Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

All One Sky FOUNDATION

Report

January 2024

TOWN OF ATHABASCA

Climate Change Risk and Vulnerability Assessment Adaptation Planning

EXECUTIVE SUMMARY

Project Overview and Approach

The Town of Athabasca (the Town) engaged Associated Engineering and All One Sky Foundation to develop an understanding of climate vulnerabilities and risks to Town owned infrastructure and assets. The Town is conducting this work with funding from the Municipal Climate Change Action Centre (MCCAC) Climate Resilience Capacity Building Program.

A series of risk identification and assessment workshops were conducted with the Town using the Public Infrastructure Engineering Vulnerability Committee (PIEVC) High Level Screening Guide (HLSG) Process. PIEVC is currently administered by the PIEVC Program Alliance consisting of Institute for Catastrophic Loss Reduction, the Climate Risk Institute, and Deutsche Gesellschaft fur Internationale Zusammernarbeit. The assessment was conducted on the following assets and areas:

- Water
- Wastewater
- Stormwater
- Solid Waste
- Facilities
- Roads
- Parks
- Fleet

The purpose of this assessment is to conduct a climate-based risk analysis for the Town's infrastructure and to summarize the highest-priority climate risks. In addition, the assessment also identified facilities that would benefit from additional assessment efforts.

The project scope can be illustrated in **Figure E-1** showing the scope of the climate risk assessment conducted on the following:

- Built environment with consideration of municipal infrastructure and building assets, as well as the level of service that these assets provide.
- Community-wide social, health, and local economy.

This encompassing evaluation allowed the assessment to recognize the dependencies between people and the services that the assets provide.

Figure E-1 Climate Risk Assessment on Community-Wide Asset and Services

The **PIEVC High Level Screening process** was used to assess the municipal assets and services. The assessment considered:

- **Direct physical damages/impacts to assets** – stormwater, water, wastewater, solid waste, roads, fleet, equipment, buildings/recreation facilities, playparks, sports field.
- **Direct services losses**, such as a flooded roadway that is impassable or outdoor facilities being closed because of smoke or heat.
- **Indirect effects of those direct impacts** –impact to the employees' ability do the work.

The **community-wide climate risk assessment** considered all potential climate related impacts affecting the Town, including the natural environment, non-municipal assets and services, the economy, and the health and wellbeing of people in the community. This scope does not include detailed of each components listed, but a qualitative discussion.

Climate Hazards Impacts

Based on the climate model projection data for the Athabasca area, some climate hazards are showing an increasing trend into the future. **The largest shifts are for extreme heat (days above +30°C), number of cooling days, frost-free seasons, annual precipitation.** These climate hazards have likelihood scores increasing from 3 to 5. The climate changes to **lightning, hail storm, wildfire, drought, and high winds**, although not specifically quantifiable, the projections are suggesting that more frequent and long periods will be observed.

On the contrary, some climate events have a decreasing trend that may be beneficial to the Town. These climate events are **low temperature days (days below -30°C), and number of freeze-thaw events**. Precipitation with **extreme rainfall events and persistent rainfall** are increasing, but the climate model is not showing a high increase.

Results

Specific to the built infrastructure, the results for each infrastructure components aimed to answer the following **two key questions**:

1. **Which climate hazards have the highest impacts on the infrastructure?**
2. **Which infrastructure components are the most vulnerable?**

The two key questions illustrate which climate hazards may impact the asset the most and where efforts should be allocated. It is also important to note that other individual asset components of high risk scores that not necessarily listed under the risks are also noteworthy and should be reviewed as part of the Town asset management plan. The **five highest risk climate hazards in mid to far future (2050 and 2080)** are shown in **Table E-4.**

Table E-4 Five Highest Risk by Climate Hazards to Town Owned and Operated Assets

Rank	Climate Hazard		Impacts
1		Wildfire Smoke	• Reduced visibility • Increase maintenance of equipment filtration system • Increase emergency services attending to health issues • Health impacts on employees working outdoors
2		High Winds	• Damage to buildings, trees, signs • Tree fall/branches blocking roadways • Increase flying debris at landfills
3		River Flooding	• Flooding of water stormwater systems, including storm ponds, catch basins, and drainage ditches • Flooded buildings and basements • Disruption to transportation network
4		Hail Storm	• Damage to facility roofs • Damage to trees • Blocked catch basins
5		Hottest Days (Above 30°C)	• Increase use of energy to cooling buildings • Asphalt surface deterioration • Equipment running hot result in potential damage • Health impact on employees working outdoor • Fires at landfills (trigger by waste types) • Impact on raw water quality and treatment

The infrastructure systems most impacted by the climate hazards are Solid Waste Management, Water, Roads, and Wastewater. The remaining assets have risks associated with them, and although do not have high risk scores, attention should also need to be paid to ensure level of service is met.

Table E-5 Risk Scores of Infrastructure Systems

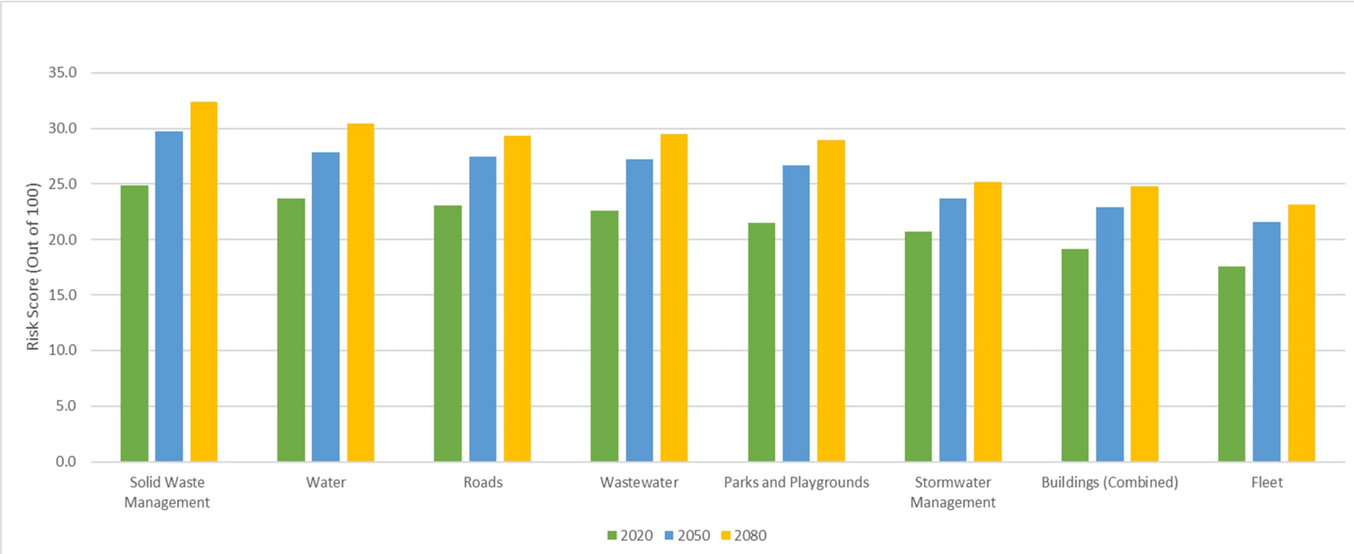

Table E-6 below shows highest rated (top three) climate hazards impacting the community, as determined through the community-wide risk assessment. The impacts noted are mainly affecting the health and wellbeing of the community.

Table E-6 Community-Wide Highest Risk Results

Rank	Climate Hazard		Impacts
1		Prolonged Drought	• Lower river flows leading to potential water supply shortage and impacts to water-reliant businesses (pulp mill, agriculture, car washes, golf course, etc.) and the local and regional economy (bulk water station use).
2		Wildfire Smoke	• Health impacts (injuries/fatalities) and potential hospitalization, particularly on vulnerable populations (seniors, low income, homeless).
3		Extended Heat Wave	• Health impacts, and potential fatalities, particularly on vulnerable populations such as seniors and those with low income and/or housing challenged. Impacts exacerbated by lack of medical staff, refuge areas (cooling centre), and space cooling in buildings that house more vulnerable individuals.

Adaptation Planning

The Community Climate Adaptation Planning Guide developed by All One Sky Foundation was used in guiding the discussion. The recommended options for adaptation actions were listed in the following:

1. **No Action** – no additional actions required; business as usual.
2. **Conduct Research, Studies, or Assessments** to obtain further information on the nature of the risk to better inform the decision-making process.
3. **Update Policies, Plans, Standards, Guidelines, or Bylaws** that considered climate risks and opportunities.
4. **Modify Operations and/or Maintenance Schedules, and Activities** that considered climate impacts.
5. **Build New or Upgrade Existing Infrastructure** to provide protection against climate risks.
6. **Increase Awareness and Education** to help community better understand risks and adaptation actions.
7. **Incorporate Emergency Management** such as response and evacuation planning, hazard mapping, and early warning, or alert systems.
8. **Consider Human Resourcing** options and evaluate the need for additional staff time allocated to climate adaptation planning, implementation, and establishing task force.

Associated Engineering facilitated the discussions, which identified the adaptation actions for each asset. These actions were examined for the medium to high risk climate impacts. The discussions highlighted the following:

- Recommended adaptation actions
- Time frame of implementation
- Climate hazards scores (medium to high risk)

Recommendations

The risk assessments and adaptation actions provided an overview of the risk and vulnerabilities of the built infrastructure and the socio-economic aspects for the Town. The following are recommendations for consideration as **Next Steps**:

1. **Prioritize Actions. Figure E-5** shows the critical infrastructure that has high climate impacts are Solid Waste, Water, Roads, and Wastewater. Priority consideration should be given to these assets to ensure level of service to the community is maintained. A list of recommended actions has been provided for the Town in Section 6 to consider and implement. Starting with low costs actions, these can be implemented with planned policy or bylaw updates. Other considerations include mainstreamed into the infrastructure renewal or upgrades, community planning, and development projects.
2. **Cross-Cutting Discussion and Information Sharing.** The Town is encouraged to share this information with other relevant departments and inform asset managers for future planning. Furthermore, the cross-departmental discussion can help to identify, assess, and address common problematic areas to protect assets.

Table ES-8 Potential Cross-Cutting Adaptation Actions Applicable to All Departments/Corporations

All Departments/Corporation
Increase public engagement and community awareness of climate change impacts and adaptations through public open houses, schools, and other discussion forums.
Increase cross-departmental collaboration and information sharing to improve management of climate change risks and opportunities.
Increase education and public awareness of the health and safety impacts of climate change.
Create and disseminate climate related risk maps across Town's departments, and to residents, businesses, and other organizations to support more resilient development and planning.
Employ an adaptive management approach to climate adaptation planning.
Increase staff training on climate change impacts and adaptations across all departments.
Increase the resilience of Town's buildings, where applicable (for frequent use only), to climate hazards and extreme weather, including zoning, planning, and permitting.
Promote sharing of Town's maps and emergency information to improve emergency response.
Promote the use of renewable energy sources in homes and buildings.
Avoid flood prone areas through zoning, planning, and development restrictions.
Identify funding opportunities for green infrastructure and buildings to increase resilience.

3. **Monitor, Assess, and Update Risk Scores and Adaptation Actions.** The Town is encouraged to identify performance or tolerance threshold (e.g., temperature, precipitation) of the asset so that it provides a baseline for monitoring. As the Town improves or makes modifications to reduce the risks and vulnerabilities to the assets, the adaptation plans can be updated. This encourages improvements and furthering the reduction and removal of risks.
4. **Continual Review of Climate Data.** The Town, overtime, should also monitor the ongoing evolution of climate projections. This will allow the Town to update the risk score and evaluate its vulnerabilities and exposure based on current and science-based information. Adaptation actions will be adjusted accordingly while staying flexible and adaptable to the potential market fluctuations.

ACKNOWLEDGEMENTS

We would like to acknowledge the following stakeholders who supported and participated in the workshops, and provided valuable feedback in this project:

Town of Athabasca

- Rachel Ramey
- Graeme Douglas
- Terry Kosinski
- Jeff Dalley

Family and Community Support Services

- Courtney Lantz
- Nadine Wiselka
- Debbie Wood

Aspen Regional Water Service Commission

- Jamie Giberson

Athabasca Regional Waste Management Services Commissions

- Robert Smith

This report was developed with the input and hard work of the listed stakeholders and we appreciate the time, effort, and knowledge contributed to this assessment to help build resilience in community.

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1 INTRODUCTION

1.1 Project Background

The Town of Athabasca (the Town) engaged Associated Engineering to develop an understanding of the climate vulnerabilities and risk for the Town's municipal infrastructure. The results of this risk assessment will guide future adaptation action planning to reduce the impacts of climate change. The Town is conducting this work with funding from Municipal Climate Change Action Centre (MCCAC) Climate Resilience Capacity Building Program.

Municipal Climate Change Action Centre

A series of risk identification and assessment workshops was conducted with the Town using the Public Infrastructure Engineering Vulnerability Committee (PIEVC) High Level Screening Guide Process. PIEVC is currently administered by the PIEVC Program Alliance consisting of Institute for Catastrophic Loss Reduction, the Climate Risk Institute, and Deutsche Gesellschaft fur Internationale Zusammernarbeit. The assessment was conducted on the following assets and areas owned by the Town:

- Water
- Wastewater
- Stormwater
- Solid Waste
- Facilities
- Roads
- Parks
- Fleet

In addition, the risk assessments also captured discussions on impacts to municipal operations staff, public users, and the impacts to service delivery.

1.2 Purpose

The purpose of this assessment is to conduct a climate-based risk analysis for the Town's infrastructure and to summarize the highest-priority climate risks. In addition, the assessment also identified facilities that would benefit from additional assessment efforts. The assessment was conducted on Town owned infrastructure and assets. To provide a robust assessment, Family and Community Support Services (FCSS) staff, the Aspen Regional Water Services Commission and the Athabasca Regional Waste Management Services Commissions were invited to participate in this assessment. The two Commissions are key service providers to the Town of Athabasca.

The results of this study will assist the Town in integrating climate risks discussion and adaptation measures into capital upgrades, maintenance, future land use planning, engineering design standards, operational practices, infrastructure assessment, and human resource programming. The assessment included:

- Analysis of climate hazards relevant to the Town considering historic values and future climate projections.
- A high level climate risk assessment of the Town's assets.
- High level community-wide risk assessment relevant to the wellbeing, and economic health of the community.
- Development of a list of high level adaptation measures to address the highest risks facing the infrastructure.

1.3 Project Scope

The project scope can be illustrated in **Figure 1-1** showing the scope of the climate risk assessment conducted on the following:

- Built environment with consideration of municipal infrastructure and building assets, as well as the level of service that these assets provide.
- Community-wide social, health, and local economy.

This encompassing evaluation allowed the assessment to recognize the dependencies between people and the services that the assets provide.

Figure 1-1 Climate Risk Assessment on Community-Wide Asset and Services

The **PIEVC High Level Screening Guide Process**, lead by Associated Engineering, was used to assess the municipal assets and services. The assessment considered:

- **Direct** physical damages/impacts to assets – stormwater, water, wastewater, solid waste, roads, fleet, equipment, buildings/recreation facilities, playparks, sports field.
- **Direct** services losses, such as a flooded roadway that is impassable or an outdoor facility being closed because of smoke or heat.
- **Indirect** effects of those direct impacts –impact to the employees' ability do the work.

The **community-wide climate risk assessment** was led by All One Sky Foundation and considered all potential climate related impacts affecting the Town. The assessment considered the natural environment, non-municipal assets and services, the economy, and the health and wellbeing of people in the community. The work follows best practices for municipal climate change risk assessment, namely the International Organization for Standardization (ISO) guideline 14092 – Climate adaptation planning for local governments and the **Climate Resilience Express – Community Climate Adaptation Planning Guide** developed by All One Sky Foundation, who will lead the work. The assessment considered:

- **Direct Impacts** to public safety (loss of life, morbidity, injury, disease, etc.), quality of life (recreation, lifestyle, evacuations, etc.), municipal finances, and the local economy.
- **Indirect Impacts** to public safety (loss of life, morbidity, injury, disease, etc.), quality of life (recreation, lifestyle, etc.), or the local economy, as a result of impacts and damage to property and infrastructure, and interruption of services.

The scope is limited to the following:

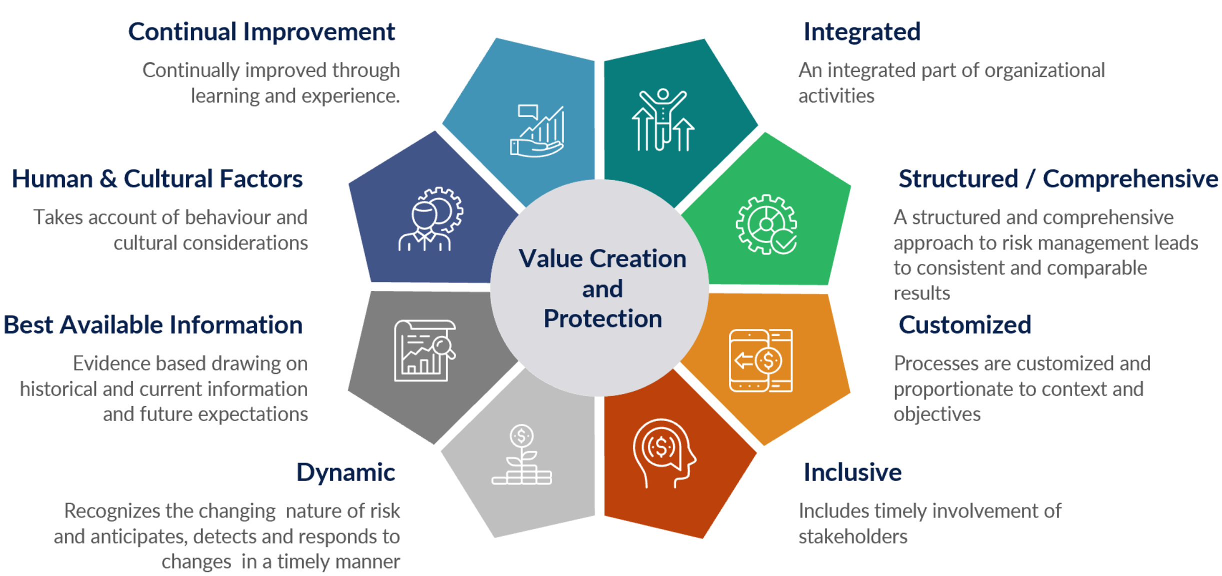
- Impacts within the geographic boundaries of the Town of Athabasca; however, solid waste services, and water treatment and distribution that provide services to the Town was included.
- Impacts on the Town of today. While considering climate projections out to the 2080's, changes were considered in terms of the Town today (in terms of development, land use patterns, and resource capacity). This allowed us to determine the climate adaptations that were necessary to implement now, to be resilient to climate changes anticipated in the future.
- Impacts that are worsening (becoming more frequent or severe) as a result of climate change.
- Climate change may also provide some benefits, in terms of increased opportunities for recreation or agriculture. These potential benefits were also excluded.
- Risk assessment of economic analysis and human wellbeing are based on qualitative discussions and knowledge of the project team as well as the participants from the Town.

Note that the risk assessment did not consider impacts outside the influence of the Town. For example, provincial policy or legislative changes, broad economic impacts, or impacts related to demographic or population changes that might affect the workforce.

1.4 Risk Assessment Process

The risk assessment process that this project adopted was based on the ISO 31000's principles of risk management. The principles followed a systematic cycle of actions to create and protect the value of the community. **Figure 1-2** illustrates the process starting from integration of organizational activities that requires the collaboration of all departments, using a structured approach to assess risk that was customized for the appropriate context. The discussion was also inclusive and dynamic, drawing from evidence-based information. Finally, the risk management process identified a continual improvement through leaning and experience.

Figure 1-2 Principals of Risk Management (ISO 31000)



Another ISO guideline that was consulted is ISO 14092. Our approach to the climate risk assessment employed a 'best practice' methodology, which was based on the "*Climate Resilience Express – Community Climate Adaptation Planning Guide*" (https://mccac.ca/app/uploads/CRE_Planning-Guide_Final.pdf), which was developed by All One Sky Foundation for the Municipal Climate Change Action Centre and the Climate Resilience Capacity Building Program. Our work is also aligned with the recently published International Standards Organization (ISO) guideline 14092: Adaptation to Climate Change—Requirements and guidance on adaptation planning for local governments and communities, and with the Intergovernmental Panel on Climate Change's (IPCC) latest conceptualization of climate risk assessment methods.

1.5 Definitions

In the PIEVC guidance, **Risk** is defined as the product of the likelihood of the "impact" and the consequence of the "impact" on the system. The "impact" in this discussion referred to the climate change impacts or climate hazards.

Vulnerability is defined as how the system fares against the climate hazards when exposed. It can also be viewed as the ability of the system to absorb the inundation of the climate hazards. In other words, vulnerability is the inability of a system to cope with the adverse effects of climate change and the climate variability. The sensitivity of the system when exposed to the climate change is often evaluated based on level of use, service life/age, maintenance/operations costs, and replacement costs. Adaptive capacity is assessed based on the cost and time required for the system to resume to its original service.

In this report, vulnerability was not assessed in detail for all services, but was assessed qualitatively within the consequence scoring. During consequence scoring, which took place in a series of workshops, Town of Athabasca staff, and the Commissions were asked how their infrastructure systems would behave when exposed to the various climate hazards at their current conditions. Their qualitative assessment was based on their engineering/technical experience and their understanding of their assets/infrastructure. This **qualitative vulnerability** discussion, coupled with the risk assessment, provides an overall understanding of the current status of the Town's infrastructure. This initial assessment of risk will allow the Town to formulate a more focused and detailed risk and vulnerability assessment for the components of each infrastructure system.
The **adaptation** measures identified in this report will provide the Town will potential activities to consider, plan, and implement. The international standard for risk management, ISO 31000 shows the progression from Risk assessment to treatment that will require monitoring, review, consultation, and communication (**Figure 1-3**).
In this project, risks to service lines and buildings were identified, setting the stage for the development of risk reduction and risk treatment measures. Beyond this project, the Town can identify site-specific risk reduction strategies and activities.

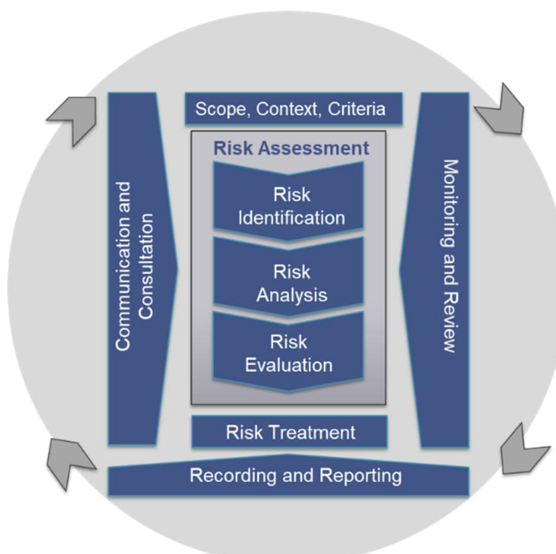


Figure 1-3 ISO 31000 Risk Management Process (High Level Screening)

2 CLIMATE PROJECTIONS

2.1 Climate Data

The Government of Canada has several data sources where historical climate data and future climate projections can be obtained. The PIEVC High Level Screen Guide (HLSG) indicates that although climate data is now available in higher spatial and temporal resolution, there are some climate parameters and geographic areas that are more difficult to obtain. Where possible, proxy datasets and modelled data was used to cover the gaps. Some complex parameters including extreme wind, complex precipitation events like hail, snowfall, and lightning do not have quantitative modelled data for evaluation, but they are based on accumulative of research indicating the likelihood of increasing or decreasing trend. For this assessment, the Climate Atlas of Canada and Climate Data Canada were used to obtain data and projections. The climate parameters, projections, and sources are listed in **Appendix A**.

2.2 Timescale and Parameters

For this project, the time horizons for assessment were chosen to align with the design life/expected lifecycle of the infrastructure, or period of time before a planned retrofit or reassessment of climate impacts. This assessment considered the following climate periods:

- 2020s (2011 – 2030)
- 2050s (2041 – 2070)
- 2080s (2071 – 2100)

Parameters were selected based on potential ongoing and future impacts to the physical infrastructure, as well as impacts to operation and maintenance. In all cases, the Representative Concentration Pathway 8.5 (RCP8.5, i.e., upper-end, most emissions) scenario was chosen to reflect a worse-case scenario for the infrastructure. Climate parameters investigated in this assessment are noted in **Table 2-1** below. For the risk assessment, not all the climate parameters apply to the infrastructure evaluated. We have used the 19 most relevant climate parameters to municipal infrastructure and services. These parameters are noted in bold font in **Table 2-1**.

Table 2-1 Climate Parameters

Climate Parameters	Climate Sub-Parameters
Temperature	• Mean annual temperature (◦C) • Mean Summer Temperature (◦C) • Number of Days Above +30◦C • Number of heatwaves • Hottest Day • Cooling Degree Days (days above 18◦C) • Mean Winter Temperatures • Number of Days below -30◦C • Mild Winter Days below -5◦C • Frost-free Season (days) • Freeze/Thaw Events
Precipitation	• Annual Total Precipitation • Number of days >10 mm • Wet Days > 20mm • Maximum 1-day Total Precipitation • Maximum 5-day Consecutive Precipitation • Short Duration 1:100-year Rainfall (mm/hr) – Overland Flooding • Winter Precipitation (mm) • Hail Storm
River Flooding	• 24 hour 100-year Rainfall (mm/hr)
Drought	• Relative Change in Standardized Precipitation Evapotranspiration Index-based
Wildfire	• Change in Average Annual Forested Area Burned
Heavy Winds	• 1-in-50 Year Gust Pressures
Lightning	• Lightning
Shifting Ecosystem	• Changing seasons and ecosystem, insect, invasive plants, and disease

For all parameters, quantitative present and future values were determined from reputable and widely used national climate data sources, and peer-reviewed scientific literature. Datasets were sourced to be as relevant as possible to identified infrastructure vulnerabilities. Detailed climate data, projections for each climate parameter for each timeframe, and a brief description are included **Appendix A**.

3 RISK ASSESSMENT

3.1 Method

The project was conducted in the phases shown in Figure 3-1 below.

Figure 3-1 Project Overview

During the **Workshop 1A, PIEVC Orientation**, Associated Engineering provided a discussion of climate change principles and parameters, the PIEVC High Level Screen Guideline (HLSG) process, and an overview of the project. Following this, we provided a presentation template for Town staff to help understand the types and scale of assets for different service lines. Each group presented the information on the assets during **Workshop 1B**, **Tell Us About Your System**. The initial information was used to create asset lists and provide insights for **Workshop 2, Risk Assessment**. The last series of workshop, **Workshop 3, Adaptation Planning,** looked at how to reduce the risks with high level adaptation planning for infrastructure and vulnerable community members at medium to high risk.

The risk assessment workshops were conducted virtually using Mural Board to facilitate the discussions. The workshops occurred between May and September 2023:

Workshop 2 Series, Risk Assessment, consisted of the following sessions:

- **Workshop 2A:** Water, Wastewater, Stormwater
- **Workshop 2B:** Roads, Parks, Buildings, Solid Waste, Fleet
- **Workshop 2C:** Community-wide (social aspects and local economy)

Workshop 3 Series, Risk Reduction/Treatment (Adaptation), was conducted in the following sessions:

- **Workshop 3A**: Water, Wastewater, Stormwater
- **Workshop 3B**: Roads, Parks, Buildings, Solid Waste
- **Workshop 3C**: Community-wide (social aspects and local economy)

3.2 Risk Identification and Assessment

Risk is discussed in terms of likelihood and consequences. The likelihood is described as the hazards, events or conditions that could occur, and consequence as the result occurring in varying levels of negative or positive impacts or effects. In quantitative terms, risk is evaluated as the product of the likelihood and consequence.

In terms of climate risk, we begin to understand how the variability of climate patterns impact the built environment and environment, and in turn, how this impacts the society. For this project, the PIEVC HLSG process was used in assessing the built infrastructure and assets. The methods are discussed in the following sections.

3.3 Assets Identification

The Town owned and maintained assets that were assessed are:

- Water
- Wastewater
- Stormwater
- Waste
- Facilities
- Roads
- Parks

3.4 Climate Likelihood Scoring

The likelihood scoring in PIEVC High Level Screening was based on the climate projections. The climate parameter trends and projections were translated into likelihood scores (L), with increasing/decreasing values reflecting increasing/decreasing occurrence over the specified time horizon. Translation into likelihood scores normalized the various climate change trend measures into a common numerical ranking. For each climate parameter, an appropriate likelihood score was applied to determine the direction-of-change for potential impact. **Table 3-1** lists the method for determining climate likelihood scores. For the Town of Athabasca assessment, we have used the PIEVC Middle Baseline Approach for likelihood scoring.

Table 3-1 PIEVC Likelihood Scoring

Likelihood Score (L)	Middle Baseline Approach – Establish Base	Method
1		Likely to occur less frequently than current climate
2		
3	Establish Current Climate Baseline Per Parameter	Likely to occur as frequently as current climate
4		
5		Likely to occur more frequently than current climate

3.5 Consequence Scoring

The assessment was completed by evaluating the consequences of the interactions between each climate parameter and each piece of infrastructure or assets. The determination of consequence was guided by a consequence rubric shown in **Table 3-2**, which focus on the following general categories:

- Built assets including linear and vertical infrastructure,
- Health and Wellbeing,
- Economic/Fin, and
- Natural Environmental/Parks.

During the virtual workshop, each participant from the Town provided the consequence scoring (**Figure 3-2**) of the asset categories that were described in Workshop 1A.

Figure 3-2 Virtual Workshop Consequence Scoring

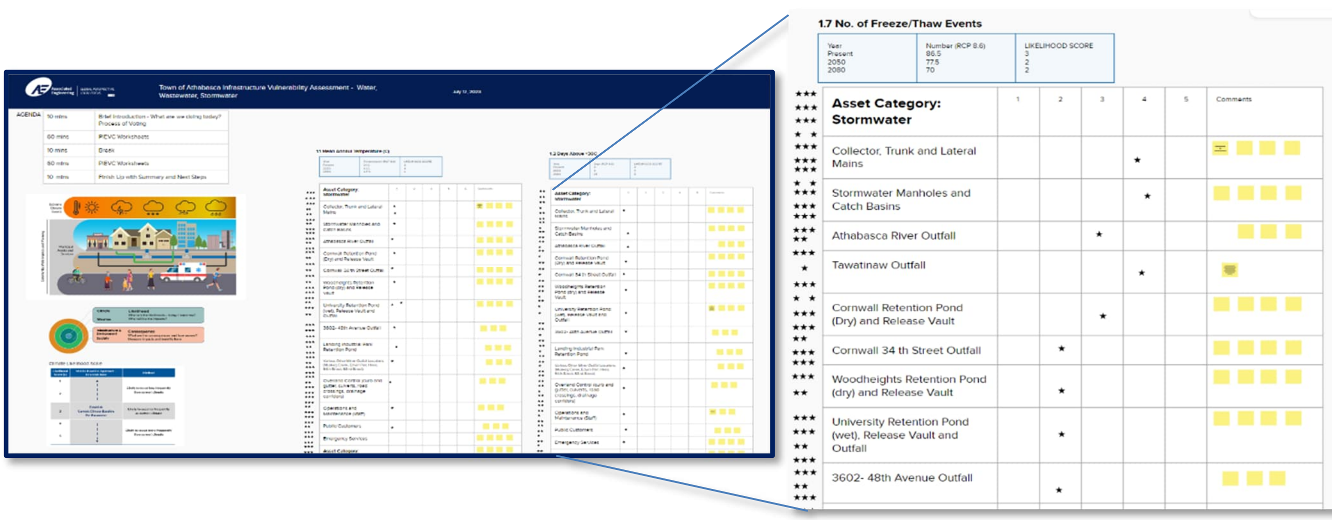


Table 3-2 Consequence Scale

Criteria	Very Low (1)	Low (2)	Moderate (3)	High (4)	Very High (5)
Built assets; above ground and underground Infrastructure; equipment (including vehicles). Green Infrastructure/Low Impact Development Elements are included.	• Minimal impacts or effects on the functionality of the system. • No replacements or repairs required. Systems can continue to function. • Minimal impacts or effects to the employees or to the public. • Return to services period is less than 1 month.		• Moderate impacts or effects on the functionality of the system. • Some replacements or repairs required. Systems can continue to function after the replacements or repairs are conducted. • Moderate impacts or effects to the employees or to the public. • Return to service period is less than 5 months.		• Significant impacts or effects on the functionality of the system. • Major replacements or repairs required. Systems may not continue to function after the replacements or repairs are conducted. Further re-engineering may be required. • Significant impacts or effects to the employees or to the public. • Return to service period is more than 10 months.
Health and Wellbeing	• Minimal health effects. • Insignificant impacts to quality of life and livability within the community. • Not likely to result in displacement of anyone. • Minimal health effects to the municipal workforce.		• Moderate health effects with some injuries or illnesses. • Moderate negative impacts to quality of life and livability within the community. • Potential for displacement of some people. • Moderate health effects to the municipal workforce.		• Significant and widespread health effects including fatalities, injuries, or illnesses. • Widespread and long-term negative impacts to quality of life and livability within the community. • Widespread community evacuations and displacement. • Long-term and significant health effects to the municipal workforce.
Economic/Financial	• No disruption of local businesses. • No job losses or reductions in productivity. • Very minimal financial cost to the municipality.		• Moderate and medium-term (days-weeks) disruption of some local businesses or economic sectors. • Some job losses and/or reduced productivity affecting some local businesses and economic sectors. • Moderate financial costs to the municipality, which is manageable within existing reserve funds.		• Significant long-term (months-years) disruption of many local businesses or economic sectors. • Widespread job losses and/or reduced productivity affecting most local businesses and economic sectors. • Significant financial costs to the municipality, well beyond existing reserve funds.
Natural Environment/Parks	• Insignificant alteration of the natural environment in and around the community. • Natural systems can easily recover.		• Moderate damage or disturbance to the natural environment, including environmentally significant areas such as wetlands, forested areas, and wildlife corridors. • Moderate damage or disturbance to trees, parks, trails, and open spaces within the community.		• Widespread, long-term and potentially irreversible, damage or disturbance to the natural environment, including environmentally significant areas such as wetlands, forested areas, and wildlife corridors. • Widespread, long-term and potentially irreversible damage or disturbance to trees, parks, trails, and open spaces within the community.

3.6 Risk Scoring

Using the likelihood and consequence scoring, the final risk score for each infrastructure component falls on a scale between **0 and 25** (shown as an example on **Figure 3-3**):

- Between 0 and 9 are considered low risk
- Between 10 and 19 are considered medium risk (yellow)
- Between 20 and 25 are considered high risk (red) items

Upon completion of the risk assessment, the risk scores across all climate-infrastructure interactions were assessed.

This review was completed to establish confidence in the professional judgement employed in the process, as well as to identify any unexpected or surprising results in terms of risk. Unexpected results were not necessarily erroneous, as they highlighted where climate changes were anticipated to introduce new issues and challenges.

The results of the assessment for each infrastructure category were compiled on a master worksheet. **Section 4** summarizes the results of the assessment.

5	CONSEQUENCE	Catastrophic	0	5	10	15	20	25
4		Major	0	4	8	12	16	20
3		Moderate	0	3	6	9	12	15
2		Minor	0	2	4	6	8	10
1		Insignificant	0	1	2	3	4	5
0		No Effect	0	0	0	0	0	0
			Negligible Not Applicable	Highly Unlikely Improbable	Remotely Possible	Possible Occasional	Somewhat Likely Normal	Likely Frequent
			LIKELIHOOD					
			0	1	2	3	4	5

Figure 3-3 Risk Assessment Matrix Example Scoring

4 RESULTS

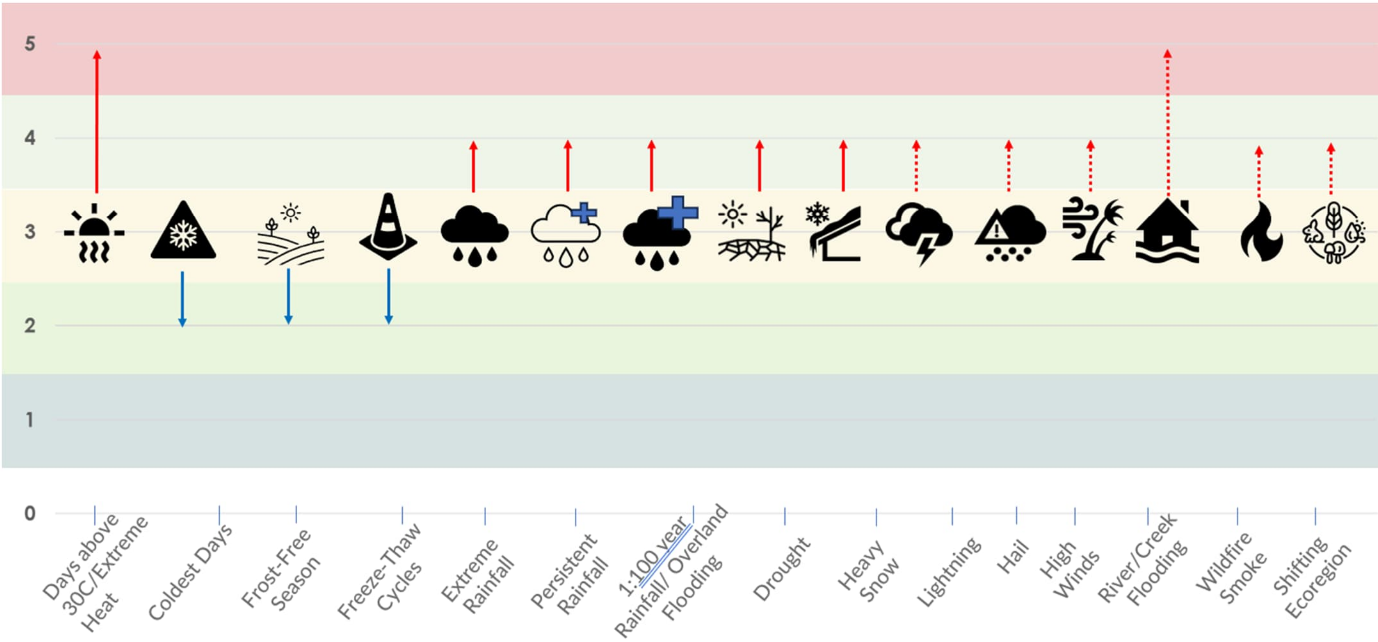
4.1 Change in Climate Hazards Over Time

Many hazards will see an increase in likeliness to occur between now and 2080. The largest shifts are for extreme heat (days above +30°C), number of cooling days, frost-free seasons, annual precipitation. These climate hazards have likelihood scores increasing from 3 to 5. The climate changes to lightning, hail storm, wildfire, drought, and high winds, although not specifically quantifiable, the projections are suggesting that more frequent and long periods will be observed.

