



If calling, please ask for Democratic Services

Climate Committee

Tuesday 25 May 2021, 1.00pm

Council Chamber, Greater Wellington Regional Council
100 Cuba Street, Te Aro, Wellington

Members

Cr Nash (Chair)

Cr Connelly (Deputy Chair)

Cr Brash

Cr Gaylor

Cr Kirk-Burnnand

Cr Laban

Cr Lee

Cr van Lier

Dr Maria Bargh

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

Climate Committee

Tuesday 25 May 2021, 1.00pm

Council Chamber, Greater Wellington Regional Council
100 Cuba Street, Te Aro, Wellington

Public Business

No.	Item	Report	Page
1.	Apologies		
2.	Conflict of interest declarations		
3.	Public participation		
4.	Confirmation of the Public minutes of the Climate Committee meeting on 23 February 2021	21.70	3
5.	Update on progress of action items from previous Climate committee meetings – May 2021	21.100	7
6.	Climate emergency programme status update	21.176	12
7.	Consideration of Climate Risk in Greater Wellington Regional Council's Planning and Reporting Processes	21.184	21
8.	Research into the transition to a low emissions economy	21.189	54
9.	Report back on Wellington Regional Growth Framework climate change project Terms of Reference workshops	Oral update	
10.	Update from Lets Get Wellington Moving and discussion on climate issues related to the programme	Oral update	



Please note these minutes remain unconfirmed until the Climate Committee meeting on 25 May 2021.

Report 21.70

Public minutes of the Climate Committee meeting on Tuesday 23 February 2021

Taumata Kōrero – Council Chamber, Greater Wellington Regional Council
100 Cuba Street, Te Aro, Wellington at 1pm.

Members Present

Councillor Nash (Chair)
Councillor Lee (Deputy Chair)
Councillor Brash
Councillor Connelly
Councillor Kirk-Burnnand
Councillor Laban
Councillor van Lier
Dr Maria Bargh

Karakia timatanga

The Committee Chair opened the meeting with a karakia timatanga.

Public Business

1 Apologies

There were no apologies

2 Declarations of conflicts of interest

There were no declarations of conflicts of interest.

3 Public participation

There was no public participation.

4 Confirmation of the Public minutes of the Climate Committee meeting of 8 December 2020 – Report 20.486

Moved: Cr Connelly / Cr Kirk-Burnnand

That the Committee confirms the Public minutes of the Climate Committee meeting of 8 December 2020 – Report 20.486

The motion was **carried**.

5 Update on progress of action items from previous Climate Committee meetings – Report 21.10 [For Information]

Luke Troy, General Manager Strategy spoke to the report.

6 Climate Emergency Response programme status update – Report 21.48 [For Information]

Andrea Brandon, Programme Lead – Climate Change, and Jake Roos, Climate Change Advisor, spoke to the report.

Noted: The Committee requested that officers report back to Council on Greater Wellington’s forestry activities.

Noted: The Committee requested that a previous quarter percent completed column be added to the update.

7 Application to the Low Carbon Acceleration Fund February 2021 – Report 21.49

Andrea Brandon, Programme Lead – Climate Change spoke to the report.

Moved: Cr Lee / Cr Kirk-Burnnand

That the Committee:

- 1 Notes the application for funding from the Low Carbon Acceleration Fund (Attachment 1).
- 2 Notes the importance of a well-planned, sustainably resourced and tightly managed retirement and restoration programme to successfully achieving our climate goals for the organisation.
- 3 Notes the application is for \$620,000 (GST exclusive), to be allocated until 30 June 2024 as follows:

2020/21	2021/22	2022/23	2023/24
\$170,000	\$150,000	\$150,000	\$150,000
- 4 Agrees to recommend to Council that this application to the Low Carbon Acceleration Fund for a total of \$620,000 (GST exclusive) is approved.
- 5 Requests officers to provide a more detailed budget for 2020/21 and how it is split between planning and Mana Whenua engagement, building on the experience of the Parks network planning process.

The motion was **carried**. Councillor Gaylor requested that her vote against the motion be recorded. Dr Bargh requested that her abstention on the motion be recorded.

8 Climate Change Commission report – draft advice on carbon budgets and National Emissions Reduction Plan– Report 21.56

Jake Roos, Climate Change Advisor, spoke to the report.

Moved: Cr Brash / Cr van Lier

That the Committee:

- 1 Notes the Commission is recommending a range of key transitions to Government that will have implications for regional and local government including Greater Wellington.
- 2 Notes consultation is open until 14 March 2021.
- 3 Agrees to take a targeted approach focussed on a small number of key areas, for a Greater Wellington submission, to provide the best chance of influencing the final product for the benefit of the Wellington region.
- 4 Agrees to the areas of particular focus for the submission.
- 5 Delegates to Council Chair and Climate Committee Chair to approve the submission.

The motion was **carried**.

Councillor Gaylor left the meeting at 2.37pm at the conclusion of the above item, and did not return.

9 Briefing on upcoming key extern/central government moves on climate – Oral Report

Katharina Achterberg, Project Coordinator, Climate Change, spoke to the report. A presentation was tabled.

Ms Achterberg provided the Committee with a timeline of opportunities to submit on proposals from external agencies, as well as two opportunities to represent Greater Wellington at external events.

Ms Achterberg explained the timeframe and process for the Resource Management Act 1991 reforms signalled by the Government. Between May and September 2021 a draft of the Natural and Built Environment Bill will be agreed to by Cabinet and referred to a special select committee inquiry. The Strategic Planning Bill and Climate Change Adaptation Bill will be developed in a parallel process.

The three bills are scheduled to be introduced to Parliament in late 2021, with all three pieces of proposed legislation to be passed by end of 2022.

Karakia whakamutunga

The Committee Chair closed the meeting with a karakia whakamutunga.

The public meeting closed at 2.44pm.

Councillor T Nash

Chair

Date:

Climate Committee
23 February 2021
Report 21.100



For Information

UPDATE ON PROGRESS OF ACTION ITEMS FROM PREVIOUS CLIMATE COMMITTEE MEETINGS – MAY 2021

Te take mō te pūrongo

Purpose

1. To update the Climate Committee (the Committee) on the progress of action items arising from previous Committee meetings.

Te horopaki

Context

2. Items raised at Committee meetings, that require actions by officers, are listed in the table of action items from previous Committee meetings ([Attachment 1](#) - Action items from previous Climate Committee meetings – May 2021). All action items include an outline of the current status and a brief comment.

Ngā hua ahumoni

Financial implications

3. There are no financial implications from this report, but there may be implications arising from the actions listed.

Ngā tūāoma e whai ake nei

Next steps

4. Completed items will be removed from the action items table for the next report. Items not completed will continue to be progressed and reported. Any new items will be added to the table following this Committee meeting and circulated to the relevant business group/s for action.

Ngā āpitihanga
Attachment

Number	Title
1	Action items from previous Climate Committee meetings – May 2021

Ngā kaiwaitohu
Signatories

Writer	Luke Troy – Kaiwhakahaere Matua Rautaki/General Manager Strategy
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He whakarāpopoto i ngā huritaonga Summary of considerations
<p><i>Fit with Council’s roles or Committee’s terms of reference</i></p> <p>The action items are of an administrative nature and support the functioning of the Committee.</p>
<p><i>Implications for Māori</i></p> <p>Māori have a vested interest in climate change issues to the extent identified in Attachment 1.</p>
<p><i>Contribution to Annual Plan / Long term Plan / Other key strategies and policies</i></p> <p>Action items contribute to Council’s and Greater Wellington’s related strategies, policies, and plans to the extent identified in Attachment 1.</p>
<p><i>Internal consultation</i></p> <p>There was no internal consultation.</p>
<p><i>Risks and impacts: legal / health and safety etc.</i></p> <p>There are no known risks.</p>

Attachment 1 to Report 21.100**Action items from previous Climate Committee meetings – May 2021**

Meeting date	Action	Status and comment
8 December 2020	<p>Climate Emergency Response Programme Status Update – Report 20.281</p> <p>Noted:</p> <p>The Committee requested that officers review/undertake regional sector research on Marginal Abatement Cost (MAC) curves to assist with both organisational and regional decision-making, and dependent on findings develop advice to share with the territorial authorities.</p>	<p>Status: Complete</p> <p>Comment:</p> <p>Information included in Report 21.176</p>
8 December 2020	<p>Climate Emergency Response Programme Status Update – Report 20.281</p> <p>Noted:</p> <p>The Committee requested that officers collate the Wellington Region’s territorial authorities’ aspirations for climate action, and provide an update to the Committee on what regional actions are signalled across the Wellington Region’s territorial authorities’ Long Term Plans in relation to climate change to assess synergies and gaps.</p>	<p>Status: Ongoing</p> <p>Comment:</p> <p>Information is currently being collated and will be reported back on at a future Climate Committee meeting.</p>
23 February 2021	<p>Climate Emergency Response status update – Report 21.48</p> <p>Noted:</p> <p>The Committee requested that officers report back to Council on Greater Wellington’s forestry activities.</p>	<p>Status: completed</p> <p>Comment: Carbon Forest Services report was provided to the Committee by email on 8 April 2021.</p>
23 February 2021	<p>Climate Emergency Response status update – Report 21.48</p> <p>Noted:</p>	<p>Status: completed</p>

Attachment 1 to Report 21.100**Action items from previous Climate Committee meetings – May 2021**

Meeting date	Action	Status and comment
	The Committee requested that a previous quarter percent completed column be added to the update.	Comment: provided in Status Report Attachment 1 to Report 21.176
23 February 2021	<p>Application to the Low Carbon Acceleration Fund February 2021 – Report 21.49</p> <p>Resolution:</p> <p>Requests officers to provide a more detailed budget for 2020/21 and how it is split between planning and Mana Whenua engagement, building on the experience of the Parks network planning process.</p>	<p>Status: Underway.</p> <p>Comment: An RFQ is being prepared for the planning component that includes drawing on existing information in respect of mana whenua’s interests in parks, and goals and aspirations for parks, environmental management plans, and cultural assessments to compile the base information that will inform the engagement and support phase. More information will be provide as the procurement proceeds.</p>

Climate Committee
25 May 2021
Report 2021.176



For Information

CLIMATE EMERGENCY RESPONSE PROGRAMME STATUS UPDATE

Te take mō te pūrongo

Purpose

1. To update the Climate Committee (the Committee) on the Climate Emergency Response Programme.

Te tāhū kōrero

Background

Greater Wellington Climate Emergency Response Programme

2. Council declared a climate emergency in August 2019. This decision responds to the urgency climate change presents and encourages a step change in how Greater Wellington Regional Council (Greater Wellington) addresses climate change, both corporately and in how it uses its influence in the Wellington Region.
3. In order to demonstrate Council’s commitment to changing the status quo, the declaration of a climate emergency was strengthened by Council adopting two ten-point action plans - a Corporate Carbon Neutrality Action Plan and a Regional Climate Emergency Action Plan. These action plans are collectively referred to as the Greater Wellington Climate Emergency Response Programme (the Programme).
4. Officers have provided a status report on the Programme ([Attachment 1](#) - Climate Emergency Response Programme Status Report (May 2021)). The overall status of the Programme is on track for the quarter to May 2021. This is due to the sharpened focus on climate action in the draft 2021-31 Long Term Plan (LTP), and the corresponding resource allocation in line with the size of the task ahead. An overview of the current status for each action plan item:

Action Plan	Complete	On track	At risk	Significant delays
Corporate Carbon Neutrality	0	8	2	0
Regional Climate Emergency	1	4	5	0

5. Two actions have reverted to the “at risk” status having been on track previously. These are actions 7 and 8, reforestation of parks, and the grazing phase out action items. Both these action items require significant oversight, planning and management to deliver. Funding has been allocated through the Low Carbon Acceleration Fund but work is behind schedule on the delivery end as procurement processes and engagement with mana whenua are taking longer than initially expected. In addition fully phasing out

grazing is dependent on planning, timing and land management funding above the level of funding signalled in the draft 2021-31 LTP.

6. A further risk to the programme is raised on the rail decarbonisation initiative, which is not one of the actions, but is a key component of the emissions reduction pathway required to enable Greater Wellington to achieve its ambitious climate goals. This is because it is dependent on the outcomes of the business case process that is underway, and significant central government funding.

