area which is highly dependent on tourism, of which there are multiple within the Canterbury Region.

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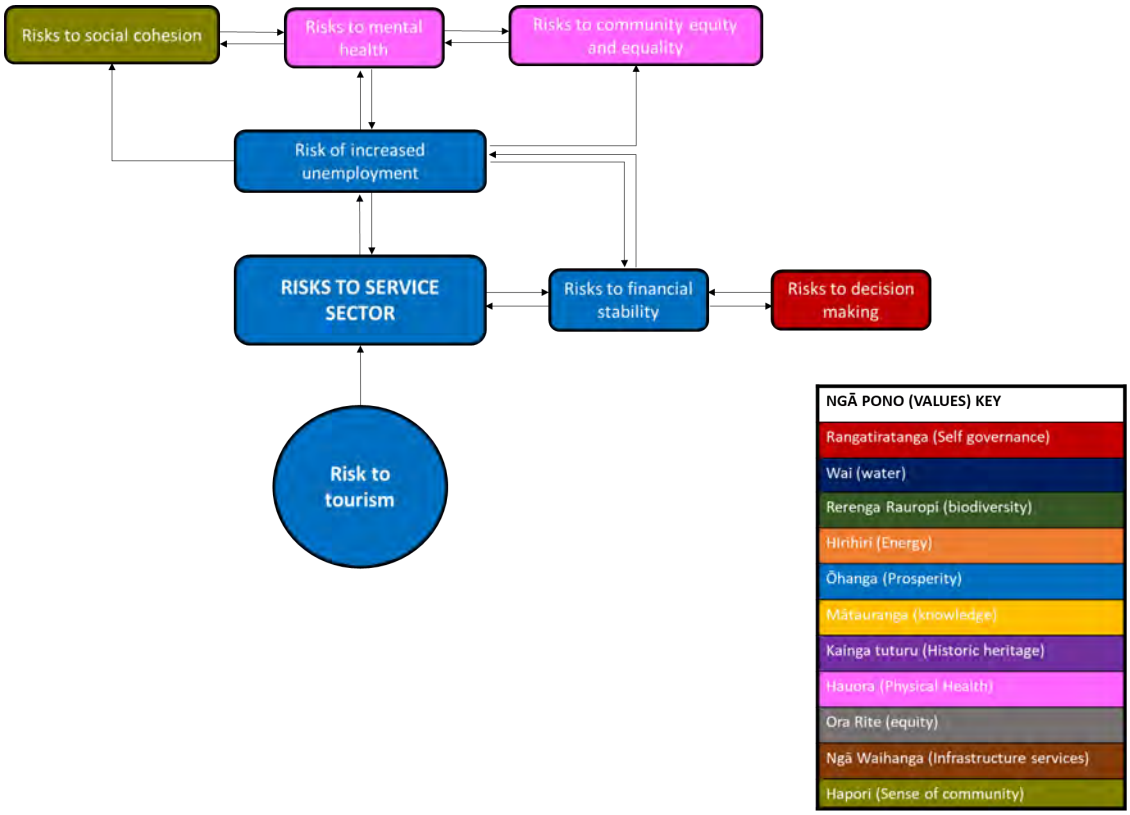

Figure 20.13: Case study of the risks interacting with the risk to service sector from the risk to tourism.

As shown in Figure 20.13, impacts on the service sector could include reduced profitability from declining tourist spending, and could result in increased unemployment and difficulties for business to service debts. Widespread disruption could conceivably result in risks to financial stability, which could result in calls for public sector intervention to support failing businesses (MfE, 2020). Current governance frameworks could result in risks to decision making, as it is unclear at present whether local government or central government would be responsible for providing financial support (MfE, 2020). The impacts on unemployment could result in declining mental health, reduced social cohesion, and a reduction in equity and equality (Brydsten et al, 2018; BERL, 2020). These impacts, moreover, could compound and further interact. Poor mental health outcomes could, for example, result in further unemployment within a community, further exacerbating social and human risks (Olesen et al, 2013). These impacts would disproportionately affect vulnerable populations with limited access to social and economic resources.

20.6 Heat-stress related illnesses case study

20.6.1 Context

Heat-stress related illnesses, such as heat exhaustion, heat stroke, cramps, swelling and rashes, may occur when people are exposed to temperatures which do not allow their bodies to naturally cool sufficiently (Centers for Disease Control and Prevention, 2017). Extreme heat contributes to cardiovascular and respiratory related deaths, particularly in elderly people (World Health Organisation, 2018). Permanent disability and death can also be caused by heat stroke (the most serious heat-related illness) if not treated by emergency treatment (Centers for Disease Control and Prevention, 2018). Although other species may also experience ill health due to heat stress, this section covers human heat stress related illnesses.

Heat-stress related illnesses are caused by an increase in mean temperature. Medically vulnerable people with pre-existing and chronic health conditions are more likely to experience illness due to heat stress.

The upstream hazards, drivers and external factors and downstream impacts of the risk of heat-stress related illnesses are illustrated in a bow-tie diagram Figure 20.14.

Figure 20.14: Bow tie diagram illustrating the causes and effects of risks to heat-stress related illnesses.

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20.6.2 Upstream climate hazards, climate drivers and external factors

Using the RCP 8.5 scenario, it is estimated that by 2100 the average temperature will increase by 1.5 – 3.5°C. The average number of hot days is expected to increase by 20-60 days. The increase in the number of hot days mean that there is more exposure to these unfavourable conditions. Coastal and inland low-elevation areas in Canterbury will experience higher temperatures than the mountainous areas.

Upstream risks to heat stress illnesses are shown in Figure 20.15.

Figure 20.15: Upstream risks to heat-stress related illnesses. Arrows indicate direction of risk interaction, colours indicate ngā pono (values).

Further details on these upstream risks in relation to the ngā pono (values) are shown in Table 20.13.

Table 20.13: Upstream drivers to heat-stress related illnesses

Framework	Upstream drivers
Ōhanga | Prosperity	**Risks to public health funding** from other climate hazards, such as may cause risk of increased incidence of illnesses relating to heat stress. This is because there may be inadequate funding available to help people manage chronic conditions, making them more vulnerable to heat stress related illnesses. Subsequently, the risk of illnesses relating to heat stress can cause risk to public health funding if there are an unexpected large amount of people who require medical treatment for these illnesses.
Ngā Waihanga | Infrastructure services	**Risks to power infrastructure** from climate hazards, such as increased temperatures, can cause power outages. Power outages create risks to illnesses from heat stress as air-conditioning units and medical equipment may not be able to be used.
Wai | Water	**Risks to the potable water network** from increased rainfall and sea level rise resulting in flooding, as well as drought events, may cause inaccessibility to water. Hydration is critical in relieving and treating heat related illnesses.

Non-climate factors also compound with the climate hazards and upstream risks to worsen their effects on heat stress. These factors include:

- Substandard housing conditions, creating hotter living environments. This would make dwellers of substandard housing more vulnerable and susceptible to heat stress.
- Population growth and aging population. Elderly are more susceptible to heat stress related illnesses.
- Lack of access to shelter (reducing the ability for people to remove themselves from the heat). This may cause people to be more exposed to hot conditions.
- Work environments. Working outdoors will expose people to conditions which may lead to illnesses related to heat stress developing.

20.6.3 Downstream impacts

Increase in illnesses relating to heat-stress can increase risks in other areas. These risks can then compound and intensify the situation. Consequences of heat stress illnesses can affect rangatiratanga (governance), hauora (physical health), ōhanga (prosperity), wai (water), ngā waihanga (infrastructure services), and ora rite (equity). Table 20.14 provides further detail into the risks for each of ngā pono (the values).

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Table 20.14: Downstream impacts of an increase in heat stress related illnesses

Ngā pono (values)	Downstream impacts of increased incidents of heat stress related illnesses
Ōhanga | Prosperity	• **Risks to business productivity and profitability** from employees requiring more sick leave, being unable to work certain vocations, and being unable to return to work due to long term effects of heat stress related illnesses. This may also cause businesses to have to close due to the inability to find suitable workers. Business closure may cause the abandonment of assets and loan defaulting. • **Risks of occupational related injuries** from increased accident risk due to diminished performance capacity (Kjellstrom et al., 2016). • **Risks to agriculture** as heat stress may impede on the agricultural workers' ability to work (Lima et al., 2021).
Rangatiratanga | Self governance	• **Risk to availability and access to funding** for public health care treatment. • **Risks to personal insurance** (such as health and life insurance) due to increased claims. This may result in changes to insurance policies and bigger cost share of heat stress related health expenses.
Hauora | Physical health	• **Risks to physical health** due to side effects of heat stress related illnesses. • **Risks to mental health** due to the changes which heat stress related illnesses cause to a person's lifestyle, capabilities, and health. • **Risks to emergency services** as there may be an increased demand for emergency services due to an increase in people suffering from heat stress related illnesses.
Ora rite | Equity	• **Risk to community equities** as vulnerable communities may experience these illnesses more and have less access to healthcare to treat these illnesses.
Wai | Water	• People may use potable water for treatment of or prevention against illnesses related to heat stress, putting pressure on and creating **risks to potable water infrastructure.**
Ngā Waihanga | Infrastructure services	• Unusually high demand for power to cool people may cause stress and **risks to power infrastructure**, causing power outages. • Reduced travel using active transport modes, placing pressures on other transport modes. This may cause **risks to the transportation network**.

These effects can then become causes of other risks. For example, increased illnesses caused by heat stress can impede the ability for agricultural workers to work. This reduces their incomes, and will have flow on effects on the economy. Food security may also be impacted. Furthermore, the loss of work or reduction in the ability to work can lead to risks to mental health.

The diagram in Figure 20.16 illustrates how ngā pono (values) interact.

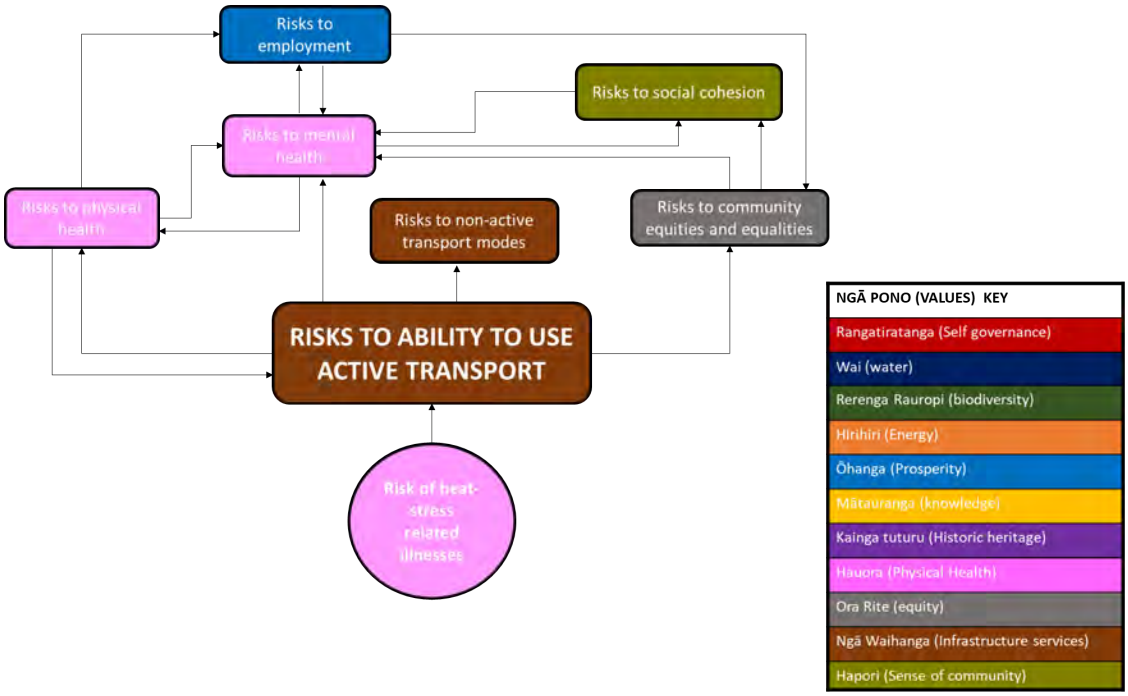


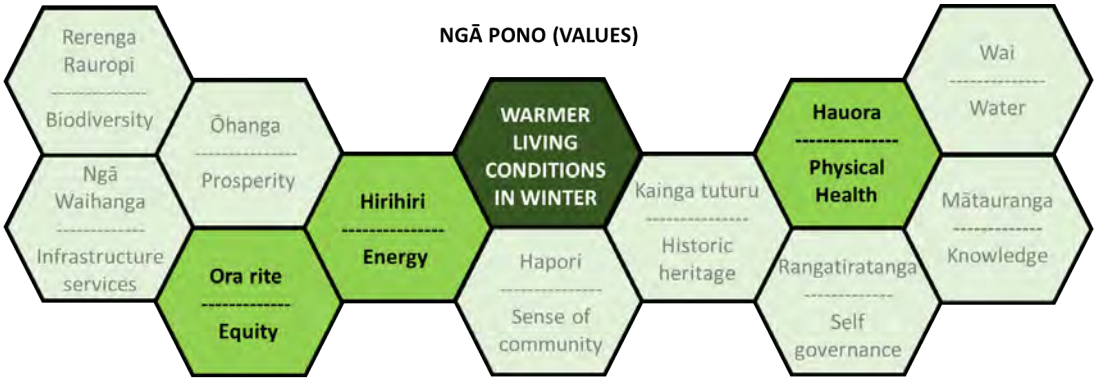
Figure 20.16: Case study of risk interactions with the risk to the ability to use active transport as a result of the risk of increased heat-stress related illnesses.

Figure 20.16 shows that heat stress related illnesses can cause physiological changes reducing the ability to undertake physical activity. This leads to reduced travel using active modes of transport, such as cycling, walking and scootering (Kjellstrom et al., 2016). This is likely to compound existing inequities, as research shows that lower income households are more likely to use active transport (Shaw et al., 2017). If low socio-economic households have their ability to commute reduced, there may be further risks to employment, food security and physical and mental health. In turn, this could cause risks to social cohesion. A decreased ability to use active transport will also increase the risk of obesity, which could lead to poor physical and mental health outcomes (Kjellstrom et al., 2016). Risks to physical and mental health can affect employment, in turn further accentuating risks to mental health.

21 Opportunities

This section explores some of the opportunities that Canterbury may experience with climate change. These opportunities cannot be considered in isolation due to the inherent synergies with climate risks. In some cases, climate risks may outweigh the benefits from the opportunities outlined below.

21.1 Warmer living conditions in winter



A reduction in cold days in winter will contribute to warmer living conditions, providing the opportunity to reduce energy use and improve health outcomes.

Currently, 15% of typical household electricity in Aotearoa New Zealand is used for space heating (Electricity Authority, 2018).

Under RCP 8.5, this opportunity will continue to grow from present day until 2100. This opportunity can also be enhanced with better housing quality. To take advantage of warmer winters (and to contribute to adapting to other temperature related risks), the opportunity to improve housing quality could be taken immediately. This includes making improvements to heating solutions, insulation, ventilation, and lighting. However, there would be significant financial implications.

21.1.1 Benefits of warmer living conditions in winter

This opportunity can lead to benefits within the Ngā Pono (values) of Hirihiri (energy), Hauora (physical health) and Ora Rite (equity).

- **Hirihiri (Energy):** Warmer temperatures will likely decrease residential energy demand over the winter months, where energy use is traditionally high. This decrease could contribute to the flattening of the annual energy demand when also considering the anticipated energy increase in summer months (Security and Reliability Council, 2018). As a result, the pressure on infrastructure and inter-seasonal hydro storage may reduce (Security and Reliability Council, 2018). There may be changes to hydro lake inflows with expected changes to snowfall and melt[10], aligning better with demand. However, more research is required to better understand the expected inflow changes.

[10] Refer to Section 10 for more details on risks to hydro lake inflows.

Furthermore, LPG consumption is projected to decline as the government focuses on reducing emissions (Botzen et al., 2021)[11] . The decline in LPG and natural gas could be further accelerated due to temperature increases, and reduced demands for heating in winter.

- **Hauora (physical health):** Cold temperatures can affect several cardiovascular, peripheral circulation, musculoskeletal, and respiratory diseases (Hassi et al., 2005). The risk of respiratory infections increases where indoor temperatures drop below 16°C. When temperature drops below 12°C, the cardiovascular system can become stressed (World Health Organisation, 2011). Having warmer temperatures in the winter months could contribute to more favourable health outcomes and a possible decrease in hypothermic illnesses and cold-related deaths. It can also reduce risk to vulnerable communities (particularly the medically vulnerable and/or people living in poor quality housing).

  A reduction in wood burner use due to warmer temperatures may lead to better respiratory health outcomes. Older and incorrectly used wood burners are associated with negative impacts on respiratory health (Asthma Foundation New Zealand, 2020).

  However, temperature is only one factor when considering health outcomes in living conditions. Other factors include household crowding, second-hand smoke, unflued gas heaters and open fires, and ventilation (EHINZ, n.d.).

- **Ora rite (Equity):** Fuel poverty is defined as households which cannot afford adequate household energy (including heating indoor areas to the World Health Organisation recommended temperatures) (O'Sullivan et al., 2015). Approximately a quarter of New Zealand households are estimated to be in fuel poverty (Howden-Chapman et al., 2012). Warmer winter temperatures could reduce the financial pressure on households. However, temperature is not the only factor contributing to fuel poverty. Other non-climate related factors include energy prices, housing quality, and energy policy (MfE, 2020a).

21.1.2 Associated risks

As discussed in Section 11.1 and 13.2.1, there will be risks to energy and health associated with the increase in average temperatures. These risks must be considered alongside this opportunity to understand the impact of increasing average temperatures.

21.1.3 External considerations

This opportunity will be limited or enhanced by a range of non-climate factors, such as prices, policies, housing standards, living conditions, and energy infrastructure. Also, the quality of housing between 2050 and 2100 will be different. Most of the buildings that will be present in the 2050s already exist (BRANZ, 2021), meaning that overall housing quality will not have changed extensively. By 2100, more iterations of building regulations will have been made, likely improving housing quality.

[11] Natural gas and LPG will be phased out by 2050 in New Zealand.

21.2 Increased tourism

An increase in average temperature and changing seasonal climates may extend the summer tourism season, providing job and business opportunities for Canterbury.

The COVID-19 pandemic has temporarily stopped international tourists visiting Canterbury since March 2020. This section assumes that international tourism will resume over the next two years. It is noted that the Mackenzie District and Kaikōura have been identified as target focus areas for the New Zealand government in the tourism sector rebuild (RNZ, 2021).

It is noted that this opportunity may only exist while temperatures are considered favourable by visitors. Perceived optimum climatic conditions for travelling vary across different areas of the world (Scott et al., 2007).

21.2.1 Benefits of increased tourism

This opportunity can lead to benefits within the Ngā Pono (values) of Ōhanga (prosperity) and Ngā Waihanga (infrastructure services).

- **Ōhanga (prosperity):** An increase in tourism may create opportunities for new jobs and businesses to emerge (Ministry for Business, Innovation and Employment [MBIE], 2018). It is estimated that for every $178,000 of visitor spend, one new job is created in tourism (Tourism New Zealand, 2020). This suggests that as more visitors visit Canterbury due to a more favourable climate, there is opportunity for the tourism industry and associated service industries to grow. With these growth opportunities, there will be other interacting opportunities (and risks) to most values of the integrated framework.

  There is also opportunity for Canterbury tourism to move to being a low-emissions industry.

21.2.2 Associated risks

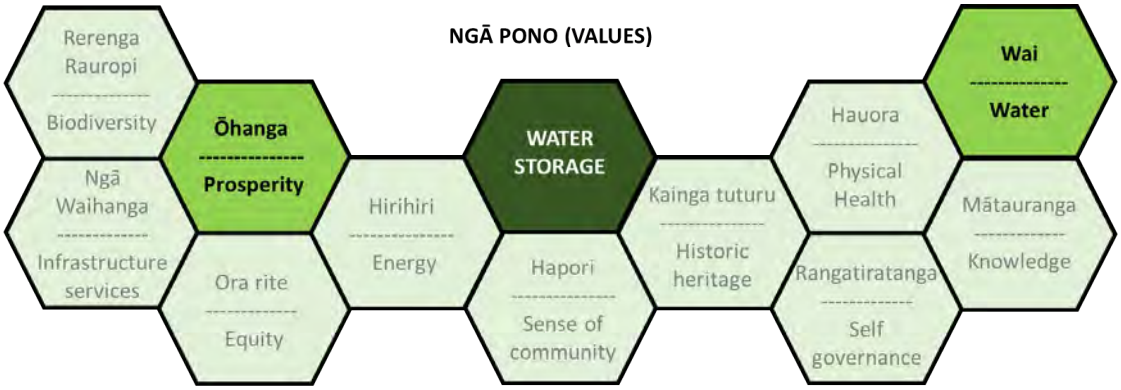
As discussed in Section 13.5, with increasing temperatures there will be risks to tourism operators (such as ski field operators and glacial exploration operators). There may also be an increase in heat stress related illnesses. With some tourism businesses operating mainly outdoors, this could expose employees to unfavourable temperatures. High temperatures can also cause other stresses on tourism related infrastructure, for example, pavements (Mills et al., 2020).

Furthermore, the increase in hot days may deter visitors from visiting. Droughts and lower flows may reduce the viability of outdoor recreational tourism (such as fishing and canoeing) (National Integrated Drought Information System, n.d.) and mahinga kai.

21.2.3 External factors

There are a range of external factors which can impact the tourism industry and may offset (or enhance) the potential increase in tourism due to warmer temperatures. These factors include visas and international visitor levies, the number of scheduled flights, marketing, international and domestic aviation prices, fuel prices, broader awareness of carbon footprints, available transport modes, and travel restrictions (such as border closures due to unprecedented situations).

21.3 Water storage



An increase in winter rainfall[12] presents an opportunity to capture and store excess river flows for beneficial uses. These may include storage for municipal and commercial uses (e.g. agriculture/horticulture). Storing water in high flow conditions (flood) will provide more resilience when water resources are unavailable or lower in the summer months.

Importantly, any consideration of water storage must consider and give effect to the National Policy Statement for Freshwater Management 2020 (NPSFM) and the principle of Te Mana o te Wai (for example, the mauri of the environment can be reduced by altering natural flows (MfE, 2020c)).

This opportunity is likely to increase with time. In certain areas of Canterbury, projections indicate a significant increase in rainfall from 2050 to 2100. Therefore, there is opportunity to investigate suitable water storage solutions now in preparation for future rainfall scenarios (considering both 2050 and 2100 scenarios).

21.3.1 Benefits of water storage

This opportunity leads to benefits within the Ngā Pono (values) of Wai (water) and Ōhanga (prosperity).

- **Wai (water):** An increase in winter rainfall and provision of storage can provide benefits to municipal water supplies for urban and rural areas around the Canterbury region. Currently groundwater supplies are plentiful, however, this opportunity may merit consideration under a future climate where drought is more prevalent (refer to Section 9.4 and 9.5).
- **Ōhanga (prosperity**): An increase in winter rainfall and provision of storage can provide benefits to agricultural and horticultural sectors within the Canterbury region. It is understood that farmers are already looking for more water storage to increase the reliability of their

[12] Winter rainfall, particularly in eastern, southern and western Canterbury, is expected to increase significantly by 2100. It is also noted that summer rainfall is expected to decrease, specifically in Banks Peninsula and inland areas.

irrigation water supply (NIWA, 2018). This benefit needs to be carefully weighed against associated risks that may arise due to continued or increased irrigation and intensive farming.

21.3.2 Associated risks

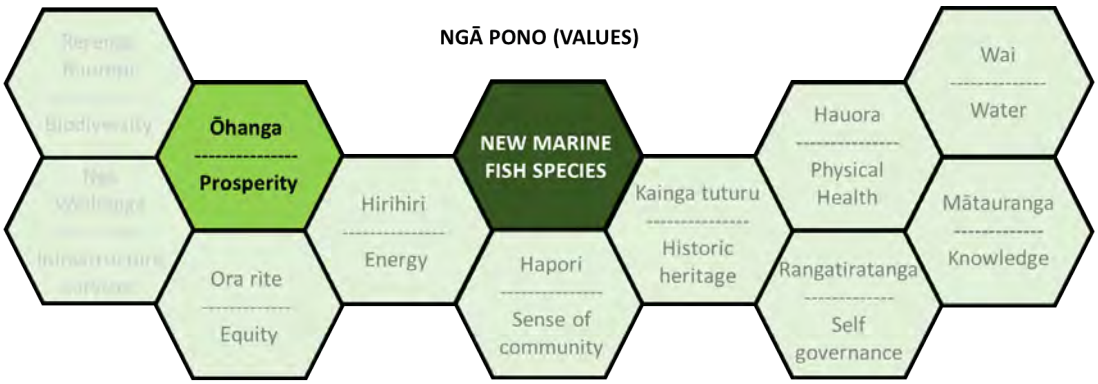
There are several associated risks with changing precipitation rates. Higher flowing rivers are only projected to occur in the winter. During the summer season there will be lower flows, potentially offsetting the higher winter flows.

As discussed in Sections 9 and 10, high flowing rivers can increase erosion and sedimentation rates, contributing to river and lake eutrophication. This has significant risks for mahinga kai and freshwater species.

21.3.3 External considerations

This opportunity will be limited by external factors such as water use policies, land use changes, efficiency of irrigation systems, and food demand. There is opportunity to consider future opportunities for water storage in developing the long-term vision for local waterbodies and catchments, under the principles of Te Mana o te Wai in the National Policy Statement for Freshwater Management 2020 (MfE, 2020b). This long-term vision, which is currently underway, intends to identify Papatipu Rūnanga and community aspirations in Canterbury. It will set the precedent and contribute to future water storage and irrigation decisions.

21.4 New marine fish species



An increase in air and ocean temperatures may provide a more favourable environment for new marine fish species, providing an opportunity to the fisheries industry.

In the 2050 RCP8.5 scenario, warm water species from the sub-tropics may migrate south to New Zealand waters (KPMG, 2020). Further research into fisheries and aquaculture opportunities under a warmer climate is recommended in order to better understand the nature of the opportunity. This section looks at opportunities between now and 2050.

21.4.1 Benefits of new marine fish species

The opportunity leads to benefits within the Ngā Pono (values) of Ōhanga (prosperity).

- **Ōhanga (prosperity):** Warmer ocean temperatures will have the potential to bring more species (such as tāmure/snapper, pākirikiri/blue cod and haku/*Seriola lalandi* or mātataharaki/*Rexea solandr*, types of kingfish) into the Quota Management Area (QMA)

(KPMG, 2020). This could provide more opportunities to the fisheries industry in southern areas of New Zealand.

21.4.2 Associated risks

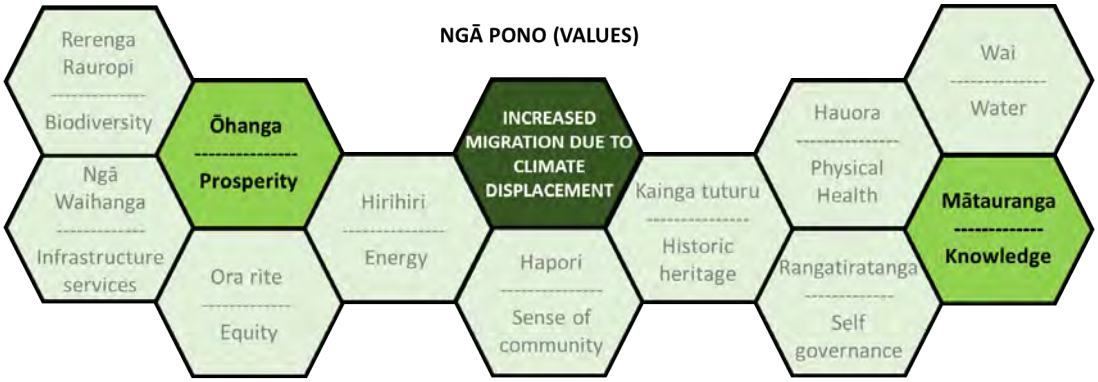
As discussed in Section 8, there are significant risks from warmer ocean temperatures and more acidic ocean conditions to native species and mahinga kai. These risks will be further exacerbated by an increase in exotic species, for example exotic species may out-compete native species. This opportunity cannot be considered in isolation.

New marine fish species may also lead to biosecurity challenges.

21.4.3 External factors

External factors which may influence this opportunity include global seafood demand, food security concerns, international and domestic marine governance, fuel prices and taxes on fish exports. There is also a potential transition opportunity to position the New Zealand (and Canterbury) fisheries industry to the global market as low-carbon and sustainable (KPMG, 2020). This may enhance the economic opportunities in the fisheries industry.

21.5 Increased migration from climate displacement



As the world experiences the effects of climate change. there will be persons displaced from their countries, lands and homes ("climate refugees"[13]). Some of these refugees will make their way to New Zealand.

Over the next 50 years, it is projected that in some scenarios, 1-3 billion people around the world will be left in temperatures which are outside of the climate conditions which humanity has experienced over the past 6000 years (Xu et al., 2020).

Increased migration can lead to two key opportunities: an increase in knowledge and skills, and the potential for enhanced prosperity. To realise these opportunities, migrants may require assistance to overcome linguistic barriers, validate/recognise past qualifications, access education, and overcome discrimination. The opportunities with increased migration due to climate displacement should be

[13] The 1951 Convention Relating to the Status of Refugees defined a refugee as "someone who is unable or unwilling to return to their country of origin owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion" (United Nations Refugee Agency, 2010). Due to climate change not being legally defined in the definition, the United Nations Refugee Agency (UNHCR) does not endorse the term "climate refugee" and instead uses the term "persons displaced in the context of disasters and climate change."

considered alongside other factors, such as hardships people may experience - including (United Nations Educational, Scientific and Cultural Organisation, 2020):

- Risks of landlessness, joblessness, homelessness, marginalization, food insecurity, increased morbidity and mortality and social disarticulation.
- Poorer access to or quality in education.
- Trauma.

21.5.1 Benefits of increased migration due to climate displacement

This opportunity leads to benefits within the Ngā Pono (values) of Mātauranga (knowledge) and Ōhanga (prosperity).

- **Mātauranga (knowledge):** Climate refugees may contribute diverse thoughts, experiences, knowledge and qualifications to all areas of Cantabrian society (in particular, in the area of climate change adaptation).
- **Ōhanga (prosperity):** Refugees can contribute to the economy and the wider prosperity of the region through meeting labour market gaps and enhancing productivity.

21.5.2 Associated risks

Associated climate risks include the increase in temperature and extreme weather events which may place pressures on food and housing (further discussed in Section 12.6.1 and 15.1). Risks to food security, housing, and social services may also be exacerbated by an increase in population.

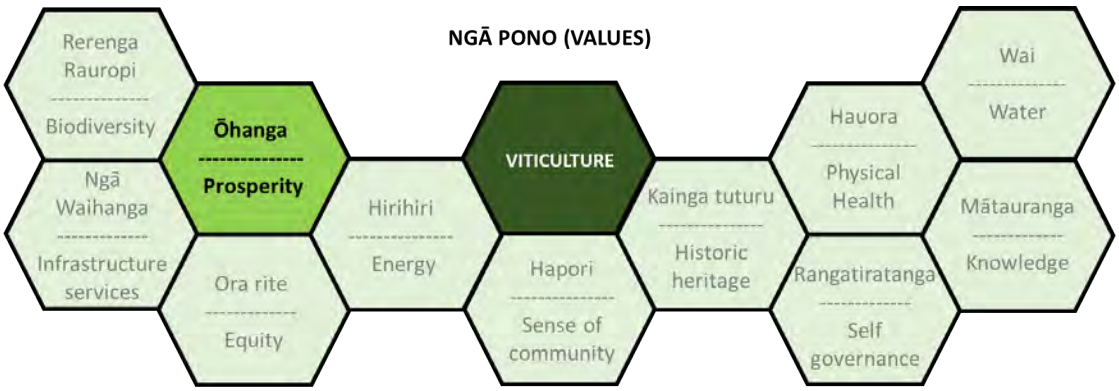
Furthermore, climate migrants may be housed in low socio-economic areas, which are often most exposed to climate hazards. This will directly impact the welfare and living conditions of persons displaced by the effects of climate change.

21.5.3 External factors

External factors will also impact this opportunity, such as immigration and refugee quotas and policies, housing supply, and resources to integrate and support these displaced people.

Furthermore, decreasing global fertility rates may induce global competition for migrants (Gallagher, 2020), ultimately reducing migration to New Zealand. This may offset the benefits of increased migration from climate displaced people.

21.6 Viticulture



Increased temperatures present an opportunity for winegrowers to grow different grape varieties within new locations, including new varieties that have not previously been successful under current climate conditions. This can lead to increased economic opportunities for the viticulture industry.

Typically, wine grapes grow in areas where temperatures average 12 - 22°C during growing season (McAllister, 2021).

As temperature increases, different wine grape varieties will become more favourable between present day, 2050 and 2100. Wine styles and grape ripening characteristics and profiles change with climate (Jones, 2017). To prepare for this opportunity, research could be undertaken into new locations with appropriate geological conditions for different wine grape varieties.

21.6.1 Benefits of viticulture

This opportunity leads to benefits within the Ngā Pono (values) of Ōhanga (prosperity).

- **Ōhanga (prosperity):** There are opportunities for winegrowers to grow grapes in different locations and to use different varieties to suit warmer temperatures (Dangerfield, 2020). A shift in wine styles may potentially expand the Canterbury wine industry.

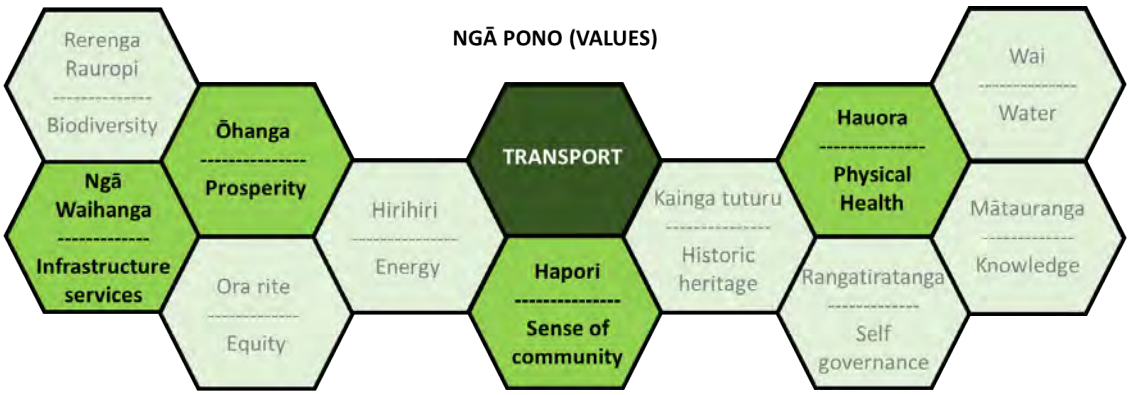
21.6.2 Associated risks

As discussed in Section 12.2, associated risks to viticulture (and the wider agriculture industry) include the increase in extreme events and seasonal variability (Dangerfield, 2020), pests and water availability.

21.6.3 External factors

Other factors which will impact the opportunity of growing a larger variety of grape species include horticulture policies, viticulture research, and consumer demand.

21.7 Reduced transport disruptions



Fewer instances of snowfall and icy conditions will likely result in reduced disruptions to the transportation network. Disruptions can subsequently impact surrounding communities, freight, and the broader economy. Reducing the instances of transportation disruptions presents an opportunity to reduce direct disruption costs to businesses and communities, operations and maintenance costs, as well as injuries and fatalities.

Across the Canterbury region, there are several major routes (such as Arthur's Pass and Lewis Pass (ECan, 2019)) which are regularly disrupted multiple times per annum due to snow and ice.

Under RCP 8.5, this opportunity will continue to grow from present day until 2100.

21.7.1 Benefits of reduced transport disruptions

This opportunity leads to benefits within the Ngā pono of Hauora (physical health), Hapori (sense of community), Ngā Waihanga (infrastructure services), and Ōhanga (prosperity).

- **Hauora (physical health):** Reduced snow and ice road conditions will likely contribute to the reduction of the number and severity of vehicle incidents, as well as the severity of physical and mental health impacts.

  Active modes users will also benefit from reduced snow and icy conditions due to less potential for falls and associated injuries. Currently, there is a decrease in active transport use in winter, with a 40% reduction in e-scooter trips in Ōtautahi/Christchurch between winter and summer months (Ensor et al., 2021). A decrease in snow and ice conditions may lead to fewer incidents and increased use of active transport modes (contributing to better health outcomes).
- **Hapori (sense of community):** Transport gives people the ability to connect and travel beyond their communities for work, services, recreation, community, family, and religious and cultural purposes (Rees et al., 2020). Reduced transport interruptions may foster better community connections, resulting in better mental health outcomes.
- **Ngā Waihanga (infrastructure services):** With warmer temperatures, road freeze-thaw cycles could reduce. This could limit the damage to paved surfaces, potentially leading to reduced transportation disruptions and winter maintenance costs (Andersson and Chapman, 2011).
- **Ōhanga (prosperity):** Road closures or difficult driving conditions on key road linkages (such as Lewis Pass and Arthur's Pass) can cause delays in freight movements as truck drivers have to drive to the conditions or take alternative routes. A reduction in snow and ice conditions on roads may provide safer driving conditions and better freight reliability.

21.7.2 Associated risks

As discussed in Section 10.2, there are a range of other risks to transportation which may result from an increase in average temperatures, flooding, and extreme weather events.

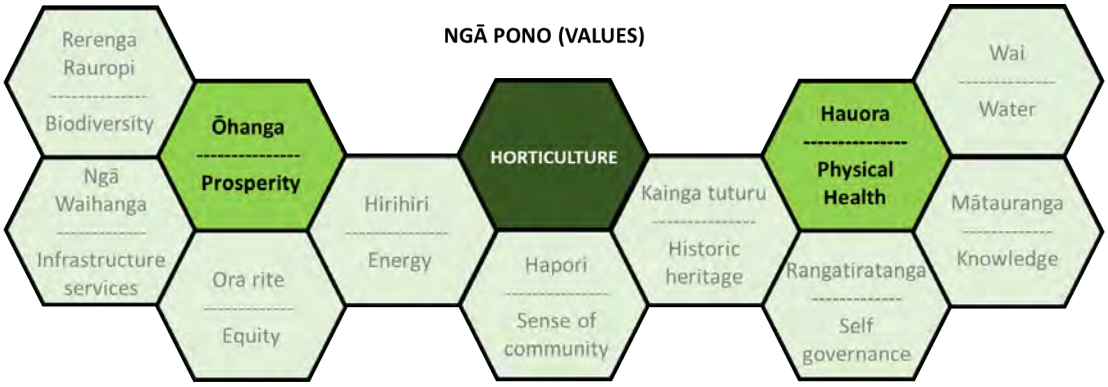
Active transport modes may also be used less due to heat-stress related illnesses. Bridges and pavements may need increased frequency of repairs due to expansion, bleeding and rutting (Dawson et al., 2016). There could also be a risk of increased air pollutants from exposure of asphalt to hot weather (Storer, 2020).

The increase in extreme weather events (such as extreme rainfall, which may lead to landslides and flooding) may also lead to further disruptions, balancing or negating the effect of reduced disruptions from reduced snow and ice.

21.7.3 External factors

External factors, such as uptake of alternate low-carbon modes, asset management, transport related policies, fuel and congestion taxes, and fees, may impact transport disruptions.

21.8 Increased horticulture productivity



An increase in average temperature, fewer frosts and a longer growing season all present opportunities for the horticulture sector to increase productivity and grow different varieties within new locations. This may include new varieties that until now have not been successful under current climate conditions.

Canterbury currently produces a wide range of vegetables, fruit, flowers, seeds and grains. Canterbury produces 47% of carrots and parsnips, 46% of potatoes and 16% of lettuce (Horticulture New Zealand, 2017) and the majority of New Zealand's grains and seeds (Millner and Roskruge, 2013).

Under RCP 8.5, this opportunity will continue to grow from present day until 2100. To prepare for and take advantage of this opportunity, investigations could be undertaken into potential new crops, ground suitability, and locations for growing.

21.8.1 Benefits of increased horticulture productivity

This opportunity leads to benefits within the Ngā Pono (values) of Ōhanga (prosperity) and Hauora (physical health).

- **Ōhanga (prosperity):** Increased horticultural productivity can lead to increased incomes, and broader economic benefits and prosperity. Reduced crop waste from fewer occurrences of frost, longer growing seasons, and the ability to grow new species which currently cannot be grown in Canterbury can also contribute to potential export and economic growth.
- **Hauora (physical health):** Increased horticultural productivity contributes to food security, ultimately impacting on physical health and well-being.

21.8.2 Associated risks

There are several major risks with climate change to horticulture productivity, as discussed in Section 13.2. These include increases in extreme weather events which may damage crops and increased occurrences of drought which could lead to water shortages and restrictions. The risk of pests and diseases may also impact on productivity levels (Ministry for Primary Industries, 2014).

High temperatures causing occupational hazard may also be a risk, reducing the number of people able to work in the horticulture industry. It may increase the number of heat-stress related illnesses and deaths in the industry.

21.8.3 External factors

There are several external factors which may influence horticulture sector productivity, including domestic and international policies regarding the primary industries, tariffs and trade agreements, food demand, and immigration policies. 28% of new entrants to the horticulture industry in 2013 were temporary migrants (Ministry for Primary Industries, 2019). There may be serious labour shortages experienced in the horticulture industry if immigration or international travel policies change (as shown by the impacts of COVID-19 border closures (Flaws, 2020)).

22 Knowledge Gaps and Future Research

Climate change presents a range of risks to the Region. However, uncertainty in the nature and severity of all aspects of climate risks is generally high. While assessment of these risks has been made using the best available information at the time, some gaps in knowledge can be clearly identified (Table 22.1). This is to be expected, and through identification of these knowledge gaps, it is possible to best set the context of the report, and associated potential next steps.

Some of the identified knowledge gaps may be filled through additional research into climate change and adaptation. This could build on the large body of established research. Extensive work is underway to gather data at local, national and international scales to further understand climate risks, and develop strategies to adapt to climate change. Research streams and data collection managed through Environment Canterbury, Universities and Crown Researchers, Sector representatives, and the National Science Challenges are of particular relevance to this regional climate risk assessment.

Table 22.1: Summary of identified knowledge gaps

Value	Research area	Comment
All	Risk assessment – screening of climate hazards	Risk screening of climate hazards and risk elements was used to inform this detailed risk assessment. As a result of this process some risk elements (e.g. historic buildings) have not been assessed. Further, for many of the elements that were assessed, the risks from a range of climate hazards that were not priorities in the screening process have not been assessed.
	Risk assessment – further detail	This risk assessment has discussed a wide range of risks at a regional scale. Many of these warrant further detailed assessment at local or sector scale.
All, particularly relevant to hapori (sense of community) and ora rite (equity)	Transition risks	Risks associated with the transition to a low-carbon economy, and those associated with an equitable transition to climate adapted communities are not included in this assessment but warrant further research.
Rerenga rauropi (biodiversity)	Ecosystem and specific element responses to climate change	Some types of natural environment are expected to exhibit threshold responses – particularly aquatic ecosystems where the level of adaptive capacity may buffer climate change effects. The level to which this effect may occur for different types of environments and the time periods until thresholds are reached (and rapid changes ensue) are unknown and require further research.
Wai (water)	Surface water	Canterbury has extremely complex interactions between snow fall, rainfall, land cover, groundwater and water use. Climate projections relating to the hydrology of the Region account for these interactions, however the results to date show unexpected results in some areas (Macara et al., 2020). Further research may be useful to understand climate projections relating to the hydrology of the Region with improved confidence.
	Groundwater	Sensitivity of groundwater to climate change is of significant relevance to water availability and ecosystems in the Region. Ongoing research is underway to reflect this importance. Further work to quantify the risk of salinisation of coastal groundwater aquifers would be beneficial, especially for those

Value	Research area	Comment
		coastal aquifers where abstraction forms a major part of potable water supply.
	Water availability	Continued research on water availability, including accounting for changes in groundwater, river flows, and changing demand from users during drier summer months.
	Extreme events and flooding	Canterbury has extremely high exposure to present day flooding. National assessment of high intensity rainfall indicates that the intensity and frequency of rare events will increase. The impact of these increases on flooding in the Region is not fully understood. Further research into the modelling of floodplains, accounting for the impact of climate change will improve the understanding of flood exposure.
	Flood protection	Detailed assessment of the capacity of flood protection assets has not formed part of this assessment. A regional scale assessment of flood protection that is provided to communities, as well as assessment of the condition of existing assets will support resilience to flooding.
Ngā waihanga (infrastructure services)	Asset vulnerability	A range of critical infrastructure sectors would benefit on further research into specific vulnerabilities.
Hirihiri (energy)	Vulnerability	The energy sector would benefit on further research into specific vulnerabilities relating to transmission and supply, across further sources than hydro.
Ōhanga (prosperity)	Financial implications and adaptations	Planning and budgeting for the growing financial burden of climate change is critical across all public and private sectors. It relies on an improved understanding of specific sectoral risks, as well wider business, insurance, and governance risks. This could be in the form of research to assist businesses and local government to consider climate risks to their services and operations, and incorporate agility, innovation, and adaptation as part of business plans and systems.
	Sector vulnerability	A range of critical infrastructure sectors would benefit on further research into specific vulnerabilities.
	Impacts and interacting risks	Studies of economic risks, impacts and interacting economic impacts, including modelling of global markets.
	Sustainable agriculture	Research into sustainable farming practices, mitigation of impacts and innovation for autonomous adaptation.
	Agriculture - biosecurity	Biosecurity/resistance to invasive pest species. Canterbury may benefit from further investment in understanding new biosecurity threats, and control or mitigation measures as the changing climate accommodates new pest species.
	Sustainable fisheries and opportunities	General research into fisheries, changing aquatic ecosystems and this relationship with commercial fishing practices.
Hauora (physical health), hapori (sense of	Physical health	Further research into understanding the impacts and implications of gradual climate hazards on mental and physical health, including research into increased prevalence of disease.

Value	Research area	Comment
community) & ora rite (equity)	Mental wellbeing, equity and community	Climate change is expected to have greater impacts on the health and wellbeing of vulnerable groups. Further research into these impacts and a method to classify and assess vulnerability to climate risk may improve outcomes for these groups.
Kāinga tūturu Historic heritage	Built heritage	Detailed climate change risk assessment.
Mātauranga Knowledge	Mātauranga Māori	Impacts and risks from climate change on mahinga kai and taonga.
Rangatiratanga Governance	Crown and mana whenua relationships	Crown and mana whenua (those with territorial rights to the land) relationships. Research into understanding the impact of climate change on the effectiveness of frameworks which outline relationship obligations and responsibilities between the Crown and mana whenua.
	Policy, guidance, and coordination	Policy, guidance, and tools to support local governance to adapt to climate change. Also, support is required to provide coordination between various governance groups, including other local government, sectors, and central government.
	Lifeline utilities	A range of critical infrastructure sectors would benefit on further research into specific vulnerabilities. Also requires support to coordinate with other services and across jurisdictional boundaries.

22.1 Interacting risks

Due to the interaction and interdependencies between ngā pono (values), individuals, communities, businesses, and industries, impacts can quickly compound and escalate across different values. Public authorities in the Canterbury Region could further explore interacting risks. Specific areas of future research to assess and address these risks include (Nichols et al., 2018):

- Undertaking additional thematic and sectoral risk assessments to strengthen understanding of these risk interactions and relationships.
- Introducing a holistic management approach to anticipate these risks. This could include a framework for monitoring and tracking risks to identify potential cascading impacts and other complex risk interactions.
- Undertaking adaptation actions, including enhancing preparedness of stakeholders to manage these risks. This could be achieved by undertaking adaptation planning and building partnerships with public and private organisations.

23 Next Steps

Understanding the risks and opportunities from climate change now and into the future is a vital step in the climate change journey. This report provides a technical basis for climate change, encapsulating a broad understanding of climate change risks within the Canterbury region currently, along with how these may shift over time, based on current understanding of climate science. Through engaging with Papatipu Rūnanga representatives and Stakeholder organisations through this process, it is hoped that individuals and organisations continues on the journey toward climate adaptation.

To support the progression toward adaptation, the next steps include consideration of risks highlighted within this report, and agreeing which should be prioritised for adaptation planning. This process is strongly dependent on the input of Local Government, Papatipu Rūnanga representatives and Stakeholder Organisations, each of which will be risk owners. For the Canterbury Mayoral Forum, this will include understanding the role of Local Government for each risk. These roles could include direct ownership, advocating for, and informing other risk owners.

Recently released Local Government Guidance provides potential next steps for the prioritisation of risks, highlighting the importance of Governance when making value judgements around consequences and urgency.

Urgency is defined as 'a measure of the degree to which further action [including adaptation] is needed in the next five years to reduce a risk or realise an opportunity from climate change' (Committee on Climate Change, 2017). Urgency provides a further prioritisation of risks based on the breakdown of the risk against key urgency criteria, shown in Table 23.1below.

Table 23.1: Urgency criteria

Urgency criteria	Explanation
Watching brief	No action foreseen over next five years. Likely a low risk over short to mid-term. Low level of interaction with other risks.
Sustain current action	Current actions considered sufficient over the next five years.
Research priority	More knowledge (research) is needed now to inform action in next 5-10 years. Likely a high risk, but not well understood.
More action needed	Action (either as acceleration of current action, or new action) is needed for adaptation in next five years. Likely a high risk, and well understood. Presents potential for lock-in.

Rating urgency is strongly dependent on the institutional knowledge within Local Government, Papatipu Rūnanga representatives and wider stakeholder organisations. A stocktake of current climate change action underway for the region could enable urgency ratings to be established, providing a natural next step for the adaptation journey.

Beyond the technical nature of each risk, including exposure and vulnerability, consideration of the consequences (or consequential impacts) may aid prioritisation.

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25 Te Reo Terminology

Haku	Kingfish, *Seriola lalandi.*
Hao	Shortfin eel. *See also tuna.*
Hapori	Sense of community, social cohesion, community facilities, interlayers of whakapapa, relationships across the generations. Strengthening inter-relationships between Te Ira-Atua, (spiritual realm) Ira Tangata (people) and Ira Whenua (natural world). The reciprocal obligations to safeguard and to protect the health of the environment and the health of people.
Hapū	Sub-tribes.
Hāpuku	Groper.
Harakeke	New Zealand flax.
Hauora	Wellbeing, including te taha hinengaro, te taha tinana, te taha wairua me te taha whanau.
He kura taiao	Living treasures.
Hirihiri	Energy.
Hoiho	Yellow-eyed penguin, *Megadyptes antipodes.*
Īnanga	A whitebait species, *Galaxias maculatus.*
Ira Tangata	People.
Ira Whenua	The natural world.
Iwi	Tribes.
Kai	Food.
Kai moana	Seafood.
Kāinga tūturu	Historic heritage, landscapes of importance to mana whenua, including urupā, historic buildings and heritage.
Kākahi	Freshwater mussel.
Kāmana	Southern crested grebe.
Kanakana	Lamprey. *See also piharau.*
Ka Tiritiri o te Moana	The Southern Alps.
Kāwanatanga	Governance.
Kēwai	Freshwater crayfish. *See also waikōura*.
Ki Uta ki Tai	From the mountains to the sea.
Kororā	White-flippered penguin, *Eudyptula minor albosignata.*
Kōwaro	Mudfish.
Kōura	Crayfish, *Paranephrops zealandicus.*
Kupu	Word.
Mahinga kai, mahika kai	Food gathering.
Mana	Authority and influence.
Mana whenua	Territorial rights, the right of an iwi to a particular area of land.

Manu	A bird or birds.
Marae	Communal gathering place for an iwi or hapū.
Mātataharaki	Kingfish, *Rexea solandr.*
Mātauranga	Knowledge, tāonga tuku iho (heritage), access to information, education.
Mātauranga Māori	Māori cultural knowledge, embedded in the whakapapa (genealogy) of Māori people and the interconnected relationship of all living things.
Mauri	Lifeforce/essence.
Mauriora	Divine spark.
Moki	Blue moki.
Nga papatipu rūnanga	Ngai Tahu's marae communities.
Nga pono	Values.
Ngā waihanga	Infrastructure services, how people have basic needs met. Includes networked infrastructure enabling physical and virtual connections (e.g. transport, telecommunications, technology, energy, shelter).
Ōhanga	Prosperity, including business, livelihoods, tourism, agriculture, fisheries.
Ora rite	Equity, including gender equality, social equity, equal opportunities for whanau to thrive and be potent.
Pā	Fortified village.
Pākirikiri	Blue cod.
Piharau	Lamprey. *See also kanakana.*
Pingao	Golden sand sedge.
Pounamu	Greenstone or jade.
Rakahuri	The Ashley River.
Rākau	Plants.
Rangatiratanga	Governance, kāwanatanga, whanau institutions, nga patatipu runanga, te tiriti partnerships, government/local government institutions, other agencies, political voice.
Rerenga rauropi	Biodiversity, including the natural environment, ecosystems, carrying capacity, taonga species, mahinga kai, kai (food).
Rūnanga	Tribal groupings.
Taha wairua	Spiritual health.
Taha tinana	Physical health.
Taha hinengaro	Mental/emotional health.
Taha whānau	Family health.
Tāmure	Snapper.
Taonga	Treasures.
Tapu	Sacred.
Te Ao Māori	The Māori world.
Te Ao Mārama	The safe place for humanity and the natural living world
Te Ira-Atua	Supernatural force, the spiritual realm.

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Te mana o te wai	The health and wellbeing of water.
Te Tiriti, Te Tiriti o Waitangi	The Treaty, The Treaty of Waitangi.
Te Whare Tapa Whā	A hauora (wellbeing) model developed in the early 1980s by Professor Mason Durie. It looks at wellbeing across the areas of taha wairua, taha tinana, taha hinengaro, and taha whanau, and remains a widely applied way to approach wellbeing in a holistic manner.
Tikanga Māori	Māori customs.
Tītī	Hutton's shearwater, *Puffinus huttoni*
Tōrea pango	Variable oyster catcher, *Haematopus unicolor*
Tororaro	Wiggy wig plant.
Tuna	Shortfin eel. *See also hao.*
Tūrangawaewae	Place of belonging through kinship and whakapapa.
Urupā	Burial ground.
Wāhi tapu	Sacred sites.
Wai	Water, including marine, freshwater, wetlands, as well as concepts of water quality, water quantity, wastewater, water conveyance, water storage, and water management.
Waikōura	Freshwater crayfish. *See also kēwai*.
Whakapapa	Genealogy.
Whānau	Family.
Whānau institutions	Family institutions, relationship networks.

26 Glossary

Adaptability	*See: Adaptive capacity.*
Adaptation	The process of adjustment to actual or expected climate and its effects (IPCC, 2021).
Adaptive capacity	The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences (IPCC, 2021).
Alpine environment	An environment in a high mountain area.
Annual Exceedance Probability (AEP)	The probability of an event happening in any given year. A 1% AEP means that there is a 1% chance that an event will occur in any given year, and that on average, one event of that size/type will happen every 100 years.
Anthropogenic	Resulting from or produced by human activities (IPCC, 2021).
Atmosphere	The gaseous envelope surrounding the earth (IPCC, 2021).
Benthic macrofauna	Organisms that live on, or in, or at the sediment-water interface, that are larger than 0.5 mm.
Biodiversity	The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (UN, 1992, referenced in IPCC, 2021).
Biosecurity	Safety from pests and diseases.
Biomass	Living or recently-dead organic material (IPCC, 2021).
Climate	Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the climate system (IPCC, 2021).
Climate change	a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use. Note that the Framework Convention on Climate Change (UNFCCC), in its Article 1, defines climate change as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'. The UNFCCC thus makes a distinction between climate change attributable to human activities altering the atmospheric composition and climate variability attributable to natural causes (IPCC, 2021).
Coastal flooding	Flooding along a coastline.

Consequence	The outcome of an event that may result from a hazard. It can be expressed quantitatively (eg, units of damage or loss, disruption period, monetary value of impacts or environmental effect), semi-quantitatively by category (eg, high, medium, low level of impact) or qualitatively (a description of the impacts) (adapted from Ministry of Civil Defence and Emergency Management [MCDEM], 2019). It is also defined as the outcome of an event affecting objectives (ISO/IEC 27000:2014 and ISO 31000: 2009) (Ministry for the Environment, 2019).
Diadromous	Fish that migrate between the sea and fresh water.
Disaster	Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery (IPCC, 2021).
Drought	A period of abnormally dry weather long enough to cause a serious hydrological imbalance. Drought is a relative term, so any discussion in terms of rainfall shortage must refer to the particular rainfall-related activity that is under discussion.
Ecosystem	An ecosystem is a functional unit consisting of living organisms, their non-living environment and the interactions within and between them (IPCC, 2021).
Equity	The principle of fairness in burden sharing and is a basis for understanding how the impacts and responses to climate change, including costs and benefits, are distributed in and by society in more or less equal ways. It is often aligned with ideas of equality, fairness and justice and applied with respect to equity in the responsibility for, and distribution of, climate impacts and policies across society, generations, and gender, and in the sense of who participates and controls the processes of decision making (IPCC, 2021).
Erosion	The geological process where earthen materials are worn away and transported by natural forces such as wind or water.
Eutrophication	The process by which a body of water, or parts of it, becomes progressively enriched with minerals and nutrients. It is characterised by excessive plant and algal growth.
Evapotranspiration	The sum of evaporation from the land surface plus transpiration from plants.
Evidence	Data and information used in the scientific process to establish findings (IPCC, 2021).
Exposure	The presence of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets in places and settings that could be adversely affected. (IPCC, 2021). Lack of protection against loss or harm in a hazard zone, affecting the number, density or value of people, property, services, or other things we value (taonga) (MCDEM, 2019).
Extreme weather event	An extreme weather event is an event that is rare at a particular place and time of year. Definitions of rare vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile of a probability density function estimated from observations. By definition, the characteristics of what is called

	extreme weather may vary from place to place in an absolute sense. When a pattern of extreme weather persists for some time, such as a season, it may be classed as an extreme climate event, especially if it yields an average or total that is itself extreme (e.g., drought or heavy rainfall over a season). (IPCC, 2021)
Fecundity	Fertility. The ability to produce an abundance of offspring or new growth.
Fire weather	A combination of conditions that set the stage for the rapid spread of wildfires.
Flood	The overflowing of the normal confines of a stream or other body of water, or the accumulation of water over areas that are not normally submerged (IPCC, 2021).
Food security	A situation where all people, at all times, have access to sufficient, safe, nutritious food that meets their dietary needs and food preferences (IPCC, 2021).
Fossil fuels	Carbon-based fuels from fossil hydrocarbon deposits, including coal, oil, and natural gas (IPCC, 2021).
Governance	A comprehensive and inclusive concept of the full range of means for deciding, managing, implementing and monitoring policies and measures. Whereas government is defined strictly in terms of the nation-state, the more inclusive concept of governance recognizes the contributions of various levels of government (global, international, regional, sub-national and local) and the contributing roles of the private sector, of nongovernmental actors, and of civil society to addressing the many types of issues facing the global community (IPCC, 2021).
Greenhouse gas	Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapour (H^2O), carbon dioxide (CO^2), nitrous oxide (N^2O), methane (CH^4) and ozone (O^3) are the primary greenhouse gases in the earth's atmosphere (IPCC, 2021).
Gross domestic product (GDP)	The sum of gross value added, at purchasers' prices, by all resident and non-resident producers in the economy, plus any taxes and minus any subsidies not included in the value of the products in a country or a geographic region for a given period, normally one year. GDP is calculated without deducting for depreciation of fabricated assets or depletion and degradation of natural resources (IPCC, 2021).
Groundwater	Water found underground in the cracks and spaces in soil, sand and rock.
Hazard	The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources (IPCC, 2021).
Heatwave	A period of abnormally hot weather. Heat waves and warm spells have various and in some cases overlapping definitions (IPCC, 2021).
HVAC	High voltage alternating current.
HVDC	High voltage direct current.

Hydrological	Related to the study of water on earth.
Impacts (consequences, outcomes)	The consequences of realized risks on natural and human systems, where risks result from the interactions of climate-related hazards (including extreme weather and climate events), exposure, and vulnerability. Impacts can be positive or negative (IPCC, 2021).
Inland flooding	Flooding that occurs inland.
ISO14091	A standard for adaptation to climate change.
Land use	Land use refers to the total of arrangements, activities and inputs undertaken in a certain land cover type (a set of human actions). The term land use is also used in the sense of the social and economic purposes for which land is managed (e.g., grazing, timber extraction, conservation and city dwelling) (IPCC, 2021).
Likelihood	The chance of a specific outcome occurring, where this might be estimated probabilistically (IPCC, 2021).
Lifeline Utilities	Lifeline utilities are entities that provide essential infrastructure services to the community such as water, wastewater, transport, energy and telecommunications (IPCC, 2021).
Lock in	A situation in which the future development of a system, including infrastructure, technologies, investments, institutions, and behavioural norms, is determined or constrained ("locked in") by historic developments (IPCC, 2021).
Low carbon economy	An economy based on low-carbon power sources, with minimal outputs of greenhouse gases.
Maladaptation, maladapted response	Maladaptation, or a maladapted response, is one in which the impacts of climate change lead to increased investment in emissions-intensive activities, increased vulnerability to climate change, or diminished welfare. It is usually an unintended consequence (IPCC, 2021).
Mitigation (of climate change)	A human intervention to reduce the sources or enhance the sinks of greenhouse gases (IPCC, 2021).
Montane environment	An environment in a hilly or mountainous area.
Moraine	Accumulations of dirt and rocks that have fallen onto the surface of a glacier.
Ocean acidification	Ocean acidification refers to a reduction in the pH of the ocean over an extended period, typically decades or longer, which is caused primarily by uptake of carbon dioxide (CO2) from the atmosphere, but can also be caused by other chemical additions or subtractions from the ocean. Anthropogenic ocean acidification refers to the component of pH reduction that is caused by human activity (IPCC, 2011, referenced in IPCC, 2021).
Poleward	Moving in the direction of either the South Pole or the North Pole.
Potential Evapotranspiration Deficit (PED)	A drought index to measure the difference between how much water could potentially be lost from an environment and how much is actually lost.
Projection	A projection is a potential future evolution of a quantity or set of quantities, often computed with the aid of a model. Unlike predictions, projections are conditional on assumptions concerning, for example, future socio-economic and technological developments that may or may not be realized (IPCC, 2021).

Resilience	The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and Transformation. Note this is closely related to the concept of adaptation (IPCC, 2021).
Risk	The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur (IPCC, 2021).
Risk assessment	The qualitative and/or quantitative scientific estimation of risks (IPCC, 2021).
Risk management	Plans, actions, strategies or policies to reduce the likelihood and/or consequences of risks or to respond to consequences (IPCC, 2021).
Risk - Extreme	An extreme risk, requiring immediate attention.
Risk – High	A high risk, requiring detailed research and planning.
Risk – Moderate	A moderate risk, requiring a change in approach.
Risk – Low	A low risk, requiring attention through routine processes.
Risk – Insignificant	An insignificant risk, to be monitored and reviewed in time.
Runoff	The flow of water over the surface or through the subsurface, which typically originates from the part of liquid precipitation and/or snow/ice melt that does not evaporate or refreeze, and is not transpired (IPCC, 2021).
Scenario	A plausible description of how the future may develop based on a coherent and internally consistent set of assumptions about key driving forces (e.g., rate of technological change (TC), prices) and relationships. Note that scenarios are neither predictions nor forecasts, but are used to provide a view of the implications of developments and actions (IPCC, 2021).
Sea surface temperature	The sea surface temperature is the subsurface bulk temperature in the top few meters of the ocean, measured by ships, buoys, and drifters (IPCC, 2021).
Sensitivity	The degree to which a system or species is affected, either adversely or beneficially, by climate variability or change (IPCC, 2021).
Socio-economic	How economic activity affects and is shaped by social processes.
Stress	A long-term issue with an important and often negative impact for New Zealand (NCCRA, 2020). Also the feeling of being overwhelmed or unable to cope with mental or emotional pressure. Both are relevant to this project.
Stressor (climate)	Persistent climatic event (eg, change in seasonal rainfall) or rate of change or trend in variables such as the mean, extremes or the range (eg, ongoing rise in mean ocean temperature or acidification), which occurs over a period of time (eg, years, decades or centuries), with important effects on the system exposed. This in turn increases vulnerability to climate change (Ministry for the Environment, 2019).
Surface water flooding	Flooding caused by a volume of rainfall that is unable to drain away through existing drainage systems or by soaking into the ground, but lies on or flows over the ground instead.

Sustainability	A dynamic process that guarantees the persistence of natural and human systems in an equitable manner (IPCC, 2021).
Three waters	Drinking water, wastewater and stormwater.
Transition	The process of changing from one state or condition to another in a given period of time. Transition can be in individuals, firms, cities, regions and nations, and can be based on incremental or transformative change (IPCC, 2021).
Uncertainty	A state of incomplete knowledge that can result from a lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from imprecision in the data to ambiguously defined concepts or terminology, incomplete understanding of critical processes, or uncertain projections of human behaviour. Uncertainty can therefore be represented by quantitative measures (e.g., a probability density function) or by qualitative statements (e.g., reflecting the judgment of a team of experts) (IPCC, 2021, see also IPCC, 2004; Mastrandrea et al., 2010; Moss and Schneider, 2000).
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC, 2021).
Wildfire	A bush or forest fire that is unplanned, unwanted, or uncontrolled.

Appendix A: Summary of 2019 Canterbury Climate Change Risk Screening Assessment

The Canterbury Climate Change Working Group, under the Canterbury Mayoral Forum (referred to as "the Working Group" throughout) carried out a Climate Change Risk Screening assessment for Canterbury. This aimed to understand the existing and future climate change risks and opportunities for the region. The project was undertaken at the end of 2019, allowing an opportunity for results of the assessment to feed into the National Climate Change Risk Assessment (NCCRA).

Completed through a process of elicitation, this project provided a broad overview and screening of the identified risks and opportunities presented by climate change. It was recommended that the screening should be followed by a risk assessment, which would go into more detail on the priority risks and opportunities identified through the initial screening process. Further detail on the priority risks, and the process undertaken to identify them, can be found in the Canterbury Climate Change Screening Report (2020).

The risk screening was undertaken using the NCCRA Framework. The risk screening process was done via stakeholder input, but involved limited participation from Te Rūnanga o Ngāi Tahu. Further input was identified as a priority for the subsequent risk assessment.

The screening included the five ngā pono, or value, domains: the built environment, natural environment, human, governance and economy domains. Risks were measured based on the climate hazards that affected the stakeholder audience, and the impact that the risk is likely to have on the region. A list of over 180 climate-related risks that could have the greatest effect across the Canterbury region was developed. Of these, over 80 (46%) were identified as priority risks, projected to have a big impact on the region.

These priority risks have been taken forward from the screening as the basis for a more detailed assessment. Some direct risks within each value domain are listed below.

A1.1 Built environment domain risks

Climate hazards most likely to present risk to the built environment include sea level rise, flooding, coastal erosion, fire, higher temperatures, drought, storms, landslides, and reduced snow and ice. These hazards are likely to affect all aspects of the built environment for both urban and rural communities. This includes flood management schemes and stopbanks, water supply infrastructure, irrigation and water races, wastewater treatment plants, roads and bridges, rail, marine facilities, airports, solid waste and contaminated sites, and coastal barriers and seawalls.

Table A.1: Risk screening summary for built environment

Risk Element	SLR	Flooding	Coastal Erosion	Fire	Higher air temp.	Drought	Storms & wind	Landslides	Mean annual rainfall	Reduced snow & ice
Settlements and urban communities	■	■	■							
Rural housing and communities		■		■						
Stopbanks and flood management schemes	■	■								
Water supply infrastructure	■	■				■	■			
Irrigation and water races						■			■	■
Wastewater treatment plant	■		■							
Roads and bridges	■	■	■							
Rail	■		■		■			■		
Marine facilities	■						■			
Airports		■								
Solid waste and contamination sites	■	■	■				■			
Coastal barriers and seawalls	■	■	■				■			

A1.2 Economy domain risks

Climate hazards that might affect the economy domain include flooding, fire, higher temperatures, drought, storms and wind, reduced snow and ice, marine heatwaves, and changes in ocean chemistry. These hazards will likely affect livestock, crops, forestry, fishing and aquaculture, and tourism.

Table A.2: Risk screening summary for economy

Risk element	Flooding	Fire	Higher air temp.	Drought	Storms & wind	Mean annual rainfall	Reduced snow & ice	Marine heatwaves	Ocean chemistry
Livestock			■	■					
Crops	■		■			■			
Exotic forestry		■	■		■				
Fishing and aquaculture					■			■	■
Tourism	■						■		

A1.3 Natural environment domain risks

Key climate hazards in the natural environment domain include sea level rise, flooding, coastal erosion, fire, higher air temperature, drought, storms and wind, annual rainfall changes, reduced snow and ice, marine heatwaves, and changes in ocean chemistry. These hazards are likely to affect native terrestrial, freshwater, and marine biodiversity; ground and surface water availability and quality; water quality in marine, estuaries, harbours, lakes, and rivers; natural coastal habitats (such as dunes, estuaries, and rocky shores); coastal wetlands; lowland and coastal environments; montane/hill country environments; alpine/high country environments; and terrestrial, freshwater, and marine pests and disease.