The climate hazards that could see a decrease in likelihood between now and 2080 are low temperature days (days below -30°C), number of freeze-thaw events. Precipitation with extreme rainfall events and persistent rainfall are increasing, but the climate model is not showing a high increase.

The change in climate hazard likelihood scores is shown in **Figure 4-1** with the base line starting at "3", either increasing or decreasing. Tables for the change in each climate parameter are given in **Appendix A**.

Figure 4-1 Change in Hazard Likelihood (2020 to 2080)



4.2 Results for All Assets (PIEVC HLSG Assessment)

The risk scores for each asset were calculated for each climate hazard and asset by multiplying the likelihood score (1 to 5) by the consequence score (1 to 5), with the highest risk score of 25. The total risk score across all the assets in the system was calculated to determine which hazards posed the greatest risk and which assets were most at risk from those hazards. Specific to the built infrastructure, the results for each infrastructure components aimed to answer the following **two key questions**:

1. Which five climate hazards have the highest impacts on the infrastructure?
2. Which top five infrastructure components are the most vulnerable?

The two key questions illustrate which climate hazards may impact the asset the most and where efforts should be allocated. It is also important to note that other individual asset components of high risk scores that not necessarily listed under the top five risks are also noteworthy and should be reviewed as part of the Town asset management plan.

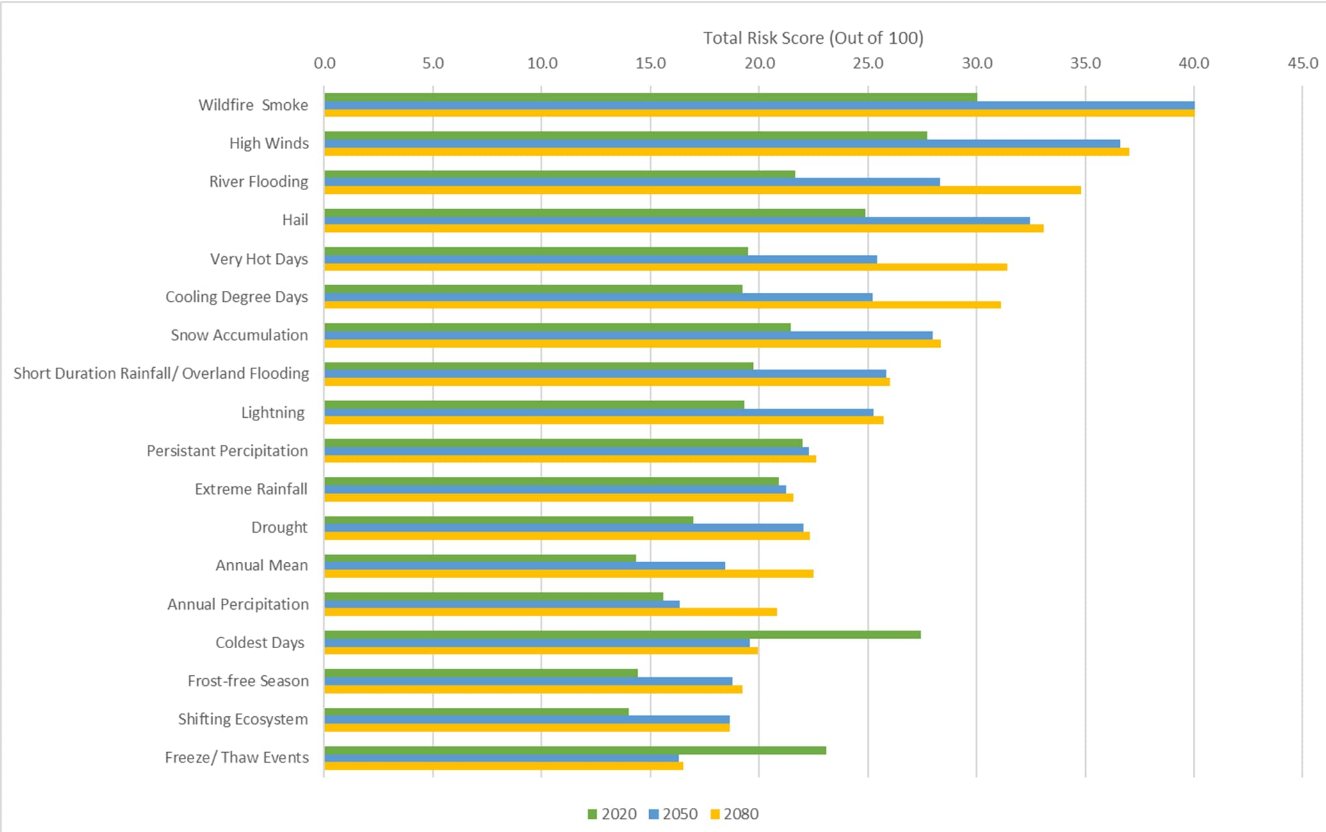
The **Five Highest Risk Climate Hazards in 2080** are shown in **Table 4-1.**

Table 4-1 Five Highest Risk by Climate Hazards to Town Owned and Operated Assets

Rank	Climate Hazard	Impacts
1	Wildfire Smoke	• Reduced visibility • Increase maintenance on equipment filtration system • Increase emergency services attending to health issues • Health impacts on employees working outdoors
2	High Winds	• Damage to buildings, trees, signs • Tree fall/branches blocking roadways • Increase flying debris at landfills
3	River Flooding	• Flooding of water stormwater systems, including storm ponds, catch basins, and drainage ditches • Flooded buildings and basements • Disruption to transportation network
4	Hail Storm	• Damage to facility roofs • Damage to trees • Blocked catch basins
5	Hottest Days (Above 30°C)	• Increase use of energy to cooling buildings • Asphalt surface deterioration • Equipment running hot result in potential damage • Health impact on employees working outdoor • Fires at landfills • Impact on water quality

The change in risk for each climate hazard across all assets over time is shown in **Figure 4-2.** The risk scores were normalized to 100 for comparison of climate hazards. Also noting that coldest days and freeze-thaw days are decreasing in risk progressing towards 2080.

Figure 4-2 Change in Risk by Climate Hazards (Present to 2080)



When we analyze the risk data for the assets based on these climate hazards, the five highest risk infrastructure systems are shown on **Table 4-2**.

Table 4-2 Infrastructure Systems of Highest Risk

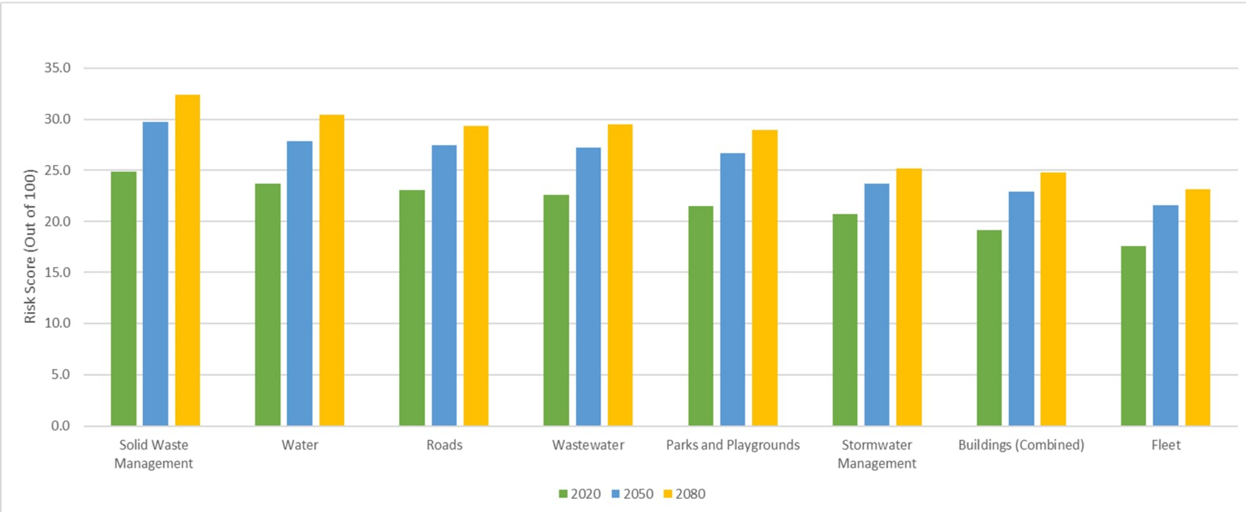
Rank	Infrastructure System	Assets Impacted (High Score)	Top Impacts
1	**Solid Waste Management Facilities and Collection**	• Recycling Facility • Transfer Sites • Honda Facility • Boyle Facility • Waste Collection Vehicles • Operations and Maintenance	• Equipment running hot during hot days. • Fires in landfills during hot and dry days. • No air conditioning in buildings at the facilities. • High wind debris management required. • Slippery roads for collection vehicles during cold weather and heavy snow. • High leachate generation during heavier, and persistent rainfall. • Access road washouts due to heavy rains. • Clean ups from extreme events (wildfire, high winds, river flooding, overland flooding) resulting in high waste volume.
2	**Water Distribution and Treatment**	• Raw Water River Pumphouse • Communication/ SCADA • Treated Water Reservoir • Treated Water Reservoirs • Microfiltration Water Treatment Plant • Distribution mains and systems • Raw Water Holding Pond • Operations and Maintenance	• Pumping and electrical equipment running hot during extreme heat conditions. • Pumping and electrical equipment may be affected by extreme cold conditions. • Hotter temperatures or drought event result in poor raw water quality in the river and pond. • Hot temperatures and drought can impact the water supply as well as treatment processes. • Drought could impact raw water capacity. • Ground movement during freeze-thaw or drought causing distribution pipes to break. • Extreme rainfall and river flooding can cause higher suspended solids and debris in river and affecting the water quality. Debris affecting the intake system. • River flooding could impact raw water pump house. • High wind and hail impacting buildings. • Wildfire results in soil erosion that can in turn impact river water quality. Ashes and debris can block intakes and microfiltration systems. • Snow accumulation on flat roofs.
3	**Roads**	• Sidewalks • Gravel and Asphalt Roads • Operations and Maintenance • Emergency Services	• Extreme cold temperatures cause contraction and result in surface cracking. • Heavy snow results in more wear and tear on roads due to more snow ploughing, sanding, and scraping. • Freeze-thaw cycles results in surface deterioration. • Heavy rainfall or persistent rain events result in subsoil saturation and ponding resulting in road structure deterioration. • Overland flooding could cause washouts. • Drought results in drying out of subgrades and more maintenance on gravel roads, as well as dust control. • High winds result in debris or fallen objects (trees, poles) blocking roadways. • River flooding resulting in road closures. • Wildfire smoke results in low visibility.

Rank	Infrastructure System	Assets Impacted (High Score)	Top Impacts
4	**Wastewater Treatment and Collection**	• Main Sewage Lift Station • West End Lift Station • Head Works • Aeration System • Operations and Maintenance	• Extreme hot temperatures can impact treatment quality. Equipment will be running hot. Problems may arise with instrumentation. • Extreme cold temperatures could freeze the service lines, impact communication system (HMI) and building heater cannot keep up. • High rainfall and persistent rain can increase infiltration (I&I) in the collection lines, and higher flows at head works. This increase in precipitation can also impact pumping capacity of lift station. • Lightning knocks out power to all equipment and electronic system. • Hailstorm damage communication systems. • High winds are causing structural damage. • River flooding can impact the Main Lift Station. • Wildfire ash blocking air intake blowers. Facility is near wooded areas.
5	**Parks, Recreation Centres (courts and skating rinks)**	• Playgrounds • Town and Common Area Riverfront • Skateboard Park • Spray Park • Operations and Maintenance	• Hot temperatures increase usage of parks and increase water usage at spray parks. • Drought results in replacement of vegetation and die-offs. • Increase operations and maintenance to repair wear and tears, clean ups, removal of water, etc. • Shorter season for winter activities. • High winds and hail result in structural damage and fallen trees. • River flooding resulting in damage to the park by the river. • Smoke inhalation and irrigation to employees working outdoors.

The normalized risk scores for all of Town's assets in 2020 up to 2080 is shown in **Figure 4-3**. Solid Waste Management and Water Treatment are not owned and operated by the Town, but they provide major service to the community, therefore, they are included in this discussion.

It is important to prioritize investments and actions to improve the resilience of these top five assets, which are presented as the highest risk; however, it is also important to consider the risks associated with Stormwater Management, Buildings, and Fleet to ensure proper and reliable performance. Adaptation Planning to reduce risk is further discussed in **Section 5**.

Figure 4-3 Change in Risk by Infrastructure



The **detailed results of the risk assessment completed using PIEVC HLSG** for each infrastructure system as well as each components are provided in **Appendix B**. The results show the likelihood and consequence scoring of each asset with the calculated risk scores.

4.3 Results for Community-Wide Assessment

As part of the community-wide assessment, the potential climate impact scenarios for the Town were described in **Table 4-3**. The impact scenarios outlined how the climate hazards identified in Section 2 could **affect social systems, community assets and/or the local economy**. The impact scenarios characterized the cause-and-effect relationship, or impact chain, between climate hazards (or changes) and consequences. The impact scenarios were identified based on the information gathered through Workshop 1B (Tell us About Your System), and our team's experience with and review of, climate risk assessments from similar communities. The scenarios, listed in **Table 4-3**, were reviewed and updated with Town staff and stakeholder at the climate risk assessment workshop.

Table 4-3 Climate Impact Scenarios for the Town

Climate Driver	Impact/Event	Potential Consequences and Vulnerabilities
Hotter summer temperatures, more heat waves	Extended Heat Wave	1. Health impacts, and potential fatalities, particularly on vulnerable populations such as seniors and those with low income and/or housing challenged. Impacts exacerbated by lack of medical staff, refuge areas (cooling centre), and space cooling in buildings that house more vulnerable individuals. 2. Cancellation/disruption of summer festivals and events, reduced quality of life, and financial losses.
Hotter summer temperatures, more cooling degree days	Longer Hotter Summers	3. Increased space cooling costs in homes and buildings, increased financial costs for homeowners and businesses. 4. Increased surface water temperatures and increased risk of algae and cyanobacteria in neighbouring lakes, Athabasca River and raw water pond, leading to degradation of water quality, with consequences for fish populations, recreation, health, and the local economy (reduced visitation).

Climate Driver	Impact/Event	Potential Consequences and Vulnerabilities
Warmer winter temperatures, fewer 'winter days'	Loss of Winter Recreation Opportunities	5. Reduced quality and reliability of ice and snow with reduced opportunities for winter recreation activities (skating, skiing, snowmobiling), leading to reduced quality of life and wellbeing, and economic losses.
Longer frost-free season	Invasive Species	6. Damage or diminished forest and urban tree canopy from insect, including increased costs and staff time to manage and maintain trees and parks. Dead and dying trees also pose a health and safety risk and can create negative impacts. Potential economic impacts for local forestry sector (pulp mill).
More heavy rainfall events	Overland Flooding (Short Duration High Intensity Rainfall Event)	7. Potential flooding of basements in homes and buildings, disruption to daily life, economic impacts, and repair costs. 8. Flooding of road networks and disruption of transportation access, impacts to quality of life, wellbeing, recreation access, and the local economy.
Hotter temperatures	Prolonged Drought (Multi-Year)	9. Stress on natural landscapes resulting in vegetation dying off and impacts to parks, open spaces, sporting fields, golf course, etc. Financial costs to the Town, businesses and residents, and potential impacts to mental health with reduced recreation. 10. Lower river flows and reduction in water-based recreation (jet boating) and reduced quality of life and wellbeing, and potential impact on water-based recreation businesses. 11. Lower river flows leading to potential water supply shortage and impacts to water-reliant businesses (pulp mill, agriculture, car washes, golf course, etc.) and the local and regional economy (bulk water station use).
Extreme weather (lightning, wind, heat wave)	Extended Power Outage (72 Hour)	12. Loss of power and communications, financial impacts for local businesses and industry, and reduced quality of life and wellbeing, notably from reduced ability to work and learn remotely, and spoilage of fridge and freezer food. Impacts exacerbated if the outage occurred in mid-winter.
Extreme weather, hail	Major Hailstorm Causing Damage	13. Damage to homes, vehicles and businesses, including crops and gardens, with economic and financial impacts.
Increased rainfall; more heavy rainfall events	River Flooding (200-Year Flood Level)[1]	14. Damage to homes and buildings and in the floodplain, economic, and financial impacts, costs to repair and clean up debris, impacts to quality of life. 15. Disruption of road and active transportation network from floodwaters and/or debris. Potential business disruption, economic impacts and loss of access to critical local facilities (grocery, hospital, RCMP, etc.). 16. Impacts to recreation assets (trails, boat launch, skate park, etc.) with financial costs to repair damaged assets and implications for recreation and quality of life. 17. Disruption of riverside festivals and events, and potential costs relocate or change event.

[1] Athabasca Flood Hazard Study assumes a 20% increase in water level to account for climate change 'freeboard' for flood inundation, and the 200-year ice jam flood water level to account for climate change.

Climate Driver	Impact/Event	Potential Consequences and Vulnerabilities
Extreme weather	Large 'Devastating' Tornado (EF 4)	18. Widespread damage to buildings and property, potential loss of life (injuries/fatalities).
Extreme weather	Windstorm (90km/H Gust)[2]	19. Damage to buildings, property, and trees including costs to repair damaged assets. Potential health impacts (injuries/fatalities) and transportation disruption from blocked roadways. 20. Cancellation/disruption of summer festivals and events, reduced quality of life, and potential financial losses.
Hotter temperatures, drier conditions	Wildland Fire Occurs Within Municipal Boundaries, Causing Damage	21. Widespread damage to buildings and property, destruction of natural assets (trees and forests), economic impacts, financial costs to clean up and re-build, potential loss of life (injuries/fatalities), and community evacuation/displacement.
Hotter temperatures, drier conditions	Wildland Fire Occurs Adjacent to the Municipal Boundaries	22. Region-wide displacement and evacuations to the Town with implications for Town staff and resources, including for firefighting and emergency services, and loss of local recreation amenities being used to accommodate evacuees.
Hotter temperatures, drier conditions	Wildfire Smoke	23. Health impacts (injuries/fatalities) and potential hospitalization, particularly on vulnerable populations (seniors, low income, homeless). 24. Reduced participation in outdoor recreation activities, including for school children (recess) with reduced quality of life and mental health consequences. 25. Increased home and building air filtration costs with financial consequences for residents, businesses, and local organizations.
Warmer winter temperatures	Freezing Rainstorm	26. Health and safety risks from traffic accidents or falls, reduced quality of life and wellbeing, and increased stress on emergency services responding to accidents. 27. Disruption of road and active transportation network, with implications for emergency response and hospital access, as well as access to homes, businesses, and schools.

The risk score for each climate impact scenario was determined based on the multiplication of likelihood and consequence score, as discussed. The following **Table 4-4** shows the top five highest risks to the community. The details of the lower risk results are shown in **Appendix C**. Only those climate impact scenarios that were assessed as "very high" and "high risks" will be considered in the climate adaptation action planning process. Twelve of the climate impact scenarios have been assessed to be "very high" (score of 4 or 5); these will be discussed in **Section 5**.

[2] Based on the Government of Canada criteria for issuing public weather alerts

Table 4-4 Community-Wide Highest Risk Results

Rank	Climate Hazard	Impacts
1	Prolonged Drought	• Lower river flows leading to potential water supply shortage and impacts to water-reliant businesses (pulp mill, agriculture, car washes, golf course, etc.) and the local and regional economy (bulk water station use).
2	Wildfire Smoke	• Health impacts (injuries/fatalities) and potential hospitalization, particularly on vulnerable populations (seniors, low income, homeless).
3	Extended Heat Wave	• Health impacts, and potential fatalities, particularly on vulnerable populations such as seniors and those with low income and/or housing challenged. Impacts exacerbated by lack of medical staff, refuge areas (cooling centre), and space cooling in buildings that house more vulnerable individuals.

5 ADAPTATION ACTION PLANNING

A series of adaptation workshops, **Workshop 3**, were conducted in November 2022 with the Town's departmental leads. For continuity, the departmental leads who attended **Workshop 1** and **Workshop 2** attended this Workshop. The workshops facilitated by Associated Engineering and All One Sky Foundation are listed in the following:

- **3A:** Water, Wastewater, Stormwater
- **3B:** Solid Waste, Roads, Fleet, and Parks
- **3C:** Community-wide (social aspects and local economy)

The Community Climate Adaptation Planning Guide developed by All One Sky Foundation was used in guiding the workshop discussion. The recommended options for adaptation actions are listed in the following:

1. **No Action** – no additional actions required; business as usual.
2. **Conduct Research, Studies, or Assessments** to obtain further information on the nature of the risk to better inform the decision-making process.
3. **Update Policies, plans, standards, guidelines, or bylaws** that consider climate risks and opportunities.
4. **Modify Operations and/or Maintenance** schedules, activities with the consideration of climate impacts.
5. **Build New or Upgrade Existing Infrastructure** to provide protection against climate risks.
6. **Increase Awareness and Education** to help community better understand risks and adaptation actions.
7. **Incorporate Emergency Management** such as response and evacuation planning, hazard mapping, and early warning or alert systems.
8. **Consider Human Resourcing Options** and evaluate the need for additional staff time allocated to climate adaptation planning, implementation, and establishing task force.

5.1 Infrastructure Systems

Associated Engineering facilitated the discussions during **Workshops 3A** and **3B** which identified the adaptation actions for each asset. These actions were examined for the medium to high risk climate impacts. The discussions were summarized and tabulated in **Appendix D** for each infrastructure system and their respective components. Each summary table highlights the following:

- Recommended adaptation actions
- Time frame of implementation

The time frames were grouped into:

- 0 to 5 years as immediate to short-term
- Up to 10 years for longer term implementation

5.2 Community-Wide Adaptation Consideration

The goal of the climate adaptation action planning process was to identify potential future actions that can be implemented by the Town to manage high priority climate change risks affecting the Community and Local Economy. An **Action Planning Workshop** was held on September 29, 2023 to consider:

1. What actions are currently being implemented to manage the social/economic consequences of each impact?
2. What new actions, or improvements/updates to existing actions, are needed to manage the social/economic consequences of each impact more effectively?

Table 5-1 provides a summary of recommended actions to be implemented by the Town to manage high priority climate change risks affecting the local economy and community. For each recommended action, the following information was provided:

1. **What is the estimated timeframe for having this action implemented (operational)?**
    a. Ongoing
    b. Near-term (next 1-2 years)
    c. Short-term (2-5 years)
    d. Medium-term (5-10 years)
    e. Long-term (10+ years)
2. **Which priority climate impact does the action help to manage?**
    a. Heat: extended heat wave and increased space cooling costs
    b. Wind: high winds and tornadoes
    c. Storm: Hail and freezing rain
    d. Fire: Wildland fire and smoke
    e. Drought: prolonged drought
    f. Power: extended power outage

Table 5-1 Climate Adaptation Action Consideration – Community-Wide

Recommended Action	Time	Wildland Fire	Drought	Wildfire Smoke	Heat	Wind	Freezing Rain	Invasive Species
1. Review and update the FireSmart Community Plan including a community-wide forest fuel assessment and risk assessment to identify areas at highest risk.	Near-term	✓						
2. Based on results of the FireSmart risk assessment, seek grant funding to complete forest fuel risk reduction in and around the community to reduce fuel load and wildfire risk.	Short-term	✓						
3. Enhance existing community FireSmart education programs, including through property assessments and a community emergency preparedness event.	Short-term	✓						
4. Develop water shortage procedures, including specific Town responses through the five stages of water shortage[3] .	Medium-term		✓					
5. Enhance public education about water conservation (water reuse, rainwater capture and reuse, etc.), through website, printed materials, or other means.	Short-term		✓					
6. Plant drought tolerant trees, shrubs and grasses that are suitable for the climate of the future[4].	Ongoing		✓					
7. Retrofit the Athabasca Regional Multiplex to function as a clean air shelter and cooling centre during extreme heat and wildfire smoke events, and to accommodate overnight stays if/when required.	Long-term	✓		✓	✓			
8. Develop a community rebate or incentive program, expanding on the Clean Energy	Medium-term	✓		✓	✓	✓		

[3] See: Government of Alberta, Drought – Information for Water License holders and municipalities: https://www.alberta.ca/drought-information-for-water-licence-holders-and-municipalities
[4] For additional details on drought tolerant and climate suitable tree species in the Edmonton Region see: Guide to Urban Forest Management in a Changing Climate: https://static1.squarespace.com/static/5ed809f05c460126fe7f10e2/t/5ef3c2dd8b38a9767d98ca23/1593033454683/Guide%2Bto%2BUrban%2BForest%2BManagement%2Bin%2Ba%2BChanging%2BClimate%2B-%2BPhase%2B2%2BReport.pdf

Recommended Action	Time	Wildland Fire	Drought	Wildfire Smoke	Heat	Wind	Freezing Rain	Invasive Species
Improvement Program (CEIP)[5], to support property owners with retrofits aimed at protecting their homes and health from extreme heat, wildfire smoke, windstorms, wildland fire, and extended power outages. Ensure the program targets the most vulnerable citizens, for example through partnership with the Greater North Foundation.								
9. Expand options for indoor public recreation opportunities during extreme heat and wildfire smoke events.	Ongoing			✓	✓			
10. Conduct a review of Town policies to ensure freezing rain, in addition to snow, is considered in all relevant operational policies.	Near-term						✓	
11. Enhance public education on emergency preparedness, including preparations for prolonged power outages.	Near-term	✓			✓	✓	✓	
12. Develop communication materials, on website or a small brochure or paper, to help manage resident expectations regarding road maintenance and priority routes.	Near-term						✓	
13. Enhance tree management, including improved trimming (pruning), focused on removing weak or overextended branches to protect trees from windstorms.	Ongoing					✓		
14. Dedicate additional staff time to the detection and prevention of invasive species and pests, including education to help residents identify and manage invasive species and pests on their property.	Ongoing							✓

[5] https://ceip.abmunis.ca/residential/locations/town-of-athabasca/

Recommended Action	Time	Wildland Fire	Drought	Wildfire Smoke	Heat	Wind	Freezing Rain	Invasive Species
15. Update the Nuisances and Untidy or Unsightly Premises Bylaw (#12-95) to incorporate invasive species and pests.	Near-term							✓
16. Update Town procurement policies to ensure climate changes, impacts and adaptation are a consideration in bids/tenders for all Town projects and developments.	Short-term	✓	✓	✓	✓	✓	✓	✓
17. Consider climate change in all strategic planning processes, including updates to the Municipal Development Plan, Area Structure Plans, and economic development planning.	Ongoing	✓	✓	✓	✓	✓	✓	✓

6 RECOMMENDATION

The risk assessments and adaptation actions provided an overview of the risk and vulnerabilities of the built infrastructure, and the socio and economic aspects for the Town. The assessment enabled the Town to identify high risk areas and allocate resources to take actions in preventing, reducing or eliminating potential risks. The assessment focused on the Town's current condition and how the assets fared with future projected climate hazards. The following recommendations for consideration as **Next Steps**:

1. **Prioritize Actions**. The critical infrastructure that has high impacts are Solid Waste, Water, Roads, and Wastewater. Priority consideration should be given to these assets to ensure level of service to the community is maintained. A list of recommended actions has been provided for the Town in **Section 5** to consider and implement. Starting with low costs actions, these can be implemented with planned policy or bylaw updates. Other considerations include mainstream into the infrastructure renewal, community planning, and development projects.
2. **Cross-Cutting Discussion and Information Sharing.** The Town is encouraged to share this information with other relevant departments and inform asset managers for future planning. Furthermore, the cross-departmental discussion can help to identify, assess, and address common problematic areas to protect assets.

Table 6-1 Potential Cross-Cutting Adaptation Actions Applicable to All Departments/Corporations

All Departments/Corporation
Increase public engagement and community awareness of climate change impacts and adaptations through public open houses, schools, and other discussion forums.
Increase cross-departmental collaboration and information sharing to improve management of climate change risks and opportunities.
Increase education and public awareness of the health and safety impacts of climate change.
Create and disseminate climate related risk maps across Town's departments, and to residents, businesses, and other organizations to support more resilient development and planning.

All Departments/Corporation
Employ an adaptive management approach to climate adaptation planning.
Increase staff training on climate change impacts and adaptations across all departments.
Increase the resilience of Town's buildings, where applicable (for frequent use only), to climate hazards and extreme weather, including zoning, planning, and permitting.
Promote sharing of Town's maps and emergency information to improve emergency response.
Promote the use of renewable energy sources in homes and buildings.
Avoid flood prone areas through zoning, planning, and development restrictions.
Identify funding opportunities for green infrastructure and buildings to increase resilience.

3. **Monitor, Assess, and Update Risk Scores and Adaptation Actions.** The Town is encouraged to identify performance or tolerance threshold (e.g., temperature, precipitation) of the asset so that it provides a baseline for monitoring. As the Town improves or make modifications to reduce the risks and vulnerabilities to the assets, the adaptation plans can be updated. This encourages improvements and furthering the reduction and removal of risks.
4. **Continual Review of Climate Data.** The Town, overtime, should also monitor the ongoing evolution of climate projections. This will allow the Town to update the risk score and evaluate its vulnerabilities and exposure based on current and science-based information. Adaptation actions will be adjusted accordingly while staying flexible and adaptable to the potential market fluctuations.

6.1 Follow Up from Council Meeting

During the December 19 Council Meeting, Associated Engineering presented the findings of the risk assessment results and adaptation recommendations. The Council had the following questions:

a) What funding programs are available to assist in future adaptation implementation?
b) What other municipalities that have done climate planning, or organizations/resources available on climate planning?

The responses to the two questions are as follows:

a) The relevant federal funding are listed in this website: Infrastructure Canada - For Partners & Builders. Communities such as Fort McMurray have used Disaster Mitigation Adaptation Fund to assist in constructing their flood protection infrastructure. Similarly, City of Edmonton has applied to this Fund to assist in flood protection for the Gold Bar Wastewater Treatment Facility.

   The Green Infrastructure Fund administered through the Federation of Canadian Municipalities (FCM), and consultation is available to help navigate the system.

   The Alberta government has funding available to protect the environment and support Canda's transition to a clean economy. The information is available here: Green Infrastructure | Alberta.ca. MCCAC has been a key funding entity to support climate adaptation and capacity building; this organization will likely continue to provide support future initiatives.

b) Two of the more recent climate risk assessments and adaptation planning that was conducted and has taken further for towards adaptation implementation is City of Lethbridge and City of Camrose. Information on both city's initiatives is found in the following web-links:
City of Camrose – Climate Risk and Vulnerability Assessment | MCCAC
Climate Adaptation Plan | Get Involved Lethbridge

The FireSmart program has been implemented in many municipalities across Alberta. Some of the municipalities have strengthened their program since the recent wildfire events. Her is an example from Town of Slave Lake: Firesmart | Engage Slave Lake. The Town of Athabasca also has a FireSmart program, and this can be further reviewed in light of climate risk.

The Edmonton Metropolitan Region Board has completed a regional risk and vulnerability assessment with adaptation planning. The report is available on this link: General 1 — EMRB. There will likely be more information available in the future to help in regional adaptation collaboration.

With our understanding of the Town's community and infrastructure, Associated Engineering is well equipped to help the Town of Athabasca implement future adaptation strategies through funding opportunities, and developing a detailed adaptation plan that is realistic and manageable based on the Town's priority.

7 CLOSURE

A Climate Change Risk Assessment was conducted to identify and evaluate the potential impact climate change may have on the Town of Athabasca's infrastructure and community, as a whole.

The services provided by Associated Engineering Alberta Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,

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The Association of Professional Engineers
and Geoscientists of Alberta

APPENDIX A – CLIMATE PROJECTED DATA

Table A-1: Town of Athabasca, Climate Projected Data

Climate variable	Brief Description	Baseline (1976-2005)	Near future (2021-2050)	Distant future (2051-2080)	Resource
Mean annual temperature (°C)		2.1°C	4.2°C	6.4°C	Climateatlas.ca
Mean summer temperature (°C)		15.4°C	17.5°C	19.6°C	Climateatlas.ca
Number of days above +30°C (#)	The number of days with a maximum temperature (Tmax) greater than 30°C. Use the Variable menu option to view annual, monthly or seasonal values for this index.	3 days	9 days	24 days	Climatedata.ca
Number of heatwaves (#)	The average number of heat waves per year. A heat wave occurs when at least three days in a row reach or exceed 30 °C	0.3	1.2	2.9	Climateatlas.ca
Hottest Day	The Hottest Day describes the warmest daytime temperature in the selected time period. In general, the hottest day of the year occurs during the summer months.	29.6°C – 30.7°C	31.6°C – 35.1°C	33.7°C – 38.7°C	Climatedata.ca
Cooling Degree Days	The number of degree days accumulated above 18°C in the selected time period. Use the Variable menu option to view the annual, monthly or seasonal values for this index. Visit the Analyze page to	38 degree days	114 degree days	258 degree days	Climatedata.ca

Table A-1: Town of Athabasca, Climate Projected Data

Climate variable	Brief Description	Baseline (1976-2005)	Near future (2021-2050)	Distant future (2051-2080)	Resource
	calculate degree days using different threshold temperatures.				
Mean Winter temperature (°C)	The average temperature of the day in winter.	-13.3°C	-10.8°C	-8.2°C	Climateatlas.ca
Number of days below -30°C (#)	The number of days with a minimum temperature (T_{min}) less than -30°C.	14.1	7.4	3.1	Climateatlas.ca
Mild Winter Days below -5°C	A Mild Winter Day is a day when the temperature drops to at least -5 °C.	140.9	122.5	104.5	Climateatlas.ca
Frost-free season (days)	The number of days between the date of the last spring frost and the date of the first fall frost, equivalent to the number of consecutive days during the 'summer' without any daily minimum temperatures below 0°C. Use the *Variable* menu option to view values for this index on the map.	120	142	161	Climatedata.ca
Freeze-thaw cycle	A freeze-thaw cycle occurs when the daily maximum temperature (T_{max}) is higher than 0°C and the daily minimum temperature (T_{min}) is less than or equal to -1°C.	86.5	77.5	70	Climateatlas.ca
Annual Total Precipitation (mm)	The total amount of precipitation (mm) accumulated in the selected time	432 mm	446 mm	471 mm	Climatedata.ca

Table A-1: Town of Athabasca, Climate Projected Data

Climate variable	Brief Description	Baseline (1976-2005)	Near future (2021-2050)	Distant future (2051-2080)	Resource
	period. Use the Variable menu option to view the annual, monthly or seasonal values for this variable. Rain and snow included.				
Number of days with >10mm precipitation (#)	The number of days with precipitation >= 10 mm.	8 to 9 days	8 to 11 days	9 to 12 days	Climatedata.ca
Wet Days >= 20mm	The number of days with precipitation >= 20 mm. Rain and snow included	2	2	2	Climatedata.ca
Maximum 1-day Total Precipitation	The largest precipitation total that falls in a single day in the selected time period. Includes both rain and snow.	31 mm	31 mm	33 mm	Climatedata.ca
Maximum 5 -day consecutive precipitation (mm)	The maximum total precipitation that falls over a consecutive 5-day period.	56 mm	57 mm	59 mm	Climatedata.ca
Short Duration Rainfall / Overland Flooding	Based on 1:100 year 24 hour event. RCP8.5	3.3 mm/hr	4.3 mm/hr	4.8 mm/hr	ClimateData.ca
Winter Precipitation	Snow accumulation over winter months (December, January, February)	67 mm	73 mm	78 mm	Climateatlas.ca
Maximum No. of Consecutive Dry Days	The maximum number of consecutive days with precipitation	27 days	26 days	26 days	Climatedata.ca

Table A-1: Town of Athabasca, Climate Projected Data

Climate variable	Brief Description	Baseline (1976-2005)	Near future (2021-2050)	Distant future (2051-2080)	Resource
	below 1mm/day, within the selected time period.				
Drought (SPEI)	SPEI (12 months), The Standardized Precipitation Evapotranspiration Index (SPEI) is a drought index based on the difference between precipitation (P) and potential evapotranspiration (PET). Negative (positive) values indicate water deficit (surplus).	General drier conditions in the summer; however, noting that the excessive moisture due to extreme rainfall with annual variability also increase with warmer climate.			Conversation with Dave Sauchyn, August 18, 2023.
		-0.1	-0.5	-0.8	Climatedata.ca (rounded up to nearest 10th decimal)
Lightning		Complex model generated considering wind shear, temperature, moisture. Increasing severe weather events modelled increasing lightning occurrence.			Dominique Paquin, et. Al., 2014. Change in North American Atmospheric Conditions Associated with Deep Convection and Severe Weather using CRCm4 Climate Projections, ISSN 0705-5900
Hailstorm	Precipitation in the form of lumps	Historical likelihood is 1 large hail day every 6-7 years [3.5-5 large hail days over period 1971-2000]. ~14% annual probability of large hail day occurring historically. There is an increasing likelihood of about 1 additional large hail day per season [1 large hail day every 5-6 years]. ~18% annual probability of large hail day occurring.			Brimelow, J. et al., 2017, The changing hail threat over North America in response to anthropogenic climate change, Nature Climate Change, DOI: 10.1038/NCLIMATE3321.

