te kaunihera ā-rohe o
matamata-piako
district council

Kaunihera | Council

Ngā Tāpiritanga – Pūrongo | Attachments – Reports

ATTACHMENTS UNDER SEPARATE COVER

Notice is hereby given that an ordinary meeting of Matamata-Piako District Council will be held on:

Ko te rā | Date:	**Wednesday 24 September 2025**
Wā | Time:	**9:00**
Meeting Room:	**Council Chambers**
Wāhi | Venue:	**35 Kenrick Street TE AROHA**

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Matamata-Piako District Council

Organisational Climate Risk Assessment 2025

Summary Report

1. CONTENTS

Part 1 - Executive Summary

An Organisational Climate Risk Assessment for Matamata-Piako District Council was carried out between June and September 2025. It was led by consultants, Tonkin + Taylor.

Purpose

The Climate Risk Assessment sought to answer the following questions:

1. **What risks are Council's assets, services and operations currently facing from climate-related natural hazards?**
2. **How are these risks likely to change over time?**
3. **To what extent is Council able to adapt to these risks?**

Goal

The goal of undertaking this work is to contribute to the climate risk information Council has available when making future focussed decisions, ensuring its continued resilience as an organisation and its ability to continue to provide services to our communities.

The results of the Climate Risk Assessment support Council's long term resilience by:

- Identifying key climate-related risks across Council's activities and operations
- Identifying areas where there is high potential adaptive capacity over time, and areas where the options to adapt may be more limited
- Providing quantitative and qualitative hazard exposure and risk information that can inform infrastructure and strategic planning
- Demonstrating to audit our management of climate risk
- Valuing the expertise of staff, and continuing to grow awareness and understanding amongst staff, thus keeping climate impacts 'front of mind'
- Providing a base of climate risk knowledge on which we can continue to build.

Outputs

The key outputs of the Climate Risk Assessment are:

1) Detailed, quantified data on Council assets exposed to flooding under various rainfall events, at present day, and at end of century, taking changes in the climate into account. This information to also be developed to be displayed visually as maps and a GIS layer.

2) A detailed, qualitative risk workbook looking at the full range of climate hazards, and assessing how these are impacting each area of Council now and likely to impact us in the future, rating the exposure, sensitivity and consequence of the risks, and assessing Council's ability to adapt to the risks.

3) This summary report.

Key Findings

The highest-rated risk for each area of Council is listed below, along with a comment on the adaptive capacity.

All the risks rated high, very high, or extreme are listed in the tables in Part 4 of this report.

Highest-rated risk for each area of Council activity			
	Risk Statement	Risk Detail	Adaptive Capacity
Strategy, Planning and Governance	Risk to staff health and safety from extreme weather events.	Risks to staff responding to extreme weather events e.g. injury.	*Adaptive capacity not rated for strategic risks.*
Roading	Risk to bridges and major culverts due to flooding and extreme weather.	Extreme weather can cause inundation/ damage to bridges and major culverts. Bridge piles and foundations can experience increased erosion/scour from waterways. Extreme weather can result in storm debris entering waterways, potentially leading to damage of, and accumulation at bridges and culverts. The cumulative impact of more frequent flooding could reduce the lifespan of bridges.	Adaptive capacity is low. Costs for proactive work are high.
Stormwater	Risk of extreme weather and flooding exceeding the capacity of the stormwater network leading to overland flows and flooding (depth, velocity).	Extreme rainfall can overwhelm stormwater systems, leading to flooding. Urban stormwater systems are often designed for low level of service in historic/ older areas (~2yr Annual Recurrence Interval - ARI) and there are limited options to upgrade them. Council does not have information on the maintenance of private stormwater infrastructure, and it is difficult to enforce maintenance. There is some variance to this risk across towns.	Adaptive capacity is low. We are currently doing hydrologic modelling and future planning. Depending on risk reduction decisions, costs are quite likely very high. In addition, growth and development are continuing.
	Risk of Te Aroha flood control structures e.g. box culvert being damaged or blocked in an extreme rainfall event.	In high rainfall events there is a high risk of debris flows which could damage or block the flood control structure especially in the hill area, leading to a risk of debris flow into the residential area of Te Aroha.	Adaptive capacity is low. Staff can do periodic assessments of structural integrity. It is difficult to do anything upstream because it is Department of Conservation land.

Highest-rated risk for each area of Council activity			
	Risk Statement	Risk Detail	Adaptive Capacity
Water	Risk to water supply due to drought.	Reduced water availability due to drought and rainfall variability - leading to water restrictions. Additionally, stream health could be impacted from the lowered stream and dam levels which could lead to risks to public health from cyanobacteria in consumption of contaminated water supply, including Te Poi water supply, Te Aroha water supply, Morrinsville water supply, and Tahuna water supply. Also includes possible low bore water levels.	Adaptive capacity is low. The ability to adapt to drought is low. It is difficult to find new water supplies. To get consent for a new supply would be very difficult. Extreme case: treating wastewater to create water, is very expensive.
	Risk to the accessibility of the Tills Road water treatment plant site due to extreme weather.	The Tills Road site may become too dangerous for staff to access during and after extreme weather, causing disruptions in treatment activities.	Adaptive capacity is low. We have already sealed the road and added drainage. We restrict access to staff for health and safety reasons. Some of it is in Department of Conservation land.
Wastewater	Risk to the functionality of the wastewater network, due to inflow and infiltration from extreme rainfall events.	Risk of high levels of inflow and infiltration (I&I) leading to uncontrolled overflows and potential public health risks. Very high exposure in Morrinsville and Te Aroha, less so in Matamata.	Adaptive capacity is low. Options are currently limited, but there are opportunities to improve resilience through targeted infrastructure upgrades, operational changes, and strategic planning, particularly in some of the highly exposed areas.
	Risk to underground wastewater infrastructure due to erosion from flooding.	Flooding can cause stream erosion and impact our utilities infrastructure. (3 waters, telecom, electricity). Pipes in embankments and slopes may be exposed or damaged if slips occur.	Adaptive capacity is medium. Criticality assessment of pipe network is underway. We will have to stage the work depending on criticality as it will be costly.

Highest-rated risk for each area of Council activity			
	Risk Statement	Risk Detail	Adaptive Capacity
Rubbish and Recycling	Risk to Matamata closed landfill from extreme rainfall.	The Matamata landfill is located adjacent to the Mangawhero Stream and operates under a resource consent that allows for the discharge of leachate into the groundwater, which could eventually enter the stream. During periods of heavy rainfall, this discharge can increase temporarily.	Adaptive capacity is low. The site is routinely monitored and reported on to Waikato Regional Council to ensure all discharges remain within the consented limits. More understanding of the risk and mitigation options is needed.
Community Facilities and Property	Risk to Council owned buildings and venues due to flooding and extreme weather.	Extreme rainfall and flooding can pose risks to Council buildings and venues. Rainfall can also overwhelm guttering and drainage and lead to building/asset damage. This could have implications for service provision e.g. libraries, offices, depots, elderly person housing.	Adaptive capacity is medium. We can make structural changes but these would be costly.
Parks and Reserves	Risk to trees in parks, reserves and berms, during extreme wind events. Risk of damage to trees and associated risks to surrounding infrastructure and people.	Extreme wind events can damage trees and lead to damage to other assets, e.g. sewer lines and risks to people, e.g. falling branches and trees.	Adaptive capacity is medium. We inspect trees on an annual basis. We can improve our data - capture our trees and their condition and put them on a risk based inspection regime. This happens now for playgrounds and mature grove trees. If inspecting regularly then we can do preventative maintenance e.g. pruning. Ensure any new planting is the right tree in the right place, including plant guidelines for developers.

Next Steps

Key next steps include

- Integrating the results into our Activity Management Plans and other planning processes.
- Integrating the GIS analysis with our asset database, and developing ways to display it visually.
- Using the results to inform strategic documents such as our draft Climate Resilience Strategy, and Growth Strategy.
- Setting up a project group to drive further next steps including:
  - further analysis and refining of the GIS data
  - keeping the risk workbook as a 'live' document, through regular review and updating of the risks, risk ratings and adaptation options
  - prioritising and filling identified data and knowledge gaps.
- Combining the GIS analysis with other metrics such as asset condition, criticality, and community vulnerability to give us a deeper understanding of risk to support decision-making.
- Exploring adaptation options / pathways / thresholds for the highly rated risks, and implications for planning, operations and funding over time.

Acknowledgements

Thank you to Tonkin + Taylor for their expertise in leading this work.

And a big thank you to all the staff from across the organisation who shared their experience and knowledge so generously during this process, and whose input has been integral to the successful completion of the assessment.

Part 2 - Context

The Organisational Climate Risk Assessment is part of a programme of strategic climate risk focused work, being undertaken at Council, aimed at building the understanding and management of climate risk at an operational and governance level.

Alongside the Organisational Climate Risk Assessment, a Carbon Emissions Inventory of Council's emissions, a Climate Resilience Strategy, an ongoing series of climate-related workshops for elected members, and climate impacts included as a top risk for Council, are other actions within this work programme.

The overall purpose of the strategic climate risk work is to support decision-making that will increase the resilience of Council as an organisation and ensure we are able to continue to provide services to our communities into the future.

The strategic climate risk work is one workstream within the Climate Change Rivermap which was developed by Council as part of the Long Term Plan 2024-34. The Rivermap brings together work happening across the organisation related to climate resilience.

Part 3 - Overview of Methodology and Results

The Climate Risk Assessment sought to answer the following questions:

1. **What risks are Council's assets, services and operations currently facing from climate-related natural hazards?**
2. **How are these risks likely to change over time?**
3. **To what extent is Council able to adapt to these risks?**

To answer these, the assessment took two complimentary approaches:

- A qualitative climate risk analysis, developed using staff expertise from across the organisation
- A quantitative flood hazard exposure analysis, developed through GIS analysis.

