



# Extreme Weather Resilience Plan



**City of Port Moody**

August 2022

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## Stakeholders

- BC Housing
- BC Hydro
- City of Coquitlam
- City of Port Coquitlam
- Eagle Ridge Hospital
- EWR Kyle Centre - Port Moody
- FortisBC
- Fraser Basin Council
- Fraser Health Authority
- Homeless Services Association of BC
- Metro Vancouver
- Phoenix Society
- School District 43
- SHARE Family & Community Services Society
- Success BC
- Suncor
- Translink
- TransLink and other transit providers
- Tri-Cities Extreme Weather Response Coordinator
- Tri-Cities Healthier Communities Partnership
- Tri-Cities Homelessness and Housing Task Group
- Tri-Cities Local Immigrant Partnership
- Tri-Cities Seniors Planning Network
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# Introduction

The climate is changing and resulting in more frequent and extreme weather events. The City of Port Moody is already experiencing these extreme weather events and their associated impacts. Over time, climate change will become more prominent in many aspects of our lives and the environment around us. Actions today will shape how people adapt, and nature responds to increasing climate risks. Therefore, the City must be prepared for, be able to respond to these impacts, and adapt to these changes in order to ensure public safety, health, and livability.

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**Climate Change** refers to the long-term shift in average temperatures and weather patterns over time.

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Past and ongoing greenhouse gas (GHG) emissions are expected to increase the intensity and frequency of climate impact events in the City and around the Province<sup>1</sup>. These changes increase the risk of extreme weather events and result in complex and interconnected impacts to Port Moody residents, physical assets such as structures and infrastructure, and cascade across multiple physical, social, cultural, economic, and ecological systems.<sup>2</sup>

According to Port Moody's 2020 *Climate Action Plan*, climate projections show Port Moody can expect hotter, drier summers; warmer winters with more rain from fall to spring; an increase in frequency and intensity of precipitation; and sea level rise, which is expected to rise 0.5 metres by 2050 and 1 metre by 2080. In addition, Port Moody can expect to experience increased risk of wildfires, flooding, extreme heat, and other associated impacts of climate change. Refer to Appendix A for more details regarding Port Moody climate projections.

Community members are not impacted the same by extreme weather events. Marginalized groups may be disproportionately impacted and have less resources to support preparedness and adaptation. For example, some community members are more vulnerable to extreme heat such as seniors living alone, children, pregnant women, and those with pre-existing medical conditions. Long-term preparedness can help minimize the consequences of extreme weather events exacerbated by climate change.

In addition, the operation of critical government and business functions, facilities, and infrastructure, that are essential to the residents' human health and safety, and the City's economic viability need to be continuous and uninterrupted as a result of these changes in our climate.

A specific action identified in the Port Moody 2020 *Climate Action Plan* is to develop an extreme weather resilience plan to meet two specific goals:

- Ensure all members of the community have equal access to information, support, and resources related to preparing for climate change impacts.

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<sup>1</sup> City of Port Moody. (2020). *Climate Action Plan. A path towards a carbon neutral, resilient Port Moody.*

<https://www.portmoody.ca/en/city-hall/climate-action-plan.aspx>

<sup>2</sup> Lawrence, J., Blackett, P., & Cradock-Henry, N. A. (2020). Cascading climate change impacts and implications. *Climate Risk Management*, 29, 100234. doi:<https://doi.org/10.1016/j.crm.2020.100234>

- Ensure the City is ready to respond to climate-related hazards, such as flooding, wildfires, and extreme heat.

The City of Port Moody developed this *Extreme Weather Resilience Plan* to meet these *Climate Action Plan* goals. This plan considers current and future climate projections, assesses the vulnerability of the population and a subset of the City's community lifelines, and identifies short-, medium- and long-term solutions to reduce or eliminate future impacts.

Prioritizing adaptation and mitigation at all levels of policy, planning and implementation can streamline resources, prevent inconsistencies, and identify strategic co-benefits for health, safety, and equity. Adaptation is essential to reduce the adverse impacts from extreme weather events in the City of Port Moody. The focus of this plan is to identify solutions to adapt to the changing climate by adjusting decisions, behaviours, and activities to account for existing or expected changes in climate<sup>3</sup>, and build community resilience while not increasing GHG emissions.

During the course of the planning process, the City planning team developed six goals with stakeholder input. The goals provide general, broad, long-term guidelines that represent a global vision for the City's *Extreme Weather Resilience Plan*. These goals guide the identification of adaptation solutions.

1. Protect life and minimize health and safety risks from extreme weather;
2. Ensure continuity, minimize impacts, and adapt lifelines and their services to extreme weather;
3. Increase education and outreach of extreme weather events and resources available to assist;
4. Integrate climate change into City and regional plans, policies, procedures, operations;
5. Ensure a coordinated response to and recovery from extreme weather events; and
6. Implement solutions to adapt to the changing climate while not increasing GHG emissions.

The success of this plan, once implemented, will be measured by the degree to which its goals have been met.

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**Adaptation** refers to the actions taken to manage the unavoidable impacts of climate change. Adapting successfully leads to improved resilience.

**Mitigation** refers to efforts to reduce or prevent the emission of greenhouse gases that contribute to climate change.

