GREAT LAKE TAUPŌ
Taupō District Council

ATTACHMENTS

Ordinary Council Meeting

5 February 2026

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TAUPŌ DISTRICT COUNCIL
MINUTES OF THE ORDINARY COUNCIL MEETING
HELD AT THE COUNCIL CHAMBER, LEVEL 1, 67 HOROMĀTANGI STREET, TAUPŌ
ON TUESDAY, 16 DECEMBER 2025 AT 1.00PM

PRESENT: Mayor John Funnell (in the Chair), Cr Rachel Cameron, Cr Duncan Campbell, Cr Nicola de Lautour, Cr Ngāhuia Foreman, Cr Sandra Greenslade, Cr Kylie Leonard, Cr Steve Manunui, Cr Wahine Murch, Cr Christine Rankin, Cr Kevin Taylor, Cr Yvonne Westerman, Cr Hope Woodward

IN ATTENDANCE: Chief Executive (Julie Gardyne), General Manager Organisation Performance (S Matthews), General Manager Community Infrastructure and Services (T Hale), General Manager People and Community Partnerships (H Tattle), General Manager Strategy and Environment (W Zander), Legal and Governance Manager (N McAdie), Finance Manager (J Paenga, via MS Teams), Communications Manager (L McMichael), Three Waters Manager (S Lealand), Iwi and Co-Governance Manager (D Rameka), Executive Manager Mayor's Office (J Later), Programme Manager (J Walton), Digital Content Creator (C Hollinger), Governance Quality Manager (S James), Reserves Advisor (B Vi), Senior Policy Advisor (P Caruana), Infrastructure Project Manager (J Dayne), Asset Manager Water (T Swindells), Resource Consents Manager (H Williams), Senior Resource Consents Planner (L Wood), Senior Committee Advisor (K Watts)

MEDIA AND PUBLIC: Seven members of the public.

Submitter to Item 5.2 Ms Sarah Matthews (via MS Teams)

Audit New Zealand auditors Mr Leon Pieterse and Mr Carter Horsup (via MS Teams)

Notes: *(i) Mayor John Funnell advised that the meeting was being recorded and livestreamed to Council's YouTube channel.*

(ii) Mayor John Funnell advised that item 5.8 8 Establishment of the Mangakino Pouakani Community Grants Distribution Committee had been withdrawn. No decision had been made regarding Representative Group committees, the community would have a chance to share their views.

1 KARAKIA

2 WHAKAPĀHA | APOLOGIES

Nil

3 NGĀ WHAKAPĀNGA TUKITUKI | CONFLICTS OF INTEREST

Mayor John Funnell advised that he would withdraw from participating in item 6.3 Appointment of External Representatives to Council Committees when the appointments to the Taupō Airport Authority Committee were discussed.

Cr Steve Manunui declared a conflict for item 6.1 Approval of Amendments to Bond Agreement with Whakapapa Holdings Limited.

4 WHAKAMANATANGA O NGĀ MENETI | CONFIRMATION OF MINUTES

4.1 ORDINARY COUNCIL MEETING - 25 NOVEMBER 2025

TDC202512/01 RESOLUTION

Moved: Cr Wahine Murch
Seconded: Cr Ngāhuia Foreman

That the minutes of the Council meeting held on Tuesday 25 November 2025 be approved and adopted as a true and correct record.

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/01 above.

5 NGĀ KAUPAPA HERE ME NGĀ WHAKATAUNGA | POLICY AND DECISION MAKING

5.1 PUBLIC FORUM

The following presentations were given by members of the public:

Ms Margaret Sagar advised that she was present on behalf of the Pukawa Property Owners' Association. She was disappointed in the loss of a direct voice to Council if the Tongariro Representative Group was not established. She was concerned that the Tūrangi Tongariro Councillor's voice would be drowned in a Taupō-centric council. The recent local government elections had shown among the highest voter turnout in the country from the Tūrangi Tongariro ward indicating that the community was not happy and had voted for change. The needs of the Tūrangi Tongariro ward outside of Tūrangi were not the same as urban Taupō or Tūrangi. She asked that elected members visit Pukawa and invited them to attend the Annual General Meeting of the Pukawa Property Owners' Association in Oreti Village at 9.30am on Friday 2 January 2026.

Ms Ngaire Grainger advised that she had been a community representative on the Tongariro Representative Group committee the previous triennium. She had emailed the elected members and was present in person to reinforce the messages. She was concerned that by not establishing the Tongariro Representative Group, the different hapū outside of Tūrangi township, and the residents of the settlements on the southern, western and eastern sides of Lake Taupō would not be represented. While she understood the intention of community forums (in place of the representative groups), she highlighted that a lot of people were not comfortable to speak up and preferred to contact someone to speak on their behalf. She also supported formal, structured meetings to allow for actions to be followed up and minutes recorded.

Members thanked Ms Sagar and Ms Grainger for speaking.

TDC202512/02 RESOLUTION

Moved: Cr Rachel Cameron
Seconded: Cr Ngāhuia Foreman

That Council receives comments from members of the public.

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/02 above.

5.2 DELIBERATION REPORT - RECLASSIFICATION OF KINLOCH RESERVE

Submitter number 3 Ms Sarah Matthews presented to members via MS Teams.

She explained that she was the property owner of 1 Sparrowhawk Way which overloooked the reserve, and that she opposed the proposed reclassification of Kinloch Reserve. She spoke to main points in her submission and highlighted that she did not believe full impact assessments had been done on the cutural and environmental impacts. She felt that the Seven Oaks developers should supply land or money to put towards a new reservoir in a different location that would not impact local residents.

In answer to questions, she clarified that while the elevation of the proposed reservoir would be the same as the existing carpark, it would extend outwards a lot further and impact views from her property.

The Reserves Advisor introduced herself and her role. She clarified the meanings of classification and vesting, noting that classification related to the activities permitted on a reserve. Vesting was a process where developers donated land to Council. She summarised the contents of the report, including engagement, assessments, and mitigation of concens raised by submitters.

In answer to questions, the following was clarified:

- Council's Iwi and Co-Governance team facilitated conversations with Mr Craig Ahipene from Mokai marae. The Reserves Advisor also raised the matter with Tūwharetoa Māori Trust Board at a regular meeting with her team. Neither parties were in opposition and were encouraged to submit feedback.
- An environmental impact report would be carried out later in the process when a resource consent was applied for.
- The existing reservoir site at the end of Boojum Dell was on steep terrain with a small platform area. Retaining walls had been required to be built where slippage had occurred. The site was not likely to be approved by mana whenua or the Department of Conservation because it would need to be extended and was close to wāhi tapu.
- Council's Environmental Advisor was confident that the native trees on the reserve that would be relocated could be done so successfully because they were still young.

While members were sympathetic to the submitters that opposed the reclassification of the reserve, they considered that the benefit to the entire Kinloch community of being able to store more water and be more resilient justifed the reclassification.

TDC202512/03 RESOLUTION

Moved: Cr Rachel Cameron
Seconded: Cr Nicola de Lautour

That Council agrees to reclassify part of Lot 101 DP 509968 to Local Purpose (Utility) for the purpose of constructing a water reservoir pursuant to section 24 of the Reserves Act 1977.

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/03 above.

5.3 ADOPTION OF THE ANNUAL REPORT 2024/25

The General Manager Organisation Performance presented the item on behalf of the Finance Manager. She welcomed auditors from Audit New Zealand who were online, Mr Leon Pieterse and Mr Carter Horsup. She highlighted that the Statement of Compliance would be updated to reflect that Mayor John Funnell would sign this.

She noted that a recommendation from the Risk and Assurance Committee would usually be presented to Council but this committee had been disestablished over the election period. The Chair of the Risk and Assurance Committee Mr Bruce Robertson had advised that he was comfortable with the report.

The report to Council that had been circulated separately to the agenda (A3873315) was helpful for the auditors to talk through issues.

Mr Leon Pieterse apologised that they could not be present in person. Overall, Audit New Zealand was comfortable with Taupō District Council's Annual Report and the few issues raised were due to insufficient audit evidence rather than demonstrating Council wasn't meeting its performance target.

In answer to questions, the following was clarified:

- Audit New Zealand had been Taupō District Council's auditor for at least 12 years.
- The annual report would be published on Council's website as soon as possible.

TDC202512/04 RESOLUTION

Moved: Cr Yvonne Westerman
Seconded: Cr Kevin Taylor

That Council, pursuant to section 98 of the Local Government Act 2002, and on the recommendation of the Risk and Assurance Committee Chairperson:

1. Adopts the Taupō District Council Annual Report 2024/25; and

2. Adopts the Taupō District Council Summary Annual Report 2024/25. **CARRIED**

Note: All members present at the Council meeting voted in favour of resolution TDC202512/04 above.

5.4 REVOCATION OF RESERVE STATUS OF LOCAL PURPOSE RESERVE (STORMWATER) AND TRANSFER TO ADJOINING OWNER - S24 RESERVES ACT 1977

The Reserves Advisor summarised the report and clarified that the preferred option was option 4 from the report.

The General Manager Strategy and Environment advised that the building consent process had been reviewed to ensure this error by the developer would not happen again. He advised that email correspondence with the developer indicated that costs would be covered by the developer, even if they exceeded the estimate of $25k.

It was highlighted that the stormwater reserve was initially owned by the developer and vested in Council so transferring the land back to the owner to solve this problem was not the same as other intentional reserve encroachments in the district.

TDC202512/05 RESOLUTION

Moved: Cr Wahine Murch
Seconded: Cr Ngāhuia Foreman

NGĀ TŪTOHUNGA | RECOMMENDATION(S)

That Council:

1. **Approves** the revocation of that 19m^2 sliver of Lot 102 DP 6081631 in Record of Title 1199645 labelled Section 1 on Drawing V200 Rev A of Definition Survey Limited dated 14 November 2025 (**Section 1**) as local purpose reserve (stormwater) pursuant to section 24(1)(b) of the Reserves Act 1977, subject to the Department of Conservation ratifying the revocation, on the basis that Section 1 is not needed for Reserves Act 1977 purposes as the balance area of the reserve is sufficient to perform the stormwater drainage function of the reserve.

2. **Declares** Section 1 surplus to Reserves Act 1977 requirements.

3. **Approves** the transfer of Section 1 to the registered owner (**developer**) of Lot 11 DP 608131 at 9 Ngawha Place, Taupō (**property**) and amalgamation of Section 1 with the property on the basis that:

   a. The agreement to transfer Section 1 to the developer is conditional on the reserve revocation process under s24 of the Reserves Act 1977 being completed;

   b. The developer meets all costs and disbursements incurred in respect of the revocation and transfer/amalgamation process.

4. **Delegates** to the Chief Executive the authority to approve the final terms and conditions of the reserve revocation and transfer, and to take such action and sign such documents as may be reasonably necessary to implement Council's resolutions above and matters ancillary to them.

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/05 above.

5.5 NEW PUBLIC ROAD NAMES - KOKOMEA STAGES 4, 5 & 6

The Senior Resource Consents Planer introduced herself and her role. She explained that this area was in Kokomea village near the new supermarket. It would usually go before the Regulatory Committee for a decision but had come before Council due to time constraints. She clarified that Ngā Hapū o Tauhara had provided a list of road names to the developer in 2021 when the subdivision was first commenced, and that it was understood that the consents would be progressed over an extended timeframe.

TDC202512/06 RESOLUTION

Moved: Cr Rachel Cameron
Seconded: Cr Christine Rankin

That Council approves the following road names within the Kokomea subdivision (Stages 4,5 and 6):

- Paki Street
- Marino Street

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/06 above.

5.6 RESULT OF CURRENT YEAR REFORECASTING OCTOBER 2025

The General Manager Organisation Performance recognised that this forecasting was a result of several years work and gave a lot of detail around the projects. Changes were not a reflection of budgeting issues, but of the changing environment. It was supported by the Chair of the Risk and Assurance Committee and was a big change for teams in the organisation. She advised that it was an improvement journey that would be refined over the following few years.

The following was clarified:

- The Motuoapa Water Treatment Plant Upgrade project had increased because the contract for all of the district's water treatment plants had been put together six years previously. Over this time, the costs for contractors and materials had increased, and some soil and geotechnical issues had been encountered at this site.
- Some projects had not required work from consultants and professionals due to timing. Some of the expenditure related to consultant and professional fees was visible in the Annual Report but many projects used consultants arranged by contractors where the detail was not obvious. It was likely that from around 2027 when the Local Government (System Improvements) Amendment Bill was enacted, this information would be required to be provided in more detail to the public.

Members thanked officers for providing this information and addressing carry forwards from projects.

TDC202512/07 RESOLUTION

Moved: Cr Rachel Cameron
Seconded: Cr Kevin Taylor

That Council

1. Receives the results of the reforecasting of capital and operational expenditure; and
2.
    a. Approves increased operational revenue of $280,000 (TWO HUNDRED AND EIGHTY THOUSAND), and a net decrease in operational expenditure of $680,000 (SIX HUNDRED AND EIGHTY THOUSAND) to be held in a surplus reserve for future Council decision-making.

    b. Approves the additional budget of $142,949 (ONE HUNDRED AND FORTY-TWO THOUSAND, NINE HUNDRED AND FORTY-NINE DOLLARS) for stormwater capital expenditure budget to complete the downstream defender district project.

    c. Approves the additional budget of $488,373 (FOUR HUNDRED AND EIGHT-EIGHT THOUSAND, THREE HUNDRED AND SEVENTY-THREE DOLLARS) for water capital expenditure budget to complete the current year works on the Motuoapa DWSNZ treatment plant upgrade project.

    d. Approves the transfer of budgets from various roading projects of $1,189,676 (ONE MILLION, ONE HUNDRED AND EIGHTY-NINE THOUSAND, SIX HUNDRED AND SEVENTY-SIX DOLLARS) to complete Broadlands Road improvements, widening and renewals projects.

    e. Approves the transfer of budgets from various roading projects of $553,545 (FIVE HUNDRED AND FIFTY-THREE THOUSAND, FIVE HUNDRED AND FORTY-FIVE DOLLARS) to complete the sealed road pavement rehabilitation.

    f. Approves the deferral of capital budgets from 2025/26 financial year to 2026/27 financial year of $15,023,725 (FIFTEEN MILLION AND TWENTY-THREE THOUSAND, SEVEN HUNDRED AND TWENTY-FIVE DOLLARS), to be confirmed during 2026/27 Annual Plan process.

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/07 above.

5.7 TAUPŌ DISTRICT COUNCIL PERFORMANCE REPORT - NOVEMBER 2025

The Chief Executive congratulated the IT team for the award they received for the fitout of He Whare ō Tūwharetoa. She also acknowledged that the organisation would be focused on new Bills and changes coming in from central government into the new year.

In answer to a question, the General Manager Strategy and Environment advised that there had been challenges faced with the initial system for the Taupō Airport terminal ventilation. A larger system had been installed which cost more. Discussions with the supplier were ongoing.

The Programme Manager introduced herself and her role. She highlighted that central government reforms had impacted projects, especially water projects. The Tūrangitukua Park seal had been completed.

In answer to a question, she advised that communication and engagement with key stakeholders would be undertaken regarding the Omori Kuratau slip project once design and a clearer idea of what needed to be done was established.

Wastewater standards had been released and understanding what these meant for long-term wastewater

strategies would be a focus in the new year.

TDC202512/08 RESOLUTION

Moved: Cr Sandra Greenslade
Seconded: Cr Wahine Murch

That Council receives the information contained in the Performance Report for the month of November 2025.

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/08 above.

5.8 ESTABLISHMENT OF THE MANGAKINO POUAKANI COMMUNITY GRANTS DISTRIBUTION COMMITTEE

Item **withdrawn**.

5.9 ALLOCATION OF TAUPŌ DISTRICT COUNCIL'S GOVERNANCE REMUNERATION POOL - RECOMMENDATIONS TO THE REMUNERATION AUTHORITY

The Chief Executive advised that the report reflected a number of conversations around the establishment of committees for the triennium. She highlighted that the establishment of representative group committees could be revisited in February if needed.

Not all members supported the ratios or the committees established.

TDC202512/09 RESOLUTION

Moved: Cr Nicola de Lautour
Seconded: Cr Ngāhuia Foreman

That Council resolves to make recommendations to the Remuneration Authority for distribution of Taupō District Council's total governance remuneration pool in accordance with Option B.

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/09 above except for Crs Duncan Campbell, Sandra Greenslade, Christine Rankin, Hope Woodward who voted against resolution TDC202512/09 and Mayor John Funnell who abstained from voting.

5.10 ADOPTION OF MEETING SCHEDULE 2026

The Senior Committee Advisor explained that the Mangakino Pouakani Community Grants Distribution Committee meetings would be removed. It was possible that the Tūrangi Co-Governance Committee hearings on 17 and 18 February would not be required, it depended on how many submissions were received from submitters who wished to speak.

Members expressed an interest in livestreaming more meetings if possible.

TDC202512/10 RESOLUTION

Moved: Cr Rachel Cameron
Seconded: Cr Wahine Murch

That Council adopts the attached meeting schedule 2026 (A3863445), as amended.

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/10 above.

5.11 COUNCIL ENGAGEMENTS FEBRUARY 2026, APPOINTMENTS, AND TRAINING AND CONFERENCE OPPORTUNITIES

The General Manager Strategy and Environment advised that the Mangakino Lakefront project did not require a steering group because it was moving into the construction phase. Updates regarding the project would be reported directly to Cr Woodward.

TDC202512/11 RESOLUTION

Moved: Cr Ngāhuia Foreman
Seconded: Cr Kevin Taylor

That Council

1. Receives the information relating to engagements for February 2026; and

2. Appoints Crs Wahine Murch, Kevin Taylor and Yvonne Westerman to the Broadlands Landfill Consent Project Steering Group for the 2025-28 Triennium; and

3. Appoints Crs Rachel Cameron and Nicola de Lautour to the Owen Delany Park Project Steering Group for the 2025-28 Triennium.

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/11 above.

6 NGĀ KŌRERO TŪMATAITI | CONFIDENTIAL BUSINESS

TDC202512/12 RESOLUTION

Moved: Cr Christine Rankin
Seconded: Cr Kylie Leonard

RESOLUTION TO EXCLUDE THE PUBLIC

I move that the public be excluded from the following parts of the proceedings of this meeting.

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

General subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Ground(s) under Section 48(1) for the passing of this resolution	Plain English reason for passing this resolution in relation to each matter
Agenda Item No: 6.1 Approval of Amendments to Bond Agreement with Whakapapa Holdings Limited	Section 7(2)(b)(ii) - the withholding of the information is necessary to protect information where the making available of the information would be likely unreasonably to prejudice the commercial	Section 48(1)(a)(i)- the public conduct of the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist	It is necessary for this item to be kept in confidence until negotiations with Whakapapa Holdings Ltd have concluded.

	position of the person who supplied or who is the subject of the information Section 7(2)(i) - the withholding of the information is necessary to enable [the Council] to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	under section 7	
Agenda Item No: 6.2 Legalisation of Oruanui Road	Section 7(2)(a) - the withholding of the information is necessary to protect the privacy of natural persons, including that of deceased natural persons Section 7(2)(i) - the withholding of the information is necessary to enable [the Council] to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	Section 48(1)(a)(i)- the public conduct of the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist under section 7	It is necessary for the public to be excluded to protect privacy of property owners and negotiations that are taking place.
Agenda Item No: 6.3 Appointment of External Representatives to Council Committees	Section 7(2)(a) - the withholding of the information is necessary to protect the privacy of natural persons, including that of deceased natural persons	Section 48(1)(a)(i)- the public conduct of the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist under section 7	It is necessary to protect applicants' personal information that they have provided in their cover letters and curriculum vitae.

CARRIED

Note: All members present at the Council meeting voted in favour of resolution TDC202512/12 above.

The meeting was adjourned at 2.59pm and reconvened at 3.12pm.

The meeting closed at 4.54pm.

The minutes of this meeting were confirmed at the Ordinary Council Meeting held on 5 February 2026.

.....
CHAIRPERSON

Extracts from Standing Orders 2022-2025

15. Public Forums | Ngā Matapakinga a te Marea

Public forums are a defined period of time, usually at the start of an ordinary meeting, which, at the discretion of a meeting, is put aside for the purpose of public input. Public forums are designed to enable members of the public to bring matters of their choice, not necessarily on the meeting's agenda, to the attention of the local authority.

In the case of a committee, subcommittee, local or community board, any issue, idea, or matter raised in a public forum, must fall within the terms of reference of that body.

15.1 Time limits | Ngā tepenga wā

A period of up to 30 minutes, or such longer time as the meeting may determine, will be available for the public forum at each scheduled local authority meeting. Requests must be made to the chief executive (or their delegate) at least one clear day before the meeting; however this requirement may be waived by the chairperson. Requests should also outline the matters that will be addressed by the speaker(s).

Speakers can speak for up to 5 minutes. Where the number of speakers presenting in the public forum exceeds 6 in total, the chairperson has discretion to restrict the speaking time permitted for all presenters.

15.2 Restrictions | Ngā Herenga

The chairperson has the discretion to decline to hear a speaker or to terminate a presentation at any time where:

- A speaker is repeating views presented by an earlier speaker at the same public forum;
- The speaker is criticising elected members and/or staff;
- The speaker is being repetitious, disrespectful or offensive;
- The speaker has previously spoken on the same issue;
- The matter is subject to legal proceedings; and
- The matter is subject to a hearing, including the hearing of submissions where the local authority or committee sits in a quasi-judicial capacity.

15.3 Questions at public forums | Ngā pātai i ngā matapakinga a te marea

At the conclusion of the presentation, with the permission of the chairperson, elected members may ask questions of speakers. Questions are to be confined to obtaining information or clarification on matters raised by a speaker.

15.4 No resolutions | Kāore he tatūnga

Following the public forum, no debate or decisions will be made at the meeting on issues raised during the forum unless related to items already on the agenda. (See the LGNZ Guide to Standing Orders for suggestions of good practice in dealing with issues raised during a forum).

15.5 Application of restrictions I Te hāngaitanga o ngā Herenga

Clause 15.2 above applies to members of the public addressing meetings at any time, not just as part of a scheduled public forum session.

Extracts from Standing Orders 2022-2025

9.1 Items of business not on the agenda which cannot be delayed | Ngā take kāore i runga i te rārangi take e kore e taea te whakaroa

A meeting may deal with an item of business that is not on the agenda where the meeting resolves to deal with that item and the chairperson provides the following information during the public part of the meeting:

(a) The reason the item is not on the agenda; and

(b) The reason why the discussion of the item cannot be delayed until a subsequent meeting.

LGOIMA, s 46A(7).

Items not on the agenda may be brought before the meeting through a report from either the chief executive or the chairperson.

Please note, that nothing in this standing order removes the requirement to meet the provisions of Part 6 of the LGA 2002 with regard to consultation and decision-making.