Table A-1: Town of Athabasca, Climate Projected Data

Climate variable	Brief Description	Baseline (1976-2005)	Near future (2021-2050)	Distant future (2051-2080)	Resource
		Report indicates an historic likelihood of 4 (likely). Likelihood is noted as health and well-being (2 – low), economic (4 – high), natural environment (2 – low), built environment (4 – high)			
Riverine Flooding	Excessive rainfall raises the water level in rivers and creeks across the region overflows onto the neighboring land. High flows: 1:100 year, 1-day stream flow to 200 year flood level.	Alberta Innovate and AE conducted a study on river water levels causing potential threat to water treatment plants in Alberta. The study showed upward trends of high flow conditions under climate change conditions.			AEPA Flood Map, Alberta Floods Portal Golder Associates Ltd, 2020. Athabasca Flood Hazard Study, DRAFT. AE's project with Alberta Innovate: Drinking Water Infrastructure Risk and Vulnerability Assessment, 2023.
Tornado	Violently rotating column of air that extends from a cumuliform cloud to the surface.	There has been one "strong" or higher tornado in the region—Edmonton, Beaumont, Millet, etc. on 31.07.1987 <1% annual probability of strong tornado	Insufficient evidence to determine trend <1% annual probability of strong tornado	Insufficient evidence to determine trend <1% annual probability of strong tornado	• Beaumont, Millet, etc. on 31.07.1987. • Elsner, J. et al, 2014, Tornado Intensity Estimated from Damage Path Dimensions, PLoS ONE 9(9): e10757

Table A-1: Town of Athabasca, Climate Projected Data

Climate variable	Brief Description	Baseline (1976-2005)	Near future (2021-2050)	Distant future (2051-2080)	Resource
High Wind	Sustained wind at 70 km/hr or gust up to 90 km/hr and more.	Minor changes from 2020 to 2080. Some data are inclusive and will need more research.			https://www.canada.ca/en/environment-climate-change/services/types-weather-forecasts-use/public/criteria-alerts.html#wind https://publications.gc.ca/collections/collection_2021/eccc/En4-415-2020-eng.pdf
Wildfire Smoke	Wildfire smoke causes health conditions. Wildfire smoke reduces visibility to 2km or less causing unhealthy air quality conditions.	16 occurrences where visibility fell below 2km between 1961-2021 Annual probability about 27%	Increasing. Projected 30-70% [mid-point of 50%] increase in the number of wildfire spread[1] days in fire zones that could affect smoke levels in the region.		Edmonton International Airport for "smoke days". Based on studies for the Edmonton Municipal Region in 2023.
Wildfire	Uncontrolled ground fire spread resulted from flammable biomass, weather, topography and ignition sources. Ignition sources may be natural (eg. lightning) or due to human error.	Using the resource data, AE generated a data base showing the potential increase of burned area from baseline 1981 to 2080s. Based on RCP 8.5 scenario, the projected % change in annual number of fires greater than 50 ha is 10% from 2020s to 42% in 2080s. % change in average annual area burned increases from 33% in 2020s to 190% in 2080s.			Wang, Xianli, Tom Swystun, and Mike D. Flannigan. "Future wildfire extent and frequency determined by the longest fire-conducive weather spell." *Science of the total environment* 830 (2022): 154752. Wang, Xianli, et al. "One extreme fire weather event determines the extent and frequency of wildland

Table A-1: Town of Athabasca, Climate Projected Data

Climate variable	Brief Description	Baseline (1976-2005)	Near future (2021-2050)	Distant future (2051-2080)	Resource
					fires." *Environmental Research Letters* 16.11 (2021): 114031. Wang, Xianli, et al. "Projected changes in daily fire spread across Canada over the next century." *Environmental Research Letters* 12.2 (2017): 025005. Wang, Xianli, et al. "The potential and realized spread of wildfires across Canada." *Global change biology* 20.8 (2014): 2518-2530.
Shifting Ecosystem	Changing seasons and ecosystems	Unknown, as it depends on disturbances to the landscape (to create windows for change) as well as changes to the climate envelope of each ecoregion			Schneider, R., 2013, Alberta's Natural Subregions Under a Changing Climate: Past, Present and Future, Report prepared by Department of Biological Sciences, University of Alberta for the Biodiversity Management and Climate Change Adaptation Project, 97p.

1. A "spread day" measures of the number of days suitable for active fire growth within the potential or observed lifetime of a fire. They are conditional on the joint occurrence of a drying period where fuel moisture is expected to support fire ignitions and survival, b) extensive fuels to support fire spread, c) extreme fire weather (hot, dry, and windy).

The following assumptions should be noted with respect to the climate risk assessment:

- There is the potential for individual models to produce baseline values that are possibly inaccurate (e.g., too warm or cold, too wet or dry, or have difficulty reproducing specific parameters).
  Note: This inaccuracy was reduced through the creation of a spread of projected values from an ensemble of many climate models.

Table A-1: Town of Athabasca, Climate Projected Data

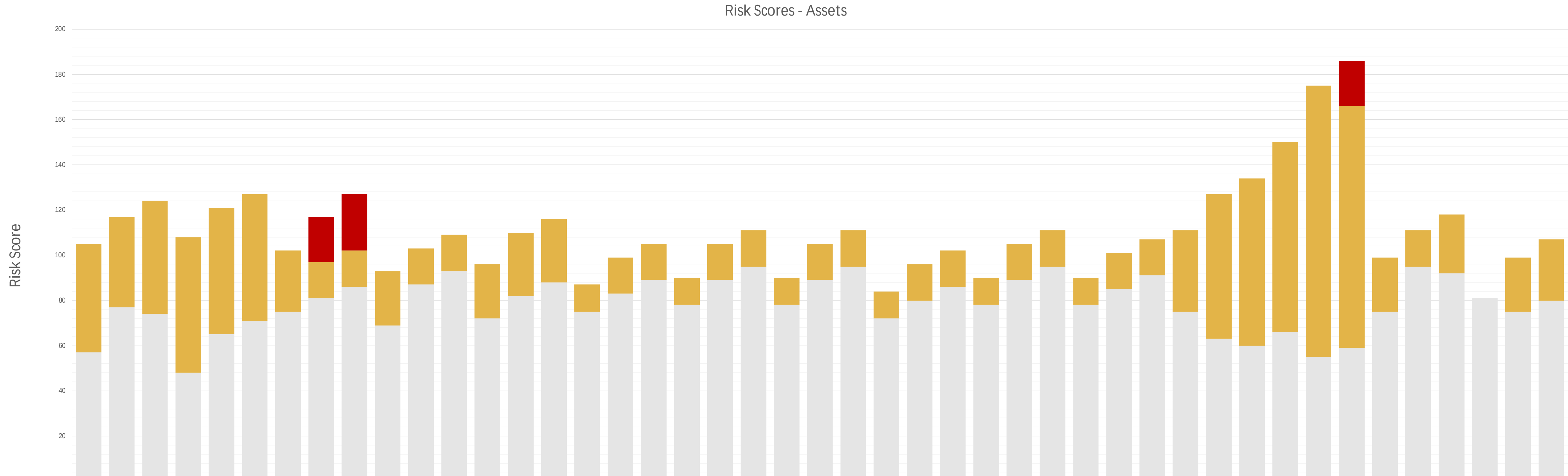
- The climate downscaling procedure implemented in ClimateData.ca, and other sources noted, may under-estimate or over-estimate the climate parameters used in this project.
- The Assessment did not account for cumulative effects of multiple climate events occurring concurrently.
- The Assessment should be updated based on new specific climate projections when they are available.

APPENDIX B – ASSETS RISK RESULTS FROM PIEVC HLSG PROCESS

PIEVC Risk Matrix
Stormwater Management System

Consequence Score: 0 - No Effect; 1 - Very Low; 2 - Low; 3 - Moderate; 4 - High; 5 - Very High		Climate Parameter																																																																																					
		Temperature																												Precipitation																								Extreme Events																				Shifting Natural Ecoregions			
		Mean Annual Temperature (-C)				Days above +30ºC				Hottest Day (-C)				Cooling Degree Days (Degree Days)				# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events				Annual Total Percipitation (mm)				Maximum 1-Day Total Percipitation (mm)				Maximum 5-day Consecutive Percipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)				Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit				Shifting Natural Ecoregions			
		Annual Mean				Very Hot Days				Hottest Day				Cooling Degree Days				Coldest Days				Frost-free Season				Freeze/ Thaw Events				Annual Percipitation				Extreme Rainfall				Persistant Percipitation				Short Duration Rainfall/ Overland Flooding				Drought				Snow Accumulation				Lightning				Hail				Tornado				River Flooding				Wildfire Smoke				Shifting Ecosystem			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14	3			120	3			86.5	3			432	3			31	3			56	3			3.3	3			-0.1	3			69	3			-	3			-	3			-	3			-	3			-	3			-	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2			446	3			31	3			57	3			4.3	4			-0.5	4			74	4			+	4			+	4			+	4			+	4			+	4			+	4		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2			471	4			33	3			59	3			4.8	4			-0.8	4			79	4			++	4			+	4			+	4			++	5			+	4			+	4		
Component: Stormwater		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Collector, Trunk, and Lateral Mains	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		12		3		3		3		12		3		12		3		12		3		3		3		3		3		3		3		6		3		3		3		6		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	4	8	Y	3	1	3	Y	3	4	12	Y	3	4	12	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		8		4		4		3		12		3		12		4		16		4		4		4		4		4		4		4		8		4		4		5		10		4		4		4		4
2 Stormwater Manholes and Catch Basins	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		12		3		3		3		12		3		12		3		12		3		3		3		3		3		3		3		12		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	4	8	Y	3	1	3	Y	3	4	12	Y	3	4	12	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		8		4		4		3		12		3		12		4		16		4		4		4		4		4		4		4		16		4		4		5		5		4		4		4		4
3 Athabasca River Outfall	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		9		3		3		3		9		3		9		3		12		3		3		3		3		3		3		3		3		3		3		3		15		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	3	6	Y	3	1	3	Y	3	3	9	Y	3	3	9	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	5	20	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		6		4		4		3		9		3		9		4		16		4		4		4		4		4		4		4		4		4		4		5		25		4		4		4		4
4 Tawatinaw Creek Outfall	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		12		3		3		3		9		3		9		3		12		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	4	8	Y	3	1	3	Y	3	3	9	Y	3	3	9	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		8		4		4		3		9		3		9		4		16		4		4		4		4		4		4		4		4		4		4		5		5		4		4		4		4
5 Cornwall Retention Pond (Dry) and Release Vault	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		9		3		3		3		9		3		12		3		12		3		3		3		6		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	3	6	Y	3	1	3	Y	3	3	9	Y	3	4	12	Y	4	4	16	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		6		4		4		3		9		3		12		4		16		4		4		4		8		4		4		4		4		4		4		5		5		4		4		4		8
6 Cornwall 34th Street Outfall	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		6		3		3		3		9		3		9		3		12		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	2	4	Y	3	1	3	Y	3	3	9	Y	3	3	9	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		4		4		4		3		9		3		9		4		16		4		4		4		4		4		4		4		4		4		4		5		5		4		4		4		4
7 Woodheights Retention Pond (Wet), Release Vault, and Outfall	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		6		3		3		3		9		3		9		3		12		3		3		3		6		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	2	4	Y	3	1	3	Y	3	3	9	Y	3	3	9	Y	4	4	16	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		4		4		4		3		9		3		9		4		16		4		4		4		8		4		4		4		4		4		4		5		5		4		4		4		8
8 University Retention Pond (Wet) and outfall	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		6		3		3		3		9		3		9		3		12		3		3		3		6		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	2	4	Y	3	1	3	Y	3	3	9	Y	3	3	9	Y	4	4	16	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		4		4		4		3		9		3		9		4		16		4		4		4		8		4		4		4		4		4		4		5		5		4		4		4		8
9 3602-48th Avenue Outfall	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		6		3		3		3		9		3		6		3		12		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	2	4	Y	3	1	3	Y	3	3	9	Y	3	2	6	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		4		4		4		3		9		3		6		4		16		4		4		4		4		4		4		4		4		4		4		5		5		4		4		4		4
10 Landing Industrial Park Retention Pond (Wet)	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		6		3		3		3		9		3		9		3		12		3		3		3		6		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	2	4	Y	3	1	3	Y	3	3	9	Y	3	3	9	Y	4	4	16	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		4		4		4		3		9		3		9		4		16		4		4		4		8		4		4		4		4		4		4		5		5		4		4		4		8
11 Various other minor outfall locations (Muskeg creek, Edwin Parr, Hees, 54th st, 53rd st)	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		9		3		3		3		9		3		9		3		12		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	3	6	Y	3	1	3	Y	3	3	9	Y	3	3	9	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		6		4		4		3		9		3		9		4		16		4		4		4		4		4		4		4		4		4		4		5		5		4		4		4		4
11 Overland Control (curb and gutter, culverts-road crossings, drainage corridors)	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		9		3		3		3		12		3		12		3		12		3		3		3		9		3		3		3		9		3		3		3		6		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	3	6	Y	3	1	3	Y	3	4	12	Y	3	4	12	Y	4	4	16	Y	4	1	4	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		6		4		4		3		12		3		12		4		16		4		4		4		12		4		4		4		12		4		4		5		10		4		4		4		4
11 Operations and Maintenance	Present		3		3		3		3		3		9		3		3		3		12		3		3		3		12		3		3		3		12		3		12		3		12		3		3		3		9		3		9		3		9		3		12		3		12		3		6		3		6
	2050	Y	4	1	4	Y	4	1	4	Y	4	3	12	Y	4	1	4	Y	2	4	8	Y	4	1	4	Y	2	4	8	Y	3	1	3	Y	3	4	12	Y	3	4	12	Y	4	4	16	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	3	12	Y	4	4	16	Y	4	4	16	Y	4	2	8	Y	4	2	8
	2080		5		5		5		5		5		15		5		5		2		8		4		4		2		8		4		4		3		12		3		12		4		16		4		4		4		12		4		12		4		12		4		16		5		20		4		8		4		8
11 Public / Customers	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		12		3		3		3		9		3		9		3		12		3		3		3		3		3		3		3		6		3		3		3		6		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	4	8	Y	3	1	3	Y	3	3	9	Y	3	3	9	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		8		4		4		3		9		3		9		4		16		4		4		4		4		4		4		4		8		4		4		5		10		4		4		4		4
11 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		3		6		3		6		3		9		3		3		3		3		3		3		3		6		3		6		3		9		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2	Y	3	1	3	Y	3	2	6	Y	3	2	6	Y	4	3	12	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2		4		4		3		6		3		6		4		12		4		4		4		4		4		4		4		8		4		8		5		15		4		4		4		4

PIEVC Risk Scores
Stormwater Management System



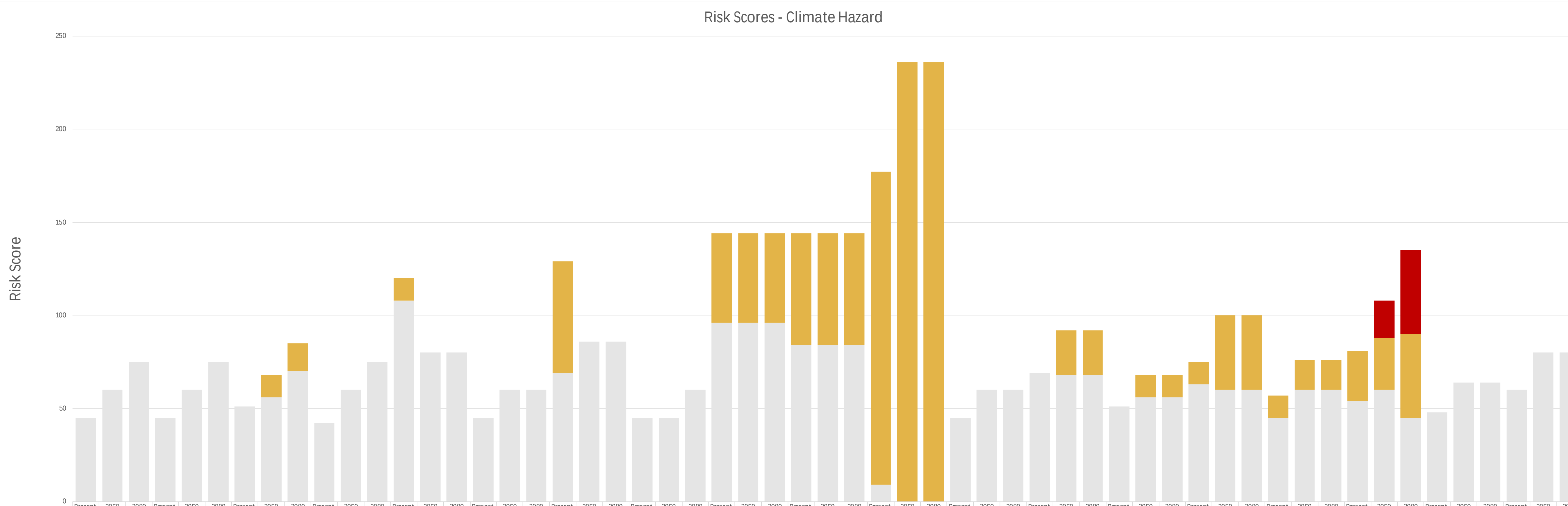
	Collector, Trunk, and Lateral Mains			Stormwater Manholes and Catch Basins			Athabasca River Outfall		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	20	25
Medium Risk Score	48	40	50	60	56	56	27	16	16
Low Risk	57	77	74	48	65	71	75	81	86

	Tawatinaw Creek Outfall			Cornwall Retention Pond (Dry) and Release Vault			Cornwall 34th Street Outfall		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0
Medium Risk Score	24	16	16	24	28	28	12	16	16
Low Risk	69	87	93	72	82	88	75	83	89

	Woodheights Retention Pond (Wet), Release Vault, and Outfall			University Retention Pond (Wet) and outfall			3602-48th Avenue Outfall		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0
Medium Risk Score	12	16	16	12	16	16	12	16	16
Low Risk	78	89	95	78	89	95	72	80	86

	Landing Industrial Park Retention Pond (Wet)			Various other minor outfall locations (Muskeg creek, Edwin Parr, Hees, 54th st, 53rd st)			Overland Control (curb and gutter, culverts-road crossings, drainage corridors)		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0
Medium Risk Score	12	16	16	12	16	16	36	64	74
Low Risk	78	89	95	78	85	91	75	63	60

	Operations and Maintenance			Public / Customers			Emergency Services		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	20	0	0	0	0	0	0
Medium Risk Score	84	120	107	24	16	26	0	24	27
Low Risk	66	55	59	75	95	92	81	75	80



	Annual Mean			Very Hot Days			Hottest Day		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0
Medium Risk Score	0	0	0	0	0	0	0	12	15
Low Risk Score	45	60	75	45	60	75	51	56	70

	Cooling Degree Days			Coldest Days			Frost-free Season		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0
Medium Risk Score	0	0	0	12	0	0	0	0	0
Low Risk Score	42	60	75	108	80	80	45	60	60

	Freeze/ Thaw Events			Annual Percipitation			Extreme Rainfall		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0
Medium Risk Score	60	0	0	0	0	0	48	48	48
Low Risk Score	69	86	86	45	45	60	96	96	96

	Persistant Percipitation			Short Duration Rainfall/ Overland Flooding			Drought		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0
Medium Risk Score	60	60	60	168	236	236	0	0	0
Low Risk Score	84	84	84	9	0	0	45	60	60

	Snow Accumulation			Lightning			Hail		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0
Medium Risk Score	0	24	24	0	12	12	12	40	40
Low Risk Score	69	68	68	51	56	56	63	60	60

	Tornado			River Flooding			Wildfire Smoke			Shifting Ecosystem		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	20	45	0	0	0	0	0	0
Medium Risk Score	12	16	16	27	28	45	0	0	0	0	0	0
Low Risk Score	45	60	60	54	60	45	48	64	64	60	80	80

PIEVC Risk Matrix
Wastewater Management System

Consequence Score

- 0 - No Effect
- 1 - Very Low
- 2 - Low
- 3 - Moderate
- 4 - High
- 5 - Very High

Climate Parameter — Temperature

			Mean Annual Temperature (◦C)				Days above +30ºC				Hottest Day (◦C)				Cooling Degree Days (Degree Days)				# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events			
			Annual Mean				**Very Hot Days**				**Hottest Day**				**Cooling Degree Days**				**Coldest Days**				**Frost-free Season**				**Freeze/ Thaw Events**			
	Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14.1	3			120	3			86.5	3		
		2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
		2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
	Component: Wastewater		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
		Present		3		3		3		3		3		3		3		3		3		6		3		3		3		9
1	Collection Mains and Forcemains	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	3	6
		2080		5		5		5		5		5		5		5		5		2		4		4		4		2		6
		Present		3		3		3		3		3		3		3		3		3		6		3		3		3		9
2	Sanitary Manholes	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	3	6
		2080		5		5		5		5		5		5		5		5		2		4		4		4		2		6
		Present		3		3		3		3		3		3		3		3		3		9		3		3		3		9
3	Lot Service Lines	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	3	6
		2080		5		5		5		5		5		5		5		5		2		6		4		4		2		6
		Present		3		3		3		9		3		12		3		9		3		9		3		3		3		3
4	1 Main Sewage Lift Station	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	3	12	Y	2	3	6	Y	4	1	4	Y	2	1	2
		2080		5		5		5		15		5		20		5		15		2		6		4		4		2		2
		Present		3		3		3		6		3		9		3		6		3		9		3		3		3		3
5	1 West End Lift Station	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	2	8	Y	2	3	6	Y	4	1	4	Y	2	1	2
		2080		5		5		5		10		5		15		5		10		2		6		4		4		2		2
		Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
6	1 Air/Vacuum Release Vault	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
		2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2
		Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
7	Service Line Cleanouts	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
		2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2
		Present		3		3		3		9		3		12		3		9		3		9		3		3		3		3
8	Headworks	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	3	12	Y	2	3	6	Y	4	1	4	Y	2	1	2
		2080		5		5		5		15		5		20		5		15		2		6		4		4		2		2
		Present		3		3		3		6		3		9		3		6		3		9		3		3		3		3
9	Aerated 3-Cell Lagoon	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	2	8	Y	2	3	6	Y	4	1	4	Y	2	1	2
		2080		5		5		5		10		5		15		5		10		2		6		4		4		2		2
		Present		3		3		3		9		3		12		3		9		3		9		3		3		3		3
10	Aeration System	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	3	12	Y	2	3	6	Y	4	1	4	Y	2	1	2
		2080		5		5		5		15		5		20		5		15		2		6		4		4		2		2
		Present		3		3		3		3		3		6		3		6		3		6		3		3		3		3
11	Communication / SCADA	2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	2	2	4	Y	4	1	4	Y	2	1	2
		2080		5		5		5		5		5		10		5		10		2		4		4		4		2		2
		Present		3		3		3		6		3		12		3		9		3		9		3		3		3		6
11	Operations and Maintenance	2050	Y	4	1	4	Y	4	2	8	Y	4	4	16	Y	4	3	12	Y	2	3	6	Y	4	1	4	Y	2	2	4
		2080		5		5		5		10		5		20		5		15		2		6		4		4		2		4
		Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
11	Public/Customers	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
		2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2
		Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
11	Emergency Services	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
		2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2

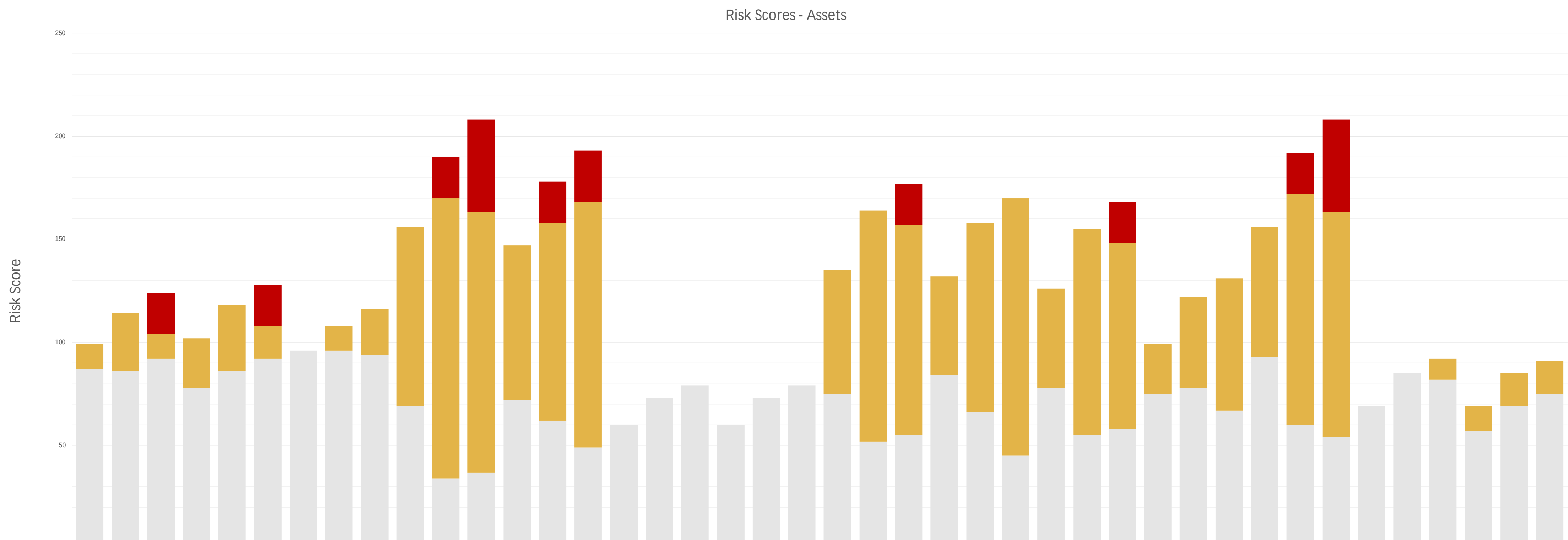
Climate Parameter — Precipitation

			Annual Total Percipitation (mm)				Maximum 1-Day Total Percipitation (mm)				Maximum 5-day Consecutive Percipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)			
			Annual Percipitation				**Extreme Rainfall**				**Persistant Percipitation**				Short Duration Rainfall/ Overland Flooding				**Drought**				**Snow Accumulation**			
	Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
		2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
		2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
	Component: Wastewater		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
		Present		3		6		3		9		3		9		3		9		3		6		3		3
1	Collection Mains and Forcemains	2050	Y	3	2	6	Y	3	3	9	Y	3	3	9	Y	4	3	12	Y	4	2	8	Y	4	1	4
		2080		4		8		3		9		3		9		4		12		4		8		4		4
		Present		3		6		3		9		3		9		3		12		3		6		3		3
2	Sanitary Manholes	2050	Y	3	2	6	Y	3	3	9	Y	3	3	9	Y	4	4	16	Y	4	2	8	Y	4	1	4
		2080		4		8		3		9		3		9		4		16		4		8		4		4
		Present		3		6		3		9		3		9		3		9		3		6		3		3
3	Lot Service Lines	2050	Y	3	2	6	Y	3	3	9	Y	3	3	9	Y	4	3	12	Y	4	2	8	Y	4	1	4
		2080		4		8		3		9		3		9		4		12		4		8		4		4
		Present		3		6		3		12		3		12		3		12		3		3		3		9
4	1 Main Sewage Lift Station	2050	Y	3	2	6	Y	3	4	12	Y	3	4	12	Y	4	4	16	Y	4	1	4	Y	4	3	12
		2080		4		8		3		12		3		12		4		16		4		4		4		12
		Present		3		6		3		12		3		12		3		12		3		3		3		6
5	1 West End Lift Station	2050	Y	3	2	6	Y	3	4	12	Y	3	4	12	Y	4	4	16	Y	4	1	4	Y	4	2	8
		2080		4		8		3		12		3		12		4		16		4		4		4		8
		Present		3		3		3		3		3		3		3		3		3		3		3		3
6	1 Air/Vacuum Release Vault	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
		2080		4		4		3		3		3		3		4		4		4		4		4		4
		Present		3		3		3		3		3		3		3		3		3		6		3		3
7	Service Line Cleanouts	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	2	8	Y	4	1	4
		2080		4		4		3		3		3		3		4		4		4		8		4		4
		Present		3		3		3		9		3		12		3		9		3		3		3		3
8	Headworks	2050	Y	3	1	3	Y	3	3	9	Y	3	4	12	Y	4	3	12	Y	4	1	4	Y	4	1	4
		2080		4		4		3		9		3		12		4		12		4		4		4		4
		Present		3		6		3		12		3		12		3		9		3		3		3		9
9	Aerated 3-Cell Lagoon	2050	Y	3	2	6	Y	3	4	12	Y	3	4	12	Y	4	3	12	Y	4	1	4	Y	4	3	12
		2080		4		8		3		12		3		12		4		12		4		4		4		12
		Present		3		3		3		6		3		6		3		6		3		3		3		9
10	Aeration System	2050	Y	3	1	3	Y	3	2	6	Y	3	2	6	Y	4	2	8	Y	4	1	4	Y	4	3	12
		2080		4		4		3		6		3		6		4		8		4		4		4		12
		Present		3		6		3		3		3		3		3		3		3		3		3		6
11	Communication / SCADA	2050	Y	3	2	6	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
		2080		4		8		3		3		3		3		4		4		4		4		4		8
		Present		3		3		3		9		3		6		3		9		3		6		3		9
11	Operations and Maintenance	2050	Y	3	1	3	Y	3	3	9	Y	3	2	6	Y	4	3	12	Y	4	2	8	Y	4	3	12
		2080		4		4		3		9		3		6		4		12		4		8		4		12
		Present		3		3		3		3		3		3		3		3		3		6		3		6
11	Public/Customers	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	2	8	Y	4	2	8
		2080		4		4		3		3		3		3		4		4		4		8		4		8
		Present		3		3		3		3		3		3		3		3		3		3		3		6
11	Emergency Services	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
		2080		4		4		3		3		3		3		4		4		4		4		4		8

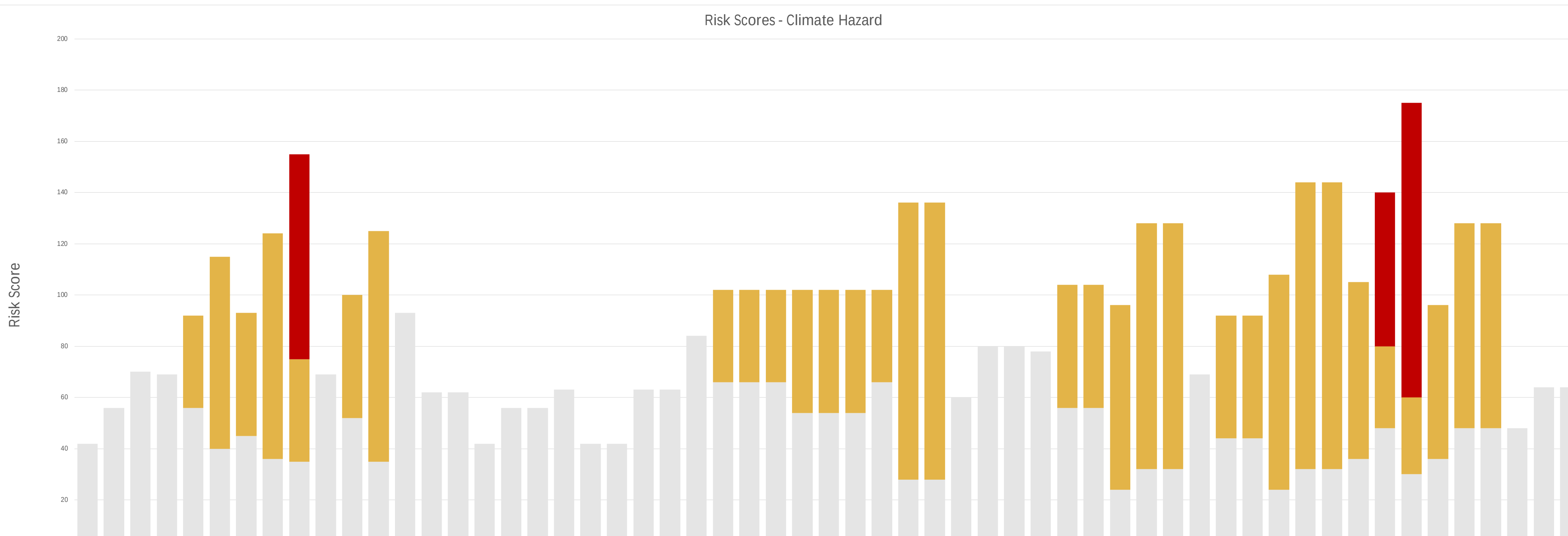
Climate Parameter — Extreme Events / Shifiting Natural Ecoregions

			Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit				Shifiting Natural Ecoregions			
			Lightning				**Hail**				**Tornado**				**River Flooding**				Wildfire Smoke				Shifting Ecosystem			
	Climate Projections	Present	-	3			-	3			-	3			-	3			-	3			-	3		
		2050	+	4			+	4			+	4			+	4			+	4			+	4		
		2080	++	4			+	4			+	4			++	5			+	4			+	4		
	Component: Wastewater		Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
		Present		3		3		3		3		3		3		3		12		3		3		3		3
1	Collection Mains and Forcemains	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	1	4
		2080		4		4		4		4		4		4		5		20		4		4		4		4
		Present		3		3		3		3		3		3		3		12		3		3		3		3
2	Sanitary Manholes	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	1	4
		2080		4		4		4		4		4		4		5		20		4		4		4		4
		Present		3		3		3		3		3		3		3		6		3		3		3		3
3	Lot Service Lines	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4
		2080		4		4		4		4		4		4		5		10		4		4		4		4
		Present		3		12		3		9		3		12		3		15		3		3		3		3
4	1 Main Sewage Lift Station	2050	Y	4	4	16	Y	4	3	12	Y	4	4	16	Y	4	5	20	Y	4	1	4	Y	4	1	4
		2080		4		16		4		12		4		16		5		25		4		4		4		4
		Present		3		12		3		9		3		12		3		15		3		6		3		3
5	1 West End Lift Station	2050	Y	4	4	16	Y	4	3	12	Y	4	4	16	Y	4	5	20	Y	4	2	8	Y	4	1	4
		2080		4		16		4		12		4		16		5		25		4		8		4		4
		Present		3		3		3		3		3		3		3		3		3		6		3		3
6	1 Air/Vacuum Release Vault	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4
		2080		4		4		4		4		4		4		5		5		4		8		4		4
		Present		3		3		3		3		3		3		3		3		3		3		3		3
7	Service Line Cleanouts	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
		2080		4		4		4		4		4		4		5		5		4		4		4		4
		Present		3		12		3		6		3		12		3		3		3		12		3		3
8	Headworks	2050	Y	4	4	16	Y	4	2	8	Y	4	4	16	Y	4	1	4	Y	4	4	16	Y	4	1	4
		2080		4		16		4		8		4		16		5		5		4		16		4		4
		Present		3		3		3		3		3		12		3		6		3		12		3		6
9	Aerated 3-Cell Lagoon	2050	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	2	8	Y	4	4	16	Y	4	2	8
		2080		4		4		4		4		4		16		5		10		4		16		4		8
		Present		3		12		3		3		3		12		3		3		3		12		3		3
10	Aeration System	2050	Y	4	4	16	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	4	16	Y	4	1	4
		2080		4		16		4		4		4		16		5		5		4		16		4		4
		Present		3		12		3		9		3		12		3		3		3		6		3		3
11	Communication / SCADA	2050	Y	4	4	16	Y	4	3	12	Y	4	4	16	Y	4	1	4	Y	4	2	8	Y	4	1	4
		2080		4		16		4		12		4		16		5		5		4		8		4		4
		Present		3		12		3		9		3		12		3		15		3		12		3		6
11	Operations and Maintenance	2050	Y	4	4	16	Y	4	3	12	Y	4	4	16	Y	4	5	20	Y	4	4	16	Y	4	2	8
		2080		4		16		4		12		4		16		5		25		4		16		4		8
		Present		3		3		3		3		3		6		3		6		3		3		3		3
11	Public/Customers	2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	4	1	4
		2080		4		4		4		4		4		8		5		10		4		4		4		4
		Present		3		3		3		3		3		3		3		3		3		12		3		3
11	Emergency Services	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4
		2080		4		4		4		4		4		4		5		5		4		16		4		4

PIEVC Risk Scores
Wastewater Management System



Asset	Period	High Risk Score	Medium Risk Score	Low Risk Score
Collection Mains and Forcemains	Present	0	12	87
	2050	0	28	86
	2080	20	12	92
Sanitary Manholes	Present	0	24	78
	2050	0	32	86
	2080	20	16	92
Lot Service Lines	Present	0	0	96
	2050	0	12	96
	2080	0	22	94
1 Main Sewage Lift Station	Present	0	87	69
	2050	20	136	34
	2080	45	126	37
1 West End Lift Station	Present	0	75	72
	2050	20	96	62
	2080	25	119	49
1 Air/Vacuum Release Vault	Present	0	0	60
	2050	0	0	73
	2080	0	0	79
Service Line Cleanouts	Present	0	0	60
	2050	0	0	73
	2080	0	0	79
Headworks	Present	0	60	75
	2050	0	112	52
	2080	20	102	55
Aerated 3-Cell Lagoon	Present	0	48	84
	2050	0	92	66
	2080	0	125	45
Aeration System	Present	0	48	78
	2050	0	100	55
	2080	20	90	58
Communication / SCADA	Present	0	24	75
	2050	0	44	78
	2080	0	64	67
Operations and Maintenance	Present	0	63	93
	2050	20	112	60
	2080	45	109	54
Public/Customers	Present	0	0	69
	2050	0	0	85
	2080	0	10	82
Emergency Services	Present	0	12	57
	2050	0	16	69
	2080	0	16	75



Climate Hazard	Period	High Risk Scores	Medium Risk Scores	Low Medium Risk
Annual Mean	Present	0	0	42
	2050	0	0	56
	2080	0	0	70
Very Hot Days	Present	0	0	69
	2050	0	36	56
	2080	0	75	40
Hottest Day	Present	0	48	45
	2050	0	88	36
	2080	80	40	35
Cooling Degree Days	Present	0	0	69
	2050	0	48	52
	2080	0	90	35
Coldest Days	Present	0	0	93
	2050	0	0	62
	2080	0	0	62
Frost-free Season	Present	0	0	42
	2050	0	0	56
	2080	0	0	56
Freeze/ Thaw Events	Present	0	0	63
	2050	0	0	42
	2080	0	0	42
Annual Percipitation	Present	0	0	63
	2050	0	0	63
	2080	0	0	84
Extreme Rainfall	Present	0	36	66
	2050	0	36	66
	2080	0	36	66
Persistant Percipitation	Present	0	48	54
	2050	0	48	54
	2080	0	48	54
Short Duration Rainfall/ Overland Flooding	Present	0	36	66
	2050	0	108	28
	2080	0	108	28
Drought	Present	0	0	60
	2050	0	0	80
	2080	0	0	80
Snow Accumulation	Present	0	0	78
	2050	0	48	56
	2080	0	48	56
Lightning	Present	0	72	24
	2050	0	96	32
	2080	0	96	32
Hail	Present	0	0	69
	2050	0	48	44
	2080	0	48	44
Tornado	Present	0	84	24
	2050	0	112	32
	2080	0	112	32
River Flooding	Present	0	69	36
	2050	60	32	48
	2080	115	30	30
Wildfire Smoke	Present	0	60	36
	2050	0	80	48
	2080	0	80	48
Shifting Ecosystem	Present	0	0	48
	2050	0	0	64
	2080	0	0	64

PIEVC Risk Matrix
Water Distribution System

Consequence Score

- 0 - No Effect
- 1 - Very Low
- 2 - Low
- 3 - Moderate
- 4 - High
- 5 - Very High