Te tātaritanga

Analysis

Key achievements this quarter

7. Emissions reduction pathways that will enable Greater Wellington to meet its climate goals have been successfully included in the draft 2021-31 Long Term Plan budget. We had a lot of discussion with Audit New Zealand on these options, and some challenges to our funding assumptions. We are now receiving some good feedback from the community through the LTP consultation process, which has ended. Deliberations will be held on 27 May.
8. A comprehensive submission was made to the Climate Change Commission on their 2021 Draft Advice to the Government. The advice includes recommendations on the levels of the first three emissions budgets taking us through to 2035. It also provides advice on strategic policy direction for meeting the emissions budgets, by looking at what is needed across different sectors.
9. The Parks department proposal to the Low Carbon Acceleration Fund, prepared for the February 2021 Climate Committee, was subsequently approved by Council at its 25 February 2021 meeting. Council also resolved to defer selling Greater Wellington Regional Council's emissions units until the 2024-34 Long Term Plan and continue to borrow against their value to fund low carbon acceleration projects rather than sell them, and to defer offsetting until there is sufficient clarity on voluntary offsetting (Report 21.47).
10. Recruitment of the Parks Restoration Project Lead is currently underway. Procurement to plan the phase down of grazing and restoration across the Parks network is underway. We are in discussions to find a workable solution to engaging with mana whenua on the Parks projects while a new model for working with mana whenua is still being worked through at the organisational level.
11. Options for managing Greater Wellington Regional Council's increasing stock of emissions units (NZUs) and our approach to voluntary offsetting were considered by the Committee at its 8 December 2020 session (Emission unit management and carbon offsetting options (Report 20.443)). The Committee's recommendations were approved by Council at its 25 February 2021 meeting.
12. The Wellington Region Climate Change Working Group met on 5 March 2021 to discuss Wellington Regional Growth Framework climate change-related projects, the work programme for the remaining term and the Terms of Reference for the newly named

Wellington Region Climate Change Forum. A joint response was submitted to the Climate Change Commission on its draft advice.

Action items update

- 13. A review was undertaken on information available regarding Marginal Abatement Cost (MAC) curves to assist with both organisational and regional decision-making (see [Attachment 2](#) – Cost Effectiveness of activities to reduce emissions).

**Ngā hua ahumoni
Financial implications**

- 14. There are no direct financial implications from the matter for decision or this report. There may be financial implications over time as individual project analysis occurs, business cases are made and budget decisions are taken during the 2021-31 Long Term Plan process.

**Ngā tūāoma e whai ake nei
Next steps**

- 15. Updates will continue to be provided to each Committee meeting as the Programme progresses.

**Ngā āpitihanga
Attachment**

Number	Title
1	Climate Emergency Response Programme Status Report (May 2021)
2	Cost effectiveness of carbon savings for reforestation and the electrification of bus fleet

**Ngā kaiwaitohu
Signatories**

Writer	Andrea Brandon – Programme Lead, Climate Change
Approvers	Tracy Plane – Manager, Strategic and Corporate Planning Luke Troy – General Manager, Strategy

<p>He whakarāpopoto i ngā huritaonga Summary of considerations</p>
<p><i>Fit with Council’s roles or with Committee’s terms of reference</i></p> <p>Updating the Climate Committee on the Programme’s status fits with its specific responsibility to “Oversee the development and review of Council’s climate change strategies, policies, plans, programmes, and initiatives (including Council’s Climate Emergency Response Programme); and recommend these matters (and variations) to Council for adoption.”</p>
<p><i>Implications for Māori</i></p> <p>There are implications for mana whenua and Māori from this report. They will be impacted by the choice of emissions reduction pathways that Greater Wellington takes to meet its climate goals, and as a result of the bid for resourcing engagement with mana whenua for the approved LCA Fund projects. A mana whenua representative has not yet been appointed to the Committee, so their related views, or impacts on goals and aspirations are not reflected in this report.</p>
<p><i>Contribution to Annual Plan / Long Term Plan / Other key strategies and policies</i></p> <p>Much of the work carried out this quarter has been focussed on ensuring climate action is included in the 2021-31 Long Term Plan and advancing the Climate Emergency Response Programme.</p>
<p><i>Internal consultation</i></p> <p>The Strategic and Corporate Planning department were consulted in the development of this report.</p>
<p><i>Risks and impacts - legal / health and safety etc.</i></p> <p>There are no identified risks relating to the content of this report.</p>

Attachment 1 to Report 21.176

Climate Emergency Response Programme Status Report (May 2021)

Corporate Carbon Neutrality Project

	Short description	Status Dec Q	Status Feb Q	Progress	% complete last Q	% complete this Q
1	Carbon policy	On track	On track	Policy endorsed by Executive Leadership Team (ELT), support package to accompany policy completed, policy launched mid-August, roll out to business underway for the 2021 calendar year	95	95
2	CEO accountability	On track	On track	Completed for 2020/21	100	100
3	Electricity supply	On track	On track	Meridian has been appointed as new supplier (mainly due to price advantage) and can provide renewable electricity certificates. However whether these certificates can or should be used requires further investigation. Since the last update Meridian has announced plans to build more windfarms, which is a welcome development. The status of the certificates in relation to emissions inventories is being considered by our carbon footprint certifier Toitu Envirocare as many of their other clients also have an interest in them.	90	90
4	Accelerate EV bus fleet	On track	On track	Electric bus fleet will increase to 108 by December 2023. Planning for a fully decarbonised bus fleet by 2030 is underway, subject to final 2021-31 LTP decision and central government funding.	25	25
5	Greater Wellington EV fleet	On track	On track	Internal EV charging infrastructure is increasing with our move to Cuba Street and new build in Masterton. Work continues on adopting the fleet optimisation review's findings. 21-36 vehicles are candidates for replacement with battery electric vehicles. A batch could be changed over prior to the end of the financial year.	60	60
6	Off road EV supply	On track	On track	Awaiting market developments. Dependent on suitable vehicle being available – there is likely to be something in 2021/22.	5	5
7	Parks reforestation	On track	At Risk	Two scenarios for Parks reforestation in draft 2021-31 LTP (1100-1350 ha) - subject to final decision; LCAF funding approved for planning, Project Lead and	10	15

Attachment 1 to Report 21.176

Climate Emergency Response Programme Status Report (May 2021)

	Short description	Status Dec Q	Status Feb Q	Progress	% complete last Q	% complete this Q
				mana whenua engagement, 2 sites (150ha) underway. While resourcing has been obtained, and recruitment is underway for a Parks Project Lead, the planning and management required to implement the change in direction for is stretching capacity and capability within the organisation.		
8	Grazing phase out	On track	At Risk	Direction agreed through parks networks plan, phase out in the planning phase as above. LCAF funding has been approved to lead a piece of work on this but due to procurement processes and the need to engage with mana whenua, this may take longer than initially expected. Fully phasing out grazing will require a greater level of commitment (planning, timing and funding) than is proposed for the 2021-31 LTP cycle.	10	15
9	Align Council Controlled Organisation (CCO) targets	On track	On track	CCO's at different stages; Wellington Regional Stadium Trust still to confirm Statement Of Intent for 20/21 yr (due to COVID-19); WellingtonNZ plans to measure and reduce emissions; Wellington Water Limited (WWL) to set emissions reduction target; CentrePort have measured emissions, set a target for 2040 and have developed an emissions reduction plan. CentrePort are interested in ongoing knowledge-sharing and collaboration on carbon reduction with Greater Wellington.	10	10
10	Low-carbon fund	On track	On track	Fund operational, funding approved through 2020-21 Annual Plan, and is fully allocated for the 2020-21 year. The future of fund is subject to final 2021-31 LTP decisions to fund Parks restoration for Years 1-3.	80	90

Attachment 1 to Report 21.176

Climate Emergency Response Programme Status Report (May 2021)

Regional Climate Emergency Project

	Short description	Status Aug Q	Status Dec Q	Progress	% complete last Q	% complete this Q
1	Governance	Complete	Complete	Climate Committee established	100	100
2	Climate change impacts analysis	On track	On track	Tools reviewed, new guidance created, to build capability/capacity across business. Carbon policy completed, Climate Change Consideration guide revised. To be rolled out to the business through the change programme, now underway	30	35
3	Strategy review & GM champion assigned	On track	On track	General Manager (GM) Strategy is Programme Sponsor. New direction, set through the two 10-pt plans, provides components of a revised strategy. Regional strategy approach is to ensure the WRGF will deliver a low emissions/climate safe region.	50	55
4	Central Government advocacy	At risk	On track	Submitted to the Climate Change Commission on its draft advice to Government. Final advice due 31 May 2021. RMA reforms are coming up next.	NA (ongoing)	NA (ongoing)
5	Support the region's TAs to adapt	At risk	At risk	The Wellington Region Climate Change Working Group (WRCCWG) (councillor reps and mana whenua) meets quarterly, officer level equivalent meet 6-weekly. The comprehensive Resource Management Act 1991 (RMA) reform that is underway will include two new acts (on spatial planning and adaptation), and the next phase of the Wellington Regional Growth Framework (WRGF) begins in July. Both will provide greater clarity on roles and responsibilities on local adaptation issues. The Climate Committee will have opportunities to progress this action.	10	10
6	Technical research to	At risk	At risk	Work underway, responsibilities lie across Greater Wellington teams and Wellington Region territorial authorities (TAs), WRGF interaction identified will improve alignment and lack of resourcing in this area. As	20	20

Attachment 1 to Report 21.176

Climate Emergency Response Programme Status Report (May 2021)

	Short description	Status Aug Q	Status Dec Q	Progress	% complete last Q	% complete this Q
	support regional adaptation			above, the RMA reforms, includes a new adaptation act, and the WRGF begins its next phase in July this year. Both will provide Greater Wellington with more clarity and opportunities for progress.		
7	Funding	At risk	At risk	One Billion Trees (1BT), shovel-ready and jobs for nature funding will improve regional outcomes for climate, but is opportunistic and ad hoc.	10	10
8	Regional mitigation	At risk	At risk	The WRCCF will provide advisory role to the climate related projects under the WRGF. Letter completed to the Climate Change Commission draft advice to Government agreed by all elected members of the WRCCWG highlighting the opportunities for regional carbon reduction.	5	10
9	Increase forested area	At risk	At risk	Work underway with Greater Wellington Parks and with Hutt City Council. Additional action funded through 1BT, shovel-ready and jobs for nature. Underlying issues including partnering with iwi, TAs, communities, Ministry of Primary Industries (MPI), limited capacity to progress to date.	10	12
10	Embed regional emissions reduction targets in key programmes	On track	On track	Good collaboration occurring with Regional Land Transport Plan, Wellington City Council and Let's Get Wellington Moving (LGWM) on agreeing targets. Recent changes at LGWM at the governance level, and added climate workstream which includes a Greater Wellington climate change advisor, along with strong climate focus in the WRGF, and potential to work with WellingtonNZ on economic transition.	20	25

Attachment 2 to Report 21.176

Cost effectiveness of carbon savings for reforestation and the electrification of bus fleet

The Ministry for the Environment (MfE) have calculated values for their national Marginal Abatement Cost (MAC) analysis. These were presented to the 8 December 2020 Climate Committee.

Regarding reforestation, MfE found:

- Sheep/beef farming -> Exotic plantation is from \$5 - \$105/tonne depending on land class and region, with a median value of \$14.49/tonne
- Sheep/beef farming -> Native forest is from \$22 - \$85/tonne depending on land class and region, with a median value of \$55.66/tonne
- Dairy farming -> Exotic plantation is from \$70 - \$216/tonne depending on land class and region, with a median value of \$112.47/tonne

Our own work for the Low Carbon Acceleration Fund calculated:

- Queen Elizabeth Park restoration \$34/tonne lifetime emissions savings, \$150/tonne just looking narrowly at carbon saved for Greater Wellington by 2030
- Kaitoke restoration \$27/tonne lifetime emissions savings, \$116/tonne just looking narrowly at carbon saved for Greater Wellington by 2030

These estimates are taken from Report 20.333 (20 September 2020 Climate Committee).

Regarding electrification of the bus fleet, MfE found that all kinds of electric vehicle conversions/replacements including electrically powered buses had negative MACs - i.e. they save money, they should not require a carbon price to be implemented (in an ideal world).