9.2 Discussion of minor matters not on the agenda | Te kōrerorero i ngā take iti kāore i runga i te rārangi take

A meeting may discuss an item that is not on the agenda only if it is a minor matter relating to the general business of the meeting and the chairperson explains at the beginning of the public part of the meeting that the item will be discussed. However, the meeting may not make a resolution, decision, or recommendation about the item, except to refer it to a subsequent meeting for further discussion.

LGOIMA, s 46A(7A).

Key Processes under Current System	Key Process under Proposed System
Hierarchy of documents, with District Plans prepared as independent documents giving effect to Regional Policy Statement prepared by Regional Council.	Hierarchy of documents, where 'Land Use Plans' have a set format, zones and provisions and must be consistent with the Regional Spatial Plan. Significantly less flexibility for land use plans. *Note that Taupō District sits within four different regions.*
Preparation of Regional Policy Statement by Regional Council. Largely focused on integrating the different functions of the regional council and the territorial authorities and ensuring clarity over who is doing what. Future Development Strategies developed by territorial authorities setting out future urban growth and infrastructure requirements over the next 30 years.	Preparation of a Regional Spatial Plan by Regional Council **and Territorial Authorities** through establishment of a Spatial Plan Committee. Committee arrangements will need to uphold iwi participation legislation and related arrangements. Spatial Plan Committee shall develop a Spatial Plan and then seek approval from Council on content. Where consensus is not achieved on approval of the Spatial Plan, the Minister will make a decision on the Plan. Forms part of the Combined Regional Plan.
Preparation of a Regional Plan by the Regional Council. Focused on managing environmental issues like air and water quality, protection of soils and biodiversity.	Preparation of a Natural Environment Plan by the Regional Council. Focused on regulating the use of natural resources within a region. Forms part of the Combined Regional Plan.
Preparation of a District Plan broadly involves the following: • Identification of an issue; • Drafting of plan change material; • Notification and submissions; • Hearings process; and • Decisions and appeals.	Preparation of a Land Use Plan broadly involves the following: • Direction from the Minister to prepare a Land Use Plan; • Selection of standardised provisions drafted by Central Govt, not subject to submissions on substance; **or** • Drafting bespoke provisions with an accompanying justification report subject to submissions and appeal; • Hearings process for which the Minister can appoint a member to independent panel.

Political judgment at the local level is embedded throughout the planning cycle, through workshops and Council meetings. Initiation of a review at any time, or on a 10-year cycle.	• Decisions and appeals. Initiation of a review at any time, no minimum review period specified. Forms part of the Combined Regional Plan.
Iwi participation legislation provides framework for engagement and consultation with iwi partners. Opportunity for iwi engagement in all planning processes.	Iwi participation legislation provides framework for engagement and consultation with iwi partners. Opportunity for iwi engagement in policy processes, less so in resource consenting process.
Issues managed predominantly at the local level.	Issues managed predominantly at the central level by 'National Policy Direction' and then the Regional Spatial Plan.
Previously Council have approved notification of residential intensification plan change provided good urban design and amenity. Council resolved to consolidate retail activities in the town centre and prevent relocation to protect industrial areas.	Amenity no longer an effect within the resource management system. Retail distribution effects no longer an effect within the resource management system.
Councillors have significant influence over the process.	Councillors are one voice amongst many in the Regional Spatial Plan, and Ministerial input will occur where consensus cannot be achieved.
Council as an infrastructure provider can designate land for future work by Notice of Requirement, or through notification during a plan change.	Council as an infrastructure provider can designate land for future work by Notice of Requirement, or through notification during a plan change, **or during development of the Regional Spatial Plan.**

Current System (Consenting)	Proposed System (Consenting)
Limited and Public notification provided for under two pathways.	Changes to notification – public notification only where all parties materially affected by a proposal cannot be identified.

Six activity classes.	Four activity classes (controlled and non-complying out).

Taupō District Council Submission on the Planning Bill and the Natural Environment Bill

Submission to: Committee Secretariat,

Environment Committee

Parliament Buildings

Wellington

This is a submission by Taupō District Council on the following:

- The Planning Bill; and
- The Natural Environment Bill

Scope of Taupō District Council's submission:

Taupō District Council is submitting on what we believe are the key issues with the two Bills. We are supportive of the submission provided by Taituarā. Rather than repeat matters raised in that submission, we have focused on those issues related to our district and that raise the most concern with the Bills as drafted.

IDENTIFICATION OF MATTERS SIGNIFICANT TO TAUPŌ DISTRICT COUNCIL

Retail Distribution

The Planning Bill currently proposes to exclude retail distribution effects from the range of effects that can be managed through planning interventions. Taupō District Council strongly opposes this exclusion. Managing retail distribution is critical to achieving the goals and responsibilities set out in the new planning system.

The Planning Bill requires councils to:

- Enable economic growth and change by providing for business development.
- Create well-functioning urban areas that integrate land use and infrastructure.
- Plan and provide for infrastructure to meet current and future demand.
- Enable competitive urban land markets by ensuring sufficient development capacity for housing and business.

Managing retail distribution effects is essential to delivering these outcomes for the following reasons:

- Efficient Infrastructure Use: Council (and Government) invest substantially in town centres, providing infrastructure and community facilities like public spaces, high quality streetscape, libraries, government offices and police stations. These investments are efficient where commercial and retail activity are agglomerated but lose their efficiency when there are no controls over retail distribution. Furthermore, if retail activity is allowed to spread throughout urban areas both local and central government will face duplication of those services and infrastructure.

  Well-Functioning Urban Areas: A centres-based approach ensures retail and business activity is located where transport networks, utilities, and community facilities already exist. This avoids inefficient sprawl and supports integrated planning. This approach also protects the valuable industrial land resource. If there were no controls over retail distribution, we would have seen

substantial areas of industrial land used for retail activities better suited to the town centre. The inappropriate co-location of activities, such as retail and residential development, within or adjacent to industrial areas can create significant reverse sensitivity issues for established and planned industrial activities. These conflicts can result in increased complaints, constraints on industrial operations, and reduced certainty for investment. Over time, this drives up land values, limits the availability of land for industrial uses that cannot reasonably locate elsewhere, and undermines the ability of industrial areas to function effectively.

- Business Growth and Market Certainty: Managing retail distribution does not force all retail into the town centre. It enables choice through neighbourhood centres and complementary locations, while maintaining a clear framework that gives landowners and investors' confidence. In our local context, Pak 'n' Save gained consent to relocate out of the town centre under a managed approach that still supports the town centre's vitality. Timing on this was crucial, 10 years ago Taupō could not have supported this approach, but recent growth meant that the town centre was sustainable without Pak'n Save as a primary anchor.

- Economic Competitiveness: Provincial centres like Taupō cannot absorb the impacts of dispersed retail the way larger cities can. Even modest decentralisation erodes the viability of the town centre, reducing productivity and making the district less attractive for business and skilled workers as well as tourists.

- Community Support: the centres-based approach has been endorsed by our community and still enables choice, well-functioning real estate markets and creates the certainty to enable private landowners to invest. Removing the ability to manage these effects would have consequences for the economic viability of our town centres and industrial areas.

Recommendations
Delete clause 14(1)(c) – Retail Distribution Effects – from "Effects Outside the Scope of the Act." This will allow councils to manage retail location in a way that supports economic growth, efficient infrastructure use (and therefore costs on the community), and well-functioning urban environments—key goals of the Planning Bill.

Te Tiriti o Waitangi Settlement Obligations

Taupō District Council has a strong and productive working relationship with the iwi partners in our district. We support the intent in the Bills to respect the existing Treaty settlement arrangements. We also support the intent behind the design of the planning system, to actively engage iwi authorities in the development of higher order planning documents.

Recommendations
Taupō District Council supports the provisions in the Bills that respect the existing Treaty settlement arrangements and the intent to actively engage iwi authorities in the development of higher order planning documents.

Standardised Planning

Taupō District Council acknowledges that there is a role for standardised planning approaches to improve consistency and certainty across the system. However, there is a lack of clarity around how the Planning Standards will be developed, consulted on, and amended over time, and what safeguards will exist if those standards prove unworkable or impose unintended constraints on councils and communities.

Once the Acts are in force, councils may be constrained in their ability to respond if subsequent national direction significantly impacts their planning functions, operational capacity, or Treaty and settlement obligations. We consider it essential that central government actively draws on local government expertise and provide adequate timeframes for consultation and submissions on the full suite of national direction, including draft Planning Standards.

Recommendations
Council recommends that national standards and other planning provisions be co-designed with local government planning practitioners and technical experts to ensure they are technically robust and workable in practice.

Regulatory Relief

Taupō District Council is concerned about the proposed regulatory relief framework. The range of relief tools contemplated, including rates relief, bonus development rights, land swaps, grants, and cash payments, has direct fiscal implications for councils and is likely to result in significant administrative and financial costs. The Bill provides no clarity on how these costs are to be funded, particularly in the context of proposed rates-capping.

The requirement for property-scale assessment is also inconsistent with the Government's broader reform direction, which seeks to standardise planning approaches and provide greater certainty for landowners and developers. Instead, the Bill introduces a bespoke, council-by-council assessment regime, where a similar landowner situation could be assessed and relieved differently across neighbouring regions. This risks inconsistent outcomes and undermines the very standardisation and certainty the reforms are intended to achieve.

Recommendations
If regulatory relief is to be required in response to nationally prescribed planning controls, the framework must clearly align responsibility, discretion, and funding. At a minimum, the Bill should: • clarify the extent of council discretion where controls are nationally directed; • ensure that councils are not required to fund relief for controls they do not set; and • provide clear, workable guidance on evidential thresholds and funding mechanisms to support consistent national implementation.

Conclusion

Taupō District Council appreciates the scale and ambition of the reforms represented in the Planning Bill and the Natural Environment Bill. We recognise the Government's intent to create a more efficient, integrated, and outcomes-focused planning system.

In providing this submission, our aim has been to highlight areas where the Bills could be refined to better support the practical realities of implementing the new system.

Taupō District Council looks forward to working constructively with central government as the new system is developed and implemented.

We **do not** wish to be heard in support of our submission.

Signed: _____

John Funnell

Mayor - Taupō District Council

REVIEW OF CLIMATE CHANGE RISKS

Contents

EXECUTIVE SUMMARY AND CONCLUSION

This paper explores the impacts and risks posed by climate change on Council's core operations and services.

Council plays several important roles in preparing for the effects of climate change:

- Planning and building controls to ensure buildings are built to withstand likely hazards and avoid unsuitable high-risk hazard areas.
- Emergency management and civil defence planning and operations.
- Providing resilient lifeline infrastructure, like water, wastewater, roads, and community evacuation centres.
- Stormwater management in urban areas (which typically is designed for regular rain events, not large flooding events – which will overwhelm the stormwater network)
- Having appropriate insurance and setting aside money to rebuild infrastructure after a natural disaster.

Climate change will have two main climate impacts.

- Increased risk (both frequency and intensity) of heavy rain and storm events, including flooding risks, high winds, landslips and erosion risks.
- Hotter drier summers, including drought and freshwater quality risks.

There are four key areas where Council is significantly exposed to risk and is unlikely to meet public expectations. These are the probability of:

- private property damage and house flooding in a large heavy rain event
- wastewater spills, including into the Waikato River, during regularly heavy rain events
- continued erosion of key public reserve land
- continued significant potholing during regular heavy rain events, concentrated on roads that have had seal maintenance deferred.

Table 1 – expected climate change impacts and risks to Council's core operations.

Climate change impact	Risks to core Council operations
Increased risk (both frequency and intensity) of heavy rain and storm events, including: • Flooding • High winds • Lightning • Power outages • Landslip / slides • Erosion The risk of heavy rainfall and storm events is expected to have a marked increase due to climate change. Climate change has the potential to increase rainfall intensity over the next 100 years:[1] • by around 10 – 22% for a 24-hour event • with a historic 1 in 100-year event (150mm of rain in 24 hours) becoming a 1 in 50-year event – twice as likely.	In a heavy rain event, for example a 1 in 5- to 1 in 20-year event we can expect: • Our stormwater networks to be overwhelmed especially in historic areas (those built prior to 2009), with water running along roads, and overland flow paths to low points. This is likely to affect private properties and some houses. For example, in a recent 1 in 20-year event six houses had flooding above their habitable floor levels. In a widespread 1 in 100-year event, up to 1,000 houses may be impacted across the district. • Our wastewater systems to be inundated with stormwater resulting in multiple overflows. This includes the Taupō Wastewater treatment plant that is designed in an overflow event to controlled-spill into the Waikato River. Or overflows of the Tūrangi wastewater treatment plant ponds into the wetland area. • Our road network will suffer significant damage, typically multiple potholes, concentrated on roads that have had seal maintenance deferred. These impacts may also occur with smaller events, particularly if there are a number of successive heavy rain events – like we have seen during 2025.
In a large storm event with heavy rain or winds we can expect: • Fallen trees, debris, and minor slips on the road network. In a large event, overwhelming numbers of road blockages may reduce access and take some time to rectify. There is also the risk of washouts undermining roads – which take a longer time to repair. • Power outages at our key water and wastewater pump stations, relying on the use of generators and reducing plant capacity. In a large event there may not be enough generators, or it may not be possible to get generators to some sites. • The possibility that water quality, affected by waves and land-runoff, is too poor to treat at Council's water treatment plants, until the compliance upgrade programme is completed. Taupō water treatment plant is already upgraded. • Erosion or bank failure at any unprotected lakefront sites, including the potential undermining of walkways, roads, or wastewater pipes close to the lake. • A very large heavy rain event, or successive smaller events, poses the risk of ground movement resulting in water or wastewater pipe breaks. The primary impacts are loss of services, and wastewater spills. • Lightning poses a risk to critical electrical and plant equipment, but is relatively low risk.	

[1] Under the mid - high climate change scenarios.

Climate change impact	Risks to core Council operations
Hotter drier summers, including: • More hot days • Increased drought risks (both frequency and intensity) • Increased bush / wildfire risks • Freshwater quality impacts (including the risk of algae blooms) • Increased risks of pests and diseases In most instances, these risks already exist. And while climate change is expected to increase these risks, it does not represent a step change in risk. Freshwater quality impacts (including the risk of algae blooms) may be an exception – the climate change impacts on these have not been quantified.	The most significant risks from a hot, dry summer are: • The primary risk is the potential for a bloom of toxic algae in the vicinity of one of our lake water intakes. (Our lake intake sites are Hatepe, Taupō, Kinloch, Motuopa, Omori, and Motutere.) This is an existing risk. There has been no quantification of how much this risk may increase due to climate change. Council has controls in place to mitigate the health risk of water supplies being contaminated by algae toxins. The most likely impact of a toxic algae outbreak near a water take would be a halt to services (reliance on reservoirs and replacement tanker water). This risk will be mitigated as part of Council's water treatment plant upgrade programme. An upgrade for the Taupō Water Treatment Plant to treat algae toxins is also planned for around 2030.

PURPOSE AND SCOPE

This paper identifies the risks to Taupō District Council's core roles and responsibilities associated with climate change. It sets out:

- Council's core roles and responsibilities in preparing for the effects of climate change.
- The climate impacts expected from climate change, identified from a review of national and regional climate risk modelling and identification.
- The risks to Council's core roles and responsibilities, identified from a review of Council's asset management plans, district planning and building consenting rules, regional risk identification, and interviews with key Council staff.
- It identifies the key risks and possible actions that could be taken to reduce the risks.

This paper will be provided to Council's Risk and Assurance Committee, and used to update Council's strategic risk "Risk 9 Effects of Climate Change", and inform any subsequent any action plan.

Scope

Officers have undertaken a full desktop review of expected climate change risks and impacts form Taupō District, including:

- Waikato Regional Council, Technical Report 2024/28: Climate change hazards and risks in the Waikato region, 23 May 2025[2]
- NIWA / Ministry for the Environment, Aotearoa New Zealand climate projections, 18 September 2024[3]
- NIWA, High Intensity Rainfall Design System V4, August 2018[4]
- WAIKATO CDEM – Hazard Scenarios[5], and Hazard Risk Assessment, regional hazard summary, Dec 2024[6]
- Council's asset management planning[7]
- Discussions with Council's asset managers and development planners.

Out of scope

This paper has not considered the impacts of a climate change related civil defence and emergency planning operation, or long-term recovery operation, which are the subject of separate work.

This paper has not examined any secondary impacts of climate change, including:

- Risks to community and private property (except for overlaps with Council's responsibilities for stormwater management).
- Council's financial preparation for climate change related events or costs.
- Insurance availability and cost (e.g. increasing insurance premiums, higher risk areas becoming uninsurable).
- Access to borrowing / capital.
- Ability to collect / increase rates.
- Migrant (or refugee) impacts.
- Supply chain disruption.
- Inflation (e.g. from food or product shortages).
- Economic impacts (e.g. impacts on tourism from reduced snow, or algae bloom closing the lake, economic impacts from emergency events, risks to agriculture and forestry, including fire risks and pests).
- The impact from risks and disaster events elsewhere in the country (e.g. constrained government funding, calls for support to help with response and recovery).
- Social, health, environmental, or cultural impacts and risks.
- Changes related to legislation, policy, legal application, technology, other markets.

[2] https://www.waikatoregion.govt.nz/environment/climate-change/waikato-regional-climate-change-hazards-and-risks/
[3] https://environment.govt.nz/facts-and-science/climate-change/climate-change-projections/
[4] https://niwa.co.nz/climate-and-weather/high-intensity-rainfall-design-system-hirds
[5] https://www.waikatocivildefence.govt.nz/assets/NEW-WCDEMG/Waikato-CDEM-Group-Hazard-Risk-Assessment-December.pdf
[6] https://www.waikatocivildefence.govt.nz/assets/NEW-WCDEMG/Waikato-CDEM-Group-Hazard-Risk-Assessment-Regional-Hazard-Summary-December-2024.pdf
[7] https://www.taupodc.govt.nz/council/plans-and-strategies/asset-management-plans

COUNCIL'S CORE ROLES AND RESPONSIBILITIES

Council plays several important roles in preparing for the effects of climate change:

- Planning and building controls to ensure buildings are built to withstand likely hazards and avoid unsuitable high-risk hazard areas.
- Emergency management and civil defence planning and operations.
- Providing resilient lifeline infrastructure, like water, wastewater, roads, and community evacuation centres.
- Stormwater management in urban areas (which typically is designed for regular rain events, not large flooding events – which will overwhelm the stormwater network).
- Having appropriate insurance and setting aside money to rebuild infrastructure after a natural disaster.

THE CLIMATE IMPACTS EXPECTED FROM CLIMATE CHANGE

This paper explores and summarises the expected climate impacts in two groupings:

- Heavy rain and storm events: Including flooding, high winds, lightning, power outages, landslip / slide, and erosion
- Hotter drier summers: Including more hot days, increased drought risks, increased bush / wildfire risks, freshwater quality impacts, and increased risks of pests and diseases.

For each, it presents a summary of the available information, including qualitative or quantitative information on the expected level or increase of the risk, and what the identified risks are for Council's roles and responsibilities.

HEAVY RAIN AND STORM EVENTS

Overview of climate impacts risks

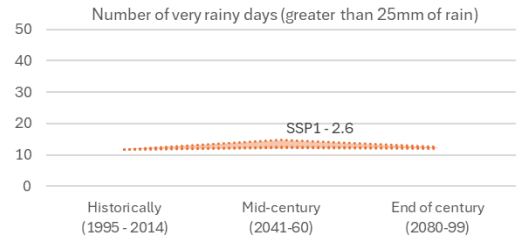
Increased risk of flooding events (both frequency and intensity): A historic 1 in 100-year event has the potential to become a 1 in 50-year event (i.e. an event of that magnitude will be twice as likely). Increased rainfall can overwhelm rivers and drainage systems, leading to widespread flooding in both urban and rural areas.

Increased erosion and landslide risks from higher rain, lake and river levels, and wind. Longer dry periods can exacerbate land instability as dry, cracked ground is more prone to failure during intense rainfall. Both one-off events, and accumulating impacts over time.

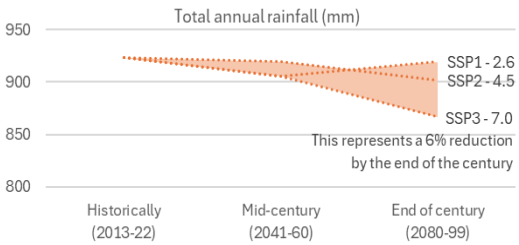
Increase risk of storm events (both frequency and intensity): Including ex-tropical cyclones, high wind, heavy rain, lightning, power and communications outages.

No increase in annual rainfall, or the number of heavy rain days is expected

Projected change in number of very rainy days [8]

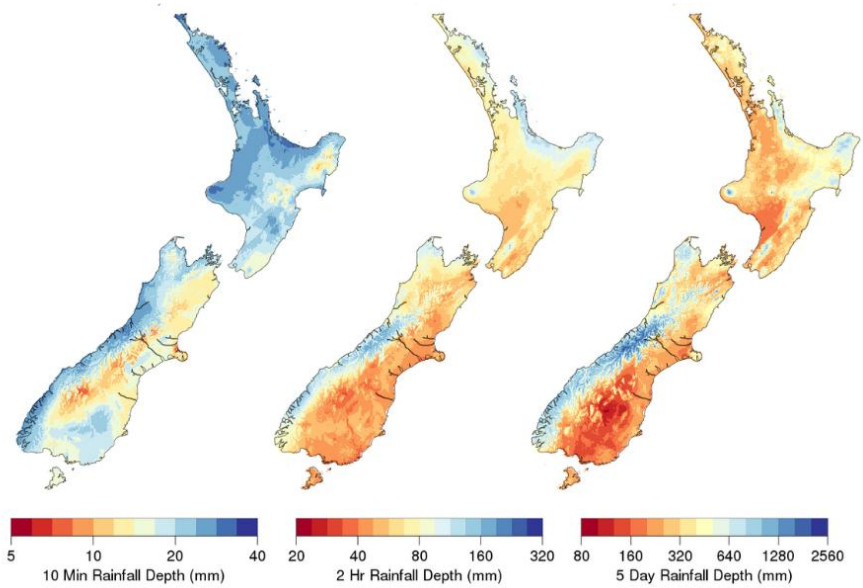


Projected change in total annual rainfall [6]



Taupō's rainfall volumes are moderate relative to other areas in New Zealand

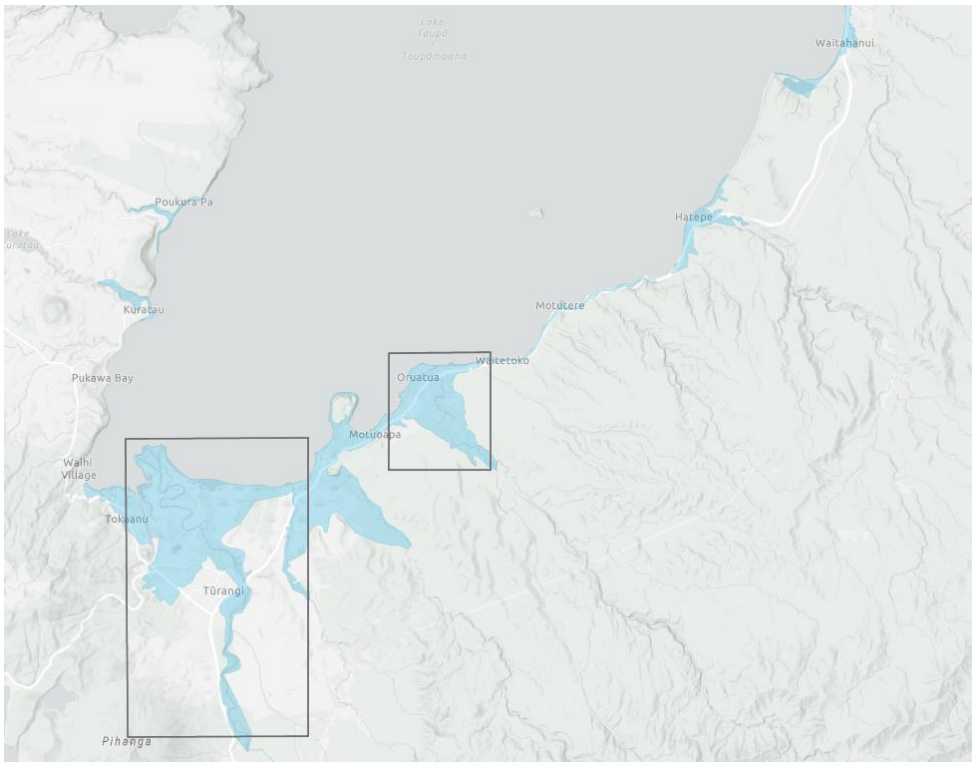
National rainfall volumes for 1 in 100-year event. [5]



[8] Source: Ministry for the Environment, Climate Change projections, Sep 2024: https://environment.govt.nz/facts-and-science/climate-change/climate-change-projections/climate-projections-summary-dashboard/

River flood mapping[9]

The Tongariro River in Tūrangi has flood protection managed by Waikato Regional Council. There is the potential for a significant number of houses to be flooded in a 1 in 100-year event, or in an extreme event where the flood protection is overwhelmed. The Tauranga-Taupō river also presents a significant flood risk to a number of houses in a large rainfall event.