3.1 Climate Risk Analysis

Overview of methodology

Risks to Council from climate-related hazards were assessed using staff expertise from across Council.

Firstly, risks to each area of Council activity were identified. These risks were then screened and rated. Risks to assets and services were rated at the present day, and at mid and end of century, under two different climate scenarios, a mid-range, and higher range scenario. (Refer to Part 6, Methodology for further detail).

To rate each risk, the following factors were considered:

Exposure - How often, and/or to what extent, is the asset currently exposed to the identified risk? And then, taking the two climate scenarios into account, how often is it likely to be exposed in the mid and long term.

Sensitivity – If the asset is exposed to the identified risk, how likely is it to be impacted/ damaged by the risk?

Consequence – If the asset is impacted by the risk, what would be the consequence to Council?

Adaptive Capacity – What can we do about the risk? Are there things that we can do and how easy/ affordable is this?

Strategic risks were treated differently due to the flow on, or indirect nature of these risks. For strategic risks, the focus was on rating the consequence of the risk.

A more detailed explanation of the methodology can be found in Part 6 of this report.

Image Risk identification workshop involving more than 50 staff from across Council

Overview of results

The output from this analysis is a risk workbook with risk descriptions and ratings for the risks identified for each of Council's asset-based activity groups, and for strategic risks.

The tables in Part 4 below outline the risks for each Council activity that were given a rating of high, very high, or extreme. For each activity the results below are organised into:

1. Risks related to Flooding, Extreme Weather, Wind, Landslides
2. Risks related to Heat, Drought, Wildfire

The full results from the climate risk analysis can be found in the Climate Risk Workbook in Council's records, CM3088083.

3.2 GIS Flood Hazard Exposure Analysis

Overview of methodology

Exposure of Council assets to flooding was assessed using Matamata-Piako District Council's draft urban flood model, noting the model has not been calibrated or validated, but is the best available information.

Exposure to flooding was assessed in the following bands:

- Not exposed to flooding
- Exposed to flooding of up to half a metre in depth
- Exposed to flooding of between half a metre and one metre in depth
- Exposed to flooding of greater than 1 metre in depth.

A range of rainfall events in the present day, and in the future incorporating a climate factor, were assessed.

An assessment against Waikato Regional Council's first draft of its regional flood model was used for areas not covered by the urban model. Noting the model represents a work-in-progress version of the outputs. Losses, pump stations, and culverts are not yet included. Depths below 0.2 m have been excluded. The model has not yet been calibrated or validated.

A more detailed explanation of the methodology can be found in Part 6 of this report below.

Overview of results

The output from this analysis was quantified data for each of Council's asset classes, showing exposure to flooding.

The tables and maps in Part 5 below give examples of the results obtained from the GIS analysis.

The full results from the GIS analysis can be found in the Flood Exposure Analysis Spreadsheet in Council's records, CM3080730. Further work will be undertaken to more fully analyse the results and to develop a way to display the results visually.

Part 4 - Results: Climate Risk Analysis

The tables below outline the risks identified as high, very high or extreme for each area of Council, taking in to account exposure, sensitivity, consequence and adaptive capacity. Risks are rated in the present day, the mid-term (2050) and the long-term (2100), under a moderate climate scenario (Shared Socioeconomic Pathways I SSP 2-4.5) and a higher climate scenario (SSP 3-7.5). For the Strategy, Planning and Governance risks, risks are rated differently, with a focus on the organisational consequence. Detail on the climate scenarios, and methodology are in Part 6 below.

4.1 Strategy, Planning and Governance

a) Key risks to Strategy, Planning and Governance from Climate Hazards

Key Climate Risks to Strategy, Planning and Governance from Climate Hazards		
Risk Statement	**Detail**	**Consequence**
Risk to staff health and safety from extreme weather events.	Risks to staff responding to extreme weather events e.g. injury.	Extreme
Risk to emergency management planning from multiple hazards.	Risk of Council's emergency management function being put under pressure over time. Response & recovery plans will need to be tailored to specific geographic areas, and specific hazards, projected impacts, and community vulnerabilities. Council response to frequent events could put significant strain on officers, or impact on 'business as usual' activities for other staff. There may come a time when Council will need to employ more Civil Defence Emergency Management (CDEM) staff.	Very High
Risk of inaccurate information being placed, and linked to, property records (including data, files, GIS).	The accuracy of property hazard information on the Land Information Memorandums (LIM) and in the District Plan is critical to addressing climate-related risks. There are issues associated with: choice of climate projections/scenarios to use, time horizons, accuracy of modelling, liability etc. If Council has information but this is not included on a LIM, and someone buys a house relying on this LIM, then Council could potentially have an insurance claim or professional indemnity claim against staff. Both an information management risk and a legal risk if a new property owner makes a claim. An example: Council staff attend a flooding event and see flooding on properties, this information is not conveyed to those responsible in Council for putting property information on LIMs.	Very High

Key Climate Risks to Strategy, Planning and Governance from Climate Hazards		
Risk Statement	**Detail**	**Consequence**
Risk of unmanaged retreat.	Risk of Council not having the powers, processes or funds it needs to successfully facilitate a managed retreat process in the future, due to a lack of appropriate legislative/ funding mechanisms.	Very High
Risk to culturally and ecologically important sites from extreme weather.	Risk of sites of cultural significance and/or ecological significance being lost or damaged, including wāhi tapu, marae, urupa and areas of food gathering. This could lead to reputational or environmental consequences as well as implications for iwi. In some areas traditional food gathering areas are adjacent to waterways, which can be impacted if waterways become polluted, due to climate risks or otherwise. Marae have an important role to play as community hubs during emergencies.	Very High
Risk of Council having inadequate disaster waste processes in place.	Risk that disaster waste could overwhelm Council's ability to manage it, if there is no plan for disaster waste in place.	Very High
Risk of Council being unable to manage climate risks effectively (capability and capacity).	Risk of Council lacking the internal capability/ capacity to interpret and apply hazard data, and provide advice and relevant policy/ technical expertise to manage climate risks (e.g. in engineering, asset management, etc.).	High
Risk of government introducing legislation which increases council workload and potential council liability.	Risk of new government legislation or policy which may affect Council in a range of ways, including increased workload, increased liability, increased complexity in decision-making and compliance. For example, in the District Plan there are particular standards we are working to. If new levels of risk are introduced which are inconsistent with current standards this leads to uncertainty as to how Council should deal with this. Such changes create uncertainty during the transition period and require Council to adapt processes, allocate additional resources, and manage heightened legal and reputational risks.	High
Risk to consenting processes due to multiple hazards.	Risk of consenting becoming more complex/onerous due to increased climate hazard exposure in the district and associated uncertainty with climate projections - leading to customer frustrations, capacity issues and delays in infrastructure provision. Note existing site-suitability provisions in the District Plan.	High
Risk of increasing insurance costs.	Risk of increasing insurance premiums or excesses for Council. Risk of potential decreasing availability of insurance cover.	High

Key Climate Risks to Strategy, Planning and Governance from Climate Hazards		
Risk Statement	**Detail**	**Consequence**
Risk of unexpected changes to population e.g. due to domestic or international migration into the district	Risk of unplanned growth leading to strain on Council infrastructure and services.	High
Risk to budgets and rate levels from extreme weather response and recovery.	Risk of additional costs to respond to extreme weather events (e.g. repairing damage, setting up welfare centres) putting pressure on Council budgets. This could result in either rates affordability issues or pressure to reduce levels of service. This could occur across multiple activity areas.	High
Risks of community mis-information, backlash and division.	Risk of community backlash due to the cumulative impacts of extreme weather events over time, with some arguing Council not doing enough while others arguing Council doing too much. Increased workload for the communications team in combatting mis-information, and addressing community concerns.	High
Risk that governance decisions do not support increasing climate resilience.	Risk that elected members choose not to support investment in climate resilience, leading to increasing costs to repair damage, and reduction in levels of service.	High
Risk of not having access to the data needed to make good decisions.	Risk that Council lacks the hazard data and/or the funding to obtain that data that it needs to make robust decisions.	High

4.2 Roading

a) Key risks to Roading from **Extreme weather, Flooding, Wind, Landslips**

Key Climate Risks to Roading Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to bridges and major culverts due to flooding and extreme weather.	Extreme weather can cause inundation/ damage to bridges and major culverts. Bridge piles and foundations can experience increased erosion/scour from waterways. Extreme weather can result in storm debris entering waterways, potentially leading to damage of, and accumulation at bridges and culverts. The cumulative impact of more frequent flooding could reduce the lifespan of bridges.	Adaptive capacity is low. Costs for proactive work are high.	Very High	Very High	Very High	Very High	Very High
Risk to roading infrastructure due to high winds.	Damage to roads and key infrastructure from strong winds, tree fall, signage, power lines and poles. Mostly along the Kaimai ranges.	Adaptive capacity is low.	High	High	High	High	Very High
Risk to roading and key infrastructure access due to flooding (Matamata).	Flooding can disrupt roading access. (Flooding also identified in other towns, but GIS analysis showed Matamata with highest percentage of roading infrastructure exposed).	Adaptive capacity is low. We could install pump stations, but costs are prohibitive.	High	High	High	High	Very High
Risk to roading and key infrastructure due to flooding (Morrinsville).	Flooding can disrupt roading access. (Flooding also identified in other towns, but GIS analysis showed Morrinsville with second highest percentage of roading infrastructure exposed).	Adaptive capacity is low. We could install pump stations, but costs are prohibitive.	High	High	High	High	High