Source: Port Moody Climate Action Plan

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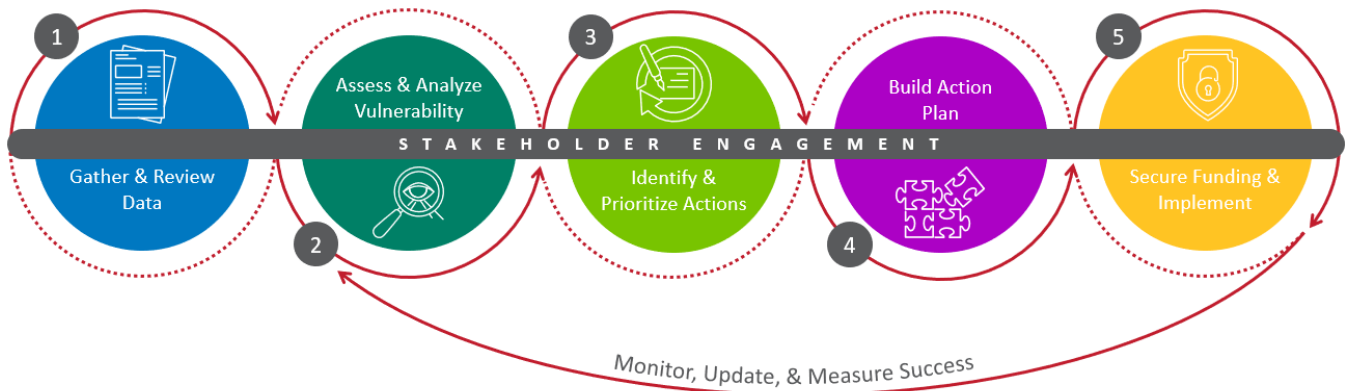
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<sup>3</sup> Government of Canada. (2021). Adapting to Climate Change in Canada. <https://www.canada.ca/en/environment-climate-change/services/climate-change/adapting.html>

# Planning Process

The Port Moody project team followed the five steps shown in Figure 1 to develop the *Extreme Weather Resilience Plan*. The project team developed the framework to support an iterative process. The framework enables the City to continue to build upon and expand this plan over time as more information/data is available and adaptation measures are implemented. As the climate changes, and measures are implemented, the framework will enable the City to update the vulnerability assessment, adjust and fine-tune the identified adaptation measures and their priorities, and to continuously adapt to the changing climate.

**Figure 1. Port Moody Extreme Weather Resilience Planning Process**



Port Moody engaged a broad range of stakeholders in the development of this plan. Table 1 summarizes the three stakeholder engagements held and their associated objectives and outcomes.

Table 1. Port Moody Extreme Weather Resilience Plan Stakeholder Engagements		
Meeting	Objective	Outcomes
Kickoff Meeting April 6, 2022	Introduce the planning process and solicit input on adaptive capacity for each extreme weather hazard.	Understand the planning process, project schedule, stakeholder involvement expectations; and obtain input regarding the City's adaptive capacity for each extreme weather event.
Vulnerability Assessment Review April 27, 2022	Discuss the draft vulnerability assessment methodology and results and initiate the identification of extreme heat adaptation measures.	Obtain input on the draft vulnerability assessment results and prioritize extreme heat adaptation measures.
Adaptation Measure Workshops June 1, 2022	Identify adaptation measures to reduce or eliminate population and lifeline vulnerability to extreme weather events, and prioritize	Collaborative discussion to identify additional vulnerabilities not identified to date; identification of potential adaptation measures; prioritization of development of specific adaptation

**Table 1. Port Moody Extreme Weather Resilience Plan Stakeholder Engagements**

<b>Meeting</b>	<b>Objective</b>	<b>Outcomes</b>
	measures through five focused workshop sessions: 1. Extreme heat 2. First Nations 3. Community lifelines 4. Population 5. Summary of solutions	measures for all extreme weather events.



# Vulnerability Assessment

## Identification of Extreme Weather Events

Five extreme weather events and associated indicators were selected to evaluate the City of Port Moody’s vulnerability as noted in Table 2. These extreme weather events provide a component or driver of the increased or accelerated risk arising from climate change. An indicator represents the measurement of observed or projected change in the climate, associated to the extreme weather event.

**WHAT WE HEARD:**  
*More than 50% of the stakeholders are most concerned about extreme heat.*

Extreme Weather Event	Indicator
Coastal Storm (wind/storm surge)	Increase in storms (frequency, intensity)
	Changes in wind speeds
	Increase in storm surge
Extreme Heat	Increase in number of days above 30°C
Extreme Cold	Change in number of days below 0°C
Increased frequency and intensity of precipitation (rain or snow)	Increase in flooding due to rain or snow accumulation
Longer dry spells	Increase in number of days between precipitation events

The City recognizes that extreme weather events can lead to secondary hazards and potential cascading effects that trigger a sequence of consequences and a network of impacts across various systems that may be more significant in magnitude than any individual event<sup>5</sup>. These secondary hazards may result from or be exacerbated by the primary extreme weather event indicators as noted in Table 3. It is important to identify the secondary hazards and their potential cascading impacts to ensure holistic climate adaptation solutions address the complexity of the climate system.