9 https://waikatoregion.maps.arcgis.com/apps/MapSeries/index.html?appid=f2b48398f93146e8a5cf0aa3fddce92c

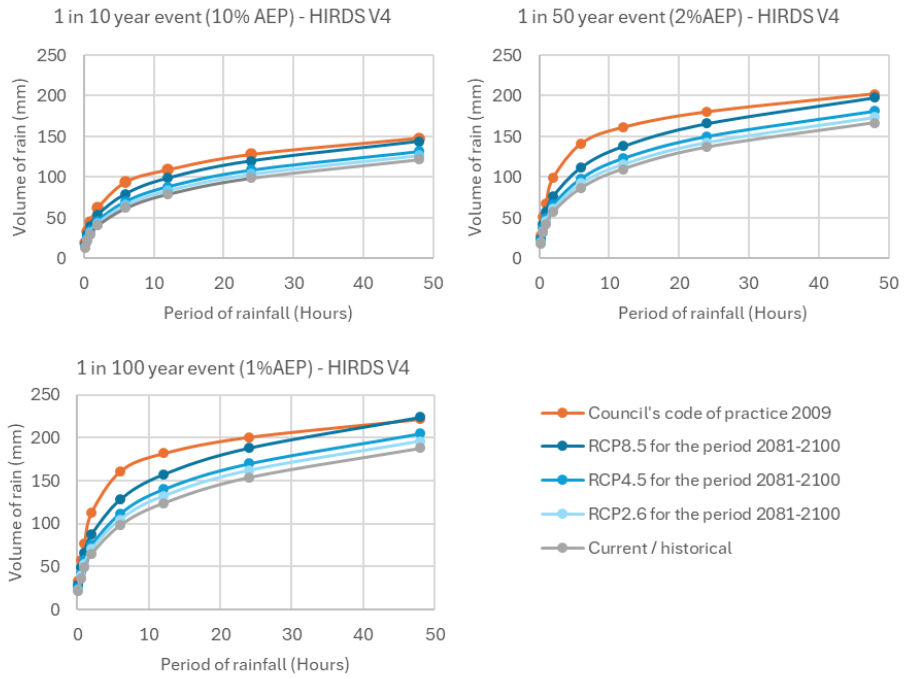
The intensity and likelihood of heavy rainfall events is increasing

Climate change has the potential to increase rainfall intensity over the next 100 years:

- by 14 – 30% for a short rain period of up to 6 hours under the mid - high climate change scenarios.
- by around 10 – 22% for a longer period of rain of 1 – 2 days under the mid - high climate change scenarios.

Or, a historic 1 in 100-year event has the potential to become a 1 in 50-year event (i.e. an event of that magnitude will be twice as likely) under the mid - higher climate change scenarios.

Projected change in intensity of heavy rainfall events [10]



Council has incorporated the risks of climate change into its rainfall modelling

- Council's Code of Practice for Development of Land (2009) applies even higher design rainfall requirements (see above charts).[11]
- Current stormwater modelling (overland flow paths (2019) – uses HIRDS version 3, with an allowance for climate change increasing rainfall intensity by around 19%.
- Current river and lake flood modelling uses AR4 (2007) and MFE guidance from 2008. However recent MFE guidance (April 2022), based on AR6, says that MfE latest models and advice from 2018 are still reasonable, the 2018 scenarios are within the range used in MFE's 2008 Guidance.[12]

[10] Source: NIWA, High Intensity Rainfall Design System (HIRDS) V4, 2018: https://niwa.co.nz/climate-and-weather/high-intensity-rainfall-design-system-hirds

[11] https://www.taupodc.govt.nz/rules-regulations-and-licenses/policies/code-of-practice-development-of-land

[12] Ministry for the Environment, Aotearoa New Zealand climate change projections guidance, April 2022: https://environment.govt.nz/assets/publications/Climate-Change-Projections-Guidance-FINAL.pdf

Overview of risk[13]

There are four key areas where Council is significantly exposed to risk and is unlikely to meet public expectations. These are the expectation of:

- private property damage and house flooding in a large heavy rain event
- wastewater spills, including into the Waikato River, during regularly heavy rain events
- continued erosion of key public reserve land
- continued significant potholing during regular heavy rain events, concentrated on roads that have had seal maintenance deferred.

Key risks

Heavy rain and storm events

	Water	Wastewater	Stormwater	Transport	Solid Waste	Property	Parks and open spaces	Building controls and planning
Flooding	✓	✓	✓	✓	✓	✓	✓	✓
High winds	✓	✓	✓	✓	✓	✓	✓	✓
Lightning	✓	✓		✓	✓	✓		
Power outages	✓	✓						
Landslip / slide	✓	✓	✓	✓		✓		✓
Erosion		✓		✓			✓	✓

In a heavy rain event, for example a 1 in 5 to 1 in 20-year event we can expect:

- Our stormwater networks to be overwhelmed in historic areas (those built prior to 2009), with water running along roads, and overland flow paths to low points. This is likely to affect private properties and some houses. For example in a recent 1 in 20-year event 6 houses had flooding above their floor levels. In a widespread 1 in 100-year event, up to 1,000 houses may be impacted across the district.
- Our wastewater systems to be inundated with stormwater resulting in multiple overflows. This includes the Taupō Wastewater treatment plant that is designed in an overflow event to controlled-spill into the Waikato River. Or overflows of the Tūrangi wastewater treatment plant ponds into the wetland area. All schemes have some risk. Mangakino is a known problem area.
- Our road network will suffer significant damage, typically multiple potholes, concentrated on roads that have had seal maintenance deferred. These impacts may also occur with smaller events, particularly if there are a number of successive heavy rain events – like those seen during 2025.

In a large storm event with heavy rain or winds we can also expect:

- Fallen trees, debris, and minor slips on the road network. In a large event, overwhelming numbers of road blockages may reduce access and take some time to rectify. There is also the risk of washouts undermining roads – which take a longer time to repair.
- Power outages at our key water and wastewater pump stations, relying on the use of generators and reducing plant capacity. In a large event there may not be enough generators, or it may not be possible to get generators to some sites.

[13] Adjusted from asset management plans following conversations with asset managers.

- The possibility that water quality, affected by waves and land-runoff, is too poor to treat at Council's water treatment plants, until the compliance upgrade programme is completed. Taupō water treatment plant is already upgraded.
- Erosion or bank failure at any unprotected lakefront sites, including the potential undermining of walkways, roads, or wastewater pipes close to the lake. Lakeshore erosion is a known problem at several sites. It occurs regularly through high wind / wave events, and through large erosion events – e.g., during storms. If left untreated, the community risks losing some high-value recreation spaces, and Council risks damage to or loss of some infrastructure assets, including wastewater and stormwater pipes. Kuratau is a significant risk area. Parts of Lake Terrace and Ferry Road are susceptible to bank failure caused by erosion of the toe of the supporting slope. While Council has funding and solutions designed, it has not implemented them due to lack of Iwi partners' support.
- A very large heavy rain event, or successive smaller events, poses the risk of ground movement and resulting in water or wastewater pipe breaks. The primary impacts are loss of services, and wastewater spills.
- Lightning poses a risk to critical electrical and plant equipment, but is relatively low risk.

Stormwater management risks

Climate change is making storm and heavy rain events more frequent and more severe. Taupō has recently experienced flooding (Feb 2025) from such an event. This event is estimated at around a 1 in 20-year event, with very heavy rainfall over a short period of 1 – 2 hours causing flooding to six houses. Such events are possible, and likely to have significant impacts on property in any area that is affected.

Problem 1 – we do not meet our service levels for 1 in 10-year event.

All new development and design areas (since at least 2009), are adequately planned and serviced to manage 1 in 10-year events, and support minimisation of property damage for 1 in 100-year events by protecting overland flow paths and gullies. The rainfall design levels that Council has used for some time are still appropriate taking into account the possible effects of climate change over the next 100 years.

However, historic stormwater systems (those built prior to 2009) are undersized and do not meet Council's intended service level of containing water for a 1 in 10-year event.

"Council has a network service level of provision of 1 in 10-year event but has not retrospectively upgraded the network unless there is a known flooding or erosion issue. To understand the current network capacity and identify the under-capacity areas that are causing problems, contractor reports and service requests and the overland flow path model are analysed".[14]

"The code of practice also considers climate change and effects on the district. The code provisions require that a 1 in 10-year event is soaked to ground for private property (pumice soils allow this) and Council's Stormwater network that predominantly services the roading network is now required to cater for a 1 in 10-year event and over land flow paths are designed up to a 1 in 100-year event.

"The Turangi township is an exception to this rule, due to the high-water table where a majority of the town discharges to the kerb.

"The older infrastructure installed before the allowance for climate change is sized to cater for 1:2 – 1:5-year events. Council has district specific climate change rainfall data included into the code." [15]

Council is working to improve its modelling to ensure it is reasonable. Once complete the information will be publicly available on LIMS (work is underway to improve modelling by the end of 2026).

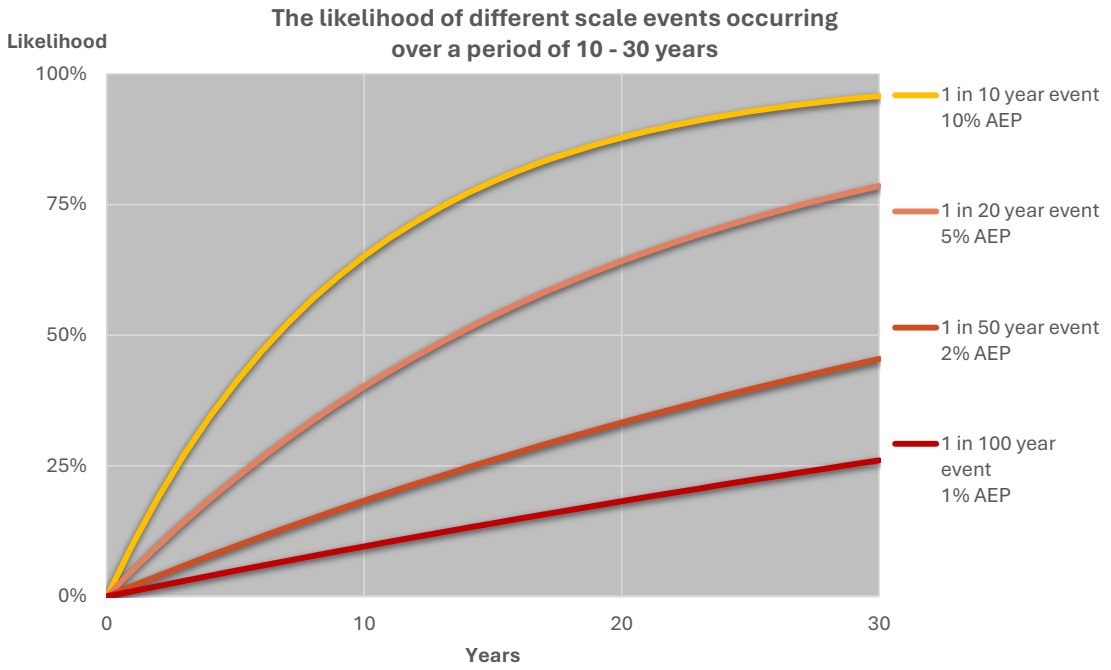
Once the modelling is complete, Council could assess the stormwater network to identify problem areas and identify if an investment programme to improve the 1 in 10-year event service levels can be achieved. This would likely be very expensive and need to be done over several years. The new requirement under the three waters reform to prepare Stormwater Network Risk Management Plans may be a catalyst for this work.

[14] Taupō District Council, Stormwater Asset Management Plan, 2024
[15] Taupō District Council, Stormwater Asset Management Plan, 2024

Problem 2 – for 1 in 20, 1 in 50, 1 in 100-year events there will be significant impacts.

High levels of rain will overwhelm Council's stormwater system (which is only designed for regular rain events), and are unlikely to be cost-efficiently managed through Council's stormwater systems.

Water will overflow into properties, following overland flow paths, and will pond in low areas.



Council has high-level modelling that suggest approximately 800 – 1,400 houses may be severely impacted in a 1 in 100-year event. This modelling has been identified as in need of significant improvement and rework.

Council is working to improve its modelling to ensure it is reasonable. Once complete the information will be publicly available on LIMS (work is underway to improve modelling by the end of 2026).

Even if Council improves its own stormwater networks, this will not change the fact that in a larger event, stormwater will not be contained by Council's stormwater network, and will follow overland flow paths, including flooding people's properties. There is an opportunity to better inform property owners about the risks of larger events – that stormwater will not be fully contained in Council networks, and that people should have their own measures in place to protect their property. More realistic modelling that can be made public and put on LIMs may be a catalyst for this work.

Council infrastructure and services risks

Water	• **Wastewater /Stormwater finding its way through to damaged water pipes due to: - Reticulation pipes movement.** With any water main break there is immediately a contamination risk. The risk scenario would be where there is land movement and a wastewater and a water pipe both break. Water mains are under pressure – so water is forced out of them rather than taking in water, and the most likely scenario is that there would be loss of services. But any break where there could be contamination is taken very seriously, and we have a number of controls that we put in place, for example: Doing a risk assessment, shutting off and/or isolating the service, repairing, disinfection, flushing the pipe and system, and doing water testing. The main mitigation for this is keeping on top of renewals, and our programme to replace older pipes made out of more brittle materials.

	• **Water quality too poor to treat:** In high wind, heavy rain or storm events, water can be stirred up in the lake and cause water quality issues, like high sediment content, that makes it difficult to treat. Currently several of our lake water intakes and treatment plants allow sediment to go through the treatment system. This is not just a quality (clarity and taste) of water issue, but also has potential health risks. Treatment plant upgrades will resolve this issue – sediment will not be able to be pass through the plant and will be captured in the treatment process. The Taupō water treatment plant already removes sediment. Currently if there are water quality issues in other areas, we rely on reservoir supplies, so there is potential service restrictions or limitations if this was an issue for a sustained period of time. Heavy rainfall can result in land runoff affecting water quality at our water supplies in Waihaha, River Road, and Tirohanga which are all stream or spring feed systems, which can be affected by surface water. When this happens we have to turn off the treatment plant, and replace water with tankers. We've not had problems in recent years at River Road or Tirohanga, but often have problems at Waihaha – which is a small restricted rural scheme (32 connected properties), many of which have their own water tanks, and little water is needed for irrigation after heavy rain events. • **Storm damage and power loss**: In heavy wind, rain or storm events there is the risk of loss of power (e.g. fallen trees taking out power). When there is power loss there is the potential for service disruption. Most of our main plants are set up to enable generators to be plugged in. In a recent event, the Tūrangi water treatment plant ran on generators for 3 – 4 weeks while power was restored. Hiring big generators and running them is costly. There is the potential for infrastructure damage in heavy rain and storm events, for example trees falling on, or flooding of network equipment (like a pump station). A lighting strike to critical electrical equipment, for example at a treatment plant, could cause significant damage.
Wastewater	• **Infiltration and inflow (I&I) of rainwater / stormwater into the wastewater network**. Large flows of rainwater get into the network through: o illegal connections to the wastewater system (e.g. house roof downpipes being plumbed into the wastewater system) o Low gully traps (example below [right image]), where rainwater will pool and flow into the wastewater system,  Source: 1News  Source: o And cracks in the wastewater pipe network. The result of getting large volumes stormwater in the wastewater network is overflows. These can occur at the treatment plants, or along the wastewater system like manholes, gully traps, or pump stations. Our treatment plants have a maximum inflow and controlled overflow spill systems, for example the Taupō Wastewater plant will overflow into the Waikato River. Our pump stations and treatment plants are monitored / have alarms systems to indicate an overflow.

	Wastewater overflows can result in health and environmental risks. In most instances these risks are low, with stormwater and rainwater washing and dispersing waste downstream fairly quickly. Health risks might be to anyone taking water further downstream, which would be managed through warning and boil water suggestions. The primary impact is reputational and cultural, with people concerned about wastewater ending up in the lake or rivers. If overflows become frequent then health and environmental risk becomes more substantial. We have an annual budget for works to reduce I&I risks. At the moment we are identifying entry points using smoke testing, flow monitoring and visual surveys. But it is a significant problem with a large number of entry points, many of which are on private property. To mitigate this risk, the first step is to identify entry areas, as we are doing through our I&I programme. We could do some further modelling to identify high risk areas. We are also doing some work to upgrade the capacity of the Taupō wastewater treatment plant. However, in practice heavy rain events are likely to result in wastewater overflows. And this is common around the country. The difference being that ours affects inland waterways, whereas in most areas it affects the coast. • **Land movement and pipe breaks:** Horizontal infrastructure, like pipes, is always at risk from land movement. This is a risk in heavy rain events, or event successive heavy rain events. The consequences of a pipe break are some environmental harm, that needs to be cleaned up. And loss of services. For a large break that will take some time to restore, we can contract temporary surface pipes to restore services, while it is fixed, as long as these are available and there is access. We haven't done any assessments to identify any particular areas that may be at risk of land movement. • **Storm damage and power loss:** Loss of power is a key risk affecting our treatment plants and pump stations. Most of our key plant is generator enabled (i.e. a generator can be plugged in to provide power), and can operate on reduced capacity for some time. In a large event getting generators to sites is a risk. Taupō wastewater treatment plant has its own generator. There is the potential for infrastructure damage in heavy rain and storm events, for example trees falling on, or flooding of network equipment (like a pump station). A lighting strike to critical electrical equipment, for example at a treatment plant, could cause significant damage.
Transport	• **Flooding: Roads or road structures damaged, blocked or destroyed due to flooding:** At extreme levels of flooding, our roads become the overland flow paths and some of them may not be passable, impacting service levels and access. We have a number of bridges around the district which are also at risk of damage during flood events. These risks can be exacerbated by forestry slash. • **Road damage and potholing:** The more common and frequent impact of high rain events is that roads that are not in good condition – where maintenance and renewals have been deferred – are easily damaged by water ingress causing potholes. Successive heavy rain events can have a dramatic impact on the quality of these roads – like widespread potholes and deeper potholes. Temporary measures to fill potholes can be washed away in successive events. Reactive work (repairing pot holes) is costly and reduces the funding available for proactive preventative maintenance. Permanent measures to repair and fix the roads comes from highly constrained budgets, and can take some time. Potholes are not just a level of service (smooth ride) issue, they can damage cars, leave the road exposed to further and greater damage in future rain events and further damage from vehicles, and can even cause road safety concerns when divers swerve to avoid them. The key to mitigating these risks would be increased preventative maintenance (pavement maintenance and drainage improvements) to stop roads being susceptible to potholing in heavy rain events. Almost all of the potholing and damage we see from heavy rain events is on roads that have had deferred maintenance and renewals.