Key Climate Risks to Roading Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk of damage to roading pavement due to flooding.	Flooding can damage road pavements (including through erosion and undermining road pavement structure). Mainly occurs in steeper catchments areas, as well as ponding in lower areas.	Adaptive capacity is low. We can improve drainage, but not many other actions we can take. There is potential for new technology in this area.	High	High	High	High	High
Risk of damage and access to roading and key infrastructure due to landslips.	Landslides cause road washouts, compromising road access and causing damage to key structures.	Adaptive capacity is low. Response and recovery is the main way we respond.	High	High	High	High	High

b) Key risks to Roading from **Heat, Drought, Wildfire**

Key Climate Risks to Roading Activity from Heat, Drought, Wildfire							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to road infrastructure due to extreme temperatures and drought (Peat soil).	Peat shrinkage can occur in drought and extreme temperature conditions, leading to road deformation and need for high cost road repairs.	Adaptive capacity is low.	High	High	High	High	High

4.3 Stormwater

a) Key risks to Stormwater from **Extreme Weather, Flooding, Wind, Landslips**

Key Climate Risks to Stormwater Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk of extreme weather and flooding exceeding the capacity of the stormwater network, leading to overland flows and flooding (depth, velocity).	Extreme rainfall can overwhelm stormwater systems, leading to flooding. Urban stormwater systems are often designed for low level of service in historic/ older areas (~2yr ARI) and there are limited options to upgrade them. Council does not have information on the maintenance of private stormwater infrastructure, and it is difficult to enforce maintenance. There is some variance to this risk across towns.	Adaptive capacity is low. We are currently doing hydrologic modelling and future planning. Depending on risk reduction decisions, costs are quite likely very high. In addition, growth and development are continuing.	High	High	High	Very High	Very High
Risk of Te Aroha flood control structures e.g. box culvert being damaged or blocked in an extreme rainfall event.	In high rainfall events there is a high risk of debris flows which could damage or block the flood control structure especially in the hill area, leading to a risk of debris flow into the residential area of Te Aroha.	Adaptive capacity is low. Staff can do periodic assessments of structural integrity. It is difficult to do anything upstream because it is Department of Conservation land.	High	High	High	Very High	Very High
Risk to underground stormwater infrastructure near to streams	Flooding can cause erosion and impact stormwater infrastructure.	Adaptive capacity is medium. Criticality assessment of the pipe network is underway. We will have to stage	Moderate	Moderate	Moderate	Moderate	Very High

Key Climate Risks to Stormwater Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating** (Exposure + Sensitivity + Consequence + Adaptive capacity)				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
due to erosion of stream banks.		the work depending on the criticality as it will be costly.					

b) Key Risks to Stormwater from **Heat, Drought, Wildfire**

No risks with a rating of high or above were identified for the Stormwater activity for heat, drought and wildfire hazards.

4.4 Water

a) Key risks to Water from **Extreme weather, Flooding, Wind, Landslips**

Key Climate Risks to Water Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to the accessibility of the Tills Road water treatment plant site due to extreme weather.	The Tills Road site may become too dangerous for staff to access during and after extreme weather, causing disruptions in treatment activities.	Adaptive capacity is low. We have already sealed the road and added drainage. We restrict access to staff for health and safety reasons. Some of it is in Department of Conservation land.	Very High	Very High	Very High	Very High	Extreme
Risk to underground water infrastructure due to erosion.	Flooding can cause stream erosion and impact our utilities infrastructure (3 waters, telecom, electricity). Pipes in embankments and slopes may be exposed or damaged if slips occur.	Adaptive capacity is medium. Criticality assessment of the pipe network is underway. We will have to stage the work depending on criticality as it will be costly.	Very High	Very High	Very High	Very High	Very High
Risk to surface raw water quality due to extreme weather, increased rainfall or flooding.	Increased extreme rainfall and flooding may contaminate water supply infrastructure, causing disruption to essential services. Particularly impacts due to sediment and contaminants leading to turbidity and making treatment far more difficult.	Adaptive capacity is medium. We have some ability to mitigate the risks and consequences. Planning going forward (Masterplans), introducing new water	Moderate	Moderate	Moderate	Very High	Very High

Key Climate Risks to Water Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating** (Exposure + Sensitivity + Consequence + Adaptive capacity)				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
		sources (although this also introduces new vulnerabilities).					
Risk to aquifer water quality due to extreme weather, increased rainfall or flooding (Nitrates).	Increased extreme rainfall and flooding may cause contamination of aquifers from nitrates. Contamination more likely to occur from private boreheads that connect to common aquifers. Nitrates can have serious long term impacts on human health.	Adaptive capacity is low. The risk response is unknown. We would potentially have to abandon the bore, and respond to possible wider contamination of the aquifer. Very difficult to deal with.	Low	Moderate	Moderate	High	Very High
Risk to functionality of water infrastructure due to power and tele-communication outages caused by extreme weather.	Extreme weather can cause power and telecom outages affecting water infrastructure's ability to operate.	Adaptive capacity is medium. Skada is quite resilient. There are options for alternative power, and most staff are equipped to work remotely. We have a number of means to ensure continued communication. Mobile coms is beyond our control and could remain vulnerable. It's possible that generators could be mobilised.	Low	Moderate	Moderate	Moderate	Very High

Key Climate Risks to Water Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to water supply infrastructure, and natural environment (streams and dams) due to landslides.	Movement of land, hillsides, stream, dams etc where underground infrastructure is present. Possible damage to intakes, surface diversion structures, streams and dams. Damage to pipe bridges. Risk to buried pipework in landslide prone areas.	Adaptive capacity is low. Some actions are possible, however they would be costly. Planning, response following events, retaining walls, powers under the Resource Management Act, access to contractors, plan to identify additional ground water sources.	Moderate	Moderate	Moderate	High	High
Risk to aquifer water quality from non-Council bores due to extreme weather, increased rainfall or flooding.	Increased extreme rainfall and flooding may cause contamination of aquifers. Contamination more likely to occur from private boreheads that connect to common aquifers.	Adaptive capacity is high. There are some measures in place to protect water sources. If there is contamination, Council can treat it. Risk from bacteria etc is low because we treat proactively.	Low	Moderate	Moderate	Moderate	High

b) Key risks to Water from **Heat, Drought, Wildfire**

Key Climate Risks to Water Activity from Heat, Drought, Wildire							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to water supply due to drought.	Reduced water availability due to drought and rainfall variability - leading to water restrictions. Additionally, stream health could be impacted from the lowered stream and dam levels which could lead to risks to public health from cyanobacteria in consumption of contaminated water supply, including Te Poi water supply, Te Aroha water supply, Morrinsville water supply, and Tahuna water supply. Also includes possible low bore water levels.	Adaptive capacity is low. The ability to adapt to drought is low. It is difficult to find new water supplies. To get consent for a new supply would be very difficult. Extreme case: treating wastewater to create water, is very expensive.	High	Very High	Very High	Extreme	Extreme

4.5 Wastewater

a) Key risks to Wastewater from **Extreme weather, Flooding, Wind, Landslips**

Key Climate Risks to Wastewater Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to the functionality of the wastewater network, due to inflow and infiltration from extreme rainfall events.	Risk of high levels of inflow and infiltration (I&I) leading to uncontrolled overflows and potential public health risks. Very high exposure in Morrinsville and Te Aroha, less so in Matamata.	Adaptive capacity is low. Options are currently limited, but there are opportunities to improve resilience through targeted infrastructure upgrades, operational changes, and strategic planning, particularly in some of the highly exposed areas.	Very High	Very High	Very High	Very High	Very High
Risk to underground wastewater infrastructure due to erosion from flooding.	Flooding can cause stream erosion and impact our utilities infrastructure. (3 waters, telecom, electricity). Pipes in embankments and slopes may be exposed or damaged if slips occur.	Adaptive capacity is medium. Criticality assessment of pipe network is underway. We will have to stage the work depending on criticality as it will be costly.	Very High	Very High	Very High	Very High	Very High

Key Climate Risks to Wastewater Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating** (Exposure + Sensitivity + Consequence + Adaptive capacity)				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to the functionality of wastewater infrastructure due to power and telecommunication outages caused by extreme weather.	Extreme weather can cause power and telecom outages affecting wastewater infrastructure's ability to operate.	Adaptive capacity is medium. Skada is quite resilient. There are options for alternative power, and most staff are equipped to work remotely. We have a number of means to ensure continued communication. Mobile coms is beyond our control and could remain vulnerable. It's possible that generators could be mobilised.	Low	Moderate	Moderate	Moderate	Very High

b) Key Risks to Wastewater from **Heat, Drought, Wildfire**

No risks with a rating of high or above were identified for the Wastewater activity for heat, drought and wildfire hazards.

4.6 Rubbish and Recycling

a) Key risks to Rubbish and Recycling from **Extreme weather, Flooding, Wind, Landslips**

Key Climate Risks to Roading Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to Matamata closed landfill from extreme rainfall.	The Matamata landfill is located adjacent to the Mangawhero Stream and operates under a resource consent that allows for the discharge of leachate into the groundwater, which could eventually enter the stream. During periods of heavy rainfall, this discharge can increase temporarily.	Adaptive capacity is low. The site is routinely monitored and reported on to Waikato Regional Council to ensure all discharges remain within the consented limits.. More understanding of the risk and mitigation options is needed.	Moderate	Moderate	Moderate	High	High

b) Key Risks to Rubbish and Recycling from Heat, Drought, Wildfire

No risks with a rating of high or above were identified for the Rubbish and Recycling activity for heat, drought and wildfire hazards.