Extreme Weather Event	Secondary Hazards
Coastal Storm (wind/storm surge)	Changes in wind seasonality
	Increased stormwater flooding and water treatment
Extreme Cold	Intensified freeze/thaw cycles
	Longer frost-free periods
Extreme Heat	Decreased air quality
	Dry spell/drought conditions; increased evaporation and vegetation water demand; reduced water supply
	Increased stress on natural assets, including urban forests

<sup>4</sup> City of Port Moody. (2020). Climate Action Plan. A path towards a carbon neutral, resilient Port Moody. <https://www.portmoody.ca/en/city-hall/climate-action-plan.aspx>

<sup>5</sup> Schauwecker, S., Gascón, E., Park, S., Ruiz-Villanueva, V., Schwarb, M., Sempere-Torres, D., Rohrer, M. (2019). Anticipating cascading effects of extreme precipitation with pathway schemes - Three case studies from Europe. Environment International, 127, 291-304. <https://www.sciencedirect.com/science/article/pii/S0160412018330976>

**Table 3. Potential Secondary Hazards Caused by an Extreme Weather Event**

Extreme Weather Event	Secondary Hazards
Increased frequency and intensity of precipitation (rain or snow)	Slope instability/Landslide
	Erosion
Longer dry spells	Wildfire
	Decreased air quality
	Drought conditions

## Identification of Assets

### Community Lifelines

Extreme weather events can physically impact critical facilities and infrastructure (i.e., community lifelines) and interrupt their delivery of essential services to a community and their surrounding region<sup>6</sup>. A total of 11 community lifelines were identified by the City project management team to initiate the vulnerability assessment. In addition, evacuation routes were identified as essential and were overlaid upon the mapping to provide the spatial analysis component of the assessment. Table 4 lists the selected community lifelines for this analysis. As weather patterns shift due to climate change, the City will undertake future vulnerability assessments and expand the list of community lifelines.

*Community lifelines enable the continuous operation of critical government and business functions, and is essential to human health, safety, and/or economic security. They provide the most fundamental services in a community that enables all aspects of society to function. Lifeline types include safety and security; food/water/shelter; health and medical; energy; communications; transportation; hazardous materials.*



**Table 4. Selected Community Lifelines**

Community Lifeline	City Rationale for Inclusion in Analysis	Community Life Type(s)
BC Hydro Substations	Provides electricity, ability to access internet and heat/cooling to residents.	Energy
Communications Towers	Provides internet and cell service to residents and allows them to communicate with support networks (e.g., friends and family) and services.	Communications
Disaster Evacuation Routes	Provides important access to provide aid/supplies and evacuate the City in case of an emergency.	Transportation
Eagle Ridge Hospital (Fraser Health Authority)	Key facility as it is the only hospital in the community. Centrally located and able to handle more intensive injuries and illnesses.	Health and Medical
FortisBC gas distribution sites	Provides heat to residents and gas for cooking.	Energy

<sup>6</sup> Federal Emergency Management Agency (FEMA). 2020. Community Lifelines. <https://www.fema.gov/emergency-managers/practitioners/lifelines>

**Table 4. Selected Community Lifelines**

<b>Community Lifeline</b>	<b>City Rationale for Inclusion in Analysis</b>	<b>Community Life Type(s)</b>
Heritage Woods Secondary School (SD43)	Key facility as it is one of two secondary schools in the community, has a kitchen, showers, upgraded safety standards, and medical supplies. Can shelter youth and residents if needed. Has partial A/C. Close proximity to other elementary and middle schools.	Safety and Security; Food, Water, Shelter
Inlet Centre Fire Hall	Provides emergency response services as the main Firehall for the City and has communications infrastructure for fire and rescue.	Safety and Security; Communications
Pacific Coast Terminal	Key facility as is well located near large water body and has the railway running through it. Ability to bring large amounts of aid/supplies via water or rail especially if evacuation routes are compromised.	Transportation
Port Moody Recreation Complex	Key facility as it is the location of Emergency Response Centre. Large Facility can shelter residents if needed. Has partial A/C	Safety and Security; Food, Water, Shelter
Port Moody Secondary School (SD43)	Key facility as it is one of two secondary schools in the community, has a kitchen, showers, and medical supplies. Can shelter youth and residents if needed. Library has A/C. Close proximity to other elementary and middle schools.	Safety and Security; Food, Water, Shelter
Port Moody Works Yard	Key facility as it contains all equipment for roadwork, city maintenance and snow clearing etc.	Safety and Security
Public Safety Building	Key facility as it is headquarters of the Royal Canadian Mounted Police (RCMP) and Port Moody Police Department, and their operations including communications infrastructure.	Safety and Security; Communications

*\* Many of the listed utilities including City sewer, water, drainage have piping and distribution systems that aren't in the scope of this study.*

### **Population**

Based on the 2016 Census, Port Moody's population has more than doubled over the past three decades, with an average annual increase of 4%, making it one of the fastest-growing municipalities in Metro Vancouver. It is essential for the City to evaluate the vulnerability of current residents, workers, and visitors, while considering the anticipated growth.

There are social characteristics that have been connected to increased vulnerability to natural hazard events. It is helpful to identify demographic groups and their geographic locations with greater vulnerability to extreme weather events to help with the identification and prioritization of adaptation measures to reduce their future risk to these events. Table 5 summarizes the demographic variables from the 2016 Census that are included in the analysis.