	• **High winds: Roads or road structures blocked/damaged due to debris (fallen trees and/or power lines) and other objects blown into vehicle paths:** Heavy rain and high wind or storm events can result in trees and power poles falling, or tree branches and debris blocking roads. Individually these are not a large problem, but in a large event where there are scores or hundreds of these there can be significantly reduced service levels or access, and a significant amount of work is required to ensure safe traffic management, clear them and restore roads. Reactive work (picking up trees, slips etc) is costly and reduces the funding available for proactive preventative maintenance. • **Land slide/slip: Roads or road structures blocked, damaged or destroyed by land slide/slip possible occurring during heavy rain:** We have a large network of rural roads, which include many road cuttings, banks, and road built up above the surrounding land. In heavy rain and high wind or storm events, banks can be brought down. A key risk factor is trees or unsuitable vegetation on banks and road cuttings. Much of this vegetation is next to the roadway on private land. Successive events can also increase the risk, and there can be areas of repetitive slipping. Individual instances are usually not a large problem, and can easily be cleared. The risk is when there is a large event and multiple slips need to be dealt with. Under-slips or washouts are a greater problem to resolve, that take more time and resource to restore the roadway. We have a number of roads that are cut into slopes that are at risk (for example the roads in to Pukawa, and Omori /Kuratau), but also many of our roads are built up above the surrounding land and can also be at risk of being undermined by slips. The main mitigation options are preventative rural drain works, and tree and vegetation management. Our budgets for these are very limited and we mostly do reactive work, after a problem has occurred, or an imminent problem is identified. We don't have strong management and communications plans and protocols in place for large events. There is a significant communications challenge letting everyone know where there are problems or road closures, and detours and delays. There is also a significant management challenge in prioritising and allocating resources to fix the problems. There is also an opportunity to test and manage community expectations – If the community are willing to tolerate their road being closure for a period and accept the delay or taking alternative routes, we can more efficiently resolve the problem, rather than rushing, trying to fix everything at once, and doing expensive traffic management in multiple areas. • Power outages impact street lights and traffic lights. • Lightning strikes are a risk to streetlights and traffic lights.
Council buildings and facilities	• There are no high-risk or significant risks identified. No buildings and property assets have been identified as being in flood risk, slip risk, or wildfire risk areas. No detailed risk assessment has been done for buildings that may be used during Civil defence emergencies – but there have been no identified reasons to need one. • Main risks are storm and wind damage, including from fallen trees. Would expect this to be low level damage, however, when a tree fell on the Acacia Bay Hall it caused significant damage. • Loss of power can impact the provision of services. For example, the pool has to be closed if we cannot operate the filter. • Lightning strike to sensitive pool equipment could cause some costly damage, but is low risk.
Reserves	• Erosion is a key risk for Taupō reserves. Erosion, particularly of the lake foreshore, is an existing issue and is likely to be exacerbated by climate change. The process of erosion can be both long-term, through cumulative impacts over time, and in large erosion events, such as storms. **Lakeshore erosion risk areas** Yellow is high risk for erosion (management ongoing, some sites considered for engineered structures) Orange moderate risk (just monitoring at this stage)

- Kuratau is a high-risk site, the erosion of the foreshore can be significant, especially where a combination of high lake level and strong winds occurs, e.g., a storm event. This erosion is currently mitigated through as-needed beach nourishment under an existing resource consent and controlled in some areas by rock revetments. We have identified engineered mitigation and control solutions, and have funding set in the long-term plan under Project Watershed (co-funded with Waikato Regional Council) to put in these measures. We are in the process of getting a resource consent for the engineered structures, and engagement and consultation with Iwi / hapū is ongoing as permission to site the structures on the lakebed will be necessary. Delays in putting in place mitigation measures means that erosion continues, reducing the foreshore (and, therefore, reserve) area.
- Tapuaeharuru cliffs is another high risk site for erosion. This site currently has little mitigation or control measures in place. A range of options for this site have been sought, including engineered protection structures. Engagement and consultation with Iwi and hapū is ongoing to understand the issue and come to an agreed solution. Funds for works at this site have been set in the long-term plan, also under Project Watershed.
- Continued erosion at the above sites, and other areas, threatens reserve land, private properties, and Council infrastructure.
- Our gully reserves are designed to be overland flow paths. In a very large event there is the potential for erosion, including landslides, of gully banks. Historically there has been little control over where the boundaries of properties on the edges of these gullies extend to, erosion therefore threatens some existing residential areas.
- In heavy rain events, we can have scouring and damage to reserves where overland flows enter onto reserves, including lakefront reserves. This has a cost / repair impact that is not always planned for in budgets.
- In high wind and storm events, damage to trees and fallen trees can be a significant impact on our reserves requiring clean up and safety management. We have a small programme of tree assessments, and remove as soon as possible any dead, dying or dangerous trees, but it is difficult to determine all trees that may be at risk in a large event.
- In heavy rain events, we typically have good drainage for our sports fields, but pumice soil still compacts and needs additional maintenance to relieve compaction and support aeration.

Building controls and planning

Flooding	**River and lake flooding** New building and development in the river and lake flood hazard areas is controlled by the Taupō District Plan. The flood maps for these areas were added in 2019, and included the potential effects of climate change for a 1 in 100-year flood event. **Urban flooding (overland flow paths)** Council has in-house (not public) urban flood maps. It is working on improving the accuracy of these maps so that they can be made public and linked to property LIMs. Subdivision controls under the Resource Management Act 1991, allow Council to ensure that new development areas avoid (or mitigate) flood risk area. Council uses its in-house flood maps, or requires developers to identify flood risks, and how they are being managed. Council's Code of practice (2009) for the development land sets out that stormwater pipes should manage water flows for a 1 in 10-year event (10% AEP), and that overland flow paths should be safe for a 1 in 100-year event (1% AEP). The code provides rainfall intensities for these return periods, which account for expected impacts of climate change.[16] The Building Act 2004 (and associated building Code) provide controls for managing flooding risk – typically a minimum flood height above potential water levels. Council uses its in-house urban flood maps to identify potentially at risk new building.
High winds	The Building Act 2004 (and associated building Code) provide controls for high wind zones. National maps of high risk areas are available.
Landslip / slide	The Building Act 2004 (and associated building Code) provide controls for potential landslip or land instability risks. These are identified and managed on a case by case basis but can usually be identified by a site inspection. New buildings and developments in the Waihi Landslide Hazard Area are controlled by the Taupō District Plan.
Erosion	Esplanade strips around the lake and rivers and the foreshore protection are in the District Plan provide some protections against new building or development in potential erosion areas.

[16] Taupō District Council, Code of Practice for Development of Land, 2009

HOTTER DRIER SUMMERS

Overview of climate impacts

More hot days: A significant increase in hot days (greater than 25ºC) is expect for Taupō district, increasing from around 10 annually to 30 – 40 by mid-century and to 25 – 80 by the end of the century. Up to 10 of those might be very hot days (greater than 30ºC). While this seems like a large increase in 'hot days', it may reflect that we have a number of days just under 25 ºC currently, that will tip over that threshold.

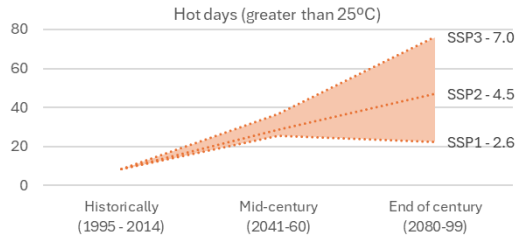
Increased drought risks: Taupō district's drought risk (frequency and intensity) is expected to increase somewhat driven by increased temperatures, but the number of dry and rainy days is not expected to change in summer, and total rainfall (mm) is actually expected to increase in summer by around 5 – 10%.

Increased bush / wildfire risks: Fire risks (frequency and intensity) are exacerbated by hotter weather, dryer conditions, and any high wind conditions. Taupō district's fire risk is expected to increase from relatively low to relatively low – medium.

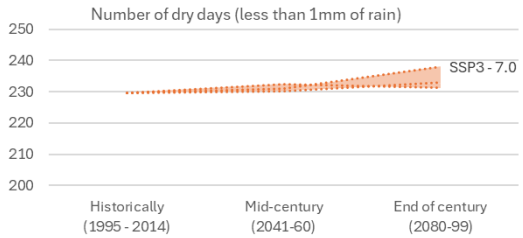
Freshwater quality impacts: Lower river flows, increasing water temperatures, impacts on habitats and species, increased risk of poor water quality, invasive species, and toxic algae bloom.

Pests / Diseases: A warming climate may allow populations of mosquitoes and ticks that spread tropical diseases, such as dengue fever and malaria. Other invasive pests and diseases may affect flora and fauna.

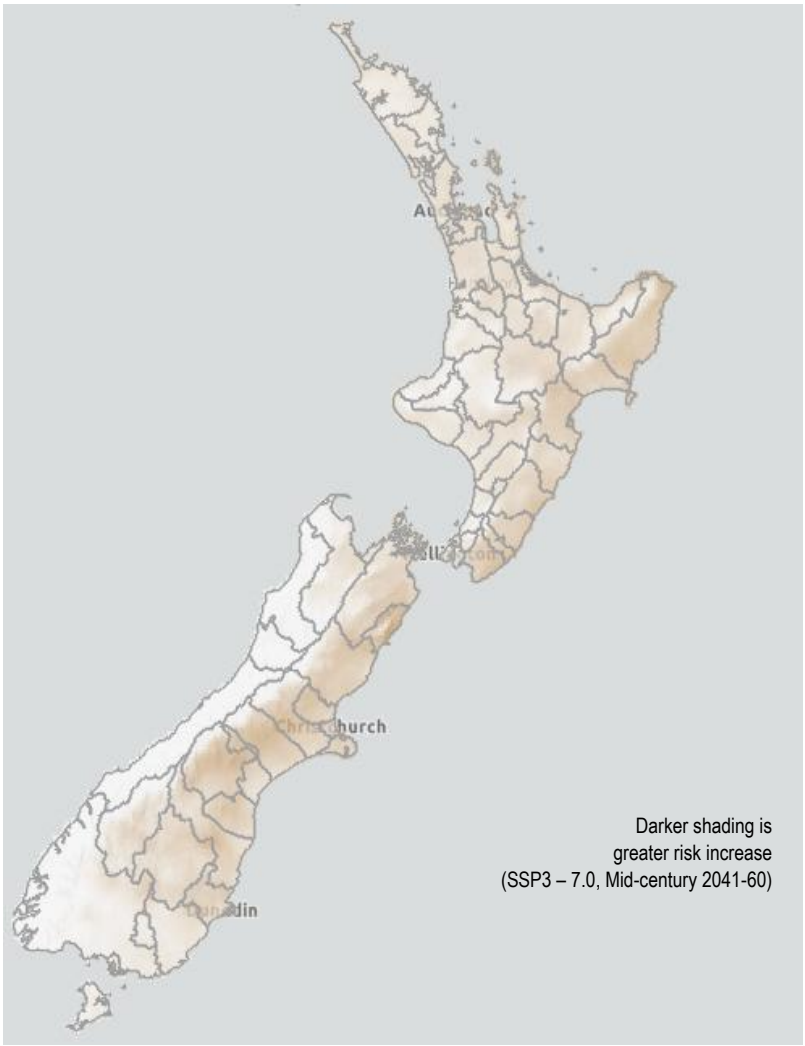
Projected increase in the number of hot days [17]



Projected increase in the number of dry days [11]



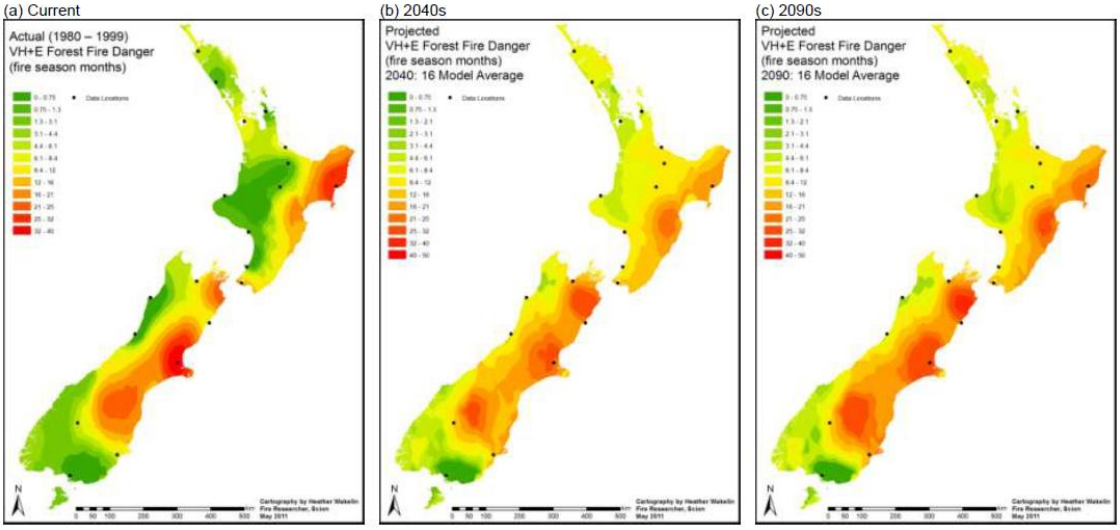
Increase in drought risk due to climate change [18]



[17] Source: Ministry for the Environment, Climate Change projections, Sep 2024: https://environment.govt.nz/facts-and-science/climate-change/climate-change-projections/climate-projections-summary-dashboard/

[18] Source: Ministry for the Environment, Climate Change projections, Sep 2024: https://map.climatedata.environment.govt.nz/

Projected increase in Very High and Extreme forest fire danger days per year [19]



Overview of risk[20]

There are no identified areas where Council is significantly exposed to risk or is unlikely to meet public expectations.

- The primary risk is the potential for a bloom of toxic algae in the vicinity of one of our lake water intakes. (Our lake intake sites are Hatepe, Taupō, Kinloch, Motuopa, Omori, and Motutere.)

  This is an existing risk. There has been no quantification of how much this risk may increase due to climate change.

  Council has controls in place to mitigate the health risk of water supplies being containment by algae toxins.

  The most likely impact of a toxic algae outbreak near a water take would be a halt to services (reliance on reservoirs and replacement tanker water).

  This risk will be mitigated as part of Council's water treatment plant upgrade programme. An upgrade for the Taupō Water Treatment Plant to treat algae toxins is also planned for around 2030.

Key risks

Hotter drier summers								
	Water	Wastewater	Stormwater	Transport	Solid Waste	Property	Parks and open spaces	Building controls and planning
More hot days								
Drought	✓						✓	
Water quality impacts (including algal blooms)	✓						✓	
Wild / bush fire			✓	✓	✓	✓		
Pests / Disease							✓	

[19] Source: *Improved estimates of the effect of climate change on NZ fire danger*, Scion and NIWA, 2011

[20] Adjusted from asset management plans following conversations with asset managers.

Council infrastructure and services risks

Water	• Public health risk from Water Source, including from Algae bloom and associated biotoxins: This is a known risk that exists currently. The risk scenario is if there is a bloom of toxic algae in the vicinity of one of our lake water intakes. Our lake intake sites are Hatepe, Taupō, Kinloch, Motuopa, Omori, and Motutere. We have a cyanotoxin management plan, which includes regular sampling over spring and summer periods to test for any signs of problems or toxins. If risks are identified we will do more frequent testing. If there are toxins present it is a real problem. They are dangerous and cannot be boiled out. We would have to stop water supplies and tanker in water to impacted communities. With our water treatment plant upgrades Hatepe, Kinloch, Motuoapa and Omori will have built in cyanotoxin treatment systems. For the Taupō water treatment plant we have funding in the Long-term Plan 2024 for upgrades to provide cyanotoxin treatment around 2030. This project hasn't yet been scoped or deigned. There are no plans for Motutere at this time. • Drought: The lake provides some insultation from the impacts of drought – we have a reasonably secure water takes for most of our network. However in a prolonged drought, restrictions are likely to be placed on us – which means that we would have to put in place water restrictions on water users. Some of our rural water schemes may be at risk, but there are no known issues (we've not had any problems in the past). Drought can also lead to ground movement (e.g. ground shrinking) which poses the risk of pipe breaks. The main mitigation for this is keeping on top of, renewals and our programme to replace older pipes made out of more brittle materials.
Wastewater	• There are no particular wastewater concerns in relation to dry spells, heat and drought. With the exception that these may have the potential to result in land movement which presents a risk of pipe breaks.
Transport	• Heat and road melting is not a significant issue for our district. We do get some softening of bitumen in high temperatures but not significant damage. There are other parts of the country that have more frequent and higher temperatures than us. This may require changes in materials in future, but we expect that these would be addressed through updating our planning and management approaches in time.
Reserves	• Droughts can have impact on our reserve operations. There might be less mowing, but more maintenance and watering costs, for example for sports fields. Many of our sport fields are not set up for irrigation (Invergarry Rd. end Crown Park, Tūrangitukua Park, Kaimanawa Reserve (outfield area) and we have a manual travelling irrigator for Mangakino sportsgrounds. Hickling Park and Crown Park (fields 1 to 10) have some irrigation, but limited capacity. So in drought conditions there is extra maintenance for sport fields, and there is a risk that the grass dies

Building controls and planning

Wild / bush fire	Forestry has setback requirements for new forests under the Resource Management (National Environmental Standards for Commercial Forestry) Regulations 2017, including 40m from an dwelling, 30m from the boundary of an urban area, and 10m from a neighbours property. Taupō's district plan requires buildings to be setback at least 30m from an existing plantation forest property boundary[21]. It also supports vegetation clearance around infrastructure, for example, under power lines.

[21] Taupō District Plan Rule 4B.2.6 vii refers

APPENDIX 1 – EXTRACTS FROM NIWA[22]

Rainfall

Typically, much of New Zealand is likely to experience drier springs and summers and wetter winters.

Extreme events

Changes to our rainfall and temperature will increase the likelihood of extreme events.

This is because a warmer atmosphere can hold more energy and moisture, leading to heavier and more intense rain.

For the same reason, ex-tropical cyclones (cyclones that originate in the Pacific) may be stronger and more intense when they reach New Zealand.

Bush fires may also increase in frequency and intensity as drought-like conditions become more common.

Temperature

Like much of the Earth, New Zealand will be warmer everywhere. Hot days – days above 25 degrees Celsius – are likely to be far more frequent.

Because of warmer temperatures, much of New Zealand may be frost free by 2100.

Drought

Meteorological drought can occur during extended periods of low rainfall. High temperatures can also exacerbate drought conditions as more evaporation occurs during hot weather. New Zealand will be much more prone to drought as our climate warms.

For much of the country, the number of days with rainfall is likely to decrease which will lead to longer dry spells. Warmer temperatures leading to moisture being evaporated from soils will further increase the risk of drought.

Water supplies

We will also have to think about our water supplies, but not only during dry periods.

In March 2017, a huge storm called 'The Tasman Tempest' descended on Auckland. Unprecedented amounts of rain fell on the Hunua Ranges causing massive slips into water reservoirs, contaminating drinking water with silt. Water restrictions were put in place and water managers realised that they would have to plan for similar events in the future.

As parts of the country become drier, people will have to think about how they can store or access water.

Freshwater environments

We're still learning how freshwater environments will be impacted by climate change. We do know that water in our rivers, lakes, estuaries and wetlands will become warmer as air temperature increases. Warmer water temperatures will likely impact the range of many species, as well as nutrient cycling and primary productivity. Like with marine waters, as freshwater environments warm, we might see proliferation of invasive species such as water hyacinth.

Changes in rainfall and snow and ice cover will also impact the amount and seasonal timing of water entering and exiting freshwater environments. Finally, changing wind and temperature patterns may increase the likelihood of algal blooms in lakes.

[22] https://niwa.co.nz/climate-change-information-climate-solvers/climate-change-and-possible-impacts-new-zealand

APPENDIX 2 – EXTRACTS FROM NIWA / MFE - AOTEAROA NEW ZEALAND CLIMATE PROJECTIONS[23]

Ministry for the Environment
Manatū Mō Te Taiao

Climate Projections by Territorial Authority

Territorial Authority

Taupō District

This summary provides an overview of how the climate is projected to change in **Taupō District** between now and 2099 and presents projections as a range of values from a low emissions to a high emissions future. These projections are relative to the **1995-2014** period and consider a range of scenarios for future climate change as defined by the Intergovernmental Panel on Climate Change (IPCC).

Average daily air temperature

Average temperatures in Taupō District are likely to be 0.9-1.5°C warmer by 2050, and 0.8-3.2°C warmer by 2090, with the greatest seasonal change projected in Summer. The average temperature in Summer is likely to increase by 1.1-1.8°C by 2050, and by 0.9-3.8°C by 2090.

Number of hot days (>25°C)

There were an average of 8.5 hot days - days when the temperature gets above 25°C - per year for Taupō District in the 1995-2014 period. There are projected to be between 0.2 and 36.0 more hot days per year by 2050, and between 0.1 and 77.3 more hot days per year by 2090.

Number of frost days (<0°C)

There were an average of 47.4 frost days - days when the temperature gets below 0°C - per year for Taupō District in the 1995-2014 period. There are projected to be between 6.0 and 33.4 fewer frost days per year by 2050, and between 5.9 and 70.4 fewer frost days per year by 2090.

Total rainfall

Annual rainfall in Taupō District is likely to change by between -7.5% and 1.3% by 2050, and change by between -11.4% and 1.0% by 2090, with greatest seasonal change projected in Spring. The total annual rainfall in Spring is likely to decrease by between -17.5% and -0.3% by 2050, and decrease by between -22.4% and -2.8% by 2090.

Number of very rainy days (>25mm)

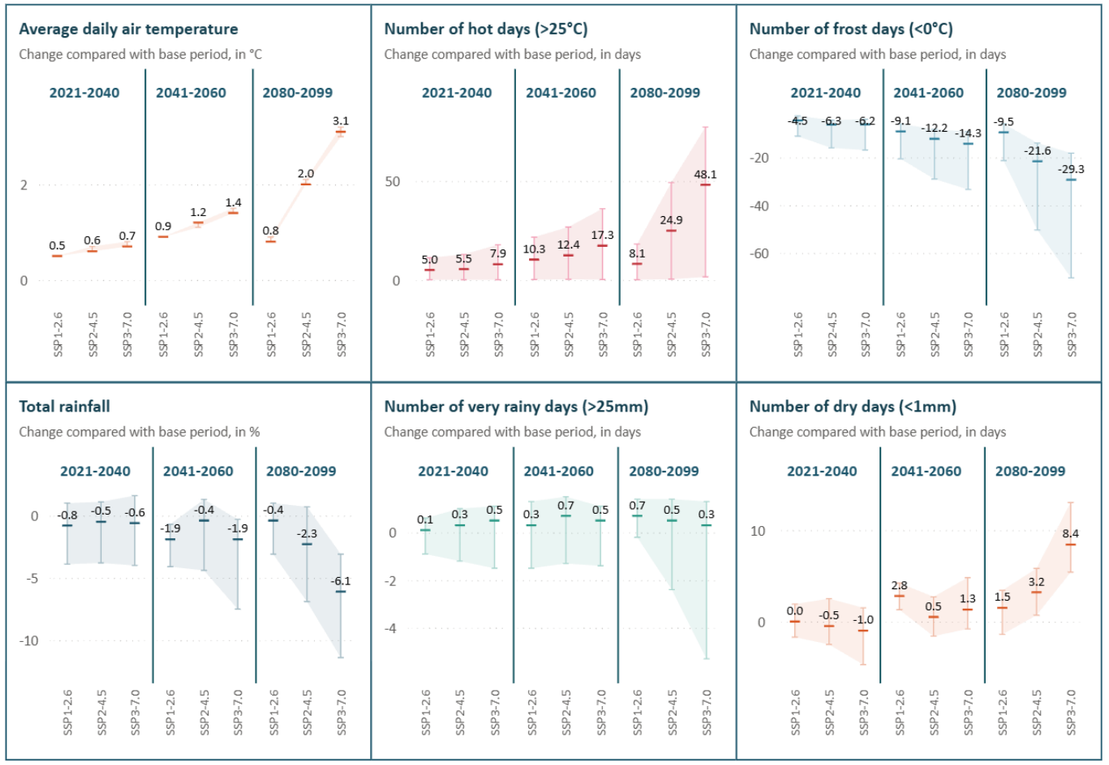
There were an average of 11.7 very rainy days - where rainfall exceeds 25 mm - for Taupō District in the 1995-2014 period. There are projected to be between 1.5 fewer and 1.5 more very rainy days per year by 2050, and between 5.3 fewer and 1.4 more very rainy days per year by 2090.

Number of dry days (<1mm)

There were an average of 229.7 dry days - days when rainfall is less than 1 mm - per year for Taupō District in the 1995-2014 period. There are projected to be between 1.6 fewer and 4.8 more dry days per year by 2050, and between 1.4 fewer and 13.0 more dry days per year by 2090.

Number of windy days (>10m/s)

There were an average of 12.6 windy days - days when the wind speed exceeded 10 metres per second per year - for Taupō District in the 1995-2014 period. There are projected to be between 0.0 and 5.7 fewer windy days per year by 2050, and between 13.3 fewer and 1.2 more windy days per year by 2090.