Climate Parameter — Temperature

		Mean Annual Temperature (°C)				Days above +30ºC				Hottest Day (°C)				Cooling Degree Days (Degree Days)				# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events			
		Annual Mean				Very Hot Days				Hottest Day				Cooling Degree Days				Coldest Days				Frost-free Season				Freeze/ Thaw Events			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14	3			120	3			86.5	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
Component: Water (Aspen Regional Water Services Commission)		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Intake	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		9
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	3	6
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		6
2 Raw Water Wet Well	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		9
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	3	6
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		6
3 Raw Water River Pumphouse	Present		3		3		3		12		3		15		3		12		3		9		3		3		3		6
	2050	Y	4	1	4	Y	4	4	16	Y	4	5	20	Y	4	4	16	Y	2	3	6	Y	4	1	4	Y	2	2	4
	2080		5		5		5		20		5		25		5		20		2		6		4		4		2		4
4 Raw Water Supply Line	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		9
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	3	6
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		6
5 Raw Water Holding Pond	Present		3		3		3		9		3		12		3		3		3		6		3		3		3		6
	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	2	4
	2080		5		5		5		15		5		20		5		5		2		4		4		4		2		4
6 Microfiltration Water Treatment Plant	Present		3		3		3		6		3		9		3		12		3		6		3		9		3		6
	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	4	16	Y	2	2	4	Y	4	3	12	Y	2	2	4
	2080		5		5		5		10		5		15		5		20		2		4		4		12		2		4
7 Regional Transmission Line	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		2
8 Treated Water Reservoirs (7)	Present		3		3		3		9		3		12		3		12		3		9		3		9		3		6
	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	4	16	Y	2	3	6	Y	4	3	12	Y	2	2	4
	2080		5		5		5		15		5		20		5		20		2		6		4		12		2		4
9 Distribution Systems (8)	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		15
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	5	10
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		10
10 Distribution Water Mains	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		15
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	5	10
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		10
11 Water Services	Present		3		3		3		3		3		3		3		3		3		12		3		3		3		15
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	4	8	Y	4	1	4	Y	2	5	10
	2080		5		5		5		5		5		5		5		5		2		8		4		4		2		10
12 Appurtenances (valves, hydrants)	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		15
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	5	10
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		10
13 Pressure Reducing Stations	Present		3		3		3		6		3		9		3		9		3		9		3		3		3		15
	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	3	12	Y	2	3	6	Y	4	1	4	Y	2	5	10
	2080		5		5		5		10		5		15		5		15		2		6		4		4		2		10
14 Communication / SCADA	Present		3		3		3		9		3		12		3		12		3		6		3		3		3		12
	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	4	16	Y	2	2	4	Y	4	1	4	Y	2	4	8
	2080		5		5		5		15		5		20		5		20		2		4		4		4		2		8
15 Operations and Maintenance	Present		3		3		3		9		3		12		3		12		3		9		3		9		3		15
	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	4	16	Y	2	3	6	Y	4	3	12	Y	2	5	10
	2080		5		5		5		15		5		20		5		20		2		6		4		12		2		10
16 Public / Customers	Present		3		3		3		3		3		12		3		3		3		9		3		3		3		12
	2050	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	4	8
	2080		5		5		5		5		5		20		5		5		2		6		4		4		2		8
17 Emergency Services	Present		3		3		3		3		3		12		3		3		3		9		3		3		3		12
	2050	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	4	8
	2080		5		5		5		5		5		20		5		5		2		6		4		4		2		8

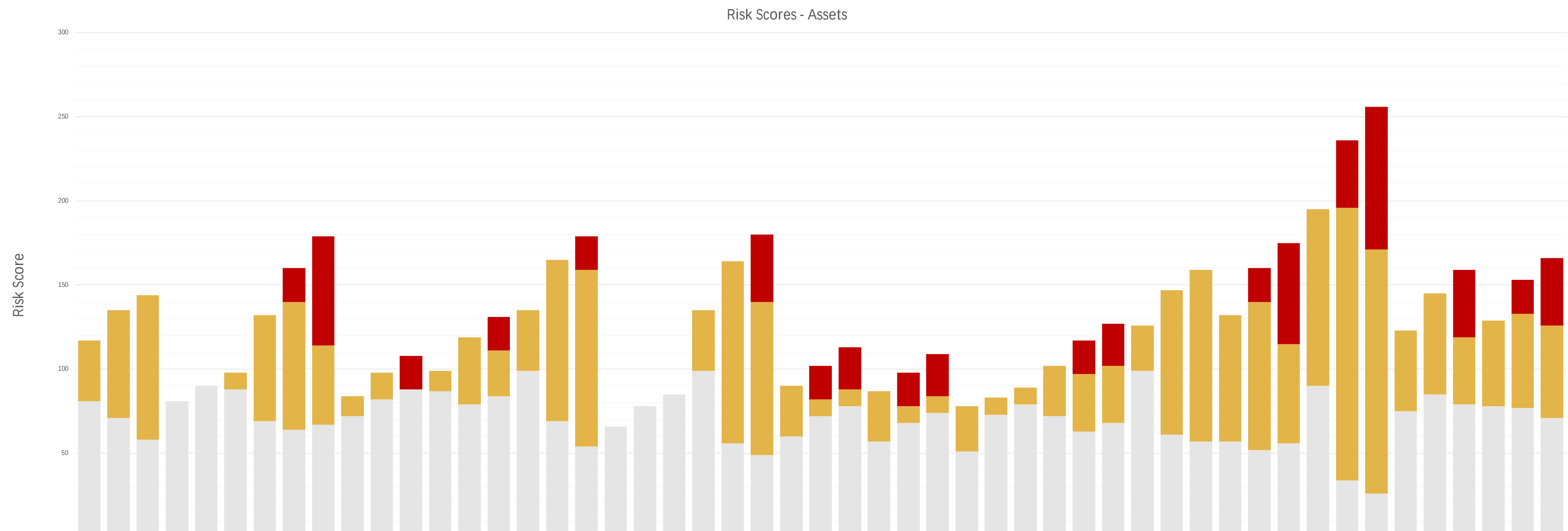
Climate Parameter — Precipitation

		Annual Total Precipitation (mm)				Maximum 1-Day Total Precipitation (mm)				Maximum 5-day Consecutive Precipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)			
		Annual Precipitation				Extreme Rainfall				Persistant Precipitation				Short Duration Rainfall/ Overland Flooding				Drought				Snow Accumulation			
Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
	2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
	2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
Component: Water (Aspen Regional Water Services Commission)		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Intake	Present		3		9		3		12		3		12		3		6		3		9		3		3
	2050	Y	3	3	9	Y	3	4	12	Y	3	4	12	Y	4	2	8	Y	4	3	12	Y	4	1	4
	2080		4		12		3		12		3		12		4		8		4		12		4		4
2 Raw Water Wet Well	Present		3		6		3		6		3		6		3		3		3		3		3		3
	2050	Y	3	2	6	Y	3	2	6	Y	3	2	6	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		8		3		6		3		6		4		4		4		4		4		4
3 Raw Water River Pumphouse	Present		3		6		3		6		3		6		3		6		3		3		3		3
	2050	Y	3	2	6	Y	3	2	6	Y	3	2	6	Y	4	2	8	Y	4	1	4	Y	4	1	4
	2080		4		8		3		6		3		6		4		8		4		4		4		4
4 Raw Water Supply Line	Present		3		6		3		3		3		3		3		3		3		6		3		6
	2050	Y	3	2	6	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	2	8	Y	4	2	8
	2080		4		8		3		3		3		3		4		4		4		8		4		8
5 Raw Water Holding Pond	Present		3		6		3		3		3		6		3		6		3		6		3		3
	2050	Y	3	2	6	Y	3	1	3	Y	3	2	6	Y	4	2	8	Y	4	2	8	Y	4	1	4
	2080		4		8		3		3		3		6		4		8		4		8		4		4
6 Microfiltration Water Treatment Plant	Present		3		9		3		6		3		6		3		6		3		6		3		3
	2050	Y	3	3	9	Y	3	2	6	Y	3	2	6	Y	4	2	8	Y	4	2	8	Y	4	1	4
	2080		4		12		3		6		3		6		4		8		4		8		4		4
7 Regional Transmission Line	Present		3		6		3		3		3		3		3		3		3		6		3		3
	2050	Y	3	2	6	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		8		3		3		3		3		4		4		4		8		4		4
8 Treated Water Reservoirs (7)	Present		3		9		3		3		3		6		3		3		3		6		3		9
	2050	Y	3	3	9	Y	3	1	3	Y	3	2	6	Y	4	1	4	Y	4	2	8	Y	4	3	12
	2080		4		12		3		3		3		6		4		4		4		8		4		12
9 Distribution Systems (8)	Present		3		6		3		3		3		3		3		3		3		3		3		6
	2050	Y	3	2	6	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		4		8		3		3		3		3		4		4		4		4		4		8
10 Distribution Water Mains	Present		3		6		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	2	6	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		8		3		3		3		3		4		4		4		4		4		4
11 Water Services	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
12 Appurtenances (valves, hydrants)	Present		3		3		3		3		3		3		3		6		3		3		3		9
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	2	8	Y	4	1	4	Y	4	3	12
	2080		4		4		3		3		3		3		4		8		4		4		4		12
13 Pressure Reducing Stations	Present		3		6		3		3		3		6		3		12		3		3		3		6
	2050	Y	3	2	6	Y	3	1	3	Y	3	2	6	Y	4	4	16	Y	4	1	4	Y	4	2	8
	2080		4		8		3		3		3		6		4		16		4		4		4		8
14 Communication / SCADA	Present		3		6		3		3		3		3		3		3		3		3		3		15
	2050	Y	3	2	6	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	5	20
	2080		4		8		3		3		3		3		4		4		4		4		4		20
15 Operations and Maintenance	Present		3		9		3		6		3		9		3		12		3		9		3		9
	2050	Y	3	3	9	Y	3	2	6	Y	3	3	9	Y	4	4	16	Y	4	3	12	Y	4	3	12
	2080		4		12		3		6		3		9		4		16		4		12		4		12
16 Public / Customers	Present		3		9		3		3		3		3		3		6		3		9		3		6
	2050	Y	3	3	9	Y	3	1	3	Y	3	1	3	Y	4	2	8	Y	4	3	12	Y	4	2	8
	2080		4		12		3		3		3		3		4		8		4		12		4		8
17 Emergency Services	Present		3		9		3		3		3		3		3		6		3		6		3		6
	2050	Y	3	3	9	Y	3	1	3	Y	3	1	3	Y	4	2	8	Y	4	2	8	Y	4	2	8
	2080		4		12		3		3		3		3		4		8		4		8		4		8

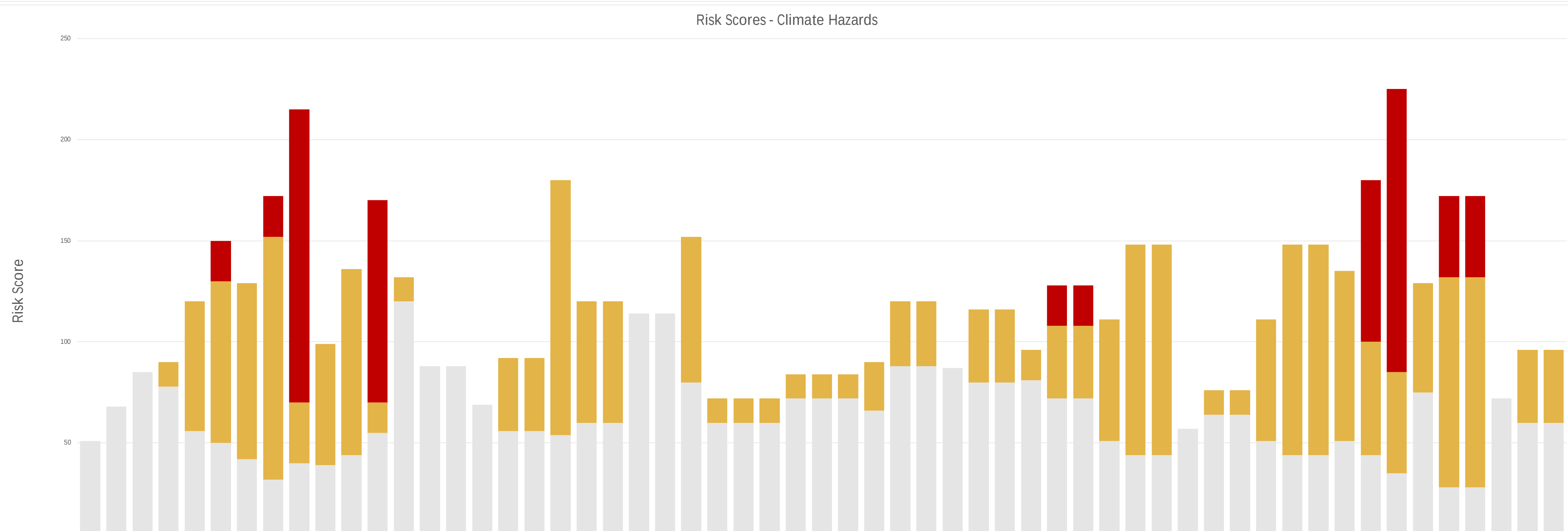
Climate Parameter — Extreme Events and Shifting Natural Ecoregions

		Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit				Shifting Natural Ecoregions			
		Lightning				Hail				Tornado				River Flooding				Wildfire Smoke				Shifting Ecosystem			
Climate Projections	Present	-	3			-	3			-	3			-	3			-	3			-	3		
	2050	+	4			+	4			+	4			+	4			+	4			+	4		
	2080	++	4			+	4			+	4			++	5			+	4			+	4		
Component: Water (Aspen Regional Water Services Commission)		Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Intake	Present		3		3		3		3		3		3		3		6		3		12		3		9
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	4	16	Y	4	3	12
	2080		4		4		4		4		4		4		5		10		4		16		4		12
2 Raw Water Wet Well	Present		3		3		3		3		3		3		3		6		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		5		10		4		4		4		4
3 Raw Water River Pumphouse	Present		3		12		3		3		3		12		3		9		3		3		3		3
	2050	Y	4	4	16	Y	4	1	4	Y	4	4	16	Y	4	3	12	Y	4	1	4	Y	4	1	4
	2080		4		16		4		4		4		16		5		15		4		4		4		4
4 Raw Water Supply Line	Present		3		3		3		3		3		3		3		12		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		5		20		4		4		4		4
5 Raw Water Holding Pond	Present		3		3		3		3		3		3		3		3		3		9		3		6
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	3	12	Y	4	2	8
	2080		4		4		4		4		4		4		5		5		4		12		4		8
6 Microfiltration Water Treatment Plant	Present		3		12		3		3		3		12		3		3		3		9		3		9
	2050	Y	4	4	16	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	3	12	Y	4	3	12
	2080		4		16		4		4		4		16		5		5		4		12		4		12
7 Regional Transmission Line	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		4		4		4
8 Treated Water Reservoirs (7)	Present		3		12		3		3		3		9		3		3		3		9		3		3
	2050	Y	4	4	16	Y	4	1	4	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		16		4		4		4		12		5		5		4		12		4		4
9 Distribution Systems (8)	Present		3		3		3		3		3		3		3		15		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	5	20	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		5		25		4		4		4		4
10 Distribution Water Mains	Present		3		3		3		3		3		3		3		15		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	5	20	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		5		25		4		4		4		4
11 Water Services	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		4		4		4
12 Appurtenances (valves, hydrants)	Present		3		3		3		3		3		3		3		15		3		9		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	5	20	Y	4	3	12	Y	4	1	4
	2080		4		4		4		4		4		4		5		25		4		12		4		4
13 Pressure Reducing Stations	Present		3		9		3		3		3		9		3		3		3		9		3		3
	2050	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		12		4		4		4		12		5		5		4		12		4		4
14 Communication / SCADA	Present		3		12		3		3		3		12		3		3		3		9		3		3
	2050	Y	4	4	16	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		16		4		4		4		16		5		5		4		12		4		4
15 Operations and Maintenance	Present		3		12		3		9		3		12		3		15		3		15		3		9
	2050	Y	4	4	16	Y	4	3	12	Y	4	4	16	Y	4	5	20	Y	4	5	20	Y	4	3	12
	2080		4		16		4		12		4		16		5		25		4		20		4		12
16 Public / Customers	Present		3		6		3		3		3		6		3		12		3		12		3		3
	2050	Y	4	2	8	Y	4	1	4	Y	4	2	8	Y	4	4	16	Y	4	4	16	Y	4	1	4
	2080		4		8		4		4		4		8		5		20		4		16		4		4
17 Emergency Services	Present		3		9		3		3		3		12		3		9		3		15		3		3
	2050	Y	4	3	12	Y	4	1	4	Y	4	4	16	Y	4	3	12	Y	4	5	20	Y	4	1	4
	2080		4		12		4		4		4		16		5		15		4		20		4		4

PIEVC Risk Scores
Water Distribution System



Asset	Period	High Risk Score	Medium Risk Score	Low Risk Scores
Intake	Present	0	36	81
Intake	2050	0	64	71
Intake	2080	0	86	58
Raw Water Wet Well	Present	0	0	81
Raw Water Wet Well	2050	0	0	90
Raw Water Wet Well	2080	0	10	88
Raw Water River Pumphouse	Present	0	63	69
Raw Water River Pumphouse	2050	20	76	64
Raw Water River Pumphouse	2080	65	47	67
Raw Water Supply Line	Present	0	12	72
Raw Water Supply Line	2050	0	16	82
Raw Water Supply Line	2080	20	0	88
Raw Water Holding Pond	Present	0	12	87
Raw Water Holding Pond	2050	0	40	79
Raw Water Holding Pond	2080	20	27	84
Microfiltration Water Treatment Plant	Present	0	36	99
Microfiltration Water Treatment Plant	2050	0	96	69
Microfiltration Water Treatment Plant	2080	20	105	54
Regional Transmission Line	Present	0	0	66
Regional Transmission Line	2050	0	0	78
Regional Transmission Line	2080	0	0	85
Treated Water Reservoirs (7)	Present	0	36	99
Treated Water Reservoirs (7)	2050	0	108	56
Treated Water Reservoirs (7)	2080	40	91	49
Distribution Systems (8)	Present	0	30	60
Distribution Systems (8)	2050	20	10	72
Distribution Systems (8)	2080	25	10	78
Distribution Water Mains	Present	0	30	57
Distribution Water Mains	2050	20	10	68
Distribution Water Mains	2080	25	10	74
Water Services	Present	0	27	51
Water Services	2050	0	10	73
Water Services	2080	0	10	79
Appurtenances (valves, hydrants)	Present	0	30	72
Appurtenances (valves, hydrants)	2050	20	34	63
Appurtenances (valves, hydrants)	2080	25	34	68
Pressure Reducing Stations	Present	0	27	99
Pressure Reducing Stations	2050	0	86	61
Pressure Reducing Stations	2080	0	102	57
Communication / SCADA	Present	0	75	57
Communication / SCADA	2050	20	88	52
Communication / SCADA	2080	60	59	56
Operations and Maintenance	Present	0	105	90
Operations and Maintenance	2050	40	162	34
Operations and Maintenance	2080	85	145	26
Public / Customers	Present	0	48	75
Public / Customers	2050	0	60	85
Public / Customers	2080	40	40	79
Emergency Services	Present	0	51	78
Emergency Services	2050	20	56	77
Emergency Services	2080	40	55	71



Climate Hazard	Period	High Risk Scores	Medium Risk Scores	Low Risk Scores
Annual Mean	Present	0	0	51
Annual Mean	2050	0	0	68
Annual Mean	2080	0	0	85
Very Hot Days	Present	0	12	78
Very Hot Days	2050	0	64	56
Very Hot Days	2080	20	80	50
Hottest Day	Present	0	87	42
Hottest Day	2050	20	120	32
Hottest Day	2080	145	30	40
Cooling Degree Days	Present	0	60	39
Cooling Degree Days	2050	0	92	44
Cooling Degree Days	2080	100	15	55
Coldest Days	Present	0	12	120
Coldest Days	2050	0	0	88
Coldest Days	2080	0	0	88
Frost-free Season	Present	0	0	69
Frost-free Season	2050	0	36	56
Frost-free Season	2080	0	36	56
Freeze/ Thaw Events	Present	0	126	54
Freeze/ Thaw Events	2050	0	60	60
Freeze/ Thaw Events	2080	0	60	60
Annual Percipitation	Present	0	0	114
Annual Percipitation	2050	0	0	114
Annual Percipitation	2080	0	72	80
Extreme Rainfall	Present	0	12	60
Extreme Rainfall	2050	0	12	60
Extreme Rainfall	2080	0	12	60
Persistant Percipitation	Present	0	12	72
Persistant Percipitation	2050	0	12	72
Persistant Percipitation	2080	0	12	72
Short Duration Rainfall/ Overland Flooding	Present	0	24	66
Short Duration Rainfall/ Overland Flooding	2050	0	32	88
Short Duration Rainfall/ Overland Flooding	2080	0	32	88
Drought	Present	0	0	87
Drought	2050	0	36	80
Drought	2080	0	36	80
Snow Accumulation	Present	0	15	81
Snow Accumulation	2050	20	36	72
Snow Accumulation	2080	20	36	72
Lightning	Present	0	60	51
Lightning	2050	0	104	44
Lightning	2080	0	104	44
Hail	Present	0	0	57
Hail	2050	0	12	64
Hail	2080	0	12	64
Tornado	Present	0	60	51
Tornado	2050	0	104	44
Tornado	2080	0	104	44
River Flooding	Present	0	84	51
River Flooding	2050	80	56	44
River Flooding	2080	140	50	35
Wildfire Smoke	Present	0	54	75
Wildfire Smoke	2050	40	104	28
Wildfire Smoke	2080	40	104	28
Shifting Ecosystem	Present	0	0	72
Shifting Ecosystem	2050	0	36	60
Shifting Ecosystem	2080	0	36	60

PIEVC Risk Matrix
Fleet

Consequence Score

- 0 - No Effect
- 1 - Very Low
- 2 - Low
- 3 - Moderate
- 4 - High
- 5 - Very High

Climate Parameter

Temperature

Component	Period	Annual Mean (Mean Annual Temperature (°C))				Very Hot Days (Days above +30°C)				Hottest Day (Hottest Day (°C))				Cooling Degree Days (Cooling Degree Days (Degree Days))				Coldest Days (# of Days Below -30°C)				Frost-free Season (# Days Without Frost)			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14.1	3			120	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4		
Component: Fleet		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Heavy Equipment	Present		3		3		3		6		3		9		3		3		3		9		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	2	3	6	Y	4	1	4
	2080		5		5		5		10		5		15		5		5		2		6		4		4
2 Light Trucks	Present		3		3		3		3		3		3		3		3		3		6		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		4		4		4
3 Parks and Green Space Equipment	Present		3		3		3		6		3		6		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	2	1	2	Y	4	1	4
	2080		5		5		5		10		5		10		5		5		2		2		4		4
4 Operations and Maintenance	Present		3		3		3		6		3		9		3		3		3		9		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	2	3	6	Y	4	1	4
	2080		5		5		5		10		5		15		5		5		2		6		4		4
5 Public / Customers	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		2		4		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4
	2080		5		5		5		5		5		5		5		5		2		2		4		4

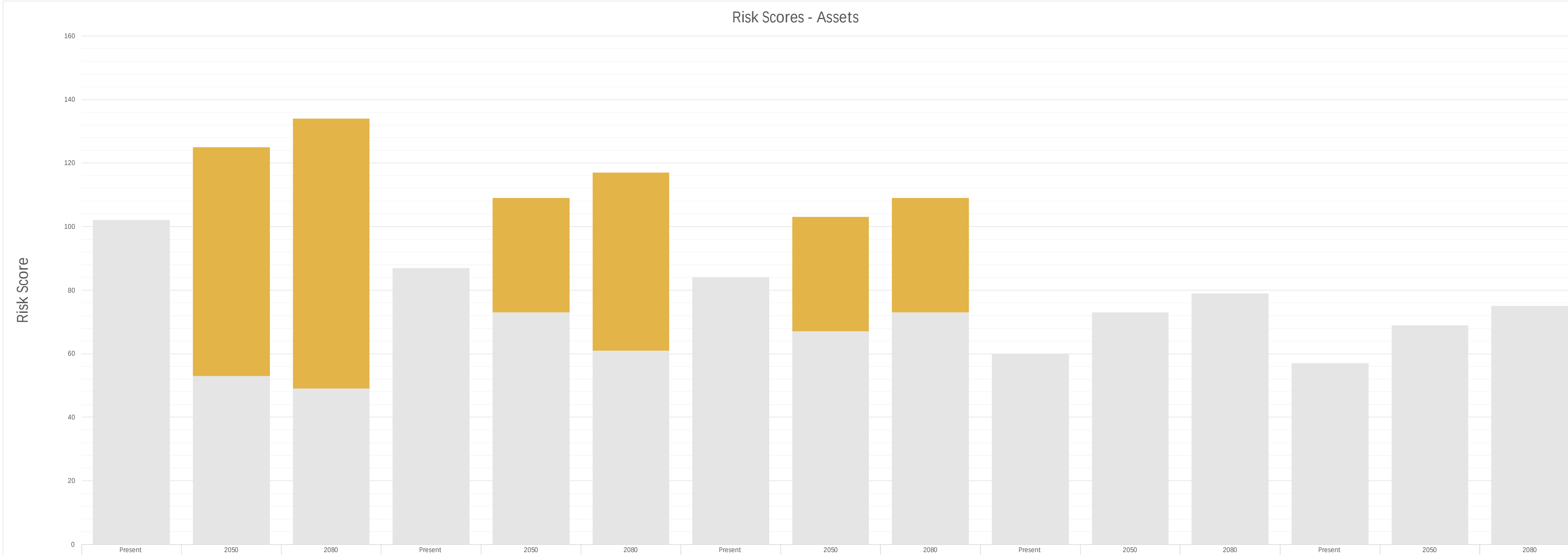
Temperature (Freeze/ Thaw Events) / Precipitation

Component	Period	Freeze/ Thaw Events (# Freeze/ Thaw Events)				Annual Percipitation (Annual Total Percipitation (mm))				Extreme Rainfall (Maximum 1-Day Total Percipitation (mm))				Persistant Percipitation (Maximum 5-day Consecutive Percipitation (mm))				Short Duration Rainfall/ Overland Flooding (Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr))				Drought (Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August))			
Climate Projections	Present	86.5	3			432	3			31	3			56	3			3.3	3			-0.1	3		
	2050	77.5	2			446	3			31	3			57	3			4.3	4			-0.5	4		
	2080	70.0	2			471	4			33	3			59	3			4.8	4			-0.8	4		
Component: Fleet		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Heavy Equipment	Present		3		3		3		3		3		3		3		3		3		3		3		9
	2050	Y	2	1	2	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	3	12
	2080		2		2		4		4		3		3		3		3		4		4		4		12
2 Light Trucks	Present		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	2	1	2	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	2	8
	2080		2		2		4		4		3		3		3		3		4		4		4		8
3 Parks and Green Space Equipment	Present		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	2	1	2	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	2	8
	2080		2		2		4		4		3		3		3		3		4		4		4		8
4 Operations and Maintenance	Present		3		3		3		3		3		3		3		3		3		3		3		9
	2050	Y	2	1	2	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	3	12
	2080		2		2		4		4		3		3		3		3		4		4		4		12
5 Public / Customers	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	2	1	2	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4
	2080		2		2		4		4		3		3		3		3		4		4		4		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	2	1	2	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4
	2080		2		2		4		4		3		3		3		3		4		4		4		4

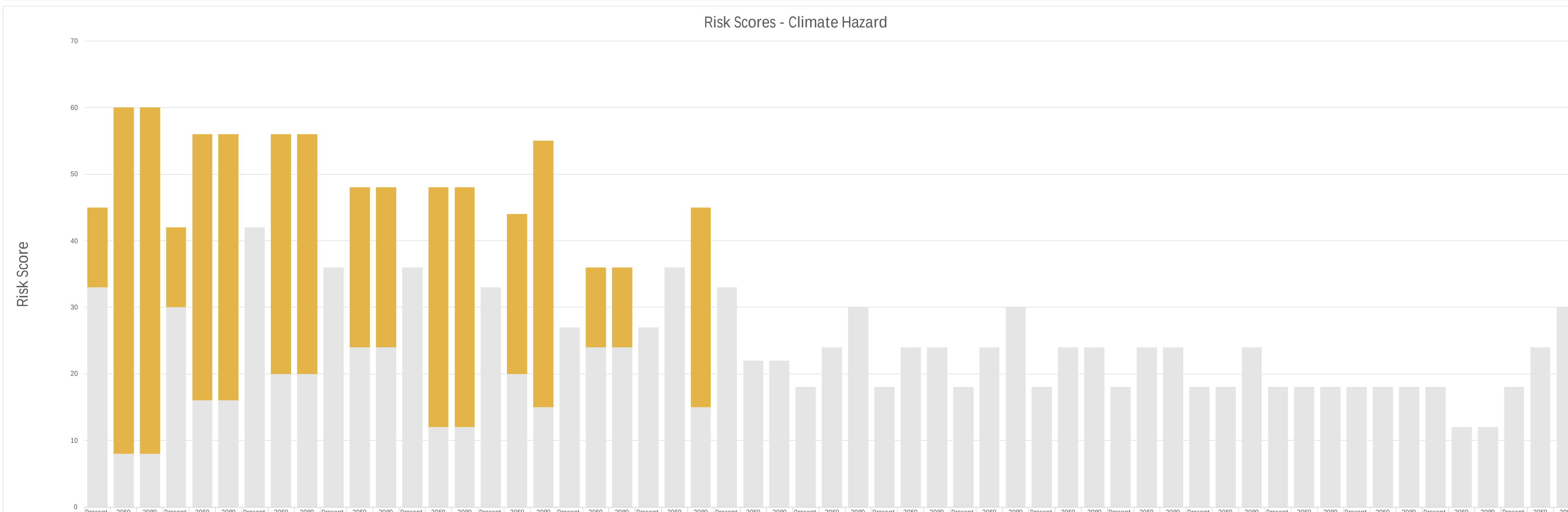
Precipitation (Snow Accumulation) / Extreme Events / Shifting Natural Ecoregions

Component	Period	Snow Accumulation (Winter Precipitation (mm))				Lightning (Lightning)				Hail (Hail Storm)				Tornado (High Wind/ Tornado)				River Flooding (Flooding)				Wildfire Smoke (Climate Moisture Deficit)				Shifting Ecosystem (Shifting Natural Ecoregions)			
Climate Projections	Present	69	3			-	3			-	3			-	3			-	3			-	3			-	3		
	2050	74	4			+	4			+	4			+	4			+	4			+	4			+	4		
	2080	79	4			++	4			+	4			+	4			++	5			+	4			+	4		
Component: Fleet		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Heavy Equipment	Present		3		9		3		3		3		9		3		9		3		3		3		9		3		3
	2050	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		12		4		4		4		12		4		12		5		5		4		12		4		4
2 Light Trucks	Present		3		6		3		3		3		9		3		9		3		3		3		9		3		3
	2050	Y	4	2	8	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		8		4		4		4		12		4		12		5		5		4		12		4		4
3 Parks and Green Space Equipment	Present		3		9		3		3		3		9		3		3		3		3		3		6		3		9
	2050	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	3	12
	2080		4		12		4		4		4		12		4		4		5		5		4		8		4		12
4 Operations and Maintenance	Present		3		9		3		3		3		12		3		9		3		3		3		12		3		6
	2050	Y	4	3	12	Y	4	1	4	Y	4	4	16	Y	4	3	12	Y	4	1	4	Y	4	4	16	Y	4	2	8
	2080		4		12		4		4		4		16		4		12		5		5		4		16		4		8
5 Public / Customers	Present		3		6		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		8		4		4		4		4		4		4		5		5		4		4		4		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		4		4		5		5		4		4		4		4

PIEVC Risk Scores
Fleet



	Heavy Equipment			Parks and Green Space Equipment			Light Trucks			Public / Customers			Emergency Services		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Score	0	72	85	0	36	56	0	36	36	0	0	0	0	0	0
Low Risk Score	102	53	49	87	73	61	84	67	73	60	73	79	57	69	75



	Hail			Wildfire Smoke			Snow Accumulation			Drought			Tornado		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	12	52	52	12	40	40	0	36	36	0	24	24	0	36	36
Low Risk Scores	33	8	8	30	16	16	42	20	20	36	24	24	36	12	12

	Hottest Day			Shifting Ecosystem			Very Hot Days			Coldest Days			Annual Mean		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	24	40	0	12	12	0	0	30	0	0	0	0	0	0
Low Risk Scores	33	20	15	27	24	24	27	36	15	33	22	22	18	24	30

	Short Duration Rainfall/ Overland Flooding			River Flooding			Frost-free Season			Lightning			Annual Percipitation		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Low Risk Scores	18	24	24	18	24	30	18	24	24	18	24	24	18	18	24

	Extreme Rainfall			Persistant Percipitation			Freeze/ Thaw Events			Cooling Degree Days		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0
Low Risk Scores	18	18	18	18	18	18	18	12	12	18	24	30

PIEVC Risk Matrix
Parks and Playgrounds

Consequence Score

0 - No Effect
1 - Very Low
2 - Low
3 - Moderate
4 - High
5 - Very High

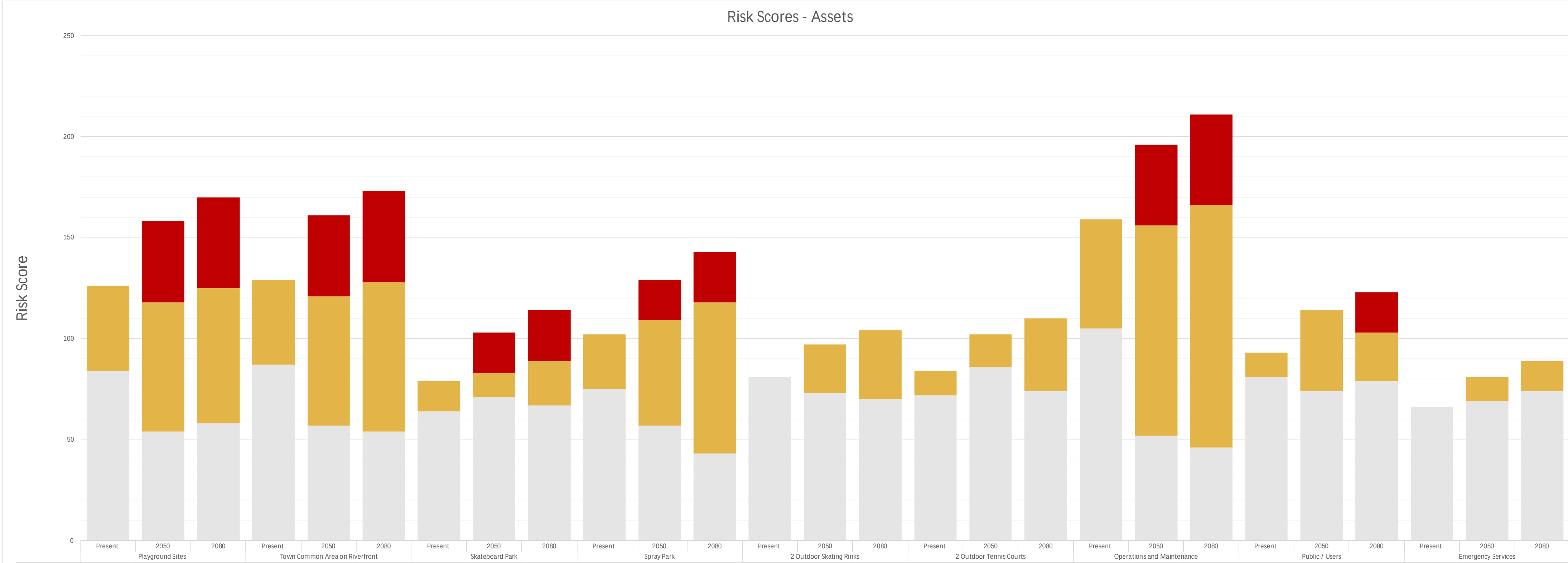
Climate Parameter

Component	Year	Temperature																											
		Mean Annual Temperature (°C)				Days above +30ºC				Hottest Day (°C)				Cooling Degree Days (Degree Days)				# of Days Below -30ºC				# Days Without Frost				# Freeze/ Thaw Events			
		Annual Mean				**Very Hot Days**				**Hottest Day**				**Cooling Degree Days**				**Coldest Days**				**Frost-free Season**				**Freeze/ Thaw Events**			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14.1	3			120	3			86.5	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
Component: Parks and Playgrounds		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
	Present		3		3		3		3		3		9		3		3		3		3		3		3		3		3
1 Playground Sites	2050	Y	4	1	4	Y	4	1	4	Y	4	3	12	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		15		5		5		2		2		4		4		2		2
	Present		3		3		3		3		3		6		3		3		3		3		3		3		3		3
2 Town Common Area on Riverfront	2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		10		5		5		2		2		4		4		2		2
	Present		3		3		3		3		3		6		3		3		3		3		3		3		3		6
3 Skateboard Park	2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	2	4
	2080		5		5		5		5		5		10		5		5		2		2		4		4		2		4
	Present		3		6		3		6		3		9		3		3		3		3		3		3		3		3
4 Spray Park	2050	Y	4	2	8	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		10		5		10		5		15		5		5		2		2		4		4		2		2
	Present		3		6		3		3		3		3		3		3		3		3		3		9		3		9
5 2 Outdoor Skating Rinks	2050	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	3	12	Y	2	3	6
	2080		5		10		5		5		5		5		5		5		2		2		4		12		2		6
	Present		3		3		3		6		3		6		3		3		3		3		3		3		3		3
6 2 Outdoor Tennis Courts	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		10		5		10		5		5		2		2		4		4		2		2
	Present		3		6		3		9		3		9		3		3		3		6		3		6		3		9
7 Operations and Maintenance	2050	Y	4	2	8	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	2	2	4	Y	4	2	8	Y	2	3	6
	2080		5		10		5		15		5		15		5		5		2		4		4		8		2		6
	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		6
8 Public / Users	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	2	4
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		4
	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
8 Emergency Services	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2