**Table 5. Vulnerable Populations**

Demographic Variable	Indicator
Age (0-14 years)	Children have limited resources and are dependent on caregivers for shelter, food, and other basic needs. Percentage of the population aged 0 to 14 years, as reported through the 2016 Statistics Canada Census of Population.
Age (>65 years)	Seniors are especially susceptible to changes, and often have reduced capacity to adapt to crisis events or chronic stressors such as extreme heat or poverty. Ripple effects of inequities can often place seniors at the most risk of being displaced or isolated. Seniors often experience limited or fixed incomes and should be a focus for mobility considerations. Consequently, they can be vulnerable to shocks, and have less adaptive capacity and reduced resilience. Percentage of the population aged 65 years or more, as reported through the 2016 Statistics Canada Census of Population.
Ownership (Renter)	A renter household refers to a private household where no member of the household owns the dwelling. An owner household refers to a private household where some member of the household owns the dwelling, even if it is still mortgaged. Percentage of households that are renters, as reported through the 2016 Statistics Canada Census of Population.
Ownership (Subsidized Housing)	Subsidized housing refers to renter households that live in a dwelling that is subsidized. Subsidized housing includes rent geared to income, social housing, public housing, government-assisted housing, non-profit housing, rent supplements and housing allowances. Subsidized renter households relates to housing affordability. Additionally, it relates to potential for wealth distribution as well as housing security in the face of urban change. Percentage of the population living in subsidized housing, as reported through the 2016 Statistics Canada Census of Population.
Chronic Medical Conditions	Occurrence of persons with chronic medical conditions relates to health and well-being. Demographic factors (like age) as well as built environment factors such as air quality and walkability may be a determinant of chronic health conditions. Percentage of population who reported one or more chronic health conditions based on a 2014 My Health, My Community survey.
Median Household Income	Median household income is a means of assessing and comparing living standards, as well as economic well-being. Low median household income is an equity consideration. Low income in Port Moody is defined as a household of 4 people with annual salary <\$80,000. Household income <\$80,000, as reported through the 2016 Statistics Canada Census of Population.
Household Suitability (Overcrowding)	Overcrowding is a means of assessing accessibility of appropriate housing; a measure of housing size relative to the composition of a household (age, sex, relationships) and can indicate areas where the availability or affordability of housing has created situations where persons cannot live in a dwelling with adequate personal space. It is important to note that the term “suitability” is highly subjective as the definition prescribed by National Occupancy Standard may not align with cultural preferences and inter-generational living arrangements. Percentage of the population in overcrowded housing, as measured through the 2016 Statistics Canada Census of Population.

**Table 5. Vulnerable Populations**

Demographic Variable		Indicator
Minority	Visible minority persons have historically and currently still suffering from systematic marginalization <sup>7</sup> . Race and ethnicity correlate with disparities in health, exposure to environmental pollution, and vulnerability to natural hazards. May correlate to less access to open space, more likely to live in substandard housing, which can negatively impact health outcomes.	Visible Minority – percentage of the population that reported being a member of a visible minority group as defined by the Employment Equity Act, calculated through the 2016 Statistics Canada Census of Population

## Methodology

Extreme weather events have the potential to harm people, property, and the environment; however, the extent of damages they cause depends upon a community’s vulnerability. Vulnerability is a function of **exposure** to the extreme weather event, **sensitivity** to the stresses they impose, and the **capacity to adapt** to these stresses. The City’s ability to prevent extreme weather events from happening in the future is limited, so the overall objective is to reduce vulnerability.

$$\text{Vulnerability} = (\text{Exposure} + \text{Sensitivity}) - \text{Adaptive Capacity}$$



### Exposure

Refers to the location of the population or community lifeline in relation to the extreme weather event. For example, if residents or a community lifeline is located in a delineated flood zone, it is considered exposed to the flood hazard. Because many extreme events are regional in nature, such as a coastal storm or extreme temperature event, the entire City is exposed. This also accounts for extreme weather events that may occur in combination resulting in a greater exposure (e.g., coastal storm and precipitation).



### Sensitivity

Refers to the ability of the population or community lifeline to withstand impacts from an extreme weather event. For example, a lifeline’s physical characteristics such as its age, may inhibit its ability to withstand an extreme wind event due to the condition of the structure and whether or not its age has caused deterioration. Population sensitivity is based the distribution of characteristics across census units such as age, rented households, and household income.



### Adaptive Capacity

Refers to the City’s ability to adjust or cope with the impacts associated with an extreme weather event. The City’s ability to assist during emergencies, provide a continuity of operations, its capacity to serve, existing plans, access to fiscal resources and educational resources were considered.

The City’s population and each of the community lifelines were evaluated and scored using the benchmarks outlined in Appendix A. Where available, spatial data and community lifeline attributes were used to evaluate exposure and sensitivity to each extreme weather event. To determine the City’s

<sup>7</sup> Metro Vancouver Regional District. 2021. *Social Equity & Regional Growth Study. Considerations for Integrating Social Equity into Regional Planning and Metro 2050.* <http://www.metrovancouver.org/services/regional-planning/PlanningPublications/MVSocialEquity-RegionalGrowthStudy.pdf>

adaptive capacity, the City project management team and stakeholders were surveyed to assess the City’s current adaptive capacity to the five extreme weather events. These results applied to both the population and community lifelines adaptive capacity component of the vulnerability formula.