Table A.3: Risk screening summary for natural environment

Risk element	SLR	Flooding	Coastal Erosion	Fire	Higher air temp.	Drought	Storms & wind	Mean annual	Reduced snow &	Marine heatwaves	Ocean chemistry
Native terrestrial biodiversity				■		■			■	■	
Native freshwater biodiversity		■			■			■			
Native marine biodiversity										■	■
Surface water availability and quality		■						■	■		
Ground water availability and quality	■					■		■			
Water quality in marine, estuaries and harbours	■							■			■
Water quality and quantity in lakes and rives	■				■			■			
Natural coastal habitats (dunes, estuaries, rocky shores)	■										
Coastal wetlands	■	■	■								

A1.4 Human domain risks

We used a slightly different methodology to measure this domain because of the challenge of measuring the indirect effects that different climate hazards could have on people and communities. Some of the biggest risks that climate hazards could cause in the human domain include direct and indirect impacts on health, impacts on mental health and wellbeing, impacts on community cohesion and stability, a reduction in community capacity and resilience, impacts on Māori, and impacts on the capacity of government agencies.

Table A.4: Summary of extreme and major *direct* risks in the human domain

Element	Climate hazards	Direct risk description
Coastal communities	• River flooding • Sea level rise • Coastal erosion	Large coastal communities are within Canterbury. Sea level rise may make coastal communities uninhabitable.
Rural communities	• Temperature • Reduced land supply (due to managed retreat elsewhere)	Farming and rural communities highly impacted – high risk of financial failure for farmers.
Direct health impacts	• Heat stress • Impact on food Extreme weather • Floods	Vulnerable populations more at risk (younger and older people, homeless population, and households without air conditioning). Increase in food insecure population. Increased deaths in vulnerable populations, including younger and older people.
Indirect health impacts	• Increased temperature • Climate change	New diseases and illness.
Psychosocial impacts	• Drought and floods for rural communities • All climate hazards	At risk groups more vulnerable - these include farmers, those with a mental illness, and young people (b/c of climate anxiety). Need to support communities to plan for uncertainty (and be aware cultures may respond differently).
Ability to work outdoors	• Increased temperature • Extreme events	Reduced productivity; increased exposure to heat stress.
Marae, Urupā, Wāhi Tapu, Taonga	• Increased rainfall • Flooding • Sea level rise • All climate hazards	Impact of sea level rise on marae; coastal inundation of food beds; and impact on rock art.
Ability to practice Tikanga Māori	• Ocean impacts • All climate hazards	Increasing water temperature impacting on Mahinga kai and taonga species.
Infrastructure servicing sites of cultural importance	• Sea level rise • Flooding	Disruption to access to sites of cultural importance.
Community capacity and resilience	• Extreme weather events	Unequal distribution of, and access to, resources. Increased cost of living, and changing labour market.
Social fabric of community/Inequity	• Sea level rise • Extreme weather events	Less social capital due to relocation of households and communities, and increases in inequity.
Agency capability impacts	• Sea level rise • Extreme flooding • Migration (climate refugees)	Relocation of coastal communities. Resettlement challenges (multicultural integration).

A1.5 Governance domain risks

Climate change will present significant challenges and risks for governance, including impacts on emergency planning and response as well as recovery operations; the ability to fund and maintain infrastructure and public services; the functioning of planning rules and policies; insurance and banking systems; the functioning of social service agencies; legal liability; water governance; and reputation of institutions.

Table A.5: Summary of risks in governance domain

Element	Climate hazards	Risk description
Emergency planning and response, and recovery operations	• Flooding • Erosion • Storms • Fire • Heat waves	Base systems are currently in place for emergency planning and response, but systems for responding to heat waves and fires are at present inadequate. Also, climate hazards will negatively impact emergency recovery operations.
Ability to fund and maintain infrastructure and public services	• All climate hazards	Climate hazards will increase the demand on public funds, negatively impacting the ability to fund and maintain infrastructure and public services – this includes water supply and agriculture/irrigation. The increased need for adaptation funding will have significant impact on council budgets.
Functioning of planning rules and policies	• All climate hazards	Climate hazards will negatively impact on the functioning of planning rules and policies.
Insurance and banking system	• Sea level rise • Erosion • Flooding • Droughts • Increase in fire weather	Impact of climate hazards on insurance availability. Higher risk to banks, due to mortgage timeframes.
Functioning of social service agencies	• Disease • Heat waves • Droughts • Sea level rise	Increased burden on social service agencies.
Functioning of police	• Floods • Increase in fire weather • Extreme weather events	Increased resources required for emergencies, and the potential for exacerbating social unrest.
Jurisdictional issues	• Dependent on hazard	Lack of jurisdictional clarity of councils and public agencies.
Legal liability	• Especially coastal erosion, sea level rise and flooding	Risk of increased legal liability of councils and public agencies.
Community facilities	• Flooding, sea level rise, and coastal erosion	Impact of climate hazards on community facilities and events.

Appendix B: Subject Matter Experts for Stakeholder Engagement

B1.1 Workshop attendees

This list provides the majority of organisations that attended each workshop.

Built	Economy	Natural	Governance	Human
Ashburton District Council	Ashburton District Council	Ashburton District Council	Ashburton District Council	CCC climate change curriculum
Christchurch Airport	Christchurch City Council	Christchurch City Council	Christchurch City Council	Christchurch City Council
Christchurch City Council	Department of Conservation	Department of Conservation	Environment Canterbury Youth Ropu	COMMUNITY AND PUBLIC HEALTH
Department of Conservation	Environment Canterbury	Environment Canterbury	Mackenzie District Council	Department of Conservation
Environment Canterbury	Federated Farmers	Forest & Bird	Tutehuarewa Marae	Environment Canterbury
Mackenzie District Council	Foundation for Arable Research	Manaaki Whenua – Landcare Research New Zealand Limited	Waimakariri District Council	Heritage NZ
Orion	Horticulture NZ	Pioneer Energy		Mackenzie District Council
Timaru District Council	Mackenzie District Council	Selwyn District Council		Manaaki Whenua – Landcare Research New Zealand Limited
Tutehuarewa Marae	Plant & Food Research	Tutehuarewa Marae		New Zealand Society of Local Government Management
University of Canterbury	Rayonier Matariki Forests	University of Canterbury		Strike 4 Climate
Waimakariri District Council	Scion (New Zealand Forest Research Institute)	Waimakariri District Council		Tutehuarewa Marae
Waitaki District Council	Strike 4 Climate			Waimakariri District Council
	The AgriBusiness Group			
	Tutehuarewa Marae			
	Waimakariri District Council			
	University of Canterbury			

B1.2 Workshop invitees

AgResearch Limited
Apiculture NZ
Aquaculture NZ
Ashburton District Council
Ashburton District Council Biodiversity Advisory Group
Ashburton Economic Recovery/Advisory Group
Ashburton Museum
Association for Resource Management
Beef & Lamb
Biosecurity New Zealand
Business NZ Energy Council
Canterbury Chamber of Commerce (CECC)
Canterbury District Health Board (CDHB)
Canterbury Engineering Lifelines Group
Canterbury Mayoral Forum
Canterbury Women's Legal Association
Christchurch City Council
Christchurch NZ
Dairy NZ
Deer Industry NZ
Department of Conservation
Department of Internal Affairs
Environment Canterbury
ECan - CDEM Canterbury
Electricity Ashburton
Environment Canterbury Youth Ropu
EQC
Federated Farmers
Financial Markets Authority
Fire and Emergency New Zealand (FENZ)
Fish & Game - Central SI
Fish & Game - North Canterbury
Fisheries Inshore NZ
Forest & Bird - Ashburton
Forest & Bird - NC
Forest & Bird - SC
Generation Zero
Hinds Drains Working Party
Hurunui DC
Kainga Ora - homes and communities (HNZ)
KiwiRail
Lifeline Group
Lyttelton Port Company
Mackenzie District Council
Manaaki Whenua – Landcare Research New Zealand Limited
Meat Industry Association
Mental Health Foundation
Meridian
Ministry for Culture and Heritage
Ministry for the Environment
Ministry for Women
Ministry of Education
Ministry of Health
Ministry of Primary Industries
Ministry of Social Development (MSD)
Museums Aotearoa
National Emergency Management Agency (NEMA)
New Zealand Archaeological Association
New Zealand Planning Institute (NZPI)
New Zealand Winegrowers
Ngāi Tahu Capital
Ngāi Tahu Farming
Ngāi Tahu Holdings
Ngāi Tahu Property
Ngāi Tahu Seafood
NIWA
North Canterbury Winegrowers
NZ Forest Owners Association
NZ Insurance Council
NZ Law Society Canterbury-Westland branch
Pacific Youth Leadership and Transformation
Prime Port Timaru
Royal New Zealand College of General Practitioners
SCDHB
Selwyn District Council
Strike 4 Climate
Sustainable Business Network
Taumutu Rūnanga and Ngāi Tahu
Te Rūnanga o Ngāi Tahu
Timaru Airport
Timaru District Council
University of Canterbury
Victoria University of Wellington
Waimakariri District Council
Waitaha Primary Health – Georgie McLeod
Waitaki District Council
Waka Kotahi NZTA
Young Farmers

Appendix C: Risk Workbook

Integrated Framework	Category	Element at risk	Climate hazard	Risk statement	Exposure				Vulnerability				Risk				Commentary	NCCRA Dom ain
									Sensitivity			Adaptive capacity						
					Present	2050	2100 RCP 4.5	2100	Present	2050	2100		Present	2050	RCP4.5 2100	2100		
Rerenga Rauropi	Bios ecurity - safety from pests and diseases	Terrestrial, freshwater, and marine ecosystems from pests and diseases	higher mean temperatures	Risk to terrestrial, freshwater, and marine ecosystems from pests and diseases due to higher mean temperatures	Moderate	High	High	Extr eme	Moderate	High	Extr eme	Low	Moderate	Extr eme	Extr eme	Extr eme	Risks to biosecurity are likely to increase in response to projec ted rising temperatures. This may result in an increased range of invasive species, particularly where exotic spec ies have higher temperature tolerance relative to indigenous species. Native species are often specifically adapted to the environment and climate, and may be out-competed by versatile invasives.	Natural
Rerenga Rauropi	Bios ecurity - safety from pests and diseases	Terrestrial, freshwater, and marine ecosystems from pests and diseases	change in mean annual rainfall	Risk to terrestrial, freshwater, and marine ecosystems from pests and diseases due to change in mean annual rainfall	Moderate	Moderate	Moderate	High	Moderate	High	High	Low	Moderate	High	High	Extr eme	Risks to biosecurity are likely increase in response to projec ted changes in rainfall. Increasing peak flows in rivers may disturb habitats resulting in opportunities for ex otic species to establish. Reduced rainfall or drought may further contribute to habitat loss and provide conditions for drought tolerant exotic species. Native species are often specifically adapted to the environmen and climate, and may be out-competed by versatile invasives.	Natural
Rerenga Rauropi	Bios ecurity - safety from pests and diseases	Terrestrial, freshwater, and marine ecosystems from pests and diseases	reduced snow & ice	Risk to terrestrial, freshwater, and marine ecosystems from pests and diseases due to reduced snow & ic e	Moderate	High	High	Extr eme	Moderate	High	High	Medium	Low	High	High	Extr eme	Risks to biosecurity are likely to increase in response to projec ted decreasing snow and ice. Reducing occurrence of frosts mean that frost sensitive invasive species may have an increased survival rate.	Natural
Rerenga Rauropi	He Kura T aiao – Living treasures	Native freshwater biodiversity - flora & fauna	higher mean temperatures	Risk to native freshwater biodiversity - flora & fauna due to higher mean temperatures	Low	Moderate	High	High	Moderate	High	Extr eme	Medium	Insignificant	Moderate	Extr eme	Extr eme	Projec ted increases in temperatures are likely to raise the temperature of waterbodies, particularly shallower lakes and rivers and streams that are not fed by snowmelt. Many native species are sensitive to temperature increases and are adapted to a narrow range of water temperatures, while others are highly adaptive. Warmer temperatures can further alter water quality by contributing to algal blooms.	Natural
Rerenga Rauropi	He Kura T aiao – Living treasures	Native freshwater biodiversity - flora & fauna	River and surface flooding	Risk to native freshwater biodiversity - flora & fauna due to river and surface flooding	Moderate	Moderate	Moderate	High	Moderate	Moderate	High	Medium	Low	Low	Moderate	High	Projec ted increases in high flows and extrem e events may cause increasing disruption to river systems. High f lows may cause erosion, sedimentation and damage from storm debris which can degrade habitats.	Natural
Rerenga Rauropi	He Kura T aiao – Living treasures	Native freshwater biodiversity - flora & fauna	change in mean annual rainfall	Risk to native freshwater biodiversity - flora & fauna due to change in mean annual rainfall	Low	Moderate	Moderate	High	Moderate	Moderate	High	Medium	Insignificant	Low	Moderate	High	Projec ted increases in seasonal extre mes are likely to stress freshwater ecosystems. Increased frequency of low flows can cause stress due to includes reduced flushing flows and can lead to the formation of stagnant pools and shallower waters which are more prone to temperature increases, which are harmful to aquatic ecosystems. The effect of reduced summertime rainfall in some river systems will be buffered by snowmelt.	Natural
Rerenga Rauropi	He Kura T aiao – Living treasures	Native marine biodiversity - flora & fauna	marine heatwaves	Risk to native marine biodiversity - flora & fauna due to marine heatwaves	Moderate	Moderate	High	High	Moderate	Moderate	High	Medium	Low	Low	High	High	Sea temperatures and marine heatwaves are projecte d to increase with climate change as sub-tropical currents penetrate further south. Marine species are sensitive to temperature changes which can cause physiological and behaviour changes, such as reduced phytoplankton abundance and alterations to species migration routes in fish, immobile species are likely to be particularly sensitive. Mobile spe cies may adapt through migration to new habitats which may also see new species entering Canterbury's c ooler waters.	Natural
Rerenga Rauropi	He Kura T aiao – Living treasures	Native marine biodiversity - flora & fauna	ocean chemistry changes	Risk to native marine biodiversity - flora & fauna due to ocean chemistry changes	Moderate	Moderate	Moderate	High	Moderate	Moderate	High	Medium	Low	Low	Moderate	High	Ocean acidif ication is occurring as oceans absorb exc ess CO_2 from the atmosphere. These changes to ocean chemistry are proje cted to increase as atmospheric greenhouse gas concentrations rise. Oce an acidification may result in reduced availability of calcium carbonate, which impacts on the life cycle of calcifying organisms such as molluscs and echinoderms. Wider ecosystem disruption may result in increased mortality and population decline.	Natural
Rerenga Rauropi	He Kura T aiao – Living treasures	Coastal wetlands	River and surface flooding	Risk to coastal wetlands due to river and surface flooding	Moderate	High	Extr eme	Extr eme	Moderate	High	High	Low	Moderate	Extr eme	Extr eme	Extr eme	Projected incre ases in rainfall intensity is likely to increase the occurrence of flooding. This may cause sediment deposition within wetlands from upstream which can make wetlands shallower, smother habitats and carry additional nutrients or contaminants. Many wetland species are specifically adapted and may suffer from habitat degradation and loss.	Natural
Rerenga Rauropi	He Kura T aiao – Living treasures	Coastal wetlands	increasing coastal erosion	Risk to coastal wetlands due to increasing coastal erosion	Moderate	High	Extr eme	Extr eme	Moderate	Moderate	High	Low	Moderate	High	Extr eme	Extr eme	Low-lying coastal wetlands are at risk from coastal erosion which may degrade habitats and cause sediment deposition.	Natural
Rerenga Rauropi	He Kura T aiao – Living treasures	Coastal wetlands	sea-level rise and salinity stresses	Risk to coastal wetlands due to sea-level rise and salinity stresses	Moderate	High	High	Extr eme	Moderate	High	High	Medium	Low	High	High	Extr eme	Sea level rise and coastal inundation are projected to increas e, which will lead to increasing salinity stress to coastal wetlands. Species composition and biodiversity (spec ies richness) is e xpected to change as a result of periodic or permanent salination of coastal wetlands. Mobile species (s ome plants and birds) c an relocate however, many species of invertebrates, some species of plants, and fish species are specifically adapted to coastal wetland conditions and cannot tolerate large changes in salinity.	Natural
Rerenga Rauropi	Land use	Alpine / high country environments	reduced snow & ice	Risk to alpine / high country environments due to reduced snow & ic e	Low	High	High	Extr eme	Moderate	Moderate	High	Low	Low	High	Extr eme	Extr eme	Alpine and high country environments are projec ted to be expos ed to reduced snow and ice as temperatures warm. Alpine ecosystems are likely to be adversely affected as alpine adapted flora and fauna change elevation tolerance, suffer from a reduction and loss of habitats and face increased competition from low-land species. Alpine adapted species often have a low capacity to adapt due to a limited range, geographic isolation and slow reproductive rates and dispersal mechanisms.	Natural

Integrated Framework	Category	Element at risk	Climate hazard	Risk statement	Exposure				Vulnerability				Risk				Commentary	NCCRA Dom ain
									Sensitivity			Adaptive capacity						
					Present	2050	2100 RCP 4.5	2100	Present	2050	2100		Present	2050	RCP4.5 2100	2100		
Rerenga Rauropi	Land use	Alpine / high country environments	higher mean temperatures	Risk to alpine / high country environments due to higher mean temperatures	Low	Moderate	High	High	Moderate	Moderate	Moderate	Low	Low	Moderate	High	High	Projec ted increases in mean temperature are likely to change the elevation tolerance of alpine species, cause reduction and loss of habitat, and cause increased competition from low-land species. M any alpine adapted species have a low capacity to adapt due to a limited range, geographic isolation and slow reproductive rates and dispersal mechanisms.	Natural
Rerenga Rauropi	Land use	Alpine / high country environments	change in mean annual rainfall	Risk to alpine / high country environments due to change in mean annual rainfall	Low	Moderate	Moderate	High	Moderate	Moderate	High	Medium	Insignificant	Low	Moderate	High	Proje cted changes in rainfall patterns may cause increased dry periods and drought. This may lead to reduced water availability causing plant stress, leading to reduction or loss of alpine habitat and increased competition from species adapted to the lower altitudinal zone s (e .g. montane), and pos sible changes of alpine ecosystems to montane ecosystems. Ma ny alpine adapted species have a low capacity to adapt due to a limited range, geographic isolation and slow reproductive rates and dispersal mechanisms.	Natural
Rerenga Rauropi	Land use	Lowland and coastal environments	increased fire-weather	Risk to lowland and coastal environments due to increased fire-weather	Moderate	High	High	High	Moderate	Moderate	High	Low	Moderate	High	Extr eme	Extr eme	Proje cted increases in wind, temperatures, and number of dry and hot days may increase the likelihood of wildfire. Lowland environments are sensitive to event type disturbances such as wildfire which may cause high rates of mortality and habitat destruction from which local ecosystems may not easily recover.	Natural
Rerenga Rauropi	Land use	Lowland and coastal environments	sea-level rise and salinity stresses	Risk to lowland and coastal environments due to sea-level rise and salinity stresses	Moderate	High	High	Extr eme	Moderate	Moderate	High	Medium	Low	Moderate	High	Extr eme	Projecte d sea level rise is likely to cause inundation, erosion and salinity stress. Sea level rise and erosion may compress or degrade coastal habitats, eventually leading to habitat or species loss. Coastal environments can adapt to sea level rise by shifting inland, however this is often limited by geographical constraints or existing land use.	Natural
Rerenga Rauropi	Land use	Lowland and coastal environments	Coastal flooding	Risk to lowland and coastal environments due to coastal flooding	Moderate	Moderate	High	High	Moderate	Moderate	High	Medium	Low	Low	High	High	Projecte d sea level rise is likely to contribute to increased coastal flooding which may cause erosion, salinization and deg rade coastal habitats.	Natural
Rerenga Rauropi	Land use	Montane/hill country environments	increased fire-weather	Risk to montane/hill country environments due to increased fire-weather	Moderate	High	High	Extr eme	High	High	High	Low	High	Extr eme	Extr eme	Extr eme	Proje cted increases in wind, temperatures, and number of dry and hot days may increase the likelihood of wildfire in montane/hill country environments. Montane ecosystems within hill country environments are highly prone to species and habitat loss during fires. Wildfires can cause widespread mortality from which there can be long recovery times.	Natural
Rerenga Rauropi	Land use	Montane/hill country environments	storms and wind	Risk to montane/hill country environments due to storms and wind	Moderate	High	High	Extr eme	High	High	High	Low	High	Extr eme	Extr eme	Extr eme	Proje cted increases in storms and wind may damage montane/hill country environments. The erodible soils within these environments are particularly sensitive when bare. De pletion of native vegetation associated with grazing, pests and other hazards contributes furthe r to erosion. These factors are likely to cause degradation of montane/hill country ecosystems.	Natural
Rerenga Rauropi	Land use	Montane/hill country environments	Drought	Risk to montane/hill country environments due to drought	Moderate	Moderate	High	High	Moderate	Moderate	High	Medium	Low	Low	High	High	The occurrence of drought in montane/hill country environments is projec ted to increase over time. Ecosystems within these environments are currently relatively tolerant of hot dry conditions, however drought may cause water shortages stressing ecosystems, and contributing to species mortality. The slow recovery of ecosystems may lead to increasing establishment of exotic s pecies.	Natural
Rerenga Rauropi	Land use	Montane/hill country environments	higher mean temperatures	Risk to montane/hill country environments due to higher mean temperatures	Low	Moderate	High	High	Moderate	Moderate	High	Medium	Insignificant	Low	High	High	Temperatures are proj ected to increase in montane/hill country environments over time. Ecosystems within these environments are currently relatively tolerant of hot dry conditions, however the adaptive capacity of species may reduce once temperature tolerance thresholds are reached.	Natural
Wai	Flood defences	Coastal barriers and sea walls	increasing coastal erosion	Risk to coastal barriers and sea walls due to increasing coastal erosion	High	Extr eme	Extr eme	Extr eme	Low	Moderate	Moderate	Medium	Low	High	High	High	Projecte d increases in sea-level rise, storms and wind and coastal flooding will increase expos ure of sea walls and barriers as these are located along the coastal edge. These structures are designed to protect against coastal hazards , however damage may occur if the design capacity is exce eded, or due to sustained and increasing exposure. Hig h costs and limited land availability limit the capacity to adapt.	Built
Wai	Flood defences	Coastal barriers and sea walls	Coastal flooding	Risk to coastal barriers and sea walls due to coastal flooding	High	Extr eme	Extr eme	Extr eme	Low	Moderate	Moderate	Medium	Low	High	High	High	Projecte d increases in sea-level rise, storms and wind and coastal flooding will increase expos ure of sea walls and barriers as these are located along the coastal edge. These structures are designed to protect against coastal hazards , however damage may occur if the design capacity is exce eded, or due to sustained and increasing exposure. Hig h costs and limited land availability limit the capacity to adapt.	Built
Wai	Flood defences	Coastal barriers and sea walls	storms and wind	Risk to coastal barriers and sea walls due to storms and wind	High	Extr eme	Extr eme	Extr eme	Low	Moderate	Moderate	Medium	Low	High	High	High	Projecte d increases in sea level rise, storms and wind and coastal flooding will increase expos ure of sea walls and barriers as these are located along the coastal edge. These structures are designed to protect against coastal hazards , however damage may occur if the design capacity is exce eded, or due to sustained and increasing exposure. Hig h costs and limited land availability limit the capacity to adapt.	Built

Integrated Framework	Category	Element at risk	Climate hazard	Risk statement	Exposure				Vulnerability				Risk				Commentary	NCCRA Dom ain
									Sensitivity			Adaptive capacity						
					Present	2050	2100 RCP 4.5	2100	Present	2050	2100		Present	2050	RCP4.5 2100	2100		
Wai	Flood defences	Coastal barriers and sea walls	sea-level rise and salinity stresses	Risk to coastal barriers and sea walls due to sea-level rise and salinity stresses	High	Extr eme	Extr eme	Extr eme	Low	Moderate	Moderate	Medium	Low	High	High	High	Projecte d increases in sea level rise, storms and wind and coastal flooding will increase expos ure of sea walls and barriers as these are located along the coastal edge. These structures are designed to protect against coastal hazards , however damage may occur if the design capacity is exce eded, or due to sustained and increasing exposure. Hig h costs and limited land availability limit the capacity to adapt.	Built
Wai	Flood defences	Stopbanks and flood management schemes	River and surface flooding	Risk to stopbanks and flood management schemes due to river and surface flooding	High	High	Extr eme	Extr eme	Moderate	High	High	Medium	Moderate	High	Extr eme	Extr eme	Projec ted increases in the size and fr equency of flood events may effectively lower the level of service currently provided by stop banks and increase the occurrence of overtopping or flood damage. Although the structures are designed to convey floods, exce eding the design capacity or frequent expos ure to high flows may cause damage or failure. is exce eded, or increasing damage may occur with high flows. Options to adapt or upgrade may be limited by high construction costs and limited land availability.	Built
Wai	Flood defences	Stopbanks and flood management schemes	sea-level rise and salinity stresses	Risk to stopbanks and flood management schemes due to sea-level rise and salinity stresses	Moderate	High	High	High	Moderate	Moderate	Moderate	Medium	Low	Moderate	Moderate	Moderate	Projected incre ases in sea-level rise will increase the expos ure of stopbanks located near the coastal edge to related flooding and erosion damage. A relatively small portion of schemes may be exposed to coas tal hazards relativ e to fluvial flooding, with sensitivity, to damage influenced by the condition and age of the structure. Options to adapt or upgrade may be limited by high construction costs and limited land availability.	Built
Wai	Freshwater	Groundwate r - availability and quality	sea-level rise and salinity stresses	Risk to groundwater - availability and quality due to sea-level rise and salinity stresses	Moderate	High	High	High	High	High	Extr eme	Low	High	Extr eme	Extr eme	Extr eme	Projecte d sea level rise may cause salinization of coas tal aquifers which may be compounded where abstraction occurs near the coastal edge. The adaptive capacity of aquifers is considered low as most have reached the upper limit of the allowable allocation.	Natural
Wai	Freshwater	Groundwate r - availability and quality	change in mean annual rainfall	Risk to groundwater - availability and quality due to change in mean annual rainfall	Moderate	High	High	Extr eme	High	High	High	Low	High	Extr eme	Extr eme	Extr eme	Changes in rainfall patterns are projected, wi th wetter winters and drier summers. Wette r winters may cause higher groundwater tables in winter, with dry summers and increasing evapotranspiration contributing to lower water tables in summer.	Natural
Wai	Freshwater	Groundwate r - availability and quality	Drought	Risk to groundwater - availability and quality due to drought	Moderate	High	Extr eme	Extr eme	High	High	High	Low	High	Extr eme	Extr eme	Extr eme	The occurrence of drought is projec ted to increase with climate change. This will lower water and reduce rates of recharge. Increased water demand is likely to coincide with ex tended dry periods and drought, placing further pressure or aquifers.	Natural
Wai	Freshwater	Water quality (lakes and rivers)	River and surface flooding	Risk to water quality (lakes and rivers) due to river and surface flooding	Moderate	Moderate	High	High	Moderate	Moderate	High	Medium	Low	Low	High	High	The frequency and intensity of storms are proje cted to increase over time which may cause increased flooding. Erosion and scour resulting from flooding may result in increased sediment in waterways, reducing water quality and disturbing habitats. Runoff entering rivers may also introduced increased nutrient and other contaminants. M odified rivers with constrained floodplains may be particularly sensitiveto degradation from flooding, and have limited	Natural
Wai	Freshwater	Water quality (lakes and rivers)	change in mean annual rainfall	Risk to water quality (lakes and rivers) due to change in mean annual rainfall	Low	Moderate	Moderate	High	Moderate	Moderate	High	Medium	Insignificant	Low	Moderate	High	Proj ected changes in rainfall are likely to result in increased frequency of low flows in most rivers. Increased frequency of low flows may reduce flushing flows and compound the effects of warmer temperatures, promoting the growth of algae and macrophytes.	Natural
Wai	Freshwater	Water quality (lakes and rivers)	reduced snow & ice	Risk to water quality (lakes and rivers) due to reduced snow & ic e	Low	Moderate	Moderate	High	Moderate	Moderate	High	Medium	Insignificant	Low	Moderate	High	Proje cted changes to snow and ice are likely to contribute to the increasing occurance of low flows. Increased frequency of low flows may reduce flushing flows and compound the effects of warmer temperatures, promoting the growth of algae and macrophytes.	Natural
Wai	Freshwater	Water quality (lakes and rivers)	higher mean temperatures	Risk to water quality (lakes and rivers) due to higher mean temperatures	Moderate	High	Extr eme	Extr eme	Moderate	High	Extr eme	Medium	Low	High	Extr eme	Extr eme	Projecte d increases in temperature are likely to be detrimental to water qual in lakes and rivers. Warmer temperatures can be harmful to native frehwater biodiversity and promote the growth of algae and macrophytes. Smaller, shallow waterbodies, and those that are not snowmelt fed are likely to be most sensitive to warming temperatures.	Natural
Wai	Freshwater	Water quality (lakes and rivers)	increasing landslides and soil erosion	Risk to water quality (lakes and rivers) due to increasing landslides and soil erosion	Moderate	High	High	High	Moderate	Moderate	Moderate	Low	Moderate	High	High	High	Increased erosion and sediment from landslides may result in increased sediment in waterways, reducing water quality and disturbing habitats.	Natural
Wai	Freshwater	Water quality (lakes and rivers)	sea-level rise and salinity stresses	Risk to water quality (lakes and rivers) due to sea-level rise and salinity stresses	Low	Moderate	High	High	Moderate	Moderate	High	Medium	Insignificant	Low	High	High	Projecte d sea level rise may cause salinization and flooding or coastal rive rs and lakes with increasing frequency. Saltwater intrusions have a profound impact on the water quality of lakes and rivers changing the types of ecological communities they can support.	Natural
Wai	Stormwater	Stormwater assets	River and surface flooding	Risk to stormwater assets due to river and surface flooding	Moderate	High	High	High	Moderate	Moderate	Moderate	Low	Moderate	High	High	High	The frequency and intensity of storms are proje cted to increase over time, which may cause increased flooding. Ov erloading of stormwater systems are likely to cause flooding of surrounding communiites, damage to components of the stormwater network, and have consequences for the water quality of recieving waterbodies. Older s ystems are likely to be particularly sensitive as these are often in poorer condition with smaller capacities.	Built

Integrated Framework	Category	Element at risk	Climate hazard	Risk statement	Exposure				Vulnerability				Risk				Commentary	NCCRA Dom ain
									Sensitivity			Adaptive capacity						
					Present	2050	2100 RCP 4.5	2100	Present	2050	2100		Present	2050	RCP4.5 2100	2100		
Wai	Wastewater	Wastewater treatment plants	sea-level rise and salinity stresses	Risk to wastewater treatment plants due to sea-level rise and salinity stresses	Moderate	High	High	High	Moderate	Moderate	Moderate	Low	Moderate	High	High	High	Projec ted sea level rise may cause erosion damage, and increased occurance of inundation resulting in overflows. Rising groundwater may introduce flotation of buried components, and increased infiltration to wastewater pipelines, causing increased loading on pumping stations. Salinizati on of wastewater may cause corrosivity and have implications for wastewater treatment plant operations.	Built
Wai	Wastewater	Wastewater treatment plants	increasing coastal erosion	Risk to wastewater treatment plants due to increasing coastal erosion	Moderate	High	High	High	Moderate	Moderate	Moderate	Low	Moderate	High	High	High	Projec ted sea level rise may cause erosion damage to components of the wastewater system that are located near the coastal edge. Wastewater assets can be expens ive to upgrade, and options to relocate are limited as these systems perform best when located at the downstream point of the network.	Built
Wai	Water	Surface water availability and supply	Drought	Risk to surface water availability and supply due to drought	Moderate	High	Extr eme	Extr eme	Extr eme	Extr eme	Extr eme	Medium	High	Extr eme	Extr eme	Extr eme	Projecte d increases in drought are likely to impact water availability and supply. Water supply is highly sensitive to drought due to exte nsive water abstraction. Reduced availability due to drought is likely to coincide with increasing demand. Strategies are currently in place to monitor and manage water sources to adapt to climate change. Further, measures to reduce demand may be adopted.	Built
Wai	Water	Surface water availability and supply	change in mean annual rainfall	Risk to surface water availability and supply due to change in mean annual rainfall	Moderate	High	High	High	High	High	High	Medium	Moderate	High	High	High	Projected change s in rainfall are likely to impact water availability and supply, with reductions in surface water availability in some parts of the region. Reduced availability due to low rainfall and river flows is likely to coincide with increased demand. Strategies are currently in place to monitor and manage water sources to adapt to climate change. Further, measures to reduce demand may be adopted.	Built
Wai	Water	Surface water availability and supply	reduced snow & ice	Risk to surface water availability and supply due to reduced snow & ic e	Low	Moderate	Moderate	High	High	High	High	Medium	Low	Moderate	Moderate	High	Proje ctions of reduced snow and ice are a component of complex hydrolo gical changes that may contribute to reduced water availability. Reduced snow and ice may result in lower summer flows in the headwaters of many major Canterbury rivers.	Built
Wai	Water	Water supply infrastructure	River and surface flooding	Risk to water supply infrastructure due to river and surface flooding	Moderate	High	High	Extr eme	Moderate	Moderate	Moderate	Medium	Low	Moderate	Moderate	High	The frequency and intensity of storms are proje cted to increase over time, which may cause increased flooding. Hig h flows, sediment and debris may cause damage and disruption to water supply facilities, particularly above ground infrastructure such as intakes. Poor c ondition or ageing components may be upgraded to improve resilience. Howe ver, the potential to adapt water supply infrastructure may be limited by the need to draw water from expose d locations, and service existing com munities.	Built
Wai	Water	Water supply infrastructure	storms and wind	Risk to water supply infrastructure due to storms and wind	Moderate	High	High	Extr eme	Moderate	Moderate	Moderate	Medium	Low	Moderate	Moderate	High	The frequency and intensity of storms are proje cted to increase over time. Hig flows, sediment and debris may cause damage and disruption to water supply facilities, particularly above ground infrastructure such as intakes. Poor condition or ageing components may be upgraded to improve resilience. Howe ver, the potential to adapt water supply infrastructure may be limited by the need to draw water from expos ed locations, and service ex isting communities.	Built
Hirihiri	Energy	Energy generation	Drought	Risk to energy generation due to drought	Low	Moderate	High	High	High	High	High	Medium	Low	Moderate	High	High	The potential for drought is projec ted to increase over time, which may impact water availability. Hydropower gene ration is the dominant source of energy generation in region, and is highly dependent on water availability. The adaptive capacity of hydropower generation is low for exis ting schemes, however there is potential for increased establishment and uptake of diverse energy sources regionally and nationally.	Built
Hirihiri	Energy	Energy transmission	Extr eme weather events	Risk to energy transmission due to extre me weather events	Low	Moderate	Extreme	Extr eme	High	High	High	Medium	Low	Moderate	Extr eme	Extr eme	Extrem e weather events are proje cted to increase, with increasing expos ure of transmission lines to wind, rainfall and flooding. Overhe ad transmission lines are particularly sensitive to damage from wind and flooding. Meas ures to reduce expos ure of transmission lines include burying lines, however this can be prohibitively expens ive for existing inf rastructure.	Built
Hirihiri	Energy	Energy transmission	River and surface flooding	Risk to energy transmission due to river and surface flooding	Low	Moderate	Extreme	Extr eme	High	High	High	Medium	Low	Moderate	Extr eme	Extr eme	Extrem e weather events are proje cted to increase, with increasing expos ure of transmission lines to wind, rainfall and flooding. Overhe ad transmission lines are particularly sensitive to damage from wind and flooding. Meas ures to reduce expos ure of transmission lines include burying lines, however this can be prohibitively expens ive for existing inf rastructure.	Built
Hirihiri	Energy	Energy transmission	Coastal flooding	Risk to energy transmission due to coastal flooding	Low	Moderate	Extreme	Extr eme	High	High	High	Medium	Low	Moderate	Extr eme	Extr eme	Projected s ea level rise will increase the expos ure of transmission lines to coastal flooding. Ov erhead transmission lines are particularly sensitive to damage from wind and flooding. Meas ures to reduce expos ure of transmission lines include burying lines, or relocating lines inland. However , this can be prohibitively expensiv e for ex isting infrastructure.	Built
Ngā Waihanga	Transport infrastructure	Airports	River and surface flooding	Risk to airports due to river and surface flooding	Moderate	High	High	High	Moderate	Moderate	High	Low	Moderate	High	Extr eme	Extr eme	Increased extr eme weather events are proje cted to occur, which may lead to increased surface and riverine flooding. Very fe w airports are currently expos ed, however the flooding of the Christchurch International Airport is not yet fully understood. Flooding can cause damage to airport buildings, runways and underground infrastructure, as well as causing disruption to services.	Built

Integrated Framework	Category	Element at risk	Climate hazard	Risk statement	Exposure				Vulnerability				Risk				Commentary	NCCRA Dom ain
									Sensitivity			Adaptive capacity						
					Present	2050	2100 RCP 4.5	2100	Present	2050	2100		Present	2050	RCP4.5 2100	2100		
Ngā Waihanga	Transport infrastructure	Marine facilities	storms and wind	Risk to marine facilities due to storms and wind	Moderate	High	Extr eme	Extr eme	High	High	High	Medium	Moderate	High	Extr eme	Extr eme	Sea level rise and increased storminess is projected to increas e with climate change. This may cause disruption to port operations as storm surge and severe weather prevents normal operation and increases the risk of damage to cranes. The capacity for ports to adapt is limited by the need to remain at coastal locations, however these facilities can be upgraded to provide improved protection to sensitive equipment	Built
Ngā Waihanga	Transport infrastructure	Marine facilities	sea-level rise and salinity stresses	Risk to marine facilities due to sea-level rise and salinity stresses	Low	Moderate	High	High	High	High	High	Medium	Low	Moderate	High	High	Sea level rise is projecte d to increase with climate change and may cause inundation of some facilities. The capacity for ports to adapt is limited by the need to remain at coastal locations, however low lying and sensitive parts of these facilities may be upgraded or raised.	Built
Ngā Waihanga	Transport infrastructure	Rail	increasing coastal erosion	Risk to rail due to increasing coastal erosion	Moderate	Moderate	High	High	High	High	High	Low	High	High	Extr eme	Extr eme	Coastal erosion is likely to increase with projec ted sea level rise and increasing storminess. Sections of rail are expose d to coastal erosion, particularly along the Kai koura Coast. Coastal erosion may damage tracks severely, and cause disruption to services. Some coastal routes have limited options for alternative inland routes, and are required to continue to serve exis ting communities.	Built
Ngā Waihanga	Transport infrastructure	Rail	increasing landslides and soil erosion	Risk to rail due to increasing landslides and soil erosion	Moderate	High	Extr eme	Extr eme	High	High	Extr eme	Medium	Moderate	High	Extr eme	Extr eme	A large section of the Kaikoura rail li ne is located adjacent to coastal clif Coastal erosion may erode or destroy the track causing disruptions and damage. There is potential for strengthening of these sections of cliff face or improved coastal defences.	Built
Ngā Waihanga	Transport infrastructure	Rail	higher mean temperatures	Risk to rail due to higher mean temperatures	Low	Moderate	High	High	High	High	High	Medium	Low	Moderate	High	High	Projec ted increasing temperatures may increase the occurrence of buckling of tracks. Mainte nance can be done to avoid buckling i.e. destressing	Built
Ngā Waihanga	Transport infrastructure	Rail	sea-level rise and salinity stresses	Risk to rail due to sea-level rise and salinity stresses	Low	Moderate	High	High	Moderate	Moderate	Moderate	Low	Low	Moderate	High	High	Projecte d sea level rise may cause inundation and increase salinity stress for coastal rail routes such as those along the K aikoura Coast. This may cause coastal erosion, disruption to services and increase corrosion due to salt water intrusion. Some coastal routes have limited options for alternative inland routes, and are required to continue to serve exi sting communities.	Built
Ngā Waihanga	Transport infrastructure	Roads and bridges	increasing coastal erosion	Risk to roads and bridges due to increasing coastal erosion	Low	Moderate	High	High	High	High	High	Low	Moderate	High	Extr eme	Extr eme	Coastal erosion is likely to increase with projec ted sea level rise and increased storminess. Coastal roads and bridges may be expose d to erosion which can damage bridge footings, road foundations, and erode surfaces. Options to adapt include retreat or abandonment.	Built
Ngā Waihanga	Transport infrastructure	Roads and bridges	River and surface flooding	Risk to roads and bridges due to river and surface flooding	Moderate	High	Extr eme	Extr eme	Moderate	High	High	Medium	Low	High	Extr eme	Extr eme	Projected incre ases in extrem e rainfall events are likely to result in increa surface and riverine flooding. B ridges expose d to flooding may be damaged through erosion, debris strike or washout. Flooding can cause disruption and damage to roads, which is influenced by material, type of structure, condition and age. Improved resilience can be achieved though maintenance and provision of alternative routes.	Built
Ngā Waihanga	Transport infrastructure	Roads and bridges	sea-level rise and salinity stresses	Risk to roads and bridges due to sea-level rise and salinity stresses	Low	Moderate	High	High	High	High	High	Medium	Low	Moderate	High	High	Projecte d sea level rise is likely to increase exposure of roads to inundation salinity stress. Roads expose d to inundation may be damaged and travel route disrupted.	Built
Ngā Waihanga	Waste management	Solid waste management and contamination sites	increasing coastal erosion	Risk to solid waste management and contamination sites due to increasing coastal erosion	Moderate	High	Extr eme	Extr eme	Moderate	High	High	Low	Moderate	Extr eme	Extr eme	Extr eme	Coastal erosion is likely to increase with projec ted sea level rise and increased storminess, which may expose some coastal landfills to erosion. Old landfills are particularly sensitivity to erosion due to often poor lining and capping protection. Increased leachate my be produced, or the integrity of landfill may be compromised. Landfills have a low adaptive capacity as they are permanent features that are expens ive and complex to remove. Remedial works may increase protection against erosion and leachate.	Built
Ngā Waihanga	Waste management	Solid waste management and contamination sites	sea-level rise and salinity stresses	Risk to solid waste management and contamination sites due to sea-level rise and salinity stresses	Moderate	High	High	Extr eme	Moderate	High	High	Low	Moderate	Extr eme	Extr eme	Extr eme	Projecte d sea level rise may expose some coastal landfills to salinity stress and inundation. Ol d landfills have high sensitivity due to likely poor lining and capping protection. Wat er ingress may cause Increased leachate to be produced, which may be a contaminant if the integrity of the landfill is compromised. Landfills are permanent features that are expensi ve and complex to rem ove, however remedial works may increase protection against erosion and leachate.	Built
Ngā Waihanga	Waste management	Solid waste management and contamination sites	River and surface flooding	Risk to solid waste management and contamination sites due to river and surface flooding	Moderate	Moderate	High	High	Moderate	Moderate	Moderate	Low	Moderate	Moderate	High	High	Projected incre ases in extrem e rainfall events are likely to increase riverine and surface flooding, increasing the number and frequency of landfills that are expos ed. Flooding can cause erosion and cause floodwater to enter the cap. This is of particular concern for old landfills due to the often poor lining and capping protection. Landfills have a low adaptive capacity as they are permanent features that are expens ive and complex to remove. Remedial works may increase protection against erosion and leachate.	Built

Integrated Framework	Category	Element at risk	Climate hazard	Risk statement	Exposure				Vulnerability				Risk				Commentary	NCCRA Dom ain
									Sensitivity			Adaptive capacity						
					Present	2050	2100 RCP 4.5	2100	Present	2050	2100		Present	2050	RCP4.5 2100	2100		
Ōhanga	Agriculture	Crops	Drought	Risk to crops due to drought	Moderate	High	Extr eme	Extr eme	High	High	High	Low	High	Extr eme	Extr eme	Extr eme	Projecte d increase in drought potential is likely to impact crops. Crops are extrem ely dependent on water availability for irrigation.	Economy
Ōhanga	Agriculture	Crops	storms and wind	Risk to crops due to storms and wind	Moderate	Moderate	High	High	High	High	High	Medium	Moderate	Moderate	High	High	Projecte d increases in storms and wind will increase exposure of crops to flooding, wind and storm damage. Crops are highly sensitive to damage from flooding and storms which can destroy crops. Change of crop cycle, timing or varieties may provide some adaptive capacity, also changing management measures such as wind shelter breaks	Economy
Ōhanga	Agriculture	Crops	higher mean temperatures	Risk to crops due to higher mean temperatures	Low	High	Extr eme	Extr eme	Low	Low	Low	Medium	Insignificant	Low	Moderate	Moderate	Proje cted increase in temperatures may increase pests and irrigation demand. Change of crop cycle, timing or varieties may provide some adaptive capacity or increased use of pesticides.	Economy
Ōhanga	Agriculture	Livestock	Drought	Risk to livestock due to drought	Moderate	High	Extr eme	Extr eme	High	High	High	Low	High	Extr eme	Extr eme	Extr eme	Projected incre ase in drought potential is likely to impact livestock farming. Livestock farming is extreme ly dependent on water availability to sustain optimum grass growth and for stock drinking water. Relocation of stock or feed supplementation may reduce impacts of drought on stock.	Economy
Ōhanga	Agriculture	Livestock	higher mean temperatures	Risk to livestock due to higher mean temperatures	Low	Moderate	High	High	Moderate	Moderate	Moderate	Medium	Insignificant	Low	Moderate	Moderate	Projected incre ase in temperature are likely to impact livestock farming. Livestock are moderately sensitive to temperature, which can lead to heat stress and lower milk production. The impacts of temperature on herds may be reduced through breeding for temperature resilience.	Economy
Ōhanga	Finance and insurance	The cost of business	storms and wind	Risk to the cost of business due to storms and wind	Low	Moderate	High	High	High	High	Extr eme	Medium	Low	Moderate	Extr eme	Extr eme	Damage s from increased severe weather and sudden events such as fire may lead to various types of costs for individuals, businesses, government (l ink to governance), and the w hole economy. Costs are likely to include those associated with loss or stranding of property and assets (including land), cos t repairing, rebuilding or replacing assets, and the cost of preventative measures. Investment opportunities may arise from the transition to a low carbon economy.	Economy
Ōhanga	Finance and insurance	Supply chains	increasing landslides and soil erosion	Risk to supply chains due to increasing landslides and soil erosion	Low	Low	Moderate	Moderate	High	High	High	Medium	Low	Low	Moderate	Moderate	Sudden onset hazar ds can impact business supply chains, making business difficult and can result in loss of stock or increased costs.	Economy
Ōhanga	Finance and insurance	Insurance	sea-level rise and salinity stresses	Risk to insurance due to sea-level rise and salinity stresses	Low	High	High	Extr eme	High	High	Extr eme	Medium	Low	High	Extr eme	Extr eme	Asset owners, including home owners, residents, and business owners, are likely to face increasing insurance premiums and exce sses due to increased and/or ongoing damage. Increased insurance premiums or reduction in insurance availability may result in a loss of property value, which has wider economic implications and ultimately may affect the viability of some businesses.	Economy
Ōhanga	Fisheries	Fisheries and aquaculture	ocean chemistry changes	Risk to fisheries and aquaculture due to ocean chemistry changes	Low	High	High	Extr eme	High	High	High	Low	Moderate	Extr eme	Extr eme	Extr eme	Changes in ocean chemistry changes are likely to occur with proj ected temperature increases. Studies of shellfish and aquatic ecosystems indicate that fisheries are extre mely sensitive to heat waves and ocean chemistry changes. Mortali ty is likely to increase and condition reduce, with potentially high consequences for fisheries.	Economy
Ōhanga	Fisheries	Fisheries and aquaculture	marine heatwaves	Risk to fisheries and aquaculture due to marine heatwaves	Low	High	High	Extr eme	Extr eme	Extr eme	Extr eme	High	Low	High	High	Extr eme	Sea temperatures and marine heatwaves are projecte d to increase with climate change, with potential loss in marine species and biodiversity. Fisheries may adapt as the relatively cool temperatures off the Canterbury coastline, may act as a favourable destination for affected species from warmer climates.	Economy
Ōhanga	Fisheries	Fisheries and aquaculture	storms and wind	Risk to fisheries and aquaculture due to storms and wind	Low	Moderate	Moderate	Moderate	High	High	High	Medium	Low	Moderate	Moderate	Moderate	Projec ted increases in storms and wind may cause increased sediment runoff nearshore environments. Reduced water quality in inshore environments may impact the health of some major fis h species and shellfish, and may smother habitats. Continued efforts to improve stormwater runoff water quality will support improved nearshore water quality.	Economy
Ōhanga	Forestry	Exotic fores try	increased fire-weather	Risk to exotic fore stry due to increased fire-weather	Low	Moderate	High	High	High	High	High	Low	Moderate	High	Extr eme	Extr eme	Pockets of exotic forestry spread across the region will be expose d to increasing fire weather, due to proje cted increases in temperatures, dry periods and wind. Forestry is highly sensitive to wildfire damage which can case substantial economic losses. M easures to reduce fire risk include pruning, weed control, undergrowth maintenance, fire breaks and off-season burning.	Economy
Ōhanga	Forestry	Exotic fores try	storms and wind	Risk to exoti c forestry due to storms and wind	Low	Moderate	High	High	Moderate	Moderate	Moderate	Low	Low	Moderate	High	High	Storms and wind are proje cted to become more severe, which will increase the expos ure of forestry, where young forests are particularly sensitive to damage. Storm damage can cause windthrow, erosion and damage to related infrastructure, with costly repairs and health and safety risks associated with clearing damaged branches. Frequent ex posure to high winds can result in sturdier trees of lower grade timber.	Economy
Ōhanga	Forestry	Exotic fores try	higher mean temperatures	Risk to exotic forestry due to higher mean temperatures	Low	Moderate	High	High	Low	Low	Low	High	Insignificant	Insignificant	Low	Low	Forests will be expose d to projected increas es in temperature, particularly in inland areas where temperatures are highest. Temperatures can change productivity (w hich may increase in many areas) and cause increased growth weeds and higher rates of pests and disease.	Economy

Integrated Framework	Category	Element at risk	Climate hazard	Risk statement	Exposure				Vulnerability				Risk				Commentary	NCCRA Dom ain
									Sensitivity			Adaptive capacity						
					Present	2050	2100 RCP 4.5	2100	Present	2050	2100		Present	2050	RCP4.5 2100	2100		
Ōhanga	Tourism	Tourism sector	reduced snow & ice	Risk to tourism sector due to reduced snow & ice	Low	Moderate	Moderate	Extr eme	High	High	High	Low	Moderate	High	High	Extr eme	Projecte d reductions in snow and ice are likely to impact the tourism sector, particularly winter sports such as skiing, and related attractions. Alpine sports tourism is highly sensitive to warming temperatures which can reduce snow base and the length of the ski season. Tourism may also be impacted by more general changes to the natural environment. Alpine sports tourism has low adaptative capacity to reduced snow and ice, however measures exist to compensate for reduced snow such as snow machines.	Economy
Ōhanga	Tourism	Tourism sector	River and surface flooding	Risk to tourism sector due to river and surface flooding	Low	High	Extr eme	Extr eme	High	High	High	Medium	Low	High	Extr eme	Extr eme	Projected incre ases in extrem e rainfall are likely to result in increased flooding. Low lying and riverine attractions are likely to be exposed to flooding, w hich may also disrupt access routes and change the natural character of the region. The tourism sector is sensitive to flood damage to coastal and riverine attractions and amenities, which can be costly to repair and disrupt services. Related cancellations can reduce consumer confidence, particularly if frequent or recurring. The tourism sector may adapt to climate change as the market is likely to continue to seek tourism destinations. There is potential for increased tourism in Canterbury relative to other destinations that may suffer more severe damage.	Economy
Hauora		Menta l wellbeing	Climate change	Risk to mental wellbeing due to climate change	Low	High	Extr eme	Extr eme	Moderate	Moderate	High	Low	Low	High	Extr eme	Extr eme	Risks to mental health may arise from a range of climate change related issues, and expos ure may be widespread across all sections of the community. Some groups within the community already ex periencing negative mental health impacts related to climate change stresses. Further mental health issues are likely to stem from a wide range of factors and compound with other physical and cultural health impacts.	Human
Hauora		Physical health	Climate change	Risk to physical health due to climate change	Low	Moderate	High	High	High	High	High	Medium	Low	Moderate	High	High	Risks to physical health from climate change are likely to be widespread across all communities. Physic al health impacts are likely to be driven by direct exposure to climate hazards such as f looding and fire, which is likely to increase as slow moving climatic changes such as high temperatures begin to impact health. Health im pacts may also arise through a range of indirect causes, such as damp housing caused by high groundwater or increased flooding. Me dical intervention and public health measures can support communities to adapt, however this may be limited by the capacity for health services to respond effectively.	Human
Ora rite		Increase inequalities and cost of living	Climate change	Risk to increase inequalities and cost of living due to climate change	Low	High	Extr eme	Extr eme	Moderate	Moderate	High	Low	Low	High	Extr eme	Extr eme	Risks to inequality and living costs are likely to arise from a range of climate hazards, and continue to inc rease as widespread effects of climate change are felt. Communities with current inequity are likely to be impacted first and most severely in the long term, and have a low capacity to adapt to change.	Human
Hapori	Housing and buildings	Rural housing and communities	River and surface flooding	Risk to rural housing and communities due to river and surface flooding	Moderate	High	Extr eme	Extr eme	High	Extr eme	Extr eme	Low	High	Extr eme	Extr eme	Extr eme	Projec ted increases in extrem e events are likely to cause increased flooding. Relatively low density of dwellings in rural communities mean that there are lower numbers of expos ed rural buildings. Howe ver, the condition of these buildings may be lower due to age and overall lack of maintenance meaning a higher sensitivity to flood damage.	Built
Hapori	Housing and buildings	Rural housing and communities	increased fire-weather	Risk to rural housing and communities due to increased fire-weather	Moderate	High	High	Extr eme	High	High	Extr eme	Medium	Moderate	High	Extr eme	Extr eme	Projecte d increases in temperature, wind and dry days are likely to increase the fire weather exposure particularly in inland rural communities. Warm er temperatures, increased areas of barren land and high vegetation cover make rural communities sensitive to fire. Def ences and strategies can be put in place to increase resilience, such as scrub clearing, pruning and planting of fire resistant trees i.e. deciduous.	Built
Hapori	Housing and buildings	Settlements and urban communities	Coastal flooding	Risk to settlements and urban communities due to coastal flooding	Moderate	High	High	Extr eme	High	High	High	Low	High	Extr eme	Extr eme	Extr eme	Projecte d increases in sea level rise and storminess are likely to lead to increased coastal flooding and erosion. Ur ban communities will be increasingly expose d to flooding, as many are located in low lying coastal areas. Buildings are sensitive to flood damage which can destroy interiors and cause loss of property. Older buildings, and those with timbe r construction are particularly sensitive. Adaptation options are available including sea walls, sand dune remediation and retreat.	Built
Hapori	Housing and buildings	Settlements and urban communities	River and surface flooding	Risk to settlements and urban communities due to river and surface flooding	Moderate	High	Extr eme	Extr eme	High	High	High	Low	High	Extr eme	Extr eme	Extr eme	Projec ted increases in extrem e events are likely to cause increased flooding to which some urban communities are highly ex posed. Buildi ngs are sensitive to flood damage which can destroy interiors and cause loss of property. Olde r buildings, and those with timber construction are particularly sensitive. Adaptation options are available including stop banks and retreat.	Built

Integrated Framework	Category	Element at risk	Climate hazard	Risk statement	Exposure				Vulnerability				Risk				Commentary	NCCRA Dom ain
									Sensitivity			Adaptive capacity						
					Present	2050	2100 RCP 4.5	2100	Present	2050	2100		Present	2050	RCP4.5 2100	2100		
Hapori	Housing and buildings	Settlements and urban communities	increasing coastal erosion	Risk to settlements and urban communities due to increasing coastal erosion	Low	Moderate	High	High	High	High	High	Low	Moderate	High	Extr eme	Extr eme	Projecte d increases in sea level rise and storminess are likely to lead to increased coastal flooding and erosion. Ur ban communities will be increasingly expose d to flooding, as many are located in low lying coastal areas. Buildings are sensitive to flood damage which can destroy interiors and cause loss of property. Older buildings, and those with timbe r construction are particularly sensitive. Adaptation options are available including sea walls, sand dune remediation and retreat.	Built
Hapori	Housing and buildings	Settlements and urban communities	sea-level rise and salinity stresses	Risk to settlements and urban communities due to sea-level rise and salinity stresses	Low	Moderate	High	High	Moderate	Moderate	Moderate	Low	Low	Moderate	High	High	Projecte d increases in sea level rise and storminess are likely to lead to increased coastal flooding and erosion. Ur ban communities will be increasingly expose d to flooding, as many are located in low lying coastal areas. Buildings are sensitive to flood damage which can destroy interiors and cause loss of property. Older buildings, and those with timbe r construction are particularly sensitive. Adaptation options are available including sea walls, sand dune remediation and retreat.	Built
Hapori		Community cohesion	Climate change	Risk to community cohesion due to climate change	Low	Moderate	Extreme	Extr eme	Moderate	High	High	Low	Low	High	Extr eme	Extr eme	Community cohesion with Canterbury may be affected by climate change in both rural and urban settings. Community disruption may be caused by event based hazards s uch as fire, extrem e events, and flooding, or slow-moving hazards, s uch as sea level rise and temperature. Exposure to hazards m ay motivate individuals or groups to relocate, where the loss of key community members can have a range of consequences for community cohesion, particularly in small communities. It is likely to be difficult for communities to adapt and recover from the loss of key members or a change in the social fabric. Some opportunities may exi st for towns that are less expos ed and may see population growth or increased cohesion in the face of adversity, and individuals may find new opportunities to show leadership.	Human
Mātauranga		Cultural identity	Climate change	Risk to cultural identity due to climate change	Low	Moderate	Extreme	Extr eme	Moderate	High	Extr eme	Low	Low	High	Extr eme	Extr eme	Māori have a deep connection to turangawaewae, and hold a strong significance regarding 'place' . Many cultural heritage site s and Marae are located in coastal and low lying areas and may be ex posed to flooding, erosion and related issues such as loss of access. Other changes are also likely to undermine cultural practices, including reduced connectivity, dispersal/relocation of communities and degradation of the natural environment.	Human
Rangatiratanga		Legal liability	Climate change	Risk to legal liability due to climate change													•Risk of increased legal liability of Councils and public agencies. Councils should strive for a full knowledge of liability through understanding of risk, across all levels of governance. This includes educating government to ensure that the correct information is available for effective decisions. This needs to look beyond today and tomorrow. •Lack of legal framework to deal with climate change.	Gov ernance
Rangatiratanga		Ability to fund and maintain public services	Climate change	Risk to ability to fund and maintain public services due to climate change													•Climate haz ards will negavely impact the ability to fund and maintain public services – this includes water supply agriculture/irrigation, community facilities and events, leading to G overnance limiting the ability to respond to societal values. •Be yond this, where do decisions sit around maintaining future infrastructure and services, looking at efficiencies vs redundancies. •Reticulation of services relies on governance, with current policy supporting reticulation.	Gov ernance
Rangatiratanga		Availability and access to funding	Climate change	Risk to availability and access to funding due to climate change													•Im pact of climate haz ards on Council budgets, insurance and reinsurance (and wider underwriting) avai lability, and for mortgage access. •The mis-alignment between insurance and mortgage timeframes further exacer bates this risk. •Str ategic planning within local government looks ahead for planning, but do budgets align to the timeframes that climate change presents. U ncertainty in who pays. •Reduction in insurance and cost transfer to council is a consequence of lack of funding availability (e .g. Red Zone).	Gov ernance
Rangatiratanga		Co-governance (including Te Tiriti Partners hips)	Climate change	Risk to co-governance (including te tiri ti partnerships) due to climate change													•The failure to establish / leverage co-governance partnerships within governance structures (w ith Māori, Y outh etc) to address Climate Change matters. •Br oad and profound differences in the manner and approach to governance which are at risk from being exac erbated by climate change, with voices lost or marginalised, departing further from (ex isting or planned) co- governance structure.	Gov ernance

Integrated Framework	Category	Element at risk	Climate hazard	Risk statement	Exposure				Vulnerability				Risk				Commentary	NCCRA Dom ain
									Sensitivity			Adaptive capacity						
					Present	2050	2100 RCP 4.5	2100	Present	2050	2100		Present	2050	RCP4.5 2100	2100		
Rangatiratanga		Emergency management and policing	Climate change	Risk to emergency management and policing due to climate change													•Systems are currently in place, but systems for responding to heat waves and fires are currently inadequate, and climate hazards negatively impact on recovery. •No c apacity for extr eme weather events, leading to impact on Council business as usual services. •Chang ing governance structures during declared emergencies over to Controller. G roup plan too short in outlook for climate change, considering present day risks leaving little room for adaptation. Linked to finance, with major f unding coming from central government, putting access on recovery rather than risk reduction through adaptation.	Gov ernance
Rangatiratanga		Exacer bating the misalignment of juristictoral areas	Climate change	Risk to exacerbating the m isalignment of juristictoral are as due to climate change													•Lack of jurisdictional clarity of Councils and public agencies (i.e. the differing jurisdictional boundaries for D istrict He alth Boards vs other agencies) f urther burdening integration between social service agencies. This risk will ultimately undermine process and increase inequities. Gi ven that community wellbeing is not a feature and responsibility within the Local Pl an, Local G overnment and wider public services will struggle given the lack of clarity with roles and responsibilities. •The risk of organisational sustainability and the associated impacts of long-term exis tence of governance and the future needs to amalgamate across differing jurisdicti ons. T •he benefits of reduced organisational costs could result in reduced granularity of knowledge and evidence to support action, loosing local values through integration of approaches to tackle seemingly common problems.	Gov ernance
Rangatiratanga		Functioning of planning rules and policies	Climate change	Risk to functioning of planning rules and policies due to climate change													•Climate haz ards will negatively impact on the functioning of planning rules and policies. •Inc reased risk from mis-funding, where planning rules and policies lead to enabling funding that contributes to mal-adaptation.	Gov ernance
Rangatiratanga		Inablity to make effective decisions	Climate change	Risk to inability to make effective decisions due to climate change													•Interlinked with legal liability, the inability to make effective decisions could lead to increased risk, mal-adaptation, and discourse. •Existing tools not fit for purpose to address climate change trade-offs that may be required, and the complexit ies that need to be considered. •Holistic approach required to ensure decision making is not in isolation, something that is not consistent or effective currently across governance.	Gov ernance
Rangatiratanga		Reputational damage	Climate change	Risk to reputational damage due to climate change													•Intrenched within the declaration of a climate emergency with lack of action, reputational risk from inaction is ever present. The choice of the "cl imate emergency" language im plies immediate action, leading to increased frustration from community over lack of visible progress. •T he pace of governance to be able to react plays a significant role in the increased reputational risk.	Gov ernance
Rangatiratanga		The availability of climate adaptation funding	Climate change	Risk to the availability of climate adaptation funding due to climate change													•Increased need for adaptation funding due to natural haz ards, and how this funding is made available to address adaptation planning.	Gov ernance
Rangatiratanga		Voting structures	Climate change	Risk to voting structures due to climate change													•Inabil ity for governance to navigate consistently through decision making, and beyond election cycles. •The misalignment of climate change and voting timeframes results in risk of failure of governance as a result of voting structure.	Gov ernance

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	WAT-03 / WAT-02-02 / 220317039207
REPORT TO:	COUNCIL
DATE OF MEETING:	5 April 2022
AUTHOR(S):	Colin Roxburgh, Water Asset Manager Hayley Proffit, Water Safety and Compliance Specialist
SUBJECT:	Update of Backflow Prevention Policy
ENDORSED BY: (for Reports to Council, Committees or Boards)	Department Manager / Chief Executive

1. SUMMARY

1.1. This report is to:

1.1.1. Update the Council in the updates made to the Council's Backflow Prevention Policy;

1.1.2. Seek approval of the Council to adopt the updated Policy.

1.2. The drivers for the renewed Policy are as follows:

1.2.1. It was first adopted in 2014, with it originally signalled that the Policy would be reviewed by 2019.

1.2.2. The requirements for water suppliers to protect networks from backflow has moved from being required under the Health Act to under the Water Services Act, which came into force in 2021. Therefore, the Policy requires updating to reflect this new over-arching legislation that it now sits under.

1.2.3. To make some aspects of the Policy more clear, without changing the overall responsibilities of different parties under the Policy.

1.3. The updated Policy has been prepared with input from key operational staff, and has been reviewed by the Council's Senior Policy Analyst with feedback and a summary of changes included with the body of this report.

Attachments:

i. 2014 Backflow Prevention Policy
ii. Proposed 2022 Backflow Prevention Policy

2. RECOMMENDATION

THAT the Council:

(a) **Receives** Report No. 220317039207.

(b) **Notes** that the Council's Backflow Prevention Policy has been updated following the five year anniversary since the Policy was adopted, in response to new legislation that sits above the Policy, and to try to make the Policy more clear and user friendly.

(c) **Notes** that overall obligations of different parties under the Policy have been reviewed and assessed as not changing significantly, and as such a Special Consultative Procedure is not required, with the overall intent of the updated Policy to be renewal of the previous Policy, with improved clarity, and giving effect to new legislation, rather than introducing a new set of obligations to any party.

(d) **Approves** the updated 2022 Backflow Prevention Policy, effective from this date.

3. BACKGROUND

3.1. Backflow is a process by which water may travel in reverse direction, potentially causing contamination to occur. Within the context of this Policy, the process of backflow from private property into the Council's potable water system is considered.

3.2. The events that may lead to this are an increase of pressure on the private side of the point of supply (i.e. if there is a pumped system such as a private well), or alternatively a drop in pressure in the public system, combined with a contaminant source being in contact with the private water system.

3.3. In 2014, the requirement for water suppliers to protect their systems from the risk of backflow came under Section 69(ZZZ) of the Health (Drinking Water) Amendment Act. In November 2021, the Water Services Act came into effect, with the obligations on water suppliers to protect their systems from backflow largely transferred to being under the Water Services Act.

3.4. In order for the Council to meet its obligations, properties must be assessed for their risk of backflow, and an appropriate device installed to manage this risk. In general, this means a device being installed at the boundary to achieve the required level of protection. The level of protection required increases with risk level.

3.5. There are different obligations for different parties, with different risk levels. The risk definitions by water use type were informed by the Building Act definitions, and checked against those set out in the Water New Zealand Boundary Backflow Prevention for Drinking Water Supplies Code of Practice. As these are informed by documents set at a national level, the risk definitions are generally consistent with those used by other councils and water suppliers. These are explained in simple terms below, but defined in greater detail within the Policy:

Low Risk: These are typically standard residential connections, and require a standard 'water toby' which is a non-testable dual check valve to manage the backflow risk.

Medium Risk: This category covers a range of commercial activities, including cafes, restaurants, and some residential activities such as private swimming pools or irrigation systems. To manage this risk, a different type of water toby is installed which has a testable double check valve, rather than the non-testable dual check valve at a low risk site.

High Risk: This category includes a range of generally commercial applications, generally involving chemicals of some nature, which may include medical facilities, pharmacies, sites involving raw sewage, automotive repair facilities, or hairdressers. High Risk sites are given the highest level of protection, using a Reduced Pressure Zone (RPZ) device. These are required to be installed above ground, as part of the way they achieve protection is to discharge any back-pressure to waste out of the bottom of the device as the non-return valves close.

3.6. For any new installation, the backflow category is defined at the time the connection is made, and an appropriate device installed, funded by the property owner.

3.7. For existing properties, the Council is continuing to work through surveying each commercial property, and ensuring that the appropriate device type is installed. The funding of these device types as set out in the 2014 Policy is that the standard sized Low and Medium hazard devices are funded by the Council, essentially as a renewal / upgrade of their service connection. For the High Hazard sites, as the device is an entirely new device type separate to the water toby connection, these are owned and funded by private property owners. This requirement for private property owners to fund the installation of their high hazard device is common practice throughout New Zealand.

3.8. Since 2014, staff have been working through implementing the Policy, both in terms of retrofitting new devices to existing connections as required, and ensuring appropriate devices are installed for any new connections, as well as undertaking annual testing on devices once installed. The 2014 Policy was subject to thorough workshops with elected members and consultation with the public prior to adoption.

3.9. While the implementation of backflow prevention has long since been a requirement on water suppliers via the Health Act, this is given greater focus under the Water Services Act. Further to this, the demonstration of an effective backflow prevention programme is now part of the draft 2022 Drinking Water Standards Quality Assurance Rules. The demonstration of effective backflow prevention is also highlighted in the Chlorine Exemption guidance released by Taumata Arowai as the first key attribute a water supplier must demonstrate as part of a chorine exemption application.

3.10. The 2014 Backflow Prevention Policy indicated that the Policy would be reviewed within 5 years of adoption, by May 2019. This date has lapsed, however it is noted that the status of the Policy remains valid beyond this time.

4. ISSUES AND OPTIONS

4.1. As identified in the Background section, key triggers were identified to update the Backflow Prevention Policy, as summarised below:

4.1.1. The Policy was first adopted in 2014, with it originally signalled that the Policy would be reviewed by 2019.

4.1.2. The requirements for water suppliers to protect networks from backflow has moved from being required under the Health Act to under the Water Services Act, which came into force in 2021. Therefore, the Policy requires updating to reflect this new over-arching legislation that it now sits under.

4.2. Given an update was required, staff also took the opportunity to update the Policy to more clearly explain the obligations of various parties under the Policy.

4.3. Consideration was also given to whether there was a need to fundamentally change any parts of the Policy, with respect to the obligations of different parties. It is however considered that such changes are not required. The Policy was subject to rigorous analysis and consultation at the time it was drafted in 2014, and there have been no fundamental issues highlighted subsequent to its adoption to suggest that significant changes are required.

4.4. It is also acknowledged that the Policy is part way through the implementation process, and any major changes to fundamental obligations within the Policy would introduce complexity in terms of equity between parties who may have had different obligations imposed on them under the 2014 Policy compared to any changes under a new policy. This could then raise concerns of fairness between property owners.

4.5. In addition, if fundamental changes were proposed, this would create a requirement to undertake a Special Consultative Procedure, which would unnecessarily consume

additional time and resource to manage despite the current Policy generally functioning well.