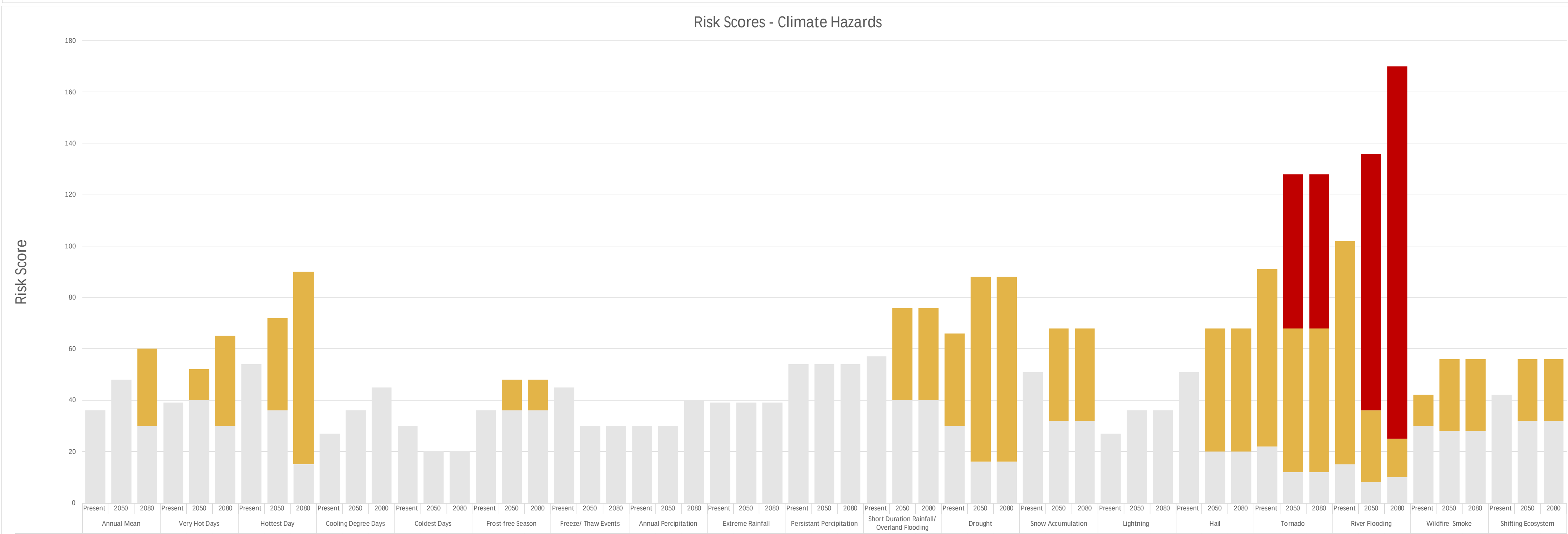
Component	Year	Precipitation																							
		Annual Total Precipitation (mm)				Maximum 1-Day Total Percipitation (mm)				Maximum 5-day Consecutive Percipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)			
		Annual Percipitation				**Extreme Rainfall**				**Persistant Percipitation**				Short Duration Rainfall/ Overland Flooding				**Drought**				**Snow Accumulation**			
Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
	2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
	2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
Component: Parks and Playgrounds		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
	Present		3		3		3		6		3		9		3		9		3		12		3		6
1 Playground Sites	2050	Y	3	1	3	Y	3	2	6	Y	3	3	9	Y	4	3	12	Y	4	4	16	Y	4	2	8
	2080		4		4		3		6		3		9		4		12		4		16		4		8
	Present		3		6		3		6		3		9		3		9		3		12		3		9
2 Town Common Area on Riverfront	2050	Y	3	2	6	Y	3	2	6	Y	3	3	9	Y	4	3	12	Y	4	4	16	Y	4	3	12
	2080		4		8		3		6		3		9		4		12		4		16		4		12
	Present		3		3		3		3		3		3		3		6		3		3		3		3
3 Skateboard Park	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	2	8	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		8		4		4		4		4
	Present		3		3		3		3		3		3		3		3		3		9		3		3
4 Spray Park	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		12		4		4
	Present		3		3		3		3		3		3		3		3		3		3		3		9
5 2 Outdoor Skating Rinks	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	3	12
	2080		4		4		3		3		3		3		4		4		4		4		4		12
	Present		3		3		3		6		3		9		3		6		3		3		3		3
6 2 Outdoor Tennis Courts	2050	Y	3	1	3	Y	3	2	6	Y	3	3	9	Y	4	2	8	Y	4	1	4	Y	4	1	4
	2080		4		4		3		6		3		9		4		8		4		4		4		4
	Present		3		3		3		6		3		9		3		9		3		12		3		9
7 Operations and Maintenance	2050	Y	3	1	3	Y	3	2	6	Y	3	3	9	Y	4	3	12	Y	4	4	16	Y	4	3	12
	2080		4		4		3		6		3		9		4		12		4		16		4		12
	Present		3		3		3		3		3		6		3		6		3		9		3		6
8 Public / Users	2050	Y	3	1	3	Y	3	1	3	Y	3	2	6	Y	4	2	8	Y	4	3	12	Y	4	2	8
	2080		4		4		3		3		3		6		4		8		4		12		4		8
	Present		3		3		3		3		3		3		3		6		3		3		3		3
8 Emergency Services	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	2	8	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		8		4		4		4		4

Component	Year	Extreme Events																								Shifting Natural Ecoregions			
		Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit								Shifting Natural Ecoregions			
		Lightning				**Hail**				**Tornado**				**River Flooding**				Wildfire Smoke								Shifting Ecosystem			
Climate Projections	Present	-	3			-	3			-	3			-	3			-	3							-	3		
	2050	+	4			+	4			+	4			+	4			+	4							+	4		
	2080	++	4			+	4			+	4			++	5			+	4							+	4		
Component: Parks and Playgrounds		Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R	Y/N	L	C	R	Y/N	L	C	R					Y/N	L	C	R
	Present		3		3		3		9		3		15		3		15		3		9						3		3
1 Playground Sites	2050	Y	4	1	4	Y	4	3	12	Y	4	5	20	Y	4	5	20	Y	4	3	12					Y	4	1	4
	2080		4		4		4		12		4		20		5		25		4		12						4		4
	Present		3		3		3		9		3		15		3		15		3		3						3		9
2 Town Common Area on Riverfront	2050	Y	4	1	4	Y	4	3	12	Y	4	5	20	Y	4	5	20	Y	4	1	4					Y	4	3	12
	2080		4		4		4		12		4		20		5		25		4		4						4		12
	Present		3		3		3		3		3		4		3		15		3		3						3		3
3 Skateboard Park	2050	Y	4	1	4	Y	4	1	4	Y	4	3	12	Y	4	5	20	Y	4	1	4					Y	4	1	4
	2080		4		4		4		4		4		12		5		25		4		4						4		4
	Present		3		3		3		9		3		12		3		15		3		3						3		3
4 Spray Park	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	5	20	Y	4	1	4					Y	4	1	4
	2080		4		4		4		12		4		16		5		25		4		4						4		4
	Present		3		3		3		3		3		6		3		3		3		3						3		3
5 2 Outdoor Skating Rinks	2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4					Y	4	1	4
	2080		4		4		4		4		4		8		5		5		4		4						4		4
	Present		3		3		3		3		3		12		3		3		3		3						3		3
6 2 Outdoor Tennis Courts	2050	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	1	4					Y	4	1	4
	2080		4		4		4		4		4		16		5		5		4		4						4		4
	Present		3		3		3		9		3		15		3		15		3		12						3		9
7 Operations and Maintenance	2050	Y	4	1	4	Y	4	3	12	Y	4	5	20	Y	4	5	20	Y	4	4	16					Y	4	3	12
	2080		4		4		4		12		4		20		5		25		4		16						4		12
	Present		3		3		3		3		3		9		3		12		3		3						3		6
8 Public / Users	2050	Y	4	1	4	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	1	4					Y	4	2	8
	2080		4		4		4		4		4		12		5		20		4		4						4		8
	Present		3		3		3		3		3		3		3		9		3		3						3		3
8 Emergency Services	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	3	12	Y	4	1	4					Y	4	1	4
	2080		4		4		4		4		4		4		5		15		4		4						4		4

PIEVC Risk Scores
Parks and Playgrounds



Asset	Period	High Risk Score	Medium Risk Score	Low Risk Score
Playground Sites	Present	0	42	84
	2050	40	64	54
	2080	45	67	58
Town Common Area on Riverfront	Present	0	42	87
	2050	40	64	57
	2080	45	74	54
Skateboard Park	Present	0	15	64
	2050	20	12	71
	2080	25	22	67
Spray Park	Present	0	27	75
	2050	20	52	57
	2080	25	75	43
2 Outdoor Skating Rinks	Present	0	0	81
	2050	0	24	73
	2080	0	34	70
2 Outdoor Tennis Courts	Present	0	12	72
	2050	0	16	86
	2080	0	36	74
Operations and Maintenance	Present	0	54	105
	2050	40	104	52
	2080	45	120	46
Public / Users	Present	0	12	81
	2050	0	40	74
	2080	20	24	79
Emergency Services	Present	0	0	66
	2050	0	12	69
	2080	0	15	74



Climate Hazard	Period	High Risk Scores	Medium Risk Scores	Low Risk Scores
Annual Mean	Present	0	0	36
	2050	0	0	48
	2080	0	30	30
Very Hot Days	Present	0	0	39
	2050	0	12	40
	2080	0	35	30
Hottest Day	Present	0	0	54
	2050	0	36	36
	2080	0	75	15
Cooling Degree Days	Present	0	0	27
	2050	0	0	36
	2080	0	0	45
Coldest Days	Present	0	0	30
	2050	0	0	20
	2080	0	0	20
Frost-free Season	Present	0	0	36
	2050	0	12	36
	2080	0	12	36
Freeze/ Thaw Events	Present	0	0	45
	2050	0	0	30
	2080	0	0	30
Annual Percipitation	Present	0	0	30
	2050	0	0	30
	2080	0	0	40
Extreme Rainfall	Present	0	0	39
	2050	0	0	39
	2080	0	0	39
Persistant Percipitation	Present	0	0	54
	2050	0	0	54
	2080	0	0	54
Short Duration Rainfall/ Overland Flooding	Present	0	0	57
	2050	0	36	40
	2080	0	36	40
Drought	Present	0	36	30
	2050	0	72	16
	2080	0	72	16
Snow Accumulation	Present	0	0	51
	2050	0	36	32
	2080	0	36	32
Lightning	Present	0	0	27
	2050	0	0	36
	2080	0	0	36
Hail	Present	0	0	51
	2050	0	48	20
	2080	0	48	20
Tornado	Present	0	69	22
	2050	60	56	12
	2080	60	56	12
River Flooding	Present	0	87	15
	2050	100	28	8
	2080	145	15	10
Wildfire Smoke	Present	0	12	30
	2050	0	28	28
	2080	0	28	28
Shifting Ecosystem	Present	0	0	42
	2050	0	24	32
	2080	0	24	32

PIEVC Risk Matrix
Roads

Consequence Score

0 - No Effect
1 - Very Low
2 - Low
3 - Moderate
4 - High
5 - Very High

Climate Parameter — Temperature

		Mean Annual Temperature (◦C)				Days above +30ºC				Hottest Day (◦C)				Cooling Degree Days (Degree Days)				# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events			
		Annual Mean				**Very Hot Days**				**Hottest Day**				**Cooling Degree Days**				**Coldest Days**				**Frost-free Season**				**Freeze/ Thaw Events**			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14.1	3			120	3			86.5	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
Component: Roads		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Asphalt Roads	Present		3		3		3		9		3		9		3		3		3		9		3		3		3		12
	2050	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	4	8
	2080		5		5		5		15		5		15		5		5		2		6		4		4		2		8
2 Gravel Roads	Present		3		3		3		3		3		3		3		3		3		3		3		6		3		12
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	2	8	Y	2	4	8
	2080		5		5		5		5		5		5		5		5		2		2		4		8		2		8
3 Sidewalks	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		12
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	4	8
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		8
4 Ramps	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		12
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	4	8
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		8
5 Road Signs	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2
8 Operations and Maintenance	Present		3		3		3		9		3		9		3		3		3		9		3		6		3		12
	2050	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	2	3	6	Y	4	2	8	Y	2	4	8
	2080		5		5		5		15		5		15		5		5		2		6		4		8		2		8
9 Public / Customers	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	2	4
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		4
10 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2

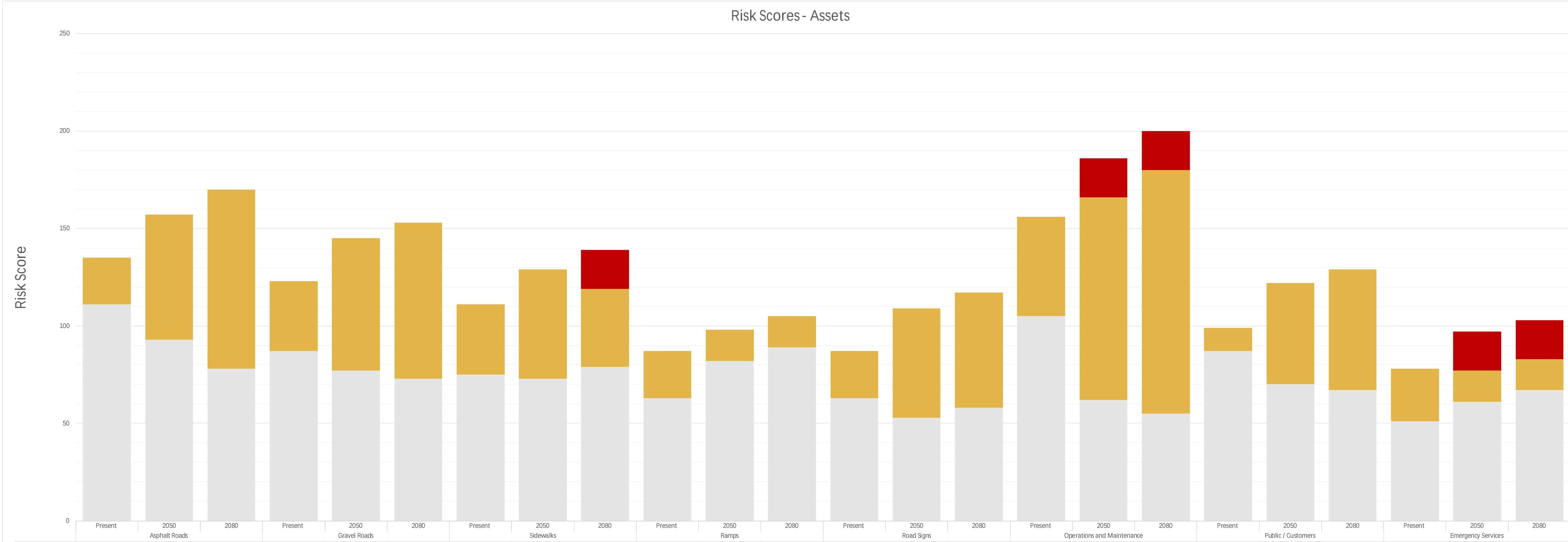
Climate Parameter — Precipitation

		Annual Total Percipitation (mm)				Maximum 1-Day Total Percipitation (mm)				Maximum 5-day Consecutive Percipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)			
		Annual Percipitation				**Extreme Rainfall**				**Persistant Percipitation**				Short Duration Rainfall/ Overland Flooding				**Drought**				**Snow Accumulation**			
Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
	2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
	2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
Component: Roads		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Asphalt Roads	Present		3		9		3		9		3		9		3		6		3		6		3		9
	2050	Y	3	3	9	Y	3	3	9	Y	3	3	9	Y	4	2	8	Y	4	2	8	Y	4	3	12
	2080		4		12		3		9		3		9		4		8		4		8		4		12
2 Gravel Roads	Present		3		9		3		9		3		9		3		9		3		12		3		9
	2050	Y	3	3	9	Y	3	3	9	Y	3	3	9	Y	4	3	12	Y	4	4	16	Y	4	3	12
	2080		4		12		3		9		3		9		4		12		4		16		4		12
3 Sidewalks	Present		3		6		3		3		3		6		3		3		3		3		3		9
	2050	Y	3	2	6	Y	3	1	3	Y	3	2	6	Y	4	1	4	Y	4	1	4	Y	4	3	12
	2080		4		8		3		3		3		6		4		4		4		4		4		12
4 Ramps	Present		3		6		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	2	6	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		8		3		3		3		3		4		4		4		4		4		4
5 Road Signs	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
8 Operations and Maintenance	Present		3		9		3		6		3		9		3		9		3		9		3		12
	2050	Y	3	3	9	Y	3	2	6	Y	3	3	9	Y	4	3	12	Y	4	3	12	Y	4	4	16
	2080		4		12		3		6		3		9		4		12		4		12		4		16
9 Public / Customers	Present		3		3		3		3		3		6		3		6		3		9		3		9
	2050	Y	3	1	3	Y	3	1	3	Y	3	2	6	Y	4	2	8	Y	4	3	12	Y	4	3	12
	2080		4		4		3		3		3		6		4		8		4		12		4		12
10 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4

Climate Parameter — Extreme Events; Shifiting Natural Ecoregions

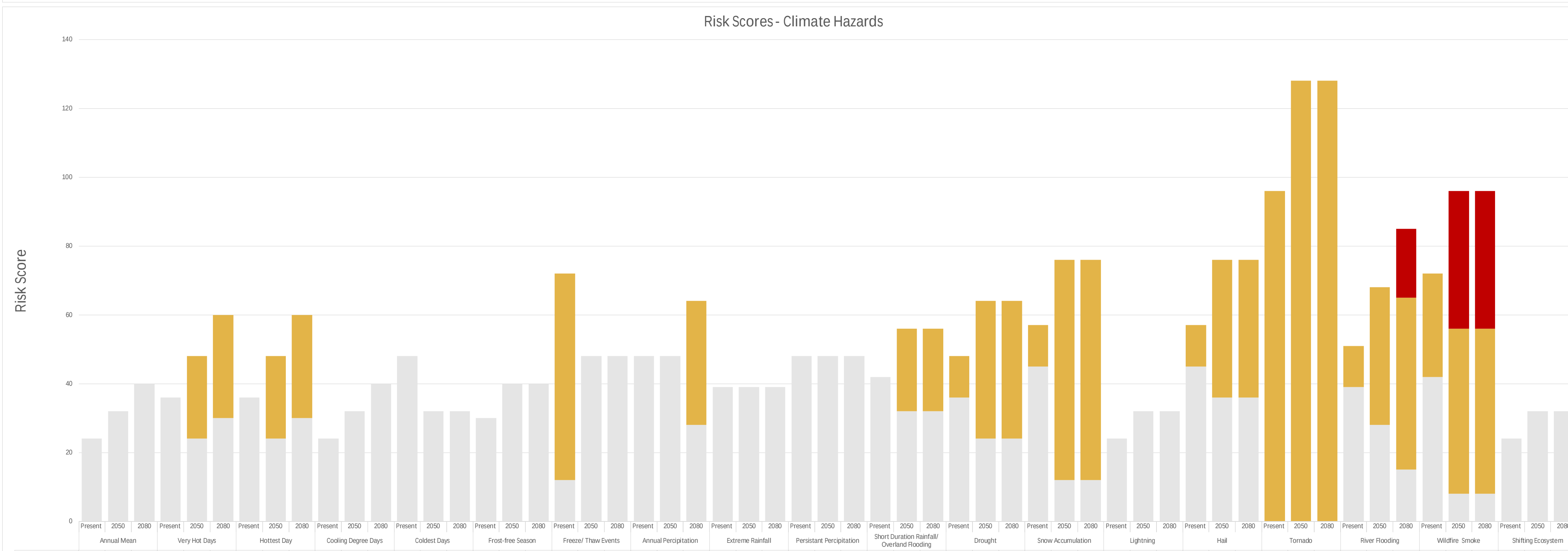
		Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit				Shifiting Natural Ecoregions			
		Lightning				**Hail**				**Tornado**				**River Flooding**				Wildfire Smoke				Shifting Ecosystem			
Climate Projections	Present	-	3			-	3			-	3			-	3			-	3			-	3		
	2050	+	4			+	4			+	4			+	4			+	4			+	4		
	2080	++	4			+	4			+	4			++	5			+	4			+	4		
Component: Roads		Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Asphalt Roads	Present		3		3		3		6		3		12		3		6		3		9		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	4	16	Y	4	2	8	Y	4	3	12	Y	4	1	4
	2080		4		4		4		8		4		16		5		10		4		12		4		4
2 Gravel Roads	Present		3		3		3		9		3		12		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		12		4		16		5		5		4		4		4		4
3 Sidewalks	Present		3		3		3		6		3		12		3		12		3		9		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	4	16	Y	4	4	16	Y	4	3	12	Y	4	1	4
	2080		4		4		4		8		4		16		5		20		4		12		4		4
4 Ramps	Present		3		3		3		6		3		12		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		8		4		16		5		5		4		4		4		4
5 Road Signs	Present		3		3		3		12		3		12		3		9		3		9		3		3
	2050	Y	4	1	4	Y	4	4	16	Y	4	4	16	Y	4	3	12	Y	4	3	12	Y	4	1	4
	2080		4		4		4		16		4		16		5		15		4		12		4		4
8 Operations and Maintenance	Present		3		3		3		9		3		12		3		9		3		15		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	3	12	Y	4	5	20	Y	4	1	4
	2080		4		4		4		12		4		16		5		15		4		20		4		4
9 Public / Customers	Present		3		3		3		6		3		12		3		6		3		9		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	4	16	Y	4	2	8	Y	4	3	12	Y	4	1	4
	2080		4		4		4		8		4		16		5		10		4		12		4		4
10 Emergency Services	Present		3		3		3		3		3		12		3		3		3		15		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	5	20	Y	4	1	4
	2080		4		4		4		4		4		16		5		5		4		20		4		4

PIEVC Risk Scores
Roads



	Asphalt Roads			Gravel Roads			Sidewalks			Ramps		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	20	0	0	0
Medium Risk Score	24	64	92	36	68	80	36	56	40	24	16	16
Low Risk Score	111	93	78	87	77	73	75	73	79	63	82	89

	Road Signs			Operations and Maintenance			Public / Customers			Emergency Services		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	20	20	0	0	0	0	20	20
Medium Risk Score	24	56	59	51	104	125	12	52	62	27	16	16
Low Risk Score	63	53	58	105	62	55	87	70	67	51	61	67



	Annual Mean			Very Hot Days			Hottest Day			Cooling Degree Days			Coldest Days		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	0	24	30	0	24	30	0	0	0	0	0	0
Low Risk Scores	24	32	40	36	24	30	36	24	30	24	32	40	48	32	32

	Frost-free Season			Freeze/ Thaw Events			Annual Percipitation			Extreme Rainfall			Persistant Percipitation		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	60	0	0	0	0	36	0	0	0	0	0	0
Low Risk Scores	30	40	40	12	48	48	48	48	28	39	39	39	48	48	48

	Short Duration Rainfall/ Overland Flooding			Drought			Snow Accumulation			Lightning			Hail		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	24	24	12	40	40	12	64	64	0	0	0	12	40	40
Low Risk Scores	42	32	32	36	24	24	45	12	12	24	32	32	45	36	36

	Tornado			River Flooding			Wildfire Smoke			Shifting Ecosystem		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	20	0	40	40	0	0	0
Medium Risk Scores	96	128	128	12	40	50	30	48	48	0	0	0
Low Risk Scores	0	0	0	39	28	15	42	8	8	24	32	32

PIEVC Risk Matrix
Solid Waste Management System

Consequence Score

- 0 - No Effect
- 1 - Very Low
- 2 - Low
- 3 - Moderate
- 4 - High
- 5 - Very High

Climate Parameter

Temperature

Component	Period	Mean Annual Temperature (-C) – Annual Mean				Days above +30ºC – Very Hot Days				Hottest Day (-C) – Hottest Day				Cooling Degree Days (Degree Days) – Cooling Degree Days				# of Days Below -30ºC – Coldest Days				# Days Without Frost – Frost-free Season				# Freeze/ Thaw Events – Freeze/ Thaw Events			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14.1	3			120	3			86.5	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
Component: Solid Waste Management		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
	Present		3		3		3		6		3		12		3		3		3		12		3		3		3		12
1 Waste Collection	2050	Y	4	1	4	Y	4	2	8	Y	4	4	16	Y	4	1	4	Y	2	4	8	Y	4	1	4	Y	2	4	8
	2080		5		5		5		10		5		20		5		5		2		8		4		4		2		8
	Present		3		3		3		3		3		12		3		3		3		12		3		3		3		9
1 Transfer Sites	2050	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	2	4	8	Y	4	1	4	Y	2	3	6
	2080		5		5		5		5		5		20		5		5		2		8		4		4		2		6
	Present		3		3		3		9		3		12		3		15		3		9		3		3		3		3
2 Recycling Facility	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	5	20	Y	2	3	6	Y	4	1	4	Y	2	1	2
	2080		5		5		5		15		5		20		5		25		2		6		4		4		2		2
	Present		3		3		3		9		3		12		3		15		3		12		3		3		3		9
3 Class II - Honda Facility	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	5	20	Y	2	4	8	Y	4	1	4	Y	2	3	6
	2080		5		5		5		15		5		20		5		25		2		8		4		4		2		6
	Present		3		3		3		9		3		12		3		15		3		12		3		3		3		6
4 Class III - Boyle Faciluty	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	5	20	Y	2	4	8	Y	4	1	4	Y	2	2	4
	2080		5		5		5		15		5		20		5		25		2		8		4		4		2		4
	Present		3		3		3		9		3		12		3		15		3		12		3		3		3		6
4 Operations and Maintenance	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	5	20	Y	2	4	8	Y	4	1	4	Y	2	2	4
	2080		5		5		5		15		5		20		5		25		2		8		4		4		2		4
	Present		3		3		3		3		3		12		3		3		3		9		3		3		3		6
5 Public / Customers	2050	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	2	4
	2080		5		5		5		5		5		20		5		5		2		6		4		4		2		4
	Present		3		3		3		3		3		6		3		3		3		3		3		3		3		3
6 Emergency Services	2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		10		5		5		2		2		4		4		2		2

Precipitation

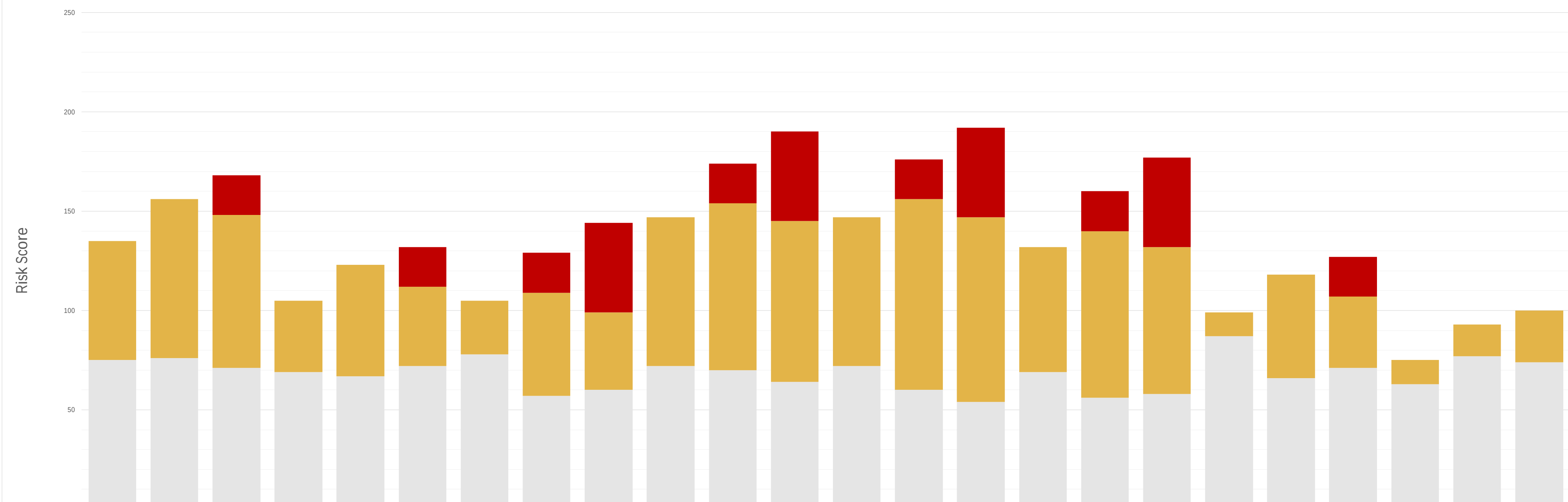
Component	Period	Annual Total Percipitation (mm) – Annual Percipitation				Maximum 1-Day Total Precipitation (mm) – Extreme Rainfall				Maximum 5-day Consecutive Precipitation (mm) – Persistant Percipitation				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr) – Short Duration Rainfall/ Overland Flooding				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August) – Drought				Winter Precipitation (mm) – Snow Accumulation			
Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
	2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
	2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
Component: Solid Waste Management		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
	Present		3		3		3		9		3		12		3		3		3		6		3		3
1 Waste Collection	2050	Y	3	1	3	Y	3	3	9	Y	3	4	12	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		3		9		3		12		4		4		4		8		4		4
	Present		3		3		3		3		3		3		3		3		3		6		3		3
1 Transfer Sites	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		8		4		4
	Present		3		3		3		3		3		3		3		3		3		3		3		3
2 Recycling Facility	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
	Present		3		3		3		9		3		12		3		3		3		6		3		3
3 Class II - Honda Facility	2050	Y	3	1	3	Y	3	3	9	Y	3	4	12	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		3		9		3		12		4		4		4		8		4		4
	Present		3		3		3		9		3		12		3		3		3		6		3		3
4 Class III - Boyle Faciluty	2050	Y	3	1	3	Y	3	3	9	Y	3	4	12	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		3		9		3		12		4		4		4		8		4		4
	Present		3		3		3		3		3		6		3		3		3		3		3		3
4 Operations and Maintenance	2050	Y	3	1	3	Y	3	1	3	Y	3	2	6	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		6		4		4		4		4		4		4
	Present		3		3		3		3		3		6		3		3		3		3		3		3
5 Public / Customers	2050	Y	3	1	3	Y	3	1	3	Y	3	2	6	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		6		4		4		4		4		4		4
	Present		3		3		3		3		3		3		3		3		3		6		3		3
6 Emergency Services	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		8		4		4

Extreme Events / Shifting Natural Ecoregions

Component	Period	Lightning – Lightning				Hail Storm – Hail				High Wind/ Tornado – Tornado				Flooding – River Flooding				Climate Moisture Deficit – Wildfire Smoke				Shifting Natural Ecoregions – Shifting Ecosystem			
Climate Projections	Present	-	3			-	3			-	3			-	3			-	3			-	3		
	2050	+	4			+	4			+	4			+	4			+	4			+	4		
	2080	++	4			+	4			+	4			++	5			+	4			+	4		
Component: Solid Waste Management		Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
	Present		3		12		3		6		3		9		3		9		3		9		3		3
1 Waste Collection	2050	Y	4	4	16	Y	4	2	8	Y	4	3	12	Y	4	3	12	Y	4	3	12	Y	4	1	4
	2080		4		16		4		8		4		12		5		15		4		12		4		4
	Present		3		9		3		3		3		12		3		3		3		9		3		3
1 Transfer Sites	2050	Y	4	3	12	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		12		4		4		4		16		5		5		4		12		4		4
	Present		3		9		3		9		3		3		3		3		3		6		3		3
2 Recycling Facility	2050	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		12		4		12		4		4		5		5		4		8		4		4
	Present		3		12		3		6		3		12		3		6		3		9		3		3
3 Class II - Honda Facility	2050	Y	4	4	16	Y	4	2	8	Y	4	4	16	Y	4	2	8	Y	4	3	12	Y	4	1	4
	2080		4		16		4		8		4		16		5		10		4		12		4		4
	Present		3		12		3		9		3		12		3		6		3		9		3		3
4 Class III - Boyle Faciluty	2050	Y	4	4	16	Y	4	3	12	Y	4	4	16	Y	4	2	8	Y	4	3	12	Y	4	1	4
	2080		4		16		4		12		4		16		5		10		4		12		4		4
	Present		3		12		3		6		3		12		3		9		3		9		3		3
4 Operations and Maintenance	2050	Y	4	4	16	Y	4	2	8	Y	4	4	16	Y	4	3	12	Y	4	3	12	Y	4	1	4
	2080		4		16		4		8		4		16		5		15		4		12		4		4
	Present		3		9		3		6		3		9		3		3		3		9		3		3
5 Public / Customers	2050	Y	4	3	12	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		12		4		8		4		12		5		5		4		12		4		4
	Present		3		12		3		3		3		3		3		3		3		6		3		3
6 Emergency Services	2050	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		16		4		4		4		4		5		5		4		8		4		4

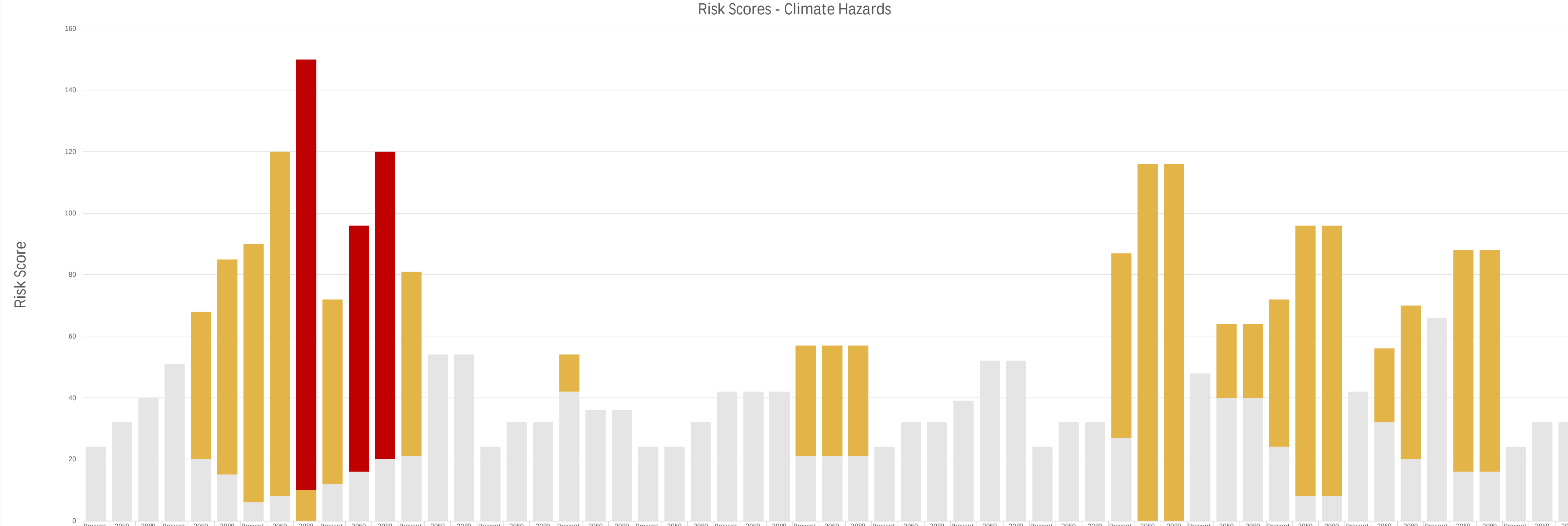
PIEVC Risk Scores
Solid Waste Management System

Risk Scores - Assets



Asset	Period	High Risk Score	Medium Risk Score	Low Risk Scores
Waste Collection	Present	0	60	75
	2050	0	80	76
	2080	20	77	71
Transfer Sites	Present	0	36	69
	2050	0	56	67
	2080	20	40	72
Recycling Facility	Present	0	27	78
	2050	20	52	57
	2080	45	39	60
Class II - Honda Facility	Present	0	75	72
	2050	20	84	70
	2080	45	81	64
Class III - Boyle Faciluty	Present	0	75	72
	2050	20	96	60
	2080	45	93	54
Operations and Maintenance	Present	0	63	69
	2050	20	84	56
	2080	45	74	58
Public / Customers	Present	0	12	87
	2050	0	52	66
	2080	20	36	71
Emergency Services	Present	0	12	63
	2050	0	16	77
	2080	0	26	74

Risk Scores - Climate Hazards



Climate Hazard	Period	High Risk Scores	Medium Risk Scores	High Risk Scores
Annual Mean	Present	0	0	24
	2050	0	0	32
	2080	0	0	40
Very Hot Days	Present	0	0	51
	2050	0	48	20
	2080	0	70	15
Hottest Day	Present	0	84	6
	2050	0	112	8
	2080	140	10	0
Cooling Degree Days	Present	0	60	12
	2050	80	0	16
	2080	100	0	20
Coldest Days	Present	0	60	21
	2050	0	0	54
	2080	0	0	54
Frost-free Season	Present	0	0	24
	2050	0	0	32
	2080	0	0	32
Freeze/ Thaw Events	Present	0	12	42
	2050	0	0	36
	2080	0	0	36
Annual Percipitation	Present	0	0	24
	2050	0	0	24
	2080	0	0	32
Extreme Rainfall	Present	0	0	42
	2050	0	0	42
	2080	0	0	42
Persistant Percipitation	Present	0	36	21
	2050	0	36	21
	2080	0	36	21
Short Duration Rainfall/ Overland Flooding	Present	0	0	24
	2050	0	0	32
	2080	0	0	32
Drought	Present	0	0	39
	2050	0	0	52
	2080	0	0	52
Snow Accumulation	Present	0	0	24
	2050	0	0	32
	2080	0	0	32
Lightning	Present	0	60	27
	2050	0	116	0
	2080	0	116	0
Hail	Present	0	0	48
	2050	0	24	40
	2080	0	24	40
Tornado	Present	0	48	24
	2050	0	88	8
	2080	0	88	8
River Flooding	Present	0	0	42
	2050	0	24	32
	2080	0	50	20
Wildfire Smoke	Present	0	0	66
	2050	0	72	16
	2080	0	72	16
Shifting Ecosystem	Present	0	0	24
	2050	0	0	32
	2080	0	0	32

PIEVC Risk Matrix
Buildings - Fire Hall

Consequence Score

0 - No Effect
1 - Very Low
2 - Low
3 - Moderate
4 - High
5 - Very High

Climate Parameter – Temperature

		Temperature																											
		Mean Annual Temperature (◦C)				Days above +30ºC				Hottest Day (◦C)				Cooling Degree Days (Degree Days)				# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events			
		Annual Mean				**Very Hot Days**				**Hottest Day**				**Cooling Degree Days**				**Coldest Days**				**Frost-free Season**				**Freeze/ Thaw Events**			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14.1	3			120	3			86.5	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
Buildings - Fire Hall		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
	Present		3		3		3		3		3		3		3		3		3		9		3		3		3		12
1 Civil – Site, Parking, Landscaped Areas, Stormwater	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	4	8
	2080		5		5		5		5		5		5		5		5		2		6		4		4		2		8
	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		3
2 Structural – Building Envelope	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		2
	Present		3		6		3		3		3		3		3		15		3		15		3		3		3		3
3 Mechanical – HVAC	2050	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	5	20	Y	2	5	10	Y	4	1	4	Y	2	1	2
	2080		5		10		5		5		5		5		5		25		2		10		4		4		2		2
	Present		3		3		3		3		3		3		3		12		3		6		3		3		3		3
4 Electrical – Electrical and Communications	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	2	2	4	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		20		2		4		4		4		2		2
	Present		3		3		3		3		3		3		3		3		3		12		3		3		3		3
5 Plumbing – Water and Wastewater	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	4	8	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		8		4		4		2		2
	Present		3		3		3		3		3		3		3		9		3		9		3		3		3		6
6 Building Staff	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	3	12	Y	2	3	6	Y	4	1	4	Y	2	2	4
	2080		5		5		5		5		5		5		5		15		2		6		4		4		2		4
	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
5 Public / Customers	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2
	Present		3		3		3		3		3		12		3		9		3		3		3		3		3		3
6 Emergency Services	2050	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	3	12	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		20		5		15		2		2		4		4		2		2