For the 2021-31 Long Term Plan, cost estimates/budgets were worked up for 'Scenario A' where all growth and replacement buses are electric, and 'Scenario B' where all growth and replacement buses are electric and all remaining buses except the spares are replaced with electric buses at contract renewal. These are:

- Scenario A: ten year cost: \$127.8M, and annual emissions in 2030 of 13,882/tonnes CO²
- Scenario B: ten year cost: \$172.6M, and annual emissions in 2030 of 3,893/tonnes CO²

Assuming a 20-year bus life with no residual value, the difference between the two scenarios is \$225/tonne CO² saved. NOTE though the costs do not include operational savings as they are based on current contractual arrangements. To give you some idea of this, a 10,000 tonne CO²/year saving equates to 3,720,000 litres of diesel fuel. Also they do not include expected cost reductions in electric vehicle technology.

Climate Committee
May 25, 2021
Report 2021.184



For Information

CONSIDERATION OF CLIMATE RISK IN GREATER WELLINGTON REGIONAL COUNCIL'S PLANNING AND REPORTING PROCESSES

Te take mō te pūrongo

Purpose

1. To inform the Climate Committee about how Greater Wellington Regional Council (Greater Wellington) considered and assessed climate risk in the process of developing and drafting the Long Term Plan 2021-31 (LTP), and provide an indication of how we might incorporate climate risk into future corporate planning and reporting processes.

Te horopaki

Context

2. Council long terms plans are a function of the Local Government Act (2002).
3. In order to meet best practice outcomes, Greater Wellington draws on the advice of the Office of the Auditor General (OAG) and Audit New Zealand.
4. With respect to the 2021-31 LTP and consideration of climate change risk, the OAG are looking for:
 - a A higher standard than the 2018 LTPs – particularly for those councils who have declared a climate emergency.
 - b Councils using the best information available to them – ideally self-commissioned.
 - c Reference to potential impacts and risks, and, extrapolation of the broad impacts of projected changes, e.g. sea level rise and changed rainfall patterns and levels, and timeframes, and indicative costs of mitigation.
5. This includes expectations of the following:
 - a Assumptions
 - i The expected effects of climate change on district/region (e.g. sea level, rainfall, floods, temperature).
 - ii The potential impacts on council's activities.
 - iii The social, economic or cultural impacts on communities.
 - b Disclosures
 - i Infrastructure Strategy.
 - ii Financial Strategy.

- c Consultation Document. The AOG expects climate change disclosures when:
 - i Council wants feedback from the community on climate change initiatives.
 - ii the climate change mitigation or adaptation measures are a major matter for inclusion in the LTP, and/or,
 - iii climate change is a matter of public interest for inclusion in a council's infrastructure or financial strategy.

Te tātaritanga Analysis

6. Since declaring a climate emergency in August 2019, and the consequential establishment of the Climate Emergency Response Programme and Climate Committee, Greater Wellington has been working to improve its cross-organisation consideration of climate change risk. The drafting of the LTP provides an opportunity to build our capabilities. Climate risk is largely represented in a narrative form in these documents.
7. As we begin to better understand the systemic nature of climate risk, and aim to prioritise mitigation and adaptation concerns in our decision-making, we can see there is a need to adopt new mechanisms and build capability in order to understand the material financial risk of climate change to Greater Wellington.
8. This practice should ideally integrate with existing risk management procedures at Greater Wellington.
9. Officers are aware of guidance provided by the Task Force for Climate-related Financial Disclosures (TCFD)¹. The Financial Stability Board created the TCFD to improve and increase reporting of climate-related financial information.
10. While TCFD reporting has become mandatory for some categories of organisations in New Zealand²; it is yet to be mandatory for local government. That said, we recognise it is possible it will become mandatory under Sections 5ZX or 5ZW of the Climate Change Response (Zero Carbon) Act (2019)³, and that it could be a useful framework for us to identify what information is valuable for internal decision-making, climate risk management and longer term capital planning purposes.
11. It could also provide a framework for us to adopt for local government statutory reporting processes. As such, we have recently begun high level discussions internally and with the Region's territorial authorities to explore what TCFD is and how it can be adapted to provide value to the Region's councils.

¹ [Recommendations of the Task Force on Climate-related Financial Disclosures Report, 2017](#)

² Registered banks, credit unions, and building societies with total assets of more than \$1 billion; managers of registered investment schemes with greater than \$1 billion in total assets under management; licenced insurers with greater than \$1 billion in total assets under management or annual premium income greater than \$250 million; equity and debt issues listed on the NZX; and crown financial institutions with greater than \$1 billion in total assets under management, such as ACC and the New Zealand Super Fund.

³ In August 2020, Cabinet agreed that it is important for public entities to consider and disclose their climate-related risks and opportunities. Central government officials will investigate increasing the scope of the reporting regime of the Climate Change Response (Zero Carbon) Act in the future.

Consideration of Climate Risk for the 2021-31 LTP

12. Work on the 2021-31 LTP commenced 18 months ago, and the climate change assumptions were developed in early 2020. At that time it was not considered or proposed to use the TCFD framework to guide the development of the LTP. It is not practical to incorporate this framework in the LTP at this late stage of the process.
13. Greater Wellington has however followed a series of steps in response to the OAG's requirements and to meet our own expectations, being cognisant of the seriousness of climate change risk to the organisation.
14. Greater Wellington has used a range of information and a number of processes and tools across the organisation to ensure this has been undertaken, including:
 - a Climate change and variability - Wellington Region report (prepared for Greater Wellington, NIWA, 2017)
 - b Toitū Carbon Reduce certification⁴
 - c Development of the Climate Change and Adverse Events Assumptions report (**Attachment 1**) prepared specifically for the LTP process.
15. Our climate change assumptions report and our overarching strategic priority to respond to the climate emergency have been considered by every activity group in Greater Wellington.
16. The climate change assumptions report was also shared with the Wellington Region Infrastructure Strategy Community of Practice members and the officers of the Wellington Region Climate Change Working Group to build regional consistency.
17. All new Greater Wellington business initiatives are required to consider climate change mitigation and adaptation impacts. This has been demonstrated through to the final versions of the Consultation and Supporting Information documents.
18. So far Greater Wellington's auditors have provided positive feedback on how the organisation has incorporated climate change into the LTP process.

Ngā hua ahumoni

Financial implications

19. The initial exploration and assessment of the TCFD recommendations is being undertaken internally with existing staff resources.

Ngā tūāoma e whai ake nei

Next steps

20. Greater Wellington staff will research the recommendations of the TCFD and consider its value to the risk management and reporting functions of the organisation.
21. On completion of this analysis we will explore using this framework to assist in the provision of a coordinating statement in the final LTP and for the next annual report.

⁴ <https://www.toitu.co.nz/what-we-offer/carbon-management#certification>

22. Staff will report back to the Climate Committee in the coming months.

Ngā āpitihanga

Attachment

Number	Title
1	Climate Change and Adverse Events – Non financial assumptions (full report)

Ngā kaiwaitohu

Signatories

Writer	Suze Keith, Kaitohutohu Strategic Advisor – Climate Change
Approver/s	Tracy Plane, Whaitaki Kaupapa Rautaki Manager, Strategic and Corporate Planning Luke Troy, General Manager, Strategy

He whakarāpopoto i ngā huritaonga Summary of considerations
<p><i>Fit with Council's roles or with Committee's terms of reference</i></p> <p>Consideration of climate change risk is a function of Council, and in particular, the Climate Committee. Understanding and monitoring how effectively this is put in to practice through Greater Wellington's statutory planning and reporting roles is a key responsibility of the Climate Committee.</p>
<p><i>Implications for Māori</i></p> <p>Workshops held to identify likely trends and their implications for Greater Wellington's 10-year work programme considered that there would be an increasing expectation to meet Te Tiriti o Waitangi obligations. More specifically these were:</p> <ul style="list-style-type: none"> - the need for increased capability to partner with iwi - meeting iwi partnership expectations - opportunities in Te Tiriti o Waitangi settlements - opportunities to co-manage and implement iwi plans/aspirations - increased push/desire for collaboration (e.g. coalition/partnership) - needing to shift the way we work
<p><i>Contribution to Annual Plan / Long Term Plan / Other key strategies and policies</i></p> <p>This report relates to how Greater Wellington considers climate risk in the development of its Long Term Plan 2021-31 and how this practice may improve in the future for all statutory reporting and business planning.</p>
<p><i>Internal engagement</i></p> <p>Consideration of climate risk and the development of the 'Climate change impacts and adverse events – non-financial assumptions Report' for the purposes of the Long Term Plan development was a cross-organisational activity.</p>
<p><i>Risks and impacts - legal / health and safety etc.</i></p> <p>Since the development of the Greater Wellington Long Term Plan 2018-28, there has been an increased understanding that climate risk is greater than environmental risk, and brings with it legal, financial, human health and economic risks. Practices to embed understanding of the implications of climate change across the business are maturing and in a state of constant evolution.</p>

Attachment 1 to Report 21.184**2021-31 Long Term Plan – Non-financial forecasting assumptions (full report)****Climate change impacts and adverse events¹****Executive summary:**

Greater Wellington Regional Council (GW) plays an important role in coordinating actions to help reduce the impacts of natural hazards and climate change on our communities, the environment and our assets - in fact climate change impacts the majority of our operations. We need to ensure this long term plan aligns with our long term climate action plans. The following assumptions and analysis provide a road map for how the risks associated with natural hazards and climate change impacts will be considered in the development of the long term plan 2021-2031.

Our region has already warmed by 0.8 degrees Celsius (°C) since pre-industrial times, with several other climatic disruptions accompanying this warming. The primary cause of that change is due to increasing the concentrations of greenhouse gases we have been pumping into the atmosphere, primarily carbon dioxide, from burning coal, oil and natural gas. Climate models predict further warming of between 0.8°C (mid-century) to 3°C (late-century), in relation to a 1995 baseline. Almost a third of the predicted mid-century warming has already happened.

Effects GW will need to contend with are increased frequency and duration of drought conditions, increased severe rainfall events, and sea level rise of a projected 1 metre by 2100 in coastal areas around the Region is expected, coupled with the exacerbated effects of storm surge. Some coastal areas will become permanently inundated, some more frequently flooded. The number of hot days (over 25°C) will increase and frost days decrease. Mean low flows in rivers and streams will decrease by 60 – 80% in some catchments, and river flooding will vary widely from previous trends. The risk of forest fire will increase several fold. This is in addition to non-climate change related adverse events, such as earthquakes and tsunamis.

When we release these greenhouse gases, they accumulate in the atmosphere and oceans. On time spans relevant to humans, once released, the carbon dioxide is in our environment essentially forever. It does not go away, unless we, ourselves, remove it. This means that the predicted mid-century warming is already locked in and without action the situation will only get worse over the coming decades.

With strong climate action to reduce the rate at which we emit greenhouse gases while increasing the removal of carbon dioxide through restoring forests and wetlands, it be might possible to maintain the total late century warming to the same as that already locked in for mid-century (about 0.8°C). It is not possible, however, to reduce the mid-century warming, due to the amount of carbon dioxide already accumulated in the atmosphere. This highlights the importance of taking action to prepare for and adapt to these predicted impacts as a matter of urgency.

¹ Contributors to this report were: Tracy Berghan and Sharyn Westlake (GW Flood Protection); Alex Pezza (GW Environmental Science); Iain Dawe (Environmental Policy); Geoff Williams (Wellington Water); Andrea Brandon (Strategic & Corporate Planning); Nicci Wood (GW Infrastructure Strategy Manager), and the GW Trends & Opportunities group participants. It was edited by Suze Keith (Strategic & Corporate Planning)

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Anthropogenic greenhouse gas emissions are warming the global atmosphere, and we know what we need to do to reduce our emissions. Uncertainty remains in whether the global community will act to reduce greenhouse gas emissions at a scale and pace with which to avoid the worst effects of climate change.

The broad nature of these impacts demands a systematic, and focused long term response by GW in strong collaboration with other parties. The period of this Long Term Plan corresponds with the period defined by the Intergovernmental Panel on Climate Change as needing to see a 50% reduction in global greenhouse gas emissions by 2030 in order to avoid the worst effects of climate change. This is also a period within which GW must initiate well-informed and considered planning measures to reduce the risk of the inbuilt and known impacts.