4.6. As part of summarising the changes between policies, and also formally assessing whether or not a Special Consultative Procedure was warranted, the proposed 2022 Policy was checked against the 2014 Policy by the Council's Senior Policy Analyst. The following table summarises key differences between the 2014 and proposed 2022 Policy and the significance of such changes, as part of this review:

Table 1: Policy Change Review Summary

Policy Review Consideration	3 Waters Response	Conclusion
The intent of the **Policy objective 4.1** has reduced in terms of levels of service from *'eliminating the risk'* to '*adequately managing the risk'.*	Intent in 2022 Policy better reflects reality of 2014 Policy.	No fundamental change, however the Policy wording now better reflects reality.
Policy 5.2.2 Installation, Certification and Accessibility of Devices are requiring more of medium hazard customers, for example, customers cannot reduce costs by installing a device themselves, and they have to notify Council once the work has been done.	As the devices are part of the public water supply network, the requirement that they only be worked on by suitably qualified parties was already in place via the Engineering Code of Practice and Hygiene Code of Practice for Work on Public Water Supplies. The additional wording in the Policy simply makes parties more aware of these requirements they may otherwise not be aware of. .	No fundamental change to obligations of parties.
Policy 5.2.4 Fire Connections imposes additional costs on the customer by requiring valves to be alarmed/monitored. This is clearly a requirement of the standard but a change to the original.	The 2014 Policy required that fire connections comply with Section 2.2 of Part 2: Code of Practice in Boundary Backflow Prevention for Drinking Water Supplies. The new wording in the 2022 Policy is simply transferring some of the Water New Zealand requirements into the Policy, to avoid the need to cross reference multiple documents to understand the core requirements.	No fundamental change to obligations of parties.
Policy 5.3.3 High Hazard requires the costs to be met by the property owner whereas the original policy states Council may subsidise the costs for larger connections and in some cases	The parts of the connection on the Council side of the boundary referred to in the 2014 Policy are Council owned pieces of infrastructure, and not part of the boundary backflow prevention system, rather the isolation valve upstream of the backflow	No fundamental change to obligations of parties.

Policy Review Consideration	3 Waters Response	Conclusion
customers may qualify for a waiver of building consent fees.	prevention device. Reference to Council funding this part was removed, as it is not actually part of the backflow prevention system and could lead to confusion.	
Policy 5.3.4 Fire Connections now require the owner to engage a certifying plumber resulting in additional costs.	Regardless of the Policy, the Building Act requires that such work be undertaken by a certifying plumber. This was however included in the Policy to make clear to individuals, without relying on parties having prior knowledge of the Building Act.	No fundamental change to obligations of parties.
Policy 5.8 Fire Hydrant Standpipes/Temporary Connections now requires contractors to take water from an approved tanker filling point which could presumably result in additional transport costs, and gives the Council the ability to recover costs associated with supplying a RPZ/standpipe in the case of an exemption being granted.	The 2014 Policy already required that contractors have an approved device, so there was already a level of discretion given to the Council in terms of who could take water, and what protection may be required to be in place. Both the 2014 and 2022 policies give the Council the rights to recover costs associated with the use of Council standpipes.	No fundamental change to obligations of parties.

4.7. Following the review of the proposed updated 2022 Policy against the 2014 Policy, it was concluded that consultation is not required, meaning that the Council can adopt the updated Policy.

Implications for Community Wellbeing

There are implications on community wellbeing by the issues and options that are the subject matter of this report. The Backflow Prevention Policy is one of the tools the Council uses to ensure residents receive safe drinking water, which is fundamental to the community wellbeing.

4.8. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū may be affected by, or have an interest in the subject matter of this report. The implementation of effective backflow prevention is part of the Council fulfilling its overarching obligation to give effect to Te Mana o te Wai, as required under the Water Services Act. Provision of backflow prevention, and protecting the public water supply from contamination, is part of acknowledging the vital importance of water, and ensuring its health and well-being is protected.

5.2. **Groups and Organisations**

There are not groups and organisations likely to be affected by, or to have an interest in the subject matter of this report.

5.3. **Wider Community**

The wider community is not likely to be affected by, or to have an interest in the subject matter of this report. While the Policy does impact upon property owners who have obligations under the Policy, these obligations are not changing as a result of the Policy update.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. **Financial Implications**

There are no financial implications of the decisions sought by this report. The core obligations of the Policy are already in place via the 2014 Policy, and this update simply reinforces obligations already in place.

This budget associated with the ongoing implementation of the Policy is included in the Annual Plan.

6.2. **Sustainability and Climate Change Impacts**

The recommendations in this report are part of ensuring that the quality of water is managed and maintained in a sustainable way.

6.3 **Risk Management**

The implementation of an effective Backflow Prevention Policy is part of the Council's overall strategy and obligation to effectively identify and manage any and all potential risks to the safety of its public water supplies. There are however no new risks arising from the adoption/implementation of the recommendations in this report; while backflow presents a risk for water suppliers to manage, the re-adoption of this Policy allows the Council to continue to manage this risk.

6.3 **Health and Safety**

There are no new health and safety risks arising from the adoption/implementation of the recommendations in this report. The proposed updated Policy continues to assist the Council is managing potential health and safety risks associated with backflow.

7. CONTEXT

7.1. **Consistency with Policy**

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy. As noted within the Issues and Options section, an assessment was undertaken regarding whether there was a potential need to consult in relation to this Policy update.

7.2. **Authorising Legislation**

The Water Services Act and Building Act are relevant in this matter.

7.3. **Consistency with Community Outcomes**

The Council's community outcomes are relevant to the actions arising from recommendations in this report. In particular:

"Core utility services are sustainable, resilient, affordable, and provided in a timely manner"

7.4. **Authorising Delegations**

The Council is authorised to adopt the updated Policy.

ATTACHMENT i

W A I M A K A R I R I
DISTRICT COUNCIL

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POLICY

Water

BACKFLOW PREVENTION POLICY

1. Introduction

The Council is committed to providing safe, high quality drinking water to all Waimakariri District's residents and businesses that are connected to a public water supply scheme. This Backflow Prevention Policy assists the Council to meet this commitment, by setting out the Council's objectives and policies that will ensure that its public water supplies are protected from contamination through approved backflow prevention devices or methods and avoidance of cross connections. This policy explains how the Council will ensure effective backflow prevention at the boundary between private property and the Council road reserve, and in so doing protect public water supplies from contamination.

The Council protects public health by taking measures to prevent backflow at the property boundary, which marks the location where the Council's water supply network joins with the privately owned supply pipe on the customers' property (i.e. the point of supply).

Backflow is usually caused by a pressure differential between the Council's water supply network and the customer owned private water reticulation. This can be caused by either backpressure (an increase in pressure in the customer owned supply pipes); back-siphonage (a loss of pressure in the Council water supply network); or cross connection (a physical inter-connection of a potable water supply to a non-potable supply). The resulting imbalance can cause water to be either sucked or pushed into the Council's water supply network, creating a potential health risk for other connected properties on the water supply network.

Back-siphonage is one of the most likely causes of backflow into the Council's water main from ordinary residential properties. Back-siphonage can be caused by any of the following: a burst water main; water being pumped from a fire hydrant during fire fighting; or high water use at another location in the water supply network. Any of these factors can cause a loss of pressure in the Council's water supply network that can cause water to be sucked back into the network from a customer's premises.

Back pressure may be caused where heating, pumping or industrial manufacturing systems are connected to a Council's water supply and the pressure in the customer's system exceeds the pressure in the Council's water supply system.

2. Regulatory and Policy Context

This section explains the Council's responsibility to manage backflow in context of legislative requirements, national standards and national guidance documents. It explains how the Council's approach to managing the risk of backflow is supported by a wider national legislative and regulatory framework.

2.1 Management of Backflow

This policy sets out the approach the Council will take to ensure contaminants from a private property are prevented from entering the Council's water supply network at the point of supply. The policy does not address backflow requirements within buildings or

structures on a customer's premises. This is the responsibility of the building owner under the New Zealand Building Code.

Any water, including treated water in a customer's supply pipe, could potentially be contaminated. The policy, in seeking to prevent backflow, treats all water on a customer's premises as potentially contaminated. The intent of a backflow prevention device is to prevent movement of potentially contaminated water or other liquid from private property into the Council water supply network.

2.2 Legal Requirements

The Building Act 2004 requires buildings to be safe and sanitary and the occupants safeguarded from potential illness. To this end, the Act contains provisions for the management of backflow within buildings located on private premises. The Act also imposes building consent requirements for device installation either at the property boundary (on the customer's side of the toby) and for devices located inside a building. For the latter, this internal protection is required as close as possible to the source of potential contamination within the building. The customer has responsibility to ensure the building is configured so that it will not negatively impact the Council network. This policy only provides protection from backflow for the water supply network at the property boundary, noting the internal building protection is a responsibility of the property owner.

The Health (Drinking Water) Amendment Act 2007 requires the Waimakariri District Council to protect drinking water quality for all its customers. The Act guides the Council's development of a backflow prevention policy intended to protect public water supplies. It specifically provides for the installation of backflow prevention devices.

The following are extracted relevant clauses from the Health (Drinking Water) Amendment Act.

69 (ZZZ) Protecting water supplies from risk of back-flow

(1) This section applies if a networked supplier considers that there is a need to protect the networked system from risks of pollution caused by water and other substances on properties connected to the networked system.

(2) A networked supplier may,—

(a) if the supplier considers it desirable or necessary,—

(i) install a back-flow prevention system in the network on the side of the point of supply for which the supplier is responsible for maintaining; or

(ii) allow the owner of property to which water is supplied to install a back-flow prevention system that incorporates a verifiable monitoring system (being a monitoring system approved by both the supplier and a drinking-water assessor):

(b) require the owner of the property in respect of which the back-flow prevention system operates or the person who is required (whether under the Local Government Act 2002 or any contract) to pay for drinking water supplied to that property,—

(i) if paragraph (a)(i) applies, to reimburse the supplier for the cost of that system (including the cost of installation, testing, and on-going maintenance); and

(ii) if paragraph (a)(i) or (ii) applies, to repair or modify any back-flow prevention system that, in the opinion of the supplier, is not functioning adequately.

(3) A person who installs a back-flow protection device must take all reasonable steps to ensure it can operate in a way that does not compromise the operation of any automatic sprinkler system connected to the water supply.

(4) A networked supplier—

(a) must test each back-flow protection device operating in its network at least once a year; and

(b) must advise the territorial authority in its area of the results; and

(c) may require the occupier of the property in respect of which the device operates to pay the reasonable costs involved in conducting the test.

The Health Act 1956 sets out requirements for supply of adequate water supplies to communities. The Act provides for introduction of bylaws to protect public health, and states penalties and offences for parties that pollute a public drinking water supply.

The Local Government Act 2002 provides Council's with the ability to make bylaws for the purpose of protecting, promoting and maintaining public health and safety. The Act also states it is an offence to pollute a public water supply and gives a Council the power to stop the supply to respond to an event that may endanger public health.

Other relevant legislation is:

- The *Health and Safety in Employment Act 1992*
- The *Plumbing, Gasfitters and Drainlayers Act 2006*
- The *Resource Management Act 1991*

The Waimakariri District Council Water Supply Bylaw 2012 made under provisions of both the Local Government Act 2002 and the Health Act 1956 includes general requirements for backflow prevention at the property boundary. It is the primary mechanism through which the Council can presently enforce its Backflow Prevention Policy. The Bylaw provides rules and enforcement mechanisms and enables prosecutions as required through the District Court. It requires an approved backflow prevention device or adequate air gap separation as applicable on all connections to a Council water supply.

2.3 Regulations

The New Zealand Building Code (NZBC clause G12) is contained in the Building Act First Schedule of the Building Regulation 1992 (referenced in Appendix 2 of this policy). Its provisions require water supply systems to be installed in a manner that avoids likelihood of contamination within the water supply network. It also identifies risks, hazards and

introduces the requirement for IQP's (Independently Qualified Person) to test backflow prevention devices.

Other relevant regulations are:

- *Camping Ground Regulations 1985*
- *Food Hygiene Regulations 1974*

2.4 Standards

The following standards are relevant to the prevention and risk management of backflow affecting public water supplies. These are:

- New Zealand Drinking Water Standards 2005 (revised 2008).
- AS/NZS 2845.1:2010 Water Supply: Backflow Prevention Devices: Materials, Design and Performance requirements.
- AS/NZS 3500.1:2003 Plumbing and Drainage: Water Services
- NZS 4541:2007 Automatic Fire Sprinkler Systems.
- New Zealand Industry Standard: Field Testing of backflow prevention devices and verification of air gaps.

2.5 Guidelines and Plans

The following guidelines and/or plans are relevant to managing the risk of backflow in the Waimakariri District:

- Boundary Backflow Prevention for Drinking Water Supplies 2013, published by Water NZ.
- Public Health Risk Management Plan Guide 'Distribution System: Backflow Prevention', version 1, Ref D2.4 published by Ministry of Health.
- Public Health Grading of Community Drinking: Water Supplies and Guidelines.
- Waimakariri District Council Engineering Code of Practice.
- Public Health Risk Management Plans have been prepared for various district water supplies. PHRMP's identify the barriers that are required to prevent contaminated water or other substances entering each scheme, including backflow prevention, avoidance of any cross connection, and other barriers such as mains location, testing and repair procedures, mains flushing, filtration and chlorination. PHRMP's also identify required improvements and their associated timeframes.

3. Definitions

Air Gap Separation is as a physical separation between the free flowing discharge end of a potable water supply pipeline, and the highest overflow level of the receiving vessel, used to prevent backflow.

Backflow is the unplanned reversal of flow of water or mixtures of water and contaminants into the water supply network.

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Backflow Prevention Device is a device that prevents backflow of water or mixtures of water and contaminants back into the water supply network.

Back Pressure refers to a situation where the pressure in the downstream (customer's) plumbing is greater than the pressure in the water supplier's mains resulting in a reversal of normal flow direction and thereby possible contamination of the mains water.

Back Siphonage refers to a situation where the pressure in the water supplier's main is less than the pressure in the downstream (customer's) plumbing, resulting in a reversal of normal flow direction and potential contamination of the mains water by water being sucked back into the water supplier's main.

Backflow Surveyor is a person suitably qualified to identify the risk of backflow at any site and hazards present at the site, qualified as described in Appendix 6 of the *Boundary Backflow Prevention for Drinking Water Supplies*, 2013, published by Water New Zealand, or any subsequent revisions of that publication. The Backflow Surveyor must achieve all required Unit Standards as required at any time.

Boundary backflow prevention device means any backflow prevention device located at or near the point of supply as defined by the water supplier, usually close to the property boundary.

Certifying Plumber is a person licensed under the Plumbers, Gasfitters and Drainlayers Act.

Connection means the service pipe from the Council's watermain to the point of supply that is owned and maintained by the Council and includes any pipes, valves, manifolds, water meters, backflow prevention device that is installed on the Council's side of the point of supply and the protection structure for any such backflow prevention device, and the water meter box.

Cross Connection means an actual or potential connection between the potable water supply and a non-potable water supply or pipework containing a contaminant, e.g. a public water supply to a rain water supply.

Customer means the owner of any property who has obtained the right to use, or direct the manner of use of, water supplied by the Council to any premises.

Extraordinary Supply means a category of an on demand supply including all purposes for which water is supplied other than ordinary domestic supply and which may be subject to specific conditions and limitations.

High Hazard Site means the premises at which any condition, device or practice is in place or is occurring which, in connection with the potable water supply system, has the potential to cause death. Examples of high hazard sites are referenced in Appendix 1.

Independent Qualified Person (IQP) means an Independent Qualified Person under the Building Act 2004. This person must be suitably qualified to test backflow prevention

devices, assess hazards and provide written documentation. This person must also meet all requirements of Appendix 6 of the *Boundary Backflow Prevention for Drinking Water Supplies*, 2013, published by Water New Zealand, or any subsequent revisions of that publication. The IQP/ Backflow Tester must achieve all required Unit Standards that are required at any time.

Low Hazard Site means the premises at which any condition, device or practice is in place or is occurring which, in connection with the potable water supply system, would constitute a nuisance, by colour, odour or taste, but not injure or endanger health. Examples of low hazard sites are referenced in Appendix 1.

Medium Hazard Site means the premises at which any condition, device or practice is in place or is occurring which, in connection with the potable water supply system, has the potential to injure or endanger health. Examples of medium hazard sites are referenced in Appendix 1.

On Demand Supply means a supply which is available directly to the customer without restriction of flow from the point of supply subject to the agreed levels of service.

Ordinary Supply means a category of an on demand supply used solely for domestic purposes, excluding any identified extraordinary water use.

Point of Supply means the point where the connection meets the supply pipe and it marks the boundary of responsibility between the customer and the Council, irrespective of property boundaries.

Potable water means water that is suitable for human consumption as defined by the Drinking Water Standard of New Zealand 2005 (revised 2008).

Premises means:
(a) a property or allotment which is held under a separate certificate of title or for which a separate certificate of title may be issued and in respect of which a building consent has been or may be issued; or
(b) a building or part of a building that has been defined as an individual unit by a cross-lease; unit title or company lease and for which a certificate of title is available; or
(c) Land held in public ownership (e.g. reserve) for a particular purpose.

Restricted Supply means a type of water supply where a limited flow is supplied by a flow control device, and storage is provided on-site by the customer to cater for demand fluctuations.

Service Pipe means that section of water pipe between the water main and the point of supply that is owned and maintained by the Council.

Supply Pipe means that section of pipe between the point of supply and the customer's premises that is installed, owned and maintained by the customer.

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Water Supply Network means all the components of the Council water supply between the point of abstraction from the natural environment and the point of supply. This includes but is not limited to: wells, infiltration galleries, intake structures, open raw water storage ponds and/or lakes, falling mains, treatment plants, treated water reservoirs, trunk mains, service mains, rider mains, pump stations and pumps, valves, hydrants, scour lines, service pipes, connections, meters, backflow prevention devices and tobies.

4. Policy Objectives

This policy seeks to protect public health and safety by managing the risk of backflow to avoid contaminants from any private property entering the Council water supply network. The objectives of the policy are to:

1) protect public health and safety by effectively preventing backflow and appropriately managing situations where there is a risk of backflow occurring in order to eliminate the risk; and
2) meet all relevant legislative requirements.

This policy seeks to achieve these objectives through its bylaw mandated requirement for customers to take responsibility to manage risks associated with backflow on the customer side of the point of supply.

The policy also seeks to:

- Protect the integrity and quality of the Council's water supply network by ensuring that non-potable water does not flow into the Council's water supply network.
- Protect potable water supplies from potential hazards by outlining requirements for installation, management and maintenance of backflow prevention devices.
- Identify the criteria where backflow prevention devices are required for low, medium or high hazard sites and the degree of protection required.
- Identify the requirements to install and test backflow prevention devices for all customers.
- Avoid cross-connection of potable water supplies with non-potable water supplies by establishing a framework which identifies and specifies responsibilities and actions that must be taken in situations where cross connection may occur.

5. Policy Statement

5.1 Application

All new and existing customers that will or currently receive a supply of potable water from the Council are required to comply with all of the requirements of this policy.

5.2 Backflow Prevention Requirements

5.2.1 Low Hazard

Low hazard sites are required to have a non-testable dual check backflow prevention device in place at the property boundary. Backflow prevention devices for low hazard sites

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are required to be located on the Council's side of the point of supply and are contained within the toby at the point of supply. These devices are installed by the Council.

5.2.2. Medium Hazard

Medium hazard sites are required to have a fully testable double check backflow prevention device at or as near as practicable to the property boundary at the point of supply.

The Council would normally install, own and maintain these devices. They would be installed within the toby at the property boundary on the road reserve unless stated otherwise (as in the case of the particular requirements applicable to various types of fire connections) (refer 5.2.4).

Larger sized connections (>25mm) will require specific design taking into account the location of the connection and existing services.

5.2.3 High Hazard

All high hazard sites will be required to have reduced pressure zone or reduced pressure zone detector devices on the customer's side of the point of supply, located as near as practicable to the property boundary.

There are two parts to high hazard devices. Device components located on the Council road reserve will be owned, maintained and installed by the Council. The reduced pressure zone device will be located on the customer's side of the point of supply and will be owned by the customer.

The customer owned components, if located outside a building, must be located above ground, protected by a suitable chamber or barrier/bollards, with lockable access to protect the device from physical damage.

Devices located on a customer's property may need to be placed within a wall or inside a building if that building has immediate frontage extending to the road reserve (e.g. shop front wall adjoins the Council footpath in a central business district). As these devices require drainage the relief valve on the device may need to be connected to the building's internal plumbing. An internal building device would drain to the wastewater network.

In some circumstances a device may need to be placed within a chamber on the outside wall of a shop that has immediate frontage to the road reserve (e.g. the device extends onto the road reserve). Location of an external backflow prevention device on the road reserve is subject to the approval of the Council's Roading Manager. Any such device may be permitted to drain to the stormwater system. This device would be owned by the customer although located on the road reserve.

The Council may offer to install devices on the customer's property, or may allow the customer to install the device on their premises.

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Any device installed by the customer on the customer's side of the point of supply must incorporate a verifiable monitoring system approved by both the Council and a Drinking Water Assessor. Devices installed by the customer will require a building consent. Any device on the customer's side of the point of supply must be installed by a certifying plumber who is also an IQP. All new devices must be tested immediately following installation by an IQP.

All devices must be accessible for testing at all times and must be located as near as practicable to the point of supply. The customer must also meet the additional provisions of Section 7.7.9 Pressure Reducing Valves and Check Valves from the Engineering Code of Practice to ensure the correct installation and functioning of these devices.

5.2.4 Fire Connections

Fire Connection for Sprinklers: Properties which have a separate fire connection shall have a testable double check backflow prevention device installed within the control room (valve house) if there are no chemicals used in association with the fire protection system. Systems using chemicals must have a reduced pressure zone device installed. The device must be installed close to the point of supply and be located between the point of supply and any booster pumps required at the site. In addition, the Council will install a single check detector on the road reserve, which will be maintained by the Council.

Systems containing foam or antifreeze must have reduced pressure zone devices installed. All Fire Systems must comply with Section 2.2 of Part 2: Code of Practice in Boundary Backflow Prevention for Drinking Water Supplies 2013, published by Water New Zealand.

5.2.5 Restricted Supplies

Customers receiving a restricted supply of water from a Council water supply are required to provide an adequate air gap separation to prevent backflow from a privately owned water storage tank entering the Council's water supply network. In addition the Council also provides and maintains boundary non testable dual check backflow prevention devices on the Council's side of the point of supply.

5.2.6 All customers

The customer shall not interfere with any approved boundary backflow prevention device in any way. The customer must ensure the Council will always have easy access to the device for the purposes of testing, monitoring or inspection as applicable.

There shall be no bypassing of boundary devices other than with another approved device, to ensure both continuity of supply during testing of devices, and to avoid cross connection.

5.3 Present Practice and Existing Customers (Retrofitting)

5.3.1 Low Hazard

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The Council will inspect and ensure all low hazard sites have an approved boundary backflow prevention device located in the road reserve on the Council's side of the point of supply.

5.3.2 Medium Hazard

The Council will identify and ensure all medium hazard sites have an approved device located at the property boundary (in accordance with Section 5.2.2). The Council will install these devices. Initial upgrades of devices for existing customers with connection sizes up to 25mm will be funded by the Council. Devices for larger connections may be subsidised by the Council, with the customer to meet the balance of costs incurred for device purchase, installation and initial testing. Devices will thereafter be owned and maintained by the Council.

5.3.3 High Hazard

Council will identify and ensure all high hazard sites have an approved device located at the property boundary (in accordance with Section 5.2.3).

High hazard sites require devices with components on the road reserve and customer's property. All the road reserve devices will be installed by the Council. The road reserve components required for connection sizes of up to 25mm will be funded by the Council. For larger connections the Council may subsidise the costs with the customer to meet the balance of costs incurred.

For the RPZ component on the customer's property, the Council will offer to install devices on behalf of the customer, or alternatively allow the customer to install the device. Devices on the customer's premises must be paid for by the customer.

Council installation of devices on the customer's premises may qualify for waiver of building consent fees in accordance with clause "K" of the Building Code.

Devices on the customer's premises will be owned and must be maintained by the customer in accordance with this policy.

5.3.4 Fire Connections

The Council will inspect and ensure all fire connections have approved boundary backflow prevention devices.

5.3.5 Restricted Supplies

The Council will inspect and ensure all restricted connections have an approved dual check boundary backflow prevention device located on the Council's side of the point of supply. In addition the customer is required to provide a registered air gap within the water storage tank on the customer's property.

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5.4 Future/New Connections

5.4.1 Low Hazard

All new customers with an assessed low hazard (including all new residential dwellings in the District) are required to have an approved backflow prevention device (in accordance with section 5.2.1) located on the Council's side of the point of supply. The devices will be owned and maintained by the Council.

5.4.2 Medium Hazard

For new medium hazard sites, approved devices (in accordance with section 5.2.2) installed within a toby box on the Council's side of the point of supply on the road reserve will be owned and maintained by the Council following installation. The customer shall pay for the new device.

5.4.3 High Hazard

For new high hazard sites, road reserve components of the high risk devices will be installed by the Council. For the RPZ component on the customer's property (in accordance with section 5.2.3), the Council may offer to install devices on behalf of the customer, or alternatively allow the customer to install the device.

All components of the devices, whether on the road reserve or customer's premises, must be paid for by the customer. On-going maintenance and servicing of devices is the responsibility of the customer.

5.5 Change of Use of Water Supply

In any situation where the customer proposes to change the water use at any premises that would result in a revised backflow risk category, the customer must notify the Council in writing of the proposed new water use. The customer is required to meet all costs of inspections, risk assessment, device purchase and installation, testing and maintenance of all new or upgraded backflow prevention devices associated with a change of water use. The Council will install new medium and low hazard devices in the road reserve to ensure the requirements of this policy for device selection and installation are met, and recover all costs from the customer. The Council may install high hazard RPZ devices on the customer's property and recover the cost from the customer, or may allow the customer to install the device.

If a proposed change of water use at a customer's premises will result in a reduced risk of backflow, the customer may request removal or replacement of the device with one that is more suitable to manage the new level of risk (see Section 5.7 for specification of devices). The Council will determine whether or not the existing device should be retained for future risk management or replaced with an alternative device. Any costs of removing the device must be met by the customer.

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5.6 Maintenance and Replacement of Damaged Devices

The Council will repair any damaged medium or low hazard backflow prevention device located in the road reserve. The Council may repair or replace any damaged high hazard device on a customer's property and charge the customer for this work, or allow the customer to complete the repairs to the satisfaction of the Council.

In any situation where the customer is required to install a new, upgraded or replacement device following a hazard assessment at their site (e.g. for a proposed change of water use or inspection of a damaged device), then a customer will be given a specified period to install the approved device. This period will be determined in accordance with the degree of risk posed by the customer and will not exceed a period of 3 months. The Council may alternatively undertake the installation and may recover the cost from the customer.

5.7 Specification and Manufacture of Boundary Backflow Prevention Devices

5.7.1 Specification of Devices

The following table specifies the minimum required backflow prevention devices to be used in relation to the assessed level of hazard and risk presented by a customer's use of water from a Council water supply.

Assessed Level of Hazard Risk / Type of Connection	Property boundary device at point of supply	
	Council Side	**Customer Side**
Low	Dual check valve (Council owned)	
Medium	Double check valve (Council owned)	
High		Reduced pressure zone valve (Customer owned)
Restricted	Dual check valve (Council owned)	Registered air gap (Customer owned)
Dedicated Fire Connection: Medium	Single check detector (Council owned)	Double check valve (Customer owned)
Dedicated Fire Connection: High	Single check detector (Council owned)	Reduced pressure zone (Customer owned)

Note: *Only dual check valves required for low hazard sites or customer's receiving restricted supplies may be non-testable. Any double check valve or any other device required for a medium or high hazard site or for fire connections must be fully testable.*

BACKFLOW PREVENTION POLICY

The Council will specify and approve the type of backflow prevention device that is to be used for each customer subject to assessment of the customer's actual or proposed water use activities and the associated assessed degree of risk of backflow from those activities. The devices to be approved will be rated according to the highest assessed risk at that site.

Non dedicated fire connections will not be permitted.

Only an IQP who is also a certifying plumber, appointed to undertake this function by the Council, can install a boundary backflow prevention device that is located on private property.

5.7.2 Manufacture of Backflow Prevention Devices

All backflow prevention devices used in the Waimakariri District must be manufactured in accordance with AS/NZS 2845.1 Water Supply: Backflow Prevention Devices: Materials, Design and Performance Requirements.

5.7.3 Installation of Boundary Backflow Prevention Devices

Device installation will comply with the Part 2- Code of Practice for Boundary Backflow Prevention within the Water New Zealand document "Boundary Backflow Prevention for Drinking Water Supplies" published by Water New Zealand, Sections 2.1 – 2.2.

Devices installed on a fire connection shall be New Zealand Insurance Council approved.

5.8 Building Consent and New Connection Requirements for Boundary Devices

The customer shall lodge a building consent application for the installation, alteration or removal of any new, upgraded or replacement backflow prevention device on the customer's side of the point of supply, when required. The customer may also be required to apply for a Compliance Schedule in conjunction with the building consent for annual warrant of fitness purposes.

The customer may also be required to apply for a new water supply connection application for the installation of a new boundary backflow prevention device.

5.9 Fire Hydrant Standpipes/ Temporary Connections

Where fire hydrants are used by contractors and third parties, these shall have an approved backflow prevention device installed. The Council owns standpipes, and may sell or rent them to customers to enable effective annual testing and recording of flow rates.

The Council will monitor the effectiveness of any backflow prevention methods in place and, if a contractor is abstracting water for non-potable purposes, the Council may require the contractor to use a hydrant standpipe with a double check valve and collapsible hoses.

BACKFLOW PREVENTION POLICY

5.10 Property Boundary Device Inspecting and Testing

The Council will test all backflow prevention devices on the property boundaries of high and medium hazard sites at least once every year.

The Council will inspect the non-testable devices at low hazard sites from time to time as required in response to identification of issues or as a part of its general water supply network maintenance programme.

All testing of backflow prevention devices will be performed by an Independent Qualified Person (IQP) as specified under the *Building Act 2004.* This person must be suitably qualified to test backflow prevention devices, assess hazards and provide written documentation. All testing will be in accordance with Section 2.3 of the Code of Practice for Boundary Backflow Prevention in *Boundary Backflow Prevention for Drinking Water Supplies 2013* published by Water New Zealand, or any subsequent revision to that document.

Testing will be undertaken at each of the following times:

- Immediately after any device installation
- On completion of any maintenance work
- After a backflow or suspected backflow incident (medium and high hazard devices)
- At the request of an Environmental Health Officer, Drinking Water Assessor, Building Consent Officer or Building Inspector, Dangerous Goods Inspector, the Water Asset Manager, 3 Waters Manager or the Water Unit Manager.
- All registered air gaps shall also be inspected and verified annually.

Where continuous supply is needed, two devices in parallel will be required to enable testing to be carried out without interruption of flow. The additional device will be provided by the customer at the customer's expense.

5.11 Backflow Prevention Risk Assessment

The risk and backflow hazards at each property will be assessed by a qualified Backflow Surveyor who will meet all of the required Unit Standards and other requirements for Backflow Surveying (see policy definitions). Installation and testing on private property will be undertaken by an IQP who is also a certifying plumber, and by an IQP for devices in the road reserve.

5.12 Enforcement and Disputes

The Council may disconnect or restrict the customer's water supply if the customer fails to meet any of the requirements of this policy, in accordance with enforcement provisions outlined in the Local Government Act 2002 and the Council's Water Supply Bylaw 2012. The Council will make every effort to give notice of an intention to disconnect, in accordance with the degree of risk presented by that customer, and the period specified in

the notice shall not be longer than 30 days. The customer will have the time specified in the notice to rectify the situation to the satisfaction of the Council.

Alternatively the Council may install a device that is required to manage the backflow hazard generated by a customer and recover costs of device purchase, installation and testing from that customer, in accordance with Section 69ZZZ of the Health (Drinking Water) Amendment Act 2007.

In the event however that a potentially serious hazard to the water supply exists then the Council may disconnect the supply immediately.

Reconnection to the supply shall not be undertaken until the appropriate remedy has been made by the customer. All costs associated with remedying the problem must be met by the customer.

If a dispute arises over the level of risk, or the type of backflow prevention device required at the property boundary, then the Water Unit Manager, 3 Waters Manager or Water Asset Manager shall nominate the device to be used. If the level of risk is unclear or unknown then a reduced pressure zone backflow preventer shall be installed.

Contamination incidents will be managed and addressed in accordance with any Water Safety Plan (also known as Public Health Risk Management Plan) that has been adopted for any Council water supply scheme.

5.13 Exemptions

An exemption to any requirement of this policy may be granted in writing only at the discretion of the Manager Utilities and Roading. In particular circumstances a backflow prevention device may be approved that is appropriate to manage the level of assessed risk to the Council's water supply network that differs from other requirements within this policy.

Exemptions are able to provide the Council with some flexibility in its application of the policy provisions. The Council may consider granting exemptions (possibly allowing a lower standard of boundary backflow prevention device) in circumstances, for instance, where the assessed risk from a customer's premises is largely reduced by the use of internal building or structure devices within the customer's premises.

5.14 Documentation

The Council will develop a register of backflow prevention devices in place at all high, medium and low hazard sites. The register will indicate the type of device and whether it is located on the Council's or customer's side of the point of supply. If the latter, the exact location of the device (e.g. outside or inside a building and exact location within a building) will be recorded.

Results of all tests and maintenance undertaken on each device will also be recorded. All test results will be kept for a period of at least two years.

BACKFLOW PREVENTION POLICY

6. Links to Other Council Policies and Community Outcomes

6.1 Water Supply Bylaw

This policy outlines the approach the Council will take in giving effect to the Waimakariri District Water Supply Bylaw 2012. The Water Supply Bylaw Section 15 contains provisions to manage backflow in the Waimakariri District. This policy will be used as a tool to assist the Council to effectively implement the approach to backflow prevention outlined in the Bylaw.

6.2 Community Outcomes

This policy gives effect to the following outcome:

- There is sufficient clean water to meet the needs of communities and ecosystems

7. Adopted by and Date

This policy was adopted at a meeting of the Council on 6 May 2014.

8. Review

This policy will be reviewed within five years of the date of its adoption, by May 2019.

ATTACHMENT ii

W A I M A K A R I R I
DISTRICT COUNCIL

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POLICY

Water

BACKFLOW PREVENTION POLICY

1. Introduction

The Council is committed to providing safe, high quality drinking water to all Waimakariri District's residents and businesses that are connected to a public water supply scheme. This Backflow Prevention Policy assists the Council to meet this commitment, by setting out the Council's objectives and strategies that will ensure that its public water supplies are protected from contamination through approved backflow prevention devices or methods and avoidance of cross connections. This policy explains how the Council will ensure effective backflow prevention at the boundary between private property and the Council road reserve, and in doing so protect public water supplies from contamination.

The Council protects public health by taking measures to prevent backflow at the property boundary, which marks the location where the Council's water supply network joins with the privately owned supply pipe on the customers' property (i.e. the point of supply).

Backflow is usually caused by a pressure differential between the Council's water supply network and the customer owned private water reticulation. This can be caused by either backpressure, back-siphonage or cross connection. The resulting imbalance can cause water to be either sucked or pushed into the Council's water supply network, creating a potential health risk for other connected properties on the water supply network.

Back-siphonage is one of the most likely causes of backflow into the Council's water main from any property. Back-siphonage can be caused by any of the following: a burst water main; water being pumped from a fire hydrant during firefighting; or high water use at another location in the water supply network. Any of these factors can cause a loss of pressure in the Council's water supply network that can cause water to be sucked back into the network from a customer's premises.

Back pressure may be caused where heating, pumping or industrial manufacturing systems are connected to a Council's water supply and the pressure in the customer's system exceeds the pressure in the Council's water supply system.

2. Regulatory and Policy Context

This section explains the Council's responsibility to manage backflow in context of legislative requirements, national standards and national guidance documents. It explains how the Council's approach to managing the risk of backflow is supported by a wider national legislative and regulatory framework.

2.1 Management of Backflow

This policy sets out the approach the Council will take to ensure contaminants from a private property are prevented from entering the Council's water supply network at the point of supply. The policy does not address backflow requirements within buildings or structures on a customer's premises. This is the responsibility of the building owner under the New Zealand Building Code.

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Any water, including water in a customer's supply pipe, could potentially be contaminated. The policy, in seeking to prevent backflow, treats all water on a customer's premises as potentially contaminated. The intent of a backflow prevention device is to prevent movement of potentially contaminated water or other liquid from private property back into the Council water supply network.

2.2 Legal Requirements

The Building Act 2004 (Building Act) requires buildings to be safe and sanitary and the occupants safeguarded from potential illness. To this end, the Building Act contains provisions for the management of backflow within buildings located on private premises. The Building Act also imposes building consent requirements for devices installed either at the property boundary (on the customer's side of the toby), or for devices located inside a building. For the latter, this internal protection is required as close as possible to the source of potential contamination within the building. The customer has responsibility to ensure the building is configured so that it will not negatively impact the Council network.

This policy only provides protection from backflow for the water supply network at the property boundary, noting the internal building protection is a responsibility of the property owner.

The Water Services Act 2021 (Water Services Act) requires the Waimakariri District Council to protect drinking water quality for all its customers. The Water Services Act guides the Council's development of a backflow prevention policy intended to protect public water supplies. It specifically provides for the installation of backflow prevention devices.

The following are relevant clauses extracted from the Water Services Act.

27 Duty to protect against risk of backflow
(1) If a drinking water supply includes reticulation, the drinking water supplier must ensure that the supply arrangements protect against the risk of backflow.

(2) If there is a risk of backflow in a reticulated drinking water supply, the drinking water supplier may—

(a) install a backflow prevention device and require the owner of the premises to reimburse the supplier for the cost of installation, maintenance, and ongoing testing of the device; or
(b) require the owner of the premises to install, maintain, and test a backflow prevention device that incorporates a verifiable monitoring system in accordance with any requirements imposed by the supplier.

(3) A person who installs a backflow protection device must take all reasonable steps to ensure it operates in a way that does not compromise the operation of any fire extinguisher system connected to the drinking water supply.

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The Water Services Act sets out the requirements for the supply of safe and sufficient drinking water to communities, and states penalties and offences for parties that contaminate a public drinking water supply.

Part 2A (Drinking Water) of the Health Act 1956 was repealed on 15th November 2021, so no longer includes reference to drinking-water regulatory activities. However, section 23 of the Health Act 1956 still provides the ability to develop bylaws to protect public health. The Local Government Act 2002 (Local Government Act) provides Council with the ability to make bylaws for the purpose of protecting, promoting and maintaining public health and safety. The Local Government Act also states it is an offence to pollute a public water supply and gives a Council the power to stop the supply to respond to an event that may endanger public health.

The following legislation and subsequent revisions of are also relevant:

- The *Health and Safety at Work Act 2015*
- The *Plumbing, Gasfitters and Drainlayers Act 2006*
- The *Resource Management Act 1991*

The Waimakariri District Council Water Supply Bylaw 2018 made under provisions of both the Local Government Act 2002 and the Water Services Act includes requirements for backflow prevention at the property boundary, in accordance with this policy. This, alongside the Water Services Act, are the primary mechanisms through which the Council can presently enforce its Backflow Prevention Policy. The Bylaw provides rules and enforcement mechanisms and enables prosecutions as required through the District Court. It requires an approved backflow prevention device or adequate air gap separation as applicable on all connections to a Council water supply.

2.3 Regulations

The New Zealand Building Code (NZBC clause G12) is contained in the Building Act First Schedule of the Building Regulation 1992 (referenced in Appendix 2 of this policy). Its provisions require water supply systems to be installed in a manner that avoids likelihood of contamination within the water supply network. It also identifies risks, hazards and introduces the requirement for IQP's (Independently Qualified Person) to test backflow prevention devices.

The following regulations and subsequent revisions of are also relevant:

- *Camping Ground Regulations 1985*
- *Food Regulations 2015*

2.4 Standards

BACKFLOW PREVENTION POLICY

The following standards or subsequent revisions are relevant to the prevention and risk management of backflow affecting public water supplies. These are:

- New Zealand Drinking Water Standards 2005 (revised 2018).
- AS/NZS 2845.1:2010 Water Supply: Backflow Prevention Devices: Materials, Design and Performance requirements.
- AS/NZS 3500.1:2021 Plumbing and Drainage: Water Services
- NZS 4541:2007 Automatic Fire Sprinkler Systems.
- New Zealand Backflow Testing Standard 2019: Field Testing of Backflow Prevention Devices and Verification of Air Gaps

2.5 Guidelines and Plans

The following guidelines and/or plans are relevant to managing the risk of backflow in the Waimakariri District:

- Boundary Backflow Prevention for Drinking Water Supplies 2019, published by Water NZ.
- National Code of Practice for Utility Operators' Access to Transport Corridors
- Waimakariri District Council Engineering Code of Practice
- Drinking Water Safety Plans have been prepared for the district water supplies. Drinking Water Safety Plans identify the barriers that are required to prevent contaminated water or other substances entering each scheme, including backflow prevention, avoidance of any cross connection, and other barriers such as mains location, testing and repair procedures, mains flushing, filtration and chlorination. Drinking Water Safety Plans also identify required improvements and their associated timeframes.

3. Definitions

Air Gap Separation is as a physical separation between the free flowing discharge end of a safe water supply pipeline, and the highest overflow level of the receiving vessel, used to prevent backflow.

Backflow is the unplanned reversal of flow of water or mixtures of water and contaminants into the water supply network.

Backflow Prevention Device means a device to prevent backflow of potentially contaminated water back into the public supply. These include:

- air gap devices (verifiable), as defined in the NZ backflow testing standard 2011;
- dual check valves (non-testable), as defined in AS/NZS 2545.1:2010;
- double check valves (DCV) (testable) , as defined in AS/NZS 2545.1:2010; and
- reduced pressure zone (RPZ) devices (testable), as defined in AS/NZS 2545.1:2010;.

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Back Pressure refers to a situation where the pressure in the downstream (customer's) plumbing is greater than the pressure in the water supplier's mains resulting in a reversal of normal flow direction and thereby possible contamination of the mains water.

Back Siphonage refers to a situation where the pressure in the water supplier's main is less than the pressure in the downstream (customer's) plumbing, resulting in a reversal of normal flow direction and potential contamination of the mains water by water being sucked back into the water supplier's main.

Backflow Surveyor is a person suitably qualified to identify the risk of backflow at any site and hazards present at the site, qualified as described in Appendix 6 of the *Boundary Backflow Prevention for Drinking Water Supplies*, 2019, published by Water New Zealand, or any subsequent revisions of that publication. The Backflow Surveyor must achieve all required Unit Standards as required at any time.

Boundary Backflow Prevention Device means any Backflow Prevention Device located at or near the point of supply as defined by the water supplier, usually close to the property boundary.

Certifying Plumber is a person licensed under the Plumbers, Gasfitters and Drainlayers Act 2006.

Connection means the service pipe from the Council's watermain to the point of supply that is owned and maintained by the Council and includes any pipes, valves, manifolds, water meters, backflow prevention device that is installed on the Council's side of the point of supply and the protection structure for any such backflow prevention device, and the water meter box.

Cross Connection means an actual or potential connection between the safe water supply and a non- safe water supply or pipework containing a contaminant, e.g. a public water supply to a rain water supply.

Customer means the owner of any property who has obtained the right to use, or direct the manner of use of, water supplied by the Council to any premises.

Extraordinary Supply means a category of an on demand supply including all purposes for which water is supplied other than ordinary domestic supply and which may be subject to specific conditions and limitations.

High Hazard Site means the premises at which any condition, device or practice is in place, is occurring, or has the potential to occur, which, in connection with the safe water supply system, has the potential to cause death. Examples of high hazard sites are referenced in Appendix 1.

Independent Qualified Person (IQP) means an Independent Qualified Person under the Building Act 2004. This person must be suitably qualified to test backflow prevention devices, assess hazards and provide written documentation. This person must also meet all requirements of Appendix 6 of the *Boundary Backflow Prevention for Drinking Water*

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Supplies, 2019, published by Water New Zealand, or any subsequent revisions of that publication. The IQP/ Backflow Tester must achieve all required Unit Standards that are required at any time.

Low Hazard Site means the premises at which any condition, device or practice is in place or is occurring which, in connection with the safe water supply system, would constitute a nuisance, by colour, odour or taste, but not injure or endanger health. Examples of low hazard sites are referenced in Appendix 1.

Medium Hazard Site means the premises at which any condition, device or practice is in place or is occurring which, in connection with the safe water supply system, has the potential to injure or endanger health. Examples of medium hazard sites are referenced in Appendix 1.

On Demand Supply means a supply which is available directly to the customer without restriction of flow from the point of supply subject to the agreed levels of service.

Ordinary Supply means a category of an on demand supply used solely for domestic purposes, excluding any identified extraordinary water use.

Point of Supply means the point where the connection meets the supply pipe and it marks the boundary of responsibility between the customer and the Council, irrespective of property boundaries.

Premises means:
(a) a property or allotment which is held under a separate certificate of title or for which a separate certificate of title may be issued and in respect of which a building consent has been or may be issued; or
(b) a building or part of a building that has been defined as an individual unit by a cross-lease; unit title or company lease and for which a certificate of title is available; or
(c) Land held in public ownership (e.g. reserve) for a particular purpose.

Restricted Supply (trickle feed supply) means a type of water supply where a limited flow is supplied by a flow control device, and storage is provided on-site by the customer to cater for demand fluctuations.

Safe drinking water as defined in the Water Services Act, means drinking water that is unlikely to cause a serious risk of death, injury, or illness,
(a) immediately or over time; and
(b) whether or not the serious risk is caused by –
    (i) the consumption or use of drinking water; or
    (ii) other causes together with the consumption or use of drinking water

Service Pipe means that section of water pipe between the water main and the point of supply that is owned and maintained by the Council.

Supply Pipe means that section of pipe between the point of supply and the customer's premises that is installed, owned and maintained by the customer.

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Water Supply Network means all the components of the Council water supply between the point of abstraction from the natural environment and the point of supply. This includes but is not limited to: wells, infiltration galleries, intake structures, open raw water storage ponds and/or lakes, falling mains, treatment plants, treated water reservoirs, trunk mains, service mains, rider mains, pump stations and pumps, valves, hydrants, scour lines, service pipes, connections, meters, backflow prevention devices and tobies.

4. Policy Objectives

This policy seeks to protect public health and safety by managing the risk of backflow to avoid contaminants from any private property entering the Council water supply network. The objectives of the policy are to:

1) protect public health and safety by effectively preventing backflow and appropriately managing situations where there is a risk of backflow occurring in order to adequately manage the risk; and
2) meet all relevant legislative requirements.

This policy seeks to achieve these objectives through the Water Services Act These documents allow Council to manage the risk of backflow from private properties into the Council water supply network either by requiring that the property owner install the required backflow prevention device/s, or by allowing Council to install the appropriate device and recover the associated costs.

The policy also seeks to:

- Protect the integrity and quality of the Council's water supply network by ensuring that unsafe water does not flow into the Council's water supply network.
- Protect safe water supplies from potential hazards by outlining requirements for installation, management and maintenance of backflow prevention devices.
- Identify the criteria where backflow prevention devices are required for low, medium or high hazard sites and the degree of protection required.
- Identify the requirements to install and test backflow prevention devices for all customers.
- Avoid cross-connection of safe water supplies with unsafe water supplies by establishing a framework which identifies and specifies responsibilities and actions that must be taken in situations where cross connection may occur.

5. Policy Statement

5.1 Application

All new and existing customers that will or currently receive a supply of safe water from the Council are required to comply with all of the requirements of this policy.

5.2 Backflow Prevention Requirements

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This section (5.2) outlines what level of protection is required at each site. Section 5.3 outlines how this is achieved at existing connections, and Section 5.4 outlines how this applies to new connections.

5.2.1 Low Hazard

Low hazard sites are required to have a non-testable dual check backflow prevention device in place at the property boundary. Backflow prevention devices for low hazard sites are required to be located on the Council's side of the point of supply and are contained within the toby at the point of supply, for standard connection sizes. These devices are owned and maintained by the Council.

5.2.2 Medium Hazard

This section applies to all medium hazard sites, with the exception of fire connections (refer section 5.2.4), or restricted connections (refer section 5.2.5).

Medium hazard sites are required to have a fully testable double check backflow prevention device at or as near as practicable to the property boundary at the point of supply.

The Council normally owns and maintains these devices. Typically standard 15 – 25mm diameter devices would be installed within the toby at the property boundary on the road reserve, and larger size devices up to 50mm in an above ground box. Standard Drawing 600-409B within the Council's Engineering Code of Practice shall be referred to for specific details and requirements. For connection sizes larger than 50mm, a specific design is required and shall be submitted to Council for approval

Location of Device

The device may either be installed immediately on the Council's side of the property boundary, as near as practicable to the property boundary, or immediately on the customer's side of the property boundary, within the road reserve, subject to agreement with the customer.

The decision regarding the most appropriate place to install the device must be made in conjunction with Council at the time the installation is being applied for / required, and will ultimately be at Council's discretion.

Installation of Devices

Devices shall be installed by an approved and suitably qualified Water Reticulation Worker, as defined in the Council's Hygiene Code of Practice for Work on Public Water Supplies.

Certification of Devices

Council shall be notified of all new devices immediately following installation, and Council shall organise the testing of the device by an IQP to ensure it has been installed and is

functioning correctly. Any faults identified during testing shall be rectified by the device owner.

Accessibility of Devices

All devices must be accessible for testing at all times

5.2.3 High Hazard

This section applies to all high hazard sites, with the exception of fire connections (in which case Section 5.2.4 applies), or restricted connections (in which case 5.2.5 applies).

Nature of Device

All high hazard sites are required to have reduced pressure zone backflow prevention devices installed. For common connection sizes (15 to 50mm internal diameter), this shall be constructed in accordance with the Standard Drawing 600-409A within the Council's Engineering Code of Practice. For connection sizes larger than this, specific design will be required, and shall be submitted to Council for approval.

Location of Device

The device may either be installed immediately on the customer's side of the property boundary, as near as practicable to the property boundary, or immediately on the Council's side of the property boundary within the road reserve, subject to Council approval.

The location relative to the property boundary is important with respect to the Building Act, as the Building Act applies to devices within the private property, but not to devices outside of the property boundary. The decision regarding the most appropriate place to install the device must be made in conjunction with Council at the time the installation is being applied for / required, and will ultimately be at Council's discretion. The device must be located above ground, protected by a suitable chamber or barrier/bollards, with lockable access to protect the device from physical damage.

Installation of Devices

Devices shall generally be installed by a Certifying Plumber.

Certification of Devices

Council shall be notified of all new devices immediately following installation, and Council shall organise the testing of the device by an IQP to ensure it has been installed and is functioning correctly. Any faults identified during testing shall be rectified by the device owner.

Accessibility of Devices

All devices must be accessible for testing at all times

BACKFLOW PREVENTION POLICY

Ownership of Device

All high hazard devices shall be owned by the property owner, unless specific agreement is made otherwise.

A scenario in which a high hazard device may be owned by Council, is one in which the device is installed by Council on the Council side of the Point of Supply under Section 27 of the Water Services Act. It is noted however under this scenario, while Council would own this device, Council could recover any costs associated with this device from the relevant property owner, in accordance with the Water Services Act.

5.2.4 Fire Connections

All Fire Systems must comply with Section 2.2 of Part 2: Code of Practice in Boundary Backflow Prevention for Drinking Water Supplies 2019, published by Water New Zealand. Key requirements from this code are outlined below.

- Fire sprinkler systems fed solely from the water supply without auxiliary water supplies must have a double check valve assembly installed.
- Systems containing hazardous additives used for firefighting (foam or antifreeze) must have reduced pressure zone devices installed.
- Backflow prevention devices associated with fire systems shall be installed in the sprinkler valve house, or other secured environment approved by the water supplier.
- In accordance with NZS 4541 Automatic Fire Sprinkler Systems, all valves on a connection serving a sprinkler system (other than a domestic sprinkler system) shall be alarmed and/or monitored for unauthorised operation. The exception to this is the underground sluice valve at the public main connection, which does not require monitoring.

5.2.5 Restricted Supplies

Customers receiving a restricted supply of water from a Council water supply are required to provide an adequate air gap separation to prevent backflow from a privately owned water storage tank entering the Council's water supply network. In addition the Council also provides and maintains boundary non testable single check backflow prevention devices on the Council's side of the point of supply.

Air gaps on private water storage tanks shall comply with Section G12 of the New Zealand Building Code, as outlined on Standard Drawing 600-403 of the Council's Engineering Code of Practice.

5.2.6 All Connection Types

BACKFLOW PREVENTION POLICY

The customer shall not interfere with any approved boundary backflow prevention device in any way. The customer must ensure the Council will always have easy access to the device for the purposes of testing, monitoring or inspection as applicable.

There shall be no bypassing of boundary devices other than with another approved device.

Parallel devices may be used to ensure continuity of supply during testing of devices, such that the main device can be bypassed by a secondary device, and visa versa, to allow testing of both devices to be conducted without interruption to supply. If a customer wishes to minimise any disruptions to supply during testing, by installing parallel devices, the additional device shall be installed at the customer's cost, regardless of the hazard class and device type required.

5.3 Present Practice and Existing Customers (Retrofitting)

This section sets out the processes that will be followed, and how costs will be apportioned, for customers who have existing connections that do not currently have the required devices installed to meet the requirements of Section 5.2.

5.3.1 Low Hazard

The Council will inspect and ensure all low hazard sites have an approved boundary backflow prevention device as part of the toby manifold located at the point of supply. These costs will be met by Council.

5.3.2 Medium Hazard

This section applies to all medium hazard sites, with the exception of fire connections (refer section 5.3.4), or restricted connections (refer section 5.3.5).

The Council will identify and ensure all medium hazard sites have an approved device located at the property boundary (in accordance with Section 5.2.2). The Council will install these devices. Initial upgrades of devices for existing customers with connection sizes up to 25mm will be funded by the Council.

Devices for larger connections (>25mm) are required to be funded by the property owner, with a subsidy from Council. The subsidy provided will be equal to the estimated value of a standard connection size (up to 25mm), and the property owner covering the 'extra-over' costs associated with the increase in size.

Devices will thereafter be owned and maintained by the Council.

5.3.3 High Hazard

This section applies to all high hazard sites, with the exception of fire connections (refer section 5.3.4), or restricted connections (refer section 5.3.5).

BACKFLOW PREVENTION POLICY

Council will identify and ensure all high hazard sites have an approved device located at the property boundary (in accordance with Section 5.2.3). As high hazard boundary devices are required to be owned by the property owner, the costs associated with their installation shall be met by the property owner. The process for ensuring requirements at all high hazard sites are met are:

- The Council shall survey existing properties to determine their hazard class.
- Where it is determined that a property meets the criteria of a high hazard property, the property owner will be required to fund the installation of an appropriate backflow prevention device.
- In general, installation of devices shall be completed by the property owner engaging a Certifying Plumber to complete the installation immediately on the private side of the boundary (at the property owner's cost), downstream of the point of supply, in accordance with the requirements set out in this Policy.
- Installations on the public side of the property boundary may only be done with approval from the Council. Circumstances where this may be approved would be:
    - if there is no feasible location on the private side of the boundary (i.e. if the building is built right up to the property boundary). In this case, the device would still be owned by the property owner. Or;
    - where the provisions in the Water Services Act are exercised whereby the Council can complete the installation on the Council side of the boundary without requiring prior approval of the property owner, with the Council becoming the owner of this device, while still retaining the right to recover costs associated with this from the property owner.

5.3.4 Fire Connections

The Council will inspect and ensure all fire connections have approved boundary backflow prevention devices, in accordance with 5.2.4.

The process for ensuring requirements at sites with dedicated fire connections are met are:

- The Council shall survey existing properties with fire connections to determine their hazard class.
- The appropriate device type (double check valve, or reduced pressure zone device) shall be selected as per 5.2.4. In general, installation of these devices shall be completed by the property owner engaging a Certifying Plumber to complete the installation at the property owner's cost, downstream of the point of supply, in accordance with the requirements set out in this Policy.
- Installations on the public side of the property boundary may only be done with approval from the Council. Circumstances where this may be approved would be:
    - if there is no feasible location on the private side of the boundary (i.e. if the building is built right up to the property boundary and it is not feasible to install it within the sprinkler valve house within the building). In this case, the device would still be owned by the property owner. Or;
    - where the provisions in the Water Services Act are exercised whereby the Council can complete the installation on the Council side of the boundary

without requiring prior approval of the property owner, with the Council becoming the owner of this device, while still retaining the right to recover costs associated with this from the property owner.

5.3.5 Restricted Supplies

The Council will inspect and ensure all restricted connections have an approved single check (non-testable) boundary backflow prevention device as part of the toby manifold located at the point of supply. These costs will be met by Council.

In addition, the customer is required to provide a registered air gap within the water storage tank on the customer's property. There are to be no cross connections in between the toby manifold and the customer's tank. In order to verify the suitability of air gaps at private tanks, the Council may:

- Inspect private tanks to confirm the presence and suitability of an air gap.
- Require that the necessary overflow pipes be installed to create an air gap, where it is not already present or adequate.
- Carry out formal verification of the air gap in accordance with the NZ Backflow Testing Standard 2011, if deemed necessary.

5.4 Future / New Connections

General Requirements

This section outlines processes to be followed to ensure adequate backflow prevention is applied to properties that apply for new connections to the Council supply. This should be read in conjunction with the Council's Water Supply Bylaw, which covers general procedures for assessing new connection applications.

As part of the new connection application, the customer must provide information as to the activities they will be undertaking on their property, which the Council will use to assign an appropriate hazard class to that property.

The applicant shall then cover the costs of an appropriate device to be installed, which shall be identified in accordance with Section 5.2 of this Policy.

New connections may also need to comply with Building Consent requirements, where applicable.

For Fire Connections, these devices will be subject to Building Consent requirements, and shall be included on the building's compliance schedule for its annual Building Warrant of Fitness.

5.5 Change of Use of Water Supply

General Requirements

BACKFLOW PREVENTION POLICY

In any situation where the customer proposes to change the water use at any premises that would result in a revised backflow risk category, the customer must notify the Council in writing of the proposed new water use. If the customer is in doubt, it is recommended that they get in contact with the Council to clarify.

The Council will then assess and confirm in writing the revised hazard class for that property. If a new device type is required to be installed, the costs of installing the new device and removing the old device shall be met by the customer. The device shall be selected and installed in accordance with Section 5.2.

New connections may also need to comply with Building Consent requirements, where applicable.

5.6 Maintenance and Replacement of Damaged Devices

The Council will repair any damaged medium or low hazard backflow prevention device owned by Council. The Council may repair or replace any damaged high hazard device owned by the customer and charge the customer for this work, or allow the customer to complete the repairs to the satisfaction of the Council. If repairs are not completed within the timeframe specified by Council, Council may undertake the repairs and recover costs from the customer.

5.7 Specification and Manufacture of Boundary Backflow Prevention Devices

5.7.1 Specification of Devices

The following table specifies the minimum required backflow prevention devices to be used in relation to the assessed level of hazard and risk presented by a customer's use of water from a Council water supply.

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POLICY

Water

BACKFLOW PREVENTION POLICY

Assessed Level of Hazard Risk / Type of Connection	Property boundary device at point of supply	
	Council Side	**Customer Side**
Low[1]	Dual check valve (Council owned)	
Medium	Double check valve (Council owned)	
High[2]	Isolation valve[3] (Council owned)	Reduced pressure zone valve (Customer owned)
Restricted	Single check valve (Council owned)	Registered air gap (Customer owned)
Dedicated Fire Connection: Medium	Isolation valve (Council owned)	Double check valve (Customer owned)
Dedicated Fire Connection: High	Isolation valve (Council owned)	Reduced pressure zone (Customer owned)

Note 1: Only dual check valves required for low hazard sites or customer's receiving restricted supplies may be non-testable. Any double check valve or any other device required for a medium or high hazard site or for fire connections must be fully testable.

Note 2: In certain circumstances the Council may install a reduced pressure zone backflow prevention device on the Council side, in accordance with the Water Services Act.

Note 3: For smaller sized connections (<25mm), a standard toby manifold shall be used on the Council side of the point of supply as the isolation valve, for larger connections (>25mm), a standard isolation valve shall be used rather than a toby manifold.

The Council will specify and approve the type of backflow prevention device that is to be used for each customer subject to assessment of the customer's actual or proposed water use activities and the associated assessed degree of risk of backflow from those activities. The devices to be approved will be rated according to the highest assessed risk at that site.

Non dedicated fire connections will not be permitted.

Only an IQP who is also a Certifying Plumber, appointed to undertake this function by the Council, can install a boundary backflow prevention device that is located on private property.

5.7.2 Manufacture of Backflow Prevention Devices

All backflow prevention devices used in the Waimakariri District must be manufactured in accordance with AS/NZS 2845.1 Water Supply: Backflow Prevention Devices: Materials, Design and Performance Requirements.

5.7.3 Installation of Boundary Backflow Prevention Devices

BACKFLOW PREVENTION POLICY

Device installation will comply with the Part 2- Code of Practice for Boundary Backflow Prevention within the Water New Zealand document "Boundary Backflow Prevention for Drinking Water Supplies" published by Water New Zealand, Sections 2.1 – 2.2. The Standard Drawings within the Council's Engineering Code of Practice shall be referred to for specific details and requirements.

Devices installed on a fire connection shall be New Zealand Insurance Council approved.

5.8 Fire Hydrant Standpipes / Temporary Connections

Where contractors require to take water from the Council system, they shall do so from an approved 'Tanker Filling Point' which are dedicated hydrants throughout the district installed for this purpose, with permanent RPZ installations upstream of the hydrant to protect the public supply from contamination. A permit from the Council is required to access these Tanker Filling Points.

Where it is not practicable to use a tanker filling point, contractors may apply to the Council to take water from a hydrant, which will be considered on a case by case basis, at the discretion of Council staff. Generally, where approval is given to access a hydrant that is not at a Tanker Filling Point, the process to access shall include the Council providing an RPZ fitted to a standpipe to the contractor to ensure protection of the public supply is achieved. The Council may recover costs associated with the supply of the RPZ / standpipe, and any other supervision of this activity.

5.9 Property Boundary Device Inspecting and Testing

The Council will test all backflow prevention devices on the property boundaries of high and medium hazard sites at least once every year, except for fire connections. Fire connections are tested under the building WoF.

The Council will inspect the non-testable devices at low hazard sites from time to time as required in response to identification of issues or as a part of its general water supply network maintenance programme.

All testing of backflow prevention devices will be performed by an Independent Qualified Person (IQP) as specified under the *Building Act.* This person must be suitably qualified to test backflow prevention devices, assess hazards and provide written documentation. All testing will be in accordance with Section 2.3 of the Code of Practice for Boundary Backflow Prevention in *Boundary Backflow Prevention for Drinking Water Supplies 2019* published by Water New Zealand, or any subsequent revision to that document.

Testing will be undertaken at each of the following times:

- Immediately after any device installation
- On completion of any maintenance work
- After a backflow or suspected backflow incident (medium and high hazard devices)

- At the request of an Environmental Health Officer, Building Consent Officer or Building Inspector, Dangerous Goods Inspector, the Water Asset Manager, 3 Waters Manager or the Water Unit Manager.
- All registered air gaps shall may also be inspected and verified, up to annually.

Where continuous supply is needed, two devices in parallel will be required to enable testing to be carried out without interruption of flow. The additional device will be provided by the customer at the customer's expense.

5.10 Backflow Prevention Risk Assessment

The risk and backflow hazards at each property will be assessed by a qualified Backflow Surveyor who will meet all of the required Unit Standards and other requirements for Backflow Surveying (see policy definitions).

5.11 Enforcement and Disputes

The Council may disconnect or restrict the customer's water supply if the customer fails to meet any of the requirements of this policy, in accordance with enforcement provisions outlined in the Local Government Act and the Council's Water Supply Bylaw 2018. The Council will make every effort to give notice of an intention to disconnect, in accordance with the degree of risk presented by that customer, and the period specified in the notice shall not be longer than 30 days. The customer will have the time specified in the notice to rectify the situation to the satisfaction of the Council.

Alternatively the Council may install a device that is required to manage the backflow hazard generated by a customer and recover costs of device purchase, installation and testing from that customer, in accordance with Section 27 of the Water Services Act .

In the event however that a potentially serious hazard to the water supply exists then the Council may disconnect the supply immediately. Reconnection to the supply shall not be undertaken until the appropriate remedy has been made by the customer. All costs associated with remedying the problem must be met by the customer.

If a dispute arises over the level of risk, or the type of backflow prevention device required at the property boundary, then the Water Unit Manager, 3 Waters Manager or Water Asset Manager shall nominate the device to be used. If the level of risk is unclear or unknown then a reduced pressure zone backflow preventer shall be installed.

Contamination incidents will be managed and addressed in accordance with any Drinking Water Safety Plan that has been adopted for any Council water supply scheme.

5.12 Exemptions

In particular circumstances a backflow prevention device may be approved that is appropriate to manage the level of assessed risk to the Council's water supply network, where it differs from other requirements within this policy. An exemption to any requirement

of this policy may be granted in writing only at the discretion of the Manager Utilities and Roading.

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5.13 Documentation

The Council will develop a register of backflow prevention devices in place at all high and medium sites. The register will indicate the type of device and whether it is located on the Council's or customer's side of the point of supply. If the latter, the exact location of the device (e.g. outside or inside a building and exact location within a building) will be recorded.

Results of all tests and maintenance undertaken on each device will also be recorded.

6. Links to Other Council Policies and Community Outcomes

6.1 Water Supply Bylaw

This policy outlines the approach the Council will take in giving effect to the Waimakariri District Water Supply Bylaw 2018. The Water Supply Bylaw Section 15 contains provisions to manage backflow in the Waimakariri District. This policy will be used as a tool to assist the Council to effectively implement the approach to backflow prevention outlined in the Bylaw.

6.2 Community Outcomes

This policy gives effect to the following outcome:

- Core utility services are sustainable, low emissions, resilient, affordable; and provided in a timely manner

7. Adopted by and Date

This policy was first adopted at a meeting of the Council on 6 May 2014.

This policy was updated and adopted at a meeting of the Council on 5 April 2022.

8. Review

This policy will be reviewed within five years of the date of its adoption, by April 2027.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	EXT-01-13/220325044452
REPORT TO:	COUNCIL
DATE OF MEETING:	5 April 2021
AUTHOR(S):	Simon Markham, Manager Strategic Projects
SUBJECT:	Approval of Council Submission on Draft ECan Annual Plan 2022/2023
ENDORSED BY: (for Reports to Council, Committees or Boards)	Department Manager / Chief Executive

1. SUMMARY

1.1. This report seeks Council approval of a submission on the draft ECan Annual Plan for 2022/2023. Proposed key submission points have previously been circulated for comment.

1.2. The most significant proposal being made by Ecan is in relation to the public transport fare structure. This would, if approved be the key driver for a proposed 24.1% lift in total rating revenue. The draft submission addresses the cost effectiveness of this proposal at this time.

Attachments:

i. Submission to Environment Canterbury In the matter of the Draft Annual Plan 2022/2023 by Waimakariri District Council (220324044291)

2. RECOMMENDATION

THAT the Council

(a) **Receives** Report No. 220325044452.

(b) **Approves** the draft submission, as may be amended, to ECan's Draft 2022/23 Annual Plan

(c) **Notes** that the submission seeks for the Council to be heard at hearings on 26-29 April 2022.

3. BACKGROUND

3.1. The Canterbury Regional Council (ECan) released their draft Annual Plan for 2022/23 on 2 March with submissions closing on 3 April (an extension for Council to confirm its submission at its 5 April meeting and lodge that day has been granted).

3.2. Both 'All Boards' and Council have been briefed by ECan Councillors on the Draft Plan. A number of questions on the Plan have been asked of ECan via those Councillors and answers received. A set of Briefing slides summarising plan proposals and proposing points of submission in response have been prepared by staff and circulated for comments. That feedback has been incorporated into the Draft submission.

4. ISSUES AND OPTIONS

4.1. The draft Council submission raises concerns about the affordability and cost effectiveness of preferred proposals that give rise to the proposed 24.1% rise in rates revenue off the back of the 12.8% rise approved by ECan for 2021/22.

4.2. Over the last 6 years ECan's targeted uniform urban public passenger transport rate in the Waimakariri District has/would (if the preferred proposal was adopted) rise by +247%. While service levels have improved over this time, proportionately they have/will not change anywhere near this level of cost increase.

4.3. The draft submission comprehensively reviews the bus fares (re)structure proposal and finds overall option 2 – a flat $2 fare across Greater Christchurch to be the most cost effective of those promoted and most likely to return benefits to Waimakariri residents.

4.4. The draft submission considers the proposed cost share and general rates funding of regional flood recovery and protection works and raises a number on concerns about its formulation, such that it would be unhelpful if it were seen as a precedent setting funding formulae.

4.5. The Regional Council's Draft 2022/23 Annual Plan also seeks feedback on a proposal for future establishment of a levy to fund action in response to climate change. The lack of specificity in relation to this proposal hinders appreciating its merits. This very important topic demands a much more rigorous assessment and level of documentation into a proposal that can meaningfully be considered.

Implications for Community Wellbeing

There are implications for community wellbeing by the issues and options that are the subject matter of this report.

4.6. The draft submission does not dispute that many in the community are 'doing it tough' and fare concessions would be of assistance. But Government is shortly to implement significant changes to superannuation payments, benefit rates and minimum wages.

4.7. It also has announced a 'trial' of significant public transport fare concessions. In Budget 2022 it has signalled funding arrangements to begin implementation of the 'in tandem to be announced' National Emissions Reduction Plan are likely.