4.7 Community Facilities and Property

a) Key risks to Community Facilities and Property from **Extreme weather, Flooding, Wind, Landslips**

Key Climate Risks to Community Facilities and Property Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to Council owned buildings and venues due to flooding and extreme weather.	Extreme rainfall and flooding can pose risks to Council buildings and venues. Rainfall can also overwhelm guttering and drainage and lead to building/asset damage. This could have implications for service provision e.g. libraries, offices, depots, elderly person housing.	Adaptive capacity is medium. We can make structural changes but these would be costly.	Moderate	Moderate	Moderate	Moderate	Very High
Risk to geothermal bores due to landslides and/or flooding.	Potential risk to geothermal bores that feed into mineral spas due to landslides and flooding.	Adaptive capacity is medium. Need to improve understanding of landslide hazard and risk, and effect on bores.	Low	Low	Low	Moderate	Very High
Risk to heritage buildings and sites in Te Aroha due to landslides and flooding.	Potential risk of damage and closure of heritage listed buildings and sites from flooding and landslides (e.g. Te Aroha Domain - 10 or so different buildings). Higher costs and more complex regulatory requirements to replace these assets. Potentially high community expectations as they contribute to community sense of place.	Adaptive capacity is low. We could replace the buildings but this would be very expensive. We can plant out hillsides to reduce risk of exposure to sites from landslides.	Moderate	High	High	High	High

Key Climate Risks to Community Facilities and Property Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating** (Exposure + Sensitivity + Consequence + Adaptive capacity)				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to events centres.	Extreme rainfall and flooding can pose risks to damage or accessibility of events centres, including their use as community response centres during events.	Adaptive capacity is low.	Low	Moderate	Moderate	Moderate	High

b) Key Risks to Community Facilities and Property from **Heat, Drought, Wildfire**

Key Climate Risks to Community Facilities and Property Activity from Heat, Drought, Wildfire							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating** (Exposure + Sensitivity + Consequence + Adaptive capacity)				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to pools due to drought.	Droughts can lead to water restrictions which would affect the pool's operations.	Adaptive capacity is low. We can fill the pool from reservoirs in November. We could truck in water to fill the pool but this would be expensive.	Low	Low	Low	Moderate	High

4.8 Parks and Reserves

a) Key risks to Parks and Reserves from **Extreme weather, Flooding, Wind, Landslips**

Key Climate Risks to Roading Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to trees in parks, reserves and berms, during extreme wind events. Risk of damage to trees and associated risks to surrounding infrastructure and people.	Extreme wind events can damage trees and lead to damage to other assets, e.g. sewer lines and risks to people, e.g. falling branches and trees.	Adaptive capacity is medium. We inspect trees on an annual basis. We can improve our data: capture our trees and their condition and put them on a risk based inspection regime. This happens now for playgrounds and mature grove trees. If inspecting regularly then we can do preventative maintenance e.g. pruning. Ensure any new planting is the right tree in the right place, including plant guidelines for developers.	Moderate	Moderate	Moderate	Very High	Very High

b) Key Risks to Parks and Reserves from **Heat, Drought, Wildfire**

Key Climate Risks to Roading Activity from Extreme Weather, Flooding, Wind, Landslips							
Risk Statement	**Risk Detail**	**Adaptive Capacity**	**Risk Rating (Exposure + Sensitivity + Consequence + Adaptive capacity)**				
			Present day	**2050 Moderate**	**2050 High**	**2100 Moderate**	**2100 High**
Risk to native vegetation due to higher temperatures (bush, wetlands).	Increasing temperatures may result in heat stress to native vegetation which over time can affect the composition of native forest etc. Nurseries take time to change direction and propagate alternatives. Policy guidance e.g. planting guides often based on what has worked historically. Plants (trees, gardens, turf) can be stressed, pick up diseases, and die. Extra expense associated with replacing.	Adaptive capacity is low. Irrigation is possible in some places but is expensive, and access is often impractical. Can do buffer planting and pest control including with community groups.	Moderate	Moderate	High	High	High
Risk to use of parks and reserves (including play spaces and sports fields) due to heat and sun exposure.	Risks to accessibility and use of parks, park structures and play spaces due to hot weather and sun exposure (playground equipment too hot to touch e.g. slides, potentially not enough shade). Prolonged heat and UV also degrades equipment faster and could increase maintenance costs and reduce asset life.	Adaptive capacity is low. Possible options: artificial shade e.g. shade sails, natural shade from trees, water fountains (currently at sports parks), water play, change materials for slides etc. Is not currently being taken into account for design.	Low	Moderate	Moderate	Moderate	High

Part 5 - Results: GIS Flood Hazard Exposure Analysis

The exposure analysis has provided us with detailed, raw data on Council asset exposure to flood hazard, at present day, and at end of century taking a changing climate into account, for a number of different rainfall scenarios.

The tables and maps below give some initial examples of what this data can show. They are intended as examples of the kind of information that we can start to refine and use, on its own, or layered with other relevant information such as asset condition, criticality etc. These examples are not intended as showing the definitive results for each asset, there is more work to be done.

The Matamata and Morrinsville examples use a 100yr ARI (Annual Recurrence Interval) rainfall event, which means a rainfall event that in any given year has a 1% chance of occurring. In layman's terms, this means a significant event, very much out of the ordinary, that is likely to cause significant impacts. It assesses flood exposure in the present day, and at end of century factoring in a changing climate.

The Te Aroha example uses a 10yr ARI rainfall event, which means a rainfall event that in any given year has a 10% chance of occurring. As above, flood exposure is assessed in the present day, and at end of century taking a changing climate into account.

5.1 Wastewater infrastructure flood exposure (Matamata)

(i) **Present Day** – Table (Wastewater points, Matamata, 100yr ARI)

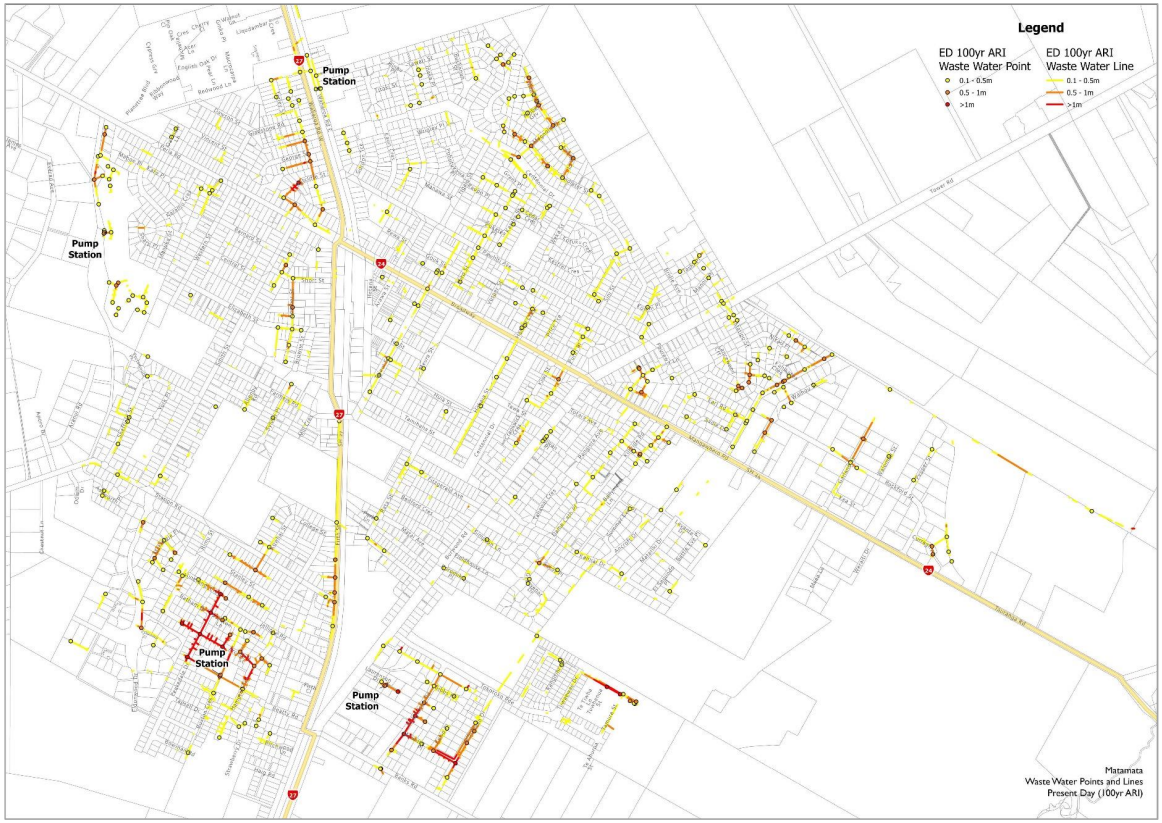
	Flood exposure depth			Total Exposed	Total not exposed	Total items
	0.1 - 0.5m	0.5 - 1m	>1m			
Matamata Wastewater Infrastructure	**312**	**71**	**13**	**396**	950	1346
Pump Station	2	2		4	4	8
Treatment Plant				0	1	1
Manhole	283	63	13	359	829	1188
Lamphole	8	1		9	46	55
Inspection Chamber	7	4		11	36	47
End Point	8	1		9	21	30
Node	3			3	12	15
Air Release Valve	1			1	1	2

(ii) **End of century**, with climate factor – Table (Wastewater points, Matamata, 100yr ARI)

	Flood exposure depth			Total exposed	Total not exposed	Total items
	0.1 - 0.5m	0.5 - 1m	>1m			
Matamata Wastewater Infrastructure	**355**	**104**	**19**	**478**	868	1346
Pump Station	2	3		5	3	8
Treatment Plant				0	1	1
Manhole	321	92	19	432	756	1188
Lamphole	9	2		11	44	55
Inspection Chamber	10	4		14	33	47
End Point	9	2		11	19	30
Node	3	1		4	11	15
Air Release Valve	1			1	1	2

The above tables indicate, for example, that in the present-day 1% AEP event, there are 359 wastewater manholes exposed to flooding, 13 of which are within a depth of more than 1m. Under the 1% AEP event, at end of century (and under a high warming scenario), this number increases to 432 manholes exposed, 19 of which are within a depth of more than 1m.