Key challenges and opportunities:

Climate change is a challenge for us all, and for GW the challenges include:

- the mismatch amongst statutory planning, environmental, political and social timeframes;
- the need to respond both carefully as well as urgently to limit mal-development and achieve future proofed responses where possible;
- increasing pressure from mana whenua, community, territorial authorities and Central Government for regional government to deliver solutions, and,
- an increasing understanding that in order to meet climate targets such as those set under the Climate Change Response (Zero Carbon) Amendment Act 2019 (Zero Carbon Act) and a climate resilient region, the way in which we carry out our activities needs to change.

Accordingly, our traditional policy responses to this societal problem may no longer be fit for purpose. There is a recognition that there is urgency with which to act, but political unpalatability in taking risks to deploy innovative solutions; that as the regional council we hold only some of the policy levers and must align with others to give effect to our individual and collective responsibilities, and that we are working in an environment of inherent change and uncertainty. Scientific evidence is clear that our climate is changing. We know this from direct surface temperature measurements, changes in rainfall and weather patterns, an increase in the frequency of extreme weather events, loss of Arctic sea ice, sea level rise, melting of the Antarctic and Greenland ice sheets, and from the NZ Southern Alps², shifts in the geographic ranges distribution of some plant and animal species, earlier unfolding of new leaves in spring and changes in bird migration patterns. What shape further climate change takes is less certain Scientists have developed climate models to help us understand which of many possible future outcomes is most likely.

The biggest uncertainty in future predictions is the human factor. How will we change our behaviour? How much will we change?

While we may not know exactly what will happen in the future we do know there is high certainty that future proofing long term decisions with climate change consideration will cost less than leaving the response until impacts are being more keenly felt.

² <https://niwa.co.nz/videos/glaciers-dont-lie>

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Change, in the form of how we respond as a society, also brings with it uncertainty. However if our response is done well, change can bring with it the opportunity to address other societal issues, by delivering local co-benefits such as improved air quality from fewer fossil fuelled vehicles, and improved health outcomes from increased use of active and public transport. Reducing our exposure to climate-related impacts can help to protect long-term investment in public and private assets, while also considering the role of natural environmental solutions to building resilience, which will improve water quality and protect biodiversity at the same time.

Natural hazards are, to a certain degree, more familiar to Wellingtonians, and as such we have strong measures in place to identify the nature of the risks we face to be able to design interventions to reduce these risks. However, some natural hazards are enhanced by climate change effects, which increases the pressure to expand ways in which we reduce such risk and potentially requires a change in approach. For example, sea level rise and more volatile weather systems can exacerbate the impacts of storm surge and increase flooding potential in exposed areas. Intense rainfall can cause greater levels of erosion, meaning slips may become more frequent and cause more damage to our natural environment and built infrastructure.

In addition, our exposure to earthquakes, landslides, and tsunami means we can't be complacent.

The major short, medium and long term assumptions associated with GW's roles and responsibilities with regards to climate change and natural hazards are primarily based around current knowledge of regional climate impact projections, understanding of our exposure to natural hazards (and the interactions between the two), central government direction, and how the region's economy will need to change to transition to low carbon and be resilient to physical impacts. In addition to the Climate Change Response (Zero Carbon) Act which directs mitigation and adaptation activities, there are seven statutes³ which cover a broad range of private property and public good issues relating to land development and management, land use controls, flood risk management and its funding, flood emergency response and recovery, and flood protection insurance. Viewed broadly, the objectives of each individual statute are different with the consequence that the mechanisms and powers differ. There are, however, areas of overlap. Managing flood risk may involve resorting to more than one of the statutes, and, cooperative action between local authorities and/or central government to achieve effective flood risk management.

For the period of this Long Term Plan, land use and infrastructure planning, including the Wellington Regional Growth Framework and Let's Get Wellington Moving, environmental protection, risk management, adaptation planning and identification of GW's exposure to both the physical and transitional risks of climate change will be prominent.

Consideration of climate change as it relates to all of GW's operations requires scenario modelling, understanding climate impacts and carbon assessment, and proactively seeking out opportunities for synergies across adaptation and mitigation outcomes. Understanding the short term implications of the longer term impacts in order to bridge the temporal divide between climate-related horizons and

³ Building Act 2004 (& Building Code 1992); Civil Defence Emergency Management Act 2002; Land Drainage Act 1908; Local Government Act 2002; Resource Management Act 1991; Rivers Board Act 1908; Soil Conservation and Rivers Control Act 1941.

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GW's strategic planning is essential to shifting from climate narrative to climate action. This requires increased capability and capacity within the organisation to carry out this work.

Recognising that climate adaptation and mitigation needs national and regional cooperation, GW will need to continue to work actively with territorial authorities around the region and build relationships with central government.

The climate change implications for the Wellington Region are wide ranging, affect different parts of our region and our communities in different ways, and in many cases, are interrelated.

- Increased flooding, slips and landslides, affecting land, houses, roads, and other assets, public transport and rural productivity;
- Difficulty in obtaining insurance due to sea level rise and increasing flood events for the community, commercial enterprise and central and local government;
- Increased coastal inundation (some areas to become permanently inundated). Over 14,000 buildings and 173km of roads in the Wellington Region are at immediate risk for sea level rise to levels previously predicted for the end of the 21st century;
- Increased prevalence of drought delivering urban and rural water shortages, and increased pressure on water infrastructure, including water storage; saltwater intrusion on groundwater;
- Increased pressure on surface freshwater and groundwater, decreased water quality, and increased levels of toxic algae events in our waterways which can also significantly impact drinking water sources;
- Increased risks of pests (such as wasps, rodents and fruit flies) and diseases (including increased risks to human health) and biodiversity losses; biodiversity changes in the water supply catchments is also a risk factor for sustainable supply of drinking water;
- Several fold increase in urban and rural wildfire risks – a particular concern for the water supply catchments which may be rendered unusable for up to a year following a major wildfire;
- Increased human heat stress, and mental health issues (for people living in both urban and rural areas);
- Increased temperatures in urban centres due to human activities, large areas of concrete and buildings, and vehicles;
- Increased air pollution and seasonal allergies;
- Impacted rural economy due to reduced agricultural production;
- Reduced soil fertility, and,
- Ocean warming and acidification; decline in fish population.

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Some natural hazards are exacerbated by climate change effects. For example, sea level rise and more volatile weather systems can worsen the impacts of storm surge and increase flooding potential in exposed areas. Intense rainfall can cause greater levels of erosion, meaning slips may become more frequent and cause more damage to the natural environment and our built infrastructure.

In addition, our exposure to earthquakes, landslides, and tsunami means that we can't be complacent. Implications of these natural hazards for GW include:

- Displaced, isolated, injured, ill and deceased persons, mental health concerns, deterioration of community wellbeing;
- Loss of lifeline utility services – potable water supply and storm water drainage and port, road and rail networks, public transport, and,
- Degradation of ecological, physical, amenity and heritage values of areas and resources – parks^[1].

Alongside the Region's territorial authorities, GW works closely with the Wellington Region Emergency Management Office (WREMO) to reduce the risk associated with natural hazards and to ensure there is a sufficient immediate response after an adverse event has happened. This includes:

- building understanding and management of regional risks (including hazards, vulnerability and ways to prevent, manage and mitigate);
- increased investment in infrastructure, taking into account long term stressors and changes to strengthen and retain functionality post-event, and,
- having viable emergency plans including alternative infrastructure and projects, such as Wellington Water's Community Infrastructure Resilience Project which will provide an above ground emergency water supply network, a new 35-million litre back up reservoir, as well as readiness and response planning for the fragile wastewater network.

GW is responsible for almost \$1 billion of assets including flood protection works, public transport and water supply infrastructure, parks and forests. In preparing for dealing with climate change and natural hazard events, GW undertook a risk assessment in 2019 to know the extent of the risks the assets and services are exposed to, and understand what may be required in terms of responding or adapting to the risks. The results are in the table below.

	Water Supply	Public Transport	Flood Protection	Parks	E Sci	Harbours
Surface flooding	Moderate 6	High15	V High 25	Moderate 10	Low 4	Moderate 9
Landslips	Moderate 6	High15	V High 20	Moderate 9	Low 4	Moderate 10
Rainfall	Low3	High15	High15	Moderate 6	Low 4	Low 1
Coastal Flooding	Moderate 6	Moderate12	V High 20	Moderate 9	Low 2	Moderate 9
Coastal Erosion	Moderate 6	High15	V High 20	Moderate 9	Low 2	Moderate 10

^[1] Wellington Region Emergency Management Office Group Plan 2019-2024

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High winds	Low 1	High15	V High 20	High15	Low 1	Moderate 6
Extreme Temperatures	Low 1	High15	Moderate 10	Moderate 9	Low 1	Low 2
Fog and Humidity	Moderate 6	Low 2	Low 2	Low3	Low 1	Moderate 10
Drought	Moderate5	Moderate 6	Moderate 8	Moderate 9	Low 1	Low 2
Wildfire	Moderate6	Moderate 6	Low 2	Moderate 9	Moderate 9	Low 1
Earthquake	Moderate 4	High 12	V High 25	Moderate 9	Moderate 9	Moderate 6
Liquifaction	Moderate 5	High 12	V High 20	Moderate 9	Low 2	Low 1
Tsunami	Moderate 5	High 12	High 12	Moderate 9	Moderate 6	Moderate 9
Volcano	Low 1	Low 2	Low 1	Low 2	Low 2	Low 1

For our flood hazard investigation and design work, the Council endorsed the use of the Climate Change Design Criteria ^[2]. The criteria used are:

- The increase in rainfall intensity to be used for calculation will be 20% by 2100, and,
- The sea level rise to be used for calculation is 1 metre by 2100.

The management of risks posed by climate change is addressed through the application of three principles:

- 1 The Floodplain Management Plan (FMP) planning process is to identify and consider the potential for climate change in the determination of all new flood protection services.
- 2 The FMP reviews are to identify any changes in current knowledge concerning impacts of climate change and re-assess the capacity of services to meet defined service levels in this context.
- 3 The FMP guidelines are to reflect the above requirements.

Wellington Water has been working with NIWA since 2008 to achieve strong alignment between climate change science and infrastructure planning processes for the GW bulk water supply. The water supply strategic planning tool (Sustainable Yield Model) includes water resource inputs consistent with the Intergovernmental Panel on Climate Change (IPCC) fifth assessment. NIWA developed downscaled scenarios from six global climate models and four representative concentration pathways. These water resource scenarios are used to assess the impact of future network upgrades and demand management options. Funding provision to include an update to the bulk water planning tool consistent with the IPCC 6th assessment due 2021/22 is included in WWL's LTP recommendations.

Climate change is expected to affect the seasonal distribution of rainfall in the Wellington region. While there is significant variation across scenarios it is likely that a shift towards dryer winters and wetter summers over the remainder of the century will increase the need for bulk water storage.

^[2] Council Report 13.720, 10 September 2013

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WWL has also completed a detailed study on the impact of sea level rise on sustainable abstraction from the Waiwhetu aquifer. This has shown that the maximum yield from the Waterloo borefield may need to decrease by 15-30 ML/d under dry conditions for a sea level rise of 0.75-1.5 m respectively. The reason for the expected reduction in yield is the need to maintain sufficient pressure in the aquifer to prevent saline intrusion into the portion of the aquifer beneath the Wellington harbour.

Climate change and sea level rise are expected to have long term adverse effects on the water supply network. However, these are not expected to be significant over the next 30 years when compared with the impact of population growth. This is in part because the NIWA dataset used in the Sustainable Yield Model date back to 1890. This long record includes very significant dry periods in the early 1900's that are not reflected in the more recent records used for IPCC downscaling.

Level of uncertainty:

The level of uncertainty for climate change is high. While it is certain that climate change is happening it is less clear what the scale, timing and intensity of the impacts will be. The changes already observed in the region are compatible with the predictions from climate models, and there is broad scientific consensus regarding the projected impacts of a range of emissions scenarios. However, much depends on the actual reduction in emissions the world achieves in the next decade and beyond as this will significantly influence the magnitude of the impacts.

WREMO applies a risk assessment methodology to build an understanding of the likelihood and scale of consequence of the natural hazards facing Wellington. The Civil Defence Emergency Management '4Rs framework' is then applied to mitigate these risks, deploying Reduction, Readiness, Response and Recovery measures⁴.