4.8 The draft submission urges ECan to pause on fare structure changes until such time as the national policy environment has clarified, the relevant local policy analysis is advanced, and the community has had a meaningful opportunity to consider alternative options for or to bus services for achieving the ends ECan is seeking.

4.8. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. **Mana whenua**

Te Ngāi Tūāhuriri hapū are likely to be affected by, or have an interest in the subject matter of this report. In the time available to prepare this submission it has not been practical to discuss this matter with Rūnanga representatives.

5.2. **Groups and Organisations**

There are groups and organisations likely to be affected by, or to have an interest in the subject matter of this report.

Community Boards have taken a keen interest in the proposed ECan Draft Annual Plan for 2022/23 and may submit in their own right.

5.3. **Wider Community**

The wider community is likely to be affected by, or to have an interest in the subject matter of this report.

ECan have invited feedback from the wider Canterbury community on the draft Annual Plan for 2022/23.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. **Financial Implications**

There are financial implications of the decisions sought by this report.

At a proposed 24.1% average rates rise in 2022/23, there are significant costs on the rate paying community.

6.2. **Sustainability and Climate Change Impacts**

The recommendations in this report do have sustainability and/or climate change impacts.

The draft submission reviews the cost effectiveness of ECan's preferred public transport fare proposal in relation to CO2 emissions. Option 1 in 23/24 is most favourable citing 1,360 Tonnes reduction.

Data from the *Ōtautahi Christchurch Climate Change Strategy 2021* suggests that Christchurch City's total gross greenhouse gas emissions were 2.72 million tonnes of carbon dioxide equivalent (tCO2-e) (no data for WD and SD available), with 36% from land transportation or 979,200 tCO2-e.

The above cited reduction is equivalent to 0.14% of ChCh land transport emissions costing $10.4M and is not regarded as cost effective. .

6.3 **Risk Management**

There are risks arising from the adoption/implementation of the recommendations in this report.

There is a risk that the separate and distinct rates between the Regional Council and the Territorial Authorities in Canterbury would not be appreciated by the ratepayers of the region and reputational damage is done to this Council and local government by such a large increase in rating over two years (+34%).

6.3 **Health and Safety**

There are not health and safety risks arising from the adoption/implementation of the recommendations in this report.

7. CONTEXT

7.1. **Consistency with Policy**

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. **Authorising Legislation**

Local Government Act 2022 Part 6 Planning, decision-making, and accountability.

7.3. **Consistency with Community Outcomes**

The Council's community outcomes are relevant to the actions arising from recommendations in this report:

The Council makes known its views on significant proposals by others affecting the District's wellbeing

7.4. **Authorising Delegations**

The Council must approve a submission in its name to external bodies.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	BAC-03-38 / 220317038835
REPORT TO:	COUNCIL
DATE OF MEETING:	5 April 2022
AUTHOR(S):	Vanessa Thompson – Business and Centres Advisor Simon Hart – Strategy and Business Unit Manager
SUBJECT:	Commercial Share Scooters Trial Results
ENDORSED BY: (for Reports to Council, Committees or Boards)	Department Manager / Chief Executive

1. SUMMARY

1.1 The purpose of this report is to seek approval from Council to continue commercial scooter share operations in the Waimakariri District, primarily located in Rangiora, Kaiapoi, Woodend and Pegasus.

1.2 A yearlong permit will be offered to Flamingo Scooters covering 1 May 2022 to 30 April 2023 for up to 300 scooters. The permit provides Flamingo Scooters with permission to operate commercially in the Waimakariri District while detailing their responsibility for all operational aspects of the service.

1.3 Staff recommend that a permit fee of up to 10 cents per ride be returned to the Council to cover related service expenditure such as the reinstatement of public assets (pavement surfaces and the like) resulting from any acts of deliberate vandalism in the public realm.

1.4 This report also includes trial data gathered between a timeframe covering 1 November 2021 to 20 March 2022.

- A total of 20,791 rides have occurred across the District (approximately 1,039 rides per week on average) since the trial's commencement.
- 37,000+ kilometres of travel has occurred between 2,500 users.
- Rides are 9.5 minutes long travelling around 1.85 kilometres on average.
- The top user demographics are 18-24 years (37%), 25-34 years (37%) and 35-44 years (16 %).
- Riders accessing Flamingo's discount plans (students, Community Card and Gold Card Users, Veterans) have saved $7,000 collectively on their rides.
- 61 complaints were received between Council and Flamingo's customer services portals (which is considered low in proportion to the total rides that have occurred).

1.5 Community feedback about the trial gathered through virtual surveys show that: 30% of rider respondents would have used some form of motor vehicle if a scooter wasn't available (Flamingo Scooters, 2022) while 60.9% of rider respondents used the scooter as a transport device to/from a destination for their last ride and 68.8% would have used a car if a scooter wasn't available (Waimakariri District Council, 2022). 58% of survey respondents also noted their desire to see commercial hire scooters retained as an alternative transport solution with the District (Waimakariri District Council, 2022).

1.6 Direct feedback received from the Waimakariri Access Group and members, plus a member of the Age-Friendly Advisory Group reference concerns with scooters being left across footpaths and causing obstructions for community members (particularly those with mobility issues and the vulnerable) and the need for more careful monitoring/repositioning

of scooters by Flamingo staff, amongst other considerations. Staff have noted some associated actions in the recommendations section of this report in consideration of these concerns.

1.7 Generally, the trial has been considered successful meeting the majority of key performance indicators previously set in the original trial permission report approved by Councillors on 7 September 2021.

Attachments:

i. None

2. RECOMMENDATION

THAT the Council:

(a) **Receives** Report No. 220317038835.

(b) **Notes** the aggregated scooter trial data that has been provided and where aspects of key data is consistent across Flamingo Scooters and Ride Reports data capturing platforms;

(c) **Notes** the community feedback which has been included and is sourced from both Flamingo Scooters and the Waimakariri District Council primarily in the form of surveys and/or direct feedback from affected community organisations;

(d) **Approves** a twelve month permit being offered to Flamingo Scooters to continue commercial scooter services in the Waimakariri District covering a timeframe from 1 May 2022 to 30 April 2023 for up to 300 scooters;

(e) **Approves** an extension of a permit term by an additional twelve months for any selected provider (to conclude 30 April 2024) at the Chief Executive's discretion under Council delegation if the first twelve month operating period continues successfully;

(f) **Approves** a permit fee of up to 10 cents per ride for every ride taken on a commercial share scooter in the Waimakariri District. This fee may be reviewed beyond the initial yearlong permit term at the Chief Executive's discretion;

(g) **Approves** geo-fencing restrictions for the trial continuing across the new permitting period, except access across the Ravenswood/Pegasus roundabout will be permitted;

(h) **Notes** the permit fees are intended to cover any superficial public realm reinstatement costs that would otherwise have come out of Greenspace or Roading Unit operational budgets as a result of scooter misuse/vandalism by members of the public;

(i) **Notes** that Flamingo Scooters or future alternative providers will be responsible for covering all operational costs to ensure the continuity of their business operations and service levels when operating in the Waimakariri District and no financial operating contribution is required from Council;

3. BACKGROUND

3.1. The Rangiora Town Centre Strategy Blueprint to 2030+ was adopted by Council on 7 July 2020. The idea of alternative transport modes for the District was imbedded as Major Project 9 which outlined an action over the short to long term: *work with providers and partners to facilitate the use of alternative transport modes, including future transport technologies, through provision of an appropriate built environment and regulatory framework.*

3.2. At a Council briefing on Tuesday 27 October 2020, Councillors approved staff progressing a commercial scooter trial in the Waimakariri District with oversight from the Town Centres Strategies Implementation Programme Working Group (TCSIPWG) to work through a range of trial parameters before any formal report was brought back to Council. The intention was to complete a six month trial covering October 2020 to March 2021.

3.3. At the approval of the TCSIPWG, a formal Request for Proposal (RFP) process was undertaken across late December 2020 to 12 February 2021 to canvas interest from commercial operators. An RFP document was released to five providers: Flamingo, Lime/Jump, Neuron, Bean and Lava. Only one proposal was received by the submission deadline date.

3.4. Staff and TCSIPWG members assessed the proposal in late February 2021 according to the RFP evaluation criteria. The commercial suppler, Flamingo Scooters (Flamingo), was deemed a suitable provider and met the pre-condition requirements. Staff were approved to continue conversations with Flamingo to outline some key considerations before the full trial parameters were brought back to Council for formal approval.

3.5. On 4 May 2021 Council approved 'in principle' a District trial of up to 400 scooters noting that under this scenario Flamingo would cover all trial infrastructure and operational costs and there would be no expectation of a significant financial contribution by Council.

3.6. In May and June staff engaged with the Waimakariri Access and Age Friendly Groups as well as the Youth Council so their feedback could be considered and reflected (where appropriate) in any trial planning.

3.7. From mid-July to early August staff sought Community Board feedback on the proposed scooter trial and all Community Boards were supportive of the trial with board member feedback (where possible) being implemented as part of any trial conditions for the District.

3.8. On 7 September 2021 Councillors formally approved a six month trial of up to 400 commercial scooters in the Waimakariri District (Rangiora, Kaiapoi, Woodend and Pegasus) with Flamingo as the operator.

3.9. The scooter trial commenced on 1 November 2021.

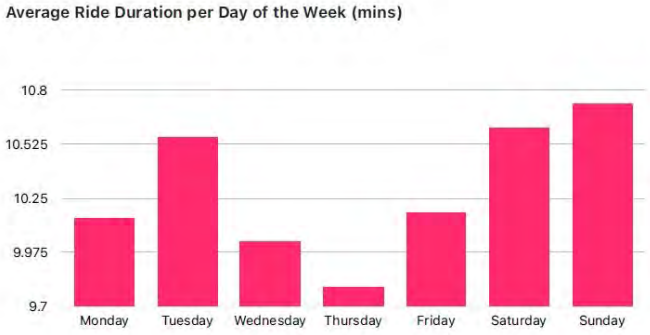
4. ISSUES AND OPTIONS

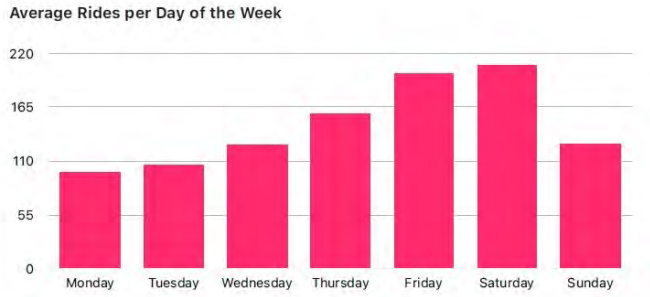
TRIAL DATA:

4.1. Key trial data covering a period from 1 November 2021 to 20 March 2022:

- 130 scooters deployed per week across the District*
- 20,791 total rides across the District (1,039 rides per week*)
    - 13,419 rides Rangiora (671 rides per week*)
    - 4,962 rides Kaiapoi (248 rides per week*)
    - 730 rides Woodend (37 rides per week*)
    - 1,624 rides Pegasus (81 rides per week*)
    - 10 rides Passchendaele Memorial Cycle Path
    - 37 rides Rangiora Woodend Road Cycle Path
    - 9 rides other (miscellaneous)
- 65% of rides have occurred in Rangiora, 24% in Kaiapoi, 3.5% in Woodend and 7.8% in Pegasus.
- 9.5 minute duration for each ride*
- 1.85 kilometres' distance for each ride*
- 37,000+ kilometres of travel
- 2,500 users
- User demographics
    - 18-24 years 37%
    - 25-34 years 37%
    - 35-44 years 16%
    - 45-54 years at 8%
    - 55 to 64 years 2%
    - 65+ years 0%
- 15% of rides in Waimakariri have been made utilising Flamingo's community plans (Student, Community Card and Gold card users) representing a savings of $7,000 for these riders collectively.

**as an average*





Figures 1 & 2 source: Flamingo Scooters Waimakariri Trial Report, March 2022.

COMMUNITY FEEDBACK:

Complaints

4.2. General data collected from the Council and Flamingo's public facing platforms has provided insight into key areas of feedback from the community.

E-Scooter Trial Community Feedback (1 November 2021 to 20 February 2022)

		Waimakariri District Council Service Requests		Flamingo Scooters Direct Feedback		
Month	**Crashes**	**Urgent Safety Issues**	**Parking Complaints**	**Parking Complaints**	**Riding Complaints**	**Other Complaints**
November 2021	1	2	5	4	1	2
December 2021	2	1	6	8	1	0
January 2022	2	2	5	9	0	0
February 2022	1	2	2	5	0	0
Total	**6**	**7**	**18**	**26**	**2**	**2**

4.3. 61 complaints were received between Council and Flamingo's formal customer service portals. If representing the complaints as a percentage of the total rides, this would represent 0.3% of the all rides, so the number of reports is considered to be very low.

Referred to Flamingo Scooters from the Waimakariri District Council

4.4. Urgent safety issues

Type: Primarily related to scooters being parking in locations that caused obstructions, particularly for those with access issues. Also relates to underage riders on scooters (sometimes multiple young riders on one scooter).

Corrective measures: Flamingo Scooters contacted riders to educate them on correct parking and arranged the immediate relocation of nuisance scooters. In the instances of children or teens riding scooters (i.e. not 18+ years) the account holder (usually a parent) was contacted and educated on correct scooter usage. In a couple of instances with

underage riding, the Council's Communications Unit pushed out social media posts to remind the community that scooters are for 18+ riders only.

4.5. Parking complaints
Type: Related to scooters being parking in locations that caused obstructions.
Corrective measures: Flamingo Scooters contacted riders to educate them on correct parking and arranged the immediate relocation of nuisance scooters.

Referred to Flaming Scooters from the community:

4.6. Parking Complaints
Type: Related to scooters being parking in locations that caused obstructions.
Corrective measures: Flamingo Scooters contacted riders to educate them on correct parking and arranged the immediate relocation of nuisance scooters.

4.7. Riding Complaints
Type: Related to poor riding behaviour that was noted by a community member.
Corrective measures: Flamingo Scooters contacted rider/s to provide riding education and/or disabled user accounts where necessary.

4.8. Other Complaints
Type: Mainly related to minor damage to public infrastructure as a result of inappropriately used scooters.
Corrective measures: Resolved internally within Greenspace Unit operational budgets in terms of repair/reinstatement of the assets. Additional restriction/No Riding Zones added to some key areas like Matawhai Park and Acacia Avenue, Rangiora High School etc.

4.9. Accidents/Crashes
Type: All accidents were related to falls from the scooters – four minor and two moderate. On investigation by Flamingo Scooters, the accidents were primarily noted as a result of rider error, i.e. using the scooters inappropriately and breaking them, making poor judgement calls around use or not familiarising themselves with the scooters (i.e. such as testing the brakes) before going on a full length ride at speed.
Corrective measures: Flamingo Scooters followed up with each rider to see that they were okay and to investigate the situations leading up to the accidents. Scooters involved in the accidents were immediately disabled, removed and inspected for damage/repaired. Flamingo undertook a follow up process with Waimakariri District Council on investigation outcomes/actions and infrastructure repair/maintenance to the Council's satisfaction.

Surveys and Facebook

4.10. Flamingo recently surveyed over 300 of their Waimakariri District riders about their **last scooter ride** to ascertain how Flamingo might have changed their travel habits. Results were as follows:

- 21.2% of trips being to/from a dining or entertainment location
- 12.1% being to/from a social or recreational activity
- 10.5% being to/from work or school
- 58.6% of respondents made a trip they otherwise wouldn't have made without a Flamingo scooter
- 30% would have used some form of motor vehicle if a Flamingo scooter wasn't available
- 11.7% said they would not have travelled if it wasn't for the availability of a Flamingo Scooter
- 46% of respondents agreed that Flamingo makes it easier for them to not own a vehicle in the Waimakariri District, while 32.2% remained neutral

4.11. The Waimakariri District Council completed online surveys from 21 February to 7 March and then again from 10 March to 22 March to gather general community feedback about the trial. The Bang the Table scooter survey page received 213 visitors plus 163 total responses. Full copies of the consultation survey and individual responses are available at Trim 220323042940 and 220324044227.

- 39.3% of respondents (64 people) had ridden a Flamingo Scooter during the trial
  - The following number of trips per rider were taken – 37.5% (1-5), 21.9% (6-10), 20.3% (11-20), 20.3% (20+).
  - The primary reason to ride an e-scooter – 34.4% (fun/recreation), 4.7% (to try the technology), 60.9% (as a transport device to/from a location)
  - For those respondents that used the scooters as a transport device, the following methods of travel would have been used most often if a scooter wasn't available – 68.8% (car), 6.3% (bike), 21.9% (walking), 1.6% (bus), 1.6% (other)
- 58% of respondents said they would like to see commercial hire scooters retained as an alternative transport solution within the District while 42% disagreed.

4.12. A sample of survey commentary includes:

Negative feedback (consolidated into key themes):

- Careless discarding of scooters generally, or in dangerous, inappropriate and unsightly places or on private property
- Scooters are an eyesore and untidy in our towns, they can appear damaged at times
- Pedestrians shouldn't have to jump out of the way as soon as they see scooter riders coming towards them
- Causing obstructions by blocking footpaths, driveways, access ways, sometimes meaning people have to go on the road to get around them
- Scooter riders should wear helmets
- Interface with traffic/intersections concerning
- Teenagers misusing them, overload them with multiple people
- Vandalism – burn out marks on private driveways etc.
- Riders who do not exercise due care for pedestrians when using them
- Making footpaths unsafe, particularly for those with mobility issues or the elderly
- Used too often by those underage, so a potential accident waiting to happen
- Not suitable for country towns/districts
- Limited areas serviced by scooters is disappointing, i.e. would like Sefton included as very limited public transport in these locations
- Scooters left for days before being collected
- Feel nuisance dumping of scooters is likely unreported
- Feel that benefits do not outweigh the safety risks for the community
- If you're shopping, you'll take a car to transport your purchases not a scooter
- Scooters left on cycle paths causing near crash hazards for cyclists
- Too expensive [to hire]
- Not really an advantage, especially if we want people to exercise more
- Private scooters are cheap enough now that someone who genuinely wants to use a scooter for local transport can buy one. E-bikes would be a better idea as they are less likely to be ridden on footpaths or abused.

Positive feedback:

- Great addition to the community, especially given the rising costs of petrol
- Benefits outweigh the negatives and unsafe/antisocial behaviour could be controlled through bylaw enforcement
- Scooters and other forms of alternative transport mode are encouraged for the Waimakariri District if appropriately managed
- [Scooters] are economical and easy
- They should be available but only in specific areas (parks, reserves, bus stops, etc.) and not anywhere/everywhere.
- Good for the environment, parking, congestion and local travel.

- Encourage me not to use my car
- I think they are a great addition to the community (although not a user) and I have never had a problem with them causing an obstruction on the pavement. I have seen them regularly parked and not discarded haphazardly. I would like to see them as a permanent fixture in the Waimakariri area.
- I can't drive so scooters have given me a fun transport option.
- I think scooters are slowing becoming part of Waimak culture. And given time, I am confident people will begin to make serious travel decisions being able to trust that they can use them.
- Some are inconsiderate where they leave them but that doesn't override the elation of seeing them arrive in our District and the pride of knowing Waimak was catching up with CCC type initiatives.
- They are a great addition to transport options in the community for short journeys.
- I have found them brilliant to get around Kaiapoi… so much more convenient than walking or biking.

Community Organisations

4.13. **Waimakariri Access Group** members would like to see the following things addressed if scooter share services are to continue in the District - a minimum distance around parked scooters that should be kept free so people can navigate around them on footpaths; stronger enforcement of incorrect parking; idle scooters which have sat for days in one location (i.e. more than 72 hours) be picked up and moved elsewhere; more parking education provided to riders on how to share and use the footpaths safely; more education provided to flamingo staff (who collect, charge and redistribute scooters) to be mindful of where they leave scooters and; the mandatory provision of helmets with scooters.

4.14. Staff engaged with a member of the community who relies on a wheelchair for his mobility needs when accessing the town centre, local shops and other access areas. On occasion he has had to travel on the road to navigate around inappropriately parked scooters causing a footpath obstruction. He has noted that the scooters are large and heavy to move for those with genuine mobility issues, or the elderly, who may not have the strength of younger community members. He has concerns about high speeds in narrow footpath areas so feels higher speeds should be restricted to wider footpath locations. He has also suggested that Council could look at dedicated scooter parking bays/stands in key areas where scooters are most often stationed, i.e. community parks, specific town centre locations etc. Overall, he has found Flamingo to be very proactive about moving scooters quickly when he has lodged a parking nuisance or safety complaint. He would support commercial scooters staying in the District but would prefer maximum numbers to be capped at 200 (or for them to stay at the current levels).

4.15. A member of the **Age-Friendly Advisory Group** has expressed concern over scooters being left across footpaths and on roads as some members feel they are heavy and hard to move. She would like to see the scooters removed as she feels they create a street hazard that is unpredictable and dangerous.

FLAMINGO SCOOTERS FEEDBACK:

4.16. Flamingo have perceived the trial to be a success despite higher than forecasted theft and vandalism of their scooters, and they would be happy to continue operations.

4.17. They have noted that due to scooter uptake the Waimakariri market is currently not large enough to support more than one provider.

4.18. They have received a number of rider complaints in relation to two imposed restriction zones by the Waimakariri District Council:

- *High Street*: Many of their riders feel that the 'no riding zone' for the portion of High Street between Ivory/Ashely and Durham Streets restricts a key travel route. Flamingo feel High Street could comfortably accommodate scooters on the road given the slow traffic flow imposed through the three pedestrian crossings, and especially given how rider experience/skill has improved. They recommend that the 'no riding zone' down this section of High Street be updated to a 'no parking zone' preventing riders from accessing the footpath but allowing them to ride on the road.
- *SH1 roundabout (Pegasus/Ravenswood):* Flamingo feel the restriction across the SH1 access way at the roundabout prohibits movement of scooters to/from Pegasus and decreases the feasibility of scooters being used as a genuine transportation option. They recommend the access way be opened up in the future if scooter operations are to continue. Staff note that that the roundabout access way is most likely being used by those with personal scooters and cyclists already due to the inbuilt access (provided by Waka Kotahi) that already exists at the site (Figure 3).

Figure 3 – SH1 (Pegasus) roundabout

4.19. The 'preferred parking' locations have helped to create a tidy designated place for scooters to park, overall keeping parking complaints to a minimum. The BNZ corner in Rangiora is the most popular preferred parking location making up over a third of all preferred parking location statistics followed by the Pegasus playground and Ruataniwha Kaiapoi Service at 20% each.

4.20. All riders are required to take a photo of their scooter parking when finishing their ride. The photos are reviewed on a daily basis by Flamingo staff who send corrective emails for poor parking and positive emails for proper parking. To date in Waimakariri, 1,638 incentive based emails have been sent to riders for good parking with future discounts offered. Meanwhile, 1,269 corrective and educational emails have been sent to riders who demonstrated parking behaviour with room for improvement.

4.21. Flamingo has recently introduced a number of battery swappable MAX scooters in Waimakariri. These scooters do not need to be collected for charging before being redeployed, instead batteries are simply replaced whilst scooters are in their deployment locations. This technology allows for a significant decrease in motor vehicle usage and an associated reduction in CO2 emissions.

4.22. Flamingo are currently working on technology that sees each scooter include 'burn out' detection and recording technology utilising the on-board sensors. It's likely that the detection response will be automatic and the rider's throttle will be automatically disabled in real-time when a burnout is detected. Flamingo staff would be notified when the system detects a burnout meaning their staff can investigate to see if this occurred naturally as part of a ride or was a deliberate act (of vandalism) by the rider. This should help to prevent these issues in the future and enable Flamingo to get on top of them much more quickly.

4.23. If commercial scooter services are to continue and given the size of the market Flamingo would prefer to operate on a 'no permit fee' model from Council. However, if a fee was to be imposed they favour a 'per trip' fee in line with some other Councils.

STAFF FEEDBACK:

4.24. Staff note that the trial has aligned with Project 9 of the Rangiora Town Centre Strategy (adopted by Council on 7 July 2020) which included an implementation action associated with the provision of alternative transport modes including future transport technologies through an appropriately built environment and regulatory framework. In general the built environment can sustain scooters well (although there is room for improvement in some areas) and the operating permit issued by the Council has provided Flamingo with a standardised set of controls from which to operate successfully.

4.25. As part of their permit conditions, Flamingo provide Council with a monthly report detailing any complaints (referred by Council or received directly by Flamingo), accidents, or any scooter maintenance or system issues.

- *Complaints:* The nature of complaints received has been very manageable and at the low end in proportion to the number of rides taken. Complaints are heavily focused around scooters causing footpath/access obstructions (genuine or just perceived) and presenting a danger to others; regular sightings of underage scooter riders (those under 18 years) and; damage/vandalism to public realm areas or sometimes private property, i.e. burn-out marks on pavements, a few driveways etc. Flamingo has been particularly pro-active about following up on any Council referred complaints, contacting complainants, relocating nuisance scooters, providing further rider education and disabling rider accounts as/when needed to Council staff's satisfaction. While it is concerning that some underage riders are accessing the scooters, anecdotally this appears to be a widespread problem and not necessarily a District one. Staff have received feedback that underage riders on hire scooters were often seen in Christchurch even when the age limit of scooter riders was set at 18+. Staff have on a couple of occasions pushed out social media communications to remind the community that Flamingo scooters are for 18+ riders only. Flamingo have also followed up on reported underage sightings by contacting account holders (parents) to provide education and/or to disable inappropriate accounts.

- *Accidents:* Six fall related accidents have occurred in total to date – four were considered minor and two moderate. Neither moderate accident was life threatening although both resulted in some form of injury. Both accidents were investigated by Flamingo and noted they were primarily the result of rider error. The riders' use of the scooters had been deemed in breach of Flamingo's safe riding guidelines and outside of appropriate use conditions. Flamingo provided information about each accident to Council staff including the condition of each rider. As the nature of the accidents were linked to inappropriate use of scooters Council staff were satisfied with the outcome of the investigations and Flamingo's response.

- *Hardware Issues:* As a result of one accident, where the same rider fell off a scooter two days in a row due to the main stem of his scooter breaking each time, staff requested an incident report and further investigation and reassurance that the broken stems did not signal an inherent hardware fault with the MAX scooters. Flamingo followed up with the incident report and provided the scooter manufacturer (Segway-Ninebot) test report to evidence the scooter model's reliability and quality assurance testing for general purpose use. In response to the incidents Flamingo also noted they were upgrading the stems on all scooters to prevent this issue from occurring again. However they noted that the broken stems were the result of intentional and repetitive rough riding by the rider that put excessive stress on the scooter (over and above general use standards).

- *Community Groups:* Staff acknowledge the feedback from community groups and their associated members and have made provision in the recommendations section of this report (clause 4.35) for some concerns to be addressed should commercial scooters services be continued in the future.

4.26. Average trip data shows that scooters are mostly used for short distance/duration rides which indicate scooters present a good alternative for replacing some shorter motor vehicle trips, especially for those in the community that live in the main centres of the District. As survey data also corroborates trip data findings, scooters appear to present a viable alternative (as one part of a broader alternative transport solution) to motor vehicle travel in the District.

4.27. Council's financial contribution to date has been approximately $3,000+GST - a small amount of pre-trial advertising at $1,000+GST and some damage reinstatement costs at $1,990+GST. The damage reinstatement costs have been absorbed by Greenspace Unit operational budgets. These relate to the removal of superficial marks from surfaces or replacement of tar seal in some parks/laneways and where the bulk of costs have been incurred repainting the band rotunda floor in Victoria Park due to burn out marks. Delta, the contractors who maintain Council's public greenspace areas, have noted a decline in marks since the onset of the trial. In the instances where Flamingo have been able to identify deliberate 'burn-out' rider/s they have provided education and/or disabled rider accounts.

4.28. Scooter access across the Pegasus SH1 roundabout linking Pegasus and Ravenswood was due to be opened six weeks into the trial. Staff opted to keep this closed noting repeat feedback received about underage Pegasus residents accessing the scooters. It was felt that in the early stages of the trial, while the community was still getting used to the technology and rider/usage standards, it would be safer to keep this access closed but reconsider opening it in the future should scooters be retained in the District.

4.29. With regard to provider permit fees, providers have tended to be charged according to a land rate model based on the footprint of each individual scooter and the market value of the land. However, some Councils are now moving toward a nominal charge 'per trip' model as it offers more flexibility and is enabling of sustainable technologies plus is more viable for providers allowing them to pay as they earn. Moreover, it allows services to continue even if ride numbers drop to lower than expected numbers. A standard per trip fee by some of the larger Councils is around 10-11 cents per trip. At 40,000 rides a year this would equate to a $4,000 (GST Excl) return.

4.30. Council currently has an agreement with Ride Report to aggregate trial data. Ride Report manage an internationally recognised software programme that tracks and aggregates micro-mobility data making it easier for mobility operators to report on information. Waka Kotahi have provided a subsidy for the first year of licence fees to Councils making it easier for them to track usage data/trends nationally across organisations. An annual Ride Report licence typically costs $7,500 USD (around $10,800 NZD). At this stage it unclear whether Waka Kotahi will be continuing their subsidy. Staff also have access to Flamingo's 'Insights Platform' which aggregates ride data. Key data areas monitored and collected between both platforms have been consistent.

4.31. Overall the commercial scooters trial has been considered successful, it has met the majority of key performance indicators set in the original trial permission report approved by Councillors on 7 September 2021.

TRIAL SUCCESS:

4.32. Measures of success for the trial included (from the 7 September Council report):

- Trial is free of any serious health and safety incidents

There were two accidents that were considered moderate in level associated with the trial – as reported to Flaming Scooters/Council by the community. While neither accident was life threatening they both resulted in some form of injury. While this measure of success has not been fully achieved staff note that the accidents were primarily as a result of rider error (scooter misuse over and above their intended use) and not any inherent fault with the scooter hardware and software systems.

- Any complaints received are resolved in a timely and satisfactory manner

All complaints received by Flamingo (directly or as a result of a Council service request) were noted as being resolved by them within the Council's permit timeframes of 2 hours for any identified urgent safety issue and 12 hours for routine incidents/complaints. Flamingo has been particularly pro-active about following up on any Council referred complaints, contacting complainants, provider further rider education, and disabling rider accounts as/when needed to Council staff's satisfaction.

- Replacement of car trips

Flamingo's survey feedback from 300 local riders show that scooters are being genuinely substituted by some as an alternative to car travel for some trips – for their last ride, 30% of the survey respondents would have used some form of motor vehicle if a Flamingo Scooter wasn't available. The Council's community survey also showed that of those respondents that rode scooters, nearly 61% used the scooter as a transport device to get to/from a location and a car would have been used most often for travel (68.8%) if a scooter wasn't available.

- Reasonable e-scooter uptake over the course of the trial

Total District trip data to date aggregates 20,000+ rides (for a period just short of five months); Selwyn District Council had 22,000 rides for a 7.5 month trial period in 2020/2021. As data across both locations is tracking to be similar, Waimakariri results look reasonable for a semi-rural District.

- The majority of public perception is positive towards scooters post trial and a general desire by the majority public to retain scooters in the District

The majority of Council's survey respondents (close to 60%) were in favour of commercial scooters retained as an alternative transport solution within the District.

RECOMMENDATION:

4.33. Staff make the following recommendations associated with this report:

- That commercial scooter services continue in the Waimakariri District;

- That a yearlong permit be offered to Flamingo covering 1 May 2022 to 30 April 2023 with a further yearlong right to renew for Flamingo or an alternative provider at the Chief Executive's approval under Council delegation;

- A ‘per clip’ permit fee of up to 10 cents (GST excl.) a ride in favour of the Waimakariri District Council or a lesser figure as determined by staff to appropriately cover public realm maintenance associated with community use of commercial scooters. This permit fee may be reviewed for subsequent operational years beyond the initial yearlong permit;

- The current status quo of geo-fencing restrictions remains unchanged bar one amendment - scooter access across the SH1 roundabout between Pegasus/Ravenswood will be made available;

- Commercial scooter deployment for the District be capped initially at 200 scooters with the potential for numbers to be increased up to 300 scooters at Council staff’s sole discretion;

- Renew the Ride Report licence if subsidised by Waka Kotahi as it ensures the reliability of ride numbers and ease of national tracking of statistics. However, if Waka Kotahi are no longer subsidising licences then continue with access to Flamingo’s Insights platform (given the consistency between the two platforms when recording trial data). The trial results have shown that per annum usage is likely to be around 40,000-45,000 rides per year in the Waimakariri District (in the short term) as the community gets used to the technology and while incentives/pressures to vacate motor vehicles are not yet strong enough. Therefore, there is relatively low risk in Council progressing without Ride Report’s platform given the low level of income made through permitting fees each year.

- Converse with Flamingo about the potential provision of helmets (attached to scooters) at the time of hire so riders have ready access to these as staff and elected members would support ongoing encouragement for riders to wear helmets with every ride;

- Discuss with Flamingo the possible need for more staff hours (Flamingo Feeders who collect/charge scooters) directed at rebalancing/redistributing scooters on a daily basis and to ensure scooters retain a high level of battery charge.

Implications for Community Wellbeing

4.34. There are implications on community wellbeing by the issues and options that are the subject matter of this report. Commercial scooter services do pose more risk for vulnerable members of the community (elderly, those with mobility issues, children/youth) by nature of the competing use of footpath space. The geo-fencing restrictions that were included as part of the trial conditions will be extended across any future operating permit to address some concerns previously raised by directly affected community groups in the pre-trail report submitted to Council on 7 September 2021.

4.35. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are not likely to be affected by, or have an interest in the subject matter of this report.

5.2. Groups and Organisations

There are groups and organisations likely to be affected by, or to have an interest in the subject matter of this report.

Prior to the trial commencing staff engaged with the Waimakariri Access Group, Age Friendly Waimakariri and Youth Council to gather some initial feedback to be considered as part of the trial framework. Grey Power also submitted a letter to the Mayor and Councillors on hearing about the proposed trial.

The **Waimakariri Access Group** noted their group was not likely to support the trial citing general safety issues for low vision or hearing impaired members or those with genuine mobility/access issues. They also felt that some of the infrastructure (footpaths etc.) in the District were not of a standard (width/surface) to support scooters safety.

Age Friendly Waimakariri were not supportive of the trial due to concerns over existing congestion in the town centres with narrow footpaths and the presence of merchant signage/sale stands and other competing footpath users. They were also worried about rider behaviour and whether riders would pay enough attention to their environment. There was a general worry about the risk for collision related falls/injury which could cause significant harm to elderly members of the community.

The **Youth Council** had some trepidation about scooters accessing the busiest parts of High Street due to the number of people/things already competing in the street. They felt that speed restrictions should apply down High Street and that scooters should be restricted in busy schools areas.

Grey Power firmly opposed the trial and felt it was high risk involving novice scooter riders that would present a hazard to the general public.

Appropriate geo-fencing restrictions/controls were applied to some operational aspects of the trial to better manage the community risks for vulnerable members of the community as highlighted by group feedback.

Recent feedback received from the Waimakariri Access Group in relation to trial conditions to date has been detailed at clause 4.13 and primarily references scooters parked inappropriately causing obstructions and without sufficient side clearway for safe navigation, more careful monitoring/repositioning of scooters needed by Flamingo staff as well as more rider education about safety standards, and the mandatory provision of helmets with scooters.

A member of the Age-Friendly Advisory Group has expressed concerns about scooters being left across footpaths and on roads as they are heavy and hard to move for some members.

Staff acknowledge these new concerns and have noted some associated actions in the recommendations section of this report.

5.3. **Wider Community**

The wider community is likely to be affected by, or to have an interest in the subject matter of this report.

Council completed a public survey about the scooter trial in February/March 2022 and feedback from the survey has been included at clause 4.11.

Flamingo also completed a survey with their local riders (community members) and a summary of their feedback is included at clause 4.10.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are not significant financial implications of the decisions sought by this report.

Staff are recommending that a payment (up to 10 cents per ride) be collected from Flamingo as a permit fee to cover any Council related costs while the services operate privately in the district. The fee may cover the reinstatement of any public assets (pavement surfaces and the like) for any act of deliberate vandalism that might occur from the presence of commercial scooters in the district. The permit fee should cover all costs so Council's contribution is $0 per year.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do have sustainability and/or climate change impacts.

There is the potential for scooters to replace some vehicle trips over the course of the yearlong permit potentially resulting in less transport emissions.

Flamingo has recently introduced a number of battery swappable MAX scooters in Waimakariri. These scooters do not need to be collected for charging before being redeployed and instead batteries are simply replaced whilst scooters are in their deployment locations. This battery swap technology allows for a significant decrease in motor vehicle usage and an associated reduction in CO2 emissions.

Flamingo's carbon footprint is calculated annually as part of our Zero Carbon Business Operations certification.

6.3 Risk Management

There are risks arising from the adoption/implementation of the recommendations in this report.

Council may be subject to criticism/blame if there are scooter related accidents/incidents regardless of whether these might be due to Flamingo and/or scooter driver error. The likelihood of an accident occurring is moderate, and the impact in terms of injury could range from minor to severe. In managing risks for any new permit period staff will employ a range of mitigating factors such as:

- Ensuring Flamingo and their infrastructure is competent (as managed and assessed regularly through regular incident and maintenance reporting)
- Implementing scooter access/use restrictions (utilising geo-fencing technology)
- Monitoring operational matters throughout the permitting period in close partnership with the Flamingo and amending things as necessary to respond to any risks/safety issues as they arise
- Working with the Council's risk unit to identify key risks (and new risks that might arise) and outlining ways to eliminate, isolate or minimise these
- Working with Flamingo to see whether helmets can be mandatorily supplied with scooters
- Keeping abreast of legislative changes linked to mechanised scooter use.

6.3 Health and Safety

There are health and safety risks arising from the adoption/implementation of the recommendations in this report.

The nature of commercial scooter services mean community members have access to motorised scooters. This can mean riders (and pedestrians) are at more risk for collision related injuries and falls by nature of scooters accessing shared spaces – footpaths and roads. In managing some of these risks staff have laid out some mitigating steps under the Risk Assessment section of this report.

Staff are recommending that scooter access across the SH1 roundabout between Pegasus/Ravenswood be made available for the new permitting period. This crossing does present some risks as this section of SH1 road is 80km. However, Waka Kotahi have included access ways across this road as part of their roundabout infrastructure in anticipation of community use – presumably whether by foot, bike or other motorised transport device. Staff will work closely with Flamingo to monitor use in this area for the first three months to ensure this access way is being used appropriately and safely by riders.

7. CONTEXT

7.1. Consistency with Policy

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. Authorising Legislation

Land Transport Act 1988

Land Transport Management Act 2003

7.3. Consistency with Community Outcomes

The Council's community outcomes are relevant to the actions arising from recommendations in this report.

There is a safe environment for all

- Harm to people from natural and man-made hazards is minimised.

Transport is accessible, convenient, reliable and sustainable

- Communities in our District are well linked with each other and Christchurch is readily accessible by a range of transport modes.

Businesses in the District are diverse, adaptable and growing

- There are growing numbers of businesses and employment opportunities in our District.

7.4. Authorising Delegations

The Council has the authority to approve land access agreements for public land and associated budgetary project spending.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	GOV-26 / 220325044585
REPORT TO:	COUNCIL
DATE OF MEETING:	5 April 2022
AUTHOR(S):	Sarah Nichols, Governance Manager
SUBJECT:	Electoral Candidate Order on Voting Papers
ENDORSED BY: (for Reports to Council, Committees or Boards)	Department Manager / Chief Executive

1. SUMMARY

1.1. The purpose of this report is to obtain Council approval for the order of candidates to appear on voting papers in the 2022 Local Body Triennium elections and any subsequent by-elections.

1.2. The Council confirmed the retention of the voting method of First Past the Post (FPP) at its meeting of February 2021.

2. RECOMMENDATION

THAT the Council:

(a) **Receives** Report No. 220325044585.

(b) **Approve**, under regulation 31 of the Local Electoral Regulations 2001, that the names of candidates at the 2022 triennial elections and any subsequent by-elections be arranged in random order.

3. BACKGROUND

3.1. Regulation 31 of the Local Electoral Regulations 2001 (the regulations) enables the Council to determine, by resolution, which order candidate names are to be arranged on voting documents. The options for order are alphabetical, random or pseudo-random.

3.2. Candidate profile statement booklets are printed in alphabetical order. It is only the order of candidate names on voting documents that the Council can determine.

3.3. Alphabetical order is the default option under the regulations. If the Council does not make a decision, under regulation 31(3) candidate names will be listed in alphabetical order by surname.

3.4. The Council decision on the order of candidate names on voting documents will be in place for the 2022 local elections to be held on 8 October 2022 and any by-elections held during the 2022 to 2025 triennial term.

3.5. The recommended option for the order of candidate names on voting documents is random order. Random order is where all candidate surnames are randomly selected by computer so that the order of surnames is different on each voting document.

3.6. The Council has used random order for voting documents at all triennial elections for all elections during at least the past 12 years. Voters in Waimakariri District elections are likely to be familiar with this approach.

4. ISSUES AND OPTIONS

4.1. Random order removes the perception of name order bias, each voter will receive a voting paper with candidates in different orders. All candidates will have equal opportunity to be at the top of some voting papers, and the bottom of others.

4.2. Under random order, candidate names will be listed differently on the voting paper than the candidate booklet, where names are listed alphabetically. There is the perception of confusion as some voters may have difficulty finding the candidates they wish to vote for, particularly when many candidates are contesting the same issue.

4.3. The other options available to the Council for the order of candidates on voting documents are alphabetical and pseudo-random order.

Alphabetical

4.4. Alphabetical order is listing candidate surnames alphabetically. This is the default option under the regulations if the Council does not make a decision.

4.5. Alphabetical order aligns with the order that candidates are listed in the candidate profile booklets. Voters may be familiar with names being listed alphabetically from Parliamentary elections.

4.6. There is some suggestion that candidates with a surname starting at the 'A' end of the alphabet may have an advantage over candidates with a surname starting at the 'Z' end of the alphabet as they will be at the top of each voting paper. This may be considered to be unfair.

Pseudo-random order

4.7. Pseudo-random order is where candidate surnames are randomly selected, and the order selected is the order appearing on all voting documents.

4.8. If pseudo-random order is decided, under regulation 31(4) the electoral officer must state by public notice the date, time and place in which the order of candidates' names will be arranged and any person is entitled to appear. Pseudo-random order provides for candidates to have equal opportunity to be at the top of the voting paper. However, some candidates will be listed at the bottom of every voting paper.

4.9. Both pseudo-random and random order remove the perception of name order bias, the pseudo-random order of names simply substitutes a different order for an alphabetical order. Any first-name bias will transfer to the name at the top of the pseudo-random list.

4.10. The regulations allow for the Council to make a decision on the order of candidate names.

4.11. Voting documents for the 2022 elections will include elections for the regional council, Environment Canterbury. Environment Canterbury will consider this matter and pass its own resolution if pseudo-random or random order is to be used for these elections. Environment Canterbury has used random order for the 2016 and 2019 elections.

4.12. The decision affects all Waimakariri District Council wards and community board areas.

Implications for Community Wellbeing

There are no implications on community wellbeing by the issues and options that are the subject matter of this report.

4.13. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are not likely to be affected by, or have an interest in the subject matter of this report. It is noted that candidates are able to provide their profile statements in both English and Te Reo.

5.2. Groups and Organisations

There are not groups and organisations likely to be affected by, or to have an interest in the subject matter of this report.

5.3. Wider Community

The wider community is not likely to be affected by, or to have an interest in the subject matter of this report. The recommendation of random order has been consistently used for Local Body elections within the District for some years and people are familiar with this.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are not financial implications of the decisions sought by this report. There is no price difference in printing in different candidate order.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do not have sustainability and/or climate change impacts.

6.3 Risk Management

There are risks arising from the adoption/implementation of different recommendations in this report. If candidate names are randomised there is a perceived risk of confusion as some voters may have difficulty finding the candidates they wish to vote for. However, as random order has been used by this Council for triennial elections and by-elections for a number of elections and the risk is deemed low.

6.3 Health and Safety

There are not health and safety risks arising from the adoption/implementation of the recommendations in this report.

7. CONTEXT

7.1. Consistency with Policy

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. Authorising Legislation

The Local Electoral Regulations 2001 enable the Council to determine by resolution the order candidates' names are to be arranged on voting documents.

7.3. Consistency with Community Outcomes

The Council's community outcomes are relevant to the actions arising from recommendations in this report.

7.4. Authorising Delegations

The Council is required to make a decision under the Local Electoral Regulations 2002, otherwise the legal default is to alphabetical order.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	Gov-01-11 / 220316038134
REPORT TO:	COUNCIL
DATE OF MEETING:	5 April 2022
AUTHOR(S):	Sarah Nichols, Governance Manager
SUBJECT:	Local Government New Zealand (LGNZ) Annual Conference Attendance 2022

ENDORSED BY: (for Reports to Council, Committees or Boards)	Department Manager	Chief Executive

1. SUMMARY

1.1. This report is to seek Councillor(s) to accompany the Mayor to the Local Government New Zealand Conference (LGNZ) and LGNZ Excellence Awards being held in Papaioea/Palmerston North from 19 to 22 July 2022.

Attachments:

i. LGNZ Conference and Awards Programme (Trim Ref: 220316038150).
ii. The Policy of Conference and Training Course Attendance (Trim 200220023132).

2. RECOMMENDATION

THAT the Council:

(a) **Receives** report No.220316038134.

(b) **Approves** Councillor Atkinson attending the Local Government New Zealand Conference from 19 to 22 July 2022 in Papaioea/Palmerston North, accompanying the Mayor and Chief Executive.

3. BACKGROUND

3.1. Each year the LGNZ hosts a national conference in a different location within New Zealand; this year it is being held in Papaioea/Palmerston North at the Central Energy Trust Arena. The conference will also include the LGNZ Excellence Awards, which recognise outstanding leadership and impact across community events, infrastructure and economic development. The Council has not entered any project or person in the Excellence Awards.

3.2. The Council Policy (*attached*) is for one Councillor to attend with the Mayor and Chief Executive. The Deputy Mayor, if available, should be able to participate in at least one LGNZ Conference during the triennium cycle. Any nominated Councillor can only attend once in any given triennium cycle (unless the conference is held in Canterbury), to enable other members to attend. The Deputy Mayor has indicated his interest and availability for attending this years LGNZ conference.

3.3. The previous LGNZ Conference was held in Blenheim from 15 to 17 July 2021, with Councillors Williams and Redmond accompanying the Mayor and Chief Executive. Although the Council Policy states that only one Councillor is to accompany the Mayor and Chief Executive to the annual conference, the Council agreed that two Councillors could attend in 2021 as there were no accommodation costs which would contribute to an off-set of the conference registration fees. The 2020 Conference scheduled in Blenheim was cancelled due to the Covid-19 national lockdown and aftermath.

3.4. During the previous triennium term, the July 2019 Conference was held in Wellington, with Councillor Felstead attending with Mayor Ayers. The 2018 Conference was held in Christchurch, and as no accommodation or travel was required, it was resolved that more Councillors than outlined in the Council Policy would attend. Accompanying the Mayor at the 2018 LGNZ Conference were Councillors Felstead, Atkinson, Blackie, Doody, Gordon, Stewart and Williams.

4. ISSUES AND OPTIONS

4.1. This year's conference theme is "Heke Mai - The Future". The message from the LGNZ President, Stuart Crosby, is about clarifying what local government may look like and how we might start to build that future. It is anticipated that the conference will combine blue-sky thinking with pragmatic solutions to answer questions about the future of local government and how to embrace the power of localism to deliver nationally. Speakers will include elected members, strategists, innovators, and iwi to inform and inspire on a broad range of topics such as co-governance, economic, environmental, social and cultural wellbeing.

4.2. The conference usually attracts approximately 500 participants. Attendance enables knowledge sharing and networking opportunities as the programme is designed to be a platform to discuss a range of topical matters. The programme is *attached*. On return, the attending Mayor and Councillor will submit a report/discussion notes to colleagues to share information gained during the Conference.

4.3. The conference commences with a Te Maruata Hui on Tuesday, 19 July 2022. Wednesday 20 July starts with various meetings from 10am to noon, with Council hosted tours scheduled in the afternoon. The formal opening ceremony will be held at 3.10pm, followed by addresses by the LGNZ President, Te Maruata, the Government and keynote speaker, Melissa Clark-Reynolds. The Simpson Grierson Welcome Reception will be hosted in the evening at the Central Energy Trust Arena. Thursday 21 July begins with a Fonterra hosted breakfast session at 7am, thereafter delegates will be addressed by the Leader of the Opposition at 8.45am. The rest of the day will be filled with various sessions followed by and interactive “walkshop” tours in the afternoon. The last day of the conference starts at 8.30am, with the Minister of Local Government, Hon Nanaia Mahuta, addressing the delegates at 10am. After more sessions, the conference will officially close at 3pm on Friday 22 July 2022. The Fulton Hogan Conference Dinner and LGNZ Excellence Awards will be held at 6.30pm at the Central Energy Trust Arena.

4.4. The Council Policy states that the Mayor, one Councillor and the Chief Executive represent the Waimakariri District Council at the LGNZ Conference. It is preferable that the Deputy Mayor attends one such conference during the 2019-22 term. Deputy Mayor Atkinson has not attended the LGNZ conference in 2020 or 2021, but indicated his interest and availability in attending this year. It is preferable that attending elected members are not proposing to retire at the Triennium local body elections, thus continuing to share the knowledge and networking gained at the conference.

4.5. There are no implications on community wellbeing by the issues and options that are the subject matter of this report.

4.6. The Management Team has reviewed this report.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are not likely to be affected by or have an interest in the subject matter of this report.

5.2. Groups and Organisations

There are no groups and organisations likely to be affected by, or to have an interest in the subject matter of this report.

5.3. Wider Community

The wider community is not likely to be affected by, or to have an interest in the subject matter of this report. However, the conference provides benefit, particularly to members, to gain a greater understanding about Local Government and provides both learning and networking opportunities.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1 Financial Implications

6.1.1 Full conference early-bird registration cost is $1,400 if booked/paid by 23 May 2022. This full conference cost increases $100 after May for standard registration.

6.1.2 Attendance for day registration is available at a rate of $750 per day. There are additional social and partner programmes available, however, the attendance of a partner of a delegate will be at the personal cost of the elected member. Partners are not eligible to attend business sessions.

6.1.3 The full conference registration includes attendance at conference business sessions (Wednesday, Thursday and Friday), delegate bag, daily catering, Simpson Grierson welcome reception (Wednesday) and the Fulton Hogan conference dinner and EXCELLENCE Awards function (Friday). In addition, the Fonterra breakfast session (Thursday) and Council hosted tours (Friday) are an additional charge of $50 and $35, respectively.

6.1.4 Accommodation ranges at select accommodation within 1.5km of the venue and ranges from $170 to $245 per night. The average accommodation cost is $200 per night per person. Delegates will not be expected to share rooms/facilities.

6.1.5 Direct flights from Christchurch to Palmerston North currently cost approximately $250 (return). Flights land at Palmerston North Airport, 4.9 km from the centre of Palmerston North. The 10-minute drive into town can be taken by taxi, shuttle or rental car. Travel is anticipated to occur either late Tuesday or Wednesday morning to enable participation in the programme from Wednesday afternoon through to Friday. Council representatives are expected to return on the Saturday due to the Fulton Hogan Conference Dinner and LGNZ Excellence Awards being held on the Friday evening. An additional contingency of $150 per person to cover incidentals such as breakfasts or non-alcoholic drinks has been included.

6.1.5 Costs are met by the training and travel operational Governance budget. The conference registration is funded from the training budget, which has a current balance of $13,333 with travel and accommodation expenses coming from the operational travel (mileage/airfares) budget that has a current overspend balance of $8,813. The funding would be from the 2021/22 financial year as registration and accommodation would be paid in March/April. The indicative cost of attendance per delegate is $2,730. A summary of indicative costs is outlined below:

	Per delegate
Standard Registration	$1,400
Fonterra Breakfast	$50
Council hosted tours	$35
Accommodation x4 nights	$800
Airfares	$250
Shuttle x2	$65
Incidentals (ie breakfast)	$150
	$2,750

A separate management operational budget meets the costs associated with the Chief Executive attending the conference.

6.2 **Sustainability and Climate Change Impacts**

The recommendations in this report do not have sustainability and/or climate change impacts.

6.3 **Risk Management**

Cancellation of the Conference is potentially possible due to the national Covid-19 situation. Should a delegate be unable to attend the conference due to unforeseen circumstances, a substitute may attend in their place, subject to general Council agreement. Any cancellation of a delegate's attendance will result in a reduced refund of fees paid.

The conference cancellation policy states that registration cancellations notified before 3 June 2022 will incur a $100 administration charge. Refunds requested before 30 June 2022 will incur a 50% refund of fees paid, and after this date no refunds will be allowed, except with the discretion of the LGNZ. If the conference is cancelled for reasons beyond the control of LGNZ, the registration fee will be refunded after the deduction of a $150 administration fee. Charges for cancellations of accommodation will be at the discretion of the hotel.

6.3 **Health and Safety**

There are no health and safety risks arising from the adoption/implementation of the recommendations in this report.

7. CONTEXT

7.1 **Consistency with Policy**

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2 **Authorising Legislation**

Not applicable.

7.3 **Consistency with Community Outcomes**

Governance: There are wide ranging opportunities for people to contribute to the decision making that effects our District.

7.4 **Authorising Delegations**

The Council has the delegation to decide attendees of the LGNZ Conference as per policy S-CP 0905 dated March 2020.

CONFERENCE PROGRAMME

Wednesday 20 July to Friday 22 July 2022

Time	Wednesday 20 July 2022 | Wenerei 20 o Hūrae 2022
9:00 - 10:00 am	Registration information desk open | Ko wātea te tēpu rēhitatanga Venue: Central Energy Trust Arena
10:00 - 12:00 pm	Member meetings | Ngā hui a ngā Mema Mayors Taskforce for Jobs AGM Young Elected Members meeting
1:00 - 3:00 pm	**Council hosted tours** Off-site venues
3:00 pm	Master of ceremonies | Te Kaiwhakataki Kōrero Mihingarangi Forbes
3:10 pm	Opening ceremony | Pōwhiri
3:45 pm	Kapu ti and biscuits
4:00 pm	LGNZ President's address | He Kōrero nā te Tumuaki o Ngā Kaunihera Paetata o Aotearoa (LGNZ)
4:15 pm	Te Maruata address | He kōrero nā Te Maruata
4:30 pm	Government's address | Tā te Kāwanatanga korero
4:45 pm	Opening keynote speaker Melissa Clark-Reynolds
5:25 pm	Simpson Grierson Welcome
6:00 - 7:30 pm	Simpson Grierson Welcome Reception | He Mihi Whakatau nā Simpson Grierson

Time	Thursday 21 July 2022 | Tāite 21 o Hūrae 2022
7:00 - 8:30 am	Fonterra breakfast session | Mahinga a te ata Speakers: Cameron Calkoen
8:30 am	Master of ceremonies | Te Kaiwhakataki Kōrero Mihingarangi Forbes
8:45 am	Leader of the Opposition's address | He kōrero nā te Kaiārahi o te Āpitihana Christopher Luxon, Leader, National Party
9:00 am	Young Elected Members address Speakers Lan Pham, Co-Chair, Young Elected Members
9:15 am	Future for local government - Imagining what's possible for local democracy in Aotearoa New Zealand Speakers: Adam Lent, CE New Local Gael Surgenor, FFLG Review Panel Te Ariki Te Puni, Board Member, Multi-Ethnic Young Leaders NZ Deputy Mayor Melanie Tavendale, Waitaki District Council
10:15 am	Morning tea | Paramanawa Amongst the exhibition Photo of all Mayors and Chairs | He whakaahua a ngā Mea katoa rātou ko ngā Tiamana
11:00 am	Co-governance - Putting Te Tiriti into action Speakers: Moko Tepania, Co-Chair of Young Elected Members, Far North District councillor Andrew Judd, former Mayor of New Plymouth Antoine Coffin, FFLG Review Panel Jade Wikaira, Strategic Policy Leader
12:00 pm	Environmental well-being - Adapting to change: increasing communities' resilience and adapting our management of the environment in response to pressures caused by climate change. Speakers: Sophie Handford, Councillor, Kāpiti Coast District Council Rachel Keedwell, Chair, Horizons Regional Council Neeraj Lala, Chief Executive, Toyota NZ Tim Myers, Chief Executive Officer, Norwood Farm Machinery
1:00 pm	Lunch | Ō Tūhoe Amongst the exhibition
1:50 pm	Stage performance | A History of Palmerston North: Abridged Central Energy Trust Arena
2:00 pm	Economic well-being - Encouraging the creation and growth of local economic wealth Speakers: Hon Stuart Nash, Minister for Economic and Regional Development/MBIE Kiri Goulter, Director - Destination Management, Regional Tourism New Zealand Warner Cowin, founder Height Project Management Max Rashbrooke, journalist and Senior Associate

3:00 - 5:00 pm	**Interactive walkshop tours | Ngā tawhio hīkoi pāhekoheko** • Cultural Well-Being | Te toiora ā-ahurea • Economic Well-Being | Te toiora ā-ōhanga • Environmental Well-Being | Te toiora ā-taiao • Social Well-Being | Te toiora ā-pāpori • Future for Local Government workshop
5:00 pm	End of conference day one

Time	Friday 22 July 2022 | Paraire 22 o Hūrae 2022
8:30 am	Master of ceremonies | Te Kaiwhakataki Kōrero Mihingarangi Forbes
8:45 am	Chief Executive's address | He kōrero nā te Kaiwhakahaere
9:00 am	Palmerston North – natural capital offerings as a product of the four well-beings - Palmy's world-class DNA Speakers: Grant Smith, Mayor, Palmerston North David Murphy, PNCC GM Stephen Berg, NZRM Director
10:00 am	Minister of Local Government address | He kōrero nā te Minita o te Kāwanatanga Paetata Hon Nanaia Mahuta, Minister of Local Government
10:15 am	Morning tea | Paramanawa Amongst the exhibition Te Maruata morning tea with the Minister of Local Government | Te paramanawa a Te Maruata me te Minita o te Kāwanatanga Paetata
11:00 am	Social well-being - Social cohesion in a post pandemic New Zealand. Speakers: Max Baxter, Mayor of Otorohanga and chair of MTFJ Tamati Shepherd-Wipiiti, Partner PwC and seconded to MoH Julie Chapman, CEO and Founder, KidsCan
12:00 pm	Cultural well-being - Engaging diverse communities to embrace our multicultural Aotearoa. Speakers: Mervin Singham, Chief Executive, Ministry for Ethnic Communities Stephanie Velvin, Welcoming Communities Coordinator, Palmerston North City Council Luke McIndoe, Head of Events & Partnerships, Palmerston North City Council Seiuli Terri-Leo Mauu, Director, ASB Polyfest
1:00 pm	Lunch | Ō Tūhoe Amongst the exhibition 'Zone of Origin' competition | Whakataetae 'Ahunga ā-Rohe'
2:00 pm	Closing keynote session | Whakakapinga a ngā kōrero matua Speaker: Dr Lucy Hone, wellbeing and resilience
2:45 pm	Early bird registration prize draw | Te kōwhiringa toa o ngā rēhitatanga wawe
2:50 pm	Closing address
3:00 pm	Closing ceremony | Te whakakapinga
3:30 pm	End of conference
3:30 - 5:30 pm	Member meetings | Ngā hui a ngā Mema Regional Sector meeting
6:30 pm	Fulton Hogan Conference dinner and LGNZ EXCELLENCE Awards | Tā Fulton Hogan Kai a te pō mō te huihuinga, me ngā Tohu KAIRANGI A LGNZ Venue: Central Energy Trust Arena

WAIMAKARIRI DISTRICT COUNCIL

S-CP 0905
Issue: 5
Date: 3/3/2020
05/03/2019
Page: 1 of 2

POLICY

Conferences and Training

CONFERENCE AND TRAINING COURSE ATTENDANCE

1 Introduction

The Council is required to give effect to the purpose of Local Government which is described in the *Local Government Act 2002* (the Act). The purpose enables democratic and effective local decision-making and action, by and on behalf of, communities to meet the present and future needs by playing a broad role in promoting the social, economic, environmental and cultural well-being of their communities, taking a sustainable development approach.

2 Policy Context

Elected members are responsible for making decisions on matters such as the services council will provide, the standard they are provided to, how they will be paid for and what bylaws need to be made. Elected members have a governance role in council as well as being an elected representative of the community.

3 Policy Objective

To make a positive impact as an elected member a range of skills and qualities are needed. A number of opportunities are provided for professional development and it is important that elected members take advantage of these.

4 Policy Statement

(a) Local Government Conference (LGNZ Annual Conference)

A report will be considered by the Council each March/April to determine attendance.

The Mayor, one Councillor, together with the Chief Executive, may represent the Council at the Local Government Conference annually.

The Deputy Mayor, if available, be able to attend at least one LGNZ Conference during the triennium cycle.

Any nominated Councillor can only attend one LGNZ Conference in any given triennium cycle (unless being held in Canterbury), to enable other members to attend.

When the LGNZ Conference is held in Canterbury, the Council will consider sending up to ten Councillors.

(b) Local Government Rural and Provincial meetings

The Mayor and one Councillor plus the Chief Executive may represent the Council at the LGNZ Rural and Provincial meetings. If the Mayor and/or Chief Executive are unable to attend, then a representative may attend in their place. This could be a Councillor, Community Board member or staff member (i.e. up to a maximum of three, including the Mayor)

(c) Local Government Zone 5/6 meetings

The Mayor and one Councillor plus the Chief Executive may represent the Council at the LGNZ Zone 5/6 meetings. If the Mayor and/or Chief Executive are unable to attend, then a representative may attend in their place. This could be a Councillor, Community Board member or staff member (i.e. up to a maximum of three, including the Mayor).

POLICY

CONFERENCE AND TRAINING COURSE ATTENDANCE

When the meeting is held in Canterbury, the Mayor may approve up to five members attending..

(d) Approval for Councillor Training Attendance

The Mayor, or in his/her absence, the Deputy Mayor, will approve all training courses, conferences and seminars attended by members of the Council and notify the Governance Manager. This will be reported as part of the Mayor's monthly diary report to Council.

Training courses (and conferences) can also be approved via a report to the Council.

Attendance at overseas conferences for any elected member shall be approved by the Council via a formal report.

The member will provide a verbal report back on conference/training to the appropriate Committee or Council portfolio update section of the meeting.

(e) Community Board Members

Approval for Community Board Members to attend conferences or training within New Zealand (excluding in-house) will be via formal Community Board report, consideration and resolution.

Any Community Board member attending a conference is required to provide a written report on the learnings/highlights to be published in the next available Board agenda for public accountability, and circulated to all elected members. Any training session will be verbally reported back at the next meeting.

(f) LGNZ National Community Board Conference (held every two years)

At least one Community Board member from each Community Board may attend the Conference and represent their community.

It is permissible for a Councillor appointed to a Community Board to attend the LGNZ Community Board Conference, however the related registration and expenses will come from the Community Board training budget and not the Council training budget.

5 Adopted by and date

Approved and adopted by the Council on 3 March 2020.

This policy shall be reviewed by the Council every three years or sooner on request.

The next review date is March 2023.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	RGN-05-28-08 / 220216020391
REPORT TO:	KAIAPOI-TUAHIWI COMMUNITY BOARD
DATE OF MEETING:	21 March 2022
AUTHOR(S):	Vanessa Thompson, Business & Centres Advisor Grant MacLeod, Greenspace Manager Hannah-Rose White, Intermediate Landscape Architect
SUBJECT:	Kaiapoi Riverbank Walkway and Memorial Reserve Update
ENDORSED BY: (for Reports to Council, Committees or Boards)	Department Manager / Chief Executive

1. SUMMARY

1.1. This report seeks a decision from the Kaiapoi-Tuahiwi Community Board concerning the proposed upgrades to Kaiapoi Riverbank Walkway and Memorial Reserve.

1.2. At a February 2022 Kaiapoi-Tuahiwi Community Board workshop to discuss Draft Concept Plan – Option C (an extended version of Option B that was approved by board members in November 2021) board members signalled a preference to defer the project until a later date and submit a 2023/24 Long Term Plan request for the increased project budget.

1.3. The anticipated project budget for Option C is approximately $271,000 (or $201,000 if excluding the lighting upgrades) and the current project budget is $135,000. This represents a shortfall in the range of $66,000-$136,000.

1.4. Staff are recommending that the project be deferred to the 2023/24 Long Term Plan cycle and the increased project budget be requested as part of this process.

Attachments:

i. Draft Concept Plan - Option C (Trim no. 220204014970)

2. RECOMMENDATION

THAT the Kaiapoi-Tuahiwi Community Board:

(a) **Receives** Report No. 220216020391.

(b) **Notes** that Draft Concept Plan – Option C is an extended version of Option B that was approved for further design by the Kaiapoi-Tuahiwi Community Board in November 2021;

(c) **Notes** that consultation has taken place with the Kaiapoi Returned Services Association on Option C and Executive Committee members were largely supportive of the plan and proposed changes;

(d) **Notes** that Option C (which includes extension of the reserve into Raven Quay, resolved kerb heights along Raven Quay, new terraces and lighting treatments) requires a total budget of around $271,000 (approximately $136,000 more than the original project budget of $135,000) if including the proposed lighting upgrades;

(e) **Notes** that the Kaiapoi-Tuahiwi Community Board have considered Option C at a workshop and the recommendations in this report result from feedback provided by attending board members;

THAT the Council:

(f) **Recommends** (as per item 4.20) that the 'Kaiapoi Riverbank Walkway and Memorial Reserve' project be deferred from 2021/22 until the 2023/24 Long Term Plan cycle and that Option C be submitted with a request for the full project budget at that time.

3. BACKGROUND

3.1. The section of the Kaiapoi Riverbanks Walkway, Southwest of the Williams Street Bridge is an important and well used link between the Raven Quay West stopbank walkway and the Kaiapoi town centre. Providing access through this location will build upon other projects to improve connectivity and walkability. Upgrading this area would also continue the renovation of the riverbanks and Williams Street. The other three bridge corners have been completed, with this corner being the last one to be upgraded.

3.2. The project currently has a $135,000 project budget set aside in the 2021/22 financial year.

3.3. The Kaiapoi-Tuahiwi Community Board were briefed by staff regarding some initial design options for potential upgrades on 18 October 2021.

3.4. Staff then presented Draft Concept Plan – Options B & C at a community board meeting on 15th November 2021, and recommended the progression of Option B (as approved by board members) for further design of the proposed walkway elements and landscaping.

3.5. After developing Option B further, staff engaged with the Returned Services Association (RSA) so their feedback could be incorporated into the updated design.

3.6. A workshop was held on 14 February 2022 with community board members and the Chairperson of the RSA to get feedback on 'Option C' and the proposed high level budget. Three alternative options were presented regarding the project's progression:

(i) Progress Option B with the current $135,000 budget – project likely completed 2022/23 if budget request successful.

(ii) Progress Option C and submit an Annual Plan request for additional budget in May 2022 – project likely completed 2022/23 if budget request successful.

(iii) Progress Option C and submit a 2023/24 Long Term Plan request for additional budget – project likely completed 2024/25 or 2025/26 if budget request successful.

3.7. Attending workshop board members signalled a preference for (iii) and noted the increased budget that could be requested through the Long Term Plan 2023/24 process. They signalled a desire to defer the project until the next LTP cycle and reassign the existing project budget of $135,000 elsewhere in 2021/22.

4. ISSUES AND OPTIONS

Option A & B Discussion

4.1. In a November 2021 report to the Kaiapoi-Tuahiwi Community Board (trim 211026171968[v02]) staff noted that the existing walkway in the Memorial Reserve was in a poor condition and did not comply with New Zealand standards for accessible access or the goals of the Waimakariri Access Strategy. The existing alignment is along the top of the stopbank, built against a concrete flood wall. A section of the wall was recently repaired by Environment Canterbury, but no further wall upgrade work is programmed. Overall, the quality and condition of the Memorial Reserve landscape treatment was generally noted as poor.

4.2. At the time, Options A and B were proposed with Option B being recommended since it fell within the existing project budget of $135,000.

4.3. Option A (figure 1) was not progressed due to the anticipated project costs of $180,000, even though it sought to widen and improve accessibility along the existing stopbank pathway. The majority of budget was absorbed by path construction and retaining wall elements designed to maintain stopbank integrity without accounting for improvements to other areas that needed it throughout the reserve.

Figure 1 - Option A (November 2021 Kaiapoi-Tuahiwi Community Board meeting)

4.4. Option B (figure 2) was recommended and subsequently accepted by the community board at the approved $135,000 budget. Instead of improving the existing stopbank pathway, new access ways through the reserve were included that met accessibility standards and provided an obvious line of sight from Williams Street to the Riverbanks walkway. Other minor improvements within the site were also included to improve the general aesthetics and utility of the reserve.

4.5. However, it was noted by staff that Option B needed further development with the upgrades presenting an opportunity to improve a wider range of form/function elements throughout the reserve since the location formed a key focal point in the town centre.