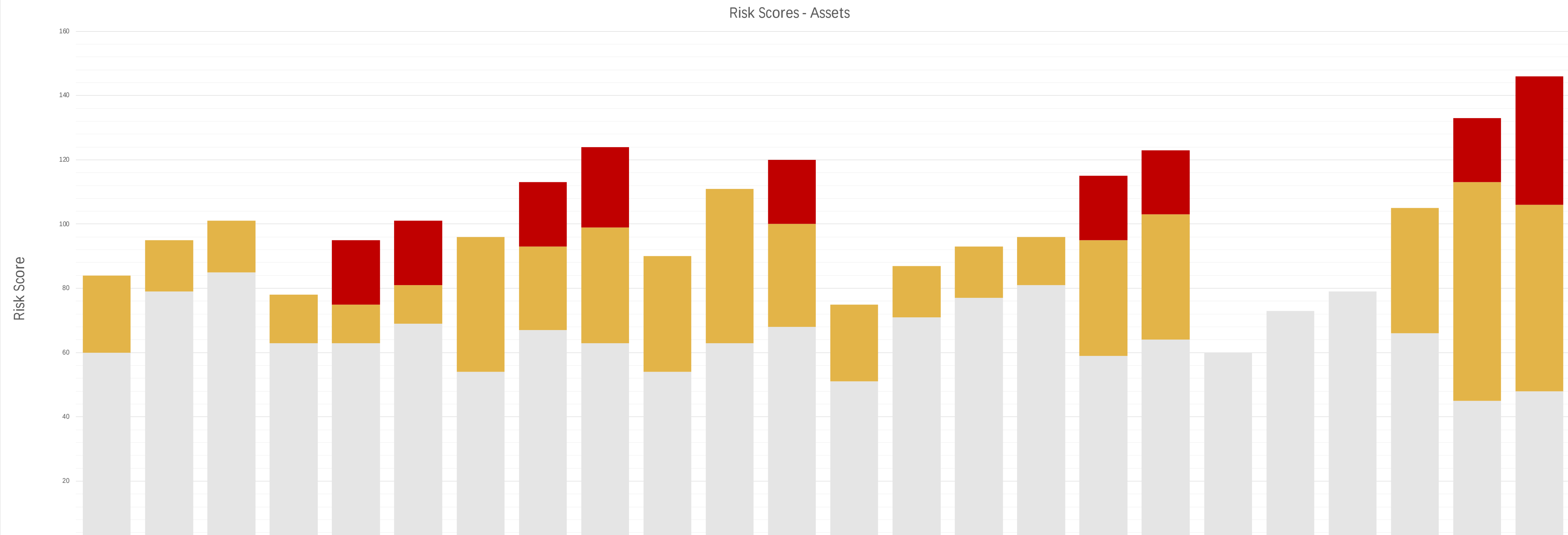
Climate Parameter – Precipitation

		Precipitation																							
		Annual Total Percipitation (mm)				Maximum 1-Day Total Percipitation (mm)				Maximum 5-day Consecutive Percipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)			
		Annual Percipitation				**Extreme Rainfall**				**Persistant Percipitation**				Short Duration Rainfall/ Overland Flooding				**Drought**				**Snow Accumulation**			
Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
	2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
	2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
Buildings - Fire Hall		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
	Present		3		3		3		3		3		3		3		3		3		3		3		12
1 Civil – Site, Parking, Landscaped Areas, Stormwater	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	4	16
	2080		4		4		3		3		3		3		4		4		4		4		4		16
	Present		3		3		3		3		3		3		3		3		3		3		3		9
2 Structural – Building Envelope	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	3	12
	2080		4		4		3		3		3		3		4		4		4		4		4		12
	Present		3		3		3		3		3		3		3		3		3		3		3		6
3 Mechanical – HVAC	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		4		4		3		3		3		3		4		4		4		4		4		8
	Present		3		3		3		3		3		3		3		3		3		3		3		6
4 Electrical – Electrical and Communications	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		4		4		3		3		3		3		4		4		4		4		4		8
	Present		3		3		3		3		3		3		3		3		3		3		3		3
5 Plumbing – Water and Wastewater	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
	Present		3		3		3		3		3		3		3		3		3		3		3		9
6 Building Staff	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	3	12
	2080		4		4		3		3		3		3		4		4		4		4		4		12
	Present		3		3		3		3		3		3		3		3		3		3		3		3
5 Public / Customers	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
	Present		3		3		3		3		3		3		3		3		3		3		3		12
6 Emergency Services	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	4	16
	2080		4		4		3		3		3		3		4		4		4		4		4		16

Climate Parameter – Extreme Events / Shifting Natural Ecoregions

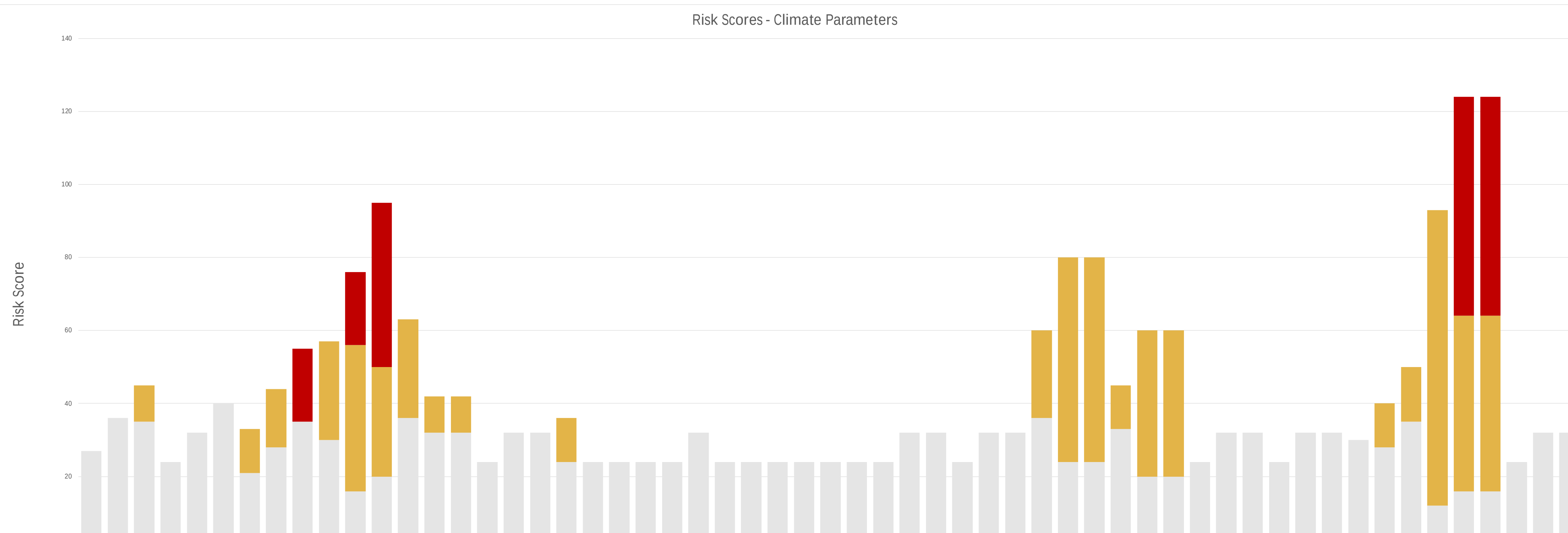
		Extreme Events																				Shifting Natural Ecoregions			
		Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit				Shifting Natural Ecoregions			
		Lightning				**Hail**				**Tornado**				**River Flooding**				Wildfire Smoke				Shifting Ecosystem			
Climate Projections	Present	-	3			-	3			-	3			-	3			-	3			-	3		
	2050	+	4			+	4			+	4			+	4			+	4			+	4		
	2080	++	4			+	4			+	4			++	5			+	4			+	4		
Buildings - Fire Hall		Y/N	L	C	R	Y/N	L	C	R	Y/N	I	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
	Present		3		3		3		3		3		3		3		3		3		6		3		3
1 Civil – Site, Parking, Landscaped Areas, Stormwater	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		8		4		4
	Present		3		3		3		3		3		3		3		3		3		15		3		3
2 Structural – Building Envelope	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	5	20	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		20		4		4
	Present		3		3		3		3		3		3		3		3		3		12		3		3
3 Mechanical – HVAC	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		16		4		4
	Present		3		12		3		3		3		3		3		3		3		12		3		3
4 Electrical – Electrical and Communications	2050	Y	4	4	16	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		16		4		4		4		4		5		5		4		16		4		4
	Present		3		3		3		3		3		3		3		3		3		12		3		3
5 Plumbing – Water and Wastewater	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		16		4		4
	Present		3		9		3		3		3		3		3		3		3		15		3		3
6 Building Staff	2050	Y	4	3	12	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	5	20	Y	4	1	4
	2080		4		12		4		4		4		4		5		5		4		20		4		4
	Present		3		3		3		3		3		3		3		3		3		6		3		3
5 Public / Customers	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		8		4		4
	Present		3		9		3		3		3		3		3		9		3		15		3		3
6 Emergency Services	2050	Y	4	3	12	Y	4	1	4	Y	4	1	4	Y	4	3	12	Y	4	5	20	Y	4	1	4
	2080		4		12		4		4		4		4		5		15		4		20		4		4

PIEVC Risk Scores
Buildings - Fire Hall



	Civil – Site, Parking, Landscaped Areas, Stormwater			Structural – Building Envelope			Mechanical – HVAC			Electrical – Electrical and Communications		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	20	20	0	20	25	0	0	20
Medium Risk Score	24	16	16	15	12	12	42	26	36	36	48	32
Low Risk Score	60	79	85	63	63	69	54	67	63	54	63	68

	Plumbing – Water and Wastewater			Building Staff			Public / Customers			Emergency Services		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	20	20	0	0	0	0	20	40
Medium Risk Score	24	16	16	15	36	39	0	0	0	39	68	58
Low Risk Score	51	71	77	81	59	64	60	73	79	66	45	48



	Annual Mean			Very Hot Days			Hottest Day			Cooling Degree Days			Coldest Days		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	20	0	20	45	0	0	0
Medium Risk Scores	0	0	10	0	0	0	12	16	0	27	40	30	27	10	10
Low Risk Scores	27	36	35	24	32	40	21	28	35	30	16	20	36	32	32

	Frost-free Season			Freeze/ Thaw Events			Annual Percipitation			Extreme Rainfall			Persistant Percipitation		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0
Low Risk Scores	24	32	32	24	24	24	24	24	32	24	24	24	24	24	24

	Short Duration Rainfall/ Overland Flooding			Drought			Snow Accumulation			Lightning			Hail		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	0	0	0	24	56	56	12	40	40	0	0	0
Low Risk Scores	24	32	32	24	32	32	36	24	24	33	20	20	24	32	32

	Tornado			River Flooding			Wildfire Smoke			Shifting Ecosystem		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	60	60	0	0	0
Medium Risk Scores	0	0	0	0	12	15	81	48	48	0	0	0
Low Risk Scores	24	32	32	30	28	35	12	16	16	24	32	32

PIEVC Risk Matrix
Buildings - FLIPS Gymnastics Building

Consequence Score

- 0 - No Effect
- 1 - Very Low
- 2 - Low
- 3 - Moderate
- 4 - High
- 5 - Very High

Climate Parameter – Temperature

		Mean Annual Temperature (◦C)				Days above +30ºC				Hottest Day (◦C)				Cooling Degree Days (Degree Days)				# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events			
		Annual Mean				Very Hot Days				Hottest Day				Cooling Degree Days				Coldest Days				Frost-free Season				Freeze/ Thaw Events			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14.1	3			120	3			86.5	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
Buildings - FLIPS Gymnastics Building		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		6		3		6		3		3		3		6		3		3		3		9
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8		4	1	4	Y	2	2	4	Y	4	1	4	Y	2	3	6
	2080		5		5		5		10		5		10		5		5		2		4		4		4		2		6
2 Structural – Building Envelope	Present		3		3		3		6		3		9		3		3		3		12		3		3		3		9
	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12		4	1	4	Y	2	4	8	Y	4	1	4	Y	2	3	6
	2080		5		5		5		10		5		15		5		5		2		8		4		4		2		6
3 Mechanical – HVAC	Present		3		6		3		15		3		15		3		15		3		15		3		3		3		6
	2050	Y	4	2	8	Y	4	5	20	Y	4	5	20	Y	4	5	20	Y	2	5	10	Y	4	1	4	Y	2	2	4
	2080		5		10		5		25		5		25		5		25		2		10		4		4		2		4
4 Electrical – Electrical and Communications	Present		3		3		3		9		3		12		3		3		3		6		3		3		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16		4	1	4	Y	2	2	4	Y	4	1	4	Y	2	1	2
	2080		5		5		5		15		5		20		5		5		2		4		4		4		2		2
5 Plumbing – Water and Wastewater	Present		3		3		3		6		3		6		3		3		3		12		3		3		3		12
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8		4	1	4	Y	2	4	8	Y	4	1	4	Y	2	4	8
	2080		5		5		5		10		5		10		5		5		2		8		4		4		2		8
6 Building Staff	Present		3		3		3		15		3		15		3		15		3		15		3		3		3		12
	2050	Y	4	1	4	Y	4	5	20	Y	4	5	20	Y	4	5	20	Y	2	5	10	Y	4	1	4	Y	2	4	8
	2080		5		5		5		25		5		25		5		25		2		10		4		4		2		8
5 Public / Customers	Present		3		3		3		15		3		15		3		15		3		15		3		3		3		6
	2050	Y	4	1	4	Y	4	5	20	Y	4	5	20		4	5	20	Y	2	5	10	Y	4	1	4	Y	2	2	4
	2080		5		5		5		25		5		25		5		25		2		10		4		4		2		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4		4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2

Climate Parameter – Precipitation

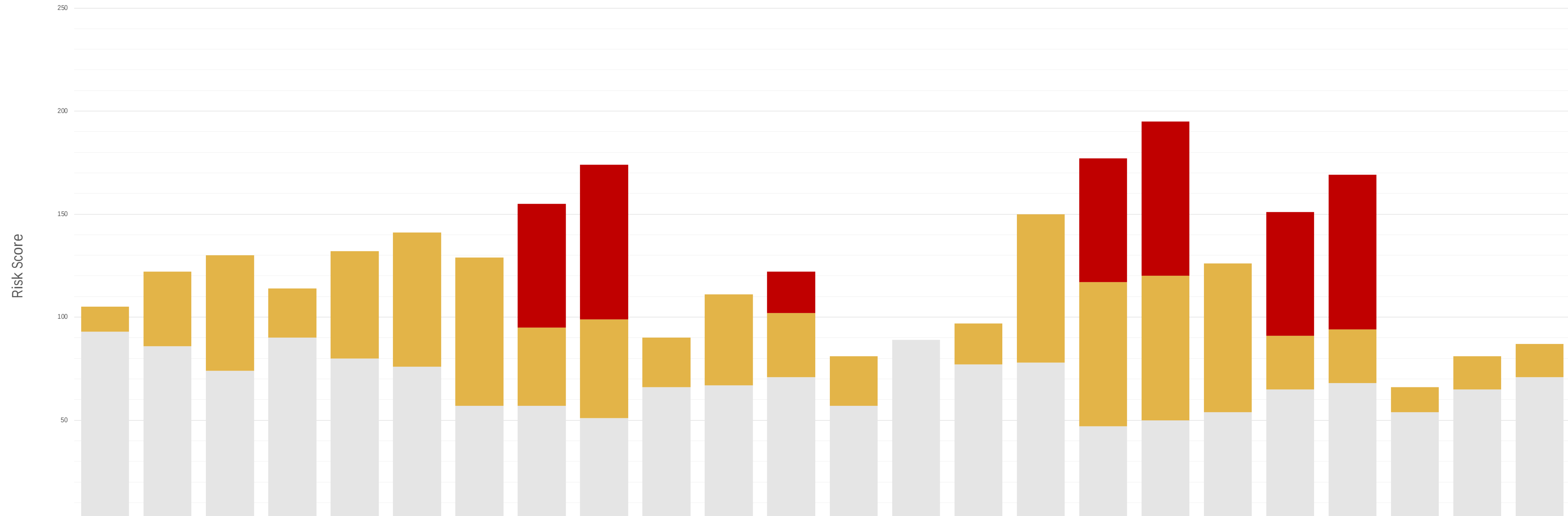
		Annual Total Percipitation (mm)				Maximum 1-Day Total Percipitation (mm)				Maximum 5-day Consecutive Percipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)			
		Annual Percipitation				Extreme Rainfall				Persistant Percipitation				Short Duration Rainfall/ Overland Flooding				Drought				Snow Accumulation			
Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
	2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
	2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
Buildings - FLIPS Gymnastics Building		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		9		3		12		3		3		3		3		3		9
	2050	Y	3	1	3	Y	3	3	9	Y	3	4	12	Y	4	1	4	Y	4	1	4	Y	4	3	12
	2080		4		4		3		9		3		12		4		4		4		4		4		12
2 Structural – Building Envelope	Present		3		3		3		9		3		6		3		3		3		3		3		12
	2050	Y	3	1	3	Y	3	3	9	Y	3	2	6	Y	4	1	4	Y	4	1	4	Y	4	4	16
	2080		4		4		3		9		3		6		4		4		4		4		4		16
3 Mechanical – HVAC	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
4 Electrical – Electrical and Communications	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
6 Building Staff	Present		3		3		3		6		3		6		3		3		3		3		3		9
	2050	Y	3	1	3	Y	3	2	6	Y	3	2	6	Y	4	1	4	Y	4	1	4	Y	4	3	12
	2080		4		4		3		6		3		6		4		4		4		4		4		12
5 Public / Customers	Present		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		4		4		3		3		3		3		4		4		4		4		4		8
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4

Climate Parameter – Extreme Events / Shifting Natural Ecoregions

		Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit				Shifting Natural Ecoregions			
		Lightning				Hail				Tornado				River Flooding				Wildfire Smoke				Shifting Ecosystem			
Climate Projections	Present	-	3			-	3			-	3			-	3			-	3			-	3		
	2050	+	4			+	4			+	4			+	4			+	4			+	4		
	2080	++	4			+	4			+	4			++	5			+	4			+	4		
Buildings - FLIPS Gymnastics Building		Y/N	L	C	R	Y/N	L	C	R	Y/N	I	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		6		3		9		3		3		3		6		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		4		8		4		12		5		5		4		8		4		4
2 Structural – Building Envelope	Present		3		3		3		9		3		9		3		3		3		6		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		4		12		4		12		5		5		4		8		4		4
3 Mechanical – HVAC	Present		3		3		3		9		3		6		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	2	8	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		4		4		12		4		8		5		5		4		16		4		4
4 Electrical – Electrical and Communications	Present		3		12		3		3		3		6		3		3		3		6		3		3
	2050	Y	4	4	16	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		16		4		4		4		8		5		5		4		8		4		4
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		4		4		4
6 Building Staff	Present		3		9		3		9		3		9		3		3		3		9		3		3
	2050	Y	4	3	12	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		12		4		12		4		12		5		5		4		12		4		4
5 Public / Customers	Present		3		3		3		6		3		6		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		4		4		8		4		8		5		5		4		16		4		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		16		4		4

PIEVC Risk Scores
Buildings - FLIPS Gymnastics Building

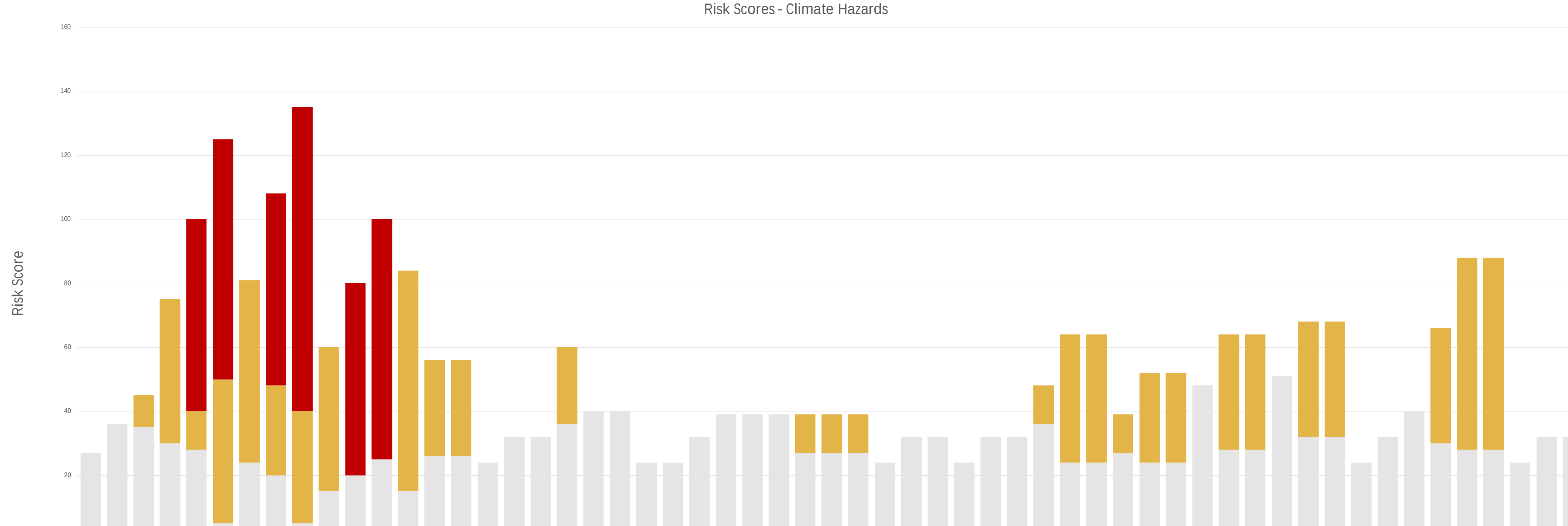
Risk Scores - Assets



	Civil – Site, Parking, Landscaped Areas, Stormwater			Structural – Building Envelope			Mechanical – HVAC			Electrical – Electrical and Communications		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	60	75	0	0	20
Medium Risk Score	12	36	56	24	52	65	72	38	48	24	44	31
Low Risk Score	93	86	74	90	80	76	57	57	51	66	67	71

	Plumbing – Water and Wastewater			Building Staff			Public / Customers			Emergency Services		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	60	75	0	60	75	0	0	0
Medium Risk Score	24	0	20	72	70	70	72	26	26	12	16	16
Low Risk Score	57	89	77	78	47	50	54	65	68	54	65	71

Risk Scores - Climate Hazards



	Annual Mean			Very Hot Days			Hottest Day			Cooling Degree Days			Coldest Days		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	60	75	0	60	95	0	60	75	0	0	0
Medium Risk Scores	0	0	10	45	12	45	57	28	35	45	0	0	69	30	30
Low Risk Scores	27	36	35	30	28	5	24	20	5	15	20	25	15	26	26

	Frost-free Season			Freeze/ Thaw Events			Annual Percipitation			Extreme Rainfall			Persistant Percipitation		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	24	0	0	0	0	0	0	0	0	12	12	12
Low Risk Scores	24	32	32	36	40	40	24	24	32	39	39	39	27	27	27

	Short Duration Rainfall/ Overland Flooding			Drought			Snow Accumulation			Lightning			Hail		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	0	0	0	12	40	40	12	28	28	0	36	36
Low Risk Scores	24	32	32	24	32	32	36	24	24	27	24	24	48	28	28

	Tornado			River Flooding			Wildfire Smoke			Shifting Ecosystem		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	36	36	0	0	0	36	60	60	0	0	0
Low Risk Scores	51	32	32	24	32	40	30	28	28	24	32	32

PIEVC Risk Matrix
Buildings - Muskeg Creek Ski Chalet

Climate Parameter

Consequence Score

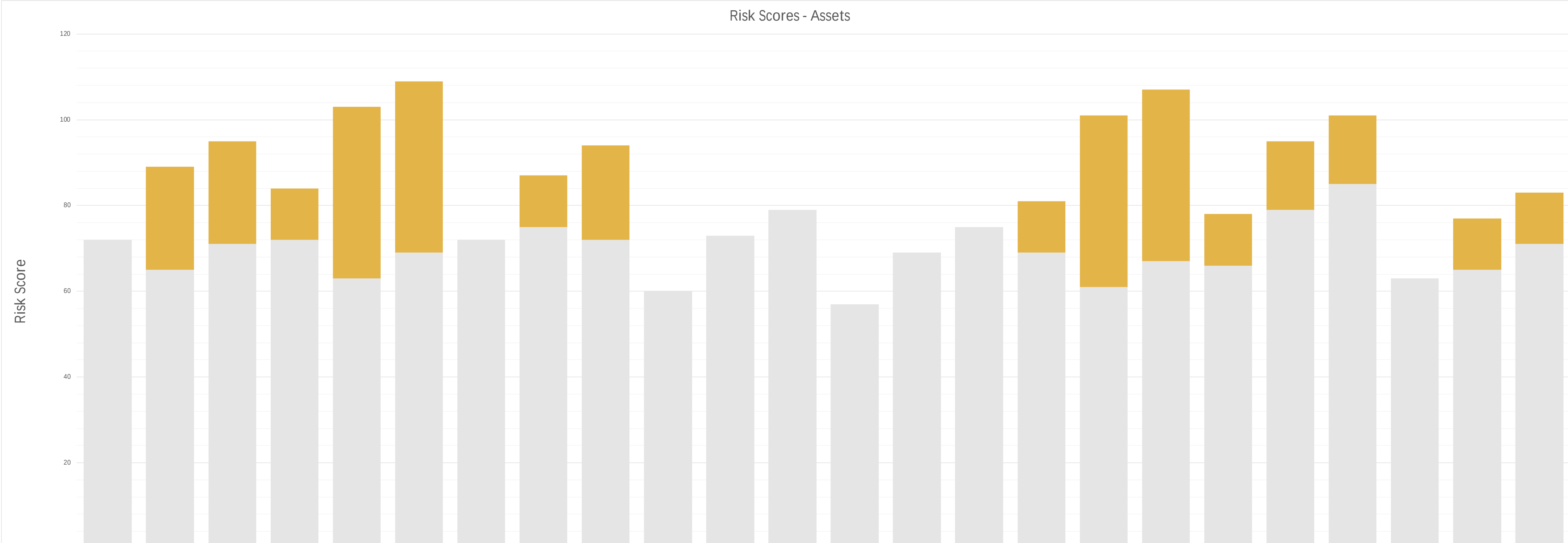
- 0 - No Effect
- 1 - Very Low
- 2 - Low
- 3 - Moderate
- 4 - High
- 5 - Very High

		Temperature: Mean Annual Temperature (◦C)				Days above +30ºC				Hottest Day (◦C)				Cooling Degree Days (Degree Days)				# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events			
		Annual Mean				**Very Hot Days**				**Hottest Day**				**Cooling Degree Days**				**Coldest Days**				**Frost-free Season**				**Freeze/ Thaw Events**			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14.1	3			120	3			86.5	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
Buildings - Muskeg Creek Ski Chalet		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2
2 Structural – Building Envelope	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		2
3 Mechanical – HVAC	Present		3		6		3		3		3		3		3		3		3		6		3		3		3		3
	2050	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	1	2
	2080		5		10		5		5		5		5		5		5		2		4		4		4		2		2
4 Electrical – Electrical and Communications	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2
6 Building Staff	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2
5 Public / Customers	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		2
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2

		Precipitation: Annual Total Precipitation (mm)				Maximum 1-Day Total Precipitation (mm)				Maximum 5-day Consecutive Precipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)			
		Annual Percipitation				**Extreme Rainfall**				**Persistant Percipitation**				Short Duration Rainfall/ Overland Flooding				**Drought**				**Snow Accumulation**			
Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
	2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
	2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
Buildings - Muskeg Creek Ski Chalet		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
2 Structural – Building Envelope	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
3 Mechanical – HVAC	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
4 Electrical – Electrical and Communications	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
6 Building Staff	Present		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		4		4		3		3		3		3		4		4		4		4		4		8
5 Public / Customers	Present		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		4		4		3		3		3		3		4		4		4		4		4		8
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4

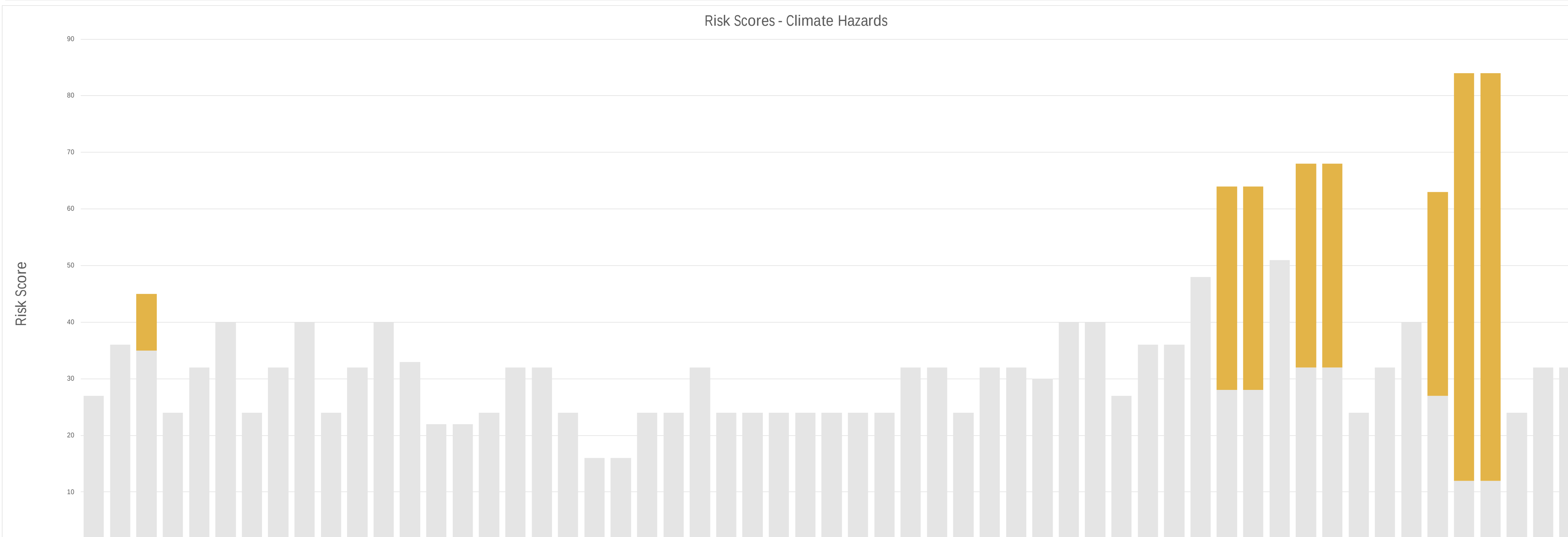
		Extreme Events: Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit				Shifting Natural Ecoregions: Shifting Natural Ecoregions			
		Lightning				**Hail**				**Tornado**				**River Flooding**				Wildfire Smoke				Shifting Ecosystem			
Climate Projections	Present	-	3			-	3			-	3			-	3			-	3			-	3		
	2050	+	4			+	4			+	4			+	4			+	4			+	4		
	2080	++	4			+	4			+	4			++	5			+	4			+	4		
Buildings - Muskeg Creek Ski Chalet		Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		6		3		9		3		3		3		9		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		4		4		8		4		12		5		5		4		12		4		4
2 Structural – Building Envelope	Present		3		6		3		9		3		9		3		3		3		12		3		3
	2050	Y	4	2	8	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		8		4		12		4		12		5		5		4		16		4		4
3 Mechanical – HVAC	Present		3		3		3		9		3		6		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		12		4		8		5		5		4		4		4		4
4 Electrical – Electrical and Communications	Present		3		3		3		3		3		6		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		8		5		5		4		4		4		4
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		4		4		4
6 Building Staff	Present		3		3		3		9		3		9		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		4		4		12		4		12		5		5		4		16		4		4
5 Public / Customers	Present		3		3		3		6		3		6		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		4		4		8		4		8		5		5		4		16		4		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		9		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		12		4		4

PIEVC Risk Scores
Buildings - Muskeg Creek Ski Chalet



	Civil – Site, Parking, Landscaped Areas, Stormwater: Present	2050	2080	Structural – Building Envelope: Present	2050	2080	Mechanical – HVAC: Present	2050	2080	Electrical – Electrical and Communications: Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Score	0	24	24	12	40	40	0	12	22	0	0	0
Low Risk Score	72	65	71	72	63	69	72	75	72	60	73	79

	Plumbing – Water and Wastewater: Present	2050	2080	Building Staff: Present	2050	2080	Public / Customers: Present	2050	2080	Emergency Services: Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Score	0	0	0	12	40	40	12	16	16	0	12	12
Low Risk Score	57	69	75	69	61	67	66	79	85	63	65	71



	Annual Mean: Present	2050	2080	Very Hot Days: Present	2050	2080	Hottest Day: Present	2050	2080	Cooling Degree Days: Present	2050	2080	Coldest Days: Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0
Low Risk Scores	27	36	35	24	32	40	24	32	40	24	32	40	33	22	22

	Frost-free Season: Present	2050	2080	Freeze/ Thaw Events: Present	2050	2080	Annual Percipitation: Present	2050	2080	Extreme Rainfall: Present	2050	2080	Persistant Percipitation: Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Low Risk Scores	24	32	32	24	16	16	24	24	32	24	24	24	24	24	24

	Short Duration Rainfall / Overland Flooding: Present	2050	2080	Drought: Present	2050	2080	Snow Accumulation: Present	2050	2080	Lightning: Present	2050	2080	Hail: Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	36	36
Low Risk Scores	24	32	32	24	32	32	30	40	40	27	36	36	48	28	28

	Tornado: Present	2050	2080	River Flooding: Present	2050	2080	Wildfire Smoke: Present	2050	2080	Shifting Ecosystem: Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	36	36	0	0	0	36	72	72	0	0	0
Low Risk Scores	51	32	32	24	32	40	27	12	12	24	32	32

PIEVC Risk Matrix
Buildings - Old Brick School

Consequence Score

0 - No Effect
1 - Very Low
2 - Low
3 - Moderate
4 - High
5 - Very High

Climate Parameter		Temperature															
		Mean Annual Temperature (°C)				Days above +30ºC				Hottest Day (°C)				Cooling Degree Days (Degree Days)			
		Annual Mean				**Very Hot Days**				**Hottest Day**				**Cooling Degree Days**			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3		
	2050	4.2	4			9	4			35.1	4			114	4		
	2080	6.4	5			24	5			38.7	5			258	5		
Buildings - Old Brick School		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5
2 Structural – Building Envelope	Present		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5
3 Mechanical – HVAC	Present		3		6		3		6		3		6		3		3
	2050	Y	4	2	8	Y	4	2	8	Y	4	2	8	Y	4	1	4
	2080		5		10		5		10		5		10		5		5
4 Electrical – Electrical and Communications	Present		3		3		3		6		3		12		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	4	16	Y	4	1	4
	2080		5		5		5		10		5		20		5		5
5 Plumbing – Water and Wastewater	Present		3		3		3		6		3		6		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4
	2080		5		5		5		10		5		10		5		5
6 Building Staff	Present		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5
5 Public / Customers	Present		3		3		3		3		3		12		3		3
	2050	Y	4	1	4	y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		5		5		5		5		5		20		5		5
6 Emergency Services	Present		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		5		5		5		5		5		5		5		5

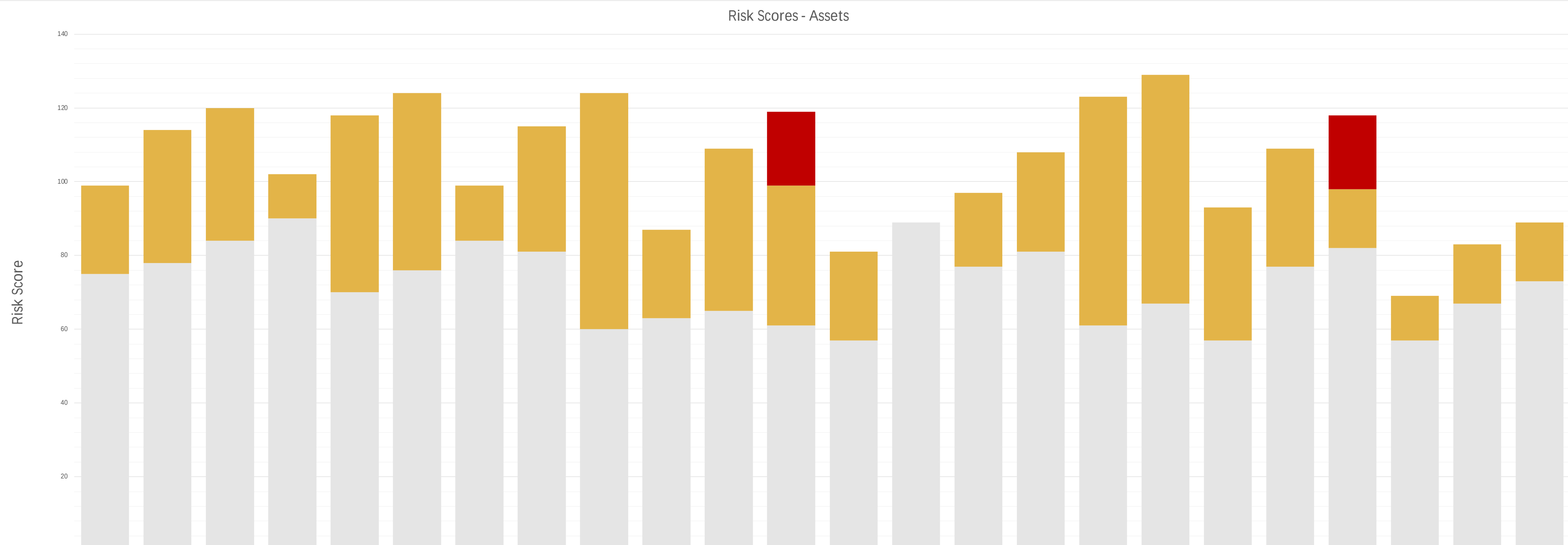
Climate Parameter		Temperature												Precipitation			
		# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events				Annual Total Percipitation (mm)			
		Coldest Days				**Frost-free Season**				**Freeze/ Thaw Events**				**Annual Percipitation**			
Climate Projections	Present	14	3			120	3			86.5	3			432	3		
	2050	7.4	2			142	4			77.5	2			446	3		
	2080	3.1	2			161	4			70.0	2			471	4		
Buildings - Old Brick School		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		3		3		12		3		3
	2050	Y	2	1	2	Y	4	1	4	Y	2	4	8	Y	3	1	3
	2080		2		2		4		4		2		8		4		4
2 Structural – Building Envelope	Present		3		6		3		3		3		12		3		3
	2050	Y	2	2	4	Y	4	1	4	Y	2	4	8	Y	3	1	3
	2080		2		4		4		4		2		8		4		4
3 Mechanical – HVAC	Present		3		15		3		3		3		6		3		3
	2050	Y	2	5	10	Y	4	1	4	Y	2	2	4	Y	3	1	3
	2080		2		10		4		4		2		4		4		4
4 Electrical – Electrical and Communications	Present		3		3		3		3		3		3		3		3
	2050	Y	2	1	2	Y	4	1	4	Y	2	1	2	Y	3	1	3
	2080		2		2		4		4		2		2		4		4
5 Plumbing – Water and Wastewater	Present		3		12		3		3		3		12		3		3
	2050	Y	2	4	8	Y	4	1	4	Y	2	4	8	Y	3	1	3
	2080		2		8		4		4		2		8		4		4
6 Building Staff	Present		3		15		3		3		3		9		3		3
	2050	Y	2	5	10	Y	4	1	4	Y	2	3	6	Y	3	1	3
	2080		2		10		4		4		2		6		4		4
5 Public / Customers	Present		3		12		3		3		3		6		3		3
	2050	Y	2	4	8	Y	4	1	4	Y	2	2	4	Y	3	1	3
	2080		2		8		4		4		2		4		4		4
6 Emergency Services	Present		3		6		3		3		3		3		3		3
	2050	Y	2	2	4	Y	4	1	4	Y	2	1	2	Y	3	1	3
	2080		2		4		4		4		2		2		4		4