Data sources:

Climate change and variability - Wellington Region, prepared for Greater Wellington Regional Council by NIWA, June 2017- <http://www.gw.govt.nz/assets/Climate-change/Climate-Change-and-Variability-report-Wlgtn-Regn-High-Res-with-Appendix.pdf>

Greater Wellington – Preparing Coastal Communities for Climate Change, June 2019 - <http://www.gw.govt.nz/assets/Uploads/Wellington-Regional-Coastal-Vulnerability-AssessmentJune-2019Final.pdf>

Wellington Region Natural Hazards Management Strategy - <http://www.gw.govt.nz/assets/Uploads/Wellington-region-natural-hazards-management-strategyMay-2019.pdf>

Wellington Region Natural Hazards Management Strategy Stock Take Issues Report - <http://www.gw.govt.nz/assets/council-hazards/WRNHMS-Stocktake-Issues-Report-Final-18-04-16.pdf>

Wellington Region Civil Defence Emergency Management Group Plan 2019 – 2024, WREMO - <https://wremo.nz/assets/Publications/Group-Plan-2019-2024.pdf>

⁴ Wellington Region Emergency Management Office Group Plan 2019-2024

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Detailed description:

The following projections for climate change in the Wellington region have been provided for two timelines to reflect different types of planning decisions. The projected changes all relate to the baseline of 1995. A more detailed analysis on a catchment by catchment basis can be found [here](#).

2040: Next few cycles of the Long Term Plan; asset management plans; resource consents

2090: Infrastructure and asset decisions that assume a life of 30-70 years and decisions for new land development areas; coastal management; any long-term structures.

CHANGES TO CLIMATE		IMPACTS AND IMPLICATIONS
Changing Temperatures and seasonality	<p>Average temperature will rise above present</p> <ul style="list-style-type: none"> - 0.5-1°C by 2040 - 1-3°C hotter by 2090 	<ul style="list-style-type: none"> • Increased human heat stress and mental health issues, rurally and in urban centres • Increased temperatures in urban centres due to human activities, large areas of concrete, buildings and vehicles • Increased risks of pests (such as wasps, rodents and fruit flies) and diseases (including risks to human health) and biodiversity losses • Reduced workplace productivity • Increased air pollution and seasonal allergies • Higher demand for drinking water at times when water is likely to be scarcer • Stress on ecosystems and associated impacts on health and economy • Range and habitat of native plants and animals will change-extinction of some species • Higher temperatures may allow for different crops to be grown. • Timing of seasonal activities such as flowering, breeding and migration will change.
	<p>More very hot days per year (above 25°C)</p> <ul style="list-style-type: none"> - Up to 30 days increase by 2040 - Up to 80 days increase by 2090 	
	<p>Fewer frost nights per year (below 0°C)</p> <ul style="list-style-type: none"> - Up to 15 fewer by 2040 - Up to 40 fewer by 2090 	
	<p>Seasonal change in temperature</p> <p>Temperature will change most in winter and autumn and least in spring</p>	
Changing rainfall patterns and intensity	<p>Change in rainfall patterns.</p> <p>Average annual rainfall</p> <ul style="list-style-type: none"> - 5-10% decrease to 10% increase by 2090 - There is high uncertainty in the range due to model differences, emissions scenarios and non-linear relationship between scenarios. 	<ul style="list-style-type: none"> • Increased prevalence of drought delivering urban and rural water shortages, and increased pressure on water infrastructure, including water storage • Saltwater intrusion on groundwater • Decreased water quality and increased levels of toxic algae which impacts biodiversity, recreation and drinking water sources • Increased flooding, slips and landslides affecting land, houses, roads and other assets, public transport and rural productivity • Flood protection infrastructure Levels of Service reduced overtime • Impacted rural community due to reduced agricultural production • Reduced soil fertility
	<p>Rainfall patterns within seasons will change:</p>	
	<p>Longer dry periods</p>	

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	<p>-More intense, more frequent drought</p> <p>Extreme rainfall -More frequent and more extreme rainfall events with up to 30% more rain during heavy rainfall days</p> <p>Changes in the number of days of very high and extreme forest fire danger - 50-150% increase</p> <p>Changes in rivers Mean annual low flow - Up to 80% decrease by 2090</p> <p>Mean annual flood - 20% decrease to 100% variation</p>	<ul style="list-style-type: none"> Regional parks negatively affected by both drought and flooding Higher stress on indigenous ecosystems, plants and animals, especially with drought Several fold increase in urban and rural wildfire risk – a particular concern for water supply catchments which may be rendered unusable for up to a year following a major wildfire
Changes to sea level and coastal hazards	<p>Permanent Sea level rise above present⁵: - 0.12-0.24 metres by 2040 - 0.68-1.75m by 2090</p>	<ul style="list-style-type: none"> Increased coastal inundation with some areas to become permanently inundated Over 14,000 buildings and 173km of roads are at immediate risk for sea level rise to levels predicted by the end of the century Saltwater incursion into freshwater habitats Difficulty in obtaining insurance due to sea level rise and increasing frequency of flood events for community, business and central and local government
	<p>More frequent storm surge (temporary raising of sea level during storms) more frequent and intense coastal flooding and coastal erosion</p>	
	<p>Saltwater intrusion into coastal groundwater, and further upstream in rivers</p>	
Oceanic changes	<p>Oceanic changes Acidification of the ocean</p> <p>General temperature rise of sea water.</p> <p>Marine heatwaves</p>	<ul style="list-style-type: none"> Altered marine ecosystems, particularly affecting hard shelled species Extinction of some species Changes to the range of species, location and abundance of fish and sea birds around NZ Impacts on aquaculture and fishing industries Reduced recreational benefits

⁵ Depending on the purpose, the appropriate sea level rise projections should be used. For example, a one metre projection is used for infrastructure planning, as it generally includes projects with a specific design life and standard. However, a range of sea level rise projections is used when applying a more customised risk-based hazards planning approach. See [Coastal hazards and climate change: Guidance for local government, December 2017](#) for further details.

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Wind	Extreme daily winds Extreme wind events are likely to increase by up to 12 days by 2090	<ul style="list-style-type: none"> • More frequent damage to trees, buildings and power lines • Will increase fire risk during hot, dry periods
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Wellington Region Climate change - present and future impacts summary – by Whaitua & Region

Te Awarua-o-Porirua whaitua			
Variable/pe-riod	2040	2090	Commentary
Average annual Temperature	+0.5°C to 1°C above present (+1°C to +1.5°C above pre-industrial)	+1C to +2.7C above present (+1.5C to +3.2C above pre-industrial)	Maximum warming in autumn and winter, least in spring Note reference to above present versus pre-industrial: About 0.5°C of warming has already happened from pre-industrial to present (1880-1909 compared to 1986-2005 reference periods). 1986-2005 is the base-reference for the IPCC models (mid-point 1995). Uncertainty range: lower range for significant emissions reduction (Paris agreement targets met), and upper range for high emissions
Average annual rainfall	0% to 5% increase	0% to 10% increase	There is a large uncertainty in the range of changes due to model differences and emission scenarios. Changes against emission scenarios are not necessarily linear. Greater likelihood of increases in autumn, winter and spring.
Amount of rain falling during heavy rainfall days (> 99 th percentile of daily rainfall)	0% to 15% increase	5% to 25% increase	Although the uncertainty in average rainfall range is high, extreme rainfall increases are more certain due to the increased amount of water vapour that the atmosphere can hold as it gets warmer (about 8% increase in saturation vapour per degree of warming)
Sea level rise	0.12 to 0.24 metres above present (0.38 to 0.5 metres above pre-industrial)	0.68 to 1.75 metres above present (0.94 to 2 metres above pre-industrial)	The projected sea level rise for 2090 is based on IPCC AR5 plus an estimated additional contribution from Antarctica, based on papers published in <i>Nature</i> in 2018. There is very high confidence in sea level rise projections, probably more so than any other variable. Note the difference between present and pre-industrial, as we have already had about 26cm of sea level rise so far. More regular storm events in the fragile coastal environment may also mean faster and more significant coastal retreat. See the link below for climate change, sea level rise and storm surge maps for the Region: https://mapping1.gw.govt.nz/gw/ClimateChange/
Number of hot days (above 25°C) per year	Between 0 and 10 days increase	Between 0 and 30 days increase	

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Number of frost nights (below 0°C) per year	Between 0 and 5 days reduction	Between 0 and 15 days reduction	
Change in the intensity of wind during windy days (>99 th percentile of daily mean)	1% to 2% increase	1% to 3% increase	
Change in annual number of windy days	2 to 4 days increase	2 to 10 days increase	
Change in annual growing degree days base 10	Increase between 200 and 300 GDD units	Increase between 300 and 900 GDD units	Measures potential for crop and pasture growth
Change in annual potential evapotranspiration deficit (mm)	Increase between 60 and 100 mm	Increase between 60 and 120 mm	Measures drought intensity
Change in rivers mean annual low flow discharge (MAL)	Decrease up to 40%	Decrease up to 40%	Measures water shortage in the catchments
Change in rivers mean annual flood discharge (MAF)	Increase up to 40%	Increase up to 80%	Measures flood potential in the catchments
Changes in number of days of very high and extreme forest fire danger	50% to 100% increase	100% to 150% increase	These figures are given by IPCC model averages. Individual models can show much higher increases of up to 700%
Key environmental impacts	<p>Increased flood intensity</p> <p>Increased coastal inundation (some areas to become permanently inundated)</p> <p>Increased erosion</p> <p>Reduced soil fertility</p> <p>Decreased water quality</p> <p>Groundwater quality and availability pressures</p> <p>Salt water intrusion</p> <p>Groundwater intrusion</p> <p>Increased pressure on water storage</p> <p>Biodiversity losses</p> <p>Increased pests such as wasps and rodents</p> <p>Ocean acidification</p>		

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	Decline in fish population Increased wildfire Increased allergies (e.g. pollen)
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Wellington Harbour & Hutt Valley whaitua			
Variable/period	2040	2090	Commentary
Average annual Temperature	+0.5°C to 1°C above present (+1°C to +1.5°C above pre-industrial)	+1°C to +2.5°C above present (+1.5°C to +3°C above pre-industrial)	Maximum warming in summer and autumn, least in spring and winter Note reference to above present versus pre-industrial: About 0.5°C of warming has already happened from pre-industrial to present (1880-1909 compared to 1986-2005 reference periods). 1986-2005 is the base-reference for the IPCC models (mid-point 1995). Uncertainty range: lower range for significant emissions reduction (Paris agreement targets met), and upper range for high emissions
Average annual rainfall	5% decrease to 10% increase	5% decrease to 10% increase	There is a large uncertainty in the range of changes due to model differences and emission scenarios. Changes against emission scenarios are not necessarily linear. Greater likelihood of positive changes in autumn, winter and spring.
Amount of rain falling during heavy rainfall days (> 99 th percentile of daily rainfall)	5% to 15% increase	5% to 30% increase	Although the uncertainty in average rainfall range is high, extreme rainfall increases are more certain due to the increased amount of water vapour that the atmosphere can hold as it gets warmer (about 8% increase in saturation vapour per degree of warming)
Sea level rise	0.12 to 0.24 metres above present (0.38 to 0.5 metres above pre-industrial)	0.68 to 1.75 metres above present (0.94 to 2 metres above pre-industrial)	The projected sea level rise for 2090 is based on IPCC AR5 plus an estimated additional contribution from Antarctica, based on papers published in <i>Nature</i> in 2018. There is very high confidence in sea level rise projections, probably more so than any other variable. Note the difference between present and pre-industrial, as we have already had about 26cm of sea level rise so far. More regular storm events in the fragile coastal environment may also mean faster and more significant coastal retreat. See the link below for climate change, sea level rise and storm surge maps for the Region: https://mapping1.gw.govt.nz/gw/ClimateChange/
Number of hot days (above 25°C) per year	Between 0 and 10 days increase	Between 0 and 40 days increase	
Number of frost nights	Between 0 and 5	Between 0 and 10	