Figure 2 - Option B (November 2021 Kaiapoi-Tuahiwi Community Board meeting)

Option C Discussion

4.6. Option C (Figure 3 & attachment i) was developed as the extended version of Option B and is budgeted at around $271,000 ($136,000 over the existing project budget). It maintains Option B's original core features but with the following key additions:

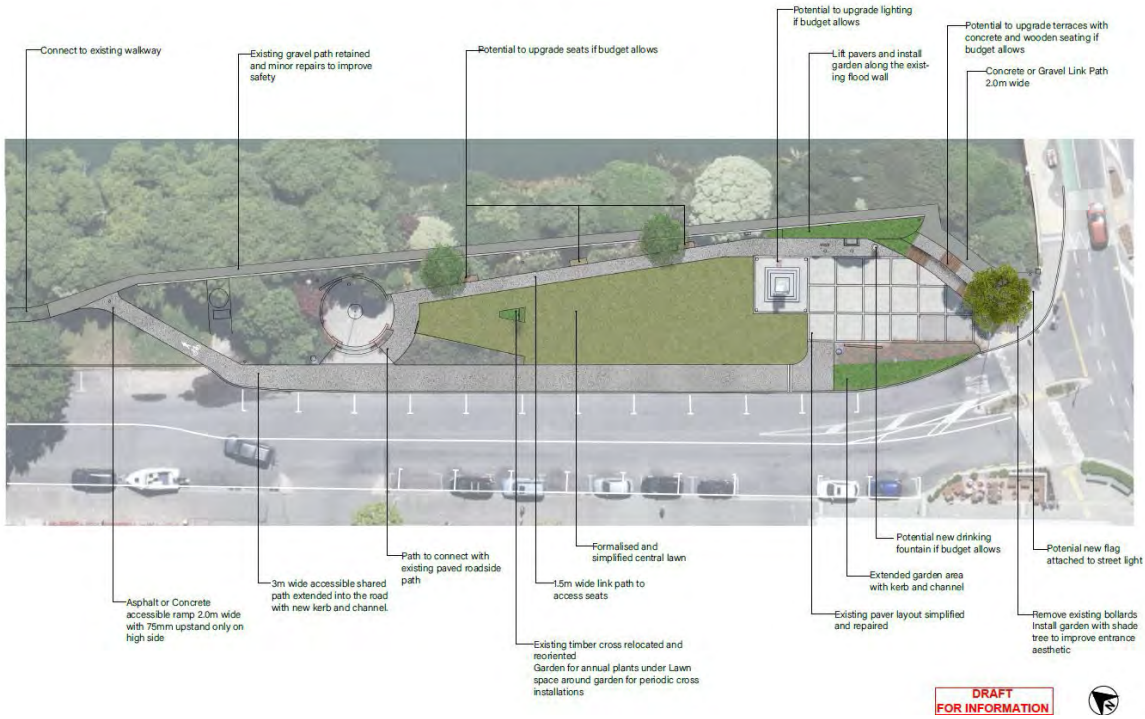


Figure 3 - Option C (November 2021 Kaiapoi-Tuahiwi Community Board meeting)

Extension of the Reserve into Raven Quay carriageway

4.7. The reserve has been extended into a portion of the carriageway which increases its boundaries and enables the retention of a large portion of lawn, even with the addition of the new pathways along Raven Quay and throughout the reserve. The Raven Quay pathway is 3 metres wide (rather than the 2.5 metres proposed in Option B) and is designed to be a shared path, accommodating both pedestrians and cyclists.

4.8. Raven Quay is classified as a Local Road in the District Plan which determines the applied Engineering Code of Practice standards. Accordingly, staff are proposing the relevant carriageway section of Raven Quay close to the Williams Street end (Figure 3) be reduced to 3.0-3.2 metre traffic lanes (narrowing to 3.0 metres northwest up Raven Quay) and 2.2 metre parking lanes, resulting in a combined carriageway width of 10.4 metres. The existing parking is retained and realigned to fit within the new carriageway width.

4.9. Go Bus and FENZ have confirmed that the carriageway realignment presents no access issues for their services.

Raven Quay Kerb Height

4.10. The variable kerb height along the north side of Raven Quay (primarily the Williams Street end) will be reduced to improve access and safety for the elderly.

4.11. The RSA and some board members have signalled a desire to see the kerb height issues resolved even if the project is deferred to a later date. Currently, there is no funding within existing roading budgets to improve that section of kerb (aside from using a portion of the existing $135,000 project budget, which the Community Board would like to reassign

elsewhere). Therefore, it is recommended that the kerb height be left in its current state and resolved as part of any 2023/24 Long Term Plan budget request.

The Terraces

4.12. The existing terraces in the eastern corner of the reserve could be upgraded to combined concrete/wooden versions constructed at a comfortable seating height (similar to the terraced seating on the embankment adjacent to the Five Peaks Brew Co establishment). The terraces are currently unattractive, not designed for seating due to their very low height and difficult to maintain for ground maintenance staff.

4.13. An Environment Canterbury Flood Protection and Drainage Bylaw Authority would likely be required for Option C and structural changes to the existing terraces.

Memorial Structures

4.14. Staff have engaged with the RSA about repainting all existing painted surfaces on the memorials (including, where applicable, the inclusion of new artwork designs) in order to refresh the structures within a contemporary town centre context. Discussions were also undertaken about shifting the existing sundial from the middle of the lawn to the edge of one rose garden. This supports a general aim to simplify/declutter the lawn area to support better sight lines between the memorial elements – from the Cenotaph through the lawn cross and down to the existing flagpole at the western end of the reserve. The RSA have generally responded positively to the suggestions and are open to the improvements.

Lighting Upgrades

4.15. In order to showcase the location at night some lighting improvements have been proposed to respond to the upgraded reserve features in Option C. The upgrades include new lamps for the lighting poles and in-ground lights, as well as for three street lights along Raven Quay/Williams Street. The street lights would need to be upgraded as the current lamps (with their general flood lighting) would overpower any new lighting treatment placed in the reserve. New street lighting would still meet the required roading/street light illumination standards but would allow for more directional control of the lighting spill.

4.16. The lighting treatments are relatively expensive at just over $70,000 (inclusive of lighting designer and electrician fee estimates) representing a significant portion of the Option C project budget. One option could be to forgo the lighting upgrades and revisit their potential implementation at a later date to reduce the required project budget down to $200,000 (instead of $271,000).

4.17. Summary of Key Design Points

4.18. Summarising the above points, the main design concepts for Option C, are:

- Extend the boundaries of the reserve to secure additional recreational benefits, such as the retention of a large lawn area and increased community space on event days
- Construct wide accessible/shared paths within the Memorial Reserve, linking Williams Street to the stop bank path to the west
- Resolve the variable kerb height issues along Raven Quay (north side) at the Williams Street end
- Upgrade the existing terraces to provide attractive and useful bleacher seating
- Repaint memorial structures to refresh them within a town centre contemporary context

- Potentially upgrade the reserve and proximity street lighting to showcase the features of the reserve at night
- Additional improvements retained from Option B include: upgrading existing seating furniture if the budget allows, additional landscaping treatments to support the pathway/lawn realignment, removing the existing bollards, and relevelling some existing pavers that require maintenance.

Recommendation

4.19. Upgrading the reserve provides an opportunity to consider a wider range of elements to ensure the best form/function outcome for the Kaiapoi town centre and to ensure the reserve reflects the high amenity values of the other four corners of the Williams Street Bridge that have undergone development over the last few years.

4.20. The Kaiapoi Town Centre Plan 2028 and Beyond also identifies Key Action #1, the 'development and enhancement of the riverbanks'. Development of the Kaiapoi Memorial Reserves area continues to progress Council's riverbank enhancement programme.

4.21. However, given the increase in the project budget for Option C, and as a result of Community Board feedback at the workshop on 14 February 2022, staff are recommending that the 'Kaiapoi Riverbank Walkway and Memorial Reserve' project be deferred from 2021/22, and a request for the full project budget of approximately $271,000 (which may be future adjusted factoring in rising construction and goods costs) be submitted as part of the 2023/24 Long Term Plan cycle.

Implications for Community Wellbeing

There are implications on community wellbeing by the issues and options that are the subject matter of this report.

Enhancement of the reserve would likely result in it becoming more activated with a natural consequence being increased visibility and interaction with memorial features. The proposed accessibility improvements will benefit multiple users by providing enough space for different users to engage with the reserve – those with accessibility issues, cyclists, pedestrians and the like.

Connectivity between Raven Quay west to the town centre would be improved.

4.22. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are not likely to be affected by, or have a significant interest in the subject matter of this report. However, a Project Initiation Request form was sent to Mahaanui Kurataiao in late 2021 (related to report 211026171968[v02]) asking that consideration be given to the level of involvement and/or Cultural reporting for this project. Staff are currently waiting to receive feedback.

5.2. Groups and Organisations

There are groups and organisations likely to be affected by, or to have an interest in the subject matter of this report.

The RSA have been consulted with on Draft Concept Plan - Options B and C. The Executive Committee unanimously endorsed Option B as their preferred option, with no significant design changes requested. Option C was also well received but with the following requests:

(i) An additional flagpole at the eastern end of the reserve
As an alternative, staff have proposed installing the permanent RSA flag on the concrete lighting pole on the Raven Quay/Williams Street corner immediately adjacent to the reserve. This replaces the need to have another pole structure in this area. Staff are currently assessing whether the pole will take the weight of the flag including any wind drag, and will follow up with the RSA once the assessments are complete. The RSA have signalled they would prefer a new pole and will pay for one if that proves to be the better option.

(j) Resolve the variable kerb height at the Williams Street end of Raven Quay (or include the temporary addition of a ramp/access way to support elderly accessibility)
As per item 4.11, there is no current roading budget provision to resolve the kerb issues in the short term, therefore staff are recommending that these issues be fixed as part of any 2023/24 Long Term Plan budget request.

(k) Inclusion of removable bollards in the first two-three carparks on the north side of Raven Quay at the Williams Street end to prevent the community parking in these parks (in spite of a road closure being in place) on memorial service days.
It is unlikely that removable bollard infrastructure would be included in on-street parks to support events in the district since these matters (road access restrictions) are usually addressed as part of an event Traffic Management Plan.

The principles around accessibility as outlined in the Waimakariri Accessibility Strategy have been considered in the designs. The Waimakariri Access Group will be consulted on the design before any further detailed design phase is undertaken and final approvals are sought from the Kaiapoi-Tuahiwi Community Board.

The Environment Canterbury (ECan) river engineer (Fred Brooks) has previously been consulted with regarding the preferred and most cost effective design solution for construction of an accessible path/s, i.e. principally on Options A & B. Ecan's preference would not be to build a wider path along the stopbank (Option A) due to potential risks for stop bank stability and integrity. While it is possible to build this path, it would require engineering design and construction monitoring, which would significantly increase construction costs. Therefore, Option B is preferred by staff over Option A as it is provides a wider range of outcomes in the reserve given the proposed budget spend.

5.3. Wider Community

The wider community is likely to be affected by, or to have an interest in the subject matter of this report.

The Kaiapoi Memorial Reserve area has been identified as a location for redevelopment in historical Kaiapoi Town Centre Plans due to it being a focal point along the Kaiapoi River and Williams Street, and to improve connectivity and accessibility throughout the town centre.

A period of public consultation on the finalised draft design may be undertaken if 2023/24 Long Term Plan funding of the project budget is secured.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are financial implications of the decisions sought by this report. The current $135,000 budget is included in the current Long Term Plan. To implement Option C there is an approximate budget shortfall of $136,000 (total budget $271,000 approximately). There is an option to remove the lighting upgrades to reduce the future budget down to $201,000 approximately.

High level cost estimates for Option C as at 21 March 2022 include:

- Site preparation $36,000

- Paving construction $58,740
- Landscape $19,480
- Lighting $70,644
- Furniture/painting $25,000
- Terraces $15,500
- Kerb upgrade (Raven Quay) $6,800
- Consents $500
- Internal costs/project management $15,000
- Contingency 10% (construction) $23,216
- **Total $270,880**

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do not have sustainability and/or climate change impacts.

However, the stopbanks are likely to be raised by Environment Canterbury in the future to account for additional sea level rise.

6.3 Risk Management

There are risks arising from the adoption/implementation of the recommendations in this report.

Due to the relatively simple type of construction required for the landscape treatments in Option C, a construction contingency allowance of 10% is considered adequate to minimise the risk of exceeding the budget. However, as a result of global forces (Covid 19 etc.) having an ongoing influence on construction and goods costs worldwide, it is likely the budget will need to be revised before being submitted for consideration under the 2023/24 Long Term Plan process.

Cost estimates have been made on the assumption that all phases of procurement and project management will be untaken by Regeneration/Greenspace staff. If this was to be managed by an external consultant there may be an increase in Project Management costs.

Construction timing is crucial to avoid memorial ceremonies and should be managed by ensuring any successful tenderer has the resources and capacity to construct within expected timeframes. Construction should not be programmed for the months where ground conditions are wet and with higher expected rainfall to avoid minimised potentials delays and/or damage.

The area is also noted to have potential liquefaction risks if subject to future earthquakes.

6.4 Health and Safety

There are health and safety risks arising from the adoption/implementation of the recommendations in this report.

A Safety in Design process has been undertaken in the development of the proposal. This focussed on incorporating end user safety, and in particular accessibility early in the design process.

Public safety through or around the site during construction will need to be managed by implementing a traffic management plan, fully fencing the site and providing alternative pedestrian access as required. This cost has been included in the construction cost estimate.

Environmental safety and H&S construction phase issues will be more fully considered during detailed design, procurement and contract management.

7. CONTEXT

7.1. Consistency with Policy

This matter is / is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. Authorising Legislation

Local Government Act 2002

Resource Management Act 1991

Historic Places Act 1993

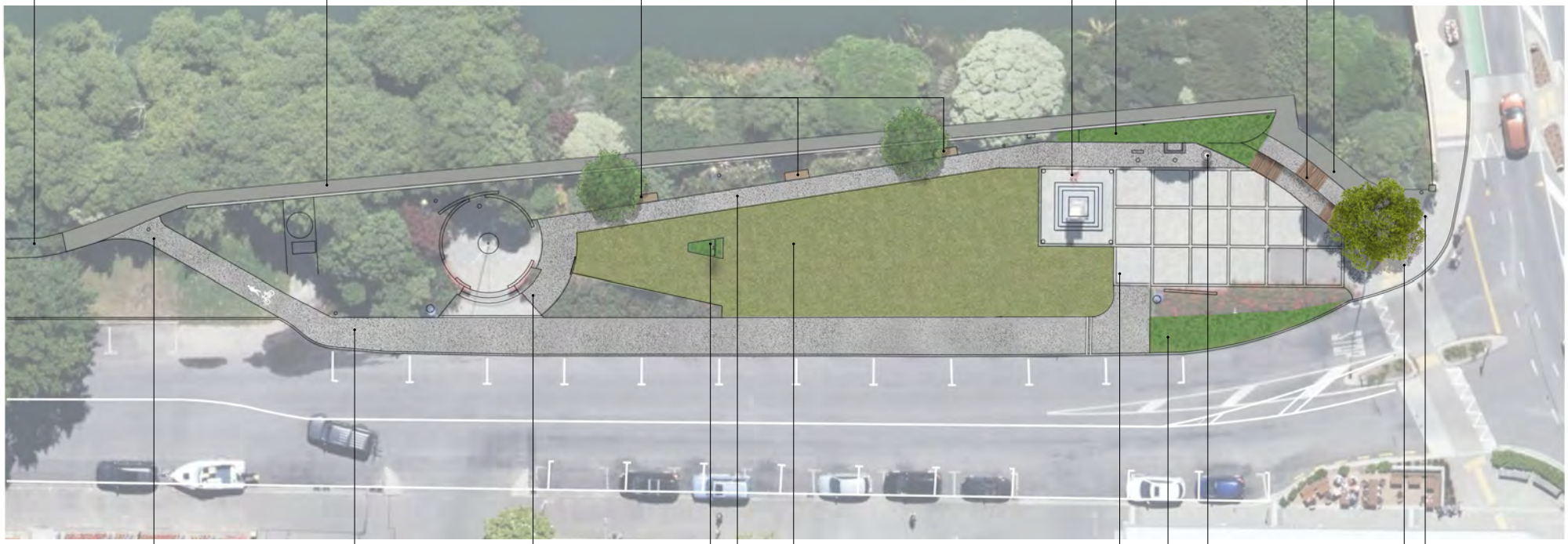
7.3. Consistency with Community Outcomes

The Council's community outcomes are relevant to the actions arising from recommendations in this report.

7.3.1. Public spaces and facilities are plentiful, accessible and high quality.

7.4. Authorising Delegations

The Kaiapoi-Tuahiwi Community Board has the delegated authority for approving design and consultation plans for recreation reserves.



DRAFT FOR INFORMATION

ISSUE	AMENDMENT	APPD.	DATE
A	DRAFT OPTION FOR INFORMATION		5.02.2022

	NAME	DATE
SURVEYED		
DESIGNED	HR WHITE	5.02.2022
DRAWN	HR WHITE	5.02.2022
CHECKED		
RECOMMENDED		

ORIGIN OF LEVELS

ORIGIN OF COORDINATES

SCALES: PLAN | DETAILS | LONG SECT hor. | LONG SECT vert. | REFERENCE FB: LB:

PROJECT TITLE: **KAIAPOI RIVERBANKS WALKWAY AND MEMORIAL RESERVE**

SHEET TITLE: **DRAFT CONCEPT PLAN OPTION C**

PROJECT No.
FILE No.
SHEET No.
PLAN No. **0003**
ISSUE A B C D E F

WAIMAKARIRI DISTRICT COUNCIL

A3

WAIMAKARIRI DISTRICT COUNCIL
REPORT FOR INFORMATION

FILE NO and TRIM NO:	DDS-06-10-02-05-03 / 211018168094
REPORT TO:	District Planning and Regulation Committee
DATE OF MEETING:	14 December 2021
AUTHOR(S):	Neil Sheerin, Senior Policy Planner Georgie Hackett, Policy Planner
SUBJECT:	REMOVAL OF MINIMUM CAR PARKING REQUIREMENTS FROM OPERATIVE DISTRICT PLAN
SIGNED BY: (for Reports to Council, Committees or Boards)	Department Manager / Chief Executive

1. SUMMARY

1.1 This report is to advise the minimum off-street car parking requirements are to be removed from the operative Waimakariri District Plan in order to comply with Policy 3.38 of the National Policy Statement on Urban Development 2020 (NPSUD). This is without using the 'standard' Resource Management Act 1991 (RMA) process and must be completed by 20 February 2022.

Attachments:

i. Appendix 1: Amendments to the operative Waimakariri District Plan.

2. RECOMMENDATION

THAT the Council:

(a) **Receives** report No. 211018168094.

(b) **Notes** that the NPSUD requires the amendment of the operative Waimakariri District Plan to remove minimum carparking requirements by 20 February 2022.

(c) **Notes** that the Development Planning Manager is delegated by Council to amend the operative Waimakariri District Plan where required by a national policy statement under section 55 of the RMA.

3. BACKGROUND

3.1. Policy 3.38 of the NPSUD, in summary, directs councils to remove from district plans provisions that require a minimum number of off-street car parks to be provided for a particular land use, development or activity, other than accessible car parks. As this is a national policy direction councils do not have a discretion in this matter.

3.2. Policy 3.38 states this must be done without using a Schedule 1 RMA process. In other words, the amendments must be made without any public process or public notification. Councils have until 20 February 2022 to do this.

3.3. The amendments to be made to the operative District Plan are attached in **Appendix 1**. Text to be deleted is shown as ~~strikethrough~~. The amendments will be made in early 2022 and before 20 February 2022 and apply to all zones within the District Plan.

3.4. The operative District ePlan will contain an electronic record of the revision, so plan users will be able to see versions of the operative Plan before and after the amendments.

3.5. Policy 3.38 also states there is nothing to stop a district plan including provisions relating to accessible car parks, loading space, cycle parks, and design standards for off-street car parking should it be provided. Provisions relating to these matters in the operative Plan will be retained. (The Proposed District Plan also contains such provisions.)

3.6. In a related matter, the NPSUD 'strongly encourages' councils manage effects associated with car parking supply and demand through comprehensive parking management plans. For clarification, district plans manage private off-street parking, while parking management plans manage public on-street and public off-street parking. The Council has recently drafted an updated District Parking Strategy. Public consultation on this has recently closed and the Strategy is to be put to Council on 7 December 2021 for adoption.

3.7. The Committee was briefed on the provisions of the NPSUD last year.

4. ISSUES AND OPTIONS

4.1 Implications for Community Wellbeing

There are implications on community wellbeing by the subject matter of this report. However, these may be minor. It is anticipated the absence of an on-site car parking requirement may not be an issue in many rural or industrial areas. In commercial areas, new businesses may be likely to provide parking to attract/retain custom. Parking design standards will be retained. Council has also recently updated its District Parking Strategy to manage effects associated with car parking supply and demand. Furthermore, given the recent public notification of the Proposed District Plan, the remaining 'life' of the operative District Plan is limited. In any case, as this is a national policy direction councils do not have a discretion in this matter.

The Management Team have reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1 Mana whenua

Te Ngāi Tūāhuriri Rūnanga are not likely to be affected by, or have an interest in the subject matter of this report greater than the general public.

5.2 Groups and Organisations

There are groups and organisations likely to be affected by, or to have an interest in the subject matter of this report. However, the implications may be minor, for the reasons outlined in section 4.1 above. In any case, as this is a national policy direction councils do not have a discretion in this matter.

5.3 Wider Community

The wider community is likely to be affected by, or to have an interest in the subject matter of this report. However, the implications may be minor, for the reasons outlined in section 4.1 above. In any case, as this is a national policy direction councils do not have a discretion in this matter.

The provisions requiring a minimum number of car parks will need to be removed practically by Friday 18 February 2022. The period between this report and that date enables staff to communicate this to interested organisations, consultants and parties ahead of the change coming into effect in order to minimise any consenting issues.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are not financial implications of the decisions sought by this report. The plan amendment will be met by existing budget as previously approved.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do have sustainability and/or climate change impacts as it may encourage uptake of alternative transport options, particularly in urban areas. The Proposed District Plan has been drafted to recognise and provide for national and regional direction regarding sustainability in transport.

6.3 Risk Management

There are not risks arising from the adoption/implementation of the recommendations in this report, other than any matters raised in submissions on the notified Proposed District Plan.

6.4 Health and Safety

There are not health and safety risks arising from the adoption/implementation of the recommendations in this report.

7. CONTEXT

7.1 Consistency with Policy

This matter is a matter of significance in terms of the Council's Significance and Engagement Policy. Amendment of the operative District Plan in the manner outlined is a national policy direction and as such councils do not have a discretion in this matter.

7.2 Authorising Legislation

The RMA applies as the key authorising legislation. Amendment of the operative District Plan in the manner outlined is a national policy direction and as such councils do not have a discretion in this matter. The amendment is required to be done without using a Schedule 1 RMA process.

7.3 Consistency with Community Outcomes

The Council's community outcomes are relevant to the actions arising from recommendations in this report. However, the implications may be minor, for the reasons outlined in section 4.1 above In any case, as this is a national policy direction councils do not have a discretion in this matter.

7.4 Authorising Delegations

Amendment of the operative District Plan in the manner outlined is a national policy direction and as such councils do not have a discretion in this matter. The amendment is required to be done without using a Schedule 1 RMA process. This matter has been referred to the District Planning and Regulation Committee as it has specific jurisdiction relating to the District Plan.

Appendix 1: Amendments to the operative Waimakariri District Plan

Table 30.8: On-Site Parking and Loading Space Minimum Requirements

Activity	~~Parking Spaces to be Provided~~	Loading Spaces to be Provided	Cycle Parking Long term (secure) Short term (casual)
Dwellinghouse	~~2 spaces per dwellinghouse, except in the Residential 6A and Business 1 Zones at Pegasus; and comprehensive residential development in the Residential 1, 2 and 6 Zones, where 1 space per dwellinghouse shall be provided~~		
Residential care homes	~~3 spaces per 10 persons accommodated~~	1 per care home with more than 20 persons accommodated	2 short term parks for greater than 20 beds; 1 long term park per 5 full time employee equivalents
Visitor accommodation	~~1 space per 2 bedrooms that are used for visitor accommodation or where accommodation is provided within dormitory rooms, one space per 4 beds~~	1 for 50 or more visitor accommodation units	1 long term park per 10 visitor accommodation units where there is no garage space provided
Educational facilities excluding pre-schools	~~1 car parking space per 25 students (Year 8 and below) and 0.5 spaces per 25 students (year 9 and above) together with 0.5 spaces per full time equivalent employees~~	1 for 100 or more students (on-site at the same time)	1 short term park per 10 students and 1 long term park for every 5 full time equivalent employees
Pre-school and childcare facilities	~~1 car parking space per 10 children and 0.5 spaces per full time equivalent employees.~~		1 short term park per 20 children and 1 long term park for every 3 full time equivalent employees
General retail	~~3 spaces per 100 m² gross floor area~~ ~~In the Business 1 Zone: 1 space per 80 m² gross floor area~~	1 where gross floor area is 100 m² or greater	Except for sites with frontage to a principal shopping street, 1 short term park and 1 long term park per 500m2 gross floor area
Home occupation	-		

	~~1 space per employee (who does not reside on the site) for general retail located within a dwellinghouse~~		
Supermarket	~~4 spaces per 100 m² gross floor area~~ ~~In the Business 1 Zone: 2 spaces per 100 m² gross floor area~~	1, plus 1 space per 1000 m² of gross floor area over 2000 m²	1 per 500 m² gross floor area plus one long term park per 5 full time equivalent employees
Large format retail	~~1 space per 60 m² gross floor area~~ ~~In the Business 1 Zone: 1 space per 100 m² gross floor area~~	1, plus 1 space per 1000 m² of gross floor area over 2000 m²	1 park up to 500 m² gross floor area plus 1 per 1000 m² gross floor area thereafter, and 1 long term park per 1000 m² gross floor area
Food and beverage	~~10 spaces per 100 m² net floor area~~ ~~In the Business 1 Zone: 5 spaces per 100 m² net floor area~~	1 for facilities between 100 m² and 450m² net floor area	1 short term park per 250 m² net floor area plus 1 long term park per 100 m² net floor area
Office	~~1 space per 40m² gross floor area~~ ~~In the Business 1 Zone: 1 space per 80 m² gross floor area~~	1 per 2000 m² gross floor area	1 short term and 1 long term park per 500 m² gross floor area
Medical centre	~~3 spaces per registered medical practitioner or~~ ~~5 spaces per 100 m² gross floor area , whichever is greater~~	1 for facilities over 1000 m² or where loading space is required for an emergency services vehicle	1 short term park per 3 health professionals plus 1 long term park per 5 full time equivalent employees
Hospital	~~3 spaces per 5 beds~~	1, plus 1 space per 1000 m² of gross floor area over 2000m2	2 short term parks, plus 1 short term park per 50 beds; and, 1 long term park per 20 beds
Industrial	~~1 spaces per 70 m² gross floor area~~	1, plus 1 space per 1000 m² of gross floor area over 2000 m²	1 long term park per 1000m² gross floor area
Warehousing and storage (excluding self-storage)	~~1 space per 100 m² gross floor area~~	1 plus 1 space per 1000 m² of gross floor area over 2000 m² gross floor area	1 long term park per 1000 m² gross floor area

Self storage	~~0.2 spaces per 100 m² gross floor area~~		
Places of assembly (includes club houses on sports grounds)	~~10 spaces per 100 m² net floor area~~	1 per 1000 m² net floor area	2 short term parks, plus 1 per 1000m2 gross floor area
Sporting grounds, playing fields	~~25 spaces per hectare used for the activity~~		3 short term parks, plus 3 additional short term parks per hectare used for the activity
Golf courses (excluding mini-golf and driving ranges) without a clubhouse	~~2 spaces per hole~~		3 short term parks plus 1 short term park per 10 hectares

31.2.1

Within the Mandeville North Business 4 Zone, shown on District Plan Map 182, development of the zone, including any buildings or structures shall occur as a comprehensive business development, including:...

~~k. Car parking shall be provided to achieve a ratio between 3.5 and 5 carparking spaces per 100m2 of gross retail area within the zone;~~...

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO and TRIM NO:	220322042010
REPORT TO:	COUNCIL
DATE OF MEETING:	5 April 2022
AUTHOR(S):	Jim Harland – Chief Executive
SUBJECT:	Health, Safety & Wellbeing Report – April 2022
ENDORSED BY: (for Reports to Council, Committees or Boards)	Department Manager / Chief Executive

1. SUMMARY

1.1. This report provides an update to the Council on Health, Safety & Wellbeing matters for March 2022. The dashboard reporting in this report is trending from February 2021 to mid-March 2022.

1.2. There were 9 incidents which occurred during February 2022 which resulted in no lost time to the organisation.

1.3. The Health & Safety Committee meeting was successfully held during February and engagement across health and safety representatives continues to be strong.

1.4. The organisation has registered 74 critical workers for the organisation under the Government definition for the Close Contact Exemption Testing for Critical Services programme. This allows the organisation to use the skills of critical workers who may be isolating as a household contact and who are not Covid positive and maintains our business continuity regime.

1.5. The Health & Safety Advisor has developed an annual plan of activities which will be used to measure progress and ensure compliance is achieved while the team manages vacancies.

Attachments:

i. Appendix A: February - March Incidents, Accidents, Near-misses reporting
ii. Appendix B: Contractor Health and Safety Capability Pre-qualification Assessment (drawn from the Site Wise database)
iii. Appendix C: Health, Safety & Wellbeing Dashboard Reports
iv. Appendix D: Health & Safety Annual Plan

2. RECOMMENDATION

THAT the Council

(a) **Receives** Report No. 220322042010

(b) **Notes** that there were no notifiable incidents this month. The organisation is, so far as is reasonably practicable, compliant with the duties of a person conducting a business or undertaking (PCBU) as required by the Health and Safety at work Act 2015.

(c) **Notes** that the Health & Safety Advisor has developed a plan of activities to support compliance and assist the organisation while the team is under resourced.

(d) **Circulates** this information to Community Boards for their information.

3. BACKGROUND

3.1. The Health and Safety at Work Act 2015 requires that Officers must exercise due diligence to make sure that the organisation complies with its health and safety duties.

3.2. An officer under the Health and Safety at Work Act 2015 is a person who occupies a specified position or who occupies a position that allows them to exercise a significant influence over the management of the business or undertaking. Councillors and the Chief Executive are considered to be the Officers of the Waimakariri District Council.

3.3. The World Health Organisation has declared a pandemic as a result of the transmission of the COVID-19 virus across the world. This report continues to provide the Council with a summary of activities which are underway to support our organisations response to the pandemic.

4. ISSUES AND OPTIONS

4.1. Incidents and accidents

4.1.1. The organisation continues to encourage our contractors to report any incidents, accidents or near misses through to us to improve the scope of our lag indicators.

4.1.2. It is recognised that reporting is showing a downward trend across many sectors, mainly due to the dispersed nature of teams / activities because of Covid-19.

4.1.3. The cable strike we have seen again this month highlights the importance of understanding these issues at a deeper level. Even though this strike was not high voltage it appears that our current hand held ground radars are not always picking up these lines. A sub group of the H&S committee has been established to review best practice from other councils and develop improved processes to reduce the cable strikes occurring.

4.2. Health & Safety Committee

4.2.1. The health and safety committee met on 4 March to review all health, safety and wellbeing activity for the past 4 months. Highlights of the meeting included:

- Welcome to new reps
- *Review of incidents and accidents, as outlined in the attached reports*
- *Update that the health and safety policy library will be brought back and live on workplace this year. This will empower all staff to access policies faster*
- *Update to our current ergonomics process to implement a triage system involving trained staff to assist when issues arise.*
- *Health and safety reps elections will be coming soon and the organisation will be increasing the number of reps from 17 to 30. This will provide better cover, support to the health and safety team and support new starters.*

4.3. Covid-19 Response – RAT tests for Critical Workers

4.3.1. The organisation has implemented its critical worker procedure in line with current government advice. We have identified 74 staff who are critical workers.

4.3.2. If someone is identified as a close contact based on the current Government advice - meaning you are a household contact of a positive Covid-19 case - and

the Waimakariri District Council requires them to return for urgent and critical work, they may be able to return to work during your self-isolation period, provided they test negative for Covid-19. They will be required to take a daily Rapid Antigen Test (RAT) before commencing work.

4.3.3. The department manager will determine, under our current BCP process if a return to work is required at the time.

4.3.4. Should they be asked to return to work during their self-isolation period with the use of RAT testing, they will be issued a letter from us with a unique identifier number, which will enable them to order RAT test kits for daily testing and pick these up from a local collection site.

4.4. Health & Safety Annual Plan

4.4.1. The Health and Safety plan has been updated taking into consideration the recent and pending vacancies surrounding this team.

4.4.2. These activities will be used to measure progress and ensure compliance while the organisation determines the future resourcing needs of the team.

4.4.3. In support for the Advisor the Health and Safety Administrator position has been appointed on a temporary basis until permanent recruitment can commence in June.

4.4.4. In addition to these activities the health and safety advisor is also delivering:

- Incident and accident management
- Accident investigations
- Health and safety committee meetings
- Inbox management
- Communications
- Reactive advice to managers and HSR's
- Covid response
- Accommodation moves
- Wellbeing

Implications for Community Wellbeing

There are implications for community wellbeing by the issues and options that are the subject matter of this report.

4.5. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. **Mana whenua**

Te Ngāi Tūāhuriri hapū are not likely to be affected by, or have an interest in the subject matter of this report.

5.2. **Groups and Organisations**

There are no external groups and organisations likely to be affected by, or to have an interest in the subject matter of this report.

5.3. **Wider Community**

The wider community is likely to be affected by, or to have an interest in the subject matter of this report.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

There are no financial implications of the decisions sought by this report.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do not have sustainability and/or climate change impacts.

6.3 Risk Management

There are no new risks arising from the adoption/implementation of the recommendations in this report.

6.3 Health and Safety

There are health and safety risks arising from the adoption/implementation of the recommendations in this report. Continuous improvement, monitoring, and reporting of Health and Safety activities are a key focus of the health and safety management system.

7. CONTEXT

7.1. Consistency with Policy

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. Authorising Legislation

The key legislation is the Health and Safety at Work Act 2015.

The Council has a number of Human Resources policies, including those related to Health and Safety at Work.

The Council has an obligation under the Local Government Act to be a good employer.

7.3. Consistency with Community Outcomes

The Council's community outcomes are relevant to the actions arising from recommendations in this report.

- There is a safe environment for all.
- Harm to people from natural and man-made hazards is minimised.
- Our District has the capacity and resilience to quickly recover from natural disasters and adapt to the effects of climate change.

The Health, Safety and Wellbeing of the organisation, its employees and volunteers ensures that Community Outcomes are delivered in a manner which is legislatively compliant and culturally aligned to our organisational principles

7.4. Authorising Delegations

An officer under the Health and Safety at Work Act 2015 is a person who occupies a specified position or who occupies a position that allows them to exercise a significant influence over the management of the business or undertaking. Councillors and Chief Executive are considered to be the Officers of WDC.

Appendix A

Date	Person type	Occurrence	Event description	Response
15/02/2022	Employee/ Volunteer	Injury	Employee used a screwdriver to take apart a tray on a vehicle. The screwdriver slipped and put a small puncture in the employee's hand.	The injury was a small shallow puncture wound in their left hand. Cleaned wound with saline then covered with plasters. There was no lost time or further medical attention needed. Discussions with the teams on wearing PPE (gloves) for tasks when appropriate.
15/02/2022	Employee/ Volunteer	Injury	An employee pulled a muscle in his right shoulder while unloading a plate compactor from a truck.	The employee already had an ache in his shoulder and it became very sore after this movement. Still under investigation and waiting on further medical information.
18/02/2022	Employee/ Volunteer	ILLMED	Knee Infection. Most likely caused by kneeling in soil/mud over a very wet work period. No known cuts and otherwise healthy.	The staff member spend 3 days as an inpatient, receiving IV fluids for an infection. This is a rear incident and is still inconclusive regarding the point of infection. Staff member is back at work and recovered fully.
22/02/2022	Non-Employee	INJURY	Staff member was entering main front counter in the customer services area. The door is heavy and the staff member opened door with left hand along with her shoulder (as she had 2 bags in right hand) Her elbow connected with her chest, resulting a sharp pain.	Staff member attended a Dr's appointment. The outcome was bruising to ribs. There is progress with the weight of the doors. Adjustments are being made to the slow closing mechanisms to lighten the restriction when opening. It has also raised concerns that there are no windows in the doors. A property request has been raised to have some installed so staff can see if someone is on the other side prior to entry.
23/02/2022	Employee/ Volunteer	ADVINTACTN	A customer attempted to use a Rapid Antigen Test to enter the Aquatic facility and was declined by staff. The customer became argumentative and emotional. The Customer then suggested she had a vaccine pass but that it didn't belong to her. The Aquatic staff held ground and refused entry.	There was a clear misunderstanding of facility entry requirements in Socio-political environment. The area was clearly signposted with entry requirements. These requirements were explained to the customer at the time.
25/02/2022	Employee/ Volunteer	ILLMED	In the IM Department, the IT server room (closed door) had a very piercing audible electronic beeping noise as a warning going off. IT discovered the noise was from the	The staff member had a headache which became a Migraine. They also had tinnitus and removed their hearing aids. After resting at home for the rest of the day,

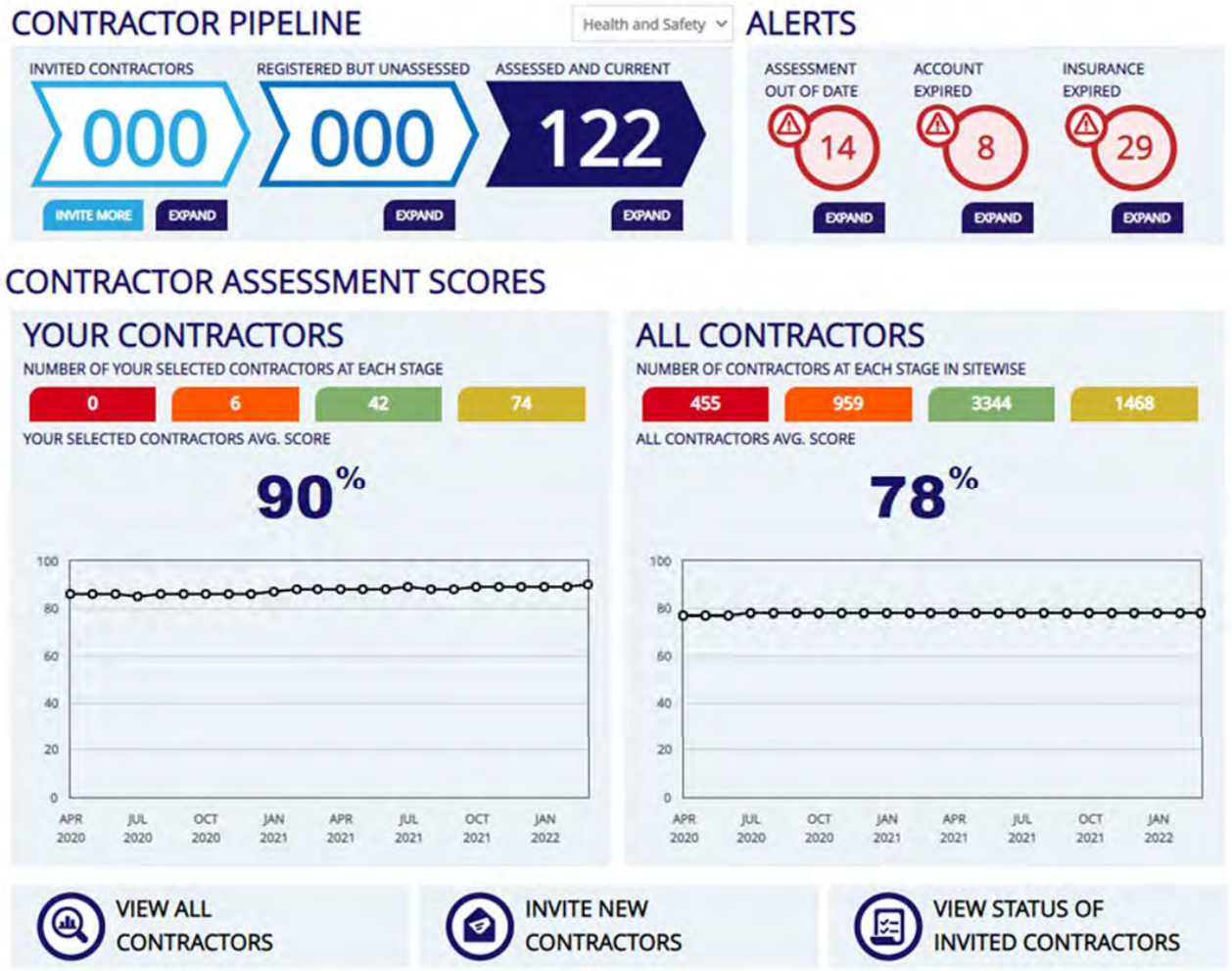
			room overheating AC unit. to drop the room temperature the server room door needed to be kept open - IT thought that it would need to be open only for half an hour or so depending on the temperature and could not switch off the warning noise. A staff member sitting in the IM department has very sensitive hearing and started to develop a headache, they took out their hearing aids to try and mitigate noise effects but the headache got worse and they started to feel nausea as the noise was triggering off tinnitus. They could feel a migraine starting to come on and so got permission from their line manager to go home.	they recovered. Currently under investigation for a solution should this happen again.
6/03/2022	Non-Employee	ADVINTACTN	Adverse interaction with customer at Kaiapoi Pool. 2 children arrived at Kaiapoi pool but were unable to enter as one was over 12.3yrs and didn't have a Vaccine pass. When they weren't able to provide a pass they moved away back to the exit which our staff member misinterpreted that a parent was waiting outside. Later the parent returned with children upset that they hadn't been allowed entry and had walked home. The parent was very aggressive with staff and followed this up with an emailed complaint.	Spoke to Lifeguard to confirm that regardless of whether or not they have a vaccine pass, any children entering our facility fall under our duty of care and our expectation is that if they can't stay we would need to contact a parent. The children in question walked off and the staff member understood this to mean a parent was following along behind or waiting outside as is often the case. Spoken with Lifeguard, and emailed complainant back.
7/03/2022	Employee/ Volunteer	INJURY	Hit the left hand two outer knuckles while doing up something on the vice. The worker was assembling a 50 mm DCV. He was tightening it whilst it was held in a vice in a co-worker's truck. The DCV slipped in the vice and his hand hit the edge of the truck, injuring the 4th and 5th knuckle and back of his hand.	No lost time, no medical attention. Just bruising/swelling. The vice was too small to hold the DCV properly. There are a few fittings that are too big to properly fit in the smaller vices, with which some trucks are equipped. Trucks need appropriate equipment for a safe working environment. Smaller vices are not fit for purpose for use with some of the larger fittings used on site. Replacement should be looked at. Would also like to assemble/update a list for standard equipment on Maintenance Trucks so that all trucks are properly equipped for safe working. Still under investigation and follow up.
8/03/2022	Employee/ Volunteer	ADVINTACTN	Angry customer on the phone. Upset about Vaccine mandates.	Currently under investigation.

Lost Time Injuries - Aquatics	2019 to current	**Injury one:** • Currently on RTW plan – 7.75hrs x 3 days per week (23.25) • Date of injury - 29th Nov 2020 • Weekly contracted hours = 38.75 • 1704 hrs lost to date **Injury two:** • Currently fully unfit • Date of injury 28 June 2019 • Weekly contracted hours = 30 • 3350 hrs lost to date
Lost Time Injuries – Water Unit	2021 to current	**Injury one:** • Date of injury – 27 April 2021 (RTW hrs 24hrs/wk. currently) • Weekly contracted hours = 40 • 908 hrs lost to date

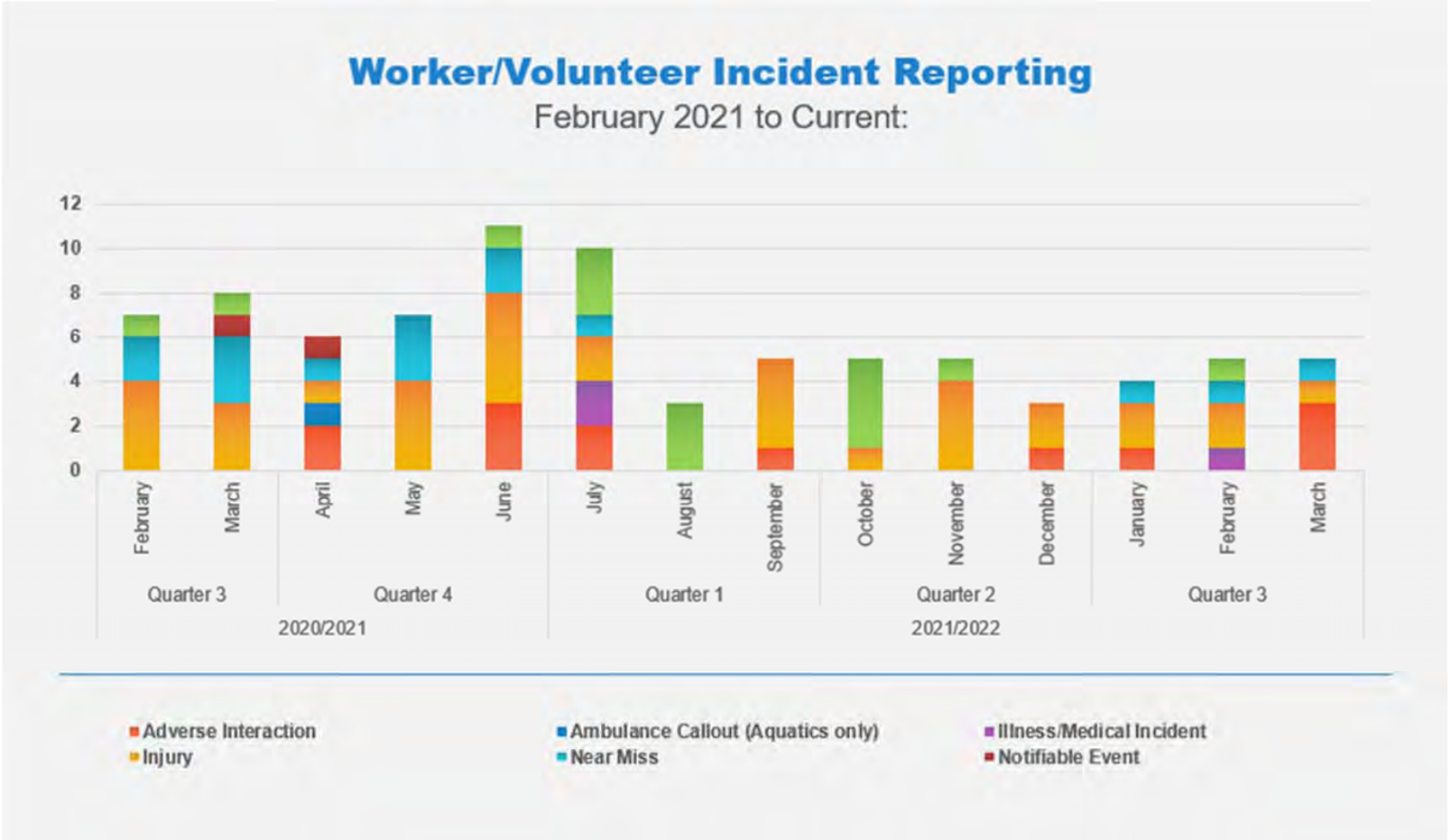
Lead Indicators

Safety Inspections Completed (Workplace Walkarounds)	2022	Workplace Walkarounds being restructured per team. Roll out for new areas in progress.
Training Delivered	2021/2022	People Trained: Nil in house training coordinated this month. Role specific training still ongoing through departments.

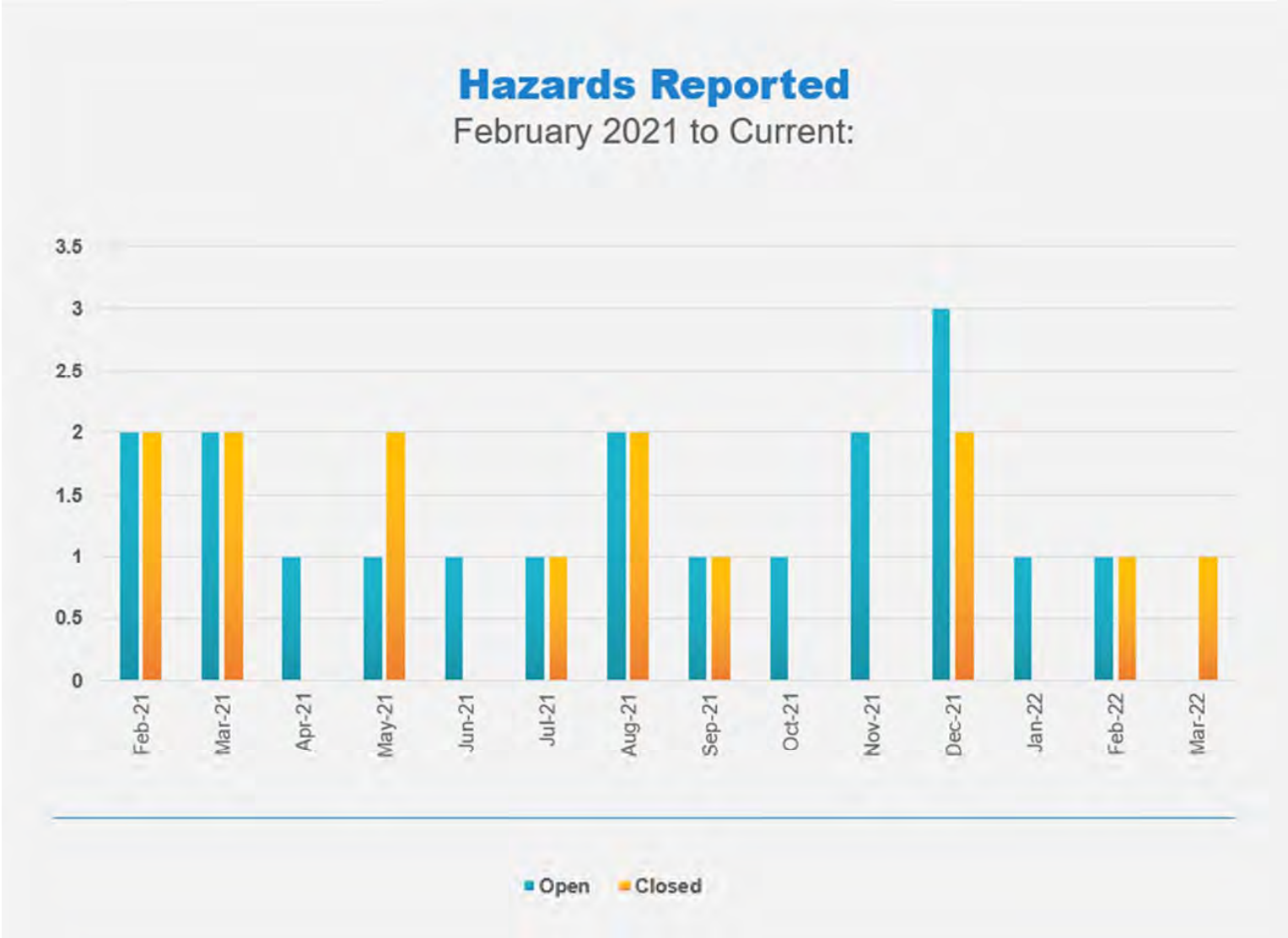
Appendix B


CONTRACTOR PIPELINE
Health and Safety
INVITED CONTRACTORS
000
INVITE MORE
EXPAND
REGISTERED BUT UNASSESSED
000
EXPAND
ASSESSED AND CURRENT
122
EXPAND
ALERTS
ASSESSMENT OUT OF DATE
14
EXPAND
ACCOUNT EXPIRED
8
EXPAND
INSURANCE EXPIRED
29
EXPAND
CONTRACTOR ASSESSMENT SCORES
YOUR CONTRACTORS
NUMBER OF YOUR SELECTED CONTRACTORS AT EACH STAGE
0
6
42
74
YOUR SELECTED CONTRACTORS AVG. SCORE
90%
100
80
60
40
20
0
APR 2020
JUL 2020
OCT 2020
JAN 2021
APR 2021
JUL 2021
OCT 2021
JAN 2022
ALL CONTRACTORS
NUMBER OF CONTRACTORS AT EACH STAGE IN SITEWISE
455
959
3344
1468
ALL CONTRACTORS AVG. SCORE
78%
100
80
60
40
20
0
APR 2020
JUL 2020
OCT 2020
JAN 2021
APR 2021
JUL 2021
OCT 2021
JAN 2022
VIEW ALL CONTRACTORS
INVITE NEW CONTRACTORS
VIEW STATUS OF INVITED CONTRACTORS

Appendix C


Worker/Volunteer Incident Reporting
February 2021 to Current:
12
10
8
6
4
2
0
February
March
April
May
June
July
August
September
October
November
December
January
February
March
Quarter 3
Quarter 4
Quarter 1
Quarter 2
Quarter 3
2020/2021
2021/2022
Adverse Interaction
Injury
Ambulance Callout (Aquatics only)
Near Miss
Illness/Medical Incident
Notifiable Event


Worker/Volunteer Incident Reporting
February 2021 to Current:
17%
Property or Vehicle
17%
Adverse Interaction
1%
Ambulance Callout (Aquatics only)
1 Incident
3%
Notifiable Event
2 Incident
6%
Illness/Medical
17%
Near Miss
15 Incidents
39%
Injury
34 Incidents


Hazards Reported
February 2021 to Current:
3.5
3
2.5
2
1.5
1
0.5
0
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Jan-22
Feb-22
Mar-22
Open
Closed

Appendix D: Health and Safety Plan 2022

The purpose of the H&S Annual plan is to support the Unit Business plan by identifying key activities which require effort in the current calendar year. These activities will be managed by the H&S Advisor in the absence of the Health & Safety Manager who will report on progress against this plan to their Department Manager sponsor. Updates will be given to the Health and Safety Committee on a quarterly basis.

Area	Activity	Actions	Stakeholders				Timeframes
			A	R	C	I	
Training & Empowerment	Health & Safety Reps	Elections to commence Training – HSR training for newly recruited to commence May and be ongoing to support department business priorities.	A	A/AD	UM/HSR	ALL	April / May
		HSR training to support new starters and complete H&S Induction	A	A	UM/HSR	ALL	May / June
		HSR Roles and Responsibilities refresh	A	A/AD	HR/UM/HSR	ALL	May / June
	Policy library	All policies accessible on workplace via a policy library. Revise 8 key H&S polices from current key policies; Leadership, Worker Engagement and Risk management.	A	AD	HR	ALL	April - November
Hazard Identification & Control Systems	Site security	CCTV and Duress alarm implementation Drills and SOP development Training coordination.	MT	UM	UM	ALL	Collaborate and investigate procurement of appropriate products April – June 2022 Implement and purchase July – September 2022
	Audit schedule	Deep dive 2 high risk areas within the organisation for auditing and reporting.	A	A	UM	UM	2 Deep dive audits to commence August with a completion by end of Sept
	Health & Safety system	Complete business case – implement a tender process with procurement and implementation phases inclusive.	MT	MT	A/UM		Completion by end of May. (TBC)
	Ergonomics	Launch a triaged three tiered process for ergonomic assessments. Tier one- self	A	A	UM	ALL	Commence project end of March with a completion estimate by

		management and setup, trained ergonomic staff support (training coordination inclusive) through to Engaging Habit Health for qualified workstation assessments.					end of May, based on training availability.
Compliance	Duty Holder review	Workflow completion and incident close out.	A	A/UM	UM		Commence with completion by end of November.
	Asbestos management	System is up to date. Adopt An assessment schedule for ongoing system maintenance	UM	UM	A	AD	Commence with completion by end of November.
Leadership & Culture	Health & Safety Risk review	6 monthly risk review with Management team and Action plan monitoring ongoing.	MT	A	UM	ALL	6 monthly April and October
	Communication	Workplace updates and Health and Safety page refresh.	A	AD	HR	ALL	Ongoing
Continuous Improvement	Safe Plus	External auditor engagement and support.	MT	A	UM	ALL	Commenced planning with likely completion by end of September.
Wellbeing	Annual Health checks	Complete annual health checks via Durham Health.	A	A	MT	ALL	April / May
	Covid response	PPE supply, communication and distribution	A	AD	UM/HR	ALL	During covid response as required and in collaboration with HR
		Risk assessment support function to departments.	MT	A	UM/ALL/HR	ALL	During covid response as required and in collaboration with HR

Key: A = Advisor; AD = Admin; MT = Management Team; UM = Unit Managers; HSR = H&S Reps; HR = Human Resources; All = All staff
ARCI = Accountable (who will lead); Responsible (who will action); Consulted (who needs to be involved); Informed (who needs to be told)

WAIMAKARIRI DISTRICT COUNCIL

MINUTES OF THE MEETING OF THE DISTRICT PLANNING AND REGULATION COMMITTEE HELD IN THE COUNCIL CHAMBER, 215 HIGH STREET, RANGIORA ON TUESDAY 22 FEBRUARY 2022 AT 1.00PM.

PRESENT:

Deputy Mayor N Atkinson (Chairperson), Councillors W Doody, N Mealings, P Redmond and Mayor D Gordon.

IN ATTENDANCE:

Councillor A Blackie.

J Harland (Chief Executive), M Bacon (Planning Manager) and K Rabe (Governance Advisor).

1 APOLOGIES

Moved: Councillor Redmond Seconded: Councillor Mealings

An apology for absence was received and sustained from Councillor Barnett.

CARRIED

2 CONFIRMATION OF MINUTES

2.1 Minutes of the meeting of the District Planning and Regulation Committee held on 14 December 2021

Moved: Mayor Gordon Seconded: Councillor Redmond

THAT the District Planning and Regulation Committee:

(a) **Confirms** the circulated Minutes of a meeting of the District Planning and Regulation Committee, held on 14 December 2021, as a true and accurate record.

CARRIED

3 MATTERS ARISING

Nil.

4 DEPUTATIONS

Nil.

5 REPORTS

5.1 Plan Implementation (Planning) Unit Update – M Bacon (Planning Manager)

M Bacon took the report as read, noting that February 2022 had been a reasonably quiet month for the Resource Consent Team.

Moved: Councillor Doody Seconded: Councillor Redmond

THAT the District Planning and Regulation Committee:

(a) **Receives** Report No. 220121006971.

(b) **Notes** the current activities and operations in the Plan Implementation Unit.

CARRIED

Councillor Redmond congratulated the Resource Consent Team, acknowledging their ability to achieve targets during a very busy year.

6 REPORT REFERRED FROM THE RANGIORA-ASHLEY COMMUNITY BOARD

6.1 Request for a Loading Zone on Railway Road – S Binder (Transport Engineer)

(Refer to attached copy of report 211102176150 to the Rangiora-Ashley Community Board meeting of 9 February 2022)

M Bacon took the report as read.

In response to a question from Councillor Doody, M Bacon explained that the Roading Team investigated the need for the loading zone and wrote the report requesting implementation. The Regulation and Planning department would manage the Parking Restrictions Schedule and the Enforcement Team would ensure compliance.

Moved: Mayor Gordon Seconded: Councillor Mealings

THAT the District Planning and Regulation Committee:

(a) **Receives** Report No. 211102176150.

(b) **Approves** establishment of a 24-hour loading zone on the west side of Railway Road north of Marsh Road for a length of 35 metres.

(c) **Circulates** this report to Utilities and Roading Committee for information.

CARRIED

Mayor Gordon supported the motion noting that the Rangiora-Ashley Community Board had considered this matter at its meeting in February 2022. He also acknowledged that Pak' n Save was an important business within the Rangiora business community.

7 CORRESPONDENCE

Nil.

8 PORTFOLIO UPDATES

8.1 District Planning Development – Councillor Kirstyn Barnett

No discussion emanated from this item.

8.2 **Regulation and Civil Defence – Councillor Philip Redmond**

Civil Defence

- ∑ Trifecta Review – feedback had been passed on and a submission was made by Mayor Gordon and Councillor Redmond.
- ∑ The heavy rain over the recent weeks had caused flooding of garages and outbuildings, however no damage to houses had been reported. One resident, her miniature pony and 14 dogs had been evacuated.

Regulation and Compliance

The Unit had all been busy as more complaints than usual were received from the public, which indicated the high levels of anxiety in the community due to the continued impact of Covid in the district.

9 QUESTIONS UNDER STANDING ORDERS

Nil.

10 URGENT GENERAL BUSINESS

Nil.

NEXT MEETING

The next meeting of the District Planning and Regulation Committee is scheduled for 1pm, on Tuesday 26 April 2022, to be held in the Council Chamber.

THERE BEING NO FURTHER BUSINESS THE MEETING CLOSED AT 1.08PM.

_____
N Atkinson
Chairperson

26 April 2022
Date

Briefing

- ∑ *Tiny Homes Update – Warren Taylor (Estimated time 15 minutes)*
- ∑ *Greater Christchurch Partnership – Spatial Plan – Heike Downie and Cameron Wood (Estimated time 1 hour)*

WAIMAKARIRI DISTRICT COUNCIL

MINUTES OF THE MEETING OF THE UTILITIES AND ROADING COMMITTEE HELD IN THE COUNCIL CHAMBER, 215 HIGH STREET, RANGIORA ON TUESDAY 22 FEBRUARY AT 3.30PM.

PRESENT

Councillor R Brine (Chairperson), Mayor D Gordon, Councillors A Blackie, S Stewart, J Ward and P Williams

IN ATTENDANCE

Councillors P Redmond, W Doody, N Mealings and N Atkinson
J Harland (Chief Executive) (from 4.02pm) G Cleary (Manager Utilities and Roading), J McBride (Roading and Transport Manager), J Dhakal (Project Engineer), A Smith (Governance Coordinator)

1 APOLOGIES

There were no apologies.

2 CONFLICTS OF INTEREST

There were no conflicts of interest recorded.

3 CONFIRMATION OF MINUTES

3.1 Minutes of a meeting of the Utilities and Roading Committee held on Tuesday 16 November 2021

Moved Councillor Blackie Seconded Councillor Williams

THAT the Utilities and Roading Committee:

(a) **Confirms** the circulated Minutes of a meeting of the Utilities and Roading Committee held on 16 November 2021, as a true and accurate record.

CARRIED

3.2 Matters arising

There were no matters arising.

4 DEPUTATION/PRESENTATIONS

There were no deputations or presentations.

5 REPORTS

5.1 Ashley Street and Coldstream Road Upgrades – Further Information – J Dhakal (Project Engineer) and J McBride (Roading and Transport Manager)

J McBride and J Dhakal presented this report which provided further information on the estimated costs of upgrades to Coldstream Road and Ashley Street, as requested by Council during the recent Annual Plan meeting. These projects had not been included in the Annual Plan at this stage, and had not been prioritised against other needs of the district. The rating impact if these were included in the Annual Plan would be an increase on the roading rate of 0.5% and an overall increase to general rate of 0.1% in the 2022/23 year. It was noted that the staff report also provided alternate set of recommendations for this matter.

Councillor Redmond sought clarification on second sentence of paragraph 4.2 in the report, and J McBride confirmed it should read "*There is currently no budget allocated for this project."*

Councillor Williams Moved recommendations (a), (d) and (e) in the staff report, but there was absence of a Seconder.

Moved Mayor Gordon Seconded Councillor Blackie

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 220209016725;

(b) **Declines** the inclusion of the Ashley Street and Coldstream Road Upgrades Projects within the 2022/23 Annual Plan, for further consideration as part of the next Long Term Plan process;

(c) **Notes** that this is the recommended option so that this project is considered as part of the next Long Term Plan process and can be prioritised against other needs within the district;

CARRIED
Councillor Williams against

Mayor Gordon pointed out that with the Council having just been through an Annual Plan process, this is not the correct time for these projects to be included. Mayor Gordon supported them being considered as part of the next Long Term Plan process.

Councillor Blackie endorsed the comments of the Mayor and that priorities need to be given consideration.

Councillor Williams, in opposing the recommendation, commented that as Ashley Street is one of the main entrances to the Rangiora township it was important for these improvements to be included in the 2022/2023 Annual Plan to improve the approach to the town. It was also pointed out that this was a recommendation from the Rangiora Ashley Community Board. Alternatively, Councillor Williams would have supported an amended recommendation approving funding for improvements along the roadside outside the A and P Showgrounds land only on Ashley Street.

Councillor Brine supported this recommendation and for this work to be undertaken in the future, but priorities need to be considered at this time.

Councillor Doody supports the comments of Councillor Williams with this entrance of Rangiora currently untidy and needing improvement.

Councillor Atkinson noted that the A and P showgrounds hosts events that attract thousands of people and suggested that it is not looked after well. He believes the Council should be better serving this area.

Mayor Gordon responded that at less expense, there could be a partnership agreement reached between the Council maintenance contractor and the A and P Association on improving the roadsides. This resolution is not seen as going against the Community Board and if the Rangiora-Ashley Community Board include this in their submission to the Annual Plan this would be considered as part of that process. Some mowing of the roadside and maintenance would provide a visual improvement of this area and suggested staff follow up with this.

5.2 Skewbridge Active Warning Signage – Concept Design – J Dhakal (Project Engineer) and J McBride (Roading and Transport Manager)

J Dhakal and J McBride presented this report which provided information to the committee on the scheme design for Skewbridge Active Warning Signage Project. J Dhakal advised that this was to be a temporary measure while there are investigations into the potential upgrade of Skewbridge in the future. The project is estimated to cost $285,000 which is within the budget of $330,000. It is planned to proceed to detailed design following presenting to this meeting and engaging with Mainpower for the power supply for the active warning signs.

Councillor Ward suggested when discussions are being undertaken with Mainpower, if there could be included in the contract, any electricity provision required for the future upgraded bridge. J McBride said potentially power would only be required on the bridge if there was to be street lighting on the bridge, or if there was a cycle facility included which required lighting. As a comparison, it was pointed out that the Cones Road Ashley River Bridge had no street lighting or cycle way lighting. This is not a level of service that the Council would be looking to provide, but could include the ability to extend that in the future if that was needed.

Councillor Williams enquired about the cost of solar powered signage, noting there is a significant difference in this cost. J McBride responded that this project is not just lighting, but also includes thresholds, changing to the road marking and tactile indicators to assist in keeping people in their lanes. Because of the number of vehicles going through this site each day, the solar panels would not hold enough charge to keep working and required a permanent power supply which is more expensive. J Dhakal noted there is different sorts of batteries that could be used, but noted that the lithium batteries which are used in cars don't retain charge in zero degrees or less, which would make it difficult during frosty winter days. Councillor Williams noted there are battery powered road signs operating 24 hours per day through the Hundalees between Picton and Christchurch.

Councillor Blackie asked how much of the cost will be provided by Mainpower
J Dhakal advised that a cost estimate has not been obtained from Mainpower as yet which would be based on the electrical design provided. Trenching is required for some of this portion which will be a cost included in the main construction contract. Regarding the lithium batteries, Councillor Blackie suggested that they could be insulated to protect against the cold temperatures. J Dhakal agreed to seek further advice from the supplier on this, but had previously been advised that permanent power supply was the best option for this location.

Following a question from Councillor Stewart on cyclists using the bridge,
J McBride said there wouldn't be the ability to provide specific facilities for cyclists with these improvements, but staff would be making sure that any new infrastructure would not use up any space in the shoulder that cyclists currently

use. Councillor Stewart suggested that it would be a good alternative for cyclists to use Skewbridge Lane rather than still using Skewbridge. J McBride suggested this could be part of the network plan and the longer term plan for Skewbridge Bridge.

Councillor Doody asked about the signage and if it was to be similar to that installed in Tram Road. J McBride said this is similar, when cars approach it will activate warning and reminding drivers to slow down. Councillor Doody noted these electronic signs were very effective and supports installation of these.

Moved Councillor Brine Seconded Councillor Williams

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. TRIM 211215200532.

(b) **Notes** that the preliminary estimate for the physical works is $285,000 and is within the budget of $330,000.

(c) **Notes** Waka Kotahi (NZTA) has approved 51% funding contribution of this project.

(d) **Notes** that staff will proceed with detailed design stage.

(e) **After** further investigation on batteries, procurement is proposed with direct engagement with Mainpower for the power supply works and open tender for the signage install and civil works.

CARRIED

Councillor Brine said this was not the final result that the Council had wanted for this bridge, but the Council was able to provide these safety measures. It was noted that NZTA are contributing 51% of the cost of these interim safety measures.

Councillor Williams supported this proposal but believes the battery option would incur considerably less cost for the Council and it is important to explore this option.

Mayor Gordon noted this was work had been considered for some time and there needed to be safety measures put in place as an interim step until the bridge replacement, which the Council will continue to pursue.

Councillor Ward suggested that accidents occurred on Skewbridge that were not being reported, and asked if there was information being provided to Council staff by residents near the bridge of any such accidents that are not being reported through injury. This information could be used to put the case to NZTA for the new bridge. J McBride said residents were very active in providing this information to Council staff. In recent times the injuries sustained from accidents on or near the bridge had been minor and there had been no fatalities but with the increased traffic volumes, the risk increases. NZTA Waka Kotahi unfortunately use death or serious injury statistics as the main driver for funding of projects. It was noted that although there have previously been fatalities at this site, these are beyond ten years, which is the criteria that NZTA use.

Following a question from Councillor Atkinson, J McBride confirmed that the signage would be able to relocated to a different site, once it was no longer needed at Skewbridge.

5.3 Wastewater Treatment Plant Fencing Contract Completion – J Dhakal (Project Engineer) and R Frizzell (Wastewater Engineer)

J Dhakal presented this report which provided an update on this fencing contract that was award just prior to the first Covid-19 Lockdown in 2020. After some delay this work was completed prior to the end of June 2020 and the overall project expenditure was below the budget.

Moved Councillor Blackie Seconded Councillor Williams

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 220112002581.

(b) **Circulates** to the community boards for their information.

CARRIED

6 CORRESPONDENCE

Nil.

7 REPORT REFERRED FROM THE WOODEND-SEFTON COMMUNITY BOARD

7.1 Vaughan Street, Sefton – Approval of No-Stopping Restriction – S Binder (Transport Engineer)

J McBride spoke to this report on behalf of the report writer. This requested installation of No Stopping restrictions on Vaughan Street, Sefton. There had been development on this street and these No Stopping areas will allow for safer traffic movements for the residents.

Following a question from Mayor Gordon on the hedge, G Cleary advised that the hedge would remain in place, which would stop the prevailing wind.