## Results Summary

### Population

The City evaluated the population’s vulnerability to each extreme weather event using the 2016 Census data. Table 6 provides an overview of the vulnerability analysis results by neighbourhood groupings in Port Moody. Refer to Appendix C for a series of maps that illustrate these results. In summary, the greatest number of residents vulnerable to extreme weather events are located in Moody Centre, Noons Creek, Mountain Meadows, and Inlet Centre.

Table 6. Overview of Neighbourhood-Level Population Climate Vulnerability Assessment Results								
Extreme Weather Event	Neighbourhood							
	Local and Northwest Port Moody	April Road and Pleasantside	Heritage Mountain and Twin Creeks Heritage Woods	Noons Creek and Mountain Meadows	Coronation Park	Inlet Centre	Moody Centre	Glenayre, Seaview, College Park, and Harbour Heights
Coastal Storm (wind/surge)	Moderate	High, Moderate	High, Moderate	High, Moderate	Moderate	High, Moderate	High, Moderate	High, Moderate
Extreme Cold	Moderate	Extreme, High, Moderate	Extreme, High, Moderate	Extreme, High	High	Extreme, High	Extreme, High	Extreme, High, Moderate
Extreme Heat	High	Extreme, High, Moderate	Extreme, High, Moderate	Extreme, High	Extreme, High	Extreme, High	Extreme, High	Extreme, High
Increased Precipitation (rain/snow)	Moderate	High, Moderate	High, Moderate	High, Moderate	High, Moderate	High, Moderate	High, Moderate	Extreme, High, Moderate
Long Dry Spells	Moderate	Extreme, Moderate	Extreme, Moderate	Extreme, Moderate	High	Extreme, High, Moderate	Extreme, High, Moderate	Extreme, High, Moderate

\*Portions of Port Moody did not have data available to support this analysis.

\*\*There are multiple results reported for a neighborhood when there are multiple Census Tracts present.

### Community Lifelines

The City evaluated the community lifeline vulnerability to each extreme weather event using the geographic location of each lifeline and attributes available. Table 7 summarizes the vulnerability analysis results for each community lifeline by extreme weather event. Refer to Appendix C for a series of maps that illustrate these results.

**Table 7. Overview of Community Lifeline Vulnerability Assessment Results**

<b>Extreme Weather Event</b>	<b>BC Hydro Substations</b>	<b>Communications Towers</b>	<b>Eagle Ridge Hospital (Fraser Health)</b>	<b>FortisBC gas distribution sites</b>	<b>Heritage Woods Secondary School (SD43)</b>	<b>Inlet Centre Fire Hall</b>	<b>Pacific Coast Terminal</b>	<b>Port Moody Recreation Complex</b>	<b>Port Moody Secondary School (SD43)</b>	<b>Port Moody Works Yard</b>	<b>Public Safety Building</b>
<b>Coastal Storm (wind/surge)</b>	Moderate	Moderate	High	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
<b>Extreme Cold</b>	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	High	Moderate	Moderate	Moderate	Moderate
<b>Extreme Heat</b>	Moderate	Moderate	High	Moderate	High	Moderate	High	High	High	Moderate	Moderate
<b>Increased Precipitation (rain/snow) and cascading landslide</b>	Moderate	High	Moderate	Moderate	Moderate	Moderate	Moderate	High	High	High	Moderate
<b>Long Dry Spells (cascading wildfire)</b>	Moderate	High	High	Moderate	Moderate	Moderate	Moderate	High	Moderate	Moderate	Moderate

## Taking Action

The *Extreme Weather Resilience Plan* outlines a set of measures to adapt to the changing climate and increase the City's resilience. There may be many measures that can be taken to adapt to extreme weather events and often times multiple measures are needed using various types of solutions to make measurable progress. The adaptation solutions fall under five main categories:

1. Physical and Nature-Based Solutions (e.g., creating and retaining more green space, planting vegetation and trees, or installing backup power generation);
2. Policies and Governance (e.g., building codes, bylaws, zoning);
3. Outreach and Education (e.g., education campaigns for residents);
4. Services and Program Development, Capacity Building (e.g., increasing staff, creating a task force); and
5. Emergency Response and Preparedness (e.g., emergency planning, training, and exercises).

The review of historic impacts, stakeholder-identified problem areas, and results of the adaptive capacity and vulnerability assessments were the basis for the selection of adaptation measures. The City project team considered a comprehensive range of measures, spanning all adaptation solution types, to specifically address vulnerabilities identified. This helped the City select solutions based upon capabilities, as well as the social, technical, and economic feasibility of each solution. Many of the adaptation measures identified meet multiple plan goals. The following summarizes the adaptation measures identified to date in no particular order, with additional details outlined in Appendix D.