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(below 0°C) per year	days re- duction	days re- duction	
Change in the intensity of wind during windy days (>99 th percen- tile of daily mean)	1% to 2% increase	1% to 4% increase	
Change in an- nual number of windy days	2 to 6 days in- crease	2 to 12 days in- crease	
Change in an- nual growing degree days base 10	Increase between 0 and 300 GDD units	Increase between 200 and 800 GDD units	Measures potential for crop and pasture growth
Change in an- nual potential evapotranspi- ration deficit (mm)	Increase between 40 and 100 mm	Increase between 40 and 140 mm	Measures drought intensity
Change in riv- ers mean an- nual low flow discharge (MAL)	Decrease up to 40%	Decrease up to 40%	Measures water shortage in the catchments
Change in riv- ers mean an- nual flood dis- charge (MAF)	Increase up to 40%	Increase up to 100%	Measures flood potential in the catchments
Changes in number of days of very high and ex- treme forest fire danger	50% to 100% in- crease	100% to 150% in- crease	These figures are given by IPCC model averages. Indi- vidual models can show much higher increases of up to 700%
Key environ- mental im- pacts	<p>Increased flood intensity</p> <p>Increased coastal inundation (some areas to become permanently inundated)</p> <p>Increased erosion</p> <p>Reduced soil fertility</p> <p>Decreased water quality</p> <p>Groundwater quality and availability pressures</p> <p>Saltwater intrusion</p> <p>Groundwater intrusion</p> <p>Increased pressure on water storage</p> <p>Biodiversity losses</p> <p>Increased pests such as wasps and rodents</p> <p>Ocean acidification</p> <p>Decline in fish population</p> <p>Increased wildfire</p>		

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Increased allergies (e.g. pollen)			
Kāpiti Coast whaitua			
Variable/period	2040	2090	Commentary
Average annual Temperature	+0.5°C to 1°C above present (+1°C to +1°C above pre-industrial)	+1°C to +2.7°C above present (+1.5°C to +3.2°C above pre-industrial)	Maximum warming in autumn and winter, least in spring Note reference to above present versus pre-industrial: About 0.5°C of warming has already happened from pre-industrial to present (1880-1909 compared to 1986-2005 reference periods). 1986-2005 is the base-reference for the IPCC models (mid-point 1995). Uncertainty range: lower range for significant emissions reduction (Paris agreement targets met), and upper range for high emissions.
Average annual rainfall	0% to 5% increase	0% to 10% increase	There is a large uncertainty in the range of changes due to model differences and emission scenarios. Changes against emission scenarios are not necessarily linear. Greater likelihood of positive changes in autumn, winter and spring.
Amount of rain falling during heavy rainfall days (> 99 th percentile of daily rainfall)	0% to 10% increase	0% to 15% increase	Although the uncertainty in average rainfall range is high, extreme rainfall increases are more certain due to the increased amount of water vapour that the atmosphere can hold as it gets warmer (about 8% increase in saturation vapour per degree of warming)
Sea level rise	0.12 to 0.24 metres above present (0.38 to 0.5 metres above pre-industrial)	0.68 to 1.75 metres above present (0.94 to 2 metres above pre-industrial)	The projected sea level rise for 2090 is based on IPCC AR5 plus an estimated additional contribution from Antarctica, based on papers published in <i>Nature</i> in 2018. There is very high confidence in sea level rise projections, probably more so than any other variable. Note the difference between present and pre-industrial, as we have already had about 26cm of sea level rise so far. More regular storm events in the fragile coastal environment may also mean faster and more significant coastal retreat. See the link below for climate change, sea level rise and storm surge maps for the Region: https://mapping1.gw.govt.nz/gw/ClimateChange/
Number of hot days (above 25°C) per year	Between 5 and 10 days increase	Between 5 and 50 days increase	
Number of frost nights (below 0°C) per year	Between 0 and 5 days reduction	Between 0 and 15 days reduction	

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Change in the intensity of wind during windy days (>99 th percentile of daily mean)	0% to 2% increase	0% to 3% increase	
Change in annual number of windy days	0 to 4 days increase	0 to 6 days increase	
Change in annual growing degree days base 10	Increase between 0 and 300 GDD units	Increase between 200 and 900 GDD units	Measures potential for crop and pasture growth
Change in annual potential evapotranspiration deficit (mm)	Increase between 40 and 80 mm	Increase between 40 and 100 mm	Measures drought intensity
Change in rivers mean annual low flow discharge (MAL)	Decrease up to 40%	Decrease up to 40%	Measures water shortage in the catchments
Change in rivers mean annual flood discharge (MAF)	Between 20% decrease and 60% increase depending on catchment	Increase up to 60%	Measures flood potential in the catchments
Changes in number of days of very high and extreme forest fire danger	50% to 100% increase	100% to 150% increase	These figures are given by IPCC model averages. Individual models can show much higher increases of up to 700%
Key environmental impacts	<p>Increased flood intensity</p> <p>Increased coastal inundation (some areas to become permanently inundated)</p> <p>Increased erosion</p> <p>Reduced soil fertility</p> <p>Decreased water quality</p> <p>Groundwater quality and availability pressures</p> <p>Saltwater intrusion</p> <p>Groundwater intrusion</p> <p>Increased pressure on water storage</p> <p>Biodiversity losses</p> <p>Increased pests such as wasps and rodents</p> <p>Ocean acidification</p> <p>Decline in fish population</p>		

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	Increased wildfire Increased allergies (e.g. pollen)
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Ruamāhanga whaitua			
Variable/pe-riod	2040	2090	Commentary
Average annual Temperature	+0.7°C to 1°C above present (+1.2°C to +1.5°C above pre-industrial)	+1.2°C to +3°C above present (+1.7°C to +3.5°C above pre-industrial)	Maximum warming in autumn and summer, least in winter Note reference to above present versus pre-industrial: About 0.5°C of warming has already happened from pre-industrial to present (1880-1909 compared to 1986-2005 reference periods). 1986-2005 is the base-reference for the IPCC models (mid-point 1995). Uncertainty range: lower range for significant emissions reduction (Paris agreement targets met), and upper range for high emissions.
Average annual rainfall	5% decrease to 5% increase	0% to 10% decrease	There is a large uncertainty in the range of changes due to model differences and emission scenarios. Changes against emission scenarios are not necessarily linear. Greater likelihood of positive changes in autumn, winter and spring.
Amount of rain falling during heavy rainfall days (> 99 th percentile of daily rainfall)	0% to 10% increase	0% to 20% increase	Although the uncertainty in average rainfall range is high, extreme rainfall increases are more certain due to the increased amount of water vapour that the atmosphere can hold as it gets warmer (about 8% increase in saturation vapour per degree of warming)
Sea level rise	0.12 to 0.24 metres above present (0.38 to 0.5 metres above pre-industrial)	0.68 to 1.75 metres above present (0.94 to 2 metres above pre-industrial)	The projected sea level rise for 2090 is based on IPCC AR5 plus an estimated additional contribution from Antarctica, based on papers published in <i>Nature</i> in 2018. There is very high confidence in sea level rise projections, probably more so than any other variable. Note the difference between present and pre-industrial, as we have already had about 26cm of sea level rise so far. More regular storm events in the fragile coastal environment may also mean faster and more significant coastal retreat. See the link below for climate change, sea level rise and storm surge maps for the Region: https://mapping1.gw.govt.nz/gw/ClimateChange/
Number of hot days (above 25°C) per year	Between 0 and 30 days increase	Between 0 and 80 days increase	

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Number of frost nights (below 0°C) per year	Between 0 and 15 days reduction	Between 0 and 40 days reduction	
Change in the intensity of wind during windy days (>99 th percentile of daily mean)	0% to 3% increase	1% to 4% increase	
Change in annual number of windy days	0 to 4 days increase	0 to 12 days increase	
Change in annual growing degree days base 10	Increase between 0 and 300 GDD units	Increase between 200 and 1000 GDD units	Measures potential for crop and pasture growth
Change in annual potential evapotranspiration deficit (mm)	Increase between 20 and 120 mm	Increase between 0 and 180 mm	Measures drought intensity
Change in rivers mean annual low flow discharge (MAL)	Decrease up to 60%	Decrease up to 80%	Measures water shortage in the catchments
Change in rivers mean annual flood discharge (MAF)	Between 20% decrease and 40% increase depending on catchment	Between 20% decrease and 60% increase depending on catchment	Measures flood potential in the catchments
Changes in number of days of very high and extreme forest fire danger	100% to 150% increase	100% to 150% increase	These figures are given by IPCC model averages. Individual models can show much higher increases of up to 700%
Key environmental impacts	Increased flood intensity Increased coastal inundation (some areas to become permanently inundated) Increased erosion Reduced soil fertility Decreased water quality Groundwater quality and availability pressures Saltwater intrusion Increased in drought frequency and intensity Increased pressure on water storage Biodiversity losses		

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	<p>Increased pests such as wasps and rodents</p> <p>High potential for fruit fly establishment</p> <p>Ocean acidification</p> <p>Decline in fish population</p> <p>Increased wildfire</p> <p>Increased allergies (e.g. pollen)</p>
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Wairarapa Coast whaitua			
Variable/period	2040	2090	Commentary
Average annual Temperature	+0.5°C to 1°C above present (+1°C to +1.5°C above pre-industrial)	+1°C to +3°C above present (+1.5°C to +3.5°C above pre-industrial)	<p>Maximum warming in autumn and summer, least in spring</p> <p>Note reference to above present versus pre-industrial: About 0.5°C of warming has already happened from pre-industrial to present (1880-1909 compared to 1986-2005 reference periods). 1986-2005 is the base-reference for the IPCC models (mid-point 1995).</p> <p>Uncertainty range: lower range for RCP4.5 and upper range for RCP8.5</p>
Average annual rainfall	5% decrease to 5% increase	10% decrease to 5% increase	There is a large uncertainty in the range of changes due to model differences and emission scenarios. Changes against emission scenarios are not necessarily linear. Greater likelihood of positive changes in autumn, winter and spring.
Amount of rain falling during heavy rainfall days (> 99 th percentile of daily rainfall)	0% to 15% increase	0% to 30% increase	Although the uncertainty in average rainfall range is high, extreme rainfall increases are more certain due to the increased amount of water vapour that the atmosphere can hold as it gets warmer (about 8% increase in saturation vapour per degree of warming)
Sea level rise	0.12 to 0.24 metres above present (0.38 to 0.5 metres above pre-industrial)	0.68 to 1.75 metres above present (0.94 to 2 metres above pre-industrial)	<p>The projected sea level rise for 2090 is based on IPCC AR5 plus an estimated additional contribution from Antarctica, based on papers published in <i>Nature</i> in 2018. There is very high confidence in sea level rise projections, probably more so than any other variable. Note the difference between present and pre-industrial, as we have already had about 26cm of sea level rise so far.</p> <p>More regular storm events in the fragile coastal environment may also mean faster and more significant coastal retreat. See the link below for climate change, sea level rise and storm surge maps for the Region:</p> <p>https://mapping1.gw.govt.nz/gw/ClimateChange/</p>

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Number of hot days (above 25°C) per year	Between 5 and 30 days increase	Between 15 and 60 days increase	
Number of frost nights (below 0°C) per year	Between 0 and 5 days reduction	Between 0 and 15 days reduction	
Change in the intensity of wind during windy days (>99 th percentile of daily mean)	0% to 3% increase	1% to 4% increase	
Change in annual number of windy days	0 to 6 days increase	0 to 10 days increase	
Change in annual growing degree days base 10	Increase between 0 and 300 GDD units	Increase between 200 and 900 GDD units	Measures potential for crop and pasture growth
Change in annual potential evapotranspiration deficit (mm)	Increase between 40 and 120 mm	Increase between 40 and 160 mm	Measures drought intensity
Change in rivers mean annual low flow discharge (MAL)	Decrease up to 60%	Decrease up to 80%	Measures water shortage in the catchments
Change in rivers mean annual flood discharge (MAF)	Between 20% decrease and 20% increase depending on catchment	Between 20% decrease and 60% increase depending on catchment	Measures flood potential in the catchments
Changes in number of days of very high and extreme forest fire danger	100% to 150% increase	100% to 150% increase	These figures are given by IPCC model averages. Individual models can show much higher increases of up to 700%
Key environmental impacts	Increased flood intensity Increased coastal inundation (some areas to become permanently inundated) Increased erosion Reduced soil fertility Decreased water quality Ground water quality and availability pressures		

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	Saltwater intrusion Increase in drought frequency and intensity Increased pressure on water storage Biodiversity losses Increased pests such as wasps and rodents High potential for fruit fly establishment Ocean acidification Decline in fish population Increased wildfire Increased allergies (e.g. pollen)
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Climate extremes predictions:

- Warm nights (>15°C) could double in Wellington and triple in Masterton by the end of the century, while cold days (<10°C) may entirely disappear;
- Heat wave days (i.e. at least three consecutive hot days) could increase by fivefold in the Wairarapa;
- Unprecedented weather: very long duration heat waves (more than 10 or 15 consecutive hot days) will start to occur in the future, especially in the Wairarapa;
- Long dry spells (10 or more consecutive days without rain) are expected to increase by up to 50% in the Wairarapa (additional 20 days per year);
- High impact, short duration extreme rainfall events (expected to occur once every 100 years or longer) are predicted to occur more frequently, and also produce up to 13% more rain per degree of warming.