Future periods

Three future time periods are presented, providing projections of

- 2020 - 2040 near-term future
- 2041 - 2060 mid-century
- 2080 - 2099 end-of-century

Projection scenarios

Three scenarios are presented to provide projections of

- SSP1-2.6 "Sustainability"
- SSP2-4.5 "Middle of the Road"
- SSP3-7.0 "Regional Rivalry"

Definition of climate variables

Average air temperature (°C)
The average daily temperature across the year.

Number of hot days
The number of days per year with a maximum daily air temperature over 25°C.

Number of frost days
The number of days per year with a minimum daily air temperature below 0°C.

Total rainfall
The total amount of rainfall per year.

Number of very rainy days
The number of days per year with more than 25 mm of rainfall.

Number of dry days
The number of days with less than 1 mm of rainfall.

Number of windy days
The number of days with maximum wind speed more than 10 metres per second.

[23] https://environment.govt.nz/facts-and-science/climate-change/climate-change-projections/climate-projections-summary-dashboard/

APPENDIX 3 – EXTRACTS FROM WAIKATO REGIONAL CLIMATE CHANGE HAZARDS AND RISKS REPORT (MAY 2025)[24]

Key climate hazards in the Waikato

This report provides an overview of climate change hazards and risks identified through a high-level risk identification and screening process. Climate change is expected to increase the frequency, severity and impact of many natural hazards in the region. Over the next century, the Waikato region can expect rising sea levels, more extreme weather, warmer summers and milder winters with seasonal rainfall shifts. It is projected that drought risk will increase in the north and east over spring and summer, and there may be seasonal changes in rainfall and wind in the west.

Severe weather and flooding

The Waikato region is highly vulnerable to severe weather events, which are expected to become more frequent and intense due to climate change. Increased rainfall can overwhelm rivers and drainage systems, leading to widespread flooding in both urban and rural areas.

The Waikato region has extensive flood management schemes and land drainage networks, all built to provide agreed levels of service. However, with climate change these may be unable to maintain historic levels of protection without considerable additional investment. Ongoing development in flood-protected areas also further increases exposure to flood risk.

Landslides and erosion

Intense rainfall and river flooding drive increased land instability, including landslides and erosion. Longer dry periods can exacerbate land instability as dry, cracked ground is more prone to failure during intense rainfall. Landslides are common in steep catchments with weak geology, particularly when soils become oversaturated. Riverbank erosion is also common on outer river bends during flood events due to high-energy flows. Erosion can also have secondary impacts on water quality, as a result of sediment loads.

Droughts

The Waikato region, traditionally known for its plentiful water resources, is increasingly facing the prospect of more frequent and severe droughts due to climate change. Rising temperatures and less consistent rainfall are expected to increase the incidence and intensity of droughts.

Temperature increase

Extreme heatwaves are becoming more common and intense in the Waikato region as national temperatures rise. These heatwaves can have wide-ranging effects on human health, animal welfare, the marine environment and economic productivity. Additionally, warmer air can hold more moisture, which can result in more intense rainfall. Recent summers have seen record-breaking temperatures, with many more warm days (≥ 25°C) than usual. High afternoon temperatures and humidity in the Waikato can cause significant heat stress, with extreme events often persisting for several days with little respite overnight. The impacts of extreme heat include increased demand for water and energy, degradation of infrastructure such as roads, and challenges for agriculture due to heat stress on livestock and reduced crop yields. Additionally, fewer frost days are expected, which can affect winter recreational activities and tourism, as seen with the record-breaking low snowfall in Tongariro National Park in 2022.

Increased fire weather

Climate change predominantly increases the risk of wildfires by increasing temperatures and reducing moisture. Higher temperatures reduce relative humidity and prolong droughts, making fire fuels more available. Changing rainfall patterns also result in increased rainfall in some areas but drier conditions in others Climate change is expected to increase fire weather risk in Waikato by about 3 per cent per decade until 2050. The high-end scenario (RCP8.5) predicts a 10 per cent increase per decade in fire danger metrics from 2050 onwards, with the worst years showing double the current fire danger levels (Melia N et al., 2022)

[24] https://www.waikatoregion.govt.nz/environment/climate-change/waikato-regional-climate-change-hazards-and-risks/

Assessment of climate hazard exposure by district

The presence, intensity and impact of climate hazards, both now and into the future, varies across the Waikato region. Each area, and the communities, iwi Māori, organisations and businesses located within it, will be affected by climate change and its associated risks differently. Therefore, each will need to plan for climate change in a unique way.

Some districts have greater exposure to certain climate hazards than others. Consequently, the impact will vary across the region. However, a lower presence of hazards and risks in some districts does not imply the absence of risk. There may still be smaller or localised areas within those districts that can be impacted by a hazard.

The following table provides an overview of each territorial authority's climate hazard exposure across the region.

✓✓✓ Territorial authority (TA) has a large exposure to this climate hazard now and into the future with the potential to impact significant areas.

✓✓ TA has presence of hazard and exposure to this climate hazard now and into the future with the potential to impact localised areas.

✓ Limited presence and exposure of hazards and/or limited impact areas are impacted.

Table: Assessment of climate hazard exposure by district in the Waikato region (**Ministry for the Environment, 2024**) (**NZ Sea Rise, 2024**) (**Waikato Regional Council, 2025**).

Council	Flooding (Fluvial and Pluvial)*	Coastal hazards	Extreme weather	Higher temperature	Dryness and drought	Increased fire weather	Groundwater rise and salinity stress	Landslides and soil erosion	Marine heatwaves and ocean chemistry changes	Decreased frost
Thames Coromandel	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓
Hauraki	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓	✓✓✓	✓
Waikato	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓	✓✓	✓✓	✓
Hamilton City	✓✓	N/A	✓✓	✓✓✓	✓✓	✓	N/A	✓	N/A	✓
Matamata-Piako	✓✓✓	N/A	✓✓✓	✓✓✓	✓✓✓	✓✓✓	N/A	✓	N/A	✓
South Waikato	✓	N/A	✓	✓✓	✓✓	✓✓	N/A	✓	N/A	✓✓
Waipā	✓✓	N/A	✓	✓✓	✓✓	✓	N/A	✓✓	N/A	✓
Ōtorohanga	✓✓	✓✓	✓✓✓	✓✓	✓	✓	✓	✓✓✓	✓	✓✓
Waitomo	✓✓✓	✓✓	✓✓✓	✓	✓	✓	✓	✓✓✓	✓	✓✓
Taupō	✓✓	N/A	✓✓	✓	✓✓✓	✓	N/A	✓✓✓	N/A	✓✓✓
Rotorua Lakes (WRC area)	✓	N/A	✓✓	✓	✓✓	✓	N/A	✓✓	N/A	✓✓✓

**Waikato Regional Council and/or other district councils provide and manage flood protection and land drainage schemes throughout the region. Waikato Regional Council manages flood protection and land drainage in Waikato District, Hauraki District, Thames Coromandel District, Matamata-Piako District, Waipā District and Taupō District. Hauraki and Ōtorohanga District Councils manage their own flood protection and land drainage for parts of their districts.*

Flooding, extreme rainfall and storms

Hazard	Description	Present day (baseline 1995-2014)	Mid-century (2040 - 2060)			End of century (2080 - 2100)			Spatial variation across the region
			SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP2-4.5	SSP3-7.0	SSP5-8.5	
Annual rainfall	• The total amount of rainfall per year or season. • Slight increase expected overall, but potential for a 11% decrease by end of century. • Rainfall intensity is expected to increase, so while seasonality of rainfall may decrease, more intense rainfall is expected to fall over shorter periods.	1160 – 2260mm total rainfall per year on average 122 to 152 rainy days per year	-3% to +0.4% change in annual rainfall -1 to +1 very rainy days per year	-3% to -2% change in annual rainfall -1 to +1 very rainy days per year	N/A	-5% to -2% change in annual rainfall -2 to +1 very rainy days per year	-8% to -6% change in annual rainfall -4 to +1 very rainy days per year	N/A	• Overall Rainfall: Projected to decrease in many districts, especially in spring. • Significant Decreases: Notable in Waikato, Thames-Coromandel, Hamilton City, Waipā, Ōtorohanga, Rotorua, and Taupō during spring. • Hauraki and Matamata-Piako: Show significant variability in winter rainfall, with decreases up to 16% and slight increases around 3%. • Taupō District: Largest projected change in rainfall by end of century, with annual rainfall expected to change between -11 and 1%. Spring rainfall could decrease by -22% to -3%. • Flooding Risk: Varies across the region, with flood-susceptible areas in all districts. Highly susceptible districts include Waikato, Hauraki, Matamata-Piako, and Coromandel. Taupō District also has flood-susceptible communities, especially in lakeshore areas like Tūrangi.
Extreme rainfall	• 1% AEP, 24 hour duration rainfall depth (mm) • A rainfall amount that has a 1% chance of being exceeded in any given year. • Likely to become more intense, leading to more extreme flooding. Projections taken from CMIP6 report (Yi, et al., 2021) where projections are provided for SSP2-4.5 and SSP5-8.5	197mm (24hr, 100year)	+13% rainfall depth (24hr, 100year)	N/A	+16% rainfall depth (24hr, 100year)	+19% rainfall depth (24hr, 100year)	N/A	+39% rainfall depth (24hr, 100year)	
Extreme weather events (wind & storms)	• Increase in cyclone frequency and intensity • Extreme precipitation intensity is projected to increase. • Windy days are defined as days with >10m/s. • The reduction in windy days tends to be more significant by end of century compared to mid-century. • Frequency of extreme winds is expected to increase in winter and decrease in summer • Increase in storm intensity predicted by end of century will result in an increase in gale force westerly winds. • This may mean that longer dry spells are followed by more intense rainfall events.	1 to 82 windy days on average per year	0 to 7 fewer windy days per year	0 to 7 fewer windy days per year	N/A	0 to 12 fewer windy days per year	0 to 20 fewer windy days per year	N/A	• North and eastern parts of the region, particularly the Coromandel Peninsula, Hauraki, Matamata-Piako and Waikato Districts are likely to experience more frequency and more intense cyclones. • Most districts are projected to experience a decrease in the number of windy days by both mid-century and end of century. • Taupō District could experience 13 fewer to 1.2 more windy days, which contrasts with the overall trend of decrease across the region. • North-eastern districts such as Coromandel, Hauraki and Matamata-Piako could experience more extreme cyclone activity into the future.
Increased land instability and soil erosion	• Increasing rainfall intensity will increase the probability of landslides occurring. • Changes in rainfall intensity could also lead to a broader geographical area susceptible to landslide risk. • Increases in earthflow, gully, sheet, and bank erosion are expected with increased rainfall and temperature.	*No projection information available							• The Coromandel Peninsula is highly susceptible to land instability, as well as Northern Waikato surrounding Port Waikato, Wharekawa, Hunua Rangers, and along King Country in the west of the region. • Land instability is also likely surrounding Lake Taupō due to the weaker volcanic ash and pyroclastic flow deposits. • These locations are also susceptible to soil erosion alongside land use areas highly populated by agriculture and horticulture, such as Hauraki Plains, Lower Waikato, Matamata-Piako and Tūākau/Pukekohe.

Temperature increase and drought

Hazard	Description	Present day (baseline 1995-2014)	Mid-century (2040 - 2060)		End of century (2080 - 2100)		Spatial variation across the region
			SSP2-4.5	SSP3-7.0	SSP2-4.5	SSP3-7.0	
Average temperatures	• The average daily air temperature per year or season.	8°C to 10°C on average per year	+ 1.1° to 1.2°C temperature increase	+ 1.3° to 1.4°C temperature increase	+ 1.9° to 2.1°C temperature increase	+ 2.9° to 3.1° C temperature increase	• Average daily temperature is expected to increase across the whole region, however Hamilton City, Ōtorohanga, Rotorua and Taupō Districts are expected to see a significant increase in the number of hot days, particularly by end of century. • By mid-century, three out of four summers in Hamilton will include a 15-day hot spell more intense than those occurring once a decade in the recent past (1984-2015). • By mid-century, significant multi-week heatwaves with temperatures at or above 30°C for several weeks could occur in Hamilton.
Hot days (>25deg)	• The number of days per year or season with a maximum daily air temperature over 25°C or greater and very hot as 30°C. • Significant increases are expected in summer, especially by end of century. • By mid-century, summer temperatures are projected to rise by +0.9°C – 1.8°C and up to 3.8°C by end of century.	10 to 38 hot days on average per year	+ 12 to 30 more hot days per year	+ 17 to 39 more hot days per year	+ 25 to 54 more hot days per year	+ 48 to 82 more hot days per year	
Frost days	• The number of days per year or season with a minimum daily air temperature below 0°C. • These will significantly decrease in the southern parts of the Waikato region, particularly by end of century.	6 to 45 frost days on average per year	3 to 12 fewer frost days per year	3 to 14 fewer frost days per year	5 to 22 fewer frost days per year	5 to 29 fewer frost days per year	• Taupō District will see the largest decrease in estimated frost days followed by Rotorua District. • There is a smaller decrease in the number of frost days seen across the northern Waikato Districts.
Drought	• Dry days are days where rainfall is less than 1mm per day. • Potential evapotranspiration deficit (PED) is a drought index (expressed in mm) representing drought exposure. • An increase in PED indicates an increase in drought severity. • By the end of century, the time spent in drought ranges from minimal change through to more than double, depending on the climate model and emission scenario considered.	213 to 242 dry days on average per year 42mm to 144mm PED	-2 to +1 more dry days per year +21mm to +36mm of PED	-2 to +1 more dry days per year +2mm to +44mm of PED	+1 to +3 more dry days per year +27mm to +66mm of PED	+6 to +8 more dry days per year +48mm to +87mm of PED	• Drought risk is expected to increase across the whole region, but particularly in north-eastern districts.
Increased fire weather	• Fire weather index is dependent on temperature, precipitation, relative humidity and wind speed. • The number of days with very high and extreme fire danger could increase significantly across the country.	*No projection information available					• The highest fire danger in Waikato is projected for the Matamata-Piako and Hauraki districts, including Matamata, Morrinsville, Waihi, Thames, Te Aroha, and Paeroa. • Districts and locations identified above will experience higher temperatures could see increased fire weather. • However, the Waikato region is not expected to see a significant increase in wind, which is an exacerbator of fire risk.

Taupō District
Climate change hazards and risks

This map provides a high-level overview of key climate hazards and risks for the district. It should not be interpreted as showing all climate hazards, risks and all locations.

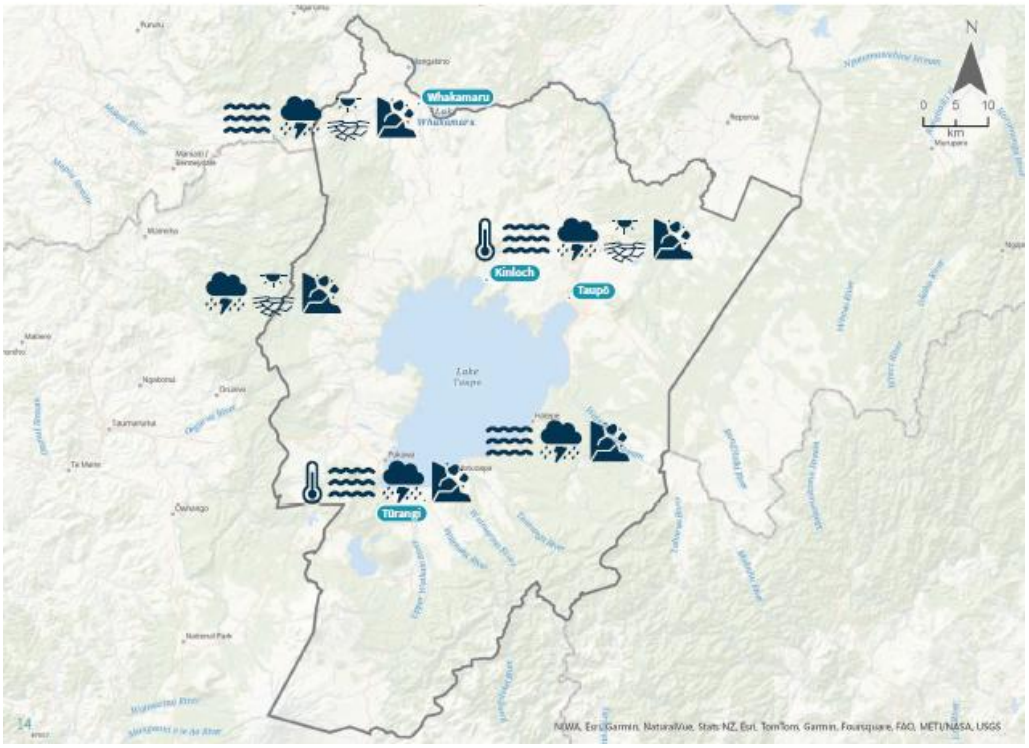
Human
The loss of winter tourism will significantly impact Taupō communities, influencing communities' mental well-being. Vulnerable communities, such as those on the eastern and southern lakefront, face potential isolation risks driven by hazards. Land instability in Waihi Village poses a risk to Iwi/Māori as demand increases on marae and community facilities with possible damage to urupā and other places of cultural significance.

Economy
Increased temperature and fewer snow days will affect winter tourism in Taupō, while increased droughts will economically impact the rural sector by reducing stock productivity and raising agricultural costs. Seasonal changes and severe weather can also harm the forestry industry through reduced rainfall, wind damage to trees and increased fire risk.

Natural environment
Warmer temperatures can negatively impact Lake Taupō's ecosystems, increasing algal blooms and biodiversity both in and around the lake. Increased rainfall and erosion can reduce water quality alongside increased run-off from urban centres like Taupō township and forestry areas.

Built environment
Critical infrastructure along SH1 and SH43 is vulnerable to flooding and land instability, and buildings along the eastern and southern shores of Lake Taupō are at risk of flooding, such as in Tūrangi, Tokaanu and Tauranga Taupō communites. Lake Taupō power generation is at risk during both high and low lake levels due to severe weather, drought and seasonality changes.

Hazards
- Extreme weather
- Rainfall and flooding
- Higher temperature
- Drought
- Land instability



Risks to the built domain

Risk focus area	Risk overview
Transport	**Road transport** • **Extreme weather** can cause washouts, slips, and surface damage. This can cause road damage and closures, impacting access, especially in rural or isolated communities. • **Flooding and landslides** risk of culvert washouts and bridge scour, making roads impassable, increasing accident rates. This can impact freight movements across the region resulting in supply chain issues and secondary impacts on the economy and people. This is exacerbated by capacity issues in existing culvert infrastructure. SH1 near Tūrangi suspectable from flooding from the Tauranga-Taupō an Tongariro rivers • **High groundwater** can compromise road integrity, requiring maintenance. • **High temperatures and drought** can lead to melting, cracking and subsidence of roads, especially in areas of peat. • **Drought related peat shrinkage** can cause subsidence, affecting roads and rail. Additionally, peat fires near roads can lead to thick smoke disrupting transport. **Air transport** • **High winds** can disrupt air services. • **High temperatures** can melt tarmac, disrupting operations.
Energy and telecommunications	**Electricity networks** • **Extreme weather** (high winds, snow and storms) can damage above-ground infrastructure, causing widespread outages, especially in isolated communities. • **Flooding** can damage infrastructure, decrease ground stability, and expose assets. • **Landslides** can cause damage to infrastructure across the region, particularly those network elements on steeper terrain. • **High temperatures** can increase conductor sag, fire risk, and reduce load ratings. Increased load to power air conditioning and irrigation. • **Wildfires** can damage assets and increase fire risk from arcing/sagging lines. **Telecommunications** • **Severe weather** (high winds and storms) can damage infrastructure, requiring repair leading to loss of power source for communities. • **Flooding** can cause direct damage. • **Fire weather** can cause direct damage.

Risk focus area	Risk overview
Three-waters infrastructure	**Water supply and treatment** • **Flooding and heavy rainfall** can damage in-stream infrastructure, storage dams, and water supply systems. Landslides can contaminate water supplies and increase sediment, putting additional demand on water treatment. **Stormwater and wastewater networks** • **Extreme rainfall and flooding** can damage / overwhelm stormwater networks. This can lead to property flooding, causing damage, and increased insurance costs. Groundwater rise can also reduce capacity within 'leaky' stormwater and wastewater systems and increases maintenance costs. • **Extreme rainfall and flooding** can impact / damage wastewater networks. Flooding and high groundwater can increase inflow and infiltration, leading to overflows and reduced treatment effectiveness. **General infrastructure** • **Higher temperatures** can affect the performance of biological wastewater treatment systems. • **Drought** can lead to dry ground conditions which could damage/crack buried infrastructure.
Community facilities, landfills, parks and reserves	**Public buildings and facilities** • **Flooding** can impact schools, hospitals, social buildings, prisons and Council buildings in low-lying areas, leading to significant financial implications for Councils and government. **Parks and reserves** • **Flooding, coastal inundation and coastal erosion** can impact parks and reserves, especially DOC reserves used for tourism and recreation. **Community facilities** • **Flooding and extreme weather** can cause loss or damage to cultural and heritage buildings such as marae and historic buildings. • **Higher temperatures** can potentially damage community facilities, and cause cracking of paving and degrading of playground materials. **Landfills and hazardous sites** • **Flooding and erosion** can cause leachate and waste exposure at landfills, contaminating waterways and affecting water quality. Similarly flooding can mobilise contaminants at contaminated sites. • **High temperatures** can cause increased odour and fire risk near landfills • **Fire weather** increasing risk of landfill fires

Risk focus area	Risk overview
Private property	• **High winds and storms** can cause damage to buildings and infrastructure. • **Flooding** can impact commercial and residential buildings in low-lying areas, causing significant potential for damage and financial implications. Tūrangi and the shores of Lake Taupō are communities where buildings are exposed to inland river flooding. Additionally, there are smaller communities across the whole region that are exposed. • **Landslides** can impact buildings near escarpments or riverbanks. Communities along the southern shores of Lake Taupō (Waihi landslide) are at risk of landslides impacting buildings. • **Increased temperatures** can lead to higher likelihood of wildfires damaging properties. • **Heatwaves** can lead to soil shrinkage, subsidence, concrete deterioration, and internal overheating of buildings.
Built domain indirect risks	**Increased generation of waste and contamination** • Extreme weather events can damage trees, bridges, buildings, and facilities, leading to significant recovery effort and costs. Also, can create large volumes of disaster waste, posing public health risks and significant clean-up costs. **Road damage and disruption** • Increased climate variability can lead to loss, damage and disruption of roads, leading to higher operation and maintenance costs over time. • Acute climate events can lead put pressure on emergency management services. Communities can become isolated and there could be increased inability of emergency services to access these areas due to safety concerns **Water availability and quality** • Over-irrigation during higher temperatures and drought can further reduce groundwater and surface water availability and quality. • Water quality can be impacted through the combination of reduced flows, higher temperatures, increased sedimentation, nutrient leaching, and agricultural runoff. **Other** • Managing outdated building standards and codes of practice will be ongoing. Also, land use policy can allow development in areas that may be exposed to climate risk. • Damaged infrastructure may make it harder to access and manage storm-affected areas, impacting other activities like pest control. • Increased acute climate events can lead to increased insurance premiums or insurance retreat.