There were four property owners which staff would consult with and if there was any objection to the installation of the No Stopping zones, staff would provide a further report to the Committee.

Moved Councillor Williams Seconded Councillor Blackie

THAT the Utilities and Roading Committee:

(a) **Approves** in principle the installation of the following no-stopping restriction on Vaughan Street subject to engagement with the residents:

i. For 120m length north of Cross Street on the west side.

ii. For 105m length north of Cross Street on the east side.

(b) **Notes** that staff have not consulted with property owners, but an information notice explaining the need for parking restrictions will be distributed to all residences prior to any works being undertaken.

CARRIED

8 MATTERS FOR INFORMATION

8.1 **Request to engage Hannon Civil Limited for Works Coastal Urban Minor Stormwater Improvements 2021/22 –** Report to Management Team Meeting 22 November 2021 – Circulates to Utilities and Roading Committee.

8.2 **Engage Water Unit for Mountain Road Mounseys Road Connection –** Report to Management Team Meeting 29 November 2021 – Circulates to Utilities and Roading Committee.

8.3 **Innovating Streets Update and Consideration of Formalising the Right Turn Restriction From Denches Road –** Report to Rangiora-Ashley Community Board Meeting 8 December 2021 – Circulates to Utilities and Roading Committee.

8.4 **Request to Continue Engaging Transcontinental New Zealand Limited for WDC Branded Rubbish Bag Supply –** Report to Management Team Meeting 13 December 2021 – Circulates to Utilities and Roading Committee.

8.5 **Contract 21/23 Waikuku Beach Water Supply Campground Headworks Upgrade Tender Evaluation and Contract Award Report –** Report to Management Team Meeting 8 February 2022 – Circulates to Utilities and Roading Committee.

8.6 **Request for Loading Zone on Railway Road –** Report to Rangiora-Ashley Community Board Meeting 9 February 2022 – Circulates to Utilities and Roading Committee.

Moved Councillor Blackie Seconded Councillor Brine

THAT the Utilities and Roading Committee receives the information in Items 8.1 to 8.6.

CARRIED

Note: *The links for 'Matters of Information' were separately circulated to elected members.*

9 PORTFOLIO UPDATES

9.1 Roading – Councillor Paul Williams

The February rainfall caused damage to roads in the district. The gravel roads were not in good condition and Councillor Williams expressed concern with the number of complaints received on the condition of these. Councillor Williams had concerns with the level of service provided.

Councillor Williams noted the issue of the failing on Butchers Road culvert and Taffes Glen Road culvert also requires some work undertaken on it.

9.2 Drainage and Stockwater – Councillor Sandra Stewart

Councillor Stewart noted there had been 500 service requests as a result of May, December and February flooding events.

Property owners in the Woodend area on private water supplies had indicated they are experiencing high levels of contamination and wished to join with the Council water supply. These properties are adjacent to Ravenswood. Councillor Stewart would like to see this offer to join the Council scheme extended further.

There was an issue with high levels of gravel in Mounsey Stream, Oxford. This had been drawn to the attention of Ecan.

K Merhtens of the Oxford Rural Drainage Advisory Group, expressed disappointment with the drain maintenance work in the area.

9.3 Utilities (Water Supplies and Sewer) – Councillor Paul Williams

Toxic algae is in the ponds south of Kaiapoi and complaints received from residents regarding the smell. Staff have been acting on this which has been effective. Pleased to report that there hadn't been any avian botulism this summer despite it being quite a hot summer to date.

9.4 Solid Waste– Councillor Robbie Brine

The next meetings of the Canterbury Waste Joint Committee and Canterbury Regional Landfill Joint Committee are scheduled to be held in Christchurch on 4 April.

The inaugural meeting of the WDC Services Governance Group took place yesterday. Following discussion it was agreed to have two groups, an operational group which would meet more frequently, but the overall governance group would meet quarterly. Councillor Brine believes this was a beneficial meeting to discuss ways to move forward with a good working relationship. Staff would be considering how the Transfer Stations would be kept operational with a Covid outbreak, and this would be challenging for those tasked with this.

Councillor Williams asked if there was any way to reduce the queues at the Transfer Stations on the weekend, and Councillor Brine said staff are noting the key issues. G Cleary advised that lanes are now open without physical distancing, and there is also funding for future improvements to rectify this situation.

9.5 Transport – Mayor Dan Gordon

Mayor Gordon spoke on the regional transport, noting the recent media reports on light rail, and there is possibly further investment in passenger transport that may be the priority for Canterbury. There was concern where the funding is going to come from for these work streams and there would need to be significant investment from the Crown The Southbrook Road improvements are progressing with a lot of planning work already undertaken by staff.

Mayor Gordon acknowledged the work of the staff during the recent flooding events. These have presented a big challenge for staff and the contractors who have been out working for the community in difficult times.

10 QUESTIONS UNDER STANDING ORDERS

There were no questions.

11 URGENT GENERAL BUSINESS

There was no urgent general business

12 MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED

Section 48, Local Government Official Information and Meetings Act 1987

Moved Councillor Brine Seconded Councillor Blackie.

THAT the public be excluded from the following parts of the proceedings of this meeting.

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:

Item No	Minutes/Report of:	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
12.1	Minutes of the public Excluded portion of Utilities and Roading Committee meeting of 16 November 2021	Confirmation of Minutes	Good reason to withhold exists under Section 7	Section 48(1)(a)
12.2 – 12.12	Reports from Management Team Meetings	Reports for Information	Good reason to withhold exists under Section 7	Section 48(1)(a)

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 which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public are as follows:

Item Nº	Reason for protection of interests	Ref NZS 9202:2003 Appendix A
12.1 – 12.12	Protection of privacy of natural persons To carry out commercial activities without prejudice	A2(a) A2(b)ii

CARRIED

CLOSED MEETING

Resolution to resume in open meeting

Moved Councillor Brine Seconded Councillor Williams

THAT the open meeting resume and the business discussed with the public excluded remains public excluded.

CARRIED

OPEN MEETING

NEXT MEETING

The next meeting of the Utilities and Roading Committee is scheduled for 3.30pm, on Tuesday 22 March 2022.

There being no further business, the meeting closed at 4.40pm.

CONFIRMED

_____

Chairperson
Councillor Robbie Brine

22 March 2022
Date

WAIMAKARIRI DISTRICT COUNCIL

MINUTES OF A MEETING OF THE AUDIT AND RISK COMMITTEE HELD VIA ZOOM ON TUESDAY 15 MARCH 2022 AT 10.00AM.

PRESENT

Councillors J Ward (Chairperson), K Barnett, S Stewart and P Williams and Mayor D Gordon.

IN ATTENDANCE

Councillors A Blackie and P Redmond.

J Harland (Chief Executive), P Christensen (Finance Manager) A Keiller (Chief Information Officer) and K Rabe (Governance Advisor).

H Warwick (Chief Executive of Enterprise North Canterbury), M Dalton (Business Support Manager of Enterprise North Canterbury), J Rogers (Visit Waimakariri Product Development) and G Byrnes (General Manager, Te Kōhaka Trust).

1 APOLOGIES

Moved: Councillor Williams Councillor Stewart

An apology for absence was received and sustained from Councillor N Atkinson and an apology for lateness by Councillor K Barnett due to technical reasons.

CARRIED

2 CONFLICTS OF INTEREST

No conflicts of interest were declared.

3 CONFIRMATION OF MINUTES

3.1 Minutes of a meeting of the Audit and Risk Committee held on Tuesday 15 February 2022

Moved: Councillor Williams Seconded: Councillor Ward

THAT the Audit and Risk Committee:

(a) **Confirms** the circulated Minutes of the meeting of the Audit and Risk Committee, held on 15 February 2022, as a true and accurate record.

CARRIED

3.2 Matters Arising

There were not matters arising.

4 PRESENTATION/DEPUTATION

Nil.

5 REPORTS

5.1 Enterprise North Canterbury Six month financial report and Promotion Business Plan report for the period ended 31 December 2021 and draft Statement of Intent for the year ending 30 June 2023– J Millward (Manager, Finance and Business)

H Warwick, M Dalton, and J Rodgers, were in attendance to present Enterprise North Canterbury's (ENC) six month progress report, its Promotion Business Plan progress report and its Statement of Intent for the financial year ending 30 June 2023.

The representatives from ENC's presentation highlighted ENC's achievements over the past year which included a successful season for Aqualand New Zealand as well as the focus for the future which included WHoW's proposed Aquasports Park, the Pegasus Bay Trail, incorporation of a Value Add Economic Hub and a new website. They also provided an update on Visit Waimakariri and a review of the Council's Event Funding which ENC administers which had been impacted by Covid-19.

There was a brief overview of the Statement of Intent which included changes to training of local business owners and managers and the Business Award Lunch. It was noted that provision had not been made to provide training of local business owners and managers in the 2022/23 financial year, as there had been a significant drop in registrations for workshops due to Covid. In 2022/23. It was proposed to relaunch the Business Awards in 2022/23 financial and not hold a gala dinner within the current Covid environment.

Councillor Stewart requested detailed data on business that had closed or relocated from the district, and a breakdown of employment opportunities for each of the main centres. M Dalton undertook to circulate the requested information to Councillors.

Councillor Redmond enquired if more focus would be placed on sustainability in future, as this was becoming an important factor, and M Dalton responded that changes were being considered for the near future.

Moved: Councillor Williams Seconded: Mayor Gordon

THAT the Audit and Risk Committee:

(a) **Receives** report No 220228027571.

(b) **Receives** the following reports for Enterprise North Canterbury, the:

I. Six month financial report for the period ended 31 December 2021 (TRIM 220301028310) and.
II. Six month Promotion of Waimakariri District Business report to 31 December 2021 (TRIM 220301028344).
III. Statement of Intent for Enterprise North Canterbury for the year ending 30 June 2023 (TRIM 220301028263).

(c) **Notes** that under the Local Government Act 2002, the Audit and Risk Committee may request Enterprise North Canterbury to make changes to the Statement of Intent. Enterprise North Canterbury would consider these changes requested and re-present the Statement of Intent prior to the 30 June.

(d) **Acknowledges** the work carried out by Enterprise North Canterbury and thanked the Trustees and staff for their efforts.

CARRIED

Mayor Gordon thanked H Warwick an her team for the work and support being done in support of the business community. He stated that ENC had his full backing and was thankful for the good working relationship and communication between the Council and ENC. He commended the work achieved during the discussion and decision regarding the Kaiapoi I-site, thanking all parties involved.

Councillor Barnett also commended ENC on their work during a very trying time, however, noted that she did not support the retention of the Kaiapoi I-site as she believed that the funding could be better utilised on digital resources. She also requested that more initiatives be developed to showcase the Waimakariri District's rural areas such as craft and walking/cycling trails.

Councillor Ward acknowledged the work done by ENC and thanked the representatives from their presentation, noting that it would be great to be able to encourage organisers of large events to utilise MainPower Stadium.

5.2 Te Kohaka o Tuhaitara Trust – Statement of Intent for the year ending 30 June 2023 – J Millward (Manager, Finance and Business)

G Byrnes, to present the Statement of Intent and for Te Kòhaka ò Tuhaitara Trust (TKTT) for the year ending 30 June 2023. The provided an update of the work being done on the restoration of the fore dunes and the identification of new sites at Waikuku Beach in need of coastal protection. He also noted that he hoped that the proposed leasing of sections at Kariki Beach would assist the TKTT with financial independence to enable them to build new headquarters which would include an education and research centre.

Councillor Barnett inquired if G Byrnes would be interested in presenting the work that the TKTT was doing to the Waimakariri Youth Council, and he replied in the affirmative.

Moved: Councillor Williams Seconded: Councillor Barnett

THAT the Audit and Risk Committee:

(a) **Receives** report No. 220218022320.

(b) **Receives** the Statement of Intent for Te Kòhaka ò Tuhaitara Trust for the year ending 30 June 2023 (TRIM 220218022352).

(c) **Notes** that under the Local Government Act 2002, the Audit and Risk Committee may request Te Kòhaka ò Tuhaitara Trust to make changes to the Statement of Intent. Te Kòhaka ò Tuhaitara Trust would consider these changes requested and re-present the Statement of Intent prior to the 30 June.

CARRIED

Councillor noted that he had only heard positive feedback regarding the Trust and the environmental work being achieved.

Councillor Barnett commended G Byrnes on both the environmental and community outcomes being achieved, and was supportive of the educational work done with young people to strengthen their connection to their environment.

Mayor Gordon agreed with the previous speakers, and acknowledged Councillor Blackie's work as the Council's representative on the TKTT.

Councillor Ward thanked G Byrnes for the passion he brought to his work.

5.3 Six Month Financial Statements for the Period Ended 31 December 2021 – Te Kōhaka o Tūhaitara Trust– J Millward (Manager, Finance and Business

G Byrnes took the report as read. He advised that the Council funded the employment of a permanent staff members who had resigned during 2021, and had not yet been replaced. He noted the staff member had commented on the isolation of the role on resignation. During the summer season the TKTT had employed nine casual workers assist with the outstanding work, which that had worked very successfully. The team dynamic had worked particularly well and had provided practical skills and knowledge for those who were involved in environment studies and had led to permanent employment for two Conservation New Zealand volunteers. G Byrnes brought this to the Committees attention in the hope that other options for employment may be possible with the funding provided by the Council.

Moved: Councillor Ward Seconded: Councillor Williams

THAT the Audit and Risk Committee:

(a) **Receives** report No. 200305030925.

(b) **Receives** the six month report for the Te Kōhaka o Tūhaitara Trust for the period ended 31 December 2021.

(c) **Notes** the operations for the six months to 31 December 2021 was progressing as planned as presented in the Statement of Intent.

CARRIED

Councillors Ward and Williams thanked G Byrnes for his presentation and work.

5.4 Cyber Security – Status Report – O Payne (Cyber Security Analyst)

A Keiller took the report as read and highlighted the improvement to maintaining compliance and the improved staff awareness of cyber security due to the training provided.

In response to a question from Councillor Redmond, A Keiller noted that elected members needed to stay alert to daily cyber attracts, and to forward any suspicious email to the IT Help desk or to himself who would then deal with it appropriately.

In conclusion, A Keiller presented on new projects being worked on by the Council's IT team which included:

- A change to the Council's anti-virus software,
- The implantation of Microsoft Intune which would enable members to have two profiles on one device (i.e. business and personal),
- Network segmentation which would protect the Council's digital infrastructure as well as reviewing processes
- Training for disaster recovery and formulating an Incident Response Plan.

Moved: Councillor Barnett Seconded: Councillor Ward

THAT the Audit and Risk Committee:

(a) **Receives** report TRIM number INF-49/220309033409.

(b) **Notes** the overall improvements to cyber security and protection of Council systems.

(c) **Notes** that the Council would continue and improve its Cyber Security Awareness Training Program for the upcoming year, and that a report and an external assessment would be provided in July 2022 on security awareness.

CARRIED

Councillor Barnett thanked A Keiller for his work and noted that this was a critical role especially with members and staff working remotely.

6 PORTFOLIO UPDATES

6.1 Audit, Risk, Long Term Plan and Excellence Programme – Councillor Joan Ward

- The Council's 2022/23 draft Annual Plan was out for consultation.
- Council Controlled Organisation Audits:
  - Enterprise North Canterbury would be audited in March 2022
  - Te Kòhaka ò Tuhaitara Trust would be audited in April 2022
  - The Waimakariri Arts collection would also be audited in April 2022.

6.2 Customer Service – Councillor Kirstyn Barnett

- Two teams were currently manning the Rangiora Service Centre front desk to protect staff from Covid as much as possible. However, there was not sufficient staff to have two teams at the Kaiapoi and Oxford Service Centres. Foot traffic was however low at these service centres since vax passes were required. A few irate customers but staff managed the situation.
- In preparation of the new dog registration in July 2022, staff were collecting email information so that more registrations could be done online.
- District rating re-valuation implementation would be done in September 2022.
- Participation in the LIMs change of ownership notification module which allowed the Council to be notified when the ownership of a property changed. All Canterbury councils were involved with this initiative.

6.3 Communications – Councillor Neville Atkinson

There was no discussion on this item.

7 QUESTIONS

Nil.

8 URGENT GENERAL BUSINESS

Nil.

THERE BEING NO FURTHER BUSINESS THE MEETING CLOSED AT10.57AM.

CONFIRMED

_____
Chairperson

_____
Date

WAIMAKARIRI DISTRICT COUNCIL

MINUTES OF A MEETING OF THE COMMUNITY AND RECREATION COMMITTEE HELD REMOTELY VIA ZOOM ON TUESDAY 15 MARCH 2022 AT 1PM.

PRESENT

Councillor N Mealings (Chairperson), Mayor D Gordon, Councillors A Blackie, R Brine, W Doody and P Redmond.

IN ATTENDANCE

Councillor Williams,
C Brown (Manager Community and Recreation), G MacLeod (Community Greenspace Manager), M Greenwood (Aquatic Facilities Manager), P Eskett (District Libraries Manager), T Sturley (Community Team Manager), M McGregor (Senior Advisor Community and Recreation), A Smith (Governance Coordinator)

1 APOLOGIES

Moved: Mayor Gordon Seconded: Councillor Blackie

THAT an apology for lateness was received and sustained from Councillor Doody.

CARRIED

2 CONFLICTS OF INTEREST

There were no conflicts of interest recorded.

3 CONFIRMATION OF MINUTES

3.1 Minutes of a meeting of the Community and Recreation Committee held on 14 December 2021

Moved: Councillor Brine Seconded: Mayor Gordon

THAT the Community and Recreation committee:

(a) **Confirms** the circulated Minutes of a meeting of the Community and Recreation Committee, held on 14 December 2021, as a true and accurate record.

CARRIED

4 MATTERS ARISING

There were no matters arising.

5 DEPUTATIONS

5.1 Wellbeing North Canterbury Yearly Update

Deidre Ryan, Manager Wellbeing North Canterbury, spoke to a PowerPoint presentation which provided the Council with an update on the Trust's work for the past year and the services offered. Thanks were extended to the Council for its ongoing support and contribution to the work that was carried out in the community.

Unconfirmed

Recent developmental work had involved the refresh the Trust branding and also was also currently in the process of updating the Trust website. The Trust had recently moved into new office premises to 200 King Street, Rangiora. The mission of the Trust was acknowledged *"Strengthen wellbeing in our community supporting our district as a caring place to live"*, and how this aligned with the Council's Long Term Plan.

The Trust had been operating for more than 30 years, working hard to make a resilient North Canterbury community in Hurunui and Waimakariri, which was a large geographically reach. Originally the Trust started as a small group in Kaiapoi and the Council involvement commenced with the employment of a Community Worker. The Trust had grown significantly from there and had a long and trusted history in the district. D Ryan noted an eleven year association with the Trust herself. There were now 38 paid employees, and 60 dedicated volunteers, working from three operational bases being 200 King Street, Rangiora, Kaiapoi Community Support at 27 Sewell Street, Kaiapoi and the Karanga Mai Early Learning Centre based at Kaiapoi High School.

The North Canterbury-wide free services that were available through the Trust were highlighted. These included

- ∑ Karanga Mai Early Learning Centre (which currently had a full role).
- ∑ Food Bank at Kaiapoi Community Support, working closely with the Food Secure Network.
- ∑ Two North Canterbury Social Workers.
- ∑ Mana Aki initiative, which was a DHB contract working with young people in Years 1 to 8.
- ∑ Counselling and wellbeing support for young people, which was all provided by registered social workers.
- ∑ Restorative Justice service provided for adults ,contracted through the Ministry of Justice.
- ∑ Two "Next Steps" staff had recently been appointed part time, specifically to support those people affected by Covid-19. One each based in Hurunui and Waimakariri Districts. One more full time staff member was to be appointed soon.
- ∑ A Hurunui specific family worker, with funding secured following the 2016 Kaikoura earthquake.
- ∑ Provided a base to host the Social Services Waimakariri Facilitator, Niki Carter who worked closely with the Council in this role.

In January 2022 a three day Surfwise Ocean Based Therapeutic Experience was conducted for young people who needed support. This was very successful, with positive feedback from the young people who attended. It was hoped to be able to secure funding to hold more of these courses.

A breakdown on the sources of funding were highlighted, which assists in keeping the Trust operating. Approximately 73% of funding was received from grants and the Trust had to secure the remaining 27%. The Council was thanked for the ongoing financial support and the help that it provided to the Trust. Local business partners included Bayleys, Ray White, and Stadium Cars who helped to secure good vehicles for staff enabling them to travel throughout the district. Local Clubs such as the Rangiora Lions and the Soroptomist Club also provided much valued support. The Leos Club at Rangiora High School had also undertaken some fundraising for the Trust. Under current Covid restrictions, many of the fundraising activities planned for in 2022, have had to be cancelled or postponed.

Mayor Gordon noted the reliance of the Trust on discretionary funding and asked what the current challenges were in providing services. D Ryan responded that the lack of certainty made things an ongoing struggle and to retain good staff the Trust needed to be able to offer long term employment contracts to retain staff. The Trust kept working at securing funding and noted that the funding available from the government was improving. It was noted

Unconfirmed

that there were no government grants available to cover the employment and vehicle costs.

Following a question from Councillor Doody on the Trust's paid employees, D Ryan confirmed that some staff were part time which equated to 34 full time employees. Councillor Doody asked if the current staffing level was sufficient for the increased pressures being felt in the community. D Ryan said that as there was more need, staff were being asked to do more but believed that the team were doing well. The Trust management needed to make sure that staff were taking breaks and also looking after their own wellbeing. Recently the DHB had approached the Trust to provide resources to support at risk young people and it was hoped to make an appointment for this role in the next two weeks.

Chairperson Mealings thanked D Ryan for the update and her presentation, noting that the work of the Trust was valued in the community.

6 REPORTS

6.1 Southbrook Park Pavilion – M McGregor (Senior Advisor Community and Recreation)

M McGregor presented the findings of the Southbrook Park Pavilion and Change Facility Feasibility Study. The Feasibility Study was commissioned following the submission from the Southbrook Community Sports Club to the Council's Long Term Plan (LTP) and was carried out by Recreation Sport Leisure Consultancy Ltd. The Club's LTP submission focused on the financial difficulties the Club was having and the operational costs of running the pavilion. Key findings were that the buildings were not fit for purpose and recommended demolition of the building. As noted in the report, the Southbrook Community Sports Club do not have the capability or capacity to resolve this situation without Council support.

Councillor Blackie questioned the demolition costs quoted in recommendation (f) and considered that these were quite high. M McGregor said further detail would need to be sought on the figures. C Brown added that these were high level estimates at the moment, taking into consideration possible asbestos within the building, which was not known at this time. If there proved to be no asbestos, the cost of demolition would be less. A quantity surveyor was used to ascertain the figures and could be checked as well.

Councillor Williams had concerns that other community facility buildings in the district that may also require to be demolished. G MacLeod referred to the renewals programme of asset management, noting that there would be more thorough and detailed information available once this work is undertaken. C Brown added, by way of background, that the Council had taken ownership of the Gatekeepers Lodge at Ohoka domain, the Rangiora Museum, the Edwards Street Sport and Recreation Trust building and the Maria Andrews Park pavilion. There were also many privately owned facilities that received funding from the Council. This Southbrook Park pavilion was not fit for purpose and there was also a lot of maintenance required and a lack of volunteers to keep the building operating. Councillor Williams requested a report on all the community facility buildings and a value on the priorities. C Brown replied that the Council had already received an update. This report suggested that the Council continue to support the Southbrook Sports Club up until the next Long Term Plan.

Councillor Mealings asked if there were any opportunities for public/private partnership for some of the buildings. C Brown pointed out that there were many clubs that had fundraised and built their own facilities and kept these maintained.

Unconfirmed

At this time, 1.39pm the meeting adjourned to allow those present to take time to acknowledge the lives lost in the Christchurch terrorists attack, which occurred on this day three years ago. The meeting reconvened at 1.45pm.

Councillor Doody asked if the changing room building was suitable for use by both males and females. C Brown noted that the current facility was not suitable for both, and any future building was still subject to design work, but would include facilities for both male and female. To keep consistent with the levels of service provided to other clubs, the Council would not provide funds towards club rooms, but would for changing rooms, infrastructure and parking. All sources of funding would be investigated in the future would go towards new changing rooms.

Councillor Redmond enquired about the Club's access to any funding and M McGregor responded that the Club had the same opportunity to apply for funding from various sources as other clubs did. This facility struggled with functionality and the Club had been falling short with operational costs, which was why they were seeking assistance from the Council. There were other aging sports club facilities around the district, but noted that this building was moved to its current site from another location, having previously been built as the Rangiora Town and Country Club. The main clubs that used the facility were touch rugby in the summer and during the winter it is a base for the Saracens Rugby Club. The club rooms would be used after weekly senior touch rugby competition in the summer and by the rugby club following games during the winter.

Moved Mayor Gordon Seconded Councillor Blackie

THAT the Community and Recreation Committee:

(a) **Receives** Report No. TRIM 220308032591.

(b) **Receives** Southbrook Pavilion Feasibility Study completed by Recreation Sport Leisure Consultants (RSL) TRIM: 220308032594

(c) **Supports** officers to continue to work with stakeholders to progress the recommendations within the feasibility study, including further consultation, development of designs and the creation of a funding strategy. This work would inform a submission to the 2024 LTP.

(d) **Notes** the study's finding that there was sufficient need for a pavilion and change facilities at Southbrook Park.

(e) **Notes** the study's finding that the existing Pavilion and change facilities were not fit for purpose and it was not viable to repair or retrofit.

(f) **Notes** that the study estimates the cost of a new Pavilion at $2,216,400, changing sheds at $1,360,000 and demolition of both facilities at $304,000. Total demolition and replacement cost estimated $3,880,400.

(g) **Notes** that the Current owner of the pavilion and changing facilities Southbrook Community Sports Club does not want to own or manage any future facilities.

(h) **Notes** the study's finding that the best chance of progressing the recommended course of action of rebuilding facilities was for Waimakariri District Council to lead the project and coordinate stake holders in preparation for the 2024 LTP.

Unconfirmed

(i) **Notes** that without financial support the provision and operation of the current facilities by the Southbrook Community Sports Club was not sustainable.

(j) **Notes** that officers have proposed budget to cover the operational costs in the 22/23 draft annual plan. Staff have approached an alternative funder on behalf of the Sports Club for this quantum with an update on that process provided to the annual plan in due course.

CARRIED

Mayor Gordon noted that this building was currently not fit for purpose, although this direction was not committing the Council to building a new facility, the feasibility study would be used in future work by the Council for the next Long Term Plan. He supported the Council continuing to assist the Club with its ongoing operating costs. The population in the Southbrook area was growing with few other public facilities.

Councillor Blackie supported this motion, however with some caution and expressed concern with a precedent being set should the Council contribute funding for a new clubrooms. He noted that there were several volunteer run sports clubs across the district that had funded and provided their own clubrooms – for example the Northern Bulldogs Rugby League Club in Kaiapoi, and the combined Rangiora and Southbrook Tennis Club facility at Coldstream Road. Councillor Blackie questioned if this was something that the ratepayer should be funding Councillor Blackie agreed with the Council continuing to provide ongoing support for the club with its current operating costs up until the next Long Term Plan.

Councillor Brine provided some history on the operations of the Clubrooms over the years. The Council initially agreed to a loan to the Club of $150,000 and for some time the Club was able to service the loan and became even more successful with the combining of Southbrook Rugby Club and Rangiora Rugby Club with Southbrook Park being the home ground of the combined club. Following the initial success, in recent years the Club has had to ask the Council to provide financial support and the club rooms had required maintenance, including furnishings and curtains, for which no funding was available. Councillor Brine believed it was clear that the current facility needed to be demolished and further discussions on a replacement facility required.

Councillor Doody said it was important to keep supporting this Club, noting that Southbrook Park was a large area and could accommodate several different sports. The Southbrook Cricket Club was not strong at the moment and Councillor Brine advised that Saracens Rugby Club had brought out the cricket clubs membership of the Southbrook Combined Sports Club as there was a cost involved for each club. This season, the cricket club had struggled to field a senior team.

Councillor Williams observed that some smaller clubs in the district appeared to be able to fundraise and maintain their facilities and have support of members but the bigger clubs struggled for volunteers and members support. Councillor Williams suggested that these clubs should be supporting themselves and fundraising.

In reply, Mayor Gordon reiterated that there was no commitment at this stage by the Council, and there would need to be a commitment from the Clubs to fundraising. Clubs needed to have this feasibility study to plot a pathway forward and there may be consideration given to a joint partnership in the future.

Unconfirmed

6.2 **Covid-19 Social Recovery Update – T Sturley (Community Team Manager)**

T Sturley presented provided an overview of Community Team activity, for the key project areas for Covid-19 social recovery for the period of August 2021 to February 2022,which aligned with the Community Development Strategy 2015-2025 and Covid-19 Recovery Strategy 2020.

There were three projects that had made significant progress, being the Food Secure project, the associated Kaiapoi Hub project, and the "Next Steps" support and information website The Food Secure project received favourable support from the Ministry of Social Development. The lead for social recovery was from the Ministry of Social Development, with partnership with the Council for the success of the districts recovery.

Compared to two years ago, the district was in a stronger position to ensure that this recovery work was effectively planned and delivered. Having a designated Social Recovery staff member within the Community Team, ensured that the projects were planned and facilitated well. The appointment of the Next Steps Facilitator would also ensure that people were responded to in a holistic manner. T Sturley suggested that the strength of the success of this plan was communication and connection. There was a wide range of community support and services involved in these local responses.

The districts recovery would go well beyond the period of Covid response and there would be the need to continue to support local business owners. There was also a pastoral care element and Community Team staff were working with ENC to discuss future care being provided to businesses. The current requirement for Covid Vaccination Certificates was noted and the social divide in the community, particularly in the last six months. There would be some work required to bring people back together and healing wounds.

Councillor Doody asked if there was to be another function to be held this year focused on mental health, family harm and alcohol related issues. T Sturley confirmed there was to be one organised for the trade sector but this would be available for the whole community.

Councillor Mealings commented that there had not been good communication regarding the temporary closure of Oxford Hospital and the Oxford Community Trust were wanting information on this. Mayor Gordon said the timeframe that the hospital will be closed for was not known. It was hoped that it would be reopened as soon as possible. Any concerns from residents should be raised by people through their GP, in the first instance. If the answers were not forthcoming through this avenue, Mayor Gordon would be happy to follow up on behalf of residents. T Sturley added that if there were issues with services being provided, she was also able to take this to the Social Services Waimakariri for a response. Sir John Hansen, the Chair of the Canterbury District Health Board had recently visited the Oxford Hospital with the Mayor, Chief Executive and Tessa Sturley and during the visit, the importance of this facility was reinforced to Chair Hansen.

Moved: Councillor Doody Seconded: Councillor Redmond

THAT the Community and Recreation Committee:

(a) **Receives** report No. 220308033266.

(b) **Notes** the evidence-based, collaborative approach applied to the facilitation of social recovery from COVID-19.

Unconfirmed

(c) **Notes** that, while some of this work sits under existing portfolios, several key projects had arisen, requiring additional staff resource. These included Food Security, the Kaiapoi Community Hub, support for the newly unemployed and the establishment of the 'Next Steps' website, including the acquisition of funding for its development, promotion and maintenance.

(d) **Notes** that, with Central Government's significant financial contribution; and the collaborative approach, sound governance and planning applied to date, key funders, including Rata Foundation and Department of Internal Affairs (DIA) had expressed significant interest in supporting the further development of the Food Security and associated community hub projects.

(e) **Notes** that recent feedback from MSD related to the attached Food Secure North Canterbury report had been extremely favourable.

(f) **Notes** that, with adequate community development provision and an increasingly across-portfolio approach, staff had maintained appropriate levels of service and the ability to respond to emerging issues and opportunities, in line with community-identified priorities.

CARRIED

Councillor Doody thanked staff for the report, and spoke on the impact of having to move the elderly patients out of the Oxford Hospital during its closure. In addition to this, there were many meals provided by the kitchen staff at the hospital and it was now good that this service had been reinstated so meals on wheels were able to continue to be provided from this facility.

Councillor Redmond said it had been mentioned by Canterbury District Health Board that they may be looking at different ways of providing services rather than through "bricks and mortar", but it was felt that communities would have a preference for retaining a local hospital facility. The provision of the meals on wheels service, as mentioned above by Councillor Doody, was a good example of this.

Mayor Gordon highlighted the good work of the Community Team and their Covid response, noting that last week T Sturley had presented to the Regional Leadership Group, which included all the Canterbury Mayors, Department of Primary Industries and Ministry of Health Officials, on the model that had been developed here in the Waimakariri in partnership with the Ministry of Social Development. Mayor Gordon acknowledged this presentation and the work of T Sturley and the team.

Mayor Gordon noted that the Oxford Hospital was 100 years old and had been a long time facility in the town. There had been a Friends of Oxford Hospital Group existing for almost the entire time and who had provided a huge investment to the facility. There had not been good communication from the District Health Board, and he acknowledged that the provision of health facilities to the community was very important.

T Sturley and the members of the Community Team were thanked for the work they had undertaken in supporting the community.

6.3 **Aquatics March Update – M Greenwood (Aquatics Manager)**

M Greenwood presented this report, which provided a summary of the Aquatic Facilities progress to date for the year against the Key Performance Indicators.

Unconfirmed

The Aquatic Facilities had once again been credited with Poolsafe status. This followed assessment of standard operating procedures and a day of onsite audits by an external assessor. Poolsafe was the industry best practice setting which ensured robust process and health and safety policies, to ensure that the customers had a safe environment to visit and recreate.

The aquatic team worked hard to maximise opportunities however requirements at Covid Red setting involved a lot of community spread and customer requirements. Staff resources were limited and being stretched by the isolation requirements. This was a constantly changing environment with changing rules weekly. With the number of staff resources currently available, the opening hours at Kaiapoi Aquatic Centre had been temporarily limited, by closing earlier over the weekends. This would enable sufficient staff resourcing to be better utilised and was in line with some of the actions of neighbouring Councils.

The recent customer satisfaction survey received an overall rating of 91%. While this was down from the last the survey results of 96%, it met the target and was pleasing under the current Covid climate.

Councillor Doody appreciated the difficulties in the current environment and thanked staff for keeping the users of the pools up to date with information. Regarding the Oxford Pool, it was advised that it had only needed to be closed for one day, due to not being able to provide cover for a staff sickness. The pool was able to reopen the following day. The season for this open pool finished last weekend. Prior to next season it was planned to approach the High School to highlight the benefits of the current training programme which was Unit standards based, which may result in opportunities to hire local lifeguard staff rather than those from outside the community.

Councillor Williams expressed concern regarding the robustness of staff levels enquiring if the Council was advertising for more lifesaver staff. M Greenwood advised that there was a minimum age requirement of over 16 for poolside lifesavers and confirmed that advertisements for staff were circulated to all the appropriate sites in order to attract staff. Councillor Williams suggested there were members of the community with surf lifesaving qualifications who would be willing to volunteer for roles at the pools on a casual basis, rather than be fulltime employees. Staff would consider enquiries from any suitably qualified applicants.

C Brown noted that the issue with closing facilities was directly related to Covid. Some other neighbouring Councils pool management staff had approached the Waimakariri aquatic centres asking if there were any staff available that could be loaned to these other facilities. The current lifesaving staffing shortage was not just an issue here in Waimakariri but throughout the industry. The impact of Covid would continue due to people needing to isolate at home.

Following a question from Councillor Redmond on the requirement of vaccine passes for patrons, M Greenwood advised that there had been feedback received from members of the community who were not in favour of the Councils position on My Vaccine pass. M Greenwood pointed out that there were many who were also in support. The requirement for having a Covid Vaccine Pass had also not had a major impact on the numbers of applicants for jobs.

Unconfirmed

Moved: Councillor Blackie Seconded: Councillor Brine

THAT the Community and Recreation Committee:

(a) **Receives** Report No. 220222024060.

(b) **Notes** Aquatic Facilities progress against key performance indicators including Financial results, Water Quality and Customer Satisfaction.

(c) **Notes** the impact of Covid on Facility Attendance across our network.

(d) **Notes** the approach to maintaining service levels throughout Covid's RED setting.

(e) **Notes** steps taken to manage impacts from staffing limitations across the network.

(f) **Notes** that following an external audit by Recreation Aotearoa, the Waimakariri Aquatic Facilities had been accredited as Poolsafe facilities.

CARRIED

6.4 **Library update to 3 March, 2022– P Eskett (District Libraries Manager)**

P Eskett presented an update on the libraries activities for the period from 2 December 2021 through to 3 March 2022. It was highlighted that there would soon be four unique designs for library cards. These were designs from Creative Admin staff member Lucas Fernandez and three staff members of the Libraries team. Examples of the card designs were shown plus an example of the current card. A new campaign would be run once the cards were available, and would be called "One Card Endless Possibilities". A local supplier had been contracted to supply the cards.

P Eskett provided an update on the adjusted layout of the library. Libraries were receiving support from the Community Facilities Team and were awaiting a formal quote to remove the obsolete radiators from Rangiora Library, maximise floor space. The Citizens Advice office, soon to be the Library Technology and Learning Hub, had been scoped for work and was awaiting the contractor to undertake this. The supply chains for materials continued to be disrupted with further delays in the supply of steel for shelving.

P Eskett noted how proud she was of the library staff in turning the regular library services to an online service as much as possible, during the Covid Red alert level. There were no waivers maintained on copyright in Alert Level Red and so there had been a lot of learning by staff to adjust to this and create original content . Craft Clubs had been taken on line and were still proving popular. The Click and Collect service was being well utilised, particularly by those without vaccine passes. The online orders were placed in brown paper bags and placed outside in the library foyers for the public to collect. P Eskett highlighted a positive interaction with a customer as a result of the use of the click and collect function.

There were no questions from members.

Unconfirmed

Moved: Councillor Doody Seconded: Councillor Blackie

THAT the Community and Recreation Committee:

(a) **Receives** Report No. 220303030689.

(b) **Notes** the customer service improvements, community feedback, events, and use of New Zealand Libraries Partnership Programme funding to contribute positively to community outcomes by Waimakariri Libraries, from 2 December 2021 to 3 March 2022.

(c) **Circulates** the report to the Boards for their information.

CARRIED

The library staff were thanked for the great work that they do for the community.

7 CORRESPONDENCE

Nil.

8 PORTFOLIO UPDATES

8.1 Greenspace (Parks, Reserves and Sports Grounds) – Councillor Robbie Brine.

- Councillor Brine noted that the current Covid restrictions were impacting on some sports clubs ability to conduct competition games within the rules. This was causing some frustration.
- The Fernside Hall carpark sealing was now completed and the remainder of the car park upgrade would commence shortly, to be completed by the end of April 2022.
- The Milton Reserve tree clearance had been completed and additional items including fencing was in the work programme.
- Councillor Brined advised that some work that had previously been programmed, may not proceed due to the current market conditions and the low response to tenders.

8.2 Community Facilities (including Aquatic Centres, Multi-use Sports Stadium, Libraries/Service Centres, Town Halls, Museums and Community Housing) – Councillor Wendy Doody.

Councillor Doody did not have any update.

8.3 Community Development and Wellbeing – Councillor Wendy Doody.

Councillor Doody did not have any update.

Unconfirmed

8.4 **Arts and Culture – Councillor Al Blackie.**

- ∑ Councillor Blackie noted the Kaiapoi Expo had made a generous donation to the Waimakariri Public Arts Trust, which was to go towards a sculpture to be located in Rangiora.
- ∑ The gift of the sculpture from the Marshall family of Ohoka, was now in the Ohoka Domain.
- ∑ The design of the mural on the public toilets in Oxford had been approved by The Trust and would be going to the Oxford-Ohoka Community Board for final approval before the local artists commences this work.
- ∑ The maintenance of the Pous at the entrance to Pegasus had been completed.

9 QUESTIONS

There were no questions.

10 URGENT GENERAL BUSINESS

There was no urgent general business.

11 MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED

Due to time constraints, the public excluded item of business was held over, to be received for information at the next meeting of the Committee.

12 NEXT COMMITTEE MEETING

The next meeting of the committee is scheduled for 3.30pm on Tuesday 31 May 2022.

There being no further business, the meeting closed at 2.58pm.

CONFIRMED

_____
Chairperson
Councillor Niki Mealings

_____
Date

Unconfirmed

WAIMAKARIRI DISTRICT COUNCIL

MINUTES OF THE MEETING OF THE UTILITIES AND ROADING COMMITTEE HELD REMOTELY VIA ZOOM ON TUESDAY 22 MARCH COMMENCING AT 3.31PM.

PRESENT

Councillor R Brine (Chairperson), Mayor D Gordon, Councillors A Blackie, S Stewart, J Ward and P Williams

IN ATTENDANCE

Councillors N Atkinson, P Redmond and K Barnett
J Harland (Chief Executive) G Cleary (Manager Utilities and Roading), K Simpson (3 Waters Manager), E Klopper (Flood Team Lead), C Roxburgh (Water Asset Manager) and A Smith (Governance Coordinator)

1 APOLOGIES

There were no apologies.

2 CONFLICTS OF INTEREST

There were no conflict of interest recorded.

3 CONFIRMATION OF MINUTES

3.1 Minutes of a meeting of the Utilities and Roading Committee held on Tuesday 22 February 2022

Moved Councillor Williams Seconded Councillor Blackie

THAT the Utilities and Roading Committee:

(a) **Confirms** the circulated Minutes of a meeting of the Utilities and Roading Committee held on 22 February 2022, as a true and accurate record.

CARRIED

3.2 Matters arising

There were no matters arising.

4 DEPUTATION/PRESENTATIONS

There were no deputations or presentations.

5 REPORTS

5.1 February 2022 Flood Event – Update on Service Requests – E Klopper (Flood Team Lead), C Fahey (Water Operations Team Leader) and K Simpson (3 Waters Manager)

K Simpson presented this report, along with E Klopper, who was introduced to the Committee, as a consultant from Beca engaged by the Council to assist with the flood recovery work. Also assisting was Jack Boyd from Stantec. The report provided an update on the further work status following the recent flood events that had impacted the district, in May 2021, December 2021 and February 2022. There was approximately 600 service requests that staff were working through and these had been triaged into groups. There were approximately 60 further investigations the staff were currently working through. There was currently a more definitive programme being put together. Regarding communications, K Simpson advised that there had been an initial response sent to everyone who had lodged a service request and it was intended to directly follow up with people to let them know the outcome of further investigation work. Staff were also providing general communication updates on the Council website. There was also targeted consultation underway with the Kaiapoi residents, noting that a lot of the service requests from Kaiapoi residents related to issues that would be addressed by the Shovel Ready projects. This would be integrated with updates on the Shovel Ready works. It was also planned to produce an information flyer to be circulated to the Waikuku Beach residents.

K Simpson provided an update on drainage maintenance that had been undertaken due to concerns raised regarding drainage, particularly in the Kaiapoi area. Feldwick Drain had been fully cleared out, some remedial works would be required for the pump station. Dudley Drain and Sunday School Drain along the railway line had also been cleaned out. Drainage investigations were underway and future reports would provide an update on the maintenance programme as it progressed. It was noted that any capital works results from the investigations, they would be included as part of a staff submission to the 2022/23 Annual Plan.

Mayor Gordon asked if drafts of any information brochures or other communications could be circulated to the elected members to make sure they were addressing concerns that members are aware of in the community. K Simpson agreed.

Councillor Williams asked if the current Council contractors had sufficient resources to undertake the required work and would there be a need to bring in extra contractors to assist with the backlog of work. K Simpson acknowledged there was a backlog of work and some contractors had issues with staff resourcing as a result of the impact of Covid. CORD had advised they would make the Council's maintenance programme a priority however, if there was still issues with keeping up with the workload, further external resources will be engaged to get the work completed.

Regarding the investigation on Ranui Mews, K Simpson advised there had been some CCTV work undertaken both on and offsite. This hadn't identified any obvious blockages, however had shown that there was work that could be done onsite and also further investigations were ongoing downstream of the site, with evidence of surcharging. Staff were also deploying level sensors into the catchment to indicate to what extent the system was surcharging during future rainfall events. Depending on the outcome of investigations, K Simpson advised that it may be a combination of doing improvements within the Council reticulation in the street, as well as onsite upgrades to the reticulation at Ranui Mews.

Following a question from Councillor Stewart, K Simpson said it was planned to get the website communications improved and easier for the public to access. Councillor Stewart suggested these updates could go onto the website home page and supported improvement in the communications.

Councillor Barnett asked if there could be an overall report provided, with an update on progress with both the roading and drainage issues following the flood events. G Cleary advised that there had been some requests for permanent flood signs which staff were initiating. There had been discussion with Waka Kotahi on shared funding, and these discussions were ongoing. It was agreed that staff would provide a report to the Committee on roading issues as well as drainage, either as a joint report, or two separate reports.

Councillor Blackie referred to the recent tour of Kaiapoi regarding the grills that hadn't been lifted or inspected for some time. As part of the contract, these were supposed to inspected on a 12 weekly cycle. It was asked if there had been any communication with the contractor about not fulfilling this part of the contract.
G Cleary advised that this matter had been taken up with the road maintenance contractors CORD at senior level as part of regular meetings. They had indicated a willingness for this to be part of a programme of inspections and maintenance work that was required.

Of the drainage service requests listed, Councillor Stewart enquired how many were not located in a drainage rating area. It was agreed that this information would be sourced by staff and circulated to all members.

Moved: Councillor Williams Seconded: Councillor Blackie

THAT the Utilities and Roading Committee:

(a) **Receives** report No. 220310034384.

(b) **Notes** that 598 drainage service requests were received related to the significant rainfall event in May 2021, December 2021 and February 2022, which had all been responded to although some require further maintenance or investigation work.

(c) **Notes** that there were currently 59 drainage assessments identified as set out in section 4.6 and this was likely to increase as the service requests were worked through.

(d) **Notes** that a webpage had been setup on the Council's website to provide updates on the status of drainage works underway and targeted information would be sent out to the Waikuku Beach and Kaiapoi communities.

(e) **Notes** that if further budgets were required for any capital works identified as part of the drainage assessment work, that these would be sought as part of the 2022/23 Annual Plan process.

(f) **Circulates** this report to the Council and the Community Boards for information.

CARRIED

Councillor Williams supported these maintenance matters being progressed as soon as possible.

5.2 Drinking Water Standards and Rules: Submission to Taumata Arowai – C Roxburgh (Water Asset Manager) and H Proffit (Water Safety and Compliance Specialist)

C Roxburgh presented this report, which sought endorsement of the Utilities and Roading Committee to the proposed submission to Taumata Arowai on the new Drinking Water Standards and Rules that had been proposed, and released for public consultation. This was a complete set of new standards and rules, comprising of five consultation documents. There was a suggested amended recommendation to what was included in the staff report and members were given the opportunity to discuss this.

The most significant document was the Quality Assurance rules, which included all the documentation rules to be adhered to by suppliers. In general a lot more sampling, monitoring and new obligations for reporting were required. Some reporting measures had gone from monthly to daily, covering connections from 50 people up to 20,000, the proportionate scale requirement did not appear to have been taken into account. This was one of the key points of the Council's submission. The most significant point in the submission related to the transition timeframes. The signalled timeframe for the final compliance standards would be advised in mid- to late-May 2022 and compliance would be expected by 1 July 2022. This was a very short turnaround and this point had been made in the Council's draft submission.

Councillor Stewart asked if there was any change to the maximum allowable levels for iron, manganese, arsenic and nitrate in the new proposed standards. C Roxburgh advised that these levels were based on the World Health Organisation standards and there had been no significant change to any of these perimeters. The Ministry of Health standards were based on the average weight of an adult human..

Councillor Blackie spoke on the small suppliers (e.g. farm cottages) and it was confirmed that if there was more than one connection to a water supply, these would be classed as a supplier. C Roxburgh advised that there hadn't been an acceptable solution, with the same rules for two houses as up to 500 people, and staff believed there should be a category for less than 50 people. Rules had been tailored to the larger end of the scale, not the smaller end.

Moved: Councillor Williams Seconded: Councillor Brine

THAT the Utilities and Roading Committee:

(a) **Receives** Report No. 220309033938.

(b) **Notes** that Taumata Arowai had prepared a suite of new documents associated with an updated version of the Drinking Water Standards for New Zealand, which they were seeking feedback on, with submissions closing on the 28th of March 2022, with relevant documents reviewed by staff and submissions prepared.

(c) **Endorses** the following submissions prepared by staff to be submitted to Taumata Arowai, in response to the consultation questions asked, noting that final amendments would be made to these submissions, to reinforce the transitional issues associated with the standards particularly with regard to chlorination, at the approval of the Chief Executive and Mayor, taking into account any feedback received from Councillors.

i. Covering letter to Taumata Arowai
ii. Submission on Drinking Water Standards
iii. Submission on Quality Assurance Rules
iv. Submission on Aesthetic Values
v. Submission on Acceptable Solution for Spring and Bore Water

vi. Submission on Acceptable Solution for Rural Agricultural Supplies.

(d) **Notes** that the submissions will be made public by Taumata Arowai.

CARRIED

6 CORRESPONDENCE

Nil

7 REPORT REFERRED

Nil

8 MATTERS FOR INFORMATION

8.1 OXFORD RURAL NO. 2 WATER MAIN RENEWALS 2021/22 – REQUEST TO ENGAGE WATER UNIT – Report to Management Team Meeting 28 February 2022– to be circulated to Utilities and Roading Committee.

Moved: Councillor Blackie Seconded: Councillor Brine

THAT the Utilities and Roading Committee receives the information in Item 8.1.

CARRIED

9 PORTFOLIO UPDATES

9.1 Roading – Councillor Paul Williams

Councillor Williams attended an inspection of some of the gravel roads in the district, some of which had been washed out by flood waters as a result of the heavy rain. These would need to be remedied.

9.2 Drainage and Stockwater – Councillor Sandra Stewart

Councillor Stewart spoke on the upcoming briefing on drainage rating. Currently there was some rural and some urban rating areas, and a District Wide Flood Protection Rate. Ecan are now also proposing a new region-wide rate. The briefing should advise exactly what all these rates were going to deliver.

Councillor Stewart was also waiting to view the draft of the new Stockwater Bylaw communications package.

9.3 Utilities (Water Supplies and Sewer) – Councillor Paul Williams

Councillor Williams advised that construction on the central Rangiora Stage 5 Sewer upgrade was progressing well, as was the Woodend Road Rising Main. The Loburn Lea project was also progressing well with connection on the Ashley side.

There was continuing flushing and testing of the Woodend and Kaiapoi water schemes following the high chloroform detection.

There had been two burst pipes in the Church Street main which were being investigated.

The Backflow Prevention Policy was ongoing.

9.4 Solid Waste– Councillor Robbie Brine

- ∑ Eco Central recently did a presentation to Christchurch City Council (CCC) Councillors about the planned $16.8M upgrade that would be starting soon at the Materials Recycling Facilities (MRF). Rowan Latham from CCC had arranged for this to be presented to the Canterbury Waste Joint Committee staff group, and to any Councillors who were able to attend. As the presentation would be on line, it would be recorded, so interested Councillors would be able to watch the recording if they could not attend the 'live' event. Once a date and time had been finalised the details would be forwarded to elected members.
- ∑ Eco Central had advised that the status of the MRF was 'green', as of the end of last week, which meant there was not expected to be any issues with recycling processing this week.
- ∑ At this stage, kerbside collections were still able to be carried out in Waimakariri. Resourcing issues had caused some delays but so far the team had not had to work on a Saturday to finish collection rounds. There were the usual four trucks on collection rounds on Monday. Waste Management did have some office staff away owing to COVID isolations, and the Council were working closely with the despatch team to ensure any service requests for missed collections were being followed up promptly.
- ∑ Also at this stage, transfer stations were still operating as usual. Staff from WDC and Waste Management had undertaken a 'service disruption exercise' to determine the likely impacts of a loss of key staff, several site staff, or a disposal site/service provider owing to COVID so that to ensure ability to advertise any change in services at short notice. This may include the following changes:
    - o Depending on staff availability, limiting the shop to shorter hours during the week, or closing the shop;
    - o If the tyre removal company could not come to site for more than a week, refusal for more tyres being dumped (lack of space to stockpile more than one week of tyres);
    - o If there were limited loader drivers or truck drivers available, ensuring rubbish was compacted and the removal of kerbside organics would be the priority therefore the Council could stop taking greenwaste and hardfill for a period of time;
    - o Depending on processing site, transport or staff availability, Council would stop taking specific recyclable materials, or close the recycling area;
    - o Depending on circumstances (staff / loader driver availability; skip driver availability), Oxford Transfer Station operations may be limited to just recycling and WDC bags.
- ∑ WDC and ECan staff would be visiting both cleanfill pits at Southrook Rehab Recycling Partnership (RRP) this week, to inspect for compliance with consent conditions. Sutherlands Pit re-test results had been sent through to ECan –Plastic Disclosure Project (PDP) had been engaged to provide advice about the likely causes of the 'peaks' in nitrate results in the South-Western bore in recent samples, including the latest re-test. The normal sampling round was scheduled for the end of April 2022, and the advice from PDP should be received by that time. This should result in the removal of the current non-compliance with condition 15.0 *"The information provided to Environment Canterbury in accordance with Condition (14) shall include recommendations on further action to be taken …"*
- ∑ The closed landfill groundwater quality report for 2021 had been received from PDP, and this had been sent to ECan. There did not seem to be any change to the groundwater quality from the previous few years.
- ∑ Councillor Brine advised that staff wished to reintroduce audits of the recycling bins and he had raised the Health and Safety concerns. It was advised that any issues would be fully mitigated, with auditors being fully gowned and using a stick, as opposed to physically going into the bins. If

any members had any issues regarding these audits being recommenced, they were asked to email these concerns to Councillor Brine.

9.5 Transport – Mayor Dan Gordon

Mayor Gordon spoke on Mulcocks Road intersection, and had recently had a meeting with NZTA and a resident who was concerned with the level of accidents there. Mayor Gordon noted it was useful to gain an understanding of the direction of NZTA in this matter.

There was a meeting scheduled to be held on 4 April 2022 with the Minister of Transport, the Chief Executive, and all the Greater Christchurch Partnership members. This meeting was to discuss transport investment in the Greater Christchurch Partnership area.

10 QUESTIONS UNDER STANDING ORDERS

There were no questions.

11 URGENT GENERAL BUSINESS

There was no urgent general business.

12 MATTERS TO BE CONSIDERED WITH THE PUBLIC EXCLUDED

Section 48, Local Government Official Information and Meetings Act 1987

Moved Councillor Brine Councillor Williams

THAT the public be excluded from the following parts of the proceedings of this meeting.

o

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:

Item No	Minutes/Report of:	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
12.1	Minutes of the public Excluded portion of Utilities and Roading Committee meeting of 22 February 2022	Confirmation of Minutes	Good reason to withhold exists under Section 7	Section 48(1)(a)
12.2 – 12.3	Reports from Management Team meetings	Reports for information	Good reason to withhold exists under Section 7	Section 48(1)(a)

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 which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public are as follows:

Item Nº	Reason for protection of interests	Ref NZS 9202:2003 Appendix A
12.1 – 12.3	Protection of privacy of natural persons To carry out commercial activities without prejudice	A2(a) A2(b)ii

CARRIED

CLOSED MEETING

The public excluded portion of the meeting commenced at 4.05pm and concluded at 4.11pm.

Resolution to Resume in Open Meeting

Moved: Councillor Brine Seconded: Councillor Blackie

THAT open meeting resumes and the business discussed with the public excluded remains public excluded.

CARRIED

OPEN MEETING

NEXT MEETING

The next meeting of the Utilities and Roading Committee is scheduled for 3.30pm, on Tuesday 26 April 2022.

There being no further business, the meeting closed at 4.11pm.

CONFIRMED

_____
Chairperson
Councillor Robbie Brine

_____
Date

BRIEFING

At the conclusion of the meeting a briefing was held to discuss:

1. ***Chlorination requirements of new drinking water standards.*** *(Colin Roxburgh) This was a briefing to full council and Community Board Chairpersons were also invited to attend.*
2. ***Kaiapoi and Woodend water supply, temporary chlorination and steps to remove this.*** *(Colin Roxburgh)*
3. ***Road Markings recommended for Southbrook Road*** *– (Shane Binder)*

MINUTES FOR THE MEETING OF THE KAIAPOI-TUAHIWI COMMUNITY BOARD HELD VIA ZOOM ON MONDAY 21 FEBRUARY 2022 AT 5PM.

PRESENT

J Watson (Chairperson), J Meyer (Deputy Chairperson), N Atkinson, A Blackie, B Cairns and M Pinkham.

IN ATTENDANCE

P Redmond (Kaiapoi-Woodend Ward Councillor)

C Brown (Manager Community and Recreation), R Kerr (Delivery Manager – Stimulus and Shovel Ready), V Thompson (Business and Centre's Advisor), S Binder (Transport Engineer), H White (Intermediate Landscape Architect – District Regeneration), K Rabe (Governance Advisor) and C Fowler-Jenkins (Governance Support Officer).

There were three members of the public present.

1 APOLOGIES

Moved: J Meyer Seconded: B Cairns

THAT apologies for absence be received and sustained from C Greengrass and S Stewart.

CARRIED

2 CONFLICTS OF INTEREST

Item 6.3 – J Watson declared a conflict of interest as she was a member of the Kaiapoi Community Garden.

3 CONFIRMATION OF MINUTES

3.1 Minutes of the Kaiapoi-Tuahiwi Community Board – 13 December 2021

Moved: J Watson Seconded: B Cairns

THAT the Kaiapoi-Tuahiwi Community Board:

(a) Confirms the circulated Minutes of the Kaiapoi-Tuahiwi Community Board meeting, held 13 December 2021, as a true and accurate record.

CARRIED

3.2 Matters Arising

There were no matters arising.

4 DEPUTATIONS AND PRESENTATIONS

4.1 Mahinga Kai – Greg Byrnes, Hannah-Rose White and Makarini Rupene

G Byrnes spoke to the Board providing them with an update on the progress at Huria Reserve, the heritage Mahinga Kai site in Kaiapoi. He explained that a Steering Group had been set up which consisted of himself, M Rupene, H White and K Dwyer. The Group had met regularly and had completed the concept plan, a schedule of quantities and estimates for work, and drafted a Statement of Intent which was required by Te Kōhaka o Tūhaitara Trust which had been contracted to oversee the project.

Plants for the current financial year and the 2022/23 financial year had been ordered. Depending on Covid restrictions the Group hoped to plant 2,000 natives before 30 June 2022. Over the next twelve months, a network of paths would be started and the design specifics for each of the individual park features would be completed.

H White one of the landscape architects gave the Board an overview of the concept plan.

M Rupene commented that the Steering Group had come up with a great concept plan which would revitalise the red zoned land, transforming it into a Mahinga kai area which had been a significant food resource area for many of the hapu who lived in the district. It was a waka waka wai wai with a 500 year vision of what it would look like after twenty years.

B Cairns offered help with sourcing plants if required and H White replied that she had ordered plants from Waiora which would cover about 80% of the 2,000 plants required and the rest would be sourced from Riverside Horticulture.

5 ADJOURNED BUSINESS

Nil.

6 REPORTS

6.1 Kaiapoi Parking Restrictions Changes – V Thompson (Business and Centres Advisor) and S Binder (Transportation Engineer)

V Thompson spoke to the report which requested approval on six parking restriction and included information on the public consultation which had been undertaken during November and December 2021.

J Watson stated she was pleased to see the fifteen minutes parking restrictions outside Corcoran French removed, as they had been underutilised.

In response to a question from P Redmond, V Thompson explained that she was unsure of the exact number of businesses contacted, however, a flyer drop to the businesses immediately adjacent to the proposed changes had been carried out and property owners were contacted via email. P Redmond believed there were quite a number of businesses affected, and noted that there had only been thirty responses to the consultation. He enquired if that was considered a good response rate. V Thompson answered that it depended on public the interest in any consultation, noting that she had dropped flyers to the affected businesses and there was also information available on all the Council's public platforms.

Moved: A Blackie Seconded: J Watson

THAT the Kaiapoi-Tuahiwi Community Board:

(a) Receives Report No. TRIM number. 210726121396.

(b) Notes the three week community/affected business engagement period that was undertaken to solicit feedback related to the proposed parking restriction changes.

(c) Notes that public feedback was generally supportive of the changes, as evidenced in the 'Let's Talk Waimakariri' summary public engagement report.

(d) Notes that the proposed changes better reflect current utilisation and saught to respond more appropriately to parking demand in the identified areas.

And

Recommends that the District Planning and Regulation Committee:

(e) Approves the six parking restrictions changes, as follows:

ITEM	TOWN	STREET	LOCATION	SIDE OF STREET	RESTRICTION	QUALIFYING REMARKS
1.	KAIAPOI	WILLIAMS STREET	CAREW ST TO OHOKA RD	WEST	P15	ADD 1X PARK, NEXT TO THE DAIRY ON THE CORNER OF OHOKA RD/WILLIAMS ST
2.	KAIAPOI	WILLIAMS STREET	HILTON ST TO RAVEN QUAY	BOTH	P60 / P15	P60 FOR ALL PARKS EXCEPT 1X P15 PARK IN FRONT OF THE DAIRY
3.	KAIAPOI	WILLIAMS STREET	RAVEN QUAY TO CHARLES ST	WEST	P60	CHANGE THE CURRENT P15 PARKS DIRECTLY IN FRONT OF 137 WILLIAMS STREET
4.	KAIAPOI	WILLIAMS STREET	CHARLES ST TO SEWELL ST	EAST	P120	CHANGE THE CURRENT P15 PARKS IN FRONT OF THE SHOPPING COMPLEX
5.	KAIAPOI	CHARLES STREET	DAVIE ST TO WILLIAMS ST	SOUTH	P60	
6.	KAIAPOI	RAVEN QUAY	BLACK ST TO WILLIAMS ST	BOTH	P60	

(f) Notes that following endorsement/approval from the Kaiapoi-Tuahiwi Community Board and District Planning and Regulation Committee, staff would update the parking schedule (pursuant to the Parking Bylaw 2019) and arrange for the relevant on-street signage to be replaced.

CARRIED

6.2 **Johnson Street, Beach Grove – Proposed installation of No-Stopping Restriction – S Binder (Transportation Engineer)**

S Binder spoke to the report noting that Johnson Street was a newly developed street in the Beachgrove Subdivision. The Council had received a service request from a resident on Johnson Street requesting possible parking or no stopping restrictions due to the narrowness of the street.

N Atkinson accepted that Johnson Street was a very narrow carriageway, however, residents and their visitors had to have somewhere to park. He noted that there was a lack of off-street parking in Johnson Street and

wondered where the cars were going to go if the Council approved the proposed no stopping restriction. S Binder recognised that the no stopping restrictions would impacting on the parking supply, however, he explained there were a number side streets which could be utilised as the density of the lots decreased and the sections were larger further north.

N Atkinson asked how many residents had approached the Council with parking concerns. S Binder replied that Council staff had only received one service request, however this had initiated an investigation into the problems facing residents as well as access problems for emergency and service vehicles.

J Watson enquired if narrow streets and parking issues occurred elsewhere in the district or were the streets in Beachgrove particularly narrow. S Binder noted that a seven metre carriageway was the narrowest street allowable and that Council staff were seeing an increase in the number of issues that narrow roads created in other subdivisions.

J Meyer drew attention to a photo in the agenda which depicted a car which was parked on the footpath and stated that this was likely to be an increasing issue with streets too narrow to allow for normal parking. S Binder explained the Council was currently dealing with parking infringements through education, however, enforcement was carried out on repeat offenders.

B Cairns stated that he visited Beachgrove regularly as part of Neighbourhood Support North Canterbury and agreed that there was little space for on street parking in the area. He suggested that the best option may be to widen the street using the berms which were wide and under utilised. S Binder replied that the current kerbing was new and were unlikely to be replaced in the near future and currently there was no funding provision for widening the streets.

M Pinkham noted that both the District Plan and Engineering Code of Practice recommended an eight metre minimum width for roads and he could not understand why there narrow roads were being allowed in the newer sub divisions. The Council had also recently been advised that, under the National Policy Statement, there would no longer be provision for parking requirements within developments and enquired if the Engineering Code of Practice should be amended to ensure that there was adequate on street parking. S Binder noted he had spent the last six months reviewing the Engineering Code of Practice which was last updated in 2008 in a bid to get consistent and best work practices in place to mitigate the issues facing on street parking in the future.

N Atkinson enquired, that if narrow streets was considered a health and safety issue due to emergency vehicle access, why was the Council requesting permission to go out to public consultation, as this should automatically be rectified. He also enquired why the Council was putting a detailed recommendation forward prior to consultation. S Binder explained that parking was a challenge and to classify this as health and safety risk may be an exaggeration, however, it was also an operational issue for rubbish trucks to access some homes. However if the Council installed no stopping lines without any consultation it could garner more unpopularity than if residents were consulted.

M Pinkham suggested that given the discussion he was comfortable that no stopping was required between properties 1-19 but he was uncomfortable with having no stopping down to the cul-de-sac area given how many properties were located there.

B Cairns asked what the cost would be to widen the road. S Binder could not give a definitive figure, however the cost for road marking and signage would amount to approximately between $2,000 and $3,000 whereas to widen the road would be more than $100,000.

Moved: N Atkinson Seconded: J Meyer

THAT the Kaiapoi-Tuahiwi Community Board:

(a) Receives Report No. 220201012277.

(b) Approves consultation being carried out on the establishment of the following no-stopping restriction on Johnson Street.

CARRIED

N Atkinson agreed that public consultation would be required and commented that residents should be able to offer options that worked for them rather than the Council prescribing where the restrictions should be placed.

J Meyer believed the motion would give residents an opportunity to comment however, whatever the final decision was it would not satisfy everyone.

P Redmond commented that he would have expected the option of the status quo included be included in the report for consideration to indicate that the Council did not have a pre conceived view of the proposed outcome. B Cairn's suggestion of widening the street was relevant, however, as the work would be unsubsidised the full cost would fall to the ratepayers.

6.3 Application to the Kaiapoi-Tuahiwi Community Board's Discretionary Grant Fund 2021/22 – K Rabe (Governance Advisor)

B Cairns enquired if the Kaiapoi Community Garden had insurance which would cover the replacement of the lawnmower, and if they had considered purchasing a second hand lawnmower. J Watson explained that the stolen lawnmower was second hand and stated that if they had insurance, it did not cover the lawnmower that was stolen.

Moved: N Atkinson Seconded: A Blackie

THAT the Kaiapoi-Tuahiwi Community Board:

(a) Receives report No.211217201964.

(b) Approves a grant of $500 to Kaiapoi Community Garden towards the purchase of a mower for the garden.

(c) Suggests that the Kaiapoi Community Garden purchase a second hand lawnmower and that it use the remaining funding to improve security to mitigate any further losses.

CARRIED

N Atkinson sympathised with the Kaiapoi Garden Club, noting that insurance on tools was unaffordable for a small community group.

6.4 Conflict of Interests Register – K Rabe (Governance Advisor)

Moved: J Watson Seconded: B Cairns

THAT the Kaiapoi-Tuahiwi Community Board:

(a) Receives report No. 220117004146.

(b) Notes a Register of Interests would be republished in the Kaiapoi-Tuahiwi Community Board's March 2022 agenda and on the Council website.

(c) Notes amendments could be made at any time by notification to the Governance Manager.

(d) Notes the Register would be next reviewed when legislation changes occur or in June 2022 (whichever is soonest).

CARRIED

7 CORRESPONDENCE

Nil.

8 CHAIRPERSON'S REPORT

8.1 Chairperson's Report for December 2021 and January 2022

- ∑ All Together Kaiapoi held the garden competition award event. The competition was held mid-January and a good number of gardens had been entered in the competition. This was proving to be a very popular event.
- ∑ Waimakariri Public Arts Trust held an event to promote the work the Trust was carrying out. Fifty people were invited to hear four artists talk about their work and demonstrate different techniques. Two sculptors were sold. This was deemed to be successful event.

Moved: J Watson Seconded: J Meyer

THAT the Kaiapoi-Tuahiwi Community Board:

(a) Receives the verbal report from the Kaiapoi-Tuahiwi Community Board Chairperson.

CARRIED

9 MATTERS REFERRED FOR INFORMATION

9.1 Oxford-Ohoka Community Board Meeting Minutes 9 December 2021 (Trim 211210198331)

9.2 Woodend-Sefton Community Board Meeting Minutes 13 December 2021 (Trim 211214199680)

9.3 Rangiora-Ashley Community Board Meeting Minutes 8 December 2021 (Trim 211207195208)

9.4 Kaiapoi Stormwater and Flooding Improvements Funding of McIntosh Drain Pumping Station – Report to Council Meeting 7 December 2021 (Trim 211123187654) – Circulates to Kaiapoi-Tuahiwi Community Board

9.5 Elected Member Expense Policy Update – Report to Council Meeting 7 December 2021 (Trim 211126189433) – Circulates to all Community Boards

9.6 Annual Development Activity Score Card 1 July 2020 – 30 June 2021 – Report to District Planning and Regulation Committee 14 December 2021 (Trim 211019168698) – Circulates to all Community Boards

9.7 Library Update to 2 December 2021 – Report to Community and Recreation Committee 14 December 2021 (Trim 211202193317) – Circulates to all Community Boards

9.8 Te Kōhaka Trust 2021/22 Promotions Business Plan – Report to Audit and Risk Committee 16 November 2021 (Trim 211109180060) – Circulates to all Community Boards

9.9 Promotion of Waimakariri District Business Plan Report, Draft Annual Report and unaudited accounts for Enterprise North Canterbury for the Year Ended 30 June 2021 – Report to Audit and Risk Committee 16 November 2021 (Trim 211110180379) – Circulates to all Community Boards

9.10 Cam River Enhancement Fund Review Decision – Report to Land and Water Committee 16 November 2021 (Trim 211014166428) – Circulates to Rangiora-Ashley and Kaiapoi-Tuahiwi Community Boards

9.11 Stormwater Management from Sutton Tools LTD – Report to Utilities and Roading Committee 16 November 2021 (Trim 210721119499) – Circulates to Land and Water Committee and Kaiapoi-Tuahiwi Community Board

9.12 Submission to Waste Strategy and Legislation Consultation: Closing 26 November 2021 – Report to Utilities and Roading Committee 16 November 2021 (Trim 211019168795) – Circulates to all Community Boards

Moved: J Watson Seconded: B Cairns

THAT the Kaiapoi-Tuahiwi Community Board

a) Receives the information in Items 9.1 to 9.12.