Wellington Region			
Variable/period	2040	2090	Commentary
Average annual Temperature	+0.5°C to 1°C above present (1986-2005) (+1°C to +1.5°C above pre-industrial)	+1°C to +3°C above present (1986-2005) (+1.5°C to +3.5°C above pre-industrial)	Maximum warming in autumn and winter, least in spring Note reference to above present versus pre-industrial: About 0.5C of warming has already happened from pre-industrial to present (1880-1909 compared to 1986-2005 reference periods). 1986-2005 is the base-reference for the IPCC models (mid-point 1995). Uncertainty range: lower range for significant emissions reduction (Paris Agreement targets met), and upper range for high emissions
Average annual rainfall	5% decrease to 10% increase	10% decrease to 10% increase	There is a large uncertainty in the range of changes due to model differences and emission scenarios. Changes against emission scenarios are not necessarily linear, and depend on geographical area and

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			season. Greater likelihood of increases in the west and decreases in the east.
Amount of rain falling during heavy rainfall days (> 99 th percentile of daily rainfall)	Up to 15% increase	Up to 30% increase	Although the uncertainty in average rainfall range is high, extreme rainfall increases are more certain due to the increased amount of water vapour that the atmosphere can hold as it gets warmer (about 8% increase in saturation vapour per degree of warming)
Sea level rise	0.12 to 0.24 metres above present (0.38 to 0.5 metres above pre-industrial)	0.68 to 1.75 metres above present (0.94 to 2 metres above pre-industrial)	The projected sea level rise for 2090 is based on IPCC AR5 plus an estimated additional contribution from Antarctica, based on papers published in <i>Nature</i> in 2018. Note the difference between present and pre-industrial, as we have already had about 26cm of sea level rise so far. More regular storm events in the fragile coastal environment may also mean faster and more significant coastal retreat. See the link below for climate change, sea level rise and storm surge maps for the Region: https://mapping1.gw.govt.nz/gw/ClimateChange/
Number of hot days (above 25°C) per year	Up to 30 days increase	Up to 80 days increase	Maximum increases in the Wairarapa, and minimum increases over the Tararua ranges.
Number of frost nights (below 0°C) per year	Up to 15 days reduction	Up to 40 days reduction	Maximum reduction over the Tararua ranges.
Change in the intensity of wind during windy days (>99 th percentile of daily mean)	Up to 2% increase	Up to 4% increase	
Change in annual number of windy days	Up to 4 days increase	Up to 12 days increase	
Change in annual growing degree days (GDD) base 10	Up to 300 GDD units	Between 200 and 1000 GDD units increase	Measures potential for crop and pasture growth
Change in annual potential evapotranspiration deficit (mm)	Between 20 and 120 mm increase	Up to 180 mm increase	Measures drought intensity
Change in rivers mean annual low flow discharge (MAL)	Up to 60% decrease	Up to 80% decrease	Measures water shortage in the catchments

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Change in rivers mean annual flood discharge (MAF)	-20% to 60% variation	-20% to 100% variation	Measures flood potential in the catchments
Changes in number of days of very high and extreme forest fire danger	50% to 150% increase	100% to 150% increase	These figures are given by IPCC model averages. Individual models can show much higher increases of up to 700%
Key environmental impacts	<p>Increased flood intensity</p> <p>Increased coastal inundation (some areas to become permanently inundated)</p> <p>Increased erosion</p> <p>Reduced soil fertility</p> <p>Decreased water quality</p> <p>Groundwater quality and availability pressures</p> <p>Salt water intrusion</p> <p>Ground water intrusion</p> <p>Increased pressure on water storage</p> <p>Biodiversity losses</p> <p>Increased pests such as wasps and rodents</p> <p>Ocean acidification</p> <p>Decline in fish population</p> <p>Increased wildfire</p> <p>Increased allergies (e.g. pollen)</p> <p>Increased drought frequency and intensity</p> <p>High potential for fruit fly establishment</p>		

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Natural Hazards (other than climate change) – WREMO Group Plan 2019-2024

Summary of risk analysis

Hazard	Likelihood – based on Annual Exceedance Probability (AEP) %	Impact – largest predicted consequence across built, lifeline, health and safety environments	Resulting risk rating
Human pandemic	<2-1	Catastrophic	High
6.2 magnitude shallow earthquake on the Wellington Fault	<1-01	Catastrophic	
7.5 magnitude earthquake on the Wellington Fault	<1-01	Catastrophic	
Distant source tsunami	<1-01	Catastrophic	
Local tsunami – Hikurangi Subduction Zone	<0.1-0.04	Catastrophic	
Flooding – stopbank breach along the Hutt River	<1-01	Major	
Landslide – affecting State Highway 1 or 2	<1-01	Major	
Lifeline utility failure – power for a sustained period (e.g. a week or more)	>2	Moderate	
Severe weather – surface flooding and storm surge	>2	Minor	
Volcanic eruption – ash cloud	<0.04	Catastrophic	
Flooding – Waikanae River (100-year event)	<2-1	Minor	
Flooding – Wairarapa (Ruamahanga River – 100-year event)	<2-1	Minor	
Urban fire or wild fire	<2-1	Minor	
Multi-year drought	<2-1	Insignificant	Low
Hazardous substances	>2	Insignificant	

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Expected effects and requirements over the life of the Long Term Plan against each GW activity group:

In some cases, actions which reduce our exposure to natural hazards and climate change can also bring about other opportunities and benefits.

When we work with the territorial authorities in the Region to prepare for increased rainfall events, by adopting urban development techniques that catch storm water and slow it down, we reduce flooding impacts on properties and help protect water quality by reducing the amount of water picking up contaminants from our roads and carrying it in to our streams, rivers and harbours.

When we work to 'flip our fleet' of buses from diesel to electric, not only do we reduce our impact on the climate, we will also reduce our exposure to increasing carbon prices and improve air quality in our urban centres. When we work with our communities to protect wetlands, not only do we reduce our impact on the climate, we also enhance the ability of the surrounding land to cope with drought and intense rain fall events and protect biodiversity. When our communities install domestic rain water tanks, they not only have a short term water supply in the event of a disruption to the water network, they reduce the rainwater runoff from their property and delay the inundation of the piped network, or damaging discharge to streams and they can also keep watering our gardens in times of drought.

Greater Wellington plays an important role in coordinating actions which help us address natural hazards and climate change - in fact climate change impacts the majority of our operations. We need to ensure this long term plan becomes, in part, our long term climate action plan.

This not only means directing resources to our services at risk from climate change and natural hazards and to assist our organisational carbon neutrality target of 2030, but also how we make decisions.

Any long term decisions need to account for a range of potential climate outcomes and have a built-in ability to adapt as needed. Climate adaptation and mitigation timeframes and planning timeframes need to be well understood to ensure timely planning processes well ahead of the impacts being felt. These same planning processes also need to have the ability to be changed when new information and innovation become available. Infrastructure, asset and planning decisions that assume a lifespan for 50-100 years already incorporate climate change projections in their initial design, particularly important when it is expensive to alter or reverse them. Hard decisions will need to be made now, potentially without full information. When a decision relates to a long-lived asset, having full information on climate impacts and emissions costs is highly unlikely, so our approaches will need to have an adaptability to them and a built in programme of monitoring and review, to be able to incorporate new challenges and opportunities as they arise.

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	1-3 years	4-10 years	11-30 years	31-100 years
Environment and Flood Protection	<p>Growth in demand for water monitoring Increased toxic algae events, societal pressure to clean up waterways, demand for community engagement on climate-related issues</p> <p>More frequent and intense flood events with the potential to cause increased damage to property and infrastructure.</p> <p>Planning for the relocation of essential low lying infrastructure, retirement of riparian areas, Higher vegetation growth rates Increased insurance premiums.</p>	<p>Climate change causing decline in water quality and quantity and biodiversity, Increasing pest risk, societal demand to restore natural environment, demand for updated climate projection data for rural and urban communities</p> <p>Pressure to protect communities will increase along with the need to consider managed retreat and avoiding development in high risk locations.</p> <p>More frequent and intense flood events with the potential to cause increased damage to property and damage infrastructure.</p> <p>Continued issues with legacy / heritage assets, together with the possibility of an increased risk of biosecurity related issues.</p>	<p>Biodiversity loss and increased biosecurity threats increasing demand for pest control</p> <p>Diminishing water quality reducing recreational, amenity, cultural values</p> <p>Increased wild fire risk affecting water quality and biodiversity</p> <p>Potential environmental degradation in new areas of land development caused by the need to retreat from existing developed areas</p> <p>Flood frequency will test existing flood protection defences.</p> <p>Flood defences that protect existing communities may need to be raised in some areas (e.g. Hutt, Waikanae, Otaki, Porirua and Masterton).</p> <p>Pressure to protect communities will increase managed retreat should actively be considered in some areas.</p> <p>Increased wild fire risk affecting regional parks</p> <p>Degradation of ecological, physical, amenity and heritage values of parks</p>	<p>Substantial biodiversity loss due to sea level rise, inland flooding, drought</p> <p>Several fold increase in urban and rural wild fire risks</p> <p>Levels of service will need to have been adjusted to ensure fair retreat and avoidance from areas frequently impacted by adverse weather events</p>
Water supply	<p>Increasing demand for seasonal storage.</p> <p>Proactive leak detection and reducing consumption</p> <p>Non-asset solutions such as community education and improved network efficiency, and/or bring forward timing for next source development. Investment in catchment management.</p>	<p>Increased potential of loss of bulk water supply services through sudden, adverse events such as earthquake, tsunami, storm surge and flooding.</p> <p>Continue improving network efficiency and reducing customer consumption.</p>	<p>Increased wild fire risk affecting water supply.</p> <p>Increased pressure on water supply, very likely needing a new source, and greater seasonal demand.</p> <p>Need to expand the supply network to accommodate growth.</p> <p>Improved energy and water efficiency can be achieved through implementing behaviour change and smart water meters.</p>	

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		<p>Ongoing non-asset solutions such as community education and leak reduction, watering restrictions in extreme cases and/or increase network capacity as summer peak demand increasingly exceeds network. Potentially significant changes to water treatment plants.</p>	<p>Sea level rise resulting in increased likelihood of saline intrusion into the Waiwhetu aquifer and reduced sustainable yield requiring reduced abstraction over the long term to increase aquifer pressures and offset the effect of sea level rise. Possible changes to catchment biodiversity adversely affecting water quality. Increase in likelihood of catchment fires affecting source availability needing monitoring of long term changes and incorporation of fire risk management.</p>	
<p>Public transport and Regional Land Transport Planning</p>	<p>Increased size and nature of weather events will drive increased transport infrastructure repair costs, increased insurance costs, and drive need for capital expenditure.</p> <p>Likely to also result in increased closures on road and rail transport networks in coastal, low lying or slips prone areas.</p> <p>Any major earthquake could have significant impacts on transport networks, including medium/long term closures of some key elements of the road and rail transport networks.</p> <p>Opportunity to embed climate mitigation resilience and adaptation into regional collaborations such as Regional Growth Framework and Wellington City via Let's Get Wellington Moving.</p>	<p>Planning for resilience in the road and rail transport networks will continue in response to the predicted impact of adverse events and climate change. Funding of building this resilience will likely be an issue.</p> <p>Increased requirement for capital expenditure for resilient Public Transport road and rail transport networks.</p> <p>Need more data collection around weather/climatic events and equivalent service disruption to be able to identify when to change our service – both short-term responses to large scale events, and over time to increasing climate change impacts.</p>	<p>Planning for resilience in the road and rail networks will continue in response to the predicted impact of adverse events and climate change. Funding will likely remain an issue.</p> <p>Adaptation, for our own assets and service provision, such as rerouting our road and rail transport networks in response to sea level rise, storms etc., and for the resilience of our communities.</p> <p>Damage to wharf infrastructure for ferry services. Potential increase in demand for ferry services due to increased frequency of road disruptions caused by extreme weather events.</p> <p>Need to increase our level of service or resilience when responding to climatic event damage (i.e. building in enhanced resilience rather than just replacing or avoiding natural hazards). NZTA as a funding partner is a barrier to this approach.</p> <p>Note all of these will be exacerbated by population growth.</p>	