APPENDIX 4 – EXTRACTS FROM 2024 ASSET MANAGEMENT PLANS

Stocktake of risks identified in Council's asset management plans (2024)

Heavy rain and storm events									
	Water	Wastewater	Stormwater	Transport	Solid Waste	Property	Parks and open spaces	Building controls and planning	Emergency management
Flooding	ü	ü	ü	ü	ü	ü	ü	ü	ü
High winds	ü	ü	ü	ü	ü	ü	ü	ü	ü
Lightning	ü	ü		ü	ü	ü			ü
Power outages	ü	ü							ü
Landslip / slide	ü	ü	ü	ü		ü		ü	ü
Erosion							ü	ü	ü

Identified high and medium risks for core Council activities

Area	Risk	Risk level
Flooding impacts		
Water	Wastewater /Stormwater finding its way through to damaged water pipes due to: - Reticulation pipe movement. Public health risk from Water Source, including from Heavy rainfall event.	High
Wastewater	Reticulation system overflows due to: Stormwater finding its way through to sewer pipes, or silting of pipes.	Medium
Stormwater	Damage to private property	Medium
Property	Properties blocked or destroyed due to flooding.	Medium
Transport	Roads or road structures damaged, blocked or destroyed due to flooding.	Medium
Solid Waste	Surrounding environment polluted due to leachate loss from pond or lined landfill cell / Liner Failure.	Medium

High wind impacts		
Water	Power outages causing plant power failure	Extreme
Water	Damage to the reticulation network due to: - Structural/electrical system damage to pump station. Damage to the intake pump station / treatment system due to stormy winds causing flooding of the pump station and structural/electrical system damage of the WTP - Computer system damage Public health risk from Water Source, including from Heavy wind.	Medium - High
Wastewater	Damage to the reticulation network due to Structural/electrical system damage of pump station. Damage to the treatment system due to: Structural/electrical system damage of the WWTP, or Computer system damage.	Medium
Stormwater	Silting of pipes, or silting of water channels.	Medium
Transport	High winds impacts on Transport. Roads or road structures blocks/damaged due to debris (fallen trees and/or power lines) and other objects blown into vehicle paths.	Medium
Landslide / slip impacts		
Water	Damage to reticulation system due to: Pipe fracture, Disconnections in joints, Pump failure, Earth slip, or Land subsidence causing changes of grade in pipe network. Damage to treatment system due to: Electrical system failure, Earth slip failure, Mechanical failure, Structural failure (e.g. Building, Control Room, contact tanks, screen filters, WTP process equipment, etc.), or Pipe fracture. Groundwater contamination due to: - Earth slips in network.	Medium
Wastewater	Damage to reticulation system due to: Pipe fracture, Disconnections in joints, Pump failure, Earth slip, or Land subsidence causing changes of grade in pipe network. Damage to treatment system due to: Electrical system failure, Earth slip failure, Mechanical failure, Structural failure (e.g., Building, Control Room, settling tanks, clarifiers, trickling filters, digester, belt press, etc.), or Pipe fracture. Groundwater contamination due to Earth slips in land disposal sight.	Medium
Stormwater	Silting of primary and secondary network caused from slip, blocking network.	Medium
Transport	Roads or road structures blocked, damaged or destroyed by land slide/slip possible occurring during heavy rain.	Medium
Property	Properties damaged or destroyed by land slide/slip possible occurring during heavy rain or earthquakes.	Medium
Erosion		
Parks and reserves.	The risk of erosion damage to lakeshore reserves is moderate (occurrence with high impact of damage). However, due to the presence of wastewater reticulation assets in some reserves, the priority assigned is high.	Medium

	Foreshore erosion can result in land loss, destruction of infrastructure, and property damage. To mitigate the effects of erosion, several erosion protection assets have been constructed on the shoreline of Lake Taupō. Most of these assets are in Tapuaeharuru Bay (i.e., Taupō township) and have been built and maintained through Project Watershed, a funding initiative where Taupō District Council covers 55% of the costs and Waikato Regional Council covers 45%.	

Stocktake of risks identified in Council's asset management plans (2024)

Hotter drier summers									
	Water	Wastewater	Stormwater	Transport	Solid Waste	Property	Parks and open spaces	Building controls and planning	Emergency management
More hot days									ü
Drought									ü
Water quality impacts (including algal blooms)	ü						ü		ü
Wild / bush fire			ü	ü	ü	ü		ü	ü
Pests / Disease							ü		ü

Identified high and medium risks for core Council activities

Area	Risk	Risk level
Water quality impacts (including algal blooms)		
Water	Public health risk from Water Source, including from: Algae bloom and associated biotoxins Water quality too poor to treat	High
Wild / bush fire impacts		
Stormwater	Drainage secondary network failure affected by reduction in vegetative cover causing erosion and instability in gullies. Greater debris in open watercourse's Primary Drainage network affected by hazardous substance fire or explosion from pollution spill causing structural damage to pipe and manhole network Damage at outlet from system.	Medium

	3rd party damage as a result of fire blow back to various inlets.	
Solid Waste	Landfill fire would restrict dumping and close landfill Potential for structural damage to RTS and Landfill buildings Fill Slumping Liner Failure	Medium
Property	Properties damaged or blocked due to scrub/bush fire	Medium

The Water Asset Management Plan 2024:

Risk	Consequence	Likelihood	Adequacy of existing controls	Level of risk
Flooding - Inaccessibility of the WTP and inability to operate the plant	Minor (Low impact of damage or failure)	Unlikely (Once every thirty years)	Effective (use of big trucks)	Low risk
Damage to the treatment system due to: - Silting of tanks - Tank overflow	Moderate (Medium impact of damage or failure)	Unlikely (Once every thirty years)	Effective (vacuum truck, WTP has 1- day storage capacity for dryweather flow, pump out to the NETWORK which has max of 2-day irrigation capacity)	Low risk
Wastewater /Stormwater finding its way through to damaged water pipes due to: - Retic pipes movement	Major (High impact of damage or failure)	Unlikely (Once every thirty years)	NC	High risk
Lightning Damage to the reticulation network due to: - Structural/electrical system damage of pump station	Major	Rare	Effective (list of local Contractors' details available when needed)	Low
Damage to the treatment system due to: - Structural/electrical system damage of the WTP - Computer system damage	Major	Rare	Effective (built-in generators, staff trained for servicing, list of local Contractors' details available when needed)	Low
High winds Damage to the reticulation network due to: - Structural/electrical system damage of pump station	Major	Unlikely	Effective (list of local Contractors' details available when needed	Medium

Damage to the intake pump station / treatment system due to: - Stormy winds flooding the pump station and Structural/electrical system damage of the WTP - Computer system damage	Major	unlikley	Effective (built-in generators, staff trained for servicing, list of local Contractors' details available when needed)	Medium
Public health risk from Water Source, including from: Algae bloom and associated biotoxins	Major	Likley	NFE	High
Water quality too poor to treat	Major	Likely	N	High
Heavy rainfall event	Moderate	Possible	NFE	Medium
Heavy wind	moderate	Almost Certain	NFE	High
Plant power failure	Major	Almost Certain	Effective	Extreme
Landslide / slip Damage to reticulation system due to: - Pipe fracture - Disconnections in joints - Pump failure - Earth slip - Land subsidence causing changes of grade in pipe network	Major	Possible	Effective (list of local Contractors' details available when needed)	Medium
Damage to treatment system due to: - Electrical system failure - Earth slip failure - Mechanical failure - Structural failure (e.g. Building, Control Room, contact tanks, screen filters, WTP process equipments, etc.) - Pipe fracture	Major	unlikely	Effective (built-in generators, staff trained for servicing, list of local Contractors' details available when needed)	Medium
Groundwater contamination due to: - Earth slips in NETWORK	Major	Possible	NC	Medium

Inaccessibility to network due to footpath/road system failure	Major	Possible	Effective (emergency road repair)	Low

The Wastewater Asset Management Plan 2024:

Risk	Consequence	Likelihood	Adequacy of existing controls	Level of risk
Flooding - Inaccessibility of the WWTP and inability to operate the plant.	Minor (Low impact of damage or failure)	Unlikely (Once every thirty years)	Effective (use of big trucks)	Low
Damage to the treatment system due to: - Silting of tanks - Tank overflow	Moderate	Unlikely	Effective (Vacuum truck, WWTP has 1- day storage capacity for dryweather flow, pump out to the LDS which has max of 2- day irrigation capacity)	Low
Reticulation system overflow due to: - Stormwater finding its way through to sewer pipes. - Silting of pipes	Major	Unlikely	NC	Medium
Lightning Damage to the reticulation network due to: - Structural/electrical system damage of pump station	Major	Rare	Effective (List of local Contractors' details available when needed)	Low
Damage to the treatment system due to: - Structural/electrical system damage of the WWTP - Computer system damage	Major	Rare	Effective (built-in generators, staff trained for servicing, list of local Contractors' details	Low
High winds Damage to the reticulation network due to: - Structural/electrical system damage of pump station	Major	Unlikely	Effective (List of local Contractors' details available when needed)	Medium
Damage to the treatment system due to: - Structural/electrical system damage of the WWTP - Computer system damage	Major	Unlikely	Effective (built-in generators, staff trained for servicing, list of local Contractors' details available when needed)	Medium
Landslide/Slip Damage to reticulation system due to: - Pipe fracture - Disconnections in joints	Major	Possible	Effective (List of local Contractors' details available when needed)	Medium

- Pump failure - Earth slip - Land subsidence causing changes of grade in pipe network.				
Damage to treatment system due to: - Electrical system failure - Earth slip failure - Mechanical failure - Structural failure (e.g., Building, Control Room, settling tanks, clarifiers, trickling filters, digester, belt press, etc.) - Pipe fracture	Major	Unlikely	Effective (built-in generators, staff trained for servicing, list of local Contractors' details available when needed)	Medium
Groundwater contamination due to: - Earth slips in LDS.	Major	Possible	NC	Medium
Inaccessibility to network due to footpath/road system failure.	Minor	Possible	Effective (Emergency road repair)	Low

The Transport Asset Management Plan 2024:

Risk	Consequence	Likelihood	Adequacy of existing controls	Level of risk
Flooding Roads or road structures damaged, blocked or destroyed due to flooding	Moderate	Possible	Effective (Weather warnings, stock banks)	Medium (The existing controls are deemed adequate for this risk)
Fire Roads damaged or blocked due to scrub/bush fire	Minor	Unlikely	Effective (Vegetation control within road reserve, fire restrictions, fire brigade, firebreaks within forest plantations	Low (The existing controls are deemed adequate for this risk)
Lightning Streetlights damaged due to power outages	Insignificant	Unlikely	Effective (Utility Providers have controls such as circuit breakers, etc.)	Low (The existing controls are deemed adequate for this risk)
High winds Roads or road structures blocks/damaged due to debris (fallen trees and/or power lines) and other objects blown into vehicle paths	Minor to Moderate (if power lines down)	Likely	Effective (Utility Providers have controls such as circuit breakers, etc. Vegetation control within road reserve, planning control for tree planting close to road.)	Medium (The existing controls are deemed adequate for this risk)
Land slide/slip Roads or road structures blocked, damaged or destroyed by land slide/slip possible occurring during heavy rain.	Major	Possible	Effective (Waihi Hill known landslide risk, has warning system)	Medium (The existing controls are deemed adequate for this risk)
Climate change Global warming may increase the number and intensity of extreme events i.e., more rainstorms. This may affect the construction timing of projects, material life and usefulness of asset.	Moderate	Likely		Medium

Roads at risk of flooding or slips

(extract from Transport Asset Management plan 2024)

10.13 Roads Risk Assessment

Below is a list of roads which are at risk from flooding or other high-risk factors.

Component / Segment	Vulnerability Ranking								Impact				Comments
		Seismic											
	Importance	Ground Shaking	Liquefaction	Fault displacement	Land slide	Ground settlement	Flood	Volcanic ash fall	Seismic	Flood	Volcanic	AADT	
Low lying roads													
KOROHE ROAD	2	D	D	D	D	D	A	C	1	2	1	267	
WAIOTAKA ROAD	1	D	D	D	D	D	A	C	1	1	1	50	
GRACE ROAD	1	D	D	D	D	D	A	C	1	1	1	157	
AWAMATE ROAD	2	D	D	D	D	D	A	C	1	2	1	62	Access to sewerage plant
WHARF ROAD	1	D	D	D	D	D	B	C	1	1	1	10	
HEUEHU PARADE	1	D	D	D	D	D	C	C	1	1	1	50	
ORUATUA AVE	1	D	D	D	D	D	C	C	1	1	1	125	
Other Roads													
OHAKURI ROAD	2	D	D	D	B	D	D	C	2	2	1	100	Narrow/cliffs/rock
WAIHI ROAD	2	D	D	D	A	D	C	C	2	2	1	255	Prone to land slides
MAPARA ROAD	2	D	D	C	D	D	D	C	2	1	1	170 - 1200	
TUKAIRANGI ROAD	2	D	D	C	D	D	D	C	2	1	1	60-150	
POIHIPI ROAD	2	C	E	D	C	D	D	C	2	2	1	500 - 3300	
WAIPAPA ROAD	2	C	E	D	C	D	D	C	3	3	1	140 - 1230	
ARIATIATIA - NTH OF DAM	2	D	D	D	C	D	D	C	2	2	1	200 - 800	
TIROHANGA ROAD	3	C	D	D	C	D	D	C	3	3	1	266	
ACACIA BAY / WILY TCE	1	D	D	D	B	D	D	D	1	1	1	30	
HUKA FALLS ROAD	2	D	D	D	C	D	D	D	1	1	1	50-700	

Definitions for the above tables are as follows:

Importance Ranking		Vulnerability Ranking		Impact Ranking	
Extremely important	5	Almost certain	A	Catastrophic	5
Very important	4	Likely	B	Major	4
Important	3	Possible	C	Moderate	3
Some importance	2	Unlikely	D	Minor	2
Not important	1	Rare	E	Insignificant	1

The Stormwater Asset Management Plan 2024:

Risk	Consequence	Likelihood	Adequacy of existing controls	Level of risk
Flooding Failure of primary and secondary network by: Blockage from debris	Moderate	Unlikely	Effective	Low
Access to network blocked, contracting staff. cannot remedy	Moderate	Unlikely	Effective	Medium
Silting of primary pipe network by debris and silt	Moderate	Likely	Effective	Low
Damage to private property	Moderate	Likely	Effective	Medium
Fire Drainage secondary network failure affected by: Reduction in vegetative cover causing erosion and instability in gullies	Major	Possible	Effective	Medium
Greater debris in open watercourse's Primary Drainage network affected by hazardous substance fire or explosion from pollution spill: causing structural damage to pipe and manhole network Damage at outlet from system	Moderate	Possible	Effective	Medium
3rd party damage as a result of fire blow back to various inlets	Moderate	Possible	Effective	Medium
High winds Potential for structural damage outlet structures from high winds causing: Damage to structural integrity of outlets	Minor	Unlikely	Effective	Low
Silting of pipes Silting of water channels	Minor	Almost Certain	Effective	Medium
Land slip/slide Silting of primary and secondary network caused from slip, blocking network	Moderate	Possible	Effective	Medium

The Solid Waste Asset Management Plan 2024:

Risk	Consequence	Likelihood	Adequacy of existing controls	Level of risk
Flooding Refuse collection unable to proceed	Moderate	Unlikely	Effective	Low
Access to disposal sites blocked, refuse unable to get to disposal sites	Moderate	Unlikely	Effective	Low
Surrounding environment polluted due to Leachate loss from pond or lined landfill cell	Major	Unlikely		Medium
Fill Slumping	Moderate	Unlikely	Effective	Low
Liner Failure	Major	Unlikely	Effective	Medium
Compaction Plant at RTS damaged	Moderate	Unlikely	Effective	Low
Weighbridge damaged and unable to weigh	Minor	Unlikely	Effective	Low
Computer system damaged and unable to record transactions	Minor	Unlikely	Effective	Low
Damage to closed Landfills	Moderate	Unlikely	Effective	Low
Fire Landfill fire would restrict dumping and close landfill	Major	Unlikely	Effective (Have a water truck on site, site has an emergency evacuation procedure, will monitor potential harmful effects of smoke for the surrounding area and evacuate if necessary, firefighting water storage pond and infrared camera listed as projects in the LTP [these have now been installed].)	Medium
Potential for structural damage to RTS and Landfill buildings	Moderate	Possible	Effective	Medium
Fill Slumping	Moderate	Possible	Effective	Medium
Liner Failure	Major	Unlikely	Effective	Medium
Lightning Compaction Plant at RTS damaged	Minor	Rare	Effective	Low
Weighbridge damaged and unable to weigh	Minor	Rare	Effective	Low

Computer system damaged and unable to record transactions	Minor	Rare	Effective	Low
High winds Potential for structural damage to RTS and Landfill buildings	Minor	Unlikely	Effective	Low
Litter strewn across a wide area	Minor	Almost Certain	Effective (Contractor employs litter fences and has staff available for litter clean up.)	Medium

The Property Asset Management Plan 2024:

Risk	Consequence	Likelihood	Adequacy of existing controls	Level of risk
Flooding Properties blocked or destroyed due to flooding.	Moderate	Possible		Medium
Fire Properties damaged or blocked due to scrub/bush fire	Moderate	Possible		Medium
Lightning Properties damaged due to power outages	Insignificant	Unlikely		Negligible
High winds Properties damaged due to debris (fallen trees and/or power lines) and other objects blown into vehicle paths.	Minor to Moderate (if power lines down)	Likely		Low
Land slide/slip Properties damaged or destroyed by land slide/slip possible occurring during heavy rain or earthquakes.	Major	Possible		Medium
Climate Change Global warming may increase the number and intensity of extreme events i.e. more rainstorms. This may affect the construction timing of projects, material life and usefulness of asset.	Moderate	Likely		Medium

The Parks and Open Spaces Asset Management Plan 2024:

Risk	Consequence	Likelihood	Adequacy of existing controls	Level of risk
Increased Rainfall Intensity and Frequency Causing flooding, unpredictable weather events.	3	3	Contingency measures to reduce damage to sports grounds when wet. Ground restrictions and cancellations	9
Flood event	4	5	Emergency response and business continuity plans	40
Environmental Hazards New/increased pests and diseases, water quality (algal blooms, etc.), faecal contamination.	5	3	Appropriate barriers Alerts to hazards (signage) in place Non routine hazard alerts	15
Trees	5	2	Hazardous trees identified and monitored	
Lakeshore Degradation	4	2	Care groups very active	8
Erosion The risk of erosion damage to lakeshore reserves is moderate (occurrence with high impact of damage). However, due to the presence of wastewater reticulation assets in some reserves, the priority assigned is high. Many Open Spaces are designated as overflow areas or are in places which it would not be prudent to build. Consequently, some parks are susceptible to flooding or are in locations which are likely to be affected by climate change. Council will need to monitor changes to water body boundaries and trends. Parks and sports grounds in low-lying areas may need to have modified use and management practices. Foreshore erosion can result in land loss, destruction of infrastructure, and property damage. To mitigate the effects of erosion, several erosion protection assets have been constructed on the shoreline of Lake Taupō. Most of these assets are in Tapuaeharuru Bay (i.e., Taupō township) and have been built and maintained through Project Watershed, a funding initiative where Taupō District Council covers 55% of the costs and Waikato Regional Council covers 45%.			Erosion protection structures monitored bi-monthly.	

APPENDIX 5 – EXTRACTS FROM WAIKATO CDEM PLANS

HAZARD SCENARIOS – WAIKATO CDEM, 2024[25]

Drought (possible: 1 in 10- to 1 in 100- year event)

Following a previous drought, a particularly dry autumn and winter see's low levels of aquafer recharge and a particularly warm and dry summer results in widespread severe drought conditions occurring across the region. Soil moisture levels are at their lowest ever and river flows in parts of the region are exceeding their lowest ever recorded levels. A drought is acknowledged for the Waikato region and a Regional Drought Committee is established. Full water restrictions are put in place for all activities for extended periods and some towns experience water supply issues as a result of low river and aquafer levels.

Extreme Temperatures (possible: 1 in 10- to 1 in 100- year event)

The region experiences a 2-week spell of continued high temperatures due to a high sitting over the country. Several days see the region hit record temperatures above 35 degrees and sustained temperatures in the early 30's. Overnight temperatures remain warm in the low twenties.

Extreme weather event – cyclone (possible: 1 in 10- to 1 in 100- year event)

A significant cyclone forms in the southern Pacific in Mid-February and moves slowly south-east towards New Zealand. At its peak it reaches Category 5 status, causing devastation in the Pacific Islands of Vanuatu. Although the system gradually loses power and is re-classified as an ex-tropical cyclone, as it moves across the Pacific and into the Tasman the storm still has sustained winds in excess of 140km/h, with gusts in excess of 160km/h. The system is predicted to make landfall north of Auckland late in the afternoon on a Saturday and track South-South-East down the North Island. However, it is preceded by large swells on the West Coast, with storm surge resulting in erosion along Point Rd, Mōkau, Sunset Beach and Port Waikato from late Friday night and early on the Saturday morning. Low-lying areas are inundated, and this continues to occur throughout the storm.

By late Saturday afternoon the storm makes landfall and begins to impact the north of the region. Wind speeds begin to increase across the north of the region with gusts in excess of 140km/h experienced in Port Waikato and Coromandel by the evening. Heavy rainfall starts to occur across the north of the region and within hours many trees have fallen, and power is cut to large parts of the region. Several key roads are closed due to tree fall as the weather intensifies. Central and southern areas begin to feel the brunt of the storm in the early hours of Sunday morning, with strong winds and rain impacting the roading, communications and electricity networks. In Coromandel, coastal flooding and erosion has impacted Te Puru and Tararu on the western coast. Low-lying farmland around the southern Firth of Thames has experienced flooding and saltwater intrusion as the storm surge builds. The storm system slows its progression across the region throughout the Sunday, resulting in intense rainfall over a 24hr period across the main river catchments. At most sites over 400mm of rain is recorded, with some receiving this in less than 16hrs. The hills surrounding Port Waikato receive more than 500mm of rain, and parts of Coromandel record their highest ever 24hr rainfall totals. Ponding occurs in low-lying areas and the river systems throughout the region begin to flood surrounding land. Flooding occurs along the Waikato River

[25] https://www.waikatocivildefence.govt.nz/assets/NEW-WCDEMG/Waikato-CDEM-Group-Hazard-Risk-Assessment-December.pdf

and Waipa Rivers north of Hamilton in Ngāruawāhia and Huntly. The Waitoa and Waihou Rivers flood across the Hauraki Plains and numerous smaller streams and rivers in the area break their banks. A stop bank breach in Paeroa leads to inundation to part of the town. In the Coromandel, many streams within steep catchments experience debris flows as the result of a high intensity period of rainfall, including streams near Thames, which exacerbates flooding of surrounding areas. Widespread slipping occurs in the high country of the region. The worst of these have occurred in the areas to the south of Port Waikato, and around the Coromandel. While these are some of the worst affected areas, the entire region has seen damaging slips. Many small communities are impacted, particularly in the east and west of the region. Several large slips have occurred on the state highways causing closures. By Sunday evening, the storm begins to move over the east coast of New Zealand and into the Pacific. Strong winds continue to occur into the early hours of the Monday Morning for most parts of the region, with Taupō and Tokoroa both experiencing high winds speeds in excess of 120km/h well into the Monday afternoon.