Climate Parameter		Precipitation															
		Maximum 1-Day Total Percipitation (mm)				Maximum 5-day Consecutive Percipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)			
		Extreme Rainfall				**Persistant Percipitation**				Short Duration Rainfall/ Overland Flooding				**Drought**			
Climate Projections	Present	31	3			56	3			3.3	3			-0.1	3		
	2050	31	3			57	3			4.3	4			-0.5	4		
	2080	33	3			59	3			4.8	4			-0.8	4		
Buildings - Old Brick School		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		9		3		12		3		3		3		3
	2050	Y	3	3	9	Y	3	4	12	Y	4	1	4	Y	4	1	4
	2080		3		9		3		12		4		4		4		4
2 Structural – Building Envelope	Present		3		9		3		6		3		3		3		3
	2050	Y	3	3	9	Y	3	2	6	Y	4	1	4	Y	4	1	4
	2080		3		9		3		6		4		4		4		4
3 Mechanical – HVAC	Present		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4
	2080		3		3		3		3		4		4		4		4
4 Electrical – Electrical and Communications	Present		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4
	2080		3		3		3		3		4		4		4		4
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4
	2080		3		3		3		3		4		4		4		4
6 Building Staff	Present		3		6		3		6		3		3		3		3
	2050	Y	3	2	6	Y	3	2	6	Y	4	1	4	Y	4	1	4
	2080		3		6		3		6		4		4		4		4
5 Public / Customers	Present		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4
	2080		3		3		3		3		4		4		4		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4
	2080		3		3		3		3		4		4		4		4

Climate Parameter		Precipitation				Extreme Events											
		Winter Precipitation (mm)				Lightning				Hail Storm				High Wind/ Tornado			
		Snow Accumulation				**Lightning**				**Hail**				**Tornado**			
Climate Projections	Present	69	3			-	3			-	3			-	3		
	2050	74	4			+	4			+	4			+	4		
	2080	79	4			++	4			+	4			+	4		
Buildings - Old Brick School		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		6		3		3		3		6		3		9
	2050	Y	4	2	8	Y	4	1	4	Y	4	2	8	Y	4	3	12
	2080		4		8		4		4		4		8		4		12
2 Structural – Building Envelope	Present		3		9		3		3		3		9		3		9
	2050	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	3	12
	2080		4		12		4		4		4		12		4		12
3 Mechanical – HVAC	Present		3		6		3		3		3		9		3		6
	2050	Y	4	2	8	Y	4	1	4	Y	4	3	12	Y	4	2	8
	2080		4		8		4		4		4		12		4		8
4 Electrical – Electrical and Communications	Present		3		3		3		12		3		3		3		6
	2050	Y	4	1	4	Y	4	4	16	Y	4	1	4	Y	4	2	8
	2080		4		4		4		16		4		4		4		8
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		4		4
6 Building Staff	Present		3		3		3		9		3		9		3		9
	2050	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	3	12
	2080		4		4		4		12		4		12		4		12
5 Public / Customers	Present		3		3		3		3		3		6		3		6
	2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	2	8
	2080		4		4		4		4		4		8		4		8
6 Emergency Services	Present		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		4		4

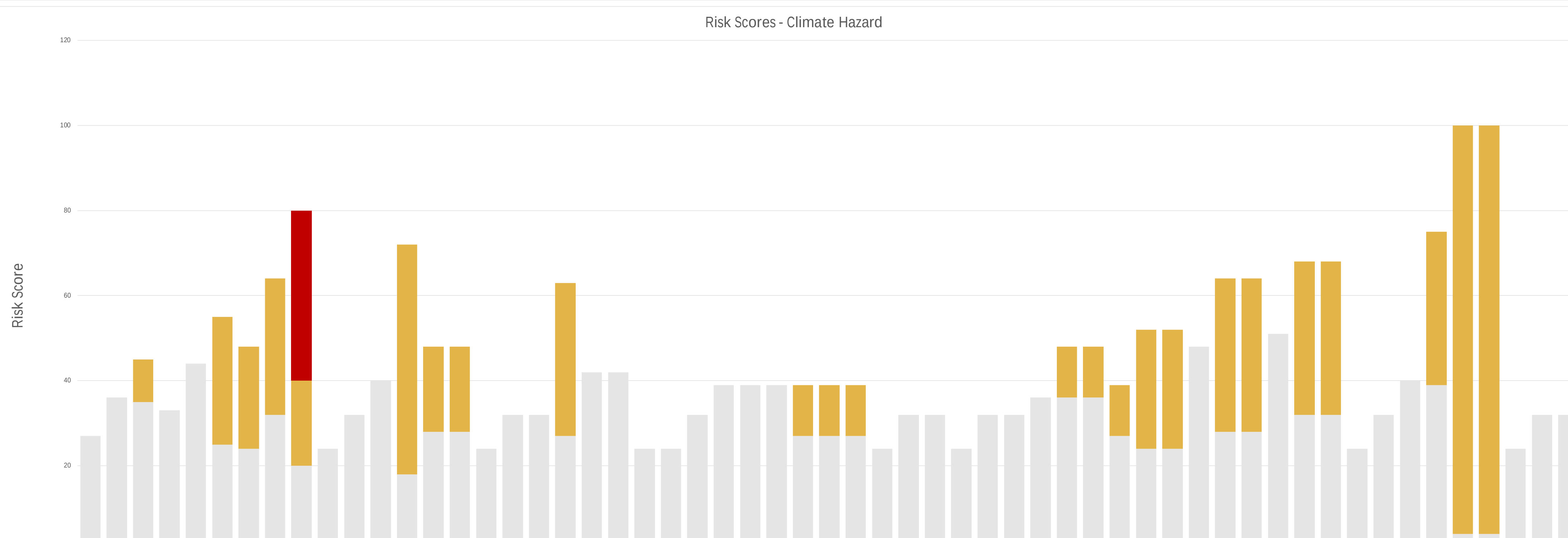
Climate Parameter		Extreme Events								Shifting Natural Ecoregions			
		Flooding				Climate Moisture Deficit				Shifting Natural Ecoregions			
		River Flooding				Wildfire Smoke				Shifting Ecosystem			
Climate Projections	Present	-	3			-	3			-	3		
	2050	+	4			+	4			+	4		
	2080	++	5			+	4			+	4		
Buildings - Old Brick School		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		9		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		5		5		4		12		4		4
2 Structural – Building Envelope	Present		3		3		3		9		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		5		5		4		12		4		4
3 Mechanical – HVAC	Present		3		3		3		9		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		5		5		4		12		4		4
4 Electrical – Electrical and Communications	Present		3		3		3		9		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	1	4
	2080		5		5		4		12		4		4
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		5		5		4		4		4		4
6 Building Staff	Present		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		5		5		4		16		4		4
5 Public / Customers	Present		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		5		5		4		16		4		4
6 Emergency Services	Present		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		5		5		4		16		4		4

PIEVC Risk Scores
Buildings - Old Brick School



	Civil – Site, Parking, Landscaped Areas, Stormwater			Structural – Building Envelope			Mechanical – HVAC			Electrical – Electrical and Communications		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	0	0	0	20
Medium Risk Score	24	36	36	12	48	48	15	34	64	24	44	38
Low	75	78	84	90	70	76	84	81	60	63	65	61

	Plumbing – Water and Wastewater			Building Staff			Public / Customers			Emergency Services		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	20	0	0	0
Medium Risk Score	24	0	20	27	62	62	36	32	16	12	16	16
Low	57	89	77	81	61	67	57	77	82	57	67	73



	Annual Mean			Very Hot Days			Hottest Day			Cooling Degree Days			Coldest Days			Frost-free Season		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	10	0	0	30	24	32	20	0	0	0	54	20	20	0	0	0
Low Risk Scores	27	36	35	33	44	25	24	32	20	24	32	40	18	28	28	24	32	32

	Freeze/ Thaw Events			Annual Percipitation			Extreme Rainfall			Persistant Percipitation			Short Duration Rainfall / Overland Flooding			Drought		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	36	0	0	0	0	0	0	0	0	12	12	12	0	0	0	0	0	0
Low Risk Scores	27	42	42	24	24	32	39	39	39	27	27	27	24	32	32	24	32	32

	Snow Accumulation			Lightning			Hail			Tornado			River Flooding			Wildfire Smoke			Shifting Ecosystem		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	12	12	12	28	28	0	36	36	0	36	36	0	0	0	36	96	96	0	0	0
Low Risk Scores	36	36	36	27	24	24	48	28	28	51	32	32	24	32	40	39	4	4	24	32	32

PIEVC Risk Matrix
Buildings - Public Library

Consequence Score

- 0 - No Effect
- 1 - Very Low
- 2 - Low
- 3 - Moderate
- 4 - High
- 5 - Very High

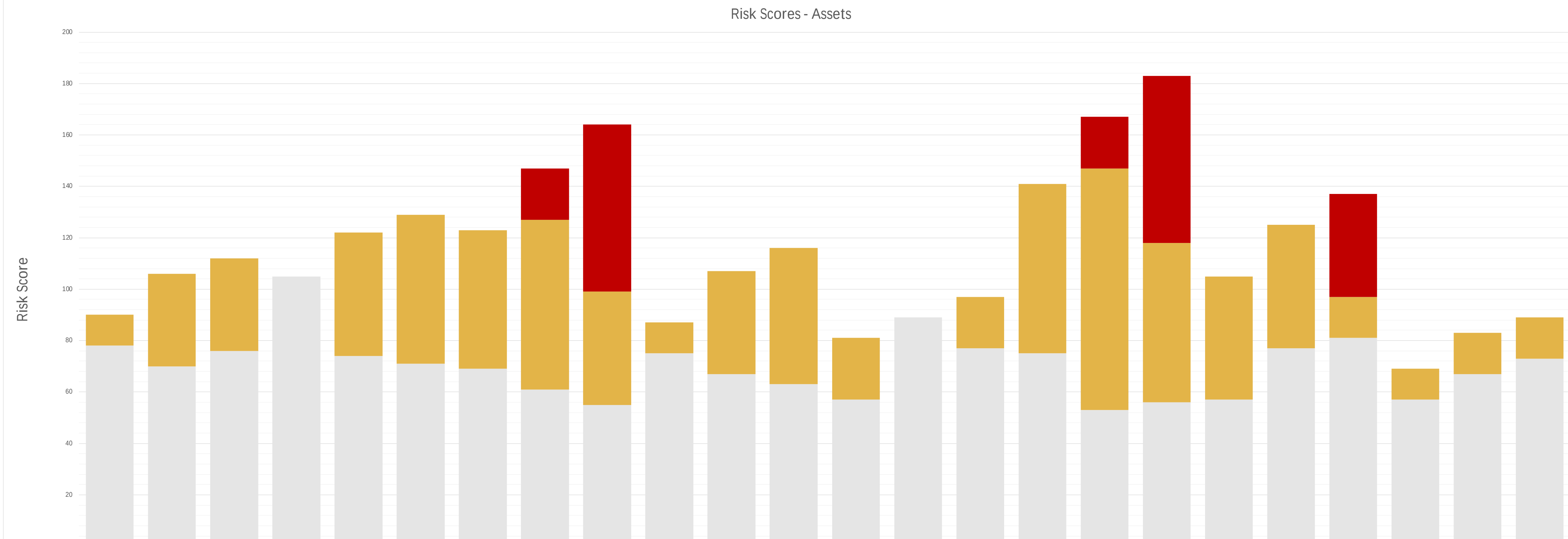
Climate Parameter

#	Buildings - Old Brick School and Public Library	Year	Temperature: Mean Annual Temperature (°C)				Days above +30ºC				Hottest Day (°C)				Cooling Degree Days (Degree Days)				# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events			
			Annual Mean				**Very Hot Days**				**Hottest Day**				**Cooling Degree Days**				**Coldest Days**				**Frost-free Season**				**Freeze/ Thaw Events**			
	Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14.1	3			120	3			86.5	3		
	Climate Projections	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
	Climate Projections	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
			Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1	Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		3
		2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	1	2
		2080		5		5		5		5		5		5		5		5		2		4		4		4		2		2
2	Structural – Building Envelope	Present		3		3		3		3		3		6		3		3		3		9		3		3		3		9
		2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	3	6
		2080		5		5		5		5		5		10		5		5		2		6		4		4		2		6
3	Mechanical – HVAC	Present		3		6		3		12		3		12		3		15		3		15		3		3		3		6
		2050	Y	4	2	8	Y	4	4	16	Y	4	4	16	Y	4	5	20	Y	2	5	10	Y	4	1	4	Y	2	2	4
		2080		5		10		5		20		5		20		5		25		2		10		4		4		2		4
4	Electrical – Electrical and Communications	Present		3		3		3		6		3		9		3		3		3		6		3		3		3		3
		2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	1	2
		2080		5		5		5		10		5		15		5		5		2		4		4		4		2		2
5	Plumbing – Water and Wastewater	Present		3		3		3		6		3		6		3		3		3		12		3		3		3		12
		2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	2	4	8	Y	4	1	4	Y	2	4	8
		2080		5		5		5		10		5		10		5		5		2		8		4		4		2		8
6	Building Staff	Present		3		3		3		12		3		12		3		15		3		15		3		3		3		9
		2050	Y	4	1	4	Y	4	4	16	Y	4	4	16	Y	4	5	20	Y	2	5	10	Y	4	1	4	Y	2	3	6
		2080		5		5		5		20		5		20		5		25		2		10		4		4		2		6
5	Public / Customers	Present		3		3		3		12		3		12		3		3		3		12		3		3		3		6
		2050	Y	4	1	4	Y	4	4	16	Y	4	4	16	Y	4	1	4	Y	2	4	8	Y	4	1	4	Y	2	2	4
		2080		5		5		5		20		5		20		5		5		2		8		4		4		2		4
6	Emergency Services	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		3
		2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	1	2
		2080		5		5		5		5		5		5		5		5		2		4		4		4		2		2

#	Buildings - Old Brick School and Public Library	Year	Precipitation: Annual Total Percipitation (mm)				Maximum 1-Day Total Percipitation (mm)				Maximum 5-day Consecutive Percipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)			
			Annual Percipitation				**Extreme Rainfall**				**Persistant Percipitation**				Short Duration Rainfall/ Overland Flooding				**Drought**				**Snow Accumulation**			
	Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
	Climate Projections	2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
	Climate Projections	2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
			Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1	Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		9		3		12		3		3		3		3		3		3
		2050	Y	3	1	3	Y	3	3	9	Y	3	4	12	Y	4	1	4	Y	4	1	4	Y	4	1	4
		2080		4		4		3		9		3		12		4		4		4		4		4		4
2	Structural – Building Envelope	Present		3		3		3		9		3		6		3		3		3		3		3		9
		2050	Y	3	1	3	Y	3	3	9	Y	3	2	6	Y	4	1	4	Y	4	1	4	Y	4	3	12
		2080		4		4		3		9		3		6		4		4		4		4		4		12
3	Mechanical – HVAC	Present		3		3		3		3		3		3		3		3		3		3		3		6
		2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
		2080		4		4		3		3		3		3		4		4		4		4		4		8
4	Electrical – Electrical and Communications	Present		3		3		3		3		3		3		3		3		3		3		3		3
		2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
		2080		4		4		3		3		3		3		4		4		4		4		4		4
5	Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		3		3		3
		2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
		2080		4		4		3		3		3		3		4		4		4		4		4		4
6	Building Staff	Present		3		3		3		6		3		6		3		3		3		3		3		6
		2050	Y	3	1	3	Y	3	2	6	Y	3	2	6	Y	4	1	4	Y	4	1	4	Y	4	2	8
		2080		4		4		3		6		3		6		4		4		4		4		4		8
5	Public / Customers	Present		3		3		3		3		3		3		3		3		3		3		3		6
		2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
		2080		4		4		3		3		3		3		4		4		4		4		4		8
6	Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3
		2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
		2080		4		4		3		3		3		3		4		4		4		4		4		4

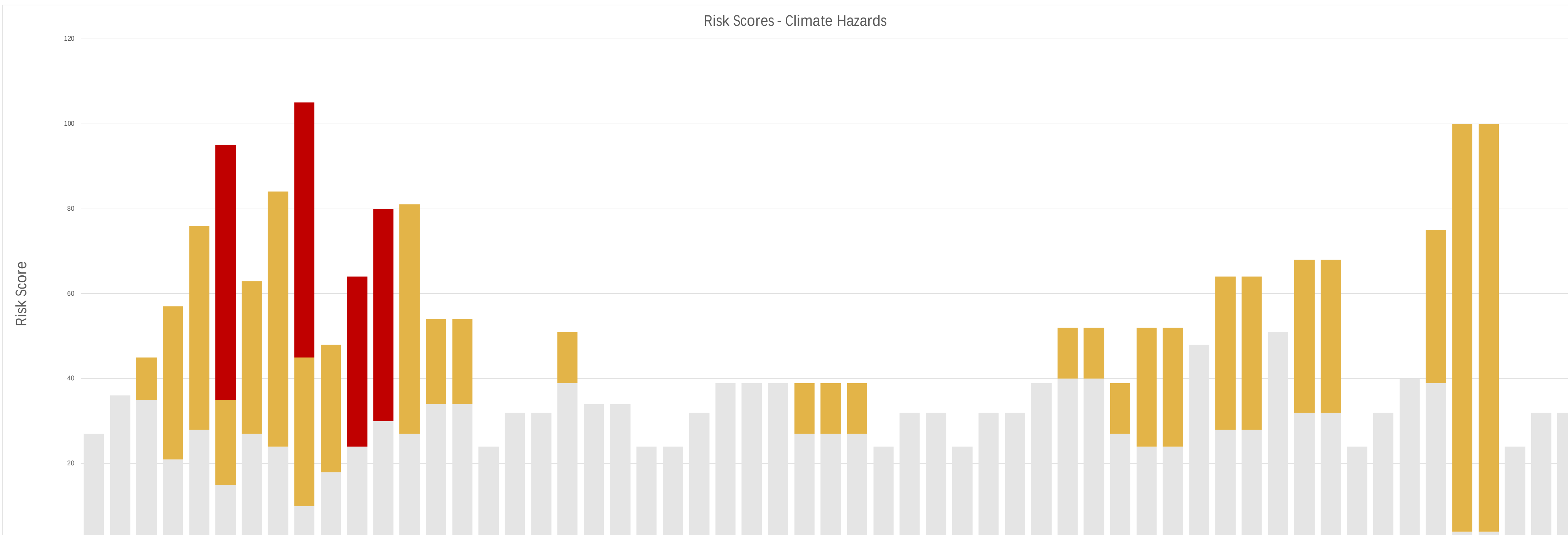
#	Buildings - Old Brick School and Public Library	Year	Extreme Events: Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit				Shifiting Natural Ecoregions: Shifiting Natural Ecoregions			
			Lightning				**Hail**				**Tornado**				**River Flooding**				Wildfire Smoke				Shifting Ecosystem			
	Climate Projections	Present	-	3			-	3			-	3			-	3			-	3			-	3		
	Climate Projections	2050	+	4			+	4			+	4			+	4			+	4			+	4		
	Climate Projections	2080	++	4			+	4			+	4			++	5			+	4			+	4		
			Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1	Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		6		3		9		3		3		3		9		3		3
		2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4
		2080		4		4		4		8		4		12		5		5		4		12		4		4
2	Structural – Building Envelope	Present		3		3		3		9		3		9		3		3		3		9		3		3
		2050	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	3	12	Y	4	1	4
		2080		4		4		4		12		4		12		5		5		4		12		4		4
3	Mechanical – HVAC	Present		3		3		3		9		3		6		3		3		3		9		3		3
		2050	Y	4	1	4	Y	4	3	12	Y	4	2	8	Y	4	1	4	Y	4	3	12	Y	4	1	4
		2080		4		4		4		12		4		8		5		5		4		12		4		4
4	Electrical – Electrical and Communications	Present		3		12		3		3		3		6		3		3		3		9		3		3
		2050	Y	4	4	16	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	3	12	Y	4	1	4
		2080		4		16		4		4		4		8		5		5		4		12		4		4
5	Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		3		3		3
		2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
		2080		4		4		4		4		4		4		5		5		4		4		4		4
6	Building Staff	Present		3		9		3		9		3		9		3		3		3		12		3		3
		2050	Y	4	3	12	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	4	16	Y	4	1	4
		2080		4		12		4		12		4		12		5		5		4		16		4		4
5	Public / Customers	Present		3		3		3		6		3		6		3		3		3		12		3		3
		2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	4	4	16	Y	4	1	4
		2080		4		4		4		8		4		8		5		5		4		16		4		4
6	Emergency Services	Present		3		3		3		3		3		3		3		3		3		12		3		3
		2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	4	16	Y	4	1	4
		2080		4		4		4		4		4		4		5		5		4		16		4		4

PIEVC Risk Scores
Buildings - Public Library



	Civil – Site, Parking, Landscaped Areas, Stormwater			Structural – Building Envelope			Mechanical – HVAC			Electrical – Electrical and Communications		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	20	65	0	0	0
Medium Risk Score	12	36	36	0	48	58	54	66	44	12	40	53
Low Risk Score	78	70	76	105	74	71	69	61	55	75	67	63

	Plumbing – Water and Wastewater			Building Staff			Public / Customers			Emergency Services		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	20	65	0	0	40	0	0	0
Medium Risk Score	24	0	20	66	94	62	48	48	16	12	16	16
Low Risk Score	57	89	77	75	53	56	57	77	81	57	67	73



	Annual Mean			Very Hot Days			Hottest Day			Cooling Degree Days		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	60	0	0	60	0	40	50
Medium Risk Scores	0	0	10	36	48	20	36	60	35	30	0	0
Low Risk Scores	27	36	35	21	28	15	27	24	10	18	24	30

	Coldest Days			Frost-free Season			Freeze/ Thaw Events			Annual Percipitation		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	54	20	20	0	0	0	12	0	0	0	0	0
Low Risk Scores	27	34	34	24	32	32	39	34	34	24	24	32

	Extreme Rainfall			Persistant Percipitation			Short Duration Rainfall / Overland Flooding			Drought		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	12	12	12	0	0	0	0	0	0
Low Risk Scores	39	39	39	27	27	27	24	32	32	24	32	32

	Snow Accumulation			Lightning			Hail			Tornado		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	12	12	12	28	28	0	36	36	0	36	36
Low Risk Scores	39	40	40	27	24	24	48	28	28	51	32	32

	River Flooding			Wildfire Smoke			Shifting Ecosystem		
	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	36	96	96	0	0	0
Low Risk Scores	24	32	40	39	4	4	24	32	32

PIEVC Risk Matrix
Buildings - Riverfront Washrooms

Consequence Score

0 - No Effect
1 - Very Low
2 - Low
3 - Moderate
4 - High
5 - Very High

Climate Parameter – Temperature

		Temperature																											
		Mean Annual Temperature (◦C)				Days above +30ºC				Hottest Day (◦C)				Cooling Degree Days (Degree Days)				# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events			
		Annual Mean				**Very Hot Days**				**Hottest Day**				**Cooling Degree Days**				**Coldest Days**				**Frost-free Season**				**Freeze/ Thaw Events**			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14.1	3			120	3			86.5	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
Buildings - Riverfront Washrooms		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2
2 Structural – Building Envelope	Present		3		3		3		3		3		6		3		3		3		3		3		3		3		6
	2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	2	4
	2080		5		5		5		5		5		10		5		5		2		2		4		4		2		4
3 Mechanical – HVAC	Present		3		6		3		9		3		12		3		12		3		9		3		3		3		3
	2050	Y	4	2	8	Y	4	3	12	Y	4	4	16	Y	4	4	16	Y	2	3	6	Y	4	1	4	Y	2	1	2
	2080		5		10		5		15		5		20		5		20		2		6		4		4		2		2
4 Electrical – Electrical and Communications	Present		3		3		3		3		3		9		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	3	12	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		15		5		5		2		2		4		4		2		2
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		6		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		10		5		5		2		2		4		4		2		2
6 Building Staff	Present		3		3		3		9		3		9		3		9		3		6		3		3		3		6
	2050	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	3	12	Y	2	2	4	Y	4	1	4	Y	2	2	4
	2080		5		5		5		15		5		15		5		15		2		4		4		4		2		4
5 Public / Customers	Present		3		3		3		12		3		12		3		9		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	4	16	Y	4	4	16	Y	4	3	12	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		20		5		20		5		15		2		2		4		4		2		2
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		2

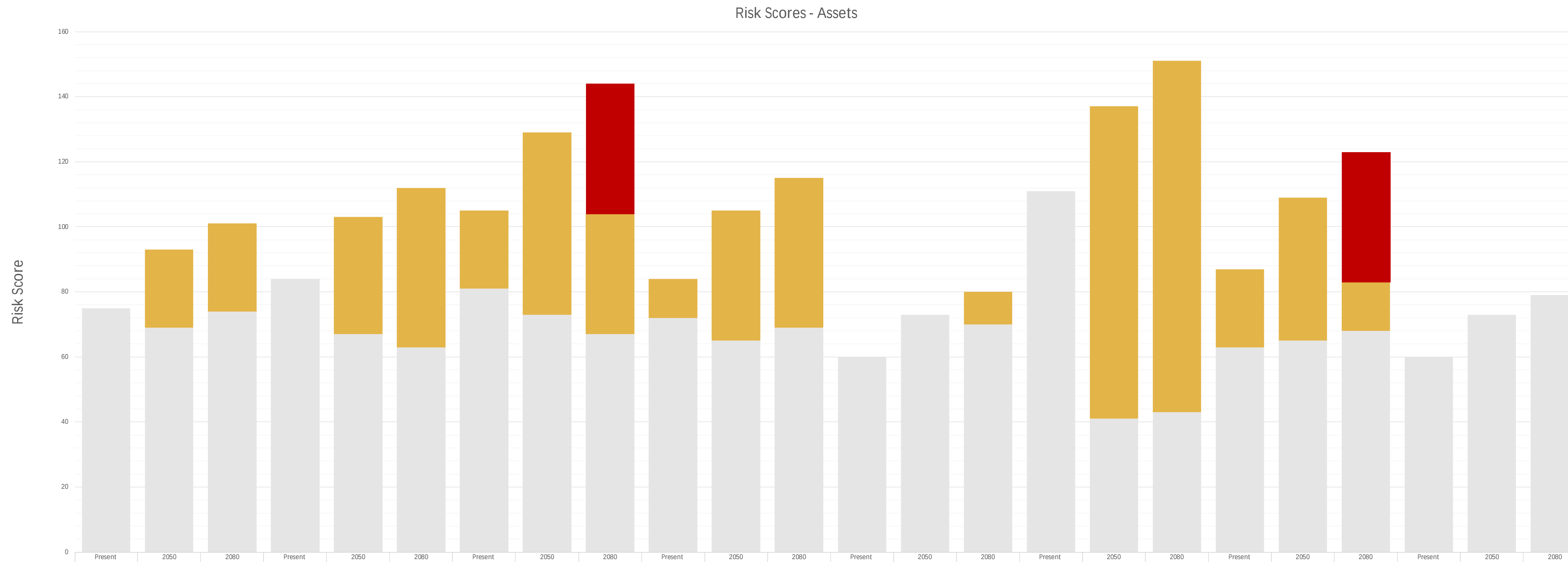
Climate Parameter – Precipitation

		Precipitation																							
		Annual Total Percipitation (mm)				Maximum 1-Day Total Percipitation (mm)				Maximum 5-day Consecutive Percipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)			
		Annual Percipitation				**Extreme Rainfall**				**Persistant Percipitation**				Short Duration Rainfall/ Overland Flooding				**Drought**				**Snow Accumulation**			
Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
	2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
	2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
Buildings - Riverfront Washrooms		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
2 Structural – Building Envelope	Present		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		4		4		3		3		3		3		4		4		4		4		4		8
3 Mechanical – HVAC	Present		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		4		4		3		3		3		3		4		4		4		4		4		8
4 Electrical – Electrical and Communications	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
6 Building Staff	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
5 Public / Customers	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4

Climate Parameter – Extreme Events and Shifting Natural Ecoregions

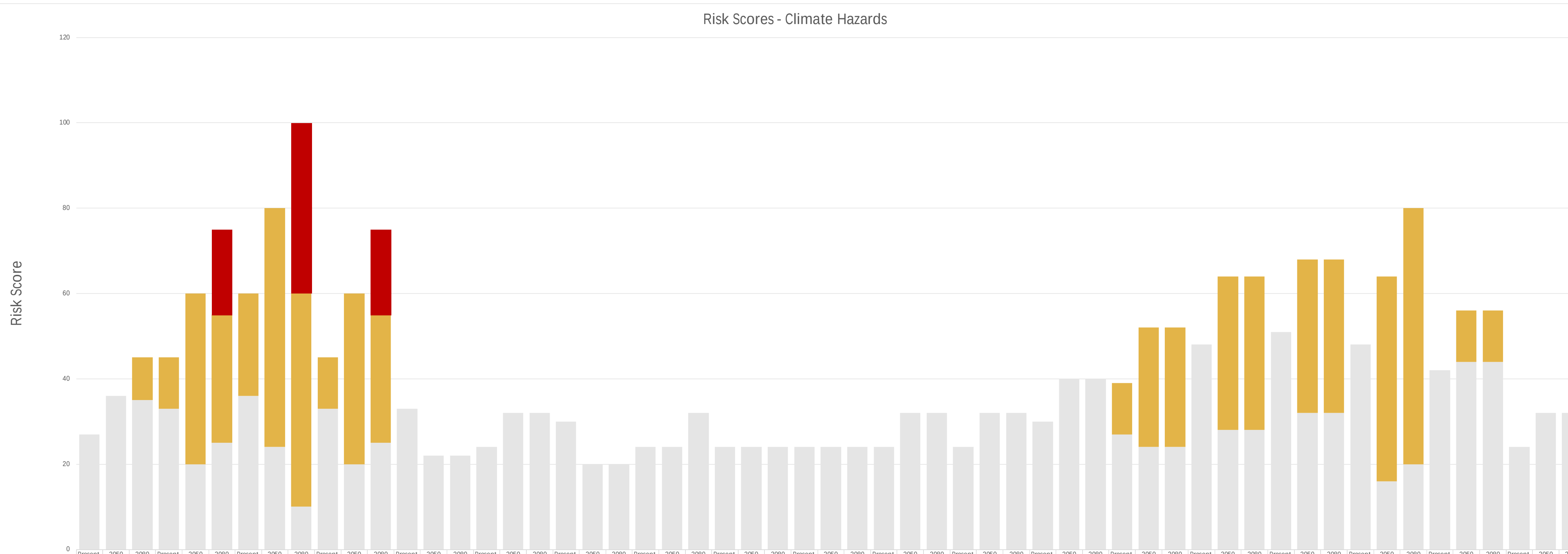
		Extreme Events																				Shifting Natural Ecoregions			
		Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit				Shifting Natural Ecoregions			
		Lightning				**Hail**				**Tornado**				**River Flooding**				Wildfire Smoke				Shifting Ecosystem			
Climate Projections	Present	-	3			-	3			-	3			-	3			-	3			-	3		
	2050	+	4			+	4			+	4			+	4			+	4			+	4		
	2080	++	4			+	4			+	4			++	5			+	4			+	4		
Buildings - Riverfront Washrooms		Y/N	L	C	R	Y/N	L	C	R	Y/N	I	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		6		3		9		3		9		3		6		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	3	12	Y	4	2	8	Y	4	1	4
	2080		4		4		4		8		4		12		5		15		4		8		4		4
2 Structural – Building Envelope	Present		3		3		3		9		3		9		3		9		3		3		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	1	4
	2080		4		4		4		12		4		12		5		15		4		4		4		4
3 Mechanical – HVAC	Present		3		3		3		9		3		6		3		3		3		6		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	2	8	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		4		12		4		8		5		5		4		8		4		4
4 Electrical – Electrical and Communications	Present		3		12		3		3		3		6		3		9		3		6		3		3
	2050	Y	4	4	16	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	2	8	Y	4	1	4
	2080		4		16		4		4		4		8		5		15		4		8		4		4
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		4		4		4
6 Building Staff	Present		3		9		3		9		3		9		3		9		3		9		3		3
	2050	Y	4	3	12	Y	4	3	12	Y	4	3	12	Y	4	3	12	Y	4	3	12	Y	4	1	4
	2080		4		12		4		12		4		12		5		15		4		12		4		4
5 Public / Customers	Present		3		3		3		6		3		6		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		4		8		4		8		5		5		4		4		4		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		6		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		8		4		4

PIEVC Risk Scores
Buildings - Riverfront Washrooms



	Civil – Site, Parking, Landscaped Areas, Stormwater			Structural – Building Envelope			Mechanical – HVAC			Electrical – Electrical and Communications		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	40	0	0	0
Medium Risk Score	0	24	27	0	36	49	24	56	37	12	40	46
Low Risk Score	75	69	74	84	67	63	81	73	67	72	65	69

	Plumbing – Water and Wastewater			Building Staff			Public / Customers			Emergency Services		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Score	0	0	0	0	0	0	0	0	40	0	0	0
Medium Risk Score	0	0	10	0	96	108	24	44	15	0	0	0
Low Risk Score	60	73	70	111	41	43	63	65	68	60	73	79



	Annual Mean			Very Hot Days			Hottest Day			Cooling Degree Days			Coldest Days			Frost-free Season			Freeze/ Thaw Events			Annual Percipitation			Extreme Rainfall		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	20	0	0	40	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	10	12	40	30	24	56	50	12	40	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Low Risk Scores	27	36	35	33	20	25	36	24	10	33	20	25	33	22	22	24	32	32	30	20	20	24	24	32	24	24	24

	Persistant Percipitation			Short Duration Rainfall / Overland Flooding			Drought			Snow Accumulation			Lightning			Hail			Tornado			River Flooding			Wildfire Smoke			Shifting Ecosystem		
	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080	Present	2050	2080
High Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Risk Scores	0	0	0	0	0	0	0	0	0	0	0	0	12	28	28	0	36	36	0	36	36	0	48	60	0	12	12	0	0	0
Low Risk Scores	24	24	24	24	32	32	24	32	32	30	40	40	27	24	24	48	28	28	51	32	32	48	16	20	42	44	44	24	32	32

PIEVC Risk Matrix
Buildings - Town Administration Office

Consequence Score

- 0 - No Effect
- 1 - Very Low
- 2 - Low
- 3 - Moderate
- 4 - High
- 5 - Very High

Climate Parameter

Temperature

		Mean Annual Temperature (·C)				Days above +30ºC				Hottest Day (·C)				Cooling Degree Days (Degree Days)				# of Days Below -30°C				# Days Without Frost				# Freeze/ Thaw Events			
		Annual Mean				**Very Hot Days**				**Hottest Day**				**Cooling Degree Days**				**Coldest Days**				**Frost-free Season**				**Freeze/ Thaw Events**			
Climate Projections	Present	2.1	3			3	3			30.7	3			38	3			14	3			120	3			86.5	3		
	2050	4.2	4			9	4			35.1	4			114	4			7.4	2			142	4			77.5	2		
	2080	6.4	5			24	5			38.7	5			258	5			3.1	2			161	4			70.0	2		
Buildings - Town Administration Office		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		6		3		6		3		3		3		9		3		3		3		9
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	3	6
	2080		5		5		5		10		5		10		5		5		2		6		4		4		2		6
2 Structural – Building Envelope	Present		3		3		3		6		3		6		3		3		3		9		3		3		3		9
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	3	6
	2080		5		5		5		10		5		10		5		5		2		6		4		4		2		6
3 Mechanical – HVAC	Present		3		6		3		9		3		12		3		12		3		9		3		3		3		6
	2050	Y	4	2	8	Y	4	3	12	Y	4	4	16	Y	4	4	16	Y	2	3	6	Y	4	1	4	Y	2	2	4
	2080		5		10		5		15		5		20		5		20		2		6		4		4		2		4
4 Electrical – Electrical and Communications	Present		3		3		3		6		3		9		3		3		3		3		3		3		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	1	2
	2080		5		5		5		10		5		15		5		5		2		2		4		4		2		2
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		6		3		3		3		12
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	2	4	Y	4	1	4	Y	2	4	8
	2080		5		5		5		5		5		5		5		5		2		4		4		4		2		8
6 Building Staff	Present		3		3		3		9		3		12		3		12		3		9		3		3		3		12
	2050	Y	4	1	4	Y	4	3	12	Y	4	4	16	Y	4	4	16	Y	2	3	6	Y	4	1	4	Y	2	4	8
	2080		5		5		5		15		5		20		5		20		2		6		4		4		2		8
5 Public / Customers	Present		3		3		3		6		3		6		3		3		3		9		3		3		3		6
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	2	3	6	Y	4	1	4	Y	2	2	4
	2080		5		5		5		10		5		10		5		5		2		6		4		4		2		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	2	1	2	Y	4	1	4	Y	2	2	4
	2080		5		5		5		5		5		5		5		5		2		2		4		4		2		4