- Connect and collaborate with neighbourhood groups to establish 'extreme weather ambassadors' to lead resilience efforts
- Develop a registry of vulnerable populations
- Increase Tri-Cities collaboration and coordination
- Enhance extreme weather event awareness, preparedness, and increase education to residents
- Establish a tree canopy enhancement program with a focus on areas with low tree equity scoring
- Update the hazardous lands development permit area (DPA)
- Provide Revitalization Tax Exemptions for properties that retrofit for adaptation and low carbon solutions (RTES)
- Establish rental decarbonization incentives with affordability covenants for properties that are resilient to extreme weather
- Develop hazard mapping inclusive of projected future conditions
- Conduct a community-level flood risk assessment
- Continue guidance for City Staff outdoor workers during extreme weather events
- Advocate for upgrades to school air conditioning
- Inventory, evaluate, and establish mutual aid agreements
- Work with BC Hydro to prioritize restoration of power to lifelines and vulnerable populations
- Develop a social network to check on vulnerable populations during extreme weather events
- Engage Strata Councils and large building management companies to include extreme weather preparedness in their plans
- Consider changes in land use and policy



- Develop geospatial tools and innovative uses for extreme event resources
- Evaluate public transportation stops (e.g., bus stops) for adequate shelter protection
- Increase public access to resources to withstand extreme heat events
- Retrofit City-owned facilities, infrastructure, parks and public lands for extreme weather events
- Continue to work with Metro Vancouver to maintain air quality monitoring in Port Moody and advocate for a regional outreach system
- Engage public health nurses to assist new parents with navigating extreme weather events
- Continue to restore, connect, and enhance green spaces to support ecosystem services and ensure long-term resiliency
- Develop a green infrastructure strategy
- Implement and update Integrated Stormwater Management Plans (ISMPs) to address flooding hazards
- Develop an urban forest strategy (underway) to address extreme weather risk mitigation and response

The City project team made an effort to clearly define readily implementable projects to set the City up for success. The project team identified additional details for each adaptation measure to support successful implementation; refer to Table 8. Appendix D outlines these additional details for each adaptation measure.

<b>Table 8. Criteria Used to Assess Adaptation Actions</b>	
<b>Criteria</b>	<b>Definition</b>
<b>Description</b>	Brief explanation of the adaptation measure and associated steps to consider for achieving the intent of the measure
<b>Goals</b>	Extreme Weather Resilience Plan goals that the adaptation measure meets.
<b>Champion</b>	A lead and support entity responsible to oversee the implementation of the solution and regularly report to the Policy and Planning progress updates.
<b>Implementation Timeframe</b>	Estimated timeframe the measure will be implemented. <ul style="list-style-type: none"> <li>• Short term – &lt;2 years</li> <li>• Medium term – 2-5 years</li> <li>• Long term – 5+ years</li> </ul>
<b>Estimated Cost</b>	Estimated cost, excludes staff time, to implement the adaptation measure. <ul style="list-style-type: none"> <li>• \$ (low) - \$0-\$10,000</li> <li>• \$\$ (medium) - \$10,000-\$50,000</li> <li>• \$\$\$ (high) - \$50,000 - \$200,000</li> <li>• \$\$\$\$ (very high) \$200,000 +</li> </ul>
<b>Implementation Priority</b>	Priority to implement the adaptation measure. All short-term implementation timeframes were considered high priority. <ul style="list-style-type: none"> <li>• High</li> <li>• Medium</li> <li>• Low</li> </ul>
<b>Potential Funding Sources</b>	Identified funding to support implementation.
<b>Integration Opportunities</b>	Current programs, policies, and plans that the adaptation solution aligns.

## Monitoring, Review, and Next Steps

The *Extreme Weather Resilience Plan* is a living document that will guide the City's adaptation over time. The City will continually monitor, review, and update this plan as important steps in their climate change adaptation process. The framework described herein was designed to enable the City to update their analysis as new information is available (e.g., updated climate projections or updated Census data), or expand upon the analysis to evaluate additional extreme weather events or community lifelines. Once implemented, the success of the plan will be measured by the degree to which its goals have been met and the adaptation measures completed.

The City's Policy Planning Division will lead the implementation of this plan. Each adaptation measure has been assigned a lead who will be responsible for the implementation and regular reporting to the Policy Planning Division on the status of each adaptation measure. The Policy Planning Division will focus on implementation of the high prioritized short-term actions, while planning for mid-to-longer term actions as feasible. Ongoing monitoring and evaluation of actions being implemented will be integrated into the Climate Action Plan Implementation process, which is designed to track progress in meeting GHG emission reduction and resilience goals and targets, and to flag when actions may be redundant or require changes. Staff will review the status of the Plan's implementation and present updates through the annual Climate Action Implementation Report. The process and methodology used to develop this plan is designed to be iterative; staff can add "community lifelines", modify sensitivity scoring, and add new data in future revisions to expand the scope of assessment. A review and revision of the Extreme Weather Resilience Plan will be completed alongside an update to the 2020 Climate Action Plan, currently scheduled for 2025.

# Appendices

## Appendix A. Summary of Port Moody Climate Change Projections

Table 9 summarizes the projected changes of the extreme weather events as outlined in the 2020 *Port Moody Climate Action Plan*. The limitations of these projections are acknowledged as there is uncertainty in climate change models. However, at the time of this plan development, the climate models referenced from the *Port Moody Climate Action Plan* are considered the best available scientific assessment of how the environmental conditions of the City will change over the next 50-years.