(iii) Present Day – Map (Wastewater points and lines, Matamata, 100yr ARI)



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(iv) End of century, with climate factor – Map (Wastewater points and lines, Matamata, 100yr ARI)

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5.2 Roading infrastructure flood exposure (Te Aroha)

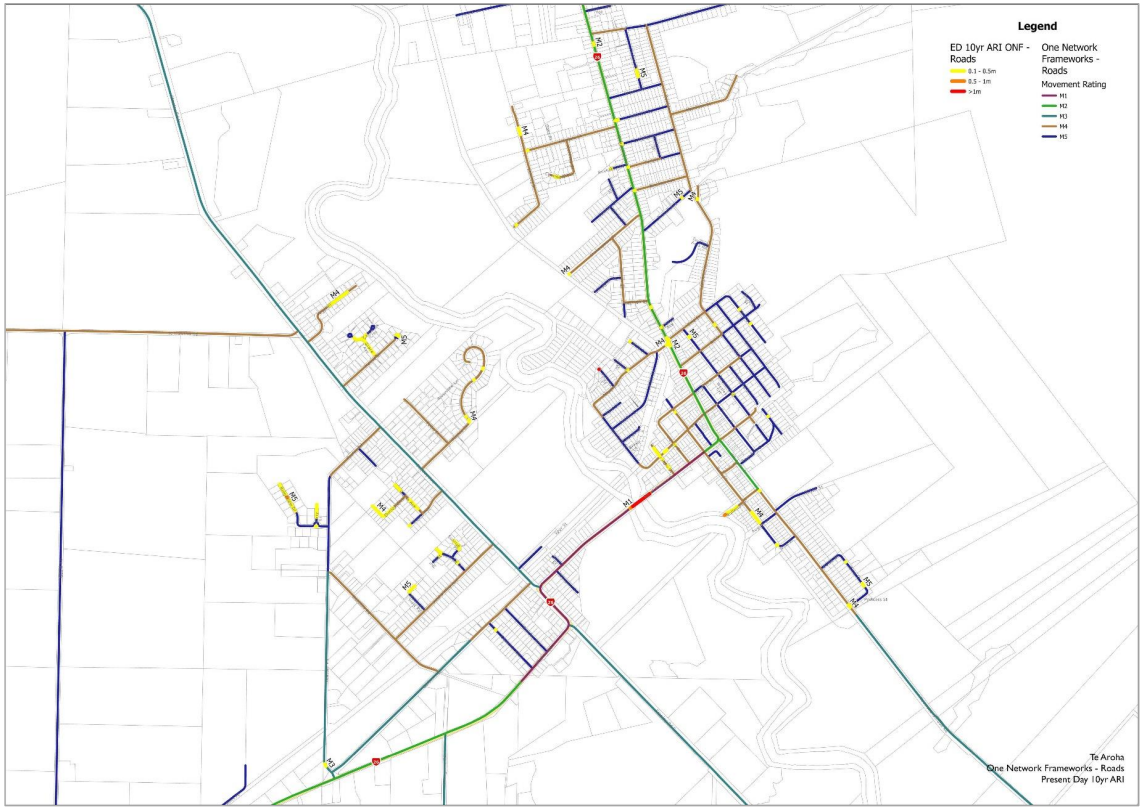
(i) Present day - Table (Roading, Te Aroha, 10yr ARI)

	Flood exposure depth			Total exposed (metres)	Total not exposed (metres)	Total metres
	0.1 - 0.5m	0.5 - 1m	>1m			
Te Aroha Roading	1349	37	103	**1489**	39003	40492

(ii) End of century with climate factor - Table (Roading, Te Aroha, 10yr ARI

	Flood exposure depth			Total exposed (metres)	Total not exposed (metres)	Total metres
	0.1 - 0.5m	0.5 - 1m	>1m			
Te Aroha Roading	2114	235	113	**2462**	38030	40492

(iii) Present day - Map (Roading, Te Aroha, 10yr ARI, overlaid with movement rating (number of vehicle movements – range from M1: highest number of vehicle movements to M5: lowest number of vehicle movements)



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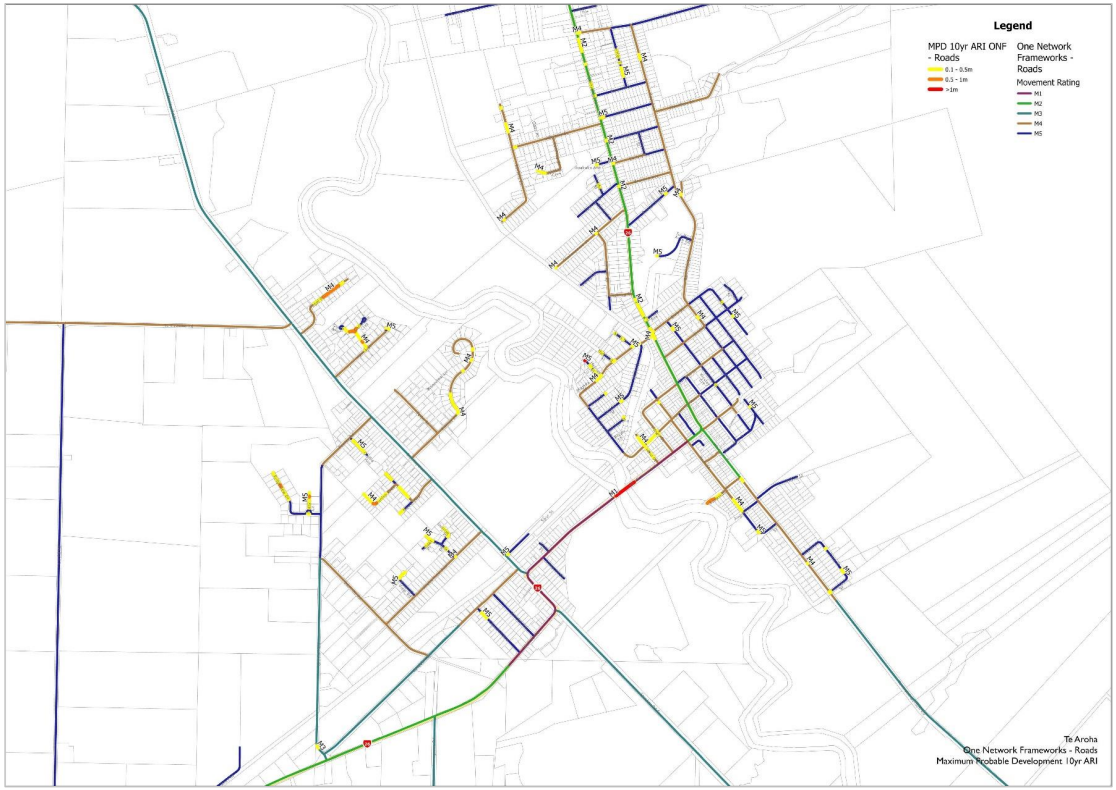
(iv) End of century with climate factor – Map (Roading, Te Aroha, 10yr ARI, overlaid with movement rating (number of vehicle movements – range from M1: highest number of vehicle movements to M5: lowest number of vehicle movements)



5.3 Parks, open spaces and cemeteries flood exposure (Morrinsville)

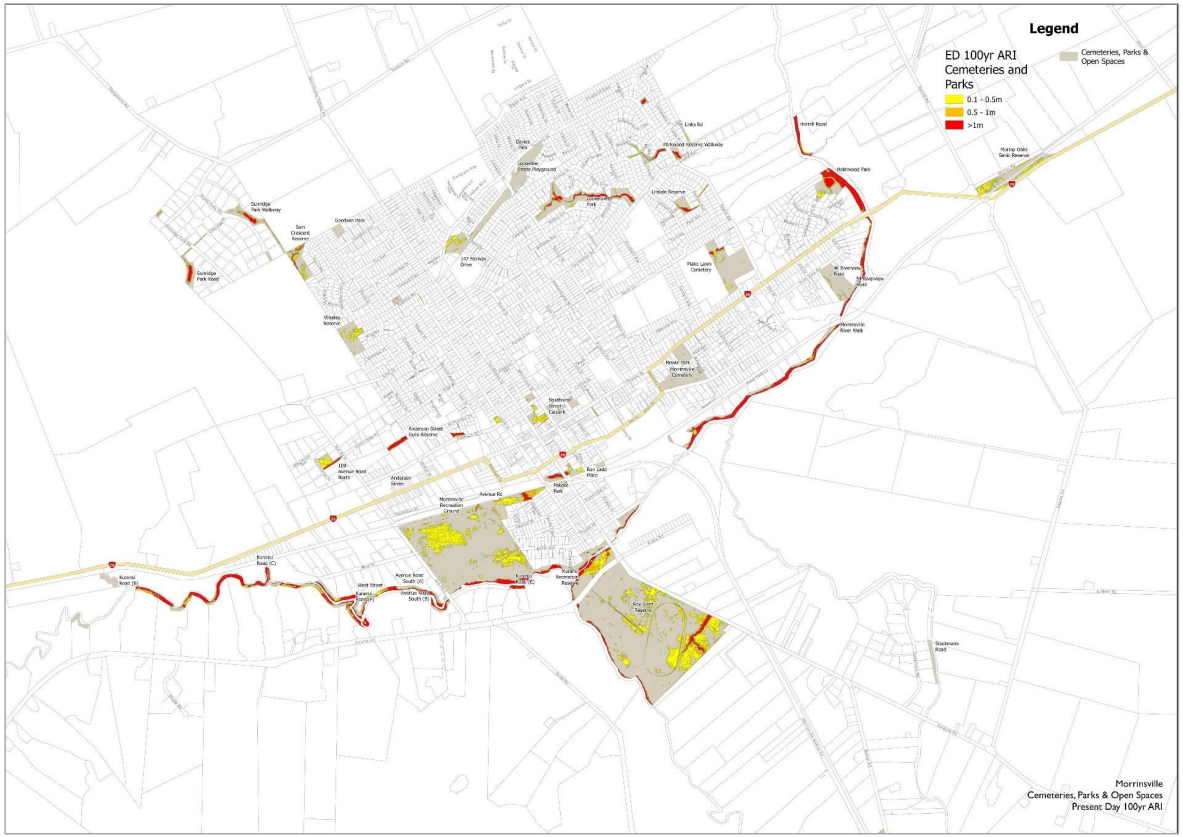
(i) Present day - Table (Parks, Reserves, Cemeteries, Morrinsville, 100yr ARI)