CARRIED

10 MEMBERS' INFORMATION EXCHANGE

P Redmond

- Attended a meeting to consider the Draft Annual Plan – there was an indicative average increase of 4.3%.
- Capital Works Programme – Due to delays with supplies, the impact of Covid restriction, adverse weather events and resourcing issues it was unlikely that the Capital Works Programme delivery would be achieved for this financial year.
- Three Waters Reform –Mayor Dan Gordon was the vice Chair of 'Communities for Local Democracy' which was gaining traction and delaying the Governments intended implantation of the reforms.

J Meyer

- The Darnley Club – was facing increasing challenges caused by Covid and there was an acknowledged responsibility to look after their clients. The Club currently had 104 clients.

A Blackie

- Attended the Waimakariri Public Art Trust function.
- The Kaiapoi River Carnival had been postponed and was now hoped to be run during Spring of 2022.

N Atkinson

- Draft Annual Plan Consultation had been approved.
- Significant rain event causing flooding issues.
- International Relations – along with Mayor Gordon attended a dinner with Chinese delegates.
- Passchendaele – four Queen Elizabeth memorial medals would be relocated to the Rangiora RSA gardens.

B Cairns

- Paris for the Weekend – Fifth Birthday celebrations.

- ∑ All Together Kaiapoi – Monthly meeting, discussed cancelled events.
- ∑ Neighborhood Support North Canterbury – Growing numbers of people signing up to Getsready.
- ∑ Food Forest Update:
  - o Two educational programmes covering mushroom growing, winter vegetable see raising, cooking demonstration and companion planting and edible weeds have brought many people to Kaiapoi.
  - o Multiple garden club visits.
  - o Multiple thefts of plants along with phone solar panel charger system which cost $350.
  - o Report would soon come to the Board regarding the educational/picnic gazebo.
- ∑ Community Hub – Was great to see the layout, shame only a small number of residents attended the public meeting.
- ∑ Food Secure North Canterbury:
  - o Attended monthly meeting - working with 19 food forests in Canterbury and are at various stages of development from Hanmer Springs to Timaru.
  - o Working on having a food forest in Woodend and Oxford.
  - o Demand for food is growing.
- ∑ Art on the Quay – January exhibition opening.
- ∑ Waimakariri Health Advisory Group – the district was well prepared for those people which would have to isolate.
- ∑ Cooperating Parish – New minister welcomed.
- ∑ Memorial reserve meeting.
- ∑ Kaiapoi Community Networking meeting.

M Pinkham

- ∑ Chaired Kaiapoi Promotions Association meeting – primary topic was the planning for future events under Covid traffic light setting.
- ∑ Attended Community Wellbeing North Canterbury Trust Audit and Finance meeting – Main focus of meeting was review of fit out of 200 King Street and relocation of offices in early March 2022.
- ∑ Attended Community Wellbeing North Canterbury Trust Board Meeting – Community Wellbeing North Canterbury Trust has been awarded a number of new contracts from the District Health Board to support young people in Waimakariri and Hurunui.
- ∑ Attended workshop on improvements to Kaiapoi Memorial Reserve – disappointing meeting.
- ∑ Attended Community Wellbeing North Canterbury Trust Audit and Finance meeting – included meeting with external financial reviewers.

11 CONSULTATION PROJECTS

11.1 Gambling

https://letstalk.waimakariri.govt.nz/let-s-talk-about-gambling

Consultation closes Monday 21 February 2022.

11.2 E-Scooters

https://letstalk.waimakariri.govt.nz/e-scooter-trial

Consultation runs throughout trial and closes in April 2022.

The Board noted the consultation projects.

12 REGENERATION PROJECTS

12.1 Town Centre, Kaiapoi

Updates on the Kaiapoi Town Centre projects are emailed regularly to Board members. These updates can be accessed using the link below: http://www.waimakariri.govt.nz/your-council/district-development/kaiapoi-town-centre.

13 BOARD FUNDING UPDATE

Board Discretionary Grant

Balance as at 16 January 2021: $4,127.

General Landscaping Budget

Balance as at 16 January 2021: $25,430.

The Board noted the funding update.

14 MEDIA ITEMS

Nil.

15 QUESTIONS UNDER STANDING ORDERS

Nil.

16 URGENT GENERAL BUSINESS UNDER STANDING ORDERS

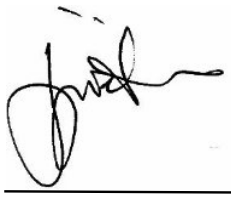
Nil.

NEXT MEETING

The next meeting of the Kaiapoi-Tuahiwi Community Board will be held at the Ruataniwha Kaiapoi Civic Centre on Monday 21 March 2022 at 5pm.

THERE BEING NO FURTHER BUSINESS THE MEETING CONCLUDED AT 6.08pm.

CONFIRMED



Chairperson

21 March 2022

Date

Workshop
(6.08pm to 6.22pm)

∑ *Stormwater and Flooding Improvements – R Kerr (Delivery Manager Stimulus and Shovel Ready)*
- Contracts split into smaller contract to enable local contractors to tender for work.
- Mackintosh Drain and Snyed Street projects completed.
- Dudley Creek and Otaki Street almost completed.
- Laying groundwork for Otaki pump station and should be completed in September 2022.
- Work on bund between Mackintosh and residential area starting in April and should be completed in September 2022.
- Request that all information circulated to residents be sent to Board members.
- Request that Board members included in Briefing to the Council on Flooding issues in Kaiapoi.

∑ *Members Forum*

MINIUTES FOR THE MEETING OF THE OXFORD-OHOKA COMMUNITY BOARD HELD VIA ZOOM ON WEDNSDAY 2 MARCH 2022 AT 7PM.

PRESENT

D Nicholl (Chairperson), T Robson (Deputy Chairperson), W Doody, S Farrell, R Harpur and N Mealings.

IN ATTENDANCE

Mayor D Gordon.

C Brown (Manager Community and Recreation), T Tierney (Manager Planning and Regulation), T Kunkel (Governance Team Leader) and C Fowler-Jenkins (Governance Support Officer).

1. APOLOGIES

Moved: N Mealings Seconded: W Doody

THAT an apology for absence be received and sustained from M Brown.

CARRIED

2. PUBLIC FORUM

There were no members of the public present for the public forum.

3. CONFLICTS OF INTEREST

There were no conflicts of interest declared.

4. CURRENT REGISTER OF INTERSTS

Moved: D Nicholl Seconded: T Robson

THAT the Oxford-Ohoka Community Board:

(a) **Received** the current Register of Interest.

CARRIED

5. CONFIRMATION OF MINUTES

5.1. Minutes of the Oxford-Ohoka Community Board – 2 February 2022

Moved: T Robson Seconded: N Mealings

THAT the Oxford-Ohoka Community Board:

(a) **Confirms** the circulated Minutes of the Oxford-Ohoka Community Board meeting, held on 2 February 2022, as a true and accurate record.

CARRIED

5.2. Matters Arising

Nil.

Unconfirmed

6. DEPUTATIONS AND PRESENTATIONS

6.1. Mandeville Stockpile – C Brown (Manager Community and Recreation)

C Brown provided a brief background on the stockpile of soil that had been dumped at the Mandeville Sports Club (MSC). He advised that on the 23 January 2022 the Council received information that contaminated soil may have been dumped at the MSC. The Council quickly inspected the soil and decided that it would be prudent to erect a shade cloth covered fence around the pile as staff were unable to determine exactly what contaminates were in the soil.

After containing the soil, the Council employed experts in contamination testing, environmental engineers Tonkin and Taylor, who undertook an assessment of the site by taking ten soil samples. Two of the samples tested positive for containing solid asbestos material. Once it was established that the soil was contaminated, the Council proceeded to liaised with the MSC on how to deal with the matter. As part of their assessment Tonkin and Taylor provided some recommendations on what the Council should do to ensure public safety, which was the Council's main priority. The assessment report recommended that the Council could put a polymer layer around the outside of the soil pile to contain it completely, which the Council had subsequently done.

C Brown highlighted that it was important to note that asbestos was only found in two samples, and the asbestos which was found was contained within a bound substance which meant there was very little risk of it becoming airborne. The Council were therefore confident that sufficient measures had been taken to ensure public safety while the soil was at the MSC. The next step was to work with the MSC and Tonkin and Taylor on the most effective and safe way to dispose of the soil.

T Robson questioned why it had taken the Council over a month to let the Board know about the problem. C Brown noted that although the Council was made aware in late January 2022 that there may be contamination, the Tonkin and Taylor assessment report, confirming the contamination, was only received on 11 February 2022, where after the Council started liaising with the MSC on the best options of ensuring public safety. Once this was done the elected members was advised of the situation, before a press release was put out. Ideally, the Council would have liked to inform the Board sooner, however, they had to wait for the assessment report and did not want to jeopardise any future actions the Council may need to take.

T Robson further asked if the Council knew why the soil was dumped at the MSC, and by who. He also enquired if the Council would be seeking reimbursement of the cost to disposing of the soil. C Brown explained that as part of their eight years Concept Development Plan, the MSC was developing a walking and cycling track around the outside of the Domain. About five years ago some of the trees on the North Eyre Road side of the Domain were removed which had created some uneven ground in between the remaining trees. The soil was to be used to level out this area as part of the cycle and walking track. The MSC was currently investigating options for removing the soil and the cost implications.

Lastly, T Robson enquired if the polymer that was sprayed on the pile was an acrylic, and would the polymer be maintained going forward and had Environment Canterbury (ECan) been notified of the contamination. C Brown confirmed that ECan had been notified and that the Council would ensure, with the help of Tonkin and Taylor, that the polymer was being maintained to ensure public safety.

R Harpur expressed concern that the matter had not been raised at the previous MSC Delegates meeting, which he attended as the Board's representative. He questioned why the MSC, who knew the soil was being tested, had not erected public warning signs sooner. He expressed a further concern that the clubs that used the MSC

Unconfirmed

grounds were not warned of the possible contamination. C Brown could not comment on the actions of the MSC, however, he noted that the Council and the MSC only received confirmation that the soil was contaminated on 11 February 2022, so the MSC may not have known about the contamination at the time of the MSC Delegates meeting.

S Barkle suggested that it may be prudent for the MSC to request a soil report from suppliers to ensure that similar situations did not happen again. C Brown noted that the Council was working with the MSC on appropriate supply chain management processes to be followed if they need to purchase any fill on the site again.

N Mealings asked that in the interest of preventing this from happening again, could the Council advice the MSC on why resource consents were required. C Brown confirmed that the MCS would be briefed on the processes and procedures they needed to follow when moving fill.

W Doody enquired if the MSC Board was being supported by Council staff as they were going through quite a tough time regarding the soil contamination. C Brown explained that Council staff had been assisting and advising the MSC Board. He acknowledged that it was very difficult for the MSC, however, they were taking the matter very seriously and were implementing all of the right measures to get the matter resolved as swiftly as possible.

T Robson asked if Tonkin and Taylor had also tested for any other contaminated that may be contained in the soil, which may therefore be a risk to the groundwater below. C Brown replied that they had tested for heavy metals, polyromantic hydrocarbons and total petroleum hydrocarbons and had found those to be at acceptable levels.

7. ADJOURNED BUSINESS

Nil.

8. REPORTS

8.1. Application to the Oxford-Ohoka Community Board's Discretionary Grant Fund 2021/22 – T Kunkel (Governance Team Leader)

T Kunkel spoke to the report noting that an application had been received from the Oxford Arts Trust towards the cost of purchasing an air purifier which they wanted to utilise in their large facility so they could continue their classes which they received Government funding for.

S Barkle asked if an air purifier was essential to have to enable the Trust to continue with their lessons. T Kunkel did not believe it was necessary, however, the Trust wanted to comply as much as possible with the Government guidelines and they felt this was the easiest way to ensure that their members could safely attend classes.

W Doody noted her concern about the number of people the Trust may have in their classes if the Board granted the funding for an air purifier. T Kunkel explained that even if the Trust had the air purifier they would still need to comply with the Government regulations on social distancing and number attendees at gatherings.

S Barkle questioned if there was any reason that the attendees could not be spaced out and be requested to wear masks during classes. W Doody commented that although it was a large room it was not well ventilated.

Unconfirmed

Moved: W Doody Seconded: R Harpur

THAT the Oxford-Ohoka Community Board:

(a) **Receives** report No. 220215019547.

(b) **Approves** a grant of $500 to the Oxford Arts Trust towards the cost of purchasing an Air Purifier Model Z3000, provided that the Trust provides the Board with additional information about room ventilation during their classes.

CARRIED

8.2. **Approval of the updated Oxford-Ohoka Community Plan 2020-2022 – T Kunkel (Governance Team Leader)**

T Kunkel noted the Community Plan had been updated to include the relevant information from 2021 as provided by the various departments. After the Board approved the draft plan, it would be submitted to the Council's Creative Admin Team for editing, formatting and layout. The final plan would be submitted to the Chairperson for final sign-off.

Moved: T Robson Seconded: N Mealings

THAT the Oxford-Ohoka Community Board:

(a) **Receives** report No. 220217021132.

(b) **Approves** the updated Oxford-Ohoka Community Plan 2020-2022. (Trim 220217021114).

(c) **Authorises** the Chairperson to approve the final version of the Oxford-Ohoka Community Plan 2020-2022, subject to any further minor editorial corrections, if required.

CARRIED

9. CORRESPONDENCE

9.1. **Letter regarding the Main Street, Oxford speed limits**

T Robson asked if the letter could be forwarded to the Council's Roading Team and if the Council could provide the Board with an explanation, as the information in the letter seemed contradictory to the information provided to the Board. T Kunkel noted she had already forwarded the letter to the Council's Roading and Transport Manager, J McBride, who was dealing with the matter. She further noted that regarding the letter about the speed limits in Main Street sent to the Council, the Mayor's office was in the process of setting up a meeting with the Board members and J McBride to discuss the matter further.

S Barkle understood that the speed limits had already been considered by the Council and they had declined that the proposed 40km/h speed limit along Main Street, Oxford. She questioned, that based on the information contained in the letter, if the Council would be willing to reconsider its previous decision. Mayor Gordon advised that he currently held the portfolio for transport for the Council so the matter would receive his full attention where after he would report back to the Board. He encouraged the Board to make a submission to the Council's 2022/23 Annual Plan on their concerns.

Unconfirmed

10. CHAIRPERSON'S REPORT

10.1. Chairperson's report for February 2022

- ∑ Attended the Ohoka Rural Drainage Advisory Group meeting, there seemed to be considerable opposition to the idea of the subdivision in Ohoka.
- ∑ Attended the North Canterbury Neighbourhood Support meeting.

Moved: R Harpur Seconded: T Robson

THAT the Oxford-Ohoka Community Board:

(a) **Receives** the verbal report from the Oxford-Ohoka Community Board Chairperson.

CARRIED

11. MATTERS FOR INFORMATION

11.1. Rangiora-Ashley Community Board Meeting Minutes 9 February 2022 (Trim 2202090244)

11.2. Woodend-Sefton Community Board Meeting Minutes 15 February 2022 (Trim 220218022525)

11.3. Oxford-Ohoka Community Board Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

11.4. Woodend-Sefton Community Board Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

11.5. Rangiora-Ashley Community Board Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

11.6. Kaiapoi-Tuahiwi Community Board Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

11.7. Amendments to School Variable Speed Zones – Report to Council Meeting 1 February 2022 – Circulates to the Rangiora-Ashley and Oxford-Ohoka Community Boards.

11.8. Stockwater Race Bylaw 2022 – Request for Adoption – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

11.9. Wellbeing, Health and Safety Report February 2022 – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

11.10. Ashley Gorge Water Supply Compliance – Report to Council Annual Plan Meeting 2 February 2022 – Circulates to the Oxford-Ohoka Community Board.

11.11. Wastewater Treatment Plant Fencing Contract Completion – Report to Utilities and Roading Committee Meeting 22 February 2022 – Circulates to all Boards.

PUBLIC EXCLUDED REPORTS

11.12. Rangiora BNZ Corner Site (70 and 74 High Street) – Divestment Evaluation Panel – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

Moved: T Robson Seconded: S Barkle

THAT the Oxford-Ohoka Community Board:

(a) **Receives** the information in Items.11.1 to 11.11.

Unconfirmed

(b) **Receives** the public excluded information in Item 10.12, which would remain in public excluded and which was circulated separately.

CARRIED

12. MEMBERS' INFORMATION EXCHANGE

T Robson

∑ Attended an Ashley Gorge Advisory Group meeting and farewell for the Chairperson who was retiring from the Group. The Group also bid farewell to the previous camp operators.

∑ Fielded numerous complaints from residents about the Mandeville stockpile of soil.

R Harpur

∑ Attended the Ohoka Rural Drainage Advisory Group meeting which voiced their opposition to the proposed Ohoka subdivision.

∑ Grey Power meeting did not take place due to Covid.

S Barkle

∑ Expressed her disappointed with the time it took for the Board to be advised about the contamination at the MSC.

∑ Fielding many questions about the proposed Ohoka subdivision and therefore requested to be kept informed.

∑ Raised concern about the current high water table levels, especially in light of potential future flooding.

S Farrell

∑ Concerned about the damage to the toilets at the Community Garden in Pearson Park which had again been vandalised.

∑ Noted that the Oxford Farmers Market had confirmed that they would like the EV Chargers to be available 24/7.

W Doody

∑ Attended the Oxford Rural Drainage Advisory Group meeting. There were concerns about the amount of water that had been flowing down Mounseys Stream.

∑ Oxford Pool were struggling with a lack of staff and the Council may have to close the pool earlier this session.

∑ She expressed her appreciation for the previous operators of the Ashley Gorge Campground.

N Mealings

∑ There had been a large amount of discussion in the community about proposed Ohoka subdivision, which she was fielding a lot of queries for.

∑ It had been a busy month for water related issues.

- On 9 February 2022, before the last flood event she visited a property on Mill Road, Ohoka that had some issues with the drain and later on discussed with Council staff.
- On 11 February 2022 she received a call from a Mandeville resident whose tank had run dry because a contractor inadvertently forgot to turn it back on.

Unconfirmed

- Rain event on 12 and 13 February 2022, she did her best to keep people informed on social media the challenges.
- 15 February the culvert bridge over the Ohoka Stream failed.

∑ 22 February observed the anniversary of the Canterbury earthquake.

∑ Attended:

- An all Boards Briefing regarding the Council's position on the proposed Three Waters reform and their involvement in Communities 4 Local Democracy.
- The Ohoka Rural Drainage Advisory Group meeting.
- Audit and Risk Committee Meeting
  - The Council's Capital Works Programme was behind schedule.
- Prevention of Drug and Alcohol Group meeting.
- District Planning and Regulation Committee meeting
  - 59% increase between 2020 and 2021. Managed to process 96.5% of the applications within the statutory timeframes. Briefing on tiny homes.
- Waimakariri Youth Council meeting.
- North Canterbury Youth Services Networking meeting.
- Council meeting.

13. CONSULTATION PROJECTS

13.1. E-Scooters

https://letstalk.waimakariri.govt.nz/e-scooter-trial

Consultation runs throughout trial and closes April 2022.

13.2. 2022/23 Draft Annual Plan

Link to consultation document available 4 March 2022 on the Council website. Consultation closes 4 April 2022.

The Board noted the consultation projects.

14. BOARD FUNDING UPDATE

14.1. Board Discretionary Grant

Balance as at 22 February 2022: $4,887.

14.2. General Landscaping Fund

Balance as at 22 February 2022: $12,710.

The Board noted the funding update.

15. MEDIA ITEMS

Nil.

16. QUESTIONS UNDER STANDING ORDERS

Nil.

Unconfirmed

17. URGENT GENERAL BUSINESS UNDER STANDING ORDERS

Nil.

NEXT MEETING

The next meeting of the Oxford-Ohoka Community Board will be held at the Mandeville Sports Centre on Wednesday 6 April 2022 at 7pm.

Workshop

∑ *Members Forum*

THERE BEING NO FURTHER BUSINESS THE MEETING CONCLUDED AT 8.25pm.

CONFIRMED

_____

Chairperson

_____

Date

Unconfirmed

MINUTES OF THE MEETING OF THE RANGIORA-ASHLEY COMMUNITY BOARD HELD VIA ZOOM ON WEDNESDAY 9 MARCH 2022 AT 7.04PM.

PRESENT:

J Gerard (Chairperson), D Lundy (Deputy Chairperson), K Barnett, R Brine, M Clarke, M Fleming, J Goldsworthy, M Harris, J Ward, A Wells and P Williams.

IN ATTENDANCE

L Smith (Manager People and Engagement), Grant Stephens (Green Space Design and Planning Team Leader), K Rabe (Governance Advisor) and E Stubbs (Governance Support Officer).

1. APOLOGIES

Moved: J Gerard Seconded: D Lundy

THAT the Rangiora-Ashley Community Board receives and sustains the apology for absence from S Lewis.

CARRIED

2. CONFLICTS OF INTEREST

There were no conflicts of interest declared.

3. CURRENT REGISTER OF INTERESTS

It was noted that there had been some alterations to the register.

Moved: K Barnett Seconded: D Lundy

THAT the Rangiora-Ashley Community Board:

(a) **Receives** the current Register of Interest.

CARRIED

4. CONFIRMATION OF MINUTES

4.1. Minutes of the Rangiora-Ashley Community Board – 9 February 2022

Moved: J Ward Seconded: J Goldsworthy

THAT the Rangiora-Ashley Community Board:

(a) **Confirms,** as a true and accurate record, the circulated Minutes of the Rangiora-Ashley Community Board meeting, held on 9 February 2022.

CARRIED

4.2. Matters Arising

There were no matters arising

5. DEPUTATIONS AND PRESENTATIONS

5.1. Milton Reserve Status - Grant Stephens

G Stephens provided an update on the Millton Reserve, advising that a number of trees that fell into the 'dead, dying or diseased' category had been removed.

Unconfirmed

The $2,000 made from log sales would be reinvested into the project. The next stage was to prune the remaining trees in order to remove any dead wood and make the space safe for public use. This work had led to various 'discoveries' in the arboretum minor which had in the past been used as a dumping ground for various materials including hard fill and old fencing. The Council were engaging with contractors to carry out the work of clearing the area in order to make it safe and maintainable going forward.

The Council believed that to ensure the safety of the public who had access to the land, the best option would be to do ground preparation work prior to any planting. Initially the suggestion was that the trees should be watered by Asplundh as part of their tree watering contract, however, further investigation had proven that the installation of an irrigation system prior to planting would be the best option. There would be costs implications associated with both the clearing of the land and instillation of an irrigation system.

Due to the increases to the budget, Council staff were investigating possible cost reductions. Some of the costs could be mitigated by the Council doing more of the work in-house as this would save on professional fees. However, the main reduction for the Board to consider would be to delay the installation of the pathways. G Stephens considered the most important priority would be ground preparation and irrigation installation. Currently the project included $60,000 for the development of path/cycle ways and he would recommended that a portion of that budget be diverted toward ground establishment and that the paths be developed at a later stage. Delaying the paths would also allow flow and connections within the reserve to be developed through its natural use. Future funding for pathways could be secured trough the 2022/23 Annual Plan or General Landscaping Fund.

G Stephens noted the formalising of the reserve as a community reserve had been raised as the initiative was being largely driven by the community including the Rotary Club, the Lions Club and the Soroptomists who were eager to commence planting. He suggested installing signage at the entrances of the reserve listing all the community groups involved in establishing the arboretum.

P Williams queried if water for the North Canterbury Model Railway Club's proposed building, might that be a better source of water due to bigger gage piping and water pressure. G Stephens agreed however, it would be dependent on the Railway Club' timeframe, however they may be open to establishing their water connection early which would enable the Board to take advantage of economies of scale.

K Barnett requested a report on the history of the Millton Reserve name to provide clarity and potentially to look at the option of a bilingual name. G Stephens recommended an information memo to the Board be written in the first instance and if the Board wished to proceed further a report could be presented at a later stage, so as to mitigate any further delays to the project.

M Fleming asked if the advisor from the Christchurch Botanic Gardens had provided any feedback on plantings for the reserve. G Stephens advised that Council staff had met with the advisor on site who had emphasised the importance of getting the initial groundwork right, and confirmed that the advisor would be providing ongoing assistance in relation to tree selections and locations.

M Fleming expressed concern at the location of a current cycle crossing on Millton Avenue and enquired if the Council had considered the safety of crossing in relation to traffic. G Stephens noted that was the advantage of delaying completing the paths within the reserve, as it would allow for more liaison with the Council's Roading Team on the development of the cycling network by the and the development of a safer crossing option.

Unconfirmed

The Board expressed agreement that delaying path construction to ensure good establishment of the ground for tree planting and irrigation was the best option.

6. ADJOURNED BUSINESS

Nil.

7. REPORTS

7.1. Rangiora-Ashley General Landscaping Report – G Stephens (Green Space Design and Planning Team Leader)

G Stephens spoke to the report which identified four projects for consideration of funding allocations. After the recommended allocations $16,310 would be left in the Board's Landscaping budget to carryover toward potential development of the next town entrance as identified by the Board.

P Williams asked about potential local suppliers for the seating projects. G Stephens confirmed that previous new community seats had been built by a local Tuahiwi based company.

M Fleming enquired if there could be consideration of the comfort and ease of access to the public seats for all users, including those with mobility issues. G Stephens advised that the seat in the Cust Domain was not situated near a pathway and may therefore allow for limited access. However, the seat at Townsend Fields could potentially have a shingle connecting path which would cost a further estimated $1,000. The Passchendaele seat would be adjacent to the path. Access was a consideration for all public seating and where possible Council staff did try to ensure good access.

K Barnett noted that there may be a need in the future to fund pathways from the Board's General Landscaping budget. She further noted that the Youth Council's Dudley Park project may also require additional funding from the Board's Landscaping budget. G Stephens explained that the Youth Council was working with the Lions Club to build and install a deck at the skatepark at a cheaper rate. However, the cost of timber and building materials had increased due to the impacts of Covid and consequently the available funding was no longer sufficient. Council staff would therefore be suggesting that the Youth Council review the priorities of the project, to establish if one or two of the smaller parts of the project could be completed with the available funding.

P Williams questioned if the Youth Council had investigated outside funding options. G Stephens advised that was still the Youth Council intent to source outside funding. If the deck was still their first priority, they would need to look at further funding sources. Prior to the Board made allocating further funds to the skatepark project, the Youth Council needed to look at prioritisation, exact costings and exploration of other funding sources.

M Fleming asked if there was potential for sponsorship for the Youth Council's project from local businesses such as McAlpines, and G Stephens commented on the difficult nature of the market in general for sourcing materials.

Moved: J Gerard Seconded: P Williams

THAT the Rangiora-Ashley Community Board:

(a) **Receives** Report No. TRIM number. 220224026118.

(b) **Notes** the Board currently had $27,010 available to allocate to general landscape projects within the Rangiora Ashley ward.

Unconfirmed

(c) **Approves** the allocation of $2,500 towards the purchase and installation of a single rugby post at Cust Domain as per the plan included within report 220224026118.

(d) **Approves** the allocation of $3,000 towards the purchase and installation of a park bench at Cust Domain as per the plan included within report 220224026118.

(e) **Notes** that staff will work with the Cust Domain Advisory Group to determine the exact location on site at time of installation of the seat and rugby post.

(f) **Notes** that the Rangiora Returned and Services Association (RSA) have donated $1,000 and some timber towards the installation of a seat, planting and a tree at the Rangiora end of the Passchendaele Walkway.

(g) **Approves** the allocation of $3,200 towards the remaining costs of purchase and installation/planting of the seat, plants and tree for the Passchendaele Walkway.

(h) **Notes** that staff will work with the Waimakariri Passchendaele Advisory Group and Rangiora RSA to determine the exact location of this seat and planting.

(i) **Approves** the allocation of $3,000 towards the purchase and installation of a park bench at Townsend Fields Subdivision, Rangiora in the location identified within this report.

(j) **Notes** that this will leave $16,310 within the Rangiora-Ashley General Landscaping Budget (10.1045.000.5224) remaining for future allocation.

(k) **Approves** further allocation as required for Millton Reserve for sponsor signage and irrigation; and that for any remaining budget be carried over into the 2022/23 financial year.

CARRIED

K Barnett commented that she and the Mayor were concerned at the delay of the project and would she would therefore like to see the Board support the Youth Council's project. It was noted that the Board would receive a new allocation for the General Landscaping budget in July 2022, and further funding allocations could then be considered.

J Gerard commented that recommendation (k) made the carryover more flexible as there had been several suggestions as to where more funding may be required including the skatepark, and signage and irrigation for the Millton Memorial Reserve. The next town entrance the Board would be working on would be the Kippenberger Avenue entrance, however, there had been no indication from Mainpower regarding undergrounding the wires at this stage therefore the project was unlikely to occur within the next Board term.

D Lundy agreed with the funding remaining flexible. He commented that the Millton Reserve planting would be highly visible and the site needed to be well prepared to allow the trees to be properly established to achieve a successful outcome.

Unconfirmed

7.2. **Application to the Rangiora-Ashley Community Board's Discretionary Grant Fund 2021/22 – K Rabe (Governance Advisor)**

K Rabe advised that the Southbrook Netball Club were applying for funds for hall hire, equipment storage and the purchase of 'Player of the Day' trophies. The Club had also been successful in an application to the Board the previous year and had contingency plans for operating in Red Light Covid settings.

Moved: M Fleming Seconded: J Ward

THAT the Rangiora-Ashley Community Board:

(a) **Receives** report No. 220221023266.

(b) **Approves** a grant of $512.30 to the Southbrook Netball Club towards the cost of hall hire, equipment storage costs and the purchase of 'Player of the Day' trophies.

CARRIED

M Fleming commended the Southbrook Netball Club for provided a good service to the community.

7.3. **Approval of the updated Rangiora-Ashley Community Board Plan 2020/22 – K Rabe (Governance Advisor)**

K Rabe noted the Board Plan had been updated for the last few months of the term. Changes were noted in red, however, she had since received further changes that would be added. She commented that formatting and layout would improve when the document was edited by the Admin Creative Team.

K Barnett provided a further minor change.

Moved: D Lundy Seconded: P Williams

THAT the Rangiora-Ashley Community Board**:**

(a) **Receives** report No. 220119005456.

(b) **Approves** the updated Rangiora-Ashley Community Board Plan 2020-2022 (Trim: 22022023824).

(c) **Authorises** the Chairperson to approve the final version of the Rangiora-Ashley Community Board Plan 2020-2022, if any further minor editorial corrections are required.

CARRIED

8. CORRESPONDENCE

Nil.

Unconfirmed

9. CHAIRPERSON'S REPORT

9.1. Chair's Diary for February 2022

Moved: J Gerard Seconded: D Lundy

THAT the Rangiora-Ashley Community Board:

(a) **Receives** report No. 220228026855.

CARRIED

10. MATTERS FOR INFORMATION

10.1. Oxford-Ohoka Community Board Meeting Minutes 2 February 2022 (Trim 220208015336)

10.2. Woodend-Sefton Community Board Meeting Minutes 15 February 2022 (Trim 220218022525)

10.3. Updated Recommendations for Speed Limit Changes throughout the Rangiora-Ashley Ward Area – Report to Council Meeting 1 February 2022 – Circulates to the Rangiora-Ashley Community Board.

10.4. Amendments to School Variable Speed Zones – Report to Council Meeting 1 February 2022 – Circulates to the Rangiora-Ashley and Oxford-Ohoka Community Boards.

10.5. Stockwater Race Bylaw 2022 – Request for Adoption – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

10.6. Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

10.7. Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

10.8. Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

10.9. Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

10.10. Wellbeing, Health and Safety Report February 2022 – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

10.11. Wastewater Treatment Plant Fencing Contract Completion – Report to Utilities and Roading Committee Meeting 22 February 2022 – Circulates to all Boards.

PUBLIC EXCLUDED REPORTS

10.12. Rangiora Corner Site – Evaluation Panel – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

Moved: D Lundy Seconded: J Ward

THAT the Rangiora-Ashley Community Board:

(a) **Receives** the information in Items 10.1 to 10.11.

(b) **Receives** the public excluded information in Item 10.12, which would remain public excluded and was circulated separately.

CARRIED

Unconfirmed

11. MEMBERS' INFORMATION EXCHANGE

D Lundy

∑ Working with Council staff on safety improvements outside Loburn Reserve.
∑ Contacted by a number of ratepayers concerned about state of gravel roads.

K Barnett

∑ Three Waters reform response ongoing.
∑ Local Government reform – number of briefings.
∑ District Plan progressing, there had been some late submissions.
∑ Awaiting central Government legislation changes.

R Brine

∑ Provided update on potential effect of Covid on transfer station. There may be a drop-off in collections dependent on driver availability. There was a difficultly sourcing truck parts meaning some trucks may be off the road.

M Clarke

∑ Stakes had been installed to improve visibility at damaged culverts.
∑ Complaints about state of roads, including large pothole on Durham Street.
∑ Noted parking on yellow lines behind the Gables Arcade – may need follow-up from Council staff to enforce restrictions.

M Fleming

∑ Assisting with gardens for Keep Rangiora Beautiful – noted the old hospital was being demolished.

M Harris

∑ Had assisted ratepayer with flooding issue on Mt Thomas Road, D Lewis and K Simpson had visited the site, which will require ECan involvement.
∑ Commented there was a substantial amount of crime occurring in the district.

J Ward

∑ Noted Annual Plan was out for consultation.
∑ Noted tender openings highlighted issues in construction industry.
∑ Rangiora corner site discussions progressing well.
∑ Joint Promotions meeting – quiet due to Covid.
∑ ECan Annual Plan out for consultation.
∑ Airfield Advisory Group meeting update.

A Wells

∑ Noted upcoming drive around with Roading Operations Team Leader to view the condition of local roads.

P Williams

∑ Would be attending the drive around with the Roading Operations Team Leader. Had requested the Roading Manager to provide an update to the Board on gravel roads.

D Lundy asked how effective the Roading Team operations were. P Williams commented at the Annual Plan meeting he had noted the need for extra funding for gravel roads and had been advised there was sufficient budget. Since then he had been advised that further funding would be required. Staff acknowledged there had been a breakdown in some systems and maintenance not kept up to date particularly with wet weather conditions. He highlighted that staff were currently under tremendous pressure.

Unconfirmed

12. CONSULTATION PROJECTS

12.1. Migrant Experiences

https://letstalk.waimakariri.govt.nz/migrant-experiences

12.2. E-Scooters Trial

https://letstalk.waimakariri.govt.nz/e-scooter-trial

The Board noted the consultation projects.

13. BOARD FUNDING UPDATE

13.1. Board Discretionary Grant

Balance as at 28 February 2022: $12,220.

13.2. General Landscaping Fund

- ∑ Carryover from 2020/21: $1,580.
- ∑ Allocation for 2021/22: $25,430.
- ∑ Balance as at 28 February 2022: $27,010.

The Board noted the above balances.

14. MEDIA ITEMS

Nil.

15. QUESTIONS UNDER STANDING ORDERS

Nil.

16. URGENT GENERAL BUSINESS UNDER STANDING ORDERS

Nil.

NEXT MEETING

The next meeting of the Rangiora-Ashley Community Board is scheduled for 7pm, Wednesday 13 April 2022.

Workshop *(8.11pm – 8.16pm)*

- ∑ *Members Forum*

  Annual Plan - The need for an Annual Plan Submission Workshop was noted. The Board agreed to discuss their submissions to both the Council and ECan's Annual Plans on Wednesday 16 March at 5.30pm via zoom.

  There was some discussion around the effectiveness of a Board submission to ECan compared to endorsing the Council submission. It was noted that ECan's rate rise for the previous year was 18% and this year they were indicating 24% which represented nearly 50% increase in two years.

THERE BEING NO FURTHER BUSINESS THE MEETING CLOSED AT 8.16PM.

Unconfirmed

CONFIRMED

_____

Chairperson

13 April 2022

Unconfirmed

MINUTES FOR THE MEETING OF THE WOODEND-SEFTON COMMUNITY BOARD HELD VIA ZOOM ON MONDAY 14 MARCH AT 6.03PM.

PRESENT

S Powell (Chairperson), A Thompson (Deputy Chairperson), A Allen, J Archer, M Paterson P Redmond and S Stewart.

IN ATTENDANCE

S Markham (Manager Strategic Projects), K Rabe (Governance Advisor) and E Stubbs (Governance Support Officer)

1 APOLOGIES

There were no apologies.

2 CONFLICTS OF INTEREST

There were no conflicts of interest declared.

3 CURRENT REGISTER OF INTERESTS

Moved: S Powell Seconded: J Archer

THAT the Woodend-Sefton Community Board:

(a) **Receives** the current Register of Interest.

CARRIED

4 CONFIRMATION MINUTES

4.1 Minutes of the Woodend-Sefton Community Board – 15 February 2022

Moved: J Archer Seconded: A Thompson

THAT the Woodend-Sefton Community Board:

(a) **Confirms,** as a true and accurate record, the circulated Minutes of the Woodend-Sefton Community Board meeting, held on 15 February 2022.

CARRIED

4.2 Matters Arising

There were no matters arising from the minutes.

5 DEPUTATIONS AND PRESENTATIONS FROM THE COMMUNITY

Nil.

6 ADJOURNED BUSINESS

Nil.

Unconfirmed

7 REPORTS

7.1 Approval of the Woodend-Sefton Community Board Plan 2020-2022– K Rabe (Governance Advisor)

S Powell noted she had provided several updates to be added in the plan such as the redevelopment of the Woodend Beach playground, developing the Waikuku Beach Spatial Plan and preparing for the Woodend – Pegasus Area Strategy.

J Archer requested the removal of the Sefton Domain Advisory Group and the Sefton Township River and Drainage Ratepayer District from his profile as he had not been contacted by these organisations to date. S Markham noted that J Archer was appointed by the Board as their official representatives to these organisations and they can therefore not just be removed from his profile. It was suggested that the organisations be marked at "currently inactive" until such time the Governance Team could verify if they still operate.

A Thompson sought clarity of the layout of the document, and K Rabe confirmed that formatting and layout would resolve when the document was put back into the design programme by the Admin Creative Team after editing was complete.

A Thompson commented that flooding was a focus area of the Board and queried whether it should be included in the Community Board Plan. P Redmond suggested where it could be included, as there was general agreement to adding drainage and flooding issues as a focus.

Moved: J Archer Seconded: A Thompson

THAT the Woodend-Sefton Community Board:

(a) **Receives** report No. 211220203074.

(b) **Approves** the updated Woodend-Sefton Community Board Plan 2020-2022 (Trim Ref: 220222023864).

(c) **Authorises** the Chairperson to approve the final version of the Woodend-Sefton Community Board Plan 2020-2022, if any further minor editorial corrections are required.

CARRIED

J Archer commented that the Community Board Plan was a good document.

8 CORRESPONDENCE

Nil.

9 CHAIRPERSON'S REPORT

9.1 Chairperson's Report for February 2022

Moved: S Powell Seconded: P Redmond

THAT the Woodend-Sefton Community Board:

(a) **Receives** report (Trim 2220308032751).

CARRIED

Unconfirmed

10 MATTERS FOR INFORMATION

10.1 Oxford-Ohoka Community Board Meeting Minutes 2 February 2021 (Trim 220208015336)

10.2 Rangiora-Ashley Community Board Meeting Minutes 9 February 2022 (Trim 2202090244)

10.3 Stockwater Race Bylaw 2022 – Request for Adoption – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

10.4 Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

10.5 Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

10.6 Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

10.7 Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

10.8 Wellbeing, Health and Safety Report February 2022 – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

10.9 Wastewater Treatment Plant Fencing Contract Completion – Report to Utilities and Roading Committee Meeting 22 February 2022 – Circulates to all Boards.

Moved: J Archer Seconded: S Stewart

THAT the Woodend-Sefton Community Board:

(a) **Receives** the information in Items 10.1 to 10.9

CARRIED

11 MEMBERS' INFORMATION EXCHANGE

P Redmond

∑ Creative Communities were seeking applications for their next round for funding. There was $86,000 to distribute which included carryover from previous years as there had been reduced applications due to Covid.

∑ Noted Pegasus had had 147 building consent applications in the 2021 year and Woodend (including Ravenswood) had 214, the fourth and third highest in the district respectively.

A Thompson

∑ Attended a meeting with the Council's Greenspace staff regarding the redevelopment plan for Waikuku Beach area. There had been a number of requests for activities, such as beach volleyball and pump track. The next step was a draft plan which would be brought back to the Board for input.

∑ Noted Council's ongoing work to guard against flooding, including surveying and stopbank repair.

M Paterson

∑ Attended site visit at Gladstone Park with the Council's Greenspace Community Assets Officer, Ed Sard, to view flooding issues. Some of the fields may not be useable for winter sport season.

∑ Noted concern raised by Woodend Beach residents regarding possible sewer overflow contamination. The Council had advised that private well owners needed to fund their own tests.

Unconfirmed

S Stewart

- Commented on ECan change to rating districts and asked whether the Board should support residents with concerns.
- There was a general discussion on issues related to recent flooding and climate change implications and the Council's role with repeat flooding of homes and equipment. It was acknowledged it was a problematic area which spanned several authorities. S Stewart encouraged the Board to request a briefing on the matter.

Moved: Allen Seconded: A Thompson

THAT the Woodend-Sefton Community Board:

(a) **Requests** a briefing in relation to flooding and drainage issues, especially in known flood risk areas within the Board area including, septic tank contamination and flooding at Gladstone Park.

CARRIED

12 CONSULTATION PROJECTS

12.1 Draft Annual Plan 2022/23

https://letstalk.waimakariri.govt.nz/draft-annual-plan-2022-23
Consultation closes 4 April 2022.

12.2 Migrant Experiences

https://letstalk.waimakariri.govt.nz/migrant-experiences

12.3 E-Scooters

https://letstalk.waimakariri.govt.nz/e-scooter-trial
Consultation will run throughout the trial and closes in April 2022.

S Markham provided an update on the Council submission to ECan's draft Annual Plan 2022/23, which was currently out for consultation. He would circulate slides of the Council's draft submission to the Mayor and Board Chairs for review. The draft submission would thereafter be submitted to the Council for input prior to the final submission going to the 5 April 2022 Council meeting for ratification. S Markham noted after reviewing the Council submission, the Board had the option to support the Council's submission or draft its own.

S Powell noted that she had sent a number of questions to ECan regarding their draft Annual Plan 2022/23, however had no reply to date. S Markham undertook to follow-up with ECan regarding replies to the questions.

13 BOARD FUNDING UPDATE

13.1 Board Discretionary Grant

Balance as at 28 February 2022: $5,480.

13.2 General Landscaping Fund

Balance as at 28 February 2022: $12,710.

The Board noted the funding update and the need to encourage groups to apply for grants before the end of the financial year. P Redmond asked if the discretionary funding would be carried over to the following financial year. K Rabe noted that usually discretionary and general landscaping funding would be carried over. However, if the carryover amounts remained high the Council may opt not reduce the Community Boards usual allocations

Unconfirmed

14 MEDIA ITEMS

Nil.

15 QUESTIONS UNDER STANDING ORDERS

Nil.

16 URGENT GENERAL BUSINESS UNDER STANDING ORDERS

Nil.

NEXT MEETING

The next meeting of the Woodend-Sefton Community Board will be held on Monday 11 April 2022 at 6pm.

Workshop
(6.50pm – 7.09pm)

- ∑ *Annual Plan Submissions*
  After reviewing the Council's submission to ECan's Annual Plan the Board may decide to support the Council or to submit on its own behalf depending on responses to questions asked.
  Items to be included in WDC Annual Plan submission:
  - o *Community Hub*
  - o *Stormwater and flooding upgrades in Kaiapoi*
  - o *Roading including rural gravel road safety and maintenance*
  - o *Gravel walkway between Pegasus and Woodend*
  - o *Timeframe for Pegasus Community Facility*

Members Forum

Update on Pegasus Lake and recent meeting with the Templeton Group

THERE BEING NO FURTHER BUSINESS THE MEETING CONCLUDED AT 7.09pm.

CONFIRMED

_____
Chairperson

_____
Date

Unconfirmed

MINUTES FOR THE MEETING OF THE KAIAPOI-TUAHIWI COMMUNITY BOARD HELD VIA ZOOM ON MONDAY 21 MARCH 2022 AT 5PM.

PRESENT

J Watson (Chairperson), N Atkinson, A Blackie, B Cairns and M Pinkham.

IN ATTENDANCE

P Redmond (Kaiapoi-Woodend Ward Councillor), S Stewart (Kaiapoi-Woodend Ward Councillor)

C Brown (Manager Community and Recreation), G MacLeod (Community Greenspace Manager), G Stephens (Design and Planning Team Leader), T Stableford (Landscape Architect), S Morrow (Rates Officer – Land Information), K Rabe (Governance Advisor) and C Fowler-Jenkins (Governance Support Officer).

1 APOLOGIES

Moved: N Atkinson Seconded: B Cairns

THAT apologies for absence be received and sustained from C Greengrass and J Meyer.

CARRIED

2 CONFLICTS OF INTEREST

Item 6.2 - B Cairns declared a conflict of interest as he was the current Chairperson o Kaiapoi Food Forrest Trust.

Item 6.3 J Watson declared a conflict of interest as she was the current Chairperson o Waimakariri Arts Trust.

3 CONFIRMATION OF MINUTES

3.1 Minutes of the Kaiapoi-Tuahiwi Community Board – 21 February 2022

Moved: J Watson Seconded: A Blackie

THAT the Kaiapoi-Tuahiwi Community Board:

(a) **Confirms** the circulated Minutes of the Kaiapoi-Tuahiwi Community Board meeting, held 21 February 2022, as a true and accurate record.

CARRIED

3.2 Matters Arising

Nil.

4 DEPUTATIONS AND PRESENTATIONS

Nil.

5 ADJOURNED BUSINESS

Nil.

Unconfirmed

6 REPORTS

6.1 Kaiapoi Riverbank Walkway and Memorial Reserve Update – V Thompson (Business and Centres Advisor), G MacLeod (Greenspace Manager) and H White (Intermediate Landscape Architect)

G MacLeod spoke to the report, noting that the Board held a workshop in February 2022 to discuss Draft Concept Plan. The Board indicated a preference for Option C, which was an extended version of Option B that was approved by the Board in November 2021. The Board had agreed to defer the project until a later date and submit a 2023/24 Long Term Plan request for the increased project budget.

J Watson noted the process seemed to be very straightforward and commented that it was good that Council staff listened to the fact the Board wanted to have the project deferred.

Moved: J Watson Seconded: B Cairns

THAT the Kaiapoi-Tuahiwi Community Board:

(a) **Receives** Report No. 220216020391.

(b) **Notes** that Draft Concept Plan – Option C was an extended version of Option B that was approved for further design by the Kaiapoi-Tuahiwi Community Board in November 2021.

(c) **Notes** that consultation had taken place with the Kaiapoi Returned Services Association on Option C and Executive Committee members were largely supportive of the plan and proposed changes.

(d) **Notes** that Option C (which includes extension of the reserve into Raven Quay, resolved kerb heights along Raven Quay, new terraces and lighting treatments) required a total budget of around $271,000 (approximately $136,000 more than the original project budget of $135,000) if including the proposed lighting upgrades.

(e) **Notes** that the Kaiapoi-Tuahiwi Community Board had considered Option C at a workshop and the recommendations in this report result from feedback provided by attending Board members.

THAT the Council:

(f) **Recommends** that the 'Kaiapoi Riverbank Walkway and Memorial Reserve' project be deferred from 2021/22 until the 2023/24 Long Term Plan cycle and that Option C be submitted with a request for the full project budget at that time.

CARRIED

6.2 Kaiapoi Food Forest Structure Proposal – G MacLeod (Greenspace Manager)

G MacLeod advised that the Kaiapoi Food Forest had put forward a proposal to the Council's Greenspace Team to consider the installation of shelter at the food forest. He noted that the information received from the Council's Utilities and Roading Teams have indicated there could be significant costs in getting the toilet connected into a waste water system. The Trust would therefore be expected to pay Development Contribution associated with the instalment of the toilet. There were also some queries around the kind of toilet that would need and if a pump would be required.

Unconfirmed

J Watson noted the relationship between the food forest and the adjacent Church, and enquired if visitors to the food forest was still able to use the toilet facilities at the church. G MacLeod confirmed that the existing arrangement was that the people who went to the food forest could visit the church to utilise their facilities.

P Redmond sought confirmation that the Council had the authority to remit of waive Development Contributions bearing in mind the Council did own the site. G MacLeod commented that in the past Council had not been able to get the Development Contributions waived for some of the projects they had done. He would therefore have to enquire with the Councils Project Development Unit on this matter.

A Blackie asked if Council staff had considered a portaloo. G MacLeod noted it was not an option that Council staff had discussed with the Trust, however, it would be something Council staff could look into.

N Atkinson noted given that the Council was focusing on sustainability, hence it support of the food forest, should a composting toilet not be considered. B Cairns explained the working of a composting toilet which had to be emptied on a regular basis and could become quite messy to deal with.

M Pinkham noted his surprise that Development Contributions were being considered, as the properties had already been subject to Development Contributions when they were first developed, and he understood that Development Contributions were only paid when a new lot was created. G MacLeod explained that Development Contributions had to be paid because new services needed to be created which would be an addition to the current system,

Moved: A Blackie Seconded: N Atkinson

THAT the Kaiapoi-Tuahiwi Community Board:

(a) **Receives** Report No. 220310034922.

(b) **Approves** in principle the footprint of a shelter at the Kaiapoi Food Forest.

(c) **Notes** that staff would work with the Kaiapoi Food Forest Trust (the Trust) to obtain detailed costs for the project including the proposed toilet and the requirement that this may have for them to pay Development Contributions. This was to fully assess the risk of the Trust requiring contributions to this project and understand what their funding strategy was as well as how they intend to fund ongoing maintenance of the shelter.

(d) **Notes** that while staff support an education shelter, there remained risk and ongoing concern with the installation of a toilet at this location. Understanding the funding strategy and ongoing financial and operational risk was required prior to a toilet being approved.

(e) **Notes** a subsequent report would be required once funding was in place and final design has been submitted by the Kaiapoi Food Forest Trust for consideration.

(f) **Notes** that staff will work with the Kaiapoi Food Forest Trust to ensure that appropriate communication was sent out to the wider public should the shelter and toilet be supported by the Kaiapoi-Tuahiwi Community Board.

(g) **Notes** that the erection of the shelter as stated by the License to Occupy was the responsibility of the Kaiapoi Food Forest Trust and the Council had no liability or responsibility to the operation of the shelter, other than if it poses a

Unconfirmed

health and safety risk, which the Kaiapoi Food Forest Trust would be instructed to rectify or mitigate.

(h) **Notes** that there was public toilet provision located at the changing rooms on Norman Kirk Park within 300 metres of this proposal, hence a public toilet at this location would exceed Levels of Service.

(i) **Notes** that the shelter once built would be owned and maintained by the Kaiapoi Food Forest Trust.

CARRIED
(Abstained: B Cairns)

N Atkinson commended the work being done by the food forest and he believed that this would be a great investment for the community.

P Redmond noted that the proposed structure was not so large that it would dominate the site, he therefore supported the supported the installation of a shelter. He also thought that it would be advantageous to install a toilet for the educational groups.

6.3 **General Landscaping Budget – T Stableford (Landscape Architect)**

T Stableford spoke to the report, noting it was to provide further information on the potential projects to be considered for funding allocation from the Kaiapoi-Tuahiwi Community Board's General Landscaping Budget, as previously discussed with the Board. These projects were the insulation of a seat and planting at the Kaiapoi end of the Passchendaele walkway, the enhancement of the Kaiapoi Town Entrances, and finding a suitable location for a Raymond Herber Sculpture donated by the Waimakariri Arts Trust. She explained that the Kaiapoi Arts Trust had confirmed that they would prefer the Raymond Herber sculpture to be located in Kaiapoi, a suitable location was still being sought.

T Stableford also advised that the Kaiapoi Interpretive Signs project, for which the Board had previously approved $20,000 was nearing its completion, however, the project needed $300 more to complete the project.

N Atkinson questioned the $3,200 allocated for the insulation of a seat and planting at the Kaiapoi end of the Passchendaele walkway. He advised that the Royal New Zealand Returned and Services' Association (RSA) were already installing seats along the Passchendaele walkway. It was noted that the money could be allocated to additional planting along the Passchendaele walkway.

With regards to Kaiapoi Town Entrances, B Cairns expressed is dismay about the state of the façade of the overhead bridge on Smith Street and the lack of maintenance of the garden area at the off-ramp. C Brown undertook to discuss the Board's concerns about the state of the Smith Street bride area with Waka Kotahi.

Moved: J Watson Seconded: B Cairns

THAT the Kaiapoi-Tuahiwi Community Board:

(a) **Receives** Report No. 220310034611.

(b) **Notes** that the Board currently had $59,010 available in the 21/22 financial year General Landscaping Budget to allocate to projects within the Kaiapoi - Tuahiwi Ward.

Unconfirmed

(c) **Approves** the allocation of $45,810 towards the costs of upgrading the Kaiapoi Town Entrances from the Kaiapoi – Tuahiwi General Landscaping Budget.

(d) **Approves** the allocation of $10,000 towards the implementation of the Raymond Herber 'Wind swept tree Sculpture' from the Kaiapoi – Tuahiwi General Landscaping Budget.

(e) **Notes** that the Royal New Zealand Returned and Services' Association (RSA) had donated $1,000 towards the installation of a seat, planting and a tree at the Kaiapoi end of the Passchendaele Walkway.

(f) **Notes** that staff would work with the Passchendaele Trust and RSA to determine the exact location of this seat and planting.

(g) **Approves** the allocation of $3,200 towards the remaining costs of purchase and installation/planting of the seat, plants and tree for the Passchendaele Walkway from the Kaiapoi – Tuahiwi General Landscaping Budget.

(h) **Notes** that staff would work with the Board to determine designs for the Kaiapoi Town Entrances and implementation will occur in the 22/23 financial year.

(i) **Notes** that staff would work with the Board to determine an appropriate location for the Raymond Herber sculpture.

(j) **Notes** that the $75,810 allocated towards the Town Entrances Project will be carried forward to be used in the 22/23 financial year.

CARRIED
(Abstained: J Watson)

J Watson commented that all the projects were worthy of funding. She asked if the Board wanted to discuss a location for the Raymond Herber sculpture now and noted that Kairaki Beach had been suggested as a location.

B Cairns commented that he was in favour of making Kaiapoi more beautiful and this funding would assist the process. He suggested that the Raymond Herber sculpture should be in a prominent place, with virtually no background such as an area on the overhead bridge. This would make a visual impact when people travelled into Christchurch.

N Atkinson expressed his pleasure that the Raymond Herber sculpture was to be installed in Kaiapoi. However, he did not agree with it being located near the motorway as it could distract motorists and Waka Kotahi did not like installing unnecessary structures on the side of the motorway. He thought that a good location for the sculpture may be the a vacant piece of grass near the Rivertown Villas.

6.4 **Road Naming – Lime Developments Limited – S Morrow (Rates Officer – Property Specialist)**

S Morrow noted that the Board's approval was being sought for two new street names in the Silverstream development in Kaiapoi. The land had been developed was known as 56 Adderley Terrace and the developer had chosen two names from the Pre-approved Road Naming List for Kaiapoi.

J Watson stated that was another name on the Pre-approved Road Naming List that may be more appropriate for this area of Kaiapoi, such as Waverly which was the

Unconfirmed

name of farm on the corner of Mill and Island Roads. . S Morrow reiterated that the named had been the developer's choice.

N Atkinson noted in the report stated that Manu Whenua had an interest in the subject matter of this report. He questioned if Council staff had provide the Rūnanga with the opportunity to supply names for inclusion in the Pre-approved Road Naming List for Kaiapoi. S Morrow advised that usually the Rūnanga would only be consulted if a developer had suggested cultural sensitive names. He noted that the Council's Governance Team were now managing the lists on behalf of the Community Boards and it was something that they could look at in future.

M Pinkham commented that the Board had previously approved the name Silverstream Boulevard to about Lot 90 in the previous stage of the Silverstream development. He recommended that the Board may need to approve the extension of Silverstream Boulevard further to the east up to Lot 180 of stage 8a, otherwise the new road would not intersect with another road. S Morrow noted that would need to be named as a part of stage 8a.

Moved: J Watson Seconded: B Cairns

THAT the Kaiapoi-Tuahiwi Community Board:

(a) **Receives** Report No. 220310034909.

(b) **Approves** the following proposed road names for Roads 1 and 2 of Silverstream Stage 8a as shown on the attached plan.
1. Bastings Street
2. Waverly Street

(c) **Approves** the extension of Silverstream Boulevard to where it joined Snead Street.

(d) **Notes***:* That the Community Board may replace any proposed names with a name of its choice.

CARRIED

6.5 **Application to the Kaiapoi-Tuahiwi Community Board's 2021/22 Discretionary Grant Fund – K Rabe (Governance Advisor)**

K Rabe advised she had warned the Clarkville Playcentre that their application may not be successful as the Board had previously declined a similar application from them. However, the Playcentre had insisted that the application be resubmitted to the Board without the inclusion of ground cover (bark) which could be considered a maintenance item.

Moved: A Blackie Seconded: J Watson

THAT the Kaiapoi-Tuahiwi Community Board:

(a) **Receives** report No. 220307031635.

(b) **Declines** the application from the Clarkville Playcentre.

CARRIED

J Watson commented that the Board's previous reasons for not previously granting funding to the Clarkville Playcentre were still valid, as the application was fundamentally the same. A Blackie concurred, noting that the ground cover (bark) was not the reason the funding was previously declined.

Unconfirmed

6.6 **Approval of the Kaiapoi-Tuahiwi Community Board Plan 2020-2022 – K Rabe (Governance Advisor)**

K Rabe advised that Community Board Plans were updated annually so they would remain current and useful as a document that highlighted the work being done by the Board.

Moved: J Watson Seconded: N Atkinson

THAT the Kaiapoi-Tuahiwi Community Board:

(a) **Receives** report No. 220222023877.

(b) **Approves** the updated Kaiapoi-Tuahiwi Community Board Plan 2020-2022 (Trim Ref: 220303030000).

(c) **Authorises** the Chairperson to approve the final version of the Kaiapoi-Tuahiwi Community Board Plan 2020-2022, if any further minor editorial corrections were required.

CARRIED

7 CORRESPONDENCE

Nil.

8 CHAIRPERSON'S REPORT

8.1 **Chairperson's Report for February 2022**

- ∑ Youth Development Grant Committee Meeting – One application was received for funding but was declined.
- ∑ New exhibition at Art on the Quay.
- ∑ Waimakariri Arts Trust meeting organising the Kaiapoi Arts Expo.
- ∑ Waimakariri Public Arts Trust meeting – Raymond Herber sculpture.

Moved: J Watson Moved: A Blackie

THAT the Kaiapoi-Tuahiwi Community Board:

(a) **Receives** the verbal report from the Kaiapoi-Tuahiwi Community Board Chairperson.

9 MATTERS REFERRED FOR INFORMATION

9.1 Oxford-Ohoka Community Board Meeting Minutes 2 February 2022 (Trim 220208015336)

9.2 Rangiora-Ashley Community Board Meeting Minutes 9 February 2022 (Trim 2202090244)

9.3 Woodend-Sefton Community Board Meeting Minutes 15 February 2022 (Trim 220218022525)

9.4 Stockwater Race Bylaw 2022 – Request for Adoption – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

Unconfirmed

9.5 Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

9.6 Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

9.7 Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

9.8 Chairpersons Report for the Period January – December 2021 – Report to Council Meeting 1 February 2021 – Circulates to all Boards.

9.9 Wellbeing, Health and Safety Report February 2022 – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

9.10 Kaiapoi Stormwater and Flooding Improvements – Funding of Additional Budget – Report to Council Annual Plan Meeting 2 February 2022 – Circulates to the Kaiapoi-Tuahiwi Community Board.

9.11 Kaiapoi Community Hub – 2022/23 Annual Plan Budget Submission – Report to Council Annual Plan Meeting 2 February 2022 – Circulates to the Kaiapoi-Tuahiwi Community Board.

9.12 Wastewater Treatment Plant Fencing Contract Completion – Report to Utilities and Roading Committee Meeting 22 February 2022 – Circulates to all Boards.

PUBLIC EXCLUDED REPORTS

9.13 Rangiora BNZ Corner Site (70 and 74 High Street) – Divestment Evaluation Panel – Report to Council Meeting 1 February 2022 – Circulates to all Boards.

Moved: J Watson Seconded: B Cairns

THAT the Kaiapoi-Tuahiwi Community Board

(a) **Receives** the information in Items 9.1 to 9.12.

(b) **Receives** the public excluded information in item 9.13, which would remain in public excluded and which was circulated separately.

CARRIED

10 MEMBERS' INFORMATION EXCHANGE

M Pinkham

- Attended Community Wellbeing North Canterbury Trust Meeting – main topic was review of current programmes.
- Attended a Waimakariri District Council Briefing on water quality matters in Kaiapoi and Woodend.
- Attended a Kaiapoi Promotions Association Meeting – Primary topic was a draft programme for spring and summer.
- Attended a Community Wellbeing North Canterbury Trust Audit and Finance Meeting – Main focus of meeting was review of the budget and the recent awarding of additional support programmes from the Canterbury District Health Board.
- Prepared written comments for the Kaiapoi-Tuahiwi Community Board submissions to the Waimakariri District Councils and Environment Canterbury's Annual Plans.

Unconfirmed

A Blackie

- ∑ Indigenous Planting Portfolio – one of the two bridges in the west end of Silverstream was approaching the project with the planning and the funding.
- ∑ The Waimakariri Public Arts Trust had approved a mural by a local artist on the toilet walls in Oxford.
- ∑ The restoration of the Pou at the gateway to Pegasus were finished.
- ∑ Bleachers had been installed at the softball diamond in Kaiapoi.
- ∑ A Shack at Pines Beach had been demolished as part of the forestry work and locals were unimpressed.
- ∑ Pegasus Bay Bylaw Committee – the Tua Tua problem on the beach had reemerged and a group of Auckland University students were going to be doing a study on the Tua Tua.
- ∑ The data from the observation Council ran at the Kairaki car park, there were 40,000 cars a year using the car park and of those 25% were going pat the car park onto the beach.

N Atkinson

- ∑ On Facebook there was a post that Frisbee golf it was coming to Kaiapoi. He had been working with G Stephens to look at whether it could go into the domain or not because he could hopefully get it funded.

S Stewart

- ∑ Arohatia Te Awa was progressing.
  - o Council had applied to Land Information New Zealand (LINZ) some old deeds to land on the corner of the Revells Road Bridge.
  - o Working to finalize access along the last property (211 Lower Camside Road, Kaiapoi).
  - o There were 6,000 plants to plant and Environment Canterbury had just donated an additional 10,000 plants.
- ∑ There had been 598 service requests for drainage and flood relief following the May, December and February storms. Fifth-nine of those required detailed assessment and of those Kaiapoi was at the top of the list.

B Cairns

- ∑ Annual Plan Submission Zoom.
- ∑ Neighborhood Support North Canterbury – over 1,000 new signups on the website and Gets Ready in eight months.
- ∑ Food Forest update.
  - o Multiple visits from groups from as far as Timaru.
  - o Scout groups had grown winter vegetable seedlings to plant out.
  - o Major increase on numbers visiting on Wednesdays for the major food drop along with casual visits throughout the week.
  - o Been invited to be a part of a Matariki event at the library.
  - o An email from a recent group visit:
    - Checking this marvelous community effort yesterday for a group of elderly ladies to visit, not sure if any toilet facility? Perhaps even a portaloo would be nice for the rest of the summer.
- ∑ Local businesses – many were struggling with having to close for at least one day a week due to staff and covid.
- ∑ Food Secure North Canterbury – attended monthly meeting, in Canterbury they were working now with 21 food forests that were at various stages of development from Hanmer Springs to Timaru.

Unconfirmed

- ∑ Art on the Quay – March Exhibition.
- ∑ Attended a Three Waters Briefing.
- ∑ Attended an All Boards Briefing.
- ∑ Rivertown Café – Michael Hempseed presented about resilience.

P Redmond

- ∑ Housing Working Group - Approved interim report to Council which included a very comprehensive list of recommendations for the way forward. It was noted that the Waimakariri District has 116 elderly persons units with 55 on waiting list. It was a small numbers, but there was high growth in list recently.
- ∑ Met with residents regarding flooding issues in Kaiapoi, which the Shovel Ready projects were expected to alleviate.
- ∑ Local Government Weekly Zoom meetings regarding the Future for Local Government - Focus now seemed to be on local governance and relationship with Central Government, democracy – roles and functions, treaty partnerships, leadership and elected members role fiscal sustainability and funding.
- ∑ Waimakariri Public Arts Trust Sip and Sculpture – Local artists at very successful event.
- ∑ Draft Annual Plan meeting – Draft Annual Plan approved for consultation which would close on April 4 2022.
- ∑ Rural and Provincial half day Zoom meeting - LGNZ Three Waters Working Group. They were tweaking existing model and not considering alternative models. Reporting to Minister on 7 March 2022.
- ∑ Compass FM Interview - Creative Communities Waimakariri applications being sought for new funding round.
- ∑ Zone 5 and 6 - Updates with no chat function.
- ∑ ECan Draft Annual Plan – Councillors Grant Edge and Clare McKay presented.
- ∑ Portfolio Update.
  - o Building consents in February 2022 remain high, up on 2021. Building Unit under pressure but coping reasonably well. Approaching 2012-14 levels. In 2021 highest number of consents in Woodend (214) followed by Kaiapoi (194) and Rangiora (161). Pegasus 147.
  - o Road to Zero Campaign launched by Waka Kotahi. Zero deaths and serious injuries by 2050, and 40% reduction by 2030. Suspicion prioritising speed reductions ahead of other options.

11 CONSULTATION PROJECTS

11.1 **Draft Annual Plan 2022/23**

https://letstalk.waimakariri.govt.nz/draft-annual-plan-2022-23
Consultation closes Monday 4 April

11.2 Migrant Experiences

https://letstalk.waimakariri.govt.nz/migrant-experiences

11.3 E-Scooters

https://letstalk.waimakariri.govt.nz/e-scooter-trial
Consultation runs throughout trial and closes in April 2022.

The Board noted the projects out for public consultation.

Unconfirmed

12 REGENERATION PROJECTS

12.1 Town Centre, Kaiapoi

Updates on the Kaiapoi Town Centre projects are emailed regularly to Board members. These updates can be accessed using the link below: http://www.waimakariri.govt.nz/your-council/district-development/kaiapoi-town-centre.

The Board noted the regeneration projects.

13 BOARD FUNDING UPDATE

13.1 Board Discretionary Grant

Balance as at 15 March 2022: $3,627.

13.2 General Landscaping Budget

Balance as at 15 March 2022: $25,430.

The Board noted the funding update.

14 MEDIA ITEMS

Nil.

15 QUESTIONS UNDER STANDING ORDERS

Nil.

16 URGENT GENERAL BUSINESS UNDER STANDING ORDERS

Nil.

NEXT MEETING

The next meeting of the Kaiapoi-Tuahiwi Community Board would be held on Monday 11 April 2022 at 5pm.

THERE BEING NO FURTHER BUSINESS THE MEETING CONCLUDED AT 6.18pm.

CONFIRMED

_____
Chairperson

_____
Date

Unconfirmed

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR DECISION

FILE NO and TRIM NO:	GOV-01-05, FIN-01 / 220218022320
REPORT TO:	Audit & Risk Committee
DATE OF MEETING:	15 March 2022
AUTHOR(S):	Jeff Millward, Manager Finance & Business Support
SUBJECT:	Te Kòhaka ò Tuhaitara Trust - Statement of Intent for the Year ending 30 June 2023

SIGNED BY: (for Reports to Council, Committees or Boards)

Department Manager | pp Chief Executive

1. SUMMARY

1.1. The purpose of this report is to present the Statement of Intent (SOI) for Te Kòhaka ò Tuhaitara Trust (TKTT) for the year ending 30 June 2023 for consideration by the Audit and Risk Committee.

1.2. Under its delegation the Audit and Risk Committee considers the SOI and provides any comments that it wishes the Trustees to consider in the SOI and any other information in relation to the CCOs.

1.3. TKTT is required to consider the comments from Shareholders (Council & Ngai Tahu) within two months of the 1 March and deliver the completed SOI to the Shareholders on or before 30 June each year. The SOI was received from TKTT on the 16 February 2022.

1.4. Greg Byrnes (General Manager) will be in attendance at the meeting to provide a presentation & speak to the report.

Attachments:

i. Draft Statement of Intent for Te Kòhaka ò Tuhaitara Trust for the year ending 30 June 2023 (TRIM 220218022352)
ii. Extracts from Schedule 8 Local Government Act 2002

2. RECOMMENDATION

THAT the Audit & Risk Committee:

(a) **Receives** report Nº 220218022320.

(b) **Receives** the Statement of Intent for Te Kòhaka ò Tuhaitara Trust for the year ending 30 June 2023 (TRIM 220218022352)

(c) **Notes** that under the Local Government Act 2002, the Audit and Risk Committee may request Te Kòhaka ò Tuhaitara Trust to make changes to the Statement of

Intent. Te Kòhaka ò Tuhaitara Trust would consider these changes requested and re-present the Statement of Intent prior to the 30 June.

3. BACKGROUND

3.1. TKTT is a Council Controlled Organisations (CCOs) as determined under the Local Government Act (LGA), as the Council appoints 50% or more of the Trustees.