Table 9. Summary of Projected Climate Changes in the City of Port Moody	
Extreme Weather Event	Projected Changes by 2080 <sup>8</sup>
Coastal Storm (wind/storm surge)	Increasing coastal flood risk
	Up to half a metre of sea level rise
Extreme Cold	Increased probability of warmer winter nights
	The lowest nighttime winter temperature on average per year will increase by approximately -5.4°C
	The one-in-twenty chance of the coldest night per year will increase by approximately 6.5°C
Extreme Heat	Double the number of days above 30°C over time
	Likely number of warm nights will increase
	Snowpack depth will decrease on average by -86% across all four seasons
Increased frequency and intensity of precipitation (rain or snow)	The annual hottest day will increase by approximately 4.5°C
	Increased precipitation (rain and snow) totals for fall, winter, and spring
Longer dry spells	Wettest days of the year will have ~17% greater amount of rain
	Increased wildfire events
	More days with poor air quality and haze
	Summer precipitation will decrease on average by -23%
	The number of consecutive days where daily precipitation is less than 1mm will increase by 4 days

<sup>8</sup> City of Port Moody. (2020). Climate Action Plan. A path towards a carbon neutral, resilient Port Moody. <https://www.portmoody.ca/en/city-hall/climate-action-plan.aspx>

## Appendix B. Vulnerability Assessment

Vulnerability is a function of **exposure** to the extreme weather event, **sensitivity** to the stresses they impose, and the **capacity to adapt** to these stresses.

$$\text{Vulnerability} = (\text{Exposure} + \text{Sensitivity}) - \text{Adaptative Capacity}$$

Table 10 describes the benchmarks and associated scoring used to evaluate the population’s vulnerability to extreme weather events. Each Census tract was assigned the number of points in the geodatabase based upon the noted scoring thresholds. A total vulnerability score was calculated for each Census tract for each extreme weather event; refer to maps in Appendix D for these results.

Table 10. Benchmarks to Evaluate Population Vulnerability				
Benchmark	Scoring			Additional Scoring Details
Exposure	Low Exposure =1	Moderate Exposure =2	High Exposure =3	Additional Scoring Details
Location	Census Tract is located nearby/proximate to delineated hazard area	Census Tract is located in a delineated hazard area	Census Tract is located in multiple delineated hazard areas inclusive of secondary hazard(s)	All extreme weather events scored a 3 (high exposure) because either regional events or may occur with other extreme weather events or secondary events.**
Sensitivity*	Low Sensitivity = 1	Moderate Sensitivity = 2	High Sensitivity = 3	Additional Scoring Details
Age 0-14 years - % population < 14 years	< 10%	10% - 20%	> 20%	Each Census tract was assigned the number of points in the geodatabase based upon the noted thresholds.
Age >65 years - % population > 65 years	< 10%	10% - 20%	> 20%	
Ownership - % of households renting	< 10%	10% - 30%	> 30%	
Subsidized Housing - % population in subsidized housing	< 5%	5% - 20%	> 20%	
Household Income – annual salary (4)	> \$110,000	\$80,000 - \$110,000	< \$80,000	

**Table 10. Benchmarks to Evaluate Population Vulnerability**

<b>Benchmark</b>	<b>Scoring</b>			<b>Additional Scoring Details</b>
<b>Household Unsuitability Index</b> - % population in unsuitable housing	< 2%	2% - 5%	> 5%	
<b>Visible Minority</b> - % of population member of a visible minority group	< 20%	20% - 30%	> 30%	
<b>Adaptive Capacity of the City</b>	<b>Weak Adaptive Capacity = -1</b>	<b>Moderate Adaptive Capacity = 0</b>	<b>Strong Adaptive Capacity = 1</b>	<b>Additional Scoring Details</b>
<b>Emergency:</b> Facilities and services available to assist vulnerable populations (e.g., shelters, community centers, health facilities)	Weak	Moderate	Strong	Adaptive capacity was determined through a survey distributed to the City Project Team and Stakeholders requesting to rank each category as weak, moderate, or strong based upon their experience living/working in the City and historic extreme weather events experienced.
<b>Continuity:</b> Continuity of operations plans; backup facilities; mutual aid agreements in place to ensure adequate resources available in emergency	Weak	Moderate	Strong	
<b>Capacity to Serve:</b> Staffing capacity for the lifeline or department/organization that owns the lifeline to apply for funding and manage upgrades or change infrastructure/utilities to respond to impacts/demands	Weak	Moderate	Strong	
<b>Plans:</b> City plans/resources/assistance available	Weak	Moderate	Strong	
<b>Fiscal:</b> City fiscal resources identified to implement mitigation/resilience measures; apply for grants; ability to bond	Weak	Moderate	Strong	
<b>Education:</b> Education/outreach to warn/provide updates in emergency	Weak	Moderate	Strong	

\*The City also considered Chronic Medical Conditions (percentage of respondents who reported one or more chronic health conditions based on the 2014 My Health, My Community Survey); however, the same percentage value was identified for all Census

units (0.279) with this population evenly distributed throughout the City; therefore, it was not evaluated spatially and not added to the vulnerability score.