Scenario based on the impacts of Cyclone Gabrielle

Fire – Wildfire (possible: 1 in 10- to 1 in 100- year event)

Continued dry, hot weather through the summer months has created a high level of fire risk across the region. A major fire is burning in a forestry block to the west of Tokoroa covering 1600ha and is spreading rapidly, fanned by strong winds from the northwest. A second fire outbreak has occurred in the Hakarimata Scenic Reserve near to Ngāruawāhia and is also spreading rapidly as a result of the high temperatures and strong winds. In the east of the region several smaller fires have developed. A fire on rural land near Ngatea has developed into a peat fire covering an area of 20ha. Several smaller fires have been lit deliberately in bush north of Whangamatā and are being fanned by the strong winds.

Land instability – Landslides (possible: 1 in 10- to 1 in 100- year event)

After a sustained period of rain widespread slipping has occurred in the high country of the region. The worst of these have occurred in the areas to the south of Port Waikato, and around the Coromandel. While these are some of the worst affected areas, the entire region has seen damaging slips. Many small communities are impacted, particularly in the West of the region. Several large slips have occurred on the state highways causing closures. Several slips have created debris dams in tributaries of the Waikato River and small streams across the region.

River Flooding (possible: 1 in 10- to 1 in 100- year event)

A Rainfall event associated with a significant low occurs in mid-winter, bringing significant rainfall to the entire region over a period of three days. Many areas have already experienced a sustained period of wet weather from a prior low-pressure system and ground water levels and river flows are already high. River systems throughout the region begin to flood surrounding land and flooding occurs along the Waikato River and Waipa Rivers north of Hamilton in Ngāruawāhia and Huntly. The Waitoa and Waihou Rivers flood across the Hauraki Plains and numerous smaller streams and rivers in the area break their banks. A stop bank breach in Paeroa leads to inundation to part of the town. In the Coromandel, many streams within steep catchments experience debris flows as the result of a high intensity period of rainfall, including streams near Thames, which exacerbates flooding of surrounding areas. Based on Regional 1% AEP flood maps, 1998 Waikato Flood event and Report: The potential for debris flows from Karaka Stream at Thames, Coromandel - Feb 2006.

Tornadoes (possible: 1 in 10- to 1 in 100- year event)

During a spell of thunderstorms around the middle of the day a strong tornado forms to the west of Frankton. It touches down in the industrial area of Frankton and continues eastwards towards the

Hamilton CBD, before crossing into Hamilton East and then moving into rural areas to the east of the city. It is on the ground for 10 minutes and has wind speeds of over 200km/h. The tornado cuts a path 200m wide and several kilometres long. Reference event – 1948 Waikato tornado Cambridge event.

WAIKATO CDEM - HAZARD RISK ASSESSMENT, REGIONAL HAZARD SUMMARY, DEC 2024[26]

Very high risk – Extreme weather event – cyclone

Context

Hazard definition

A cyclone consists of high winds and heavy rainfall and is normally associated to a significant low pressure system moving from the tropics southwards to New Zealand in Late spring and summer. These events can result in large accumulations of rain, causing flooding, surface ponding and landslides. They can also result in damage to trees and infrastructure from high wind speeds. Often these events are also accompanied by storm surges, increasing the risk to low-lying coastal areas.

Magnitude and frequency

The magnitude and frequency of storm events within New Zealand is increasing, with a noticeable increase in the severity and magnitude of storms over the past 20 years. On average, New Zealand is impacted by one extropical cyclone each year, however, the location of impact and severity can vary greatly. With climate change the magnitude and frequency of cyclones is likely to increase. Most recently New Zealand experienced Cyclone Gabrielle, which had record rainfall and wind speeds, and was NZ's largest cyclone event to date. The likelihood of a significant cyclone impacting the Waikato region is possible.

Exposure

The region is exposed to cyclones moving onto land from both the northwest and the northeast. Areas such as Coromandel are particularly exposed to cyclone events.

Vulnerability

The region is extremely vulnerable to these types of events, with moderate to major impacts likely across all four of the environments. In particular, the built environment is extremely vulnerable, in particular low-lying and coastal areas prone to flooding and landslides.

Risk Analysis Confidence

Uncertainty / Confidence level in assessment data

The assessment of this hazard is based upon the risk assessment conducted at the risk assessment workshops and has been given a moderate level of confidence.

[26] https://www.waikatocivildefence.govt.nz/assets/NEW-WCDEMG/Waikato-CDEM-Group-Hazard-Risk-Assessment-Regional-Hazard-Summary-December-2024.pdf

Potential Impacts

Built Environment

The built environment would be significantly impacted in a major cyclone event, with damage likely to residential housing, commercial and industrial properties and community facilities. Critical infrastructure, including roads, telecommunications, electricity and 3 waters would likely be heavily impacted with potential loss of services for extended periods of time.

High risk – Drought

Context

Hazard definition

Drought occurs due to significant periods without rainfall and sustained warm temperatures. This results in reduced river and groundwater levels and impacts to plant growth and services that utilise water.

Magnitude and frequency

The Waikato recorded its driest decade from 2011 to 2021. Historically, water shortage and drought within the Waikato region has not been as severe as in others. However, drought events have impacted communities and the Waikato region's economy in the recent past. Areas typically most affected by water shortage and drought conditions are in the north: the Hauraki Plains, lower Waikato Basin, Thames-Coromandel and Pukekohe.

There have been a number of drought events since 2007/08. Six of the seven driest three-month periods on record (1905 to present) have occurred since 2007/08.

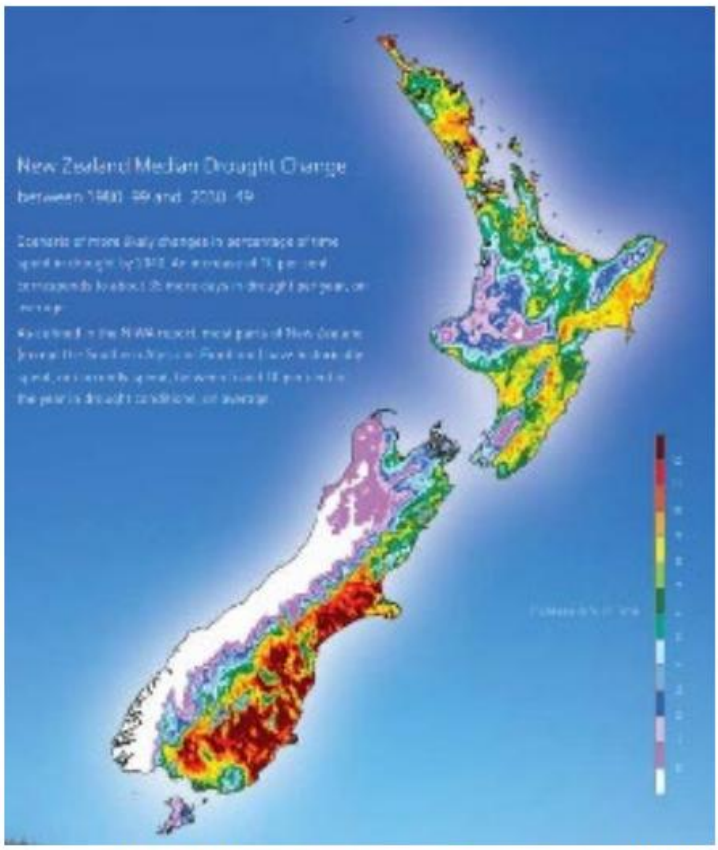
Exposure

All of Waikato is exposed to the consequences of drought. Climate change is likely to bring warmer temperatures, more extreme weather patterns, and rising sea levels. Drought and water security issues are expected to become more intense and frequent in the region (and across New Zealand) with widespread environmental, social, economic, and cultural impacts.

Vulnerability

Any significant drought in the Waikato region poses a threat to regional water security and will severely impact the primary industries including agricultural production and forestry. Both industries are extremely susceptible to the impacts of drought and when affected may also result in job losses, impacts to social wellbeing, and impacts to the natural environment. Additionally, they also can impact the energy and transportation assets resulting in power outages.

Modelling, mapping, and Geospatial analysis 'Drought in a changing climate' – NIWA



'Drought in a changing climate' - NIWA

Risk Analysis Confidence

Uncertainty / Confidence level in assessment data

The assessment of this hazard is based upon the risk assessment conducted at the risk assessment workshops and has been given a moderate level of confidence.

Potential Impacts

Built Environment

The built environment is likely to experience minor to moderate impacts. Moderate to major impacts are expected for potable and wastewater services. Some moderate impacts to electricity supply may occur.

unrated risk – Fire – wildfire

Context

Hazard definition

Wildfire can occur in forestry, agricultural production land and areas of scrub. Fires can be started naturally, by lightning strike, or by arcing from electricity supply lines and acts of arson. Fire is most common when ground moisture levels are low and relative humidity in the air is also low, providing perfect conditions for ignition. High winds can also result in larger fires, providing mobilisation for hot embers and fanning flames.

Magnitude and frequency

The risk of wildfire is at the highest in summer months within New Zealand when ground conditions are at their driest. The Waikato region has large areas of pine forestry that are susceptible to fire in dry conditions. In addition, numerous grass fires can occur in very dry summers.

Among the many consequences of climate change, wildfires are growing in intensity and spreading in range across Earth's ecosystems. FENZ have already seen wildfires occur earlier during the warmer months.

Exposure

Areas in Waikato exposed to wildfire risk include rural areas, native or plantation forest, shrub lands and grasslands. In addition, wildfires can also travel across the rural-urban divide, exposing buildings and infrastructure to this risk.

Vulnerability

Any significant wildfire could have a significant impact on the forestry industry within the region and some key lifeline utilities, such as electricity distribution and transportation networks. It may also have potentially significant impacts to the natural environment, in particular regional parks, forests and bush reserves and significant flora and fauna.

Risk Analysis Confidence

Uncertainty / Confidence level in assessment data

The assessment of this hazard was initially based upon the results of the hazard surveys, with survey data as the only source of assessment there is the lowest level of confidence.

Following a workshop where the survey results were reviewed, by experts within the field, this assessment in alignment with the NEMA Assessment for confidence table, is given a moderate level of confidence.

Potential Impacts

Built Environment

The built environment is likely to experience minor to moderate impacts from this type of event, including potential damage to buildings (residential, commercial & industrial, non-commercial & community facilities), electricity supply and telecommunications.

High risk – land instability / landslides

Context

Hazard definition

Landslides can occur as the result of significant rainfall, extended dry periods or earthquakes. The Waikato region has mainly experienced significant landslides as a result of heavy rainfall events in the past. Parts of the region have been isolated by landslides previously, such as the Coromandel Peninsula, following the January 2023 cyclone event, which created a number of significant slips throughout the region and resulted in significant damage to SH 25. Areas on the West Coast, including Port Waikato and Raglan have also been impacted by significant slips.

Magnitude and frequency

Landslides can occur at any time but are most often related to periods of severe weather. These can have widespread and significant impacts on lifeline utilities throughout the region.

Exposure

The region has a number of areas prone to landslides and debris flows. Predominantly these are on the west coast south of Port Waikato, the King Country, Coromandel Peninsula and other areas of hill country.

Vulnerability

Any significant landslides are likely to impact lifeline utilities, mainly regional transportation routes. They may also have impacts on other aspects of the built environment, including residential and commercial buildings. The impacts of a landslide event may also result in isolated populations and impact key sectors, such as agriculture. That natural environment may also see impacts to freshwater ecosystems and areas of forestry and native bush.

Risk Analysis Confidence

Uncertainty / Confidence level in assessment data

The assessment of this hazard was initially based upon the results of the hazard surveys, with survey data as the only source of assessment there is the lowest level of confidence.

Following a validation process where the survey results were reviewed, by experts within the field, this assessment in alignment with the NEMA Assessment for confidence table, is given a low level of confidence.

This rating should be taken as provisional and may change during the life of the next Group Plan following a full risk assessment for this hazard.

Potential Impacts

Built Environment

The built environment is likely to experience minor to moderate impacts from this type of event. The worst impacts would likely be seen in residential properties impacted by slips and the impacts to key regional transportation links.

High risk – river flooding

Context

Hazard definition

Flooding is Waikato's most common natural hazard and occurs when rainfall events within river catchments exceed the capacity of the system. This results in excess water breaking out of river channels and flowing over adjacent land until the amount of water in the system no longer exceeds capacity of the channel.

The Waikato region has numerous rivers and small streams. The major river within the region is the Waikato River, which is fed by Lake Taupō and several smaller rivers and flows north through Hamilton to Port Waikato. In addition, there are several rivers capable of widespread flooding across the Hauraki Plains, threating townships including Paeroa and Te Aroha.

Magnitude and frequency

Several severe flooding events have occurred in the Waikato region resulting in widespread consequences. Most recently in February 2023, Cyclone Gabrielle caused widespread flooding across parts of the region, including Coromandel, Matamata-Piako and the Waikato District. Other significant floods have occurred on an almost annual basis within the region, with several declarations of emergency made for flooding within the past 20 years.

Exposure

Large parts of Waikato are prone or sensitive to flooding:

Coromandel - due to its short steep catchments (where rain quickly runs into the rivers) and susceptibility to tropical storms. The Coromandel has frequent severe flooding when water levels rise very quickly, with little time for warning and preparation.

Hauraki Plains - low lying farmland and towns are vulnerable to flooding along the Waihou and Piako river systems.

Farmland adjacent to the Waipā River – vulnerable to flooding, especially since the river is uncontrolled by dams.

Lower Waikato River (from Ngāruawāhia north) - properties on low lying land near the Waikato River are at risk. The river carries large volumes of water where the Waipā River joins the Waikato River.

Flooding at the southern end of Lake Taupō - where the Tongariro and Tauranga-Taupō rivers enter the Lake.

Vulnerability

Any high magnitude flood event is likely to cause significant damage to residential and commercial buildings. However, widespread flooding is unlikely to impact highly populated areas within the region and is likely to impact largely rural areas. Utilities are also likely to be impacted in the short to medium term, particularly roading, and access to key services limited. There is also likely to be significant silting and debris in areas that have flooded. Some settlements may also be disconnected from the rest of the region due to significant impacts to roading networks.

Risk Analysis Confidence

Uncertainty / Confidence level in assessment data

The assessment of this hazard is based upon the risk assessment conducted at the risk assessment workshops and has been given a moderate level of confidence.

Potential Impacts

Built Environment

In this scenario moderate impacts to residential and commercial buildings are expected. Damage is also expected to occur to three waters services and transportation networks.

High risk – Tornadoes

Context

Hazard definition

Tornadoes are violently rotating columns of air, extending from a thunderstorm, which are in contact with the ground. The winds inside a tornado spiral inward and upward. For a thunderstorm to produce a tornado it requires warm humid air near the surface with cold, dry air above.

Magnitude and frequency

The Waikato region has experienced several tornadoes in the past, with several passing through urban areas of Hamilton and Cambridge. While tornadoes in New Zealand are not of a magnitude seen in places such as the United Staes of America, they are still capable of causing significant damage and can have sustained winds up to 150km/h+.

Exposure

All of Waikato is exposed to tornadoes, there is no way of predicting where the next tornado may occur.

Vulnerability

Tornadoes are destructive and can lead to injuries and fatalities. Depending on the path they take, they may also damage buildings, infrastructure and utility services resulting in power outages.

Risk Analysis Confidence

Uncertainty / Confidence level in assessment data

The assessment of this hazard was initially based upon the results of the hazard surveys, with survey data as the only source of assessment there is the lowest level of confidence.

Following a validation process where the survey results were reviewed, by experts within the field, this assessment in alignment with the NEMA Assessment for confidence table, is given a low level of confidence.

This rating should be taken as provisional and may change during the life of the next Group Plan following a full risk assessment for this hazard.

Potential Impacts

Built Environment

Localised damage to the built environment is anticipated for this scenario. Depending on where the tornado tracks, this may result in moderate to major damage to residential and commercial properties and critical infrastructure.

Medium risk - Extreme temperatures

Context

Hazard definition

Heatwaves occur during late spring to early Autumn and generally consist of more than three days where temperatures exceed 5°C above average temperatures, although there is no recognised definition within New Zealand. Significant heatwaves can occur over several weeks and even modest increases in seasonal temperatures can have significant impacts.

Magnitude and frequency

Severe heatwaves are not a common occurrence in New Zealand; however, increased temperatures are being observed regularly throughout the country and within the Waikato Region. The past two years have seen record temperatures set and it is highly likely that increased summer temperatures will be experienced as the impacts of climate change begin to impact our weather systems. The likelihood of a significant heatwave impacting the Waikato region is rated as possible.

Exposure

The entire Waikato region could be exposed to this hazard.

The Vulnerability

The main vulnerabilities to this hazard exist within the social and natural environments, in particular the health of the aged population and the impacts to marine, terrestrial and freshwater environments. There is some risk to the economic and built environments, particularly agricultural production and water supply.

Risk Analysis Confidence

Uncertainty / Confidence level in assessment data

The assessment of this hazard was initially based upon the results of the hazard surveys, with survey data as the only source of assessment there is the lowest level of confidence.

Following a validation process where the survey results were reviewed, by experts within the field, this assessment in alignment with the NEMA Assessment for confidence table, is given a low level of confidence.

This rating should be taken as provisional and may change during the life of the next Group Plan following a full risk assessment for this hazard.

Potential Impacts

Built Environment

The built environment is likely to experience minimal impacts from this event, with some minor impacts to three waters infrastructure.

EXTRACTS FROM WAIKATO CDEM GROUP PLAN ACTIONS 2025 – 2030[27]

The purpose of this Group Plan Actions document is to implement our Strategic Group Plan 2025-2030, which was reviewed and approved for public consultation by the Waikato CDEM Group Joint Committee, 24 March 2025.

Group Hazard and Risk Consequence Analysis: - Severe Weather/Flooding Event (Oct 26 – Jun 27)"

- Information gap analysis completed.
- Areas requiring increased hazard and risk understanding identified.
- Hazard and risk understanding increased through research and/or risk assessments.
- Results reported and communicated.

Infrastructure Resilience: - Increase understanding of risks to infrastructure; - Individually and collectively increase infrastructure resilience. (Jul 25 – Jun 30):

- Infrastructure included in impact assessments.
- Results of impact assessments on risks communicated to infrastructure owners and operators.
- Communication of the risk results within infrastructure organisations is reported to stakeholders.
- Mitigation programme is developed, implemented, monitored and reported.
- Individual and collective adaptation, reduction and avoidance activities undertaken are reported.

Operational Response Plans: - Severe weather and flooding (Jun 27 – Sep 28):

- Complete development of a regional operational plan for this hazard.
- Test and exercise the plan to ensure it is fit for purpose.
- Agree and set review cycle.

[27] Waikato CDEM Group, Draft Group Plan Actions 2025 – 2030, May 2025

APPENDIX 6 – DETAILS BEHIND THE MODELLED SCENARIOS

What are RCPs?

The Representative Concentration Pathways (RCPs) were developed around 2010 by the global climate science community. They provide a common set of "concentration pathways": descriptions of the amount of carbon dioxide in the atmosphere, both historically and into the future by year - from 2005 through to 2300. In addition to carbon dioxide, aerosols and other greenhouse gases like methane, nitrous oxide, and organic compounds are also specified.

RCPs refer to differing concentrations of greenhouse gases in the atmosphere and represent four potential futures based on how much greenhouse gas humans continue to emit. The four scenarios are:

- RCP8.5: very high greenhouse gas concentrations – emissions continue to rise throughout the 21st century
- RCP6.0: mid-high concentrations - emissions peak around 2080, then decline
- RCP4.5: low-mid concentrations - emissions peak around 2040, then decline
- RCP2.6: low concentrations - emissions peak around 2020 and decline substantially thereafter

What are SSPs?

Shared Socioeconomic Pathways (SSPs) are a set of five scenarios which were developed by the global climate science community around 2015. Each scenario is characterised by how difficult adaptation and mitigation could be.

Climate change projections are modelled representations of the potential future climate over the next century. NIWA and Ministry for the Environment (MfE) have recently released downscaled climate change projections for New Zealand using the latest AR6 data. These provide the region with the most current understanding of how the climate may change across the region into the future

Three scenarios were used in the NIWA and MfE projections.[28]

- The 'Sustainability' scenario, SSP1-2.6, assumes that the world shifts gradually toward a more sustainable path, emphasising more inclusive development that respects environmental boundaries. It assumes that warming stays below 2˚C, with net zero CO_2 emissions reached by 2050.
- The 'Middle of the road' scenario, SSP2-4.5, assumes that the world follows a path in which social, economic, and technological trends do not shift markedly from historical patterns. It assumes that warming reaches 2.7˚C by 2100.
- The 'Regional rivalry' scenario, SSP3-7.0, assumes the world becomes more focused on national and regional security issues, and there is no additional climate policy. It assumes CO_2 emissions approximately double from current levels by 2100 and warming reaches 3.6˚C by 2100.

[28] Waikato Regional Council, Climate change hazards and risks in the Waikato Region, May 2025

APPENDIX 7 - NOTES OF DISCUSSIONS WITH COUNCIL STAFF

NOTES OF DISCUSSION WITH THE WATER ASSET MANAGER

1. Work through AMP risk register.

(a) Wastewater /Stormwater finding its way through to damaged water pipes due to: - Retic pipes movement

With any water main break there is immediately a contamination risk. The risk scenario would be where there is land movement and a wastewater and a water pipe both break. Water mains are under pressure – so water is forced out of them rather than taking in water, and the most likely scenario is that there would be loss of services. But any break where there could be contamination is taken very seriously, and we have a number of controls that we put in place, for example: Doing a risk assessment, shutting off and/or isolating the service, repairing, disinfection, flushing the pipe and system, and doing water testing.

The main mitigation for this is keeping on top of renewals, and our programme to replace older pipes made out of more brittle materials.

(b) Public health risk from Water Source, including from Algae bloom and associated biotoxins

This is a known risk that exists currently. The risk scenario is if there is a bloom of the toxic algae in the vicinity of one of our lake water intakes.

Our lake intake sites are Hatepe, Taupō, Kinloch, Motuopa, Omori, and Motutere.

We have a cyanotoxin management plan, which includes regular sampling over spring and summer periods to test for any signs of problems or toxins. If risks are identified we will do more frequent testing.

If there are toxins present it is a real problem. They are very unsafe and cannot be boiled out. We would have to stop water supplies and tanker in water to those communities.