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<p>Regional Strategy and Partnerships</p>	<p>Climate change coordination and leadership function across the region for us as regional council, working with territorial authorities and actively advocating for regional benefit to central government. Increased community expectation of explicit climate action amongst other improved environmental outcomes. Partnership on climate discussions with mana whenua is needed. Spatial planning work needs to be informed by the same climate change assumptions as our other projects. Tension between providing more housing while avoiding existing and greenfield development on vulnerable land. Lobby government to change legislation such as RMA, to encourage spatial planning and the use of economic instruments. First National Climate Change Risk Assessment (2020) and Adaptation Plan (2022) will be written with expectations of local government to provide risk assessment information including measures to reduce risk exposure. Foster partnerships with TAs to minimise tensions and promote the setting and achievement of proactive environmental goals. Decreased reputation, low awareness of GW's responsibility as an environmental steward; dependency on multi agency contributions and political will to achieve outcomes leading to confusion about roles and accountability.</p>	<p>Ongoing adequate funding for WREMO in the face of increasing climatic weather events.</p> <p>Ability to meet increasing insurance premiums. Increasing pressure on local government to protect communities and community assets from adverse events.</p> <p>Increased need to seek central government funding mechanisms to provide equitable responses to increasing demand for community resilience actions.</p>	<p>Increased potential for the deterioration of community wellbeing through people being displaced, injured, isolated etc., and community seeking local government support.</p>	
<p>Whole organisation</p>	<p>Increased expectation to provide leadership; expectation to effectively communicating during and after adverse events. Business Continuity Planning critical.</p>	<p>The possibility that the region will have to cope with a severe adverse event in this time frame is perceived as being greater than previously thought.</p>	<p>The likelihood of a severe adverse event in this timeframe is greater.</p> <p>Building increased resilience into infrastructure will likely result in increased capital costs.</p>	

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	<p>Risk of increased closures on road and rail transport networks in coastal, low lying or slip prone areas.</p>	<p>Building resilience into infrastructure may result in increased capital costs.</p> <p>Flood frequency and severity increases.</p> <p>Future flooding, storm and earthquake events resulting in increased closures of road and rail transport networks in coastal, low lying or slip prone areas with links to some communities disrupted by adverse events and sea level rises.</p> <p>Loss of bulk water supply to the metro cities.</p> <p>Increasing insurance costs.</p> <p>Comprehensive adaptation plan(s) covering all functions and services required.</p> <p>Increased requirement to work with the community in raising awareness of climate change mitigation and adaptation solutions.</p> <p>There may be issues with heritage/legacy assets exposed to extreme weather events (dams, heritage culverts, pipelines, water supply intakes and flood protection infrastructure).</p>	<p>Adaption to low/no emission methods for maintenance and construction of facilities and services.</p> <p>Effects of climate change may require further migration of essential services inland or away from riparian edges.</p> <p>Unsettling our business operation through adverse events Need for stronger business continuity planning</p> <p>Ensuring wider rollout of video conferencing technology for internal business continuity</p> <p>Increases in demand for water supply network to serve increased housing</p> <p>More people potentially at risk living in hazard zones</p>	
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Climate Committee
25 May 2021
Report 2021.189



For Decision

Research into the transition to a low emissions economy

Te take mō te pūrongo

Purpose

1. To request Climate Committee approval to establish a research workstream and commission research into the transition to a low emissions economy for the Wellington region.

He tūtohu

Recommendation

That the Committee:

- 1 **Notes** the intention to undertake research on key topics to inform policy development
- 2 **Notes** that it has a leadership role in shaping the just transition to a low emissions economy
- 3 **Notes** there has been considerable research into the transition at the national level
- 4 **Notes** that the Wellington region has a unique emissions profile, which is relatively low emissions compared to the rest of New Zealand
- 5 **Recommends** that officers' commission research in partnership with WellingtonNZ into the economic transition to inform the Regional Economic Development plan and direct action specifically for the Wellington region, that takes account of the nature of our economy and that supports a just transition.
- 6 **Considers** any future priorities for future research.

Te tāhū kōrero

Background

2. In developing the strategic priorities for the Climate Committee, it was noted that:
 - a Research will be helpful to underpin policy development.
 - b Transformational change is required to both reduce greenhouse gas emissions and limit the severity of the impacts of climate change on our people and places.
 - c there will be challenges, but there will also be opportunities to deliver a cleaner and more resilient environment, while ensuring solutions are fair and equitable, and

- d Greater Wellington has a leadership role to play in shaping the just transition to a low emissions economy.
3. Transformational change in the make-up of our economy is required to limit the impacts of climate change and reduce the damage it will bring to our people and places. This will not happen by chance or if left to market forces. If we continue to take an incremental approach, our exposure to climate risks around the Wellington Region will only increase and eventually become too expensive for councils (i.e. ratepayers) to manage. We may also miss out on the opportunities that the transition presents including generating new jobs and new markets while avoiding the lock in of high-carbon, maladapted investments. This means we need to plan for the change.
4. There is mounting pressure to both increase housing stock and limit the economic impact of the COVID-19 pandemic. Responses to these pressures could derail the transition and/or increase the impacts and risks facing our region, but they could also set us up on the right path. They could also result in exacerbating issues being faced by our most vulnerable people and communities.
5. Some key initiatives are already underway that will be critical to the success or otherwise of our transition to a low emissions region.
6. The Wellington Regional Growth Framework has been initiated to ensure that growth in the region is well planned. Four key challenges have been identified in planning for growth and development in the Wellington region. These are:
 - a a lack of sufficient and affordable housing
 - b the impacts of natural hazards and climate change on our environment
 - c inequitable access to social, educational and economic opportunities, and
 - d unequal access of tangata whenua to housing.
7. Council and WellingtonNZ are leading the development of the Regional Economic Development plan with the Councils across the region and other stakeholders. This plan will identify the key interventions needed at a regional level to maximise the economic benefits to the region, including consideration of different economic scenarios and approaches. The plan should reflect the strategies of the new Long Term Plans together with the COVID recovery response.
8. The first phase of the Regional Economic Development Plan has been identifying the current plans, documents and information sources as well as proposing a framework for moving into a second phase with stakeholder engagement and development of an action plan. The plan will ultimately be governed by the Wellington Regional Leadership Committee (Joint Committee) alongside the Wellington Regional Growth Framework.
9. Existing regional plans have not yet captured the opportunity or impact of economic transitions driven by climate change. The Regional Economic Development plan must therefore include climate change consideration to deliver on its role to best position the region in its transition to a low carbon economy. What this would entail has not yet been explored at the regional level.
10. There is an existing body of research on the transition to a low emissions economy that can be drawn from. There have been national scale investigations (e.g. New Zealand

Productivity Commission¹, Royal Society of New Zealand² and Motu³) and regional scale initiatives (e.g. Taranaki⁴).

11. We have good information on our regional economy, including what this consists of⁵, and our regional emissions^{6,7}. We have information on the Māori economy⁸ and have worked alongside our Māori communities to develop Te Matarau a Māui, a Māori Economic Development strategy for the Wellington region⁹.
12. The proposed research is the first topic to be scoped. It is anticipated that other areas for future research will be pursued as required and subject to available resources.

Te tātaritanga Analysis

13. To ensure the best outcomes for the climate, we need to better understand what is meant by the term “just transition” for the Wellington region. This is needed from an economic perspective to inform the transition and ensure the Regional Economic Development plan is consistent with the transition, and does not exacerbate climate impacts.
14. There is also a need to manage the risks to the economy and the social aspects of the transition. That means we need to act carefully, and be able to adapt to cushion and/or buffer the economic impact of the transition.
15. It will be critical that the right investments are made in outcomes that will change the economy. The Wellington’s Regional Economic Development Plan will provide guidance to the Joint Committee for the future funding priorities from the Regional Targeted Rate. To drive the transition in the right direction, therefore, we need to know what those outcomes are, and for them to be embedded within the actions presented to the Joint Committee.
16. This research is aimed at plugging that gap in our knowledge. It would ideally be jointly commissioned by Greater Wellington and WellingtonNZ, with the Joint Committee in mind as the key user.

¹ [Low-emissions Economy](#)

² [Transition to Low Carbon Economy](#)

³ <https://www.motu.nz/assets/Uploads/LEF-Dialogue-Synthesis-New-Zealands-Low-Emission-Future-Final.pdf>

⁴ <https://www.taranaki.co.nz/vision-and-strategy/taranaki-2050>

⁵ <https://www.gw.govt.nz/wellington-region-economic-profile/>

⁶ <https://www.stats.govt.nz/information-releases/greenhouse-gas-emissions-by-region-industry-and-household-year-ended-2018>

⁷ <https://www.gw.govt.nz/assets/Climate-change/GHG-Summary-Report-Wellington2019WRFinal.pdf>

⁸ <https://wrgf.co.nz/wp-content/uploads/2020/03/BERL-Report-GWRC-final-report-29-March-2018.pdf>

⁹ <http://www.gw.govt.nz/prosperity-for-maori-a-key-goal-of-new-maori-regional-economic-development-strategy/>

Ngā hua ahumoni
Financial implications

17. There will be financial implications in commissioning research. Our expectations are that we will work with WellingtonNZ to co-design the project brief, scope the works and share the cost between the agencies within existing budgets.

Ngā tikanga whakatau
Decision-making process

18. The matters requiring decision in this report were considered by officers against the decision-making requirements of Part 6 of the Local Government Act 2002.

Te hiranga
Significance

19. Officers considered the significance (as defined by Part 6 of the Local Government Act 2002) of the matters for decision, taking into account Council's *Significance and Engagement Policy* and Greater Wellington's *Decision-making Guidelines*. Officers consider that this matter is of low significance. The matter is consistent with existing Council policy and strategies and does not impact on the Council's capability and capacity.

Te whakatūtakitaki
Engagement

20. No engagement is considered necessary for this proposal.

Ngā tūāoma e whai ake nei
Next steps

21. If the Committee agrees to commission the research, an update will be provided on progress at the 17 August 2021 Committee meeting.
22. The Committee may wish to identify other potential areas of research to assist the achievement of the strategic priorities.

Ngā kaiwaitohu
Signatories

Writer	Andrea Brandon – Programme Lead Climate Change
Approver/s	Tracy Plane – Manager Strategic and Corporate Planning Luke Troy – General Manager Strategy

He whakarāpopoto i ngā huritaonga Summary of considerations
<p><i>Fit with Council’s roles or with Committee’s terms of reference</i></p> <p>The Committee’s consideration of the research request fits with its role to support the transition of the region to a resilient low emissions economy.</p>
<p><i>Implications for Māori</i></p> <p>There are potentially implications for Māori in researching the low emissions economy and the transition impact. Key inputs into the research will build off “<i>Te Matarau a Māui: Collaborative Pathways to Prosperous Māori Futures</i>”, the 2018 BERL report “<i>Māori Economy in the Greater Wellington Region</i>” and other relevant information.</p>
<p><i>Contribution to Annual Plan / Long Term Plan / Other key strategies and policies</i></p> <p>This research will contribute towards the successful implementation of the Climate Emergency Response Programme.</p>
<p><i>Internal consultation</i></p> <p>Company Portfolio & Economic Development Manager; Te Hunga Whiriwhiri. Note WellingtonNZ have also been consulted.</p>
<p><i>Risks and impacts - legal / health and safety etc.</i></p> <p>No risks have been identified.</p>