	Flood exposure depth			Total exposed (metres^2)	Total not exposed (metres^2)	Total metres^2
	0.1 - 0.5m	0.5 - 1m	>1m			
Morrinsville Parks, Open Spaces	189515	41741	117353	**348609**	721408	1070017
Morrinsville Cemeteries	2326	480	756	**3562**	43820	47382

(i) End of century with climate factor - Table (Parks, Reserves, Cemeteries, Morrinsville, 100yr ARI)

	Flood exposure depth			Total exposed (metres^2)	Total not exposed (metres^2)	Total metres^2
	0.1 - 0.5m	0.5 - 1m	>1m			
Morrinsville Parks, Open Spaces	245562	45605	146778	**437945**	632072	1070017
Morrinsville Cemeteries	3105	597	1034	**4736**	42646	47382

(i) Present day - Map (Parks, Open Spaces, Cemeteries, Morrinsville, 100yr ARI)



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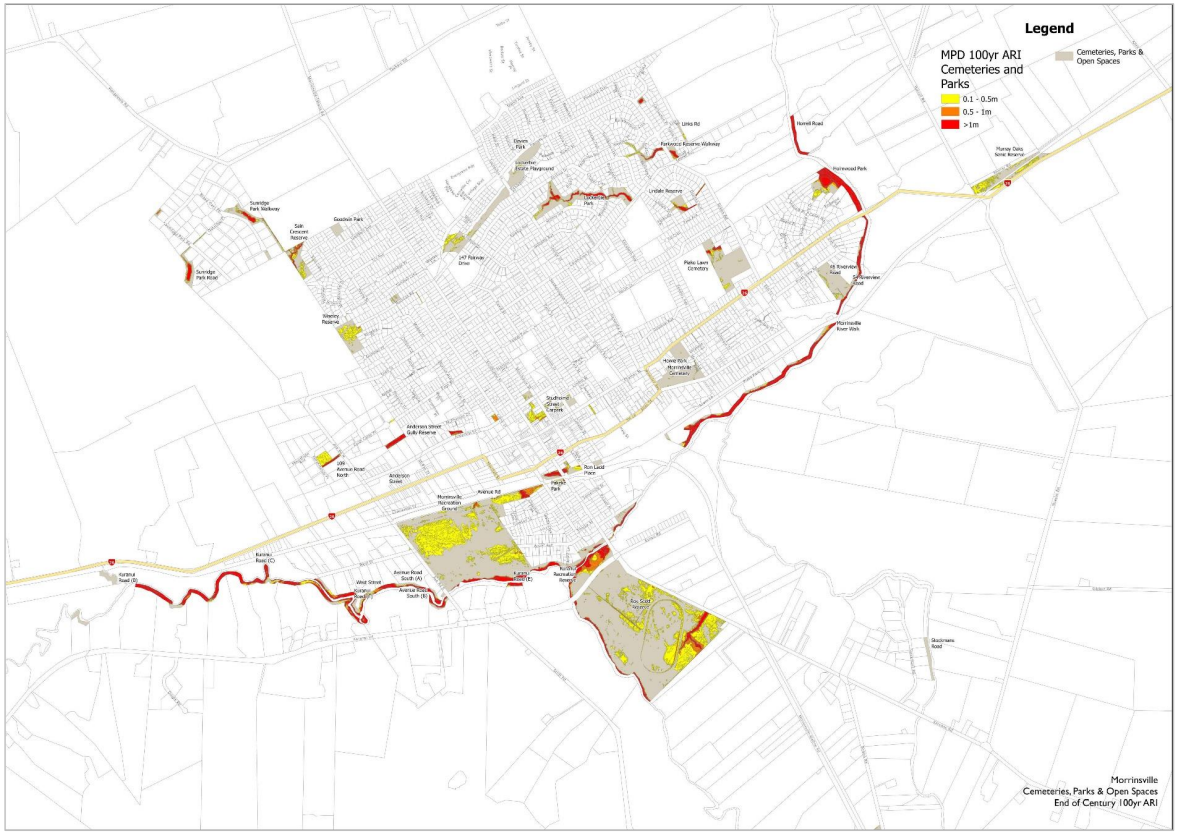
(i) End of century with climate factor - Map (Parks, Open Spaces, Cemeteries, Morrinsville, 100yr ARI)



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Part 6 - Methodology

The Climate Risk Assessment took two complimentary approaches to building understanding of Council's climate-related risks: a qualitative climate risk analysis based on staff expertise, and a quantitative flood hazard exposure analysis based on flood modelling and asset data. The methodology for each of these is described below.

6.1 Climate Risk Analysis

The aim of this part of the assessment was to build an understanding of the risks to Council's assets, services and operations from climate-related natural hazards, and the options that Council has to adapt to these risks.

The process of identifying, refining and rating climate risks took place as follows:

1. Identifying the risks

a) Current impacts

A facilitated workshop was held, bringing together staff from across the organisation, to identify climate-related impacts on our assets and services. Staff considered impacts from both the groups of natural hazards depicted below:

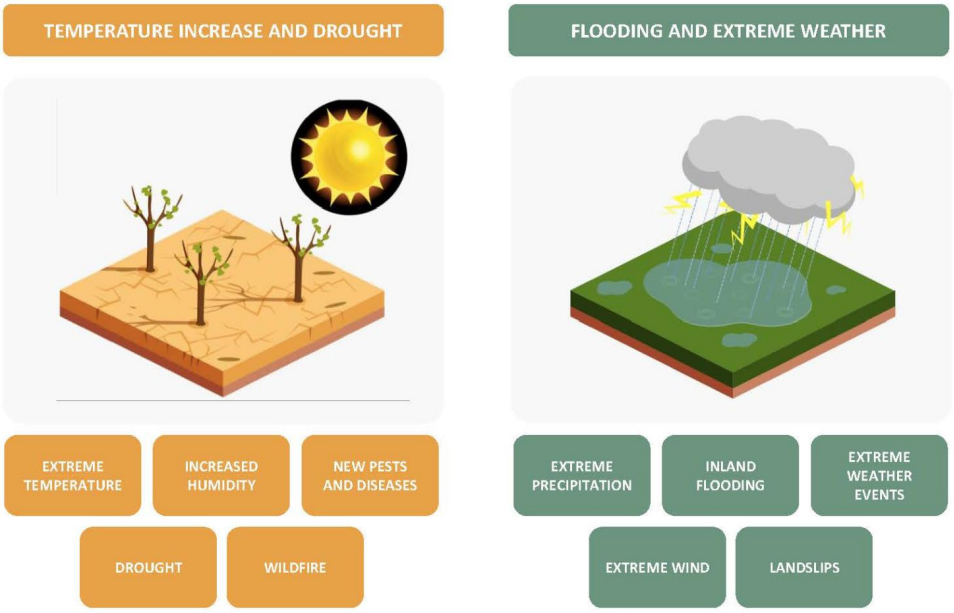

Image Climate-related natural hazards

Staff used their experience, and in-depth knowledge of assets and services, to identify and describe how climate-related natural hazards are currently impacting infrastructure and operations and how these impacts could be exacerbated if the severity and frequency of these hazards increase into the future.

b) Future impacts - climate scenarios

When thinking about how climate-related natural hazards may impact us in the future, published climate scenarios were used to guide thinking. Climate scenarios provide a range of plausible future outcomes. There are two main ways in which these climate scenarios are framed:

- SSPs, Shared Socioeconomic Pathways, are narratives about future societal, economic, and technological development that influence the climate.
- RCPs, Representative Concentration Pathways, are quantitative pathways for different greenhouse gas concentrations and radiative forcing (energy flow in and out of the Earth's atmosphere) over time.

The graphs below bring these two factors together. The graph on the left shows five different possible scenarios for how greenhouse gas emission levels may change over time globally, until the end of the century. The graph on the right shows how these changes in emissions are likely to affect the temperature increase that the Earth experiences.