Precipitation

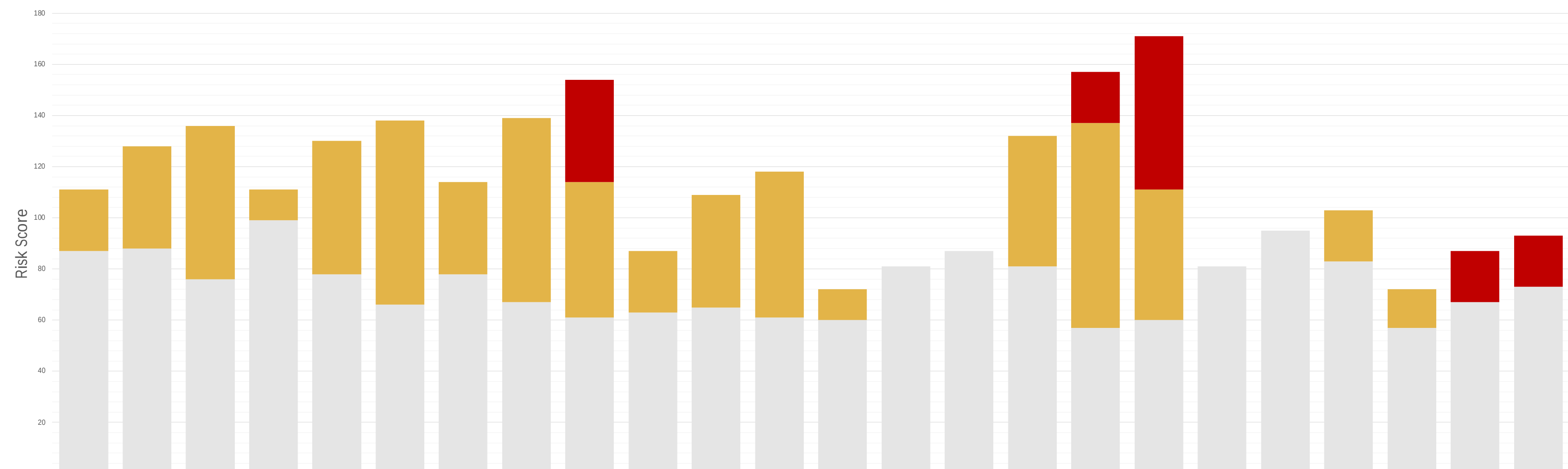
		Annual Total Percipitation (mm)				Maximum 1-Day Total Percipitation (mm)				Maximum 5-day Consecutive Percipitation (mm)				Short Duration Rainfall IDF Data: 1:100 year 24 hour event (mm/hr)				Relative Standardized Precipitation Evapotranspiration Index-based Drought Severity Scale for Agricultural Growing Season (May-August)				Winter Precipitation (mm)			
		Annual Percipitation				**Extreme Rainfall**				**Persistant Percipitation**				Short Duration Rainfall/ Overland Flooding				**Drought**				**Snow Accumulation**			
Climate Projections	Present	432	3			31	3			56	3			3.3	3			-0.1	3			69	3		
	2050	446	3			31	3			57	3			4.3	4			-0.5	4			74	4		
	2080	471	4			33	3			59	3			4.8	4			-0.8	4			79	4		
Buildings - Town Administration Office		Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		9		3		12		3		3		3		3		3		6
	2050	Y	3	1	3	Y	3	3	9	Y	3	4	12	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		4		4		3		9		3		12		4		4		4		4		4		8
2 Structural – Building Envelope	Present		3		3		3		9		3		6		3		3		3		3		3		9
	2050	Y	3	1	3	Y	3	3	9	Y	3	2	6	Y	4	1	4	Y	4	1	4	Y	4	3	12
	2080		4		4		3		9		3		6		4		4		4		4		4		12
3 Mechanical – HVAC	Present		3		3		3		3		3		3		3		3		3		3		3		6
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	2	8
	2080		4		4		3		3		3		3		4		4		4		4		4		8
4 Electrical – Electrical and Communications	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
6 Building Staff	Present		3		3		3		6		3		6		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	2	6	Y	3	2	6	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		6		3		6		4		4		4		4		4		4
5 Public / Customers	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		3		3		3
	2050	Y	3	1	3	Y	3	1	3	Y	3	1	3	Y	4	1	4	Y	4	1	4	Y	4	1	4
	2080		4		4		3		3		3		3		4		4		4		4		4		4

Extreme Events / **Shifting Natural Ecoregions**

		Lightning				Hail Storm				High Wind/ Tornado				Flooding				Climate Moisture Deficit				Shifting Natural Ecoregions			
		Lightning				**Hail**				**Tornado**				**River Flooding**				Wildfire Smoke				Shifting Ecosystem			
Climate Projections	Present	-	3			-	3			-	3			-	3			-	3			-	3		
	2050	+	4			+	4			+	4			+	4			+	4			+	4		
	2080	++	4			+	4			+	4			++	5			+	4			+	4		
Buildings - Town Administration Office		Y/N	L	C	R	Y/N	L	C	R	Y/N	\	C	R	Y/N	L	C	R	Y/N	L	C	R	Y/N	L	C	R
1 Civil – Site, Parking, Landscaped Areas, Stormwater	Present		3		3		3		6		3		9		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	3	12	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		4		4		8		4		12		5		5		4		16		4		4
2 Structural – Building Envelope	Present		3		3		3		9		3		9		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		4		4		12		4		12		5		5		4		16		4		4
3 Mechanical – HVAC	Present		3		3		3		9		3		6		3		3		3		12		3		3
	2050	Y	4	1	4	Y	4	3	12	Y	4	2	8	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		4		4		12		4		8		5		5		4		16		4		4
4 Electrical – Electrical and Communications	Present		3		12		3		3		3		6		3		3		3		12		3		3
	2050	Y	4	4	16	Y	4	1	4	Y	4	2	8	Y	4	1	4	Y	4	4	16	Y	4	1	4
	2080		4		16		4		4		4		8		5		5		4		16		4		4
5 Plumbing – Water and Wastewater	Present		3		3		3		3		3		3		3		3		3		6		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		8		4		4
6 Building Staff	Present		3		9		3		9		3		9		3		3		3		15		3		3
	2050	Y	4	3	12	Y	4	3	12	Y	4	3	12	Y	4	1	4	Y	4	5	20	Y	4	1	4
	2080		4		12		4		12		4		12		5		5		4		20		4		4
5 Public / Customers	Present		3		3		3		6		3		6		3		3		3		6		3		3
	2050	Y	4	1	4	Y	4	2	8	Y	4	2	8	Y	4	1	4	Y	4	2	8	Y	4	1	4
	2080		4		4		4		8		4		8		5		5		4		8		4		4
6 Emergency Services	Present		3		3		3		3		3		3		3		3		3		15		3		3
	2050	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	1	4	Y	4	5	20	Y	4	1	4
	2080		4		4		4		4		4		4		5		5		4		20		4		4

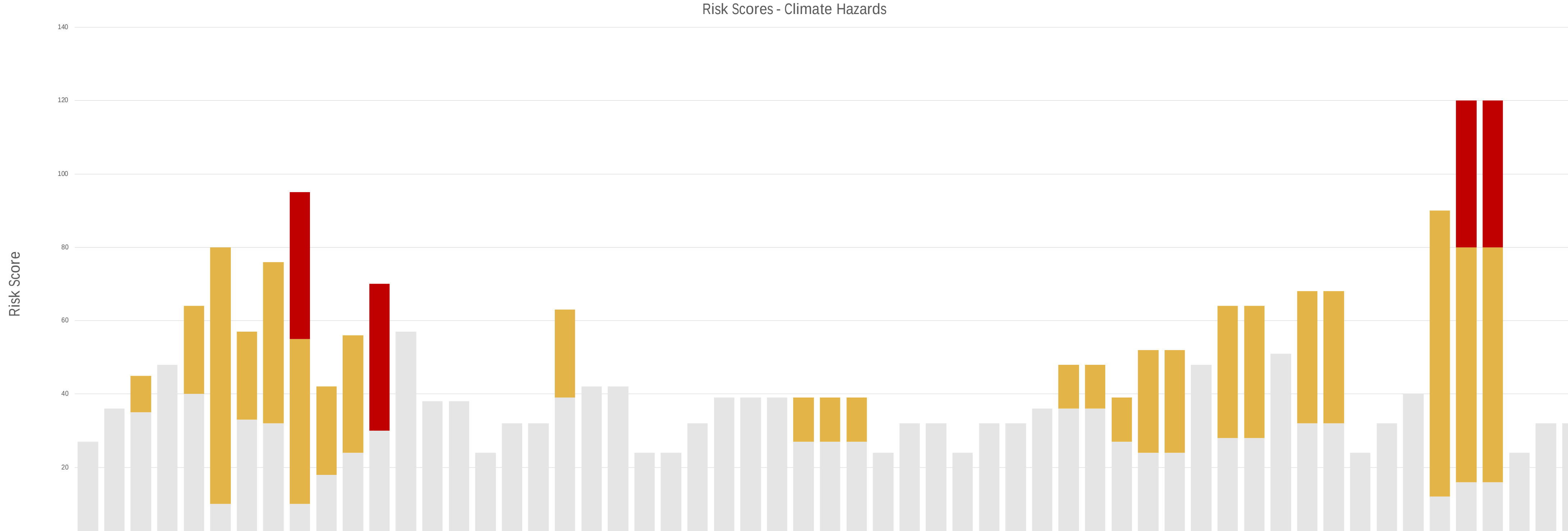
PIEVC Risk Scores
Buildings - Town Adminstration Office

Risk Scores - Assets



Category	Period	High Risk Score	Medium Risk Score	Low Risk Score
Civil – Site, Parking, Landscaped Areas, Stormwater	Present	0	24	87
	2050	0	40	88
	2080	0	60	76
Structural – Building Envelope	Present	0	12	99
	2050	0	52	78
	2080	0	72	66
Mechanical – HVAC	Present	0	36	78
	2050	0	72	67
	2080	40	53	61
Electrical – Electrical and Communications	Present	0	24	63
	2050	0	44	65
	2080	0	57	61
Plumbing – Water and Wastewater	Present	0	12	60
	2050	0	0	81
	2080	0	0	87
Building Staff	Present	0	51	81
	2050	20	80	57
	2080	60	51	60
Public / Customers	Present	0	0	81
	2050	0	0	95
	2080	0	20	83
Emergency Services	Present	0	15	57
	2050	20	0	67
	2080	20	0	73

Risk Scores - Climate Hazards



Hazard	Period	High Risk Scores	Medium Risk Scores	Low Risk Scores
Annual Mean	Present	0	0	27
	2050	0	0	36
	2080	0	10	35
Very Hot Days	Present	0	0	48
	2050	0	24	40
	2080	0	70	10
Hottest Day	Present	0	24	33
	2050	0	44	32
	2080	40	45	10
Cooling Degree Days	Present	0	24	18
	2050	0	32	24
	2080	40	0	30
Coldest Days	Present	0	0	57
	2050	0	0	38
	2080	0	0	38
Frost-free Season	Present	0	0	24
	2050	0	0	32
	2080	0	0	32
Freeze/ Thaw Events	Present	0	24	39
	2050	0	0	42
	2080	0	0	42
Annual Percipitation	Present	0	0	24
	2050	0	0	24
	2080	0	0	32
Extreme Rainfall	Present	0	0	39
	2050	0	0	39
	2080	0	0	39
Persistant Percipitation	Present	0	12	27
	2050	0	12	27
	2080	0	12	27
Short Duration Rainfall / Overland Flooding	Present	0	0	24
	2050	0	0	32
	2080	0	0	32
Drought	Present	0	0	24
	2050	0	0	32
	2080	0	0	32
Snow Accumulation	Present	0	0	36
	2050	0	12	36
	2080	0	12	36
Lightning	Present	0	12	27
	2050	0	28	24
	2080	0	28	24
Hail	Present	0	0	48
	2050	0	36	28
	2080	0	36	28
Tornado	Present	0	0	51
	2050	0	36	32
	2080	0	36	32
River Flooding	Present	0	0	24
	2050	0	0	32
	2080	0	0	40
Wildfire Smoke	Present	0	78	12
	2050	40	64	16
	2080	40	64	16
Shifting Ecosystem	Present	0	0	24
	2050	0	0	32
	2080	0	0	32

APPENDIX C – COMMUNITY-WIDE RISK RESULTS

The following **Table C-1** the full results of the community-wide climate risk assessment for the Town of Athabasca, including:

- The impact
- The Historic and Future Likelihood Scores
- The **Consequence Score**, as determined at the climate risk assessment workshop
- The **Risk Score**, which is the Future Likelihood Score multiplied by the Consequence Score
- The **Risk Level** between **0 and 25,** whereby scores:
    - between 0 and 9 are considered low risk
    - between 10 and 19 are considered medium risk
    - between 20 and 25 are considered high risk

Table C-1 Community-Wide Climate Risk Assessment Results

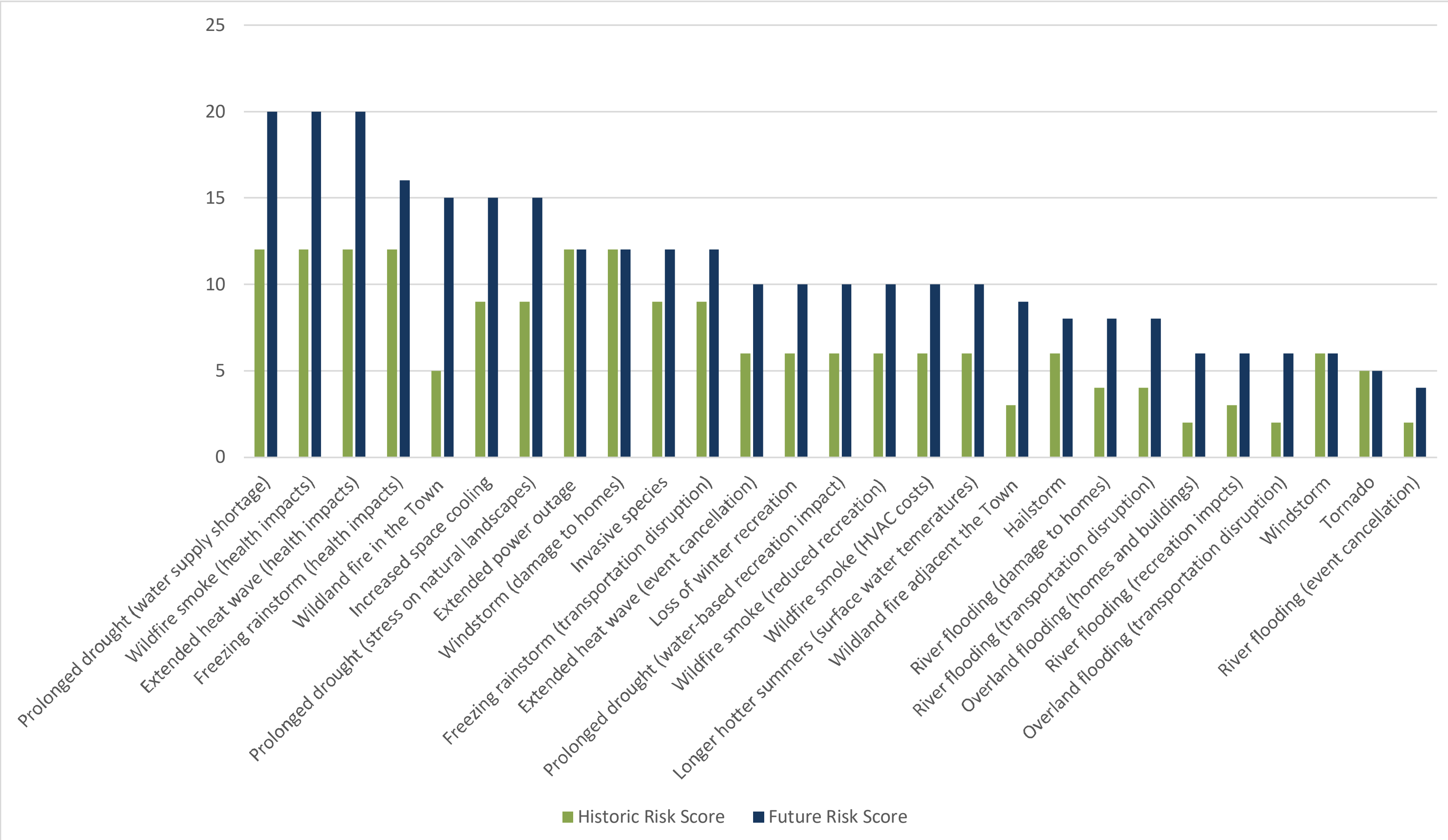
Climate Impact Scenario	Historic Likelihood	Future Likelihood	Consequence Score	Risk Score	Risk Level
Prolonged Drought - Lower river flows leading to potential water supply shortage and impacts to water-reliant businesses (pulp mill, agriculture, car washes, golf course, etc.) and the local and regional economy (bulk water station use).	3	5	4	20	**High**
Wildfire Smoke - Health impacts (injuries/fatalities) and potential hospitalization, particularly on vulnerable populations (seniors, low income, homeless).	3	5	4	20	**High**
Extended Heat Wave - Health impacts, and potential fatalities, particularly on vulnerable populations such as seniors and those with low income and/or housing challenged. Impacts exacerbated by lack of medical staff, refuge areas (cooling centre), and space cooling in buildings that house more vulnerable individuals.	3	5	4	20	**High**
Freezing Rainstorm – Health and safety risks from traffic accidents or falls, reduced quality of life and wellbeing, and increased stress on emergency services responding to accidents.	3	4	4	16	**Medium**
Wildland Fire in the Town - Widespread damage to buildings and property, destruction of natural assets (trees and forests), economic impacts, financial costs to clean up and re-build, potential loss of life (injuries/fatalities), and community evacuation/displacement.	1	3	5	15	**Medium**
Longer Hotter Summers - Increased space cooling costs in homes and buildings, increased financial costs for homeowners and businesses.	3	5	3	15	**Medium**
Prolonged Drought - Stress on natural landscapes resulting in vegetation dying off and impacts to parks, open spaces, sporting fields, golf course, etc. Financial costs to the Town, businesses and residents, and potential impacts to mental health with reduced recreation.	3	5	3	15	**Medium**

Climate Impact Scenario	Historic Likelihood	Future Likelihood	Consequence Score	Risk Score	Risk Level
Extended Power Outage - Loss of power and communications, financial impacts for local businesses and industry, and reduced quality of life and wellbeing, notably from reduced ability to work and learn remotely, and spoilage of fridge and freezer food. Impacts exacerbated if the outage occurred in mid-winter.	3	3	4	12	**Medium**
Windstorm - Damage to buildings, property, and trees including costs to repair damaged assets. Potential health impacts (injuries/fatalities) and transportation disruption from blocked roadways.	3	3	4	12	**Medium**
Invasive Species - Damage or diminished forest and urban tree canopy from insect, including increased costs and staff time to manage and maintain trees and parks. Dead and dying trees also pose a health and safety risk and can create negative impacts. Potential economic impacts for local forestry sector (pulp mill).	3	4	3	12	**Medium**
Freezing Rainstorm - Disruption of road and active transportation network, with implications for emergency response and hospital access, as well as access to homes, businesses, and schools.	3	4	3	12	**Medium**
Extended Heat Wave - Cancellation/disruption of summer festivals and events, reduced quality of life, and financial losses.	3	5	2	10	**Medium**
Loss Of Winter Recreation - Reduced quality and reliability of ice and snow with reduced opportunities for winter recreation activities (skating, skiing, snowmobiling), leading to reduced quality of life and wellbeing, and economic losses.	3	5	2	10	**Medium**
Prolonged Drought - Lower river flows and reduction in water-based recreation (jet boating) and reduced quality of life and wellbeing, and potential impact on water-based recreation businesses.	3	5	2	10	**Medium**
Wildfire Smoke - Reduced participation in outdoor recreation activities, including for school children (recess) with reduced quality of life and mental health consequences.	3	5	2	10	**Medium**
Wildfire Smoke - Increased home and building air filtration costs with financial consequences for residents, businesses, and local organizations.	3	5	2	10	**Medium**
Longer Hotter Summers - Increased surface water temperatures and potential increased risk of algae and cyanobacteria in lakes, leading to degradation of water quality, with consequences for fish populations, recreation, health, and the local economy (reduced visitation).	3	5	2	10	**Medium**
Wildland Fire Adjacent The Town - Region-wide displacement and evacuations to the Town with implications for Town staff and resources, including for firefighting and emergency services, and loss of local recreation amenities being used to accommodate evacuees.	1	3	3	9	**Low**

Climate Impact Scenario	Historic Likelihood	Future Likelihood	Consequence Score	Risk Score	Risk Level
Hailstorm - Damage to homes, vehicles, and businesses, including crops and gardens, with economic and financial impacts.	3	4	2	8	**Low**
River Flooding - Damage to homes and buildings and in the floodplain, economic and financial impacts, costs to repair and clean up debris, impacts to quality of life.	1	2	4	8	**Low**
River Flooding - Disruption of road and active transportation network from floodwaters and/or debris. Potential business disruption, economic impacts and loss of access to critical local facilities (grocery, hospital, RCMP, etc.).	1	2	4	8	**Low**
Overland Flooding - Potential flooding of basements in homes and buildings, disruption to daily life, economic impacts, and repair costs.	1	3	2	6	**Low**
River Flooding - Impacts to recreation assets (trails, boat launch, skate park, etc.) with financial costs to repair damaged assets and implications for recreation and quality of life.	1	2	3	6	**Low**
Overland Flooding - Flooding of road networks and disruption of transportation access, impacts to quality of life, wellbeing, recreation access, and the local economy.	1	3	2	6	**Low**
Windstorm - Cancellation/disruption of summer festivals and events, reduced quality of life and potential financial losses.	3	3	2	6	**Low**
Tornado - Widespread damage to buildings and property, potential loss of life (injuries/fatalities).	1	1	5	5	**Low**
River Flooding - Disruption of riverside festivals and events, and potential costs relocate or change event.	1	2	2	4	**Low**

Figure C-1 provides a summary of the climate risk assessment, comparing the historic and future climate risk scores for each climate impact scenario.

Figure C-1 Summary of Climate Risk Scores Comparing Historic and Future[6]



[6] Note that the names of some climate impacts have been abbreviated for presentation purposes in this Figure

APPENDIX D – ADAPTATION ACTIONS

Table D-1: Water Infrastructure and Treatment Recommended Adaptation Actions

No.	Categories of Actions	Recommended Actions	Time Frame
Water Infrastructure and Treatment			
1	Conduct Research	**River Flooding**: Review the raw water supply line and river intake to determine types of protection required. **Extreme Heat/Hot Days Above 30ºC**: • Review and conduct stress test on equipment at the raw water river pump house and microfiltration water treatment plant. Investigate new technology for higher temperature rating and determine threshold performance for both sites. • All communications and SCADA units shall be reviewed, and stress tested to determine threshold performance. • Review water is available for fire fighting. **Drought**: Review water consumption trends from the community to determine storage capacity. **Lightning**: Review the level of protection for more frequent lightning events at the raw water river pumphouse and microfiltration water treatment plant. **Heavy Precipitation**: Conduct ongoing assessment on water quality.	**0-5 years**
2	Update Policies, Plans, Standards, Guidelines, and Bylaws	**Drought:** Review, update, or upgrade policy for water conservation and management. **All Hazards**: Review, update, or upgrade safe work policies for staff working outdoors.	**0-5 years**
3	Increase Awareness and Education	**All Hazards**: Review with Operations on all safe work policies, plans, and guidelines. Practice and remind staff of all potential climate hazards. Identify changes need to be made.	**0-5 years**
4	Operations and Maintenance	**Persistent Rain/Heavy Rains/River Flooding**: Ongoing monitoring of turbidity at the intake. **Drought and Extreme Heat/Hot Days above 30ºC**: • Ongoing monitoring of water quality and quantity at intake, storage, and treatment. • Ongoing monitoring of equipment operating threshold at the microfiltration water treatment plant. **1:100 year 24 hour Rainfall Event Overland Flood**: Ongoing monitoring to ensure that the power system is not affected at the pressure reducing station. **Lightning**: Ongoing monitoring of communication and SCADA equipment. **Hail**: Plan for higher replacement and maintenance costs. **High Winds**: Plan for higher replacement and maintenance costs.	**0-5 years**
5	Build New or Upgrade Existing Infrastructure	**River Flooding**: Utility box at the raw water river pumphouse is near the 1:100 year flood level; discuss with utility company about relocation or protection.	**0-5 years**
		Drought: Review capacity for future expansion.	**5-10 years**

Table D-2 Wastewater Infrastructure and Treatment Recommended Adaptation Actions

No.	Categories of Actions	Recommended Actions	Time Frame
Wastewater Infrastructure and Treatment			
1	Conduct Research	**River Flooding**: Review flood hazard mapping and assess risk to the collection mains and force mains within the river flood zone. **Extreme Heat/Hot Days above 30°C**: Review and conduct stress test on equipment at the Main Sewage Lift Station, West End Lift Station, and the aeration system at lagoon cell. Investigate new technology for higher temperature rating and determine threshold performance. **Persistent Rain/Heavy Rains**: Ongoing tracking of I/I and determine program for addressing the issue. Review the storage and treatment capacity of the lagoon.	**0-5 years**
2	Increase Awareness and Education	**All Hazards**: Review with Operations on all safe work policies, plans, and guidelines. Practice and remind staff of all potential climate hazards. Identify changes need to be made.	**0-5 years**
3	Update Policies, Plans, Standards, Guidelines, and Bylaws	**Wildfire Smoke**: Develop safe work policy for staff when working under this condition.	**0-5 years**
4	Operations and Maintenance	**Hail:** Ongoing observation of hail damage; replace with more durable system. **All Hazards**: Increase replacement budget and proactive planning, where applicable. **Lightning**: Ongoing observation of damage; increase replacement budget and provide power surge protection to equipment. **Wildfire Smoke**: Ongoing assessment of the filtration unit; increase replacement budget with upgrades.	**0-5 years**
5	Build New or Upgrade Existing Infrastructure	**River Flooding**: The collection mains and force mains will need to be relocated out of the flooding areas.	**5-10 years**
6	Emergency Services	**All Hazards**: Review all safe work policies, plans, and guidelines, and upgrade as required.	**5-10 years**

Table D-3 Stormwater Recommended Adaptation Actions

No.	Categories of Actions	Recommended Actions	Time Frame
Stormwater Management			
1	Operations and Maintenance	**Freeze-thaw Cycle:** Ongoing review and assess of damage of the collection trunk and lateral mains, stormwater manholes and catch basins; increase replacement and repair budget. Increase operations and maintenance budget to address issues. **Hail**: Plan for higher replacement and maintenance cost to unclog stormwater and mains. **River Flooding:** Increase operations and maintenance budget for clean up/water pumping at the river outfalls.	**0-10 years**
2	Update Policies, Plans, Standards, Guidelines, and Bylaws	**All Hazards**: Review, revise, or update safe work policies for staff working outdoors. **River Flooding:** Review, revise, or upgrade policies, standards for construction within the flood zone.	**0-5 years** **5-10 years**
3	Increase Awareness and Education	**All Hazards**: Educate the public and internally on the hazards and discuss the expected level of service that the Town would or could provide. **1:100 year 24 hour Rainfall Event Overland Flood**: Educate the home owners of flood protection on their properties and understand the insurance/loss protection coverage.	**0-10 years**

Table D-4 Solid Waste Recommended Adaptation Actions

No.	Categories of Actions	Recommended Actions	Time Frame
Solid Waste Management			
1	Conduct Research	**Wildfires**: For landfill sites, review if there is sufficient buffer between the key facility and tree lines for wildfire prevention.	0-5 years
2	Update Policies, Plans, Standards, Guidelines, and Bylaws	**Lightning:** Review, update, or upgrade policy to include safe work practices in the event of lightning. This will include stop work policy. **High winds:** Review, update, or upgrade policy for include safe work practices and stop work policy. **Extreme Heat/Hot Days above 30°C**: Policy is already in place for staff working in extreme heat; however, need to communicate with staff on this policy. **Extreme Heat resulting in Landfill Fires**: Review, update, or upgrade waste handling procedures when encountering hot materials or fire potential materials. **Persistent Rain/Heavy Rains/River Flooding**: Review, update, or upgrade safe work practices on wet surfaces (waste, roads, etc.).	0-5 years
3	Increase Awareness and Education	**All Hazards**: Review with Operations on all safe work policies, plans, and guidelines. Practice and remind staff of all potential climate hazards. Identify changes need to be made. **Extreme Heat/Hot Days above 30°C**: Educate the public about not disposing e-waste in landfills, but rather at the designated transfer sites.	0-5 years
4	Operations and Maintenance	**Extreme Heat/Hot Days above 30°C:** Check that AC in collection vehicles are in proper function. Reschedule collection to earlier hours to avoid heat. **Extreme Cold/Cold Days below -30°C**: Paying more attention to repeated starting of equipment in cold temperatures to avoid damage. **Persistent Rain/Heavy Rains/River Flooding**: Reschedule and plan out alternate haul routes if rain result in washouts or flooding in roadways. **Wildfire Smoke**: Plan for higher maintenance and replacement costs for equipment. Re-routing and plan out alternate haul routes. Reschedule waste collection to avoid health impacts on staff. **High Winds**: Ensure daily cover is placed and wind fences are used around the active face.	0-5 years
		Hail: Plan for higher replacement and maintenance cost.	5-10 years
6	Build New or Upgrade Existing Infrastructure	**All Hazards:** During equipment replacement, review features that would be robust to reduce damage. **Wildfire/High Winds/Hail/Flood**: Plan for landfill cell capacity to receive more waste. Staging waste material (e.g. ash, soil, damaged building structures, tree trunks/branches) no suitable for cell disposal separately from existing waste.	5-10 years
7	Emergency Management	**Wildfire**: Collaborate with the Town that would coordinate effort on a waste disposal plan during recovery period.	0-5 years

Table D-5 Roads and Sidewalks Recommended Adaptation Actions

No.	Categories of Actions	Recommended Actions	Time Frame
Roads and Sidewalks			
1	Conduct Research	**Extreme Heat/Hot Days above 30ºC**: Investigate asphalt mix design for hotter temperatures. **Freeze-thaw cycle**: Investigate/research on subgrade integrity and drainage requirements to reduce the impacts from freeze-thaw cycle.	**0-5 years**
2	Update Policies, Plans, Standards, Guidelines, and Bylaws	**Extreme Heat/Hot Days above 30ºC**: Review, update, or upgrade policy for include safe work practices and stop work policy. **Wildfire Smoke:** Review, update, or upgrade policy for include safe work practices and stop work policy. **All Climate Hazards**: Review asset management program for optimization and replacements.	**0-5 years**
3	Increase Awareness and Education	**All climate hazards**: Review with Operations on all safe work policies, plans, and guidelines. Practice and remind staff of all potential climate hazards. Identify changes need to be made. **Extreme Heat/Hot Days above 30ºC**: Educate the public about not disposing e-waste in landfills, but rather at the designated transfer sites.	**0-10 years**
4	Operations and Maintenance	**Freeze-thaw cycle**: Ongoing repairs of sidewalks and roads; increase operations and maintenance budget. **Extreme Heat/Hot Days above 30ºC:** Increase operations and maintenance budget for resurfacing and repairs. **Persistent Rain/Heavy Rains/River Flooding**: Increase in operations and maintenance budget for repairs and reconstruction of roads from washouts or flooding in roadways. **Winter Precipitation:** Increase operations and maintenance of snow removal; repairing wear and tear on the roads from blading.	**0-10 years**
6	Build New or Upgrade Existing Infrastructure	Overall integrity for all climate hazards – the roads will be rehabilitated and transition to different durable surfaces.	**5-10 years**
7	Emergency Management	**High Winds:** Obstruction removal to enable emergency vehicles to pass through. Review and update emergency routes. **Wildfire**: Review, update, and revise FireSmart, where applicable.	**0-5 years**

Table D-6 Parks and Playgrounds Recommended Adaptation Actions

No.	Categories of Actions	Recommended Actions	Time Frame
Parks and Playgrounds			
1	Conduct Research	**1:100 Year rainfall event:** Complete studies to identify risks and impacts on parks and playgrounds. **Drought:** Investigate low-maintenance surface alternatives for parks and playgrounds that are resilient to dry weather. **River Flooding:** Investigate/research direct impacts of flooding based on prior observations and AEPA Flood maps. **Hail:** Monitor the frequency of hail events and assess their impact. Evaluate the potential need to expand sheltered regions in parks.	**0-5 years**
2	Update Policies, Plans, Standards, Guidelines, and Bylaws	**1:100 Year Rainfall Event:** Review policies and increase safeguards against danger zones by incorporating additional barricades. Revise communication strategies for extreme events with the public. **Extreme Heat/Hot Days above 30°C**: Review, update, or upgrade policy for include safe work practices and stop work policy. **Drought:** Review and update water conservation policies.	**0-5 years**
3	Increase Awareness and Education	**All Hazards:** Inform the public about hazards as they arise and potential shifts in service levels during climate events. Educate the community on the changing norms associated with climate change. **Drought:** Encourage and guide the public on water conservation measures. Communicate updated water conservation policies. **Extreme Heat/Hot Days above 30°C**: Inform the public about safety measures to adopt during extreme heat and direct them to available shelters in parks.	**0-10 years**
4	Operations and Maintenance	**Hail and River Flooding:** Increase replacement budget as needed. Review insurance policies. **Extreme Heat/Hot Days above 30°C:** If additional spray parks are constructed, there will be increased usage and higher operation and maintenance demands. Increase O&M as needed. **Snow:** Increase operation and maintenance budget on skating rinks. **Hail/Tornado:** Adjust operations to prevent working during adverse climate events. Check the weather forecast before commencing work.	**0-10 years**
6	Build New or Upgrade Existing Infrastructure	**1:100 Year Rainfall Event:** Improve drainage within parks to mitigate localized flooding.	**5-10 years**
7	Human Resourcing	**All Hazards:** Evaluate resource allocation. Identify human resources for the continued implementation and research of the noted adaptation actions. Increase budget for insurance of infrastructure.	**0-5 years**

Table D-7 Fleet Recommended Adaptation Actions

No.	Categories of Actions	Recommended Actions	Time Frame
Fleet			
1	Conduct Research	**Extreme Heat/Hot Days above 30°C**: Investigate low-maintenance surface alternatives for parks and green spaces that are resilient to high temperatures.	0-5 years
2	Update Policies, Plans, Standards, Guidelines, and Bylaws	**Drought:** Review and update policies to include increased maintenance during climate event. **Extreme Heat/ Hot Days above 30°C:** Review and update policies to include increased maintenance during climate event. **Hail:** Establish protocols for fleet evaluation, protection, and restoration. **Wildfire smoke:** Develop safe work policy for staff when working under this condition. Evaluate existing policies, identify deficiencies, and address equipment needs and shortages. **All Hazards:** Review current documents, actions, and policies. Make updates as needed.	0-5 years
3	Operations and Maintenance	**Hail, Tornado and Wildfire Smoke:** Adjust operations to prevent working during adverse climate events. Check the weather forecast before commencing work. **All Hazards:** Increase operation and maintenance budget as needed. **Winter Precipitation:** Increase snow removal efforts and the maintenance of snow removal equipment.	0-5 years
4	Human Resourcing	**All Hazards:** Evaluate resource allocation. Identify human resources for the continued implementation and research of the noted adaptation actions.	0-5 years

Table D-8 Buildings Recommended Adaptation Actions

No.	Categories of Actions	Recommended Actions	Time Frame
Buildings – Town Administration Office			
1	Conduct Research	**Extreme Heat/Hot Days above 30ºC**: Conduct research on methods for mitigating the Heat Island Effect including the application and impacts of utilizing vegetation and tree canopies to provide shading of parking lot and landscaped areas during extreme heat. Monitor performance if electrical units under extreme heat conditions and replace units with better ratings if needed. **Extreme Heat/Hot Days above 30ºC/Cooling Degree Days:** Assess the building envelope and determine upgrades or replacement requirements to minimize cooling needs. Research available technologies that can further reduce cooling requirements.	**0-5 years**
2	Update Policies, Plans, Standards, Guidelines, and Bylaws	**Winter Precipitation**: Review snow clearing policies and update snow thickness threshold criteria based on the changing climate. **Extreme Heat/Hot Days above 30ºC**: Review, update, or upgrade policy for include safe work practices and stop work policy. **Hail/Tornado/ Wildfire and Smoke:** Monitor frequency of adverse climate events. Review and upgrade insurance policies as required.	**0-5 years**
3	Operations and Maintenance	• **Extreme Heat/Hot Days above 30ºC:** Increase allocation of funds for operation and maintenance (O&M) and the replacement of landscaping affected by die-offs. • **Extreme Heat/Hot Days above 30ºC/Cooling Degree Days:** Increase building component O&M as required and allocate additional funding for cooling costs. • **Wildfire and Smoke:** Monitor filtration systems and replace as needed. • **Hail/Tornado/ Wildfire and Smoke:** Assess and replace building components as required in response to climate events. Increase allocation of funds for replacement if require. • **Lightning:** Monitor and evaluate all building systems to ensure they are safeguarded from potential impacts. • **Winter Precipitation:** Monitor roof conditions, including deterioration due to snow build-up. Adjust operation and maintenance (O&M) frequency as necessary. • **All Hazards:** Increase maintenance frequency and replacement as required.	**0-10 years**
Buildings – Old Brick School			
4	Build New or Upgrade Existing Infrastructure	Facility is not frequently used: consider upgrade/ replace building systems including HVAC, electrical, windows, and walls to align with eco-friendly standards in accordance with the secured funding.	**5-10 years**

No.	Categories of Actions	Recommended Actions	Time Frame
Buildings – Public Library			
5	Update Policies, Plans, Standards, Guidelines, and Bylaws	**Lightening/Hail/Tornado:** Monitor frequency of adverse climate events. Review and upgrade insurance policies as required.	**0-5 years**
6	Operations and Maintenance	**Extreme Rainfall/Persistence Rainfall/1:100 year 24 hour Rainfall Event Overland Flood:** Increase maintenance frequency to improve efficiency of the stormwater system. **Extreme Heat/Hot Days above 30°C:** Monitor building HVAC system, electrical cabinets, and plumbing systems. Increase maintenance frequency as needed. **Coldest Days/Days below -30°C:** Monitor building HVAC system. Increase maintenance frequency as needed. **Wildfire and Smoke:** Monitor filtration systems and replace as needed. **Hail/Tornado/Wildfire and Smoke: A**ssess and replace building components as required in response to climate events. Increase allocation of funds for replacement if require.	**0-10 years**
Buildings – FLIPS Gym			
8	Update Policies, Plans, Standards, Guidelines, and Bylaws	**Hail/Tornado/Wildfire and Smoke:** Monitor frequency of adverse climate events. Review and upgrade insurance policies as required. **Winter Precipitation**: Review building envelop load ratings and revise snow clearing policies accordingly. Monitor building envelop during heavy snowfall.	**0-5 years**
9	Operations and Maintenance	**Hail/Tornado/Wildfire and Smoke: A**ssess and replace building components as required in response to climate events. Increase allocation of funds for replacement if require. **All Hazards:** Assess and monitor HVAC system performance and increase maintenance or replace as needed.	**0-10 years**
Buildings – Riverfront Washrooms			
10	Build New or Upgrade Existing Infrastructure	**All Hazards:** Replace washrooms as necessary due to damages.	**0-10 years**
Buildings – Muskeg Creek Ski Chalet			
11	No Action	**All Hazards:** Business as usual	**N/A**

No.	Categories of Actions	Recommended Actions	Time Frame
Buildings – Fire Hall			
12	Update Policies, Plans, Standards, Guidelines, and Bylaws	**Hail/Tornado/Wildfire and Smoke:** Monitor frequency of adverse climate events. Review and upgrade insurance policies as required.	**0-5 years**
13	Operations and Maintenance	**Wildfire and Smoke:** Monitor filtration systems and replace as needed. **Hail/Tornado/Wildfire and Smoke: A**ssess and replace building components as required in response to climate events. Increase allocation of funds for replacement if require. **Lightning:** Monitor and evaluate all building systems to ensure they are safeguarded from potential impacts.	**0-10 years**