3.2. Under section 64 of the LGA, the CCO must have a Statement of Intent that complies with clauses 9 and 10 of Schedule 8, provided in section 7.2 of this report.

3.3. One of the principal objectives of a control-controlled organisation is to achieve the objectives of its shareholder Council, as specified in the Statement of Intent.

4. ISSUES AND OPTIONS

4.1. The Trust provided the draft SOI for comment and a business case to support the Strategic direction of TKTT that encompasses Kairaki, Pines Beach and the Eastern and Western Conservation Management areas.

4.2. The purpose of a SOI is to:

(a) state publicly the activities and intentions of a council-controlled organisationfor the year and the objectives to which those activities will contribute; and

(b) provide an opportunity for Council, being a shareholder, to influence the direction of the organisation; and

(c) provide a basis for the accountability of the directors to their shareholders for the performance of the organisation.

4.3. The following changes are recommended to the draft SOI from the 2021/22 SOI which are:

Objectives and performance targets 2022 - 2023 Huria reserve	
Add Item 17	Complete the installation of the pathway network
Add Item 18	Plant 20,000m2 forest wetland species
Add Item 19	Design and install main entry
Add Item 20	Order plants for 2023 spring and autumn planting

4.4. The Audit and Risk committee have the option to:

4.4.1. Accept the SOI as presented;

4.4.2. Request TKTT to consider amending the SOI, in which case TKKT would consider these changes and is required to under the Act to represent the SOI to Council prior to 30 June;

4.5. The Management Team has reviewed this report and supports the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Not specifically sought, however the Statement of Intent is provided by the Trust to Te Runanga o Ngāi Tahu who is the other settlor.

5.2. Groups and Organisations

There are groups and organisations likely to have an interest in the subject matter of this report and the Trust engage directly with these entities in relation to the services provided and work programme.

5.3. Wider Community

The objectives and measures are reported within annual plans and the draft LTP/Annual Plans to be adopted in June and are reported to within the Annual Report.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

The Council has budget provision in the 2022/23 Annual Plan totalling $246,793 which is a 2.9% increase on 2021/22 consisting of:

Activity	2021/22 Budget	2022/23 Budget
Operating Grant, including audit fees (140.100.2410)	199,903	205,873
Directors insurance (135.332.2312)	5,700	5,860
Meeting fees (135.332.2465)	2,880	2,960
Lease – Camp (163.739.2391)	10,700	11,010
Lease – Forestry (167.532.2332)	20,500	21,090
Total	239,683	246,793

The Council also provides for the accounting, payroll and administrative services for the Trust. Included in the above is audit fees, rates and software costs that are paid directly on behalf of the Trust.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do have sustainability and/or climate change impacts. The work that TKTT undertake directly impacts positively.

6.3. Risk Management

The Key Assumptions and Risks determined within the LTP have been used as the underlying basis in preparation of the AP.

7. CONTEXT

7.1. Consistency with Policy

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. Authorising Legislation

Local Government Act specifies the requirements of a Council Controlled Organisation (CCO) accountability and reporting to the Council. Key extracts are provided in Attachment 2 from Schedule 8 of the Local Government Act 2002:

7.3. Consistency with Community Outcomes

The work of Te Kohaka o Tuhaitara Trust contributes to the outcomes and are provided within the Council's annual plan that:

- Public spaces and facilities are plentiful, accessible and high quality;
- There are wide ranging activities for enjoying the outdoors;
- Public Organisations give effect to the spirit of the Treaty of Waitangi;
- The community's cultures, arts and heritage are conserved and celebrated;
- People have a wide ranging opportunities for learning and being informed;
- People are friendly and caring, creating a strong sense of community in our district;
- There are wide ranging opportunities for people to contribute to the decision-making by public organisations that affects our District.

7.4. Delegations

The Audit and Risk Committee has the jurisdiction to "review annually draft performance agreements, including Statement of Corporate Intent of the Council-controlled organisations and recommend adoption to Council" (Delegation S-DM 1022).

Jeff Millward
Manager Finance & Business Support

Te Kōhaka o Tūhaitara Trust

Attachment 1

DRAFT STATEMENT OF INTENT

FOR THE YEAR ENDING 30 JUNE 2023

INTRODUCTION

Te Kōhaka o Tūhaitara Trust is a creation of Statute under the Ngāi Tahu (Tūtaepatu Lagoon Vesting) Act 1998, that gave effect to certain provisions of the Deed of 'On Account Settlement', signed on 14 June 1996 by the Crown and Te Runanga o Ngāi Tahu as representative of Ngāi Tahu, -

(a) By vesting Tūtaepatu Reserve in Te Runanga o Ngāi Tahu; and

(b) By providing for the establishment of a recreation reserve at Woodend.

Tūtaepatu Lagoon is defined in Schedule 1 of the Act; and the recreational lands are defined in schedule 2 of the Act.

The Act required the Waimakariri District Council and Te Runanga o Ngāi Tahu (The Settlors) to establish a Trust to manage and administer the reserves. By a Deed, dated 31 August 1998, the Settlors established a charitable Trust known as Te Kōhaka o Tūhaitara Trust, whereby the trustees shall be three appointed by the Waimakariri District Council and three from Te Runanga o Ngāi Tahu. The Ngāi Tahu (Tūtaepatu Lagoon Vesting) Act 1998 provides the legal mechanism for this to be achieved.

Te Kōhaka o Tūhaitara Trust is a Council Controlled Organisation (CCO) under the Local Government Act 2002, because the Council appoints half of the trustees.

Accordingly, the Trust must prepare an annual Statement of Intent and meet certain reporting requirements under the Local Government Act.

The purpose of the Statement of Intent is to specify the purpose, direction and objectives of the Trust and thereby providing an accountability mechanism for the operation of the Trust.

THE OBJECTS OF THE TRUST

The object of the Trust is to manage and administer the Reserve under the management plan prepared in accordance with the Trust Deed for so long as the Reserve is classified as a Recreation Reserve pursuant to the Reserves Act.

NATURE AND SCOPE OF ACTIVITIES

Tūhaitara Coastal Park covers approximately 575ha of land along the coastline from the Waimakariri River mouth to Waikuku Township. Stretching along the coast for 10.5 kilometres it comprises many natural features of local, regional and national importance to the people of New Zealand. As a coastal park it will provide a range of opportunities to preserve Ngāi Tahu values, retain and enhance biodiversity, and provide recreational and educational opportunities for all people.

The Minister of Conservation has appointed the Trust as a local authority for the purpose of the Reserves Act 1977.

The Trust has commenced implementation of the adopted Management Plan.

The Reserves Act does not apply to the Tūtaepatu Lagoon, although the Tūhaitara Coastal Park and Waikuku Beach Reserves Management Plan does. Part B Waikuku Beach Reserve, which

is administered by the Waimakariri District Council, is a separate Reserve but is also subject to the Reserve Management Plan as the land is contiguous.

GOVERNANCE ARRANGEMENTS

The Trust's policies and objectives are detailed in the Tūhaitara Coastal Reserve Management Plan. The Statement of Intent is the Trust's annual work programme aimed at meeting the vision

> *To create a coastal reserve which is founded on and expresses strong ecological, conservation and cultural values and provides opportunity for compatible recreation and education activities for all people of New Zealand and to uphold the mana of Ngai Tahu Whanui by protecting and enhancing the mahinga kai values of Tūtaepatu lagoon.*

The Trust is required to meet at least twice per year to provide governance over the Trust's activities, and copies of minutes are distributed to the Settlors. The Trust meets monthly to ensure that the expectations required by the management plan are realised.

All staff, volunteer and contractors working in the Tūhaitara Coastal Park are required to comply with the Te Kōhaka o Tūhaitara Trust Coastal Park Health and Safety Plan.

OBJECTIVES AND PERFORMANCE TARGETS 2022 -2023

All of the listed performance targets will be prioritised and evaluated with consideration to the success in obtaining external funding and the needs of our adjoining communities.

The Trust will:

1. Manage and administer the Reserve in accordance with the approved Reserve Management Plan.
2. Ensure all reporting mechanisms to the Settlors are timely and within their statutory timeframes.
3. Ensure that the health and safety and employment conditions of Trust staff, contractors, and visitors meet relevant legislation.
4. Ensure concessions for events and other activities on Trust land will have Health and Safety Plans and Public Liability Insurance. (Note: Concessions are not just for events, but can be for ice cream vehicles, coffee vehicles, and research activities; they are a mechanism to control all activities.)
5. Ensure that lease agreements are compatible with the Reserve Management Plan and finalised where necessary to maximise the revenue potential for the Trust.
6. Promote the cultural significance and history of the land. and ensure this is reflected in new programmes.
7. Maximise the opportunities for additional partnerships and sustainable funding to continue with the rehabilitation of Tūhaitara Coastal Park.
8. Develop two performing biota nodes to progress the long-term goal of indigenous coastal forest along the length of the Tūhaitara Park.
9. Continue the rehabilitation of Tūhaitara Coastal Park.
10. Ensure that access and maintenance programmes are in line with strategic plans
11. and priorities and that they are appropriately resourced.
12. Ensure all work programmes and maintenance activities are consistent with the Park's cultural, biodiversity, ecological, and recreation values.
13. Provide and maintain a minimum 20 kilometres of walking, cycling, and bridle trails within the park for recreational purposes.
14. Finalise plans for the development of a new Trust office/education facility

15. Develop two additional foredune restoration sites
16. Commence the leasing of the Kairaki Beach fee simple sections.

OBJECTIVES AND PERFORMANCE TARGETS 2022 -2023 HURIA RESERVE

17. Complete the installation of the pathway network
18. Plant 20,000m^2 forest wetland species
19. Design and install main entry
20. Order plants for 2023 spring and autumn planting.

INFORMATION TO BE PROVIDED TO THE SETTLORS

The Trust shall present:

- A six monthly report on the Trust's activities shall be provided, in accordance with the Local Government Act 2002, on the financial performance and position and its progress towards the Performance Targets and other Measures contained in the Statement of Intent.
- An Annual Report shall be prepared in accordance with the Local Government Act 2002, and the reporting requirements prescribed from time to time by the Settlors.
- Copies of the minutes of meetings.
- The MOU between the Trust and the WDC sets out the partnership and requirements
- Ngāi Tahu have informed the Trust that it should report directly to Ngāi Tūahuriri Runanga which will be done quarterly

OTHER REQUIREMENTS

Ratio of Trustee Funds to Total Assets

The ratio of Trust Funds to Total Assets shall be maintained at a minimum of least 90%.

Trust Funds means the Trust equity of the trust as at balance date.

Total Assets means all current and non-current assets of the Trust as at balance date.

Profits and Financial Reserves to be Distributed

The Trust will not distribute any profits or financial reserves during the financial year.

Interests in Other Organisations

The Trust will not purchase or accept an ownership interest in any other organisation, without the prior approval of the Settlors.

Commercial Value of the Trust

The Trustees' estimate of the value of the Trust is the level of Trust equity shown in the latest audited financial statements. The Trustees will consider the Trust's value annually as part of the preparation of the Annual Report.

Activities the Trust is Seeking Compensation from the Council

The Council provides administrative support and financial management for the Trust and compensates the three Council appointed trustees with meeting allowances.

From time to time the Trust may request the Council to assist the Trust by contributing to various projects on the Trust land. Other than in these circumstances, there are no activities that the Trust is seeking compensation from the Council, other than for any land leased to the Council, which will be on normal commercial terms and conditions.

Accounting Policies

Refer to Appendix 1

Appendix 1

STATEMENT OF ACCOUNTING POLICIES

REPORTING ENTITY AND STATUTORY BASE

Te Kōhaka o Tūhaitara Trust is a Trust established to manage and administer the Recreation Reserve contained in the deed of interest of Ngāi Tahu Whanau and other New Zealanders in terms of the Reserves Act 1977.

The financial statements will be prepared in accordance with New Zealand Generally Accepted Accounting Practice.

MEASUREMENT SYSTEM

The accounting principles recognised as appropriate for the measurement and reporting of financial performance and financial position on a historical cost basis are followed by the Trust.

ACCOUNTING POLICIES

The following specific accounting policies that materially affect the measurement of financial performance and financial position are applied:

(a) Fixed Assets

Fixed assets are recorded at valuation deemed appropriate at the time of transfer, by Quotable Value New Zealand. Valuation was based on a fair market value. Depreciation is recognised in the Statement of Financial Performance on a straight line basis over the estimated life of each part of an item of property, plant and equipment. The estimated useful life for the current and comparative periods are as follows:

Property, plant and equipment 3-40 years.

(b) Goods and Services Tax (GST)

The Trust is registered for GST. The financial statements are prepared exclusive of GST, with the exception of receivables and payables, whose invoices include GST.

(c) Receivables

Receivables are stated at expected realisable value, after a provision (if any) for doubtful balances.

(d) Reduced Disclosure Regime

The Trust qualifies for Reduced Disclosure Reporting. Full advantage will be taken of all Reduced Disclosure reporting exemptions.

CHANGES IN ACCOUNTING POLICIES

There have been no changes in accounting policies.

Attachment 2

1 Purpose of statement of intent

The purpose of a statement of intent is to—
(a) state publicly the activities and intentions of a council controlled organisation for the year and the objectives to which those activities will contribute; and
(b) provide an opportunity for shareholders to influence the direction of the organisation; and
(c) provide a basis for the accountability of the directors to their shareholders for the performance of the organisation.

2 Statements of intent for council-controlled organisations

The board of a council-controlled organisation must deliver to its shareholders a draft statement of intent on or before 1 March each year.

3 Completion of statements of intent

The board must—
(a) consider any comments on the draft statement of intent that are made to it within 2 months of 1 March by the shareholders or by any of them; and
(b) deliver the completed statement of intent to the shareholders on or before 30 June each year.

4 Modifications of statements of intent by board

The board may, by written notice, modify a statement of intent at any time if the board has first—
(a) given written notice to the shareholders of the proposed modification; and
(b) considered any comments made on the proposed modification by the shareholders or by any of them within—
(i) 1 month after the date on which the notice under paragraph (a) was given; or
(ii) any shorter period that the shareholders may agree.

5 Modifications of statements of intent by resolution of shareholders

(1) Despite any other provision of the Act or of the constitution of any council-controlled organisation, the shareholders of a council-controlled organisation may, by resolution, require the board to modify the statement of intent by including or omitting any provision or provisions of the kind referred to in clause 9(1)(a) to (i), and any board to whom notice of the resolution is given must comply with the resolution.
(2) Before giving notice of the resolution to the board, the shareholders must consult the board concerned as to the matters to be referred to in the notice.
6 Statement of intent required if exemption granted under section 7 revoked. If an exemption granted under section 7 is revoked, the council- controlled organisation must,—
(a) if there is more than 6 months remaining in the financial year, prepare a statement of intent for that financial year; or
(b) if there is not more than 6 months remaining in the financial year, prepare a statement of intent for the following financial year.

7 Obligation to make statements of intent available

A completed statement of intent and each modification that is adopted to a statement of intent must be made available to the public by the board within 1 month after the date on which it is delivered to the shareholders or adopted, as the case may be.

8 Savings of certain transactions
A failure by a council-controlled organisation to comply with any provision of this schedule or with any provision in a statement of intent does not affect the validity or enforceability of any deed, agreement, right, or obligation entered into, obtained, or incurred by that organisation.

9 Contents of statements of intent
A statement of intent must, to the extent that is appropriate given the organisational form of the council-controlled organisation, specify for the group comprising the council-controlled organisation and its subsidiaries (if any), and in respect of the financial year immediately following the financial year in which it is required by clause 3(b) to be delivered and each of the immediately following 2 financial years, the following information:
(a) the objectives of the group; and
(b) a statement of the board's approach to governance of the group; and
(c) the nature and scope of the activities to be undertaken by the group; and
(d) the ratio of consolidated shareholders' funds to total assets, and the definitions of those terms; and
(e) the accounting policies of the group; and
(f) the performance targets and other measures by which the performance of the group may be judged in relation to its objectives; and
(g) an estimate of the amount or proportion of accumulated profits and capital reserves that is intended to be distributed to the shareholders; and
(h) the kind of information to be provided to the shareholders by the group during the course of those financial years, including the information to be included in each half-yearly report (and, in particular, what prospective financial information is required and how it is to be presented); and
(i) the procedures to be followed before any member or the group subscribes for, purchases, or otherwise acquires shares in any company or other organisation; and from any local authority (whether or not the local authority has agreed to provide the compensation); and
(k) the board's estimate of the commercial value of the shareholders' investment in the group and the manner in which, and the times at which, that value is to be reassessed; and
(l) any other matters that are agreed by the shareholders and the board.
(2) If a council-controlled organisation has undertaken to obtain or has obtained compensation from its shareholders in respect of any activity, this undertaking or the amount of compensation obtained must be recorded in—
(a) the annual report of the council-controlled organisation; and
(b) the annual report of the local authority.
(3) Any financial information, including (but not limited to) forecast financial information, must be prepared in accordance with generally accepted accounting practice.

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO and TRIM NO:	DRA-16-03 / 220310034384
REPORT TO:	UTILITIES AND ROADING
DATE OF MEETING:	22 March 2022
AUTHOR(S):	Emile Klopper, Flood Team Lead Caroline Fahey, Water Operations Team Leader Kalley Simpson, 3 Waters Manager
SUBJECT:	February 2022 Flood Event - Update on Service Requests
ENDORSED BY: (for Reports to Council, Committees or Boards)	Department Manager / Chief Executive

1. SUMMARY

1.1 The purpose of this report is to update the Utilities & Roading Committee on the status of the drainage service requests received related to the significant rainfall events that occurred over the 29th to 31st May 2021, 15th December 2021 and 12th February 2022.

1.2 A total of 598 drainage service requests were received related to these rainfall events. All service requests have been responded to although some require further follow-up maintenance or investigation work as set out in this report.

1.3 A Flood Team has been established, comprising of two external consultants and 3 Waters staff with support from the Project Delivery unit. All service requests have been triaged and grouped into focus areas requiring further assessment. A total of 59 areas have been identified for further assessment, which is going to take a number of months to work through.

1.4 The focus of this report is on the February 2022 event, however ongoing investigation work is also covered from the May 2021 and December 2021 events which was previously identified in other reports (refer TRIM 210909144676 and 211223205713).

Attachments

i. Flood Team Prioritisation Methodology
ii. May 2021 Flood Event - Update on Service Requests (TRIM 210909144676)
iii. Response to December 2021 Flooding Event (TRIM 211223205713)

2. RECOMMENDATION

THAT the Utilities & Roading Committee:

(a) **Receives** report No. 220310034384.

(b) **Notes** that 598 drainage service requests were received related to the significant rainfall event in May 2021, December 2021 and February 2022, which have all been responded to although some require further maintenance or investigation work.

(c) **Notes** that there are currently 59 drainage assessments identified as set out in section 4.6 and this is likely to increase as the service requests are worked through.

(d) **Notes** that a webpage has been setup on the Council's website to provide updates on the status of drainage works underway and targeted information will be sent out to the Waikuku Beach and Kaiapoi communities.

(e) **Notes** that if further budgets are required for any capital works identified as part of the drainage assessment work, that these will be sought as part of the 2022/23 Annual Plan process.

(f) **Circulates** this report to the Council and the Community Boards for information.

3. BACKGROUND

3.1 The flood event that occurred on the 12th February occurred over an unusually wet period for February, when 200mm of rainfall occurred over a 2 week period in the eastern part of the District. This is approximately one third of the average annual rainfall. The previous 12 months have seen approximately 900mm of rainfall occur, which has only been exceeded twice in the last 20 years. The catchments in the District are currently very saturated and the groundwater levels are high, particularly in the coastal area.

3.2 The rainfall was higher in the coastal parts of the district (refer to Table 1 below). The critical duration of 24 hours meant that our larger drains (e.g.: Dudley Drain, Feldwick Drain and McIntosh Drain) and storage system were tested, however there were some more intense periods of rainfall that tested our piped systems and cause blockages at some locations.

Table 1 – Rainfall and Return Period 12th February 2022

Site	Total Rainfall	Return Period	Critical Duration	Rainfall For Critical Duration
Kaiapoi	98.4 mm	19 years, 0 months	24 Hours	94.6 mm
Woodend	107.8 mm	23 years, 1 months	24 Hours	101.4 mm
Rangiora	98.8 mm	13 years, 2 months	24 Hours	94.0 mm
Mandeville	68.6 mm	4 years, 1 months	24 Hours	64.2 mm
Summerhill	87.2 mm	5 years, 0 months	24 Hours	87.2 mm
Oxford	68.6 mm	2 years, 6 months	24 Hours	60.6 mm

3.3 Figure 1 below shows the total rainfall to have occurred in the previous 12 months. As mentioned above, the current total of over 900mm has only been previously exceeded twice in the last 20 years. It is expected that this figure will increase as we move into winter, which is typically a wetter time of the year in our District.

3.4 Figure 2 below shows the current groundwater levels in a monitoring bore M35/0143 to the west of Mandeville. When levels are above 10m below ground level the undercurrents are usually following in the District, which is currently occurring in the No.10 Road and Siena Place areas. It is expected that the undercurrents will continue to flow in the Mandeville area for at least the next two months.

3.5 Groundwater levels in the coastal area are also very high at the moment, which is impacting drainage systems, particularly soakage type systems, in Waikuku Beach, Pegasus, Woodend Beach and The Pines Beach.

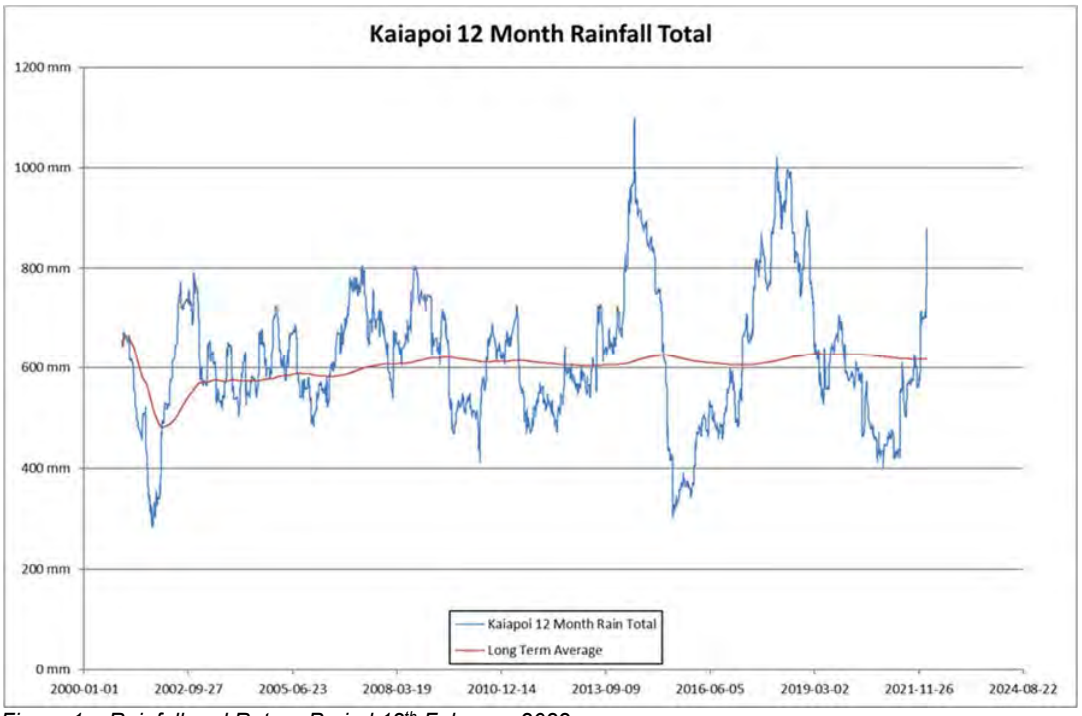


Figure 1 – Rainfall and Return Period 12th February 2022

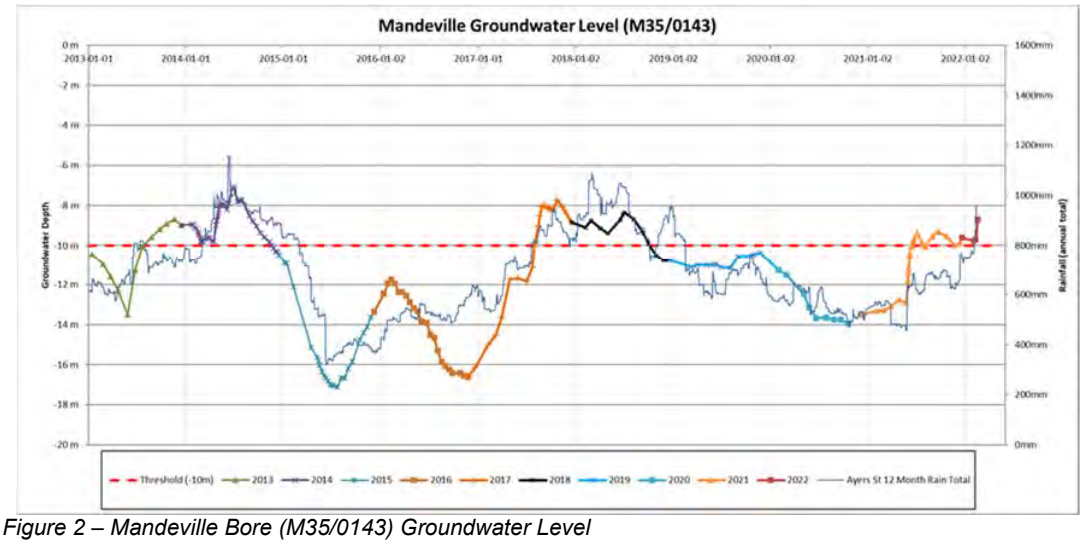


Figure 2 – Mandeville Bore (M35/0143) Groundwater Level

3.6 Analysis of the May 2021 Flood Event and December 2021 Flooding Event is included in previous reports (refer TRIM 210909144676 and TRIM 211223205713 respectively).

4. ISSUES AND OPTIONS

4.1. A total of 598 drainage service requests were received related to the three rainfall events. Typically Council receives about 800 drainage related services requests a year, so the 598 service requests therefore equates to approximately three quarters of a year's requests. Additionally the Drainage team is experiencing an increase in service requests, given the saturated catchments and high groundwater level currently being experienced. There has been nearly 1,500 drainage service requests logged in the past 12 months, which is close to double what we typically receive. This has created a backlog that has to be worked through.

4.2. As a result of this backlog, a Flood Team has been established to focus on the flood event related service requests. The Flood Team comprises of two external consultants, working 3 days per week, and 3 Waters staff with support from the Project Delivery Unit.

4.3. All service requests have been triaged and grouped into focus areas requiring further assessment. A total of 59 areas have been identified for further assessment (refer Section 4.6 below), which is going to take a number of months to work through.

4.4. The 598 service requests have been triaged using a prioritisation methodology (refer Attachment i), which has been workshopped with the 3 Waters team. This included looking at the frequency of service requests, impact on the local network, and economic, environmental and human risk factors, as well as community drivers, low hanging fruit type solutions and discretionary outlier factors.

4.5. The spread of the 59 investigations across the District is shown in Table 2 below.

Table 2 – Investigations across the District

Scheme		**Investigations – Focus Areas**
1	Rangiora Urban	3
2	Kaiapoi Urban	17
3	Coastal Urban - Woodend	3
4	Coastal Urban - Waikuku Beach	4
5	Coastal Urban - Pines Kairaki	3
6	Pegasus	1
7	Oxford Urban	5
8	Ohoka Rural	4
9	Loburn Lea	0
10	Oxford Rural	1
11	Clarkville Rural	0
12	Coastal Rural	4
13	Rural Central	1
14	Cust Rural	2
15	Ashworths Rural	0
16	District Drainage	9
17	Stockwater / Irrigation	0
18	Wastewater	2
Total		**59**

4.6. It is expected that it will take a number of months to address the backlog of service requests and work through the investigations identified. It is noted that all 598 service requests have been responded to or acknowledged, however further follow up is required for those service requests where investigation work is required.

Drainage Assessments

4.7. The following areas have already been identified for further investigation. Some of these investigations are already underway. It is noted that additional localised areas may be added to the list as the service requests are worked through.

Rangiora (3)

- Newnham Street
- Ivory Street
- Strachan Place

Kaiapoi (17)

- Beach Road – Underway
- Mansfield Drive – Underway
- Williams Street / Golf Course
- Williams / Dale Street
- Sovereign Boulevard – Underway
- Old North Road
- Bracebridge Street
- Kalmia Place
- Feldwick Drive / Feldwick Drain and PS – Underway
- Williams / Cass Street
- Cridland Street West
- Fuller Street – Underway
- Porter Place / Dudley Drain – Underway
- Wesley Street
- Hamel Lane
- Williams Street / Courtenay Drive – Underway
- Main North Road / Courtenay Stream – Underway

Woodend (3)

- Woodglen Drive
- Norton Place – Underway
- Rangiora Woodend Road

Waikuku Beach (4)

- Broadway Avenue – Underway
- Reserve Road
- Kiwi Avenue
- Swindells Road – Underway

Pines / Kairaki (3)

- Beach Road – Underway
- Batten Grove
- Featherstone Avenue

Pegasus (1)

- Pegasus Main Street

Oxford Urban (5)

- Kowhai Street
- Bay Road
- Queen Street
- Burnett Street
- High Street / Church Street – Underway

Ohoka Rural (4)

- Mill Road / Ohoka village
- Mill Road Ohoka Stream – Underway
- McHughs Road – Underway
- Wilson Drive

Oxford Rural (1)

- Victoria Street – Underway

Coastal Rural (4)

- Main North Road (SH1) / Waikuku village
- MacDonalds Lane
- Stalkers Road / Woodend Beach
- Main North Road (SH1) / North of Pineacres – Underway

Central Rural (1)

- Skewbridge Road

Cust Rural (2)

- Cust Road / Earlys Road – Underway

- 1838-1842 Cust Road

District Drainage (9)

- Taaffes Glen Road – Underway
- Toppings Road – Underway
- Smarts Road – Underway
- Steffens Road
- Depot Road – Underway
- Upper Sefton Road
- Dixons Road
- Hodgsons Road
- Mt Thomas Road – Underway

Wastewater (2)

- Ranui Mews – Underway
- Kairaki PS – Underway

4.8. Regular programme and progress updates will be reported to the Utilities and Roading Committee at future meetings as this work progresses.

4.9. As we move into winter, Council staff will closely monitor groundwater levels and track weather events, and will proactively mobilise contractors and deploy temporary pumps and sucker trucks if necessary. Where there are areas of specific concern staff will contact residents directly in advance of any events to advise them of what they can be doing.

Implications for Community Wellbeing

Some of the locations of flooding have had flooding in the past and some residents have had to make insurance claims for flood related damage. This has a potential implication on community wellbeing for these residents.

4.10. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are not likely to be directly affected by this work. However they will have an interest in any future proposed works that may have an impact on waterways and rivers. Staff will update the Runanga at the executive meetings and where relevant on specific projects engage with MKT.

5.2. Groups and Organisations

Community boards and drainage advisory groups will be updated on the investigation works and any specific future proposed works that come out of the assessment.

5.3. Wider Community

A dedicated webpage was been set up for the May 2021 event and has been recently updated, refer:

https://www.waimakariri.govt.nz/services/water-services/stormwater/drainage-works

A community meeting was held for Waikuku Beach residents on 6 July 2021, however not all investigation work has been completed in this area. It is planned to release a targeted update to the Waikuku Beach community, either via a local newsletter flyer or dedicated flyer.

Target consultation is also planned for the Kaiapoi Community via the Shovel Ready programme of works which will address most of the issues experienced in the Dudley Drain, Feldwick Drain and McIntosh Drain catchments.

Additionally proactive communications will be released for what Council is doing and what the community can do as we approach the winter season.

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

The costs associated with this investigation work will be charged to existing Drainage asset management and operations budgets. Any physical inspection work such as pipe maintenance and CCTV inspection work will be charged to the maintenance budget for the relevant Drainage scheme.

If further budgets are required for any capital works identified as part of the drainage assessment work, that these will be sought as part of the 2022/23 Annual Plan process.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do not have sustainability and/or climate change impacts.

6.3 Risk Management

There are no additional risks arising from the adoption/implementation of the recommendations in this report. The improvements implemented as a result of the drainage assessment identified will reduce the overall risk profile to Council and the community.

Health and Safety

The health and safety risks associated with undertaking this investigation work will be managed by standard Council processes.

7. CONTEXT

7.1. Consistency with Policy

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. Authorising Legislation

The Local Government Act 2002 sets out the power and responsibility of local authorities, including the Council's role in providing drainage services.

7.3. Consistency with Community Outcomes

The Council's community outcomes listed below are relevant to the actions arising from recommendations in this report.

- *There is a safe environment for all*
- *Core utility services are provided in a timely and sustainable manner*

7.4. Authorising Delegations

The Utilities and Roading Committee is responsible for activities related to Stormwater drainage.

Attachment i - Flood Team Prioritisation Methodology

As part of the prioritisation and/or triaging of the Service Requests (SR), we need to assign a weighting to the request. Some criteria was developed to aid in assigning said weight. The selected criteria aims to balance out the various factors affecting the SR. These criteria and a short description can be seen below.

1. Frequency of SR – 2/15

Various properties experienced some form of flooding during the flood events with subsequent SR's being logged. An assumption was made that certain properties and SR's should be prioritised above others should multiple SR's be logged at that particular property. That being said, it's worth noting that the scale of flooding and potential damage due to flooding doesn't necessarily correlate with the amount and/or frequency of logging a SR. As such the frequency category was allocated a weighting of 2/15.

When reviewing and analysing the frequency of SR's being reported/logged per property, the below was observed.

Frequency SR Logged	Properties	Weighting
1	421	0.5
2	47	1
3	9	1.5
4	2	2
5	1	2
Invalid Address	15	0
Total SR's Logged	570	

From the above table it can be seen that 421 properties logged 1 SR request, 47 logged 2 requests, 9 logged 3 SR's, 2 logged 4 SR's and 1 property logged 5 SR's. The above table also shows how the weighting distribution was split up. From the weighting distribution it can be seen that properties that had an "invalid address" received a "0" weighting. This is due to properties logging a SR without providing an adequate address cannot be prioritised above those that have as WDC staff will have no practical means to investigate the SR.

2. Impact on the local network – 3/15

If, upon further investigation, it becomes apparent that certain SR's would have a significant impact on the larger local network, these SR's need to be prioritised above others as they might indicate a larger problem. Scoring/weighting for the SR's impact on the local network will be done in the following manner:

Scenario	No of Properties Affected	Road Classification Affected	Weighting (x/3)
1	1	Private Roads	0/3
2	>1 and <7	Local Roads	1/3
3	>7 and <15	Collector Roads	2/3
4	>15	Arterial and Strategic Roads	3/3

3. Risk – 3/15

Risk was split up into three categories each with an equal weighting (see below). A simple yes or no answer was seen as sufficient for the purposes of prioritising the SR's.

- Economic Risk – 1/3
  - Does the SR relate to a flooding event which would cause economic damage such as damage to property?

- Human Risk – 1/3
  - Is there a risk to human and/or animal wellbeing?
- Environmental Risk – 1/3
  - Is there an environmental risk?

4. Community drivers – 1/15

Certain locations of flooding have more impact on and awareness among the wider community. Community drivers include locations where flooding issues have been elevated on social media or to elected members, or may involve locations where the community is particularly vulnerable (e.g.: elderly residents). This factor was included to prioritise issues where there is greater community concern in trying to resolve persistent flooding issues.

5. Low hanging fruit – 1/15

Low hanging fruit is defined as SR's that would, with relatively little effort, result in the issue to be resolved. Typical examples include rudimentary maintenance related works or even replacing damaged sumps and/or pipes.

6. Discretionary Outliers – 5/15

If during the investigation and triaging phase certain SR's are identified which, to the best of the Flood Team's professional opinion, has an increased need to resolve, an added 5 points to the prioritisation score can be applied. These discretionary outliers will, per definition, be the minority and should only be allocated for the odd SR that truly needs to be prioritised above all others. This criteria is also intended to act as a pathway to certain SR's that would otherwise fall by the wayside due to a low frequency of submission and other criteria being underrepresented.

Weightings for the above criteria were therefore as follows:

Frequency	2
Impact on local network	3
Risk	3
Community Drivers	1
Low Hanging Fruit	1
Discretionary Outlier	5
Total	15

ATTACHMENT II

WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO and TRIM NO:	DRA-16-03 / 210909144676
REPORT TO:	UTILITIES AND ROADING
DATE OF MEETING:	21 September 2021
AUTHOR(S):	Caroline Fahey, Water Operations Team Leader Kalley Simpson, 3 Waters Manager
SUBJECT:	May 2021 Flood Event - Update on Service Requests
ENDORSED BY: (for Reports to Council, Committees or Boards)	Department Manager / Chief Executive

1. SUMMARY

1.1 The purpose of this report is to update the Utilities & Roading Committee on the status of the drainage service requests received during or following the significant rainfall event that occurred over the weekend of 29th to 31st May 2021 and the following smaller event on 20th June 2021.

1.2 A total of 269 drainage service requests were received related to the rainfall events. All service requests have been responded to although some require further follow-up maintenance or investigation work as set out in this report.

1.3 The focus of this report is on the follow-up work required to address service requests that were lodged but not part of the response and emergency work undertaken which is covered in other reports (refer 210625103046 and 210817135255).

2. RECOMMENDATION

THAT the Utilities & Roading Committee:

(a) **Receives** report No. 210909144676.

(b) **Notes** that 269 drainage service requests were received related to the significant rainfall event in May 2021 and following smaller event in June 2021, which have all been responded to although some require further maintenance or investigation work.

(c) **Notes** that there are currently 13 drainage assessments identified as set out in section 4.3 and this is likely to increase as the service requests are worked through.

(d) **Notes** that a webpage has been setup on the Council's website to provide updates on the status of drainage works underway.

(e) **Notes** that if further budgets are required for any capital works identified as part of the drainage assessment work, that these will be sought as part of the 2022/23 Annual Plan process.

(f) **Circulates** this report to the Council for information.

3. BACKGROUND

3.1 The flood event that occurred over the weekend of 29th to 31st May 2021 was a significant rainfall event over a three-day period which resulted in damage to Council's infrastructure assets as outlined in the report presented to Council in July 2021 (refer 210625103046). A smaller scale rainfall event followed on 20th June 2021.

3.2 The rainfall was higher in the western parts of the district (refer Table 1 below) and was a longer duration event which had more of an impact on river flows, and infrastructure next to rivers, rather than our urban systems.

Table 1 – Rainfall Depths 29th-31st May 2021

Rainfall Totals				
	29 May (mm)	**30 May (mm)**	**31 May (mm)**	**Total (mm)**
Oxford	6	122.8	37.8	227.6
Rangiora	44.8	99.8	31.4	176
Mandeville	37	72.4	19.4	128.8
Kaiapoi	29.8	78.2	22.6	130.6
Woodend	36	71.2	34.8	142
Summerhill	54.5	105.2	30.8	190.6

3.3 The highest rainfall quantities in the Waimakariri District were recorded around the foothills of Oxford and Okuku, with coastal areas showing lower-level rainfall levels. Coastal areas however were affected by swollen river levels and high tides, causing backflow of flood water into lower lying areas.

4. ISSUES AND OPTIONS

4.1. A total of 269 drainage service requests were received related to the rainfall events. Typically Council receives about 800 drainage related services requests a year, so the 269 service requests equates to approximately one third of a year's requests received over a short period of time. This has created backlog that has to be worked through.

4.2. The 269 service requests have been classified into one of the following categories:

4.2.1. **Maintenance Undertaken** (21) – This relates to either clearing a blockage or maintaining a drain. This may have been undertaken during the event (e.g., typically clearing of blocked sumps) or over the following weeks post event (e.g., programmed drain maintenance).

4.2.2. **Maintenance Proposed** (120) – This relates to areas that require more assessment to confirm no maintenance is required or areas where more substantial maintenance works is required (e.g., cleaning of Mounsey Stream), which will require more planning.

4.2.3. **Signs Erected** (12) – This relates to requests where the only works requested or undertaken was to erect flooding signs.

4.2.4. **Advice Provided** (19) – This relates to either advice being provided on a private drainage issue or the status of our system (e.g., confirming that the water race system had been shut down).

4.2.5. **Drainage Assessment** (80) – This relates to service requests where further investigation and assessment is required to determine if there is an underlying issue with the drainage system. These areas are discussed further below.

4.2.6. **Roading Investigation** (15) – This relates to service requests where water is running off the road onto private property or roading infrastructure may not be operating adequately (e.g., soak pits).

4.2.7. **Subdivision related** (2) – This relates to drainage issues in development areas that are more to do with compliance (e.g.: erosion and sediment control).

4.3. It is noted that all 269 service requests have been responded to or acknowledged and closed off.

Drainage Assessments

4.4. The following areas have already been identified for further investigation. It is noted additional localised areas will be added to the list as the service requests are worked through.

Kaiapoi

- Kiln Place – Blue Skies Pipeline Investigation (Complete)
- Kaikanui Stream – Capacity Assessment (Underway)
- Cridland Street West – Pipeline condition and capacity assessment

Waikuku Beach

- Waikuku Beach Campground – Extension of stopbank (Complete led by Environment Canterbury)
- Swindells Road – Pipeline condition and capacity assessment (Underway)
- Collins Drive – Flapgate upgrade
- Waikuku Beach Road – Flooding assessment
- Kiwi Ave Reserve – Pipeline condition and capacity assessment

Oxford

- Church Street / Burnett Street – Drain capacity assessment
- Pearsons Drain (Bay Road & Burnett Street) – Drain capacity review
- Burnett Street – Strategy development
- High Street / Church Street – Drainage assessment (Underway)
- Weka Street – Drainage upgrades (Underway)

4.5. The above assessment work is being undertaken by 3 Waters and PDU staff with support from Stantec who have a resource seconded into the Water Operations Team 2 days a week for this work. It is expected that it will take until the end of November to address the backlog of service requests.

Implications for Community Wellbeing

Some of the locations of flooding have had flooding in the past and some residents have had to make insurance claims for flood related damage. This has a potential implication on community wellbeing for these residents.

4.6. The Management Team has reviewed this report and support the recommendations.

5. COMMUNITY VIEWS

5.1. Mana whenua

Te Ngāi Tūāhuriri hapū are not likely to be directly affected by this work. However they will have an interest in any future proposed works that may have an impact on waterways and rivers. Staff will update the Runanga at the executive meetings and where relevant on specific projects engage with MKT.

5.2. Groups and Organisations

There are some drainage related issues that also relate to water races and irrigation races. Where this is the case staff are coordinating with Waimakariri Irrigation Limited.

5.3. Wider Community

A community meeting was held with the residents of Kiln Place the 11 June 2021 and a community meeting was held for Waikuku Beach residents on 6 July 2021.

A dedicated webpage has been set up, refer:

https://www.waimakariri.govt.nz/services/water-services/stormwater/drainage-works

6. OTHER IMPLICATIONS AND RISK MANAGEMENT

6.1. Financial Implications

The costs associated with this investigation work will be charged to existing Drainage asset management and operations budgets. Any physical inspection work such as pipe maintenance and CCTV inspection work will be charged to the maintenance budget for the relevant Drainage scheme.

If further budgets are required for any capital works identified as part of the drainage assessment work, that these will be sought as part of the 2022/23 Annual Plan process.

6.2. Sustainability and Climate Change Impacts

The recommendations in this report do not have sustainability and/or climate change impacts.

6.3 Risk Management

There are no additional risks arising from the adoption/implementation of the recommendations in this report. The improvements implemented as a result of the drainage assessment identified will reduce the overall risk profile to Council and the community.

Health and Safety

The health and safety risks associated with undertaking this investigation work will be managed by standard Council processes.

7. CONTEXT

7.1. Consistency with Policy

This matter is not a matter of significance in terms of the Council's Significance and Engagement Policy.

7.2. Authorising Legislation

The Local Government Act 2002 sets out the power and responsibility of local authorities, including the Council's role in providing drainage services.

7.3. Consistency with Community Outcomes

The Council's community outcomes listed below are relevant to the actions arising from recommendations in this report.

- *There is a safe environment for all*
- *Core utility services are provided in a timely and sustainable manner*

7.4. Authorising Delegations

The Utilities and Roading Committee is responsible for activities related to Stormwater drainage.

ATTACHMENT III

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO:	DRA-16 / 211223205713
DATE:	21st December 2021
MEMO TO:	Utilities and Roading Committee
FROM:	Kalley Simpson, 3 Waters Manager
SUBJECT:	Response to December 2021 Flooding Event

Purpose

The purpose of this memo is to provide some context to the Committee regarding the recent event, as well as provide information on how the staff are responding.

What was the event?

This table shows the details of the December 2021 rainfall event as recorded.

December 15th 2021

Site	Total Rainfall	Return Period	ARI (%)	Critical Duration	Rainfall For Critical Duration
Kaiapoi	112.2mm	70 years, 2 months	1.4%	12 Hours	91.8mm
Woodend	131.2mm	122 years, 11 months	0.81%	12 Hours	107.8mm
Rangiora	104.8mm	35 years, 10 months	2.8%	12 Hours	88.8mm
Mandeville	66mm	8 years, 1 month	12%	12 Hours	58.4mm
Summerhill	60.2mm	3 years, 1 month	32%	2 Hours	19.0mm
Oxford	40.2mm	0 years, 11 months	110%	12 Hours	29.4mm

To give a comparison, the following are the same details for the May 2021 event.

May 30th 2021

Site	Total Rainfall	Return Period	ARI (%)	Critical Duration	Rainfall For Critical Duration
Kaiapoi	133.6mm	18 years, 10 months	5.3%	48 Hours	121.8mm
Woodend	147.4mm	24 years, 10 months	4.0%	72 Hours	145.2mm
Rangiora	178.4mm	47 years, 8 months	2.1%	48 Hours	160.4mm
Mandeville	131.0mm	17 years, 1 month	5.8%	48 Hours	120.8mm
Summerhill	195.2mm	46 years, 0 month	2.2%	48 Hours	173.2mm
Oxford	232.2mm	129 years, 4 months	0.8%	72 Hours	229.2mm

Comparison of the two events shows that the December 2021 event was focussed on the coastal area of the District and had slightly less rainfall but over a shorter period of time. A more detailed analysis of both these rainfall events is set out in the attached memo (refer TRIM 211222205116).

How did the Council organisation respond?

The U&R team were monitoring this weather event from early Monday afternoon. It became clear a day or two before the event that there was a significant rainfall expected. In response to this, the staff began contingency planning, and deployed contractors to check pump stations, inlet grills and flap gates, clean out key sumps and drains, and ensure known problem areas were inspected. Temporary pumps and sucker trucks were placed on standby.

On the day and night, the U&R department had teams inspecting the main geographical areas and reporting back on issues. In addition, service requests were being logged and contractor feedback was captured.

The majority of the issues were recorded in Kaiapoi, with lesser issues in Woodend, Waikuku Beach and Rangiora. The west of the District remained relatively trouble free.

Over the period of the 15th and 16th December, 171 flood event related service requests were received. On that day, and in the following days, the service requests were triaged. Those that were emergency issues were dealt with on the day. Others were collated for further assessment. Note that a number of these requests related to issues that also occurred in the May event. This places greater urgency on understanding the cause and determining solutions.

The Council's Civil Defence Emergency Management team was mobilised and provided coordination throughout the event, however, this is not covered in the scope of this memo.

What is still being carried out?

The service requests have been allocated to individual staff, who have been contacting every submitter to discuss the issue raised, as well as assuring them that there issue has been captured and will be investigated to determine the appropriate response. It is noted that submitters have been advised that it will be several months before the issues have been investigated.

Staff have identified that there is insufficient internal resource to deal with the extra workload, given the current resource levels and workload.

It is intended that a flood response PCG will be set up comprising on internal and external staff in order to respond to this event. Staff have reached out the external consultants, seeking assistance with a flood response lead engineer and also a flood response assistant engineer. These roles will be funded from existing budgets.

The external roles will be filled in order to investigate and report on the issues, including making recommendations by approx. May 2022. A report will be prepared for the Utilities and Roading Committee at that time making recommendations on further works.

Summary

Staff are aware that this latest event has caused a number of issues around the District, some of which are repeat issues. We are working towards looking into the issues, considering options and reporting to the Committee with recommendations, but this will take time and extra resources. In the meantime, submitters are being contacted to assure them that their concerns are being looked at.

WAIMAKARIRI DISTRICT COUNCIL

MEMO

FILE NO AND TRIM NO:	DRA-16 / 211222205116
DATE:	22nd December 2021
MEMO TO:	Mayor, Councillors and Community Board Members
FROM:	Jordan Cathcart, Project Engineer
SUBJECT:	Rainfall Event Analysis – 15 December 2021

1. Purpose

The purpose of this memo is to provide a summary of rainfall analysis carried out for the storm events of May 30th 2021 and December 15th 2021 and discuss key characteristics and comparisons between the two events.

2. Summary

In the 2021 year the Waimakariri District has experienced two storm events with significant rainfall intensity and volume.

The first event occurred on May 30th 2021 and was characterised by a long duration (48-72 hours) with the most significant rainfall located more inland (Oxford, Summerhill and Rangiora). The most critical recurrence interval was in Oxford, of 0.8% (129 years) across 72 hours.

The general flooding mechanism was widespread surface flooding due to primary and secondary stormwater networks at capacity combined with high river flows. In addition, outlet locations near rivers, coastal and main channels experienced flooding due to being unable to discharge due to high downstream water levels.

Table 1 May 30th Rainfall Analysis

Site	Total Rainfall	Return Period	AEP (%)	Critical Duration	Rainfall For Critical Duration
Kaiapoi	133.6mm	18 years, 10 months	5.3%	48 Hours	121.8mm
Woodend	147.4mm	24 years, 10 months	4.0%	72 Hours	145.2mm
Rangiora	178.4mm	47 years, 8 months	2.1%	48 Hours	160.4mm
Mandeville	131.0mm	17 years, 1 month	5.8%	48 Hours	120.8mm
Summerhill	195.2mm	46 years, 0 month	2.2%	48 Hours	173.2mm
Oxford	232.2mm	129 years, 4 months	0.8%	72 Hours	229.2mm

The second event occurred on December 15th 2021 and was characterised by a shorter duration of 12 hours with much more significant rainfall along the coastline (Woodend, Kaiapoi and to some extent Rangiora) rather than inland. The most critical recurrence interval was in Woodend, of 0.8% (122 years).

The general flooding mechanism was confined to the more coastal townships, with surface flooding due to primary stormwater networks at capacity. There was moderate

flows in rivers and main channels, however, was not expected to be causing significant impact on the ability of upstream networks to discharge.

Table 2 December 15th Rainfall Analysis

Site	Total Rainfall	Return Period	AEP (%)	Critical Duration	Rainfall For Critical Duration
Kaiapoi	112.2mm	70 years, 2 months	1.4%	12 Hours	91.8mm
Woodend	131.2mm	122 years, 11 months	0.8%	12 Hours	107.8mm
Rangiora	104.8mm	35 years, 10 months	2.8%	12 Hours	88.8mm
Mandeville	66mm	8 years, 1 month	12%	12 Hours	58.4mm
Summerhill	60.2mm	3 years, 1 month	32%	2 Hours	19.0mm
Oxford	40.2mm	0 years, 11 months	110%	12 Hours	29.4mm

3. Annual Exceedance Probability (AEP)

It is important to define the annual exceedance percentage (AEP) of the storm events above. This is also commonly expressed as the 'return period' or 'average recurrence interval'.

This is described by NIWA as being "*The inverse of probability (generally expressed in %), it gives the estimated time interval between events of a similar size or intensity.*

For example, the return period of a flood might be 100 years; otherwise expressed as its probability of occurring being 1/100, or 1% in any one year. This does not mean that if a flood with such a return period occurs, then the next will occur in about one hundred years' time - instead, it means that, in any given year, there is a 1% chance that it will happen, regardless of when the last similar event was. Or, put differently, it is 10 times less likely to occur than a flood with a return period of 10 years (or a probability of 10%)."

The annual exceedance probability is estimated using a comparison to the High Intensity Rainfall Design System (HIRDSv4) developed by NIWA. HIRDSv4 uses a regionalised index-frequency method to allow for estimates of high intensity rainfall at any location throughout New Zealand for several return periods and durations. Although this tool is primarily used for use with designing infrastructure, an estimate of the expected recurrence interval of a storm post-event can be used as an indication of the severity.

The data used for the development of this tool is based on historic rainfall records in the area. When considering significant events such as experienced this year, there is comparatively little data to compare to i.e. for an event >100 years there is not necessarily rainfall records for the past 100 years in the area of interest. For this reason statistical analysis is relied upon to calculate the expected recurrence interval for events such as these.

As the HIRDS is developed additional rainfall records will form part of the dataset and influence future iterations.

Another important consideration is that the statistical analysis and corresponding annual exceedance probability is dependent on the location within the district. For example, 100mm of rainfall over 12 hours will return a different AEP for Oxford and Kaiapoi.

4. Event Comparison

Although there are some similarities when viewing the annual exceedance probability in isolation, the rainfall experienced was quite different between the two events.

Key differences between these rainfall events can be grouped into the following.
- Location of rainfall
- Critical duration of the storm
- Time of year

Please note this is not considered to be an exhaustive list of factors affecting rainfall response.

4.1. Rainfall Location

As presented in Tables 1 and 2, there can be significant variation across the district, with the location in which the bulk of the rainfall occurs having an impact on the response of the system.

For the May event, widespread rainfall fell across the district with higher intensity in the upper catchments of Oxford and Okuku. This mobilised surface runoff across all catchments, and affected the ability of downstream networks to discharge due to high water levels in main drainage channels and rivers.

This was not the case in the December event as relatively low amounts of rainfall fell inland, meaning there was a larger capacity available in river channels.

4.2. Critical Duration

4.2.1. Rainfall Critical Duration

The critical duration of a rainfall event represents the period of time in which the AEP/return period is most significant. This may not necessarily represent the full duration if there were periods of lighter, or no, rain.

4.2.2. Catchment Critical Duration

The critical duration of a catchment represents the storm duration for a return period that will generate the largest peak runoff from that catchment.

This is the time taken for runoff to travel the length of the catchment and is generally related to catchment size and land cover. An example is that, for any given return period, the critical duration for an urban street or neighbourhood would typically be less than 1 hour. At a town level this is in the order of 6 hours and for larger catchments such as the Ashley River is around 24-48 hours.

Longer duration rainfall events accumulate a larger volume of rainfall, at a lower intensity compared to a shorter duration storm of the same return period. A longer duration can influence the capacity of the stormwater and land drainage at a much broader scale as there is more time for larger catchments to reach peak runoff whilst still raining.

This can be complex when considering an area of the district that is affected by smaller urban catchments and larger rural catchments, for example Rangiora and Kaiapoi with upstream rural catchments to the west. In addition, the ability for the Kaiapoi urban network to discharge to the river network can be significantly restricted when water levels are high.

This was experienced in May where the river levels and main drainage channels across the district were swollen due to the significant rainfall volume across a long period and large rural catchments.

In December the duration was shorter and river flows reached peak levels after the highest intensity rainfall had passed, meaning that surface flooding was not compounded by river levels.

Longer duration events are also more likely to coincide with one, or several, high tide cycles as was the case for the May event.

4.3. Seasonal Variation / Antecedent Conditions

The time of year affects the ability for infiltration of stormwater to ground (antecedent moisture condition). The likelihood of higher groundwater levels, and preceding rainfall events affecting the antecedent moisture conditions are higher in the winter (May event) than summer (December event).

In May, due to a combination of antecedent conditions and a long duration event the infiltration or 'storage' had been exceeded causing a larger proportion of rainfall to be directed to surface flow. The effect of infiltration has less of an impact within urban areas with large impervious areas.

4.4. Event Summary

4.4.1. May 30th 2021

- Widespread surface flooding due to primary and secondary stormwater networks at capacity
- Long duration and high intensity rainfall in upper catchments caused high river flows
- High tide coinciding with peak river and rainfall
- Outlet locations near rivers, coastal and main channels experienced flooding due to being unable to discharge due to high downstream water levels.

4.4.2. December 15th 2021

- Rainfall localised around coastal townships, with surface flooding within these areas
- Moderate flow in rivers and main channels
    - Low rainfall in upper catchments mean less inflow to rivers
    - Peak river flows after periods of most intense rainfall had passed
- High tide didn't coincide with peak rainfall
- Outlet ability to discharge was not significantly affected by downstream water levels.

5. Conclusion

Rainfall analysis forms an important tool to provide context to the severity of rainfall at various locations around the district, however, it is critical to consider all aspects of a rainfall event such as duration, location and antecedent conditions.

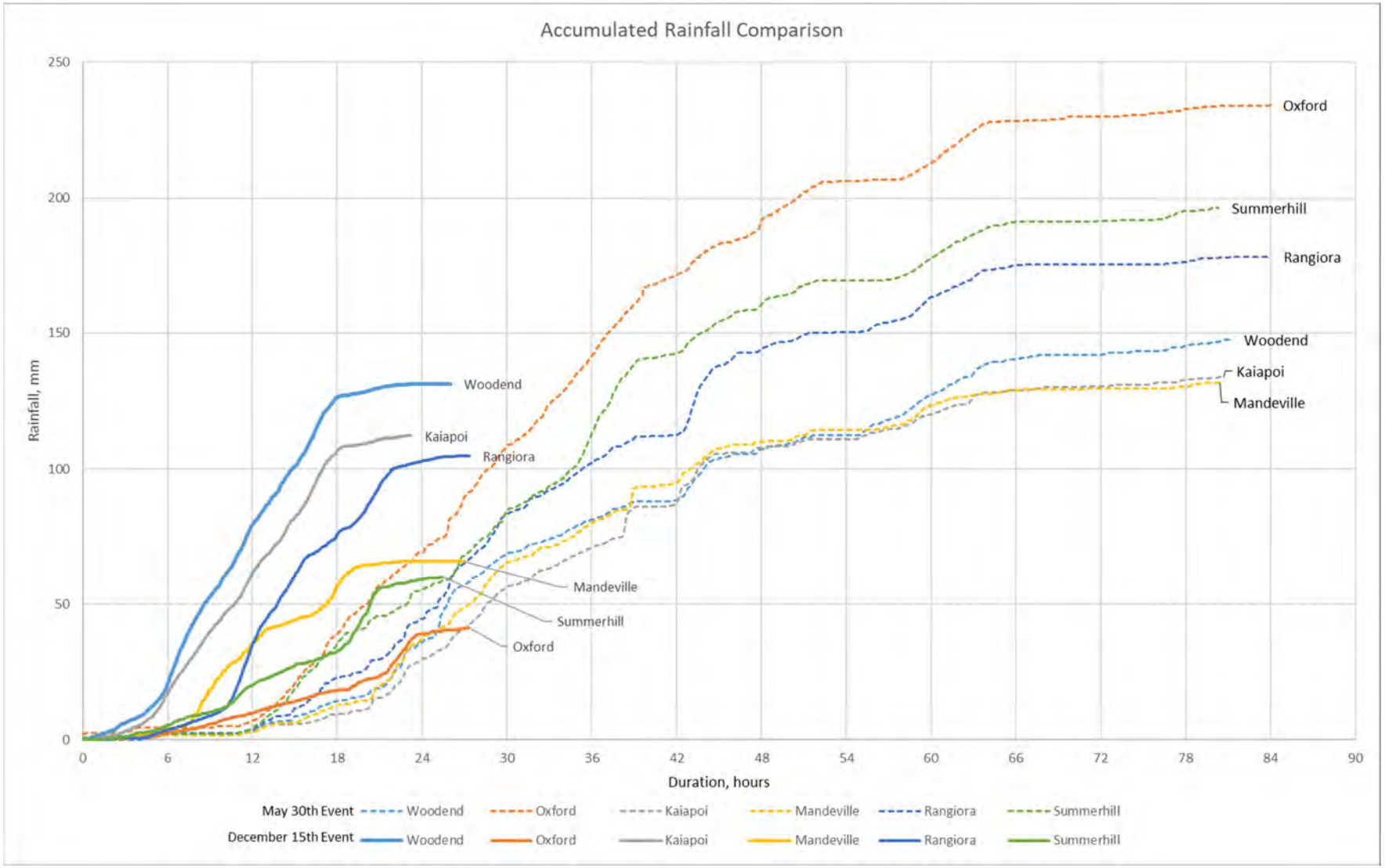
Although the May 30th and December 15th storms were estimated to have a return period of >100 years (<1%) in Oxford and Woodend respectively, the ability of the primary and secondary networks to convey stormwater was characterised very differently.

6. References

NIWA, https://niwa.co.nz/natural-hazards/faq/what-is-a-return-period

HIRDSv4 Technical Report, NIWA, August 2018, https://niwa.co.nz/sites/niwa.co.nz/files/2018022CH_HIRDSv4_Final.pdf

7. Appendix A: Accumulated Rainfall



WAIMAKARIRI DISTRICT COUNCIL

REPORT FOR INFORMATION

FILE NO: GOV-18 / 220329046828

REPORT TO: Council

DATE OF MEETING: 5 April 2022

FROM: Dan Gordon, Mayor

SUBJECT: Mayor's Diary
Wednesday 23 February to Tuesday 29 March 2022

1. SUMMARY

Attend regular meetings with the Chief Executive, Management Team and staff.

Wednesday 23 February	Meetings: Welcomed:	Update on Three Waters by Ngāi Tahu to Mayors and Chief Executives of the Takiwā, via MS Teams; Whakatane District Council re position of Communities 4 Local Democracy, via Zoom; Enterprise North Canterbury Board Meeting and Strategy Workshop Minister David Clark to the Mandeville Sports Ground for the announcement of upgrades to rural broadband
Thursday 24 February	Meetings:	On-site at Silverstream with residents; on-site at Youngs Road with resident and Council's Roading Manager; Business Liaison Officer for Rangiora Promotions; resident re housing concern
Friday 25 February	Meetings:	Communities for Local Democracy Plenary Group, via Zoom; resident re planning concern; Deputy Mayor Atkinson and staff with business owners re development opportunity; LGNZ Future for Local Government workshop; Rangiora RSA Club President and Matt Doocey MP re development proposal
Saturday 26 February	Meeting:	With resident re roading concern
Monday 28 February	Meetings:	Greater Christchurch Partnership re agenda for upcoming meeting with Minister Wood, via Zoom; Southland District Council re position of Communities 4 Local Democracy, via Zoom; Communities 4 Local Democracy Co-ordinating Team; Regional Road Safety Working Group meeting de-brief; with staff and Councillors Doody, Redmond and Ward re Mainpower Stadium
Tuesday 1 March	Interview: Meetings:	Compass FM Pre-Council agenda check; BNZ Corner Divestment Evaluation Panel; monthly Council meeting; briefing by staff on Kaiapoi/Woodend water quality

Wednesday 2 March	Meetings:	On-site with residents and staff member re intrusion of Council trees; with business owner re her wellbeing clinic; with staff re rates for commercial dwellings; Waitaha Primary Health Board, via Zoom; with resident re Kaiapoi Food Forest; Oxford-Ohoka Community Board Meeting, via Zoom
Thursday 3 March	Interview: Meetings: Participated	David Hill, North Canterbury News Canterbury Regional Leadership Group: Covid Protection Framework, via Zoom; LGNZ Rural & Provincial Sector workshop re Future for Local Government, via Zoom; Managing Editor of North Canterbury News; Representatives of Greater Christchurch Partnership briefing to Council, via MS Teams; Community Board Chairs and Deputy Chairs, via Zoom; All Boards' briefing in video for the District Libraries' March Movement Month
Friday 4 March	Meetings:	Communities for Local Democracy Co-ordinating Team, via Zoom; LGNZ Rural & Provincial Sector, via Zoom; business owners re airfield operations
Sunday 6 March	Meeting:	Waimakariri Arts Trust, via Zoom
Monday 7 March	Meetings:	Communities 4 Local Democracy Co-ordinating Team, via Zoom; Canterbury Mayoral Forum Climate Change Steering Group, via MS Teams; Head Students of Southbrook School re ideas for assisting their community, via Zoom; Southbrook Road Improvement Working Party, via Zoom; Martin Witt re Smokefree Action Plan; with Councillor Mealings, residents and Planning Unit staff re Ohoka Private Plan Change, via Zoom
Tuesday 8 March	Interview: Meetings:	Compass FM Briefing to Council by Enterprise North Canterbury, via MS Teams; Preview of Greater Christchurch Partnership agenda; Briefings to Council; Kapiti Coast District Council re position of Communities 4 Local Democracy, via Zoom
Wednesday 9 March	Meetings:	Briefing to Mayors and Chief Executives by the Chair of the Three Waters Governance Working Group, on its report, via Zoom; Communities 4 Local Democracy Co-ordinating Team, via Zoom; Christchurch City Council representatives on the Communities 4 Local Democracy Plenary Group, via Zoom; Rangiora-Ashley Community Board, via Zoom
Thursday 10 March	Meetings:	Canterbury Regional Leadership Group: Covid Protection Framework, via Zoom; Mayor Sam Broughton; Director of Regional Relationships Waka Kotahi, with resident and Council staff re speed limit on Mulcocks Road, via Zoom; relevant Elected Members and staff with Templeton Group re Pegasus; Communities for Local Democracy Co-ordinating Team, via Zoom; Communities for Local Democracy Chair, and LGNZ President, Vice President and Chief

		Executive, via Zoom; residents and Council staff re progress of residential development, via Zoom
Friday 11 March	Meetings:	Greater Christchurch Partnership sub-group, and Committee, both via Zoom; Communities for Local Democracy Plenary Group, via Zoom; Deputy Mayor Christchurch City Council, via Zoom; Communities for Local Democracy sub-group, via Zoom
Saturday 12 March	Meeting:	Three Water Reforms with various participants, via Zoom
Sunday 13 March	Attended:	Country Schools Cricket at The Willows
Monday 14 March	Meetings:	Communities for Local Democracy Co-ordinating Team, via Zoom; LGNZ Zone 5 & 6 Sector, via Zoom; South Link Education Trust, CDHB and staff re Rangiora Health Hub development, via Zoom; representative of Rangiora Bowling Club; District RSA representatives re Anzac Day services; Woodend-Sefton Community Board, via Zoom
Tuesday 15 March	Interviews: Meetings:	Compass FM Extraordinary Meeting of Council, via Zoom; Audit and Risk Committee, via Zoom, Community and Recreation Committee, via Zoom; Briefing to Council on Environment Canterbury's Draft Annual Plan, by their District Councillors, via Zoom; Dr Te Maire Tau re Māori Reserve 873; Tuesday Club, via Zoom
Wednesday 16 March	Meetings:	Communities for Local Democracy Co-ordinating Team and external advisors re report by Three Waters Governance Working Group, via Zoom
Thursday 17 March	Meetings:	Canterbury Regional Leadership Group: Covid Protection Framework, via Zoom; Oxford-Ohoka Community Board Member and Council's Roading Manager re Oxford speed limits; Communities for Local Democracy Co-ordinating Team, via Zoom; Deputy Mayor Neville Atkinson
Friday 18 March	Meetings:	On-site with resident re right of way issue; Regional Climate Change Councillor Workshop, via Zoom
Saturday 19 March	Attended:	Annual General Meeting of the Rangiora RSA
Sunday 20 March	Meeting:	Waimakariri Arts Trust
Monday 21 March	Meetings:	Communities for Local Democracy Co-ordinating Team, via Zoom; Matt Doocey MP and Council's Chief Executive, via Zoom; BNZ Corner Divestment Evaluation Panel, via Zoom; pre-meeting of Canterbury Civil Defence Group re Emergency Management Trifecta Consultation, via Zoom; Housing Working Group, via Zoom; pre-briefing by Council staff on chlorination of Woodend and Kaiapoi water supplies, via MS Teams; Communities for Local

		Democracy sub-group, via Zoom; Oxford Promotions AGM and monthly meeting
Tuesday 22 March	Interview: Meetings:	Compass FM Deputy Mayor and staff re subdivision issue, via Zoom; Canterbury Civil Defence group, with Minister for Emergency Management re Trifecta Consultation, via Zoom; Utilities and Roading Committee, via Zoom; briefing to Council on chlorination, via Zoom; Tuesday Club, via Zoom; AGM of Waimakariri Community Arts Council
Wednesday 23 March	Meetings:	Canterbury Mayoral Forum pre Canterbury Regional Leadership Group: Covid Protection Framework, via Zoom; Roading and Transport Portfolio Holders, with staff, via MS Teams; with resident re housing concern; BNZ Corner Divestment Evaluation Panel, via Zoom; Council, with Matt Doocey MP and Simon Watts MP re Local Government and Three Waters Reforms; Council's Management Team re Government's announcement on ending Covid mandate restrictions, via MS Teams; Councillors Barnett and Mealings, and Council staff, re Youth Council Stage Project, via Zoom; representative of Bellgrove Group Ltd
Thursday 24 March	Meetings:	Canterbury Regional Leadership Group: Covid Protection Framework, via Zoom; on-site at Sutton Tools; Communities for Local Democracy Co-ordinating Team, via Zoom;
Friday 25 March	Meetings: Attended:	With Chief Executive and staff re the submission to Taumata Arowai on drinking water standards; Canterbury Mayoral Forum and Papatipu Rūnanga Chairs, via MS Teams Cricket fixture - New Zealand International Women's Invitational XI v The Willows Schoolgirls XI
Monday 28 March	Meetings: Attended:	Chief Executive Enterprise North Canterbury; Communities for Local Democracy Co-ordinating Team; Passchendaele Advisory Group Raising of Ukraine flag at Council's Ruataniwha Service Centre in Kaiapoi
Tuesday 29 March	Interview: Meetings:	Compass FM Briefings to Council, via Zoom; Communities for Local Democracy sub-group, via Zoom; Youth Council, via MS Teams

THAT the Council:

a) **Receives** report Nº. 220329046828

Dan Gordon
MAYOR