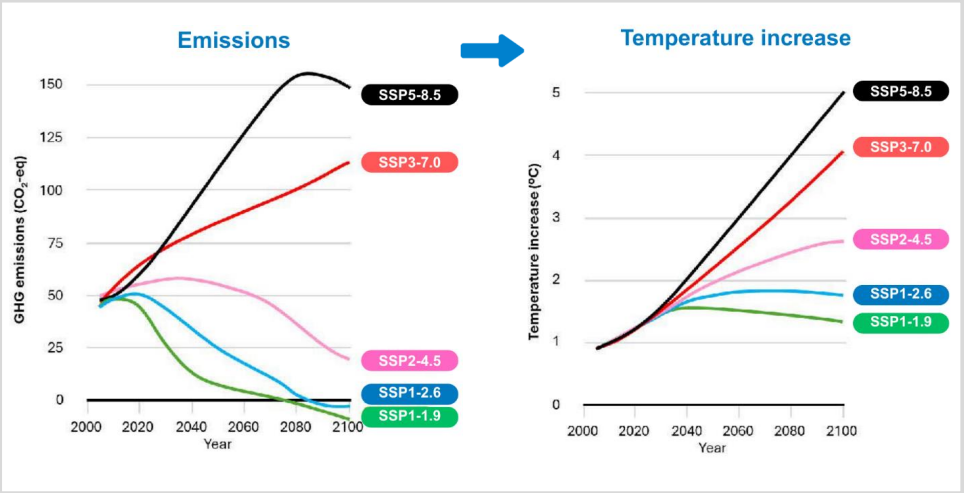

Image Climate Scenarios

Because the future is inherently uncertain, it is best practice when undertaking climate related work to use at least two different scenarios in analysis. For MPDC's Climate Risk Assessment **SSP2-4.5**, a moderate emissions and warming scenario, and **SSP3-7.0**, a higher emissions and warming scenario were used.

c) Future impacts – local climate projections

Based on the climate scenarios selected, climate projections for a number of climate variables have been obtained. These projections are specific to Matamata-Piako district, and have been drawn from the downscaled national climate projections developed by Earth Sciences New Zealand, updated in mid-2024.

A summary of the climate projections for the district under these scenarios is provided in the tables below.

(i) Projections for Matamata-Piako related to Rainfall, Extreme Rainfall / Flooding, Wind

Climate hazard	Measure	Present day Baseline 1995 - 2014	Mid-century (2050)		End of century (2100)	
			SSP2 - 4.5	SSP3 - 7.0	SSP2 - 4.5	SSP3 - 7.0
Rainfall	Annual rainfall	1235 mm total rainfall per year on average	1363 mm total rainfall per year on average	1229 mm total rainfall per year on average	1329 mmtotal rainfall per year on average	1161 mm total rainfall per year on average
Extreme rainfall / flooding	Extreme weather events (100-year, 24-hour event) From site ID B75871 (Matamata, HIRDS)	206mm total rainfall for a 100 year, 24 hour rainfall event	6% increase (219mm for a 100 year, 24 hour rainfall event)	7% increase (221mm for a 100 year, 24 hour rainfall event)	10% increase (227mm for a 100 year, 24 hour rainfall event)	21% (251mm for a 100 year, 24 hour rainfall event)
Wind	Wd99pVAL – Strong Wind Value (99th percentile) – absolute values in km/h	51	50	61	51	50

(ii) Projections for Matamata-Piako related to Temperature, Drought, Wildfire

Climate hazard	Measure	Present day Baseline 1995-2014	Mid-century (2050)		End of century 2100)	
			SSP2 -4.5	SSP3 -7.0	SSP2 - 4.5	SSP3 - 7.0
Average temperatures	Annual average temperature	14°C	15.3°C	15.7°C	16.2°C	17.3°C
Extreme temperature	Annual hot days (>25°C)	30 days	61 days	70 days	87 days	115 days
Extreme temperature	Annual hot days (>30°C)	0.5 day	2.5 days	3 days	5.5 days	17 days

Climate hazard	Measure	Present day Baseline 1995-2014	Mid-century (2050)		End of century 2100)	
			SSP2 -4.5	SSP3 -7.0	SSP2 - 4.5	SSP3 - 7.0
Extreme temperature	Annual frost days (<0°C)	6 to 45 frost days on average per year	3 to12 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
Drought	Annual potential evapo-transpiration deficit (PED)	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 +21mm 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
Wildfire	Increased fire weather (very high and extreme fire danger days)	*no projection data 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.				

The climate scenarios, and the climate projections described above were used throughout the risk identification and risk rating process to inform judgements about the likely future impacts from climate-related natural hazards.

2. Rating the risks

After the risk identification workshop, the second step in the process brought together staff within each activity area to work their way through refining and analysing each of the identified risks, and adding in any other risks that emerged through the discussion.

The analysis followed the process outlined in the diagram below. Each of these steps is described in more detail on the following pages.

a) Exposure

Exposure was rated in the present day using the matrix below.

Exposure (can use either A or B)			
A) Qualitative definition for an event impacting on a single element or group.		**B)** Quantitative definition for an event impacting on a wide number of elements, where geospatial data exists.	
Exposure rating (A)	Definition	Exposure rating (B)	Definition
Very High	Has happened several times in the past year and in each of the previous 5 years or May occur several times per year in the future	Very High	Significant and widespread exposure of elements to the hazard. **Option 1:** >50% of sector or element is exposed to the hazard in a 1% event **Option 2:** >25% of the of sector or element is exposed to the hazard in a 1 in 10 year event **Option 3:** >10% of network is exposed annually
High	Has happened at least once in the past year and in each of the previous 5 years or May arise about once per year in the future	High	High exposure of elements to the hazard. **Option 1:** 25-50% of sector or element is exposed to the hazard in a 1% event **Option 2:** 10-25% of the of sector or element is exposed to the hazard in a 1 in 10 year event **Option 3:** 0-5% of network is exposed annually
Moderate	Has happened during the past 5 years but not in every year or May arise once in 25 years in the future	Moderate	Moderate exposure of elements to the hazard. **Option 1:** 10-25% of sector or element is exposed to the hazard in a 1% event **Option 2:** 5-10% of the of sector or element is exposed to the hazard in a 1 in 10 year event
Low	May have occurred once in the last 5 years or May arise once in 25 to 50 years in the future	Low	Low exposure of elements to the hazard. **Option 1:** 5-10% of sector or element is exposed to the hazard in a 1% event **Option 2:** 0-5% of the of sector or element is exposed to the hazard in a 1 in 10 year event
Very Low	Has not occurred in the past 5 years or Unlikely during the next 50 years in the future	Very Low	Isolated elements are exposed to the hazard. **Option 1:** 0-5% of sector or element is exposed to the hazard in a 1% event

In the majority of cases, the definition descriptions on the left (Exposure rating A), were used. In some cases, where the GIS analysis provided quantitative information, the definition descriptions on the left were used (Exposure rating B).

Once present day exposure was rated, and the reason for the rating recorded, the exposure into the mid and end of century, under the two climate scenarios was extrapolated out. This was informed by the climate projections outlined above.

b) Sensitivity

The next step was to characterise the sensitivity of the asset in question. The matrix below was used.

Sensitivity	
Sensitivity relates to how the element will fare when exposed to a hazard, which is a function of its properties or characteristics. Sensitivity can be influenced by age, condition, material, design etc.	
Sensitivity rating	Definition
Extreme	Extremely likely to be adversely affected, because the element or asset is extremely sensitive to a given hazard.
High	Highly likely to be adversely affected, because the element or asset is highly sensitive to a given hazard.
Moderate	Moderately likely to be adversely affected, because the element is moderately sensitive to a given hazard.
Low	Low likelihood of being adversely affected, because the element has low sensitivity to a given hazard.
Very Low	Very low likelihood of being adversely affected, because the element has low sensitivity to a given hazard.

c) Consequence

Thirdly, the consequence to Council if the risk did occur was assessed. MPDC's draft organisational consequence table was used, see below. Please note, these tables are still draft, and are intended to be incorporated into Council's Risk Management Framework when that is adopted.

For the risk assessment, a primary consequence criteria was selected and the level of consequence rated against that. Other criteria were then also assessed, as relevant, noting that the criteria with the highest assessed consequence was used for the rating.

	CONSEQUENCE	LOW	MODERATE	HIGH	VERY HIGH	EXTREME
1	Operational performance and capability	No impact on level of services delivered (quality or quantity). Negligible performance impact.	Moderate impact on level of services. Relatively minor diminishment in quality of delivery or operation of core service or activity.	More noticeable impact on the delivery or quality of services. Workarounds required to maintain operation of core service or activity.	Considerable impact on the delivery or quality of services. Service levels have changed. Core service or activity only partially functional. Impedes or significantly delays achievement of key strategic objective, significant workarounds and impact to Business as Usual (BAU).	Major impact on the delivery or quality of service or operation. Sustained inability to deliver core service or activity. Non-achievement of key strategic objective/s.
2	Damage or loss to property and assets	Minimal damage or loss, easily addressed with no real disruption to service and with minimal cost impact.	Damage or loss that disrupts service for a short time, but with only relatively moderate consequence and work-arounds that are relatively easy to put in place.	Loss of facility or asset use for a lengthier time period requiring significant and potentially costly alternatives to be put in place, and considerable disruption to service delivery.	Loss of major facility or asset for extended period, resulting in major cost and disruption to service delivery, including potentially the inability to deliver normal services for an extended period of time.	Catastrophic and permanent loss of a building or other significant asset resulting in complete disruption to service delivery for a lengthy period and/or major irrecoverable costs.
3	Financial	Total financial impact of less than $100k OPEX/Revenue; or $500k CAPEX.	Total financial impact of $100k-$250k OPEX/Revenue; or $500k-$1m CAPEX. Impact contained to individual activities and short term impact to operations.	Total financial impact $250k-$750k OPEX/Revenue; or $1m-$2m CAPEX. Impact across multiple activities and wider effect on operations and performance.	Total financial impact $750k-$2M OPEX/Revenue; or $2m-$4m CAPEX. Cost management measures required across all activities. Impact across 1-3yr operational and capital programmes.	Total financial impact >$2M OPEX/Revenue; or > $4m CAPEX. Impact on long term plan. Extraordinary financial measures required to correct situation.
4	Legal and regulatory compliance	Minor non-compliance able to be remedied without penalty or notification.	Non-compliance resulting in minor penalty or other relatively minor imposed action.	Non-compliance resulting in need for mandatory reporting of the breach and potential impact on Council's reputation or brand.	Non-compliance resulting in formal sanction or prosecution by regulator with significant impact on Council's reputation or brand.	Major compliance breach, or multiple breaches, that result in major prosecution with application of maximum penalty or severe sanction by regulator. Serious and sustained damage to Council's reputation or brand.
5	Contractual responsibilities and relationships with suppliers	Minor contractual breach resulting in minor costs to rectify and no material impact on ongoing relationship between contracting parties.	Potential for dispute requiring mediation or other forms of outside assistance to rectify, and requirement for small level of compensation. Some damage to contracting parties relationship.	Material breach of contractual obligation, resulting in potential litigation or requirement for significant financial settlement, and putting stress in the contracting parties' relationship. If the breach is of a regulatory	Requirement for litigation to settle matters. Relationship between contracting parties becomes adversarial.	Major or multiple litigation actions required. Relationship between contracting parties is severely damaged.