With our water treatment plant upgrades Hatepe, Kinloch, Motuoapa and Omori will have built in cyanotoxin treatment systems. For the Taupō water treatment plant we have funding in the Long-term Plan 2024 for upgrades to provide cyanotoxin treatment around 2030. This project hasn't yet been scoped or deigned. There are no plans for Motutere at this time other than providing tankers in the case of an event.

(c) Water quality too poor to treat

In high wind, heavy rain or storm events, water can be stirred up in the lake and cause water quality issues, like high sediment content, that makes it difficult to treat. Currently several of our lake water intakes and treatment plans allow sediment to go through the treatment system. This is not just a quality (clarity and taste) of water issue, but also has potential health risks. Our new treatment plant upgrades will resolve this issue – sediment will not be able to be pass through the plant and will be captured in the treatment process. The Taupō water treatment plant already removes sediment.

Currently if we have water quality issues in other areas, we must rely on reservoir storage, so there is potential service restrictions or limitations if supply is an issue for a sustained period of time.

Heavy rainfall can result in land runoff affecting water quality at our water supplies in Waihaha, River Road, and Tirohanga which are all either stream or spring feed systems, which can be affected by surface water. When this happens we have to turn off the treatment plant, and replace water with tankers. We've not had problems in recent years at River Road or Tirohanga, but often have problems at Waihaha – which is a small restricted rural scheme (32 connected properties), many of which have their own water tanks, and little water is needed for irrigation after heavy rain events.

(d) Storm damage and power loss

In heavy wind, rain or storm events there is the risk of loss of power (e.g. fallen trees taking out power)

There is the potential for infrastructure damage in heavy rain and storm events, for example trees falling on, or flooding of network equipment (like a pump station).

A lighting strike to critical electrical equipment, for example at a treatment plant, could cause significant damage.

When there is power loss there is the potential for service disruption. Most of our main plants are set up to enable generators to be plugged in. In a recent power outage event, the Tūrangi water treatment plant ran on generators for 3 – 4 weeks while power was restored. Hiring large generators and running them is costly.

2. Any risks from drought?

The lake provides some insulation from the impacts of drought as its levels are managed – we have a reasonable secure water take for most of our water systems. However, in a prolonged drought, restrictions are likely to be placed on us – which means that we would have to put in place water restrictions on users.

Some of our rural water schemes may be at risk, but there are no known issues (we've not had any problems in the past).

Drought can also lead to ground movement (e.g. ground shrinking) which poses the risk of pipe breaks. The main mitigation for this is keeping on top of renewals, and our programme to replace older pipes made of more brittle materials.

NOTES OF DISCUSSION WITH THE WASTEWATER ASSET MANAGER

1. What are the main risks to wastewater services and infrastructure?

The risk section of the asset management plan needs to be reviewed, and decisions made on how risks should be best managed.

The biggest risk for our wastewater system as it relates to climate change is likely overflows caused by high infiltration and inflow (I&I) of rainwater / stormwater into the wastewater network. Large flows of rainwater into the network through:

- illegal connections to the wastewater system (e.g. house roof downpipes being plumbed into the wastewater system)
- Low gully traps (examples below), where rainwater will pool and flow into the wastewater system,

- And cracks in the wastewater pipe network.

The result of getting large volumes stormwater in the wastewater network is overflows. These can occur at the treatment plants, or along the wastewater system like manholes, gully traps, or pump stations.

Our treatment plants have a maximum inflow and controlled overflow spill systems, for example the Taupō Wastewater plant will overflow into the Waikato River. Our pump stations and treatment plants are monitored / have alarms systems to indicate an overflow.

Wastewater overflows can result in health and environmental risks. In most instances these risks are low, with stormwater and rainwater washing and dispersing waste downstream fairly quickly. Health risks might be to anyone taking water further downstream, which would be managed through warning and boil water suggestions. There is also reputational and cultural impacts, with people concerned about wastewater ending up in the lake or rivers. These overflows due to inflow and infiltration are low frequency but there is a risk this frequency could increase as rainfall intensifies.

We have an annual budget for works to reduce I&I risks. Currently we are identifying entry points using smoke testing, flow monitoring and visual surveys. But it is a significant problem with a large number of entry points, many of which are on private property.

2. What could we do to mitigate these risks?

The first step is to identify entry areas, as we are doing through our I&I programme. We are also doing some work to increase the hydraulic capacity of the Taupō wastewater treatment plant.

Taumata Arowai has recently consulted on proposed wastewater standards for managing overflows and bypasses and this will likely dictate much of the work we need to do in this space.

Other risks

Power loss

Loss of power is a key risk affecting our treatment plants and pump stations. Most of our key plant is generator enabled (i.e. a generator can be plugged in to provide power) and can operate on reduced capacity for some time. In a large event getting generators to sites is a risk. Taupō wastewater treatment plant has its own generator.

Land movement and pipe breaks

Horizontal infrastructure like pipes are always at risk from land movement. This is a risk in heavy rain events, or event successive heavy rain events. The consequences of a pipe break are some environmental harm, that needs to be cleaned up. And loss of services. For a large break that will take some time to restore, we can contract temporary surface pipes to restore services, while it is fixed, as long as these are available and there is access.

We have started some work to understand the risk to our wastewater trunk main that spans several SWS gulleys. Further work is needed to complete the task.

Storms

There is the potential for infrastructure damage in heavy rain and storm events, for example trees falling on, or flooding of network equipment (like a pump station).

A lighting strike to critical electrical equipment, for example at a treatment plant, could cause significant damage and have an operational impact.

3. Any risks from drought?

There are no particular wastewater concerns in relation to dry spells, heat and drought identified.

NOTES OF DISCUSSION WITH THE STORMWATER ASSET MANAGER

1. What is Council's role and responsibility for stormwater management / what are our service levels / what should people expect?

The Council has determined that our target level of service is to meet a 1:10yr (A 10% Annual exceedance Probability) for its piped networks, and that properties are to provide for onsite disposal for the same event.

For new development areas our code of practice sets out a service level of 1 in 10-year event being contained on private property and road stormwater to be contained by the stormwater network.

Stormwater systems are in place for all urban areas and these are comprised of piped networks, channels and gullies and overland flow paths.

In practice, many historical areas have stormwater systems that are designed for smaller events than what we would currently consider a 1 in 10-year event. This historical network is undersized to provide this level of service.

For a larger event, stormwater is not expected to be contained on private properties, and the stormwater system dealing with stormwater from road corridors is expected to be full, meaning that water will flow through the many existing 'overland flow paths in the urban areas', these are low lying areas and gullies that allow water to flow downhill through to the lake. In new development areas, we ensure that no development or houses occur in these areas. In historic areas, some of these are located in private property, and there has been some houses built in areas where stormwater is expected to flow, sometimes at a significant depth.

Taupō District Council (TDC) commissioned CDM Consultants Ltd (CDM) during late 2017 to develop two-dimensional (2D) Rain-on-Grid (ROG) stormwater models for Taupō Districts urban areas in order to better understand overland flow-paths and how these are affecting properties. The models included the best information made available by TDC at the time, with improvements and field validation subsequently undertaken by various summer students with CDM guidance. InfoWorks ICM (Integrated Catchment Management) software Version 8.03 was used to undertake this hydraulic modelling for TDC.

The current modelling has been limited due to poor quality information and as a result of piecemeal delivery and as such this now needs revising and improvements.

Because of this it is conservative and predicts much wider impacts that we might actually expect in a 1 in 100-year rainfall event. The current modelling indicates approximately 1,400 houses in the district (around 800 of them in Taupō), might be significantly impacted by stormwater flooding.

We are currently tendering for a new SW modeller to develop a new model using the latest information and rainfall data and this is expected to provide more certainty on the potential impacts of overland flows.

Climate change impacts are already being felt – they are more frequent and larger than expected. Some of the events that we have seen happening elsewhere could also happen here.

Taupō is subject to short but very intensity high rainfall events which causes significant amounts of surface water. For example, we had a flooding event on the evening of 7 February 2025. This a short duration event which had very intense rainfall for a 1 – 2-hour period. The level of rain in the period was approximately a 1 in 20-year event. In this event at least 6 homes we impacted by stormwater flooding. The water for these 6 homes was above the level of their floor – that is the point where there is really significant damage done to homes.

This impact on these homes was not because they were the most at risk, but because that was where the rainfall was concentrated. If the rain had have fallen a 1km elsewhere it would have been a different 6 – 12 houses impacted.

So for a 1 in 10-year event, we have some areas where Council's services may not be meeting our level of Service. Upgrading our stormwater infrastructure for these areas is not easy or cheap. It would be a major programme of expenditure over sometime.

And for events greater than 1 in 10-years, like the events on 7 February 2025, or larger events stormwater will not be contained without Council systems or on people's properties through their own systems and so will flow through overland flow paths. Many of those are contained on the road network, on reserves, and in reserve gullies. But in historic areas, many run through private property, and many of these have houses in them.

There is currently not a good public understanding of the limitations of Council's stormwater network and that is not designed to contain water for large rainfall events. For larger events like 1 in 20-year events, people may have to take their own precautions to manage potential flooding risks on their properties. One challenge is that our currently flood modelling is not accurate and had not been made public.

We are working to improve our current flood modelling. We hope to have revised modelling by the end of this financial year that we can have more trust in, make public and put on LIMs. It could also form the basis for district plan controls for new development in overland flow areas. After we have that modelling, we can have a detailed look at what our investment and management options are to reduce the risks and impacts for private property and houses.

In the meantime, the long-term plan provided funding to assess and invest in solutions to reduce the risks in a number of areas identified by the current modelling as likely problem areas.

The 7 February 2025 event also identified some other operational challenges. It was a short event all over in just over an hour, which mean it didn't trigger a civil defence emergency operation. But there were still significant impacts on houses and people, which needed support, and building safety and sanitary inspections and other measures. Since that event we are developing some SOPs (standard operating procedures) for Council and its contractors to respond to such events.

NOTES OF DISCUSSION WITH THE TRANSPORT ASSET MANAGER

1. Work through AMP risk register.

(a) Flooding: Roads or road structures damaged, blocked or destroyed due to flooding

At extreme levels of flooding, our roads become the overland flow paths and some of them may not be passable, impacting service levels and access.

We have a number of bridges around the district which are also at risk of damage during flood events. These risks can be exacerbated by forestry slash.

The more common and frequent impact of high rain events is that our roads that are not in good condition – where maintenance and renewals have been deferred, roads are easily damaged by water ingress causing potholes. Successive heavy rain events can have a dramatic impact on the quality of these roads – like widespread potholes and deeper potholes. Temporary measures to fill potholes can be washed away in successive events.

Permanent measures to repair and fix the roads come from highly constrained budgets, and can take some time. Potholes are not just a level of service (smooth ride) issue, they can damage cars, leave the road exposed to further and greater damage in future and can even cause road safety concerns when divers swerve to avoid them.

The key to mitigating these risks would be increased preventative maintenance (road sealing and kerb and channel improvements) to stop roads being susceptible to potholing in heavy rain events. Almost all the potholing and damage we see from heavy rain events is on roads that have had deferred maintenance and renewals.

(b) High winds: Roads or road structures blocks/damaged due to debris (fallen trees and/or power lines) and other objects blown into vehicle paths

Heavy rain and high wind or storm events can result in trees and power poles falling, or tree branches and debris blocking roads. Individually these are not a large problem, but in a large event where there are overwhelming numbers of these there can be significantly reduced service levels or access, and a significant amount of work is required to ensure safe traffic management, clear them and restore roads.

Power outages impact streetlights and traffic lights.

Lightning strikes are a risk to streetlights and traffic lights.

(c) Land slide/slip: Roads or road structures blocked, damaged or destroyed by land slide/slip possible occurring during heavy rain.

We have a large network of rural roads, which include many road cuttings and banks In Heavy rain and high wind or storm events, banks can be brought down.

A key risk factor is trees or unsuitable vegetation on banks and road cuttings. Much of this vegetation is next to the roadway on private land.

Successive events can also increase the risk, and there can be areas of repetitive slipping.

Individually instances are usually not a large problem, and can easily be cleared. The risk is when there is a large event with multiple slips to be dealt with.

Underlips or washouts are a greater problem to resolve, they take more time and resource to restore the roadway. We have several roads that are cut into slopes that are at risk (for example the roads in to Pukawa, and Omori /Kuratau), but also many of our roads are built up above the surrounding land and can also be at risk of being undermined by slips.

The main mitigation options are preventative rural drain works, and tree and vegetation management. Our budgets for these are very limited and we mostly do reactive work, after a problem has occurred, or an imminent problem is identified.

We don't have strong management and communications plans and protocols in place for large events. There is a significant communications challenge letting everyone know where there are problems or road closures, detours and delays.

There is also a significant management challenging in prioritising and allocating resources to fix the problems. There is also an opportunity to test and manage community expectations – If the community are willing to tolerate their road being closed for a period and accept the delay or taking alternative routes, we can more efficiently resolve the problem, rather than rushing, trying to fix everything at once, and doing expensive traffic management in multiple areas.

2. Are there concerns about high temperature and roads melting?

It is not a significant issue for our district. We do get some softening of bitumen in high temperatures but not significant damage. There are other parts of the country that have more frequent and higher temperatures than us.

This may require changes in materials in future, but we expect that these would be address through updating our planning and management approaches in time.

NOTES OF DISCUSSION WITH THE SOLID WASTE ASSET MANAGER

1. What are the risks to Council's waste management operations?

The biggest risk of impact would be managing disaster waste. In a large event, like a flood of many houses, there are tonnes of waste materials that need to be managed and disposed of.

There is a national system, including disaster waste funding (and waiving of waste levies for disaster waste) that we can call on.

The main problem is how and where to deal with and dispose of a sudden large amount of waste.

We have limited capacity at our district landfill (Broadlands landfill), and we will need to consider if we want to use this space up for disaster waste.

In practice, we would need to find a bit of land, like a farm, somewhere where we could temporarily house all the waste, until it can be sorted and processed and disposal arrangements determined.

2. What about flooding risks at the landfill?

Landfill has a designed stormwater channel – which is appropriately scoped to deal with a large event. We have not had any problems there to date.

We have closed landfill in Tūrangi and Mangakino, both of which are well situated above flood areas.

NOTES OF DISCUSSION WITH THE PROPERTY ASSET MANAGER

3. What are the risks to Council's buildings and facilities?

There are no high risk or significant risks identified. No buildings and property assets have been identified as being in flood risk, slip risk, or wildfire risk areas. No detailed risk assessment has been done for buildings that may be used during Civil defence emergencies – but there have been no identified reasons to need one.

Main risks are storm and wind damage, including from fallen trees. Would expect this to be low level damage, however, when a tree fell on the Acacia Bay Hall it caused significant damage.

Loss of power can impact the provision of services. For example, the pool must be closed if we cannot operate the filter.

Lightning strike to sensitive pool equipment could cause some costly damage but is low risk.

NOTES OF DISCUSSION WITH THE PARKS AND RESERVE ASSET MANAGER

1. What are the key risks for parks and reserves?

Lakeshore erosion is the key risk that is getting worse and is likely to be impacted by climate change.

Erosion happens both long-term, cumulative impacts over time, and in large erosion events like storms. Erosion effects in Kuratau can be significant in high water, wind/wave, storm events.

We are aware of the key lakeshore erosion areas. Erosion in these areas is getting worse. We have identified mitigation engineering solutions and have funding set in the long-term plan (co-funded with Waikato Regional Council) for project watershed to put in these measures. The main problem we have is getting iwi / hapu agreement to these solutions. Delays in putting in place mitigation measures means that erosion continues, and foreshore is lost before it can be protected. While the reserves and land are the are being lost first and this has an impact on the local communities and their resources and amenities, behind these reserves are Council infrastructure and private property and houses, which are also at risks if the reserves are diminished.

Our gully reserves are designed to be overland flow paths. In a large event there is the potential for erosion, or landslips of gully banks. It is important to keep new development well setback from gully banks. There are some houses reasonably close to gullies in historic areas.

We have several gully reserves, and some reserves alongside rivers. We have not done any comprehensive assessments of river reserve or gully reserve erosion risks.

2. Any other comments

In heavy rain events we can have scouring and damage to reserves where overland flows enter onto reserves, including lakefront reserves. This has a cost / repair impact.

In high wind and storm events damage to trees and fallen trees can be a significant impact on our reserves requiring clean up and safety management. We have a small programme of tree assessments but cannot determine which trees might be at risk in a large event.

3. Sports fields

Droughts can have impact on our reserve operations. There might be less mowing, but more maintenance and watering costs, for example for sports fields. Many of our sport fields are not set up for irrigation (Invergarry Rd. end Crown Park, Tūrangitukua Park, Kaimanawa Reserve (outfield area) and we have a Manual travelling irrigator for Mangakino sportsgrounds. Hickling Park and Crown Park (fields 1 to 10) have some irrigation, but limited capacity. In drought conditions there is extra maintenance for sport fields, and there is a risk that the grass dies.

In heavy rain events, we typically have good drainage for our sports fields, but pumice soils still compacts and needs additional maintenance to relieve compaction and support aeration.

NOTES OF DISCUSSION WITH THE DEVELOPMENT ENGINEER

1. How do we manage / mitigate the risks to new development areas?

(a) Flooding

For new development areas, e.g. new subdivisions / greenfield areas, we make sure that there are no overland flow paths on private property. Overland flow paths are contained on the road networks, reserves, and gully reserves.

What are our stormwater concerns in historic areas?

Stormwater management was historically done for a 1 in 5-year event. And that is a historical event. So for a larger event you can expect water not to be contained on people' properties, and the roading stormwater network to be overwhelmed and water to flow on roads and into overland flow paths, some of which cross private property.

Lake Taupō being in a bowl helps. Most water can flow down roads towards low points on Lake Terrace, and then overflow into the lake.

Where there are overland flow paths on private property and where houses have been allowed to build there is where there will be the greatest impacts.

Could the stormwater network be upgraded to cater to larger events, like our current 1 in 10-year expectations?

It is hard to upgrade the stormwater system. It is not like the putting in a larger wastewater main, like the southern trunk main upgrade, where we could put in horizontally long stretches of new plastic piping. The stormwater pipes are large concrete pipes. It would be a major exercise and very costly to replace them with new larger concrete pipes and you would need to start with the largest pipes down by the outlets first. They also tend to be under the roadway pavements, which means that the laying and reinstatement must be done to a very high standard. Changes to outlets within the lake margins require the approval of the lake owner.

(b) Landslips / slides and erosion

For new development areas we deal with these through structure plans and subdivision plans. We ensure good setbacks from gully banks. Geo-engineers do site inspections.

There are lakeshore erosion concerns in historic areas. We have some infrastructure that is at risk if/when lakefront reserves are lost. Including wastewater pipes in Kuratau that were previously a long way from the water and now are not that far away. And in Taupō, there is Council infrastructure around 2 Mile Bay and Copthorne Manuels that is at risk and needs to be protected. Sections of the great lake shared path are at erosion risk. There is some other infrastructure further back, like pumping stations that could be at risk in the long-term if erosion continued, and may need protection.

Mostly these can be protected through engineering means.

Our roading network is exposed to slips and vegetation / trees coming down. This is for both large events and cumulative events that saturate the ground.

Individual events are manageable, clearing small slips and trees is reasonable easy, the big problem is in a large event where there are lots of them all over the place, which takes a significant time to deal with. Power poles and power lines are also a risk. While many roads have alternative routes, some do not, and

multiple slips in many places may create loss of service and access problems until they can be cleared. And if there are many of these there are also cost impacts that become material.

In practice some of these could be mitigated, the main aim would be vegetation and tree clearance. Vegetation and trees are one of the key risks for banks and cutting slip risks too, as they create leverage and torque pressures. But Council's vegetation management budget is low and stretched. We are primarily reactive, responding after problems occur, or imminent problems are reported or identified. And in practice we are not going to cut down all the trees that could be a problem. We do not have plans in the short-medium term to significantly mitigate these risks.

Cumulative impacts of intense rain also impact the road networks service levels. We get a significant number of potholes which take time to repair. And rain washes away temporary measures fill in potholes until they can be permanently repaired. The result is roads in poor condition for a time, and in worst cases these can lead to significant vehicle damage.

In a heavy rain event will stormwater on roads reduce access?

Roads become secondary overland flow paths, so there is potential for reduced access. But in practice there are a few select areas where it is worst. Nothing too major.

Probably more major are the areas of State Highway 1 which are prone for flooding.

What about washouts / slips undermining roads?

We are fortunate that we don't have too many of those. But there are areas where it is a problem.

The most significant risk areas are probably the entrance roads to Pukawa, and to Omori/Kuratau. We have some investment dealing with some weak spots, but there are more risk areas right along the roads so there will remain risk along that road.

2. Any other comments

The regional Council is responsible for flood protection and management. We have some major flood bank and management areas towards the south, in Tūrangi, and Tauranga-Taupō. It is the regional Council's responsibility to maintain flood banks, and do river gravel dredging / removal as appropriate. There are some concerns about how much of that has been done in recent years. We are hearing reports that access to maintain stop banks, for example tree removal, has not been granted since some key areas of land have been transferred from the Department of Conservation to local Iwi / hapu. And there hasn't been gravel removal for several years, which used to be done regularly to reduce flooding risks.

Landfill fire risks are not really impacted by climate change. They are a very real risk at present, often cause by laptop batteries and the like.

NOTES OF DISCUSSION WITH THE SENIOR PLANNER

1. How do we manage / mitigate the risks to new development areas?

The District Plan has river and lake flood risk areas mapped and controls in place to manage new development increasing the risk in those areas.

Overland flow path risks are not currently managed through the district plan. Instead, we apply building controls the manage new development in these areas. We are working to improve our overland flow path risk maps, with the intention that these could then be included in the district plan.

The district plan and our structure planning has setbacks from gullies.

Around the lake we have foreshore protection area, which manages the risk of new development or building close to the lake. This may provide some erosion protection, at least in the medium term.

We have a growth strategy which identified future areas for urban development. National hazard risks and their mitigation is a key factor in determining these areas, and the structure planning for those areas before they are zoned for development.

NOTES OF DISCUSSION WITH THE SENIOR BUILDING CONTROL OFFICER

1. How do we manage / mitigate the risks to new development areas?

(c) Flooding

District plan covers river flooding risk areas.

For urban flooding areas (overland flows) these are not in the district plan and need to be managed by building controls. We use Waikato regional flood maps (hazards) – inundation maps to identify potential flood risk areas, then we use Council's internal maps to identify risk areas and ensure that new building mitigates these risks (for example by building floor heights above potential water depths)

(d) Landslips / slides and erosion

Any new build must provide evidence of suitable ground bearing. This would identify any slop stability issues. E.g. through Geotech assessments.

(e) High winds

Building code has zoning and provisions for high wind areas.

(f) Wildfire

Nothing specific in the building code for wildfire.

2. What is / are the biggest concerns?

Nothing.

3. Any other comments

Our PIM process could be improved. Currently we have to double check for natural hazards to make sure that we are considering everything we need to.

There are national building standards process to adjust and improve things as required over time. E.g. for the gradual impacts of climate change like heat management.