	CONSEQUENCE	LOW	MODERATE	HIGH	VERY HIGH	EXTREME
				nature this may lead to action by the regulator.		
6	Information technology, information management and security	Isolated breach or failure, easily restored with no loss of information or ongoing consequence beyond a few days.	Compromise of access or other means of information security resulting in concern over confidentiality, integrity and/or potential loss of information.	Obvious exploitation of security flaws with evident compromise of confidentiality and integrity of information, and/or loss of information.	Major compromise of systems, confidentiality and integrity of information, and/or a major loss of information. Loss of core system for a period impacting service delivery and requiring significant people time or cost to restore. Evident impact on reputation and brand.	Catastrophic loss of information and operating ability for an extended period, severely impacting service delivery, and requiring huge resources in either people time or cost to restore. Severe and sustained impact on reputation and brand.
7	People – health, safety and well-being	Would cause minor illness, injuries or well-being concerns that are generally able to be treated on-site with no long-term effects or days lost.	Would cause minor illness, injuries or well-being concerns that may require medical attention but with no long-term effects and no more than 3 days of time lost.	Requires hospital treatment and/or more than 10 days of recovery but with no long-term effects.	Long-term illness, permanent disability, multiple serious injuries or well-being concerns as a result of workplace harm. Reportable events.	Fatality/ies, multiple ill health, permanent disability, serious injury or well-being concerns due to workplace harm. Investigations find Council culpable for significant PCBU failings.
9	Community trust and perception	Minimal impact on the regard in which Council is held by its community, and/or on Council's interactions and engagement with the community. Community perception levels as measured by regular externally commissioned survey are not impacted.	Minor impact on the regard in which Council is held by its community, and/or on Council's interactions and engagement with the community. Some reduction in community perception levels as measured by regular externally commissioned survey.	Significant impact on the regard in which Council is held by its community, and/or on Council's interactions and engagement with the community. Evident reduction in community perception levels as measured by regular externally commissioned survey.	Major impact on community trust and confidence. Clearly evident in compromised interactions and engagement with the community. Major reduction in community perception levels as measured by regular externally commissioned survey.	Severe impact on community trust and confidence. Evident in the community's lack of engagement with Council and in Council processes. Also evident in public criticism of Council and/or clear opposition to Council proposals in consultative processes. Severe impact on community perception levels as measured by

	CONSEQUENCE	LOW	MODERATE	HIGH	VERY HIGH	EXTREME
						regular externally commissioned survey.
10	Relationship with mana whenua	Minimal impact on relationships with mana whenua.	Minor impact on relationships, engagement becomes more difficult.	Significant impact on relationships, engagement difficult, partnership on projects challenging.	Major impact on relationships. Trust and partnership interactions badly jeopardised.	Severe impact on relationship. Complete breakdown in trust, partnership focus lost.
11	Environmental well-being	Little or no impact on the environment.	Minor or short-term and restorable impact on the environment.	Significant environmental damage of localised importance and longer-term impact with possible regulatory intervention.	Serious environmental damage of regional importance and longer-term impact with possible regulatory intervention.	Permanent environmental damage requiring on-going remediation and monitoring with regulatory involvement.
12	Climate change resilience	Little or no impact on climate adaptation plans.	Impact on climate adaptation plans in a very localised context or in the short-term, able to be addressed in time with reworked plans.	Serious or longer-term impact on climate change adaptation plans with significant implications to address.	Major impact on climate change adaptation plans with those impacts compromising service levels, potentially resulting in community vulnerability and a risk of major financial and reputational damage.	Extensive or catastrophic impact on climate change adaptation plans resulting in severely reduced service levels, community vulnerability and severe financial and reputational damage.

d) Initial Risk Rating

Taken together, exposure + sensitivity + consequence provided an initial risk rating for the present day, mid-term and long-term, under both climate scenarios. Providing this initial risk before adaptive capacity is assessed allows Council to understand the inherent risk prior to considering the adaptive capacity.

e) Adaptive capacity

The last element included in the risk rating process is the adaptive capacity. Where implementable/ affordable actions were identified, a rating of medium or high would be given. Where it was assessed that there were not many options to adapt to the risk, and/or where these actions would be prohibitively expensive, a rating of low or very low would be given. A high adaptive capacity rating results in a lower overall revised risk.

Adaptive capacity	
Relates to how easily/efficiently an at-risk element can adapt (autonomously) or be adapted (planned) when exposed to a climate hazard. Again, this is a function of an at-risk element's properties or characteristics. Adaptive capacity can be influenced by ease or cost of repair, level of redundancy / back up etc.	
Adaptive capacity rating	Definition
Very Low	The organisation, element or asset has a very low capacity to adapt.
Low	The organisation, element or asset has a low capacity to adapt.
Medium	The organisation, element or asset has a moderate capacity to adapt.
High	The organisation, element or asset has a high capacity to adapt
Very High	The organisation, element or asset has a very high capacity to adapt

6.2 GIS Flood Hazard Exposure Analysis

The aim of this part of the assessment was to build an understanding of the extent to which Council assets are exposed to flooding under current and future rainfall events, taking a changing climate into account. It is an exposure analysis rather than a risk analysis as it looks only at whether an asset is exposed to flooding, and does not take into account the sensitivity, consequence or adaptive capacity of the asset.

The analysis used asset data from MPDC's GIS system and the following flood models:

1. MPDC's draft flood model for our urban area catchments (Matamata, Morrinsville, Te Aroha, and Waharoa). Noting that the model is draft, has not been calibrated or validated, but is the best available information.

2. Waikato Regional Council's draft regional flood model for assets that fell outside the MPDC model. Noting the model represents a work-in-progress version of the outputs.

Losses, pump stations, and culverts are not yet included. Depths below 0.2 m have been excluded. The model has not yet been calibrated or validated.

For the areas covered by the MPDC flood model, the flood exposure was assessed under the following rainfall scenarios:

Present Day	End of century factoring in a changing climate
2 year ARI(all)	
10 year ARI (all)	10 year ARI (all)
50 year ARI (Te Aroha, Waharoa)	
100 year ARI (Matamata, Morrinsville)	100 year ARI (all)

The flooding depth bands that were used were:

Flooding Depth
Not exposed to flooding
Exposed to flooding of up to half a metre in depth
Exposed to flooding of between half a metre and one metre in depth
Exposed to flooding of greater than 1 metre in depth

These models were based on an RCP6 climate scenario, which is a moderately high emissions scenario.

For the areas assessed against the Waikato Regional Model, there was just one, present day scenario available. Flood depth bands were ‘not exposed’, and ‘greater than 20cm’.

Outputs are in the form of pivot tables, so that data can be easily interrogated depending on requirements.

Part 7 - Next Steps

The results of the Climate Risk Assessment support Council’s long term resilience by:

- Identifying key climate-related risks across Council’s activities and operations
- Identifying areas where there is high potential adaptive capacity over time, and areas where the options to adapt may be more limited
- Providing quantitative and qualitative hazard exposure and risk information that can inform infrastructure and strategic planning
- Demonstrating to audit our management of climate risk
- Valuing the expertise of staff, and continuing to grow awareness and understanding amongst staff, thus keeping climate impacts ‘front of mind’

- Providing a base of climate risk knowledge on which we can continue to build.

Key next steps involve:

Step One

Making best use of the information in the Climate Risk Assessment:

- Integrating the results into our Activity Management Plans and other planning processes.
- Integrating the GIS analysis with our asset database, and developing ways to display it visually.
- Using the results to inform strategic documents such as our draft Climate Resilience Strategy, and Growth Strategy.

Step Two

Building on the information gathered, by setting up a project group to drive further work including:

- Further analysis and refining of the GIS analysis.
- Keeping the risk workbook as a 'live' document, by setting up processes for regularly reviewing and updating the risks, risk ratings and adaptation options.
- Prioritising and filling identified data and knowledge gaps.

Step Three

Strengthening our management and mitigation of climate risk by:

- Combining the GIS analysis with other metrics such as asset condition, criticality, and community vulnerability to give us a deeper understanding of risk to support decision-making.
- Exploring adaptation options / pathways / thresholds for the highly rated risks, and implications for planning, operations and funding over time.