*\*\*All extreme weather events scored a 3 (high exposure) because either regional events or may occur with other extreme weather events or secondary events. The following was taken into consideration per extreme weather event.*

**Coastal storm:** regional event; may occur with increased precipitation

**Extreme cold:** regional event; may occur with increased precipitation

**Extreme heat:** regional event; may occur in a long dry period

**Increased precipitation:** Flood zone, steep slopes, historic slide locations used; may occur with extreme temperature and/or coastal storm

**Long dry spells** – Extreme or high wildfire risk area used; may occur with extreme heat

Table 11 describes the benchmarks and associated scoring used to evaluate each community lifeline’s vulnerability to extreme weather events. Each lifeline was assigned the number of points in the geodatabase based upon the noted scoring thresholds. A total vulnerability score was calculated for each lifeline for each extreme weather event; refer to maps in Appendix D for these results.

<b>Table 11. Benchmarks to Evaluate Community Lifeline Vulnerability</b>				
<b>Benchmark</b>	<b>Scoring</b>			<b>Additional Scoring Details</b>
<b>Exposure</b>	<b>Low Exposure = 1</b>	<b>Moderate Exposure = 2</b>	<b>High Exposure = 3</b>	
Location	Census Tract is located nearby/proximate to delineated hazard area	Census Tract is located in a delineated hazard area	Census Tract is located in multiple delineated hazard areas inclusive of secondary hazard(s)	All extreme weather events scored a 3 (high exposure) because either regional events or may occur with other extreme weather events or secondary events.*
<b>Sensitivity</b>	<b>Low Sensitivity = 1</b>	<b>Moderate Sensitivity = 2</b>	<b>High Sensitivity = 3</b>	<b>Additional Scoring Details</b>
<b>Age/condition of lifeline – Is the lifeline built to current codes and standards? Are there mitigation measures in place to reduce impacts?</b>	<10 years	10 - 30 years	>30 years <i>(if no age provided, assume score of 3)</i>	Physical attributes collected from City used to evaluate; results in the geodatabase deliverable
<b>Access (e.g., roadway) to lifeline – Is the roadway accessible to the lifeline during the hazard event (north/south/east/west)?</b>	Roadway Approaching Lifeline is Outside Hazard Area - Extreme heat - Extreme cold	Roadways Approaching Lifeline are Located in Hazard Area	Immediate Access is Located in Hazard Area	The north/south/east/west roadway approach to each lifeline was examined. Coastal storm: Canopy cover was examined for tree debris until coastal flooding delineation is available. <ul style="list-style-type: none"> <li>• High sensitivity (3): If all N/S/E/W routes are located where canopy coverage &gt;20% (3);</li> <li>• Moderate sensitivity (2): If at least one route is &gt;20% or if main road and alternative route located in or near canopy coverage &gt;20% and &lt;20% (2)</li> </ul>

**Table 11. Benchmarks to Evaluate Community Lifeline Vulnerability**

Benchmark	Scoring			<i>Additional Scoring Details</i>
				<ul style="list-style-type: none"> <li>• Low sensitivity (1): If main road and alternative route have canopy coverage &lt;20%</li> </ul> <p>Extreme Heat:</p> <ul style="list-style-type: none"> <li>• Low sensitivity (1): All lifelines were assigned a 1</li> </ul> <p>Extreme Cold:</p> <ul style="list-style-type: none"> <li>• Low sensitivity (1): All lifelines were assigned a 1</li> </ul> <p>Increased precipitation: Flood hazard zones and steep slopes were used to evaluate roadway access:</p> <ul style="list-style-type: none"> <li>• High sensitivity (3): If all N/S/E/W routes are located in flood hazard area and steep slope hazard area or located where a historical flood event has occurred</li> <li>• Moderate sensitivity (2): If at least one route is located in the flood hazard area, steep slope hazard area, or in a historical flood event hazard area</li> <li>• Low sensitivity (1): If no routes are located in the flood hazard area, steep slope hazard area, or in a historical flood event hazard area</li> </ul> <p>Long dry spell: Wildfire hazard zones were used to evaluate roadway access:</p> <ul style="list-style-type: none"> <li>• High sensitivity (3): If roadway access is located in an extreme or high wildfire zone</li> <li>• Moderate sensitivity (2): If roadway access is located in moderate wildfire zone (2);</li> </ul>



**Table 11. Benchmarks to Evaluate Community Lifeline Vulnerability**

Benchmark	Scoring			Additional Scoring Details
<p><b>Population Impacts</b> - Are the employees and/or population served impacted by the lifeline (evacuation needed/sheltering/injuries)? Sources may include historic impacts</p>	<p>If Lifeline is impacted, Employees/City Population is inconvenienced (need to visit another lifeline to obtain service; or delay in services due to minor outage)/No major injuries</p>	<p>If Lifeline is impacted, a portion of City population impacted/Injuries possible</p>	<p>If Lifeline impacted, City-wide population needs are not met/Injuries or death likely</p>	<ul style="list-style-type: none"> <li>Low sensitivity (2): If roadway access is located outside of extreme, high, or moderate wildfire zones</li> </ul> <p>Subjective assessment by the City Project Team.</p>
<p><b>Physical Impacts</b> – What is the estimated level of damage from the hazard to the lifeline? Sources include historic impacts, available damage functions in models (% loss or duration of interruption of services)</p>	<p>Physical Impact &lt;5% Loss and could be immediately repaired in very short-term/downtime is &lt; 3 hours</p>	<p>Physical Impact 5-25% Loss and could not be immediately repaired/downtime is &lt; 1 day</p>	<p>Physical Impact &gt;25% Loss and Could not be immediately repaired/downtime is in days</p>	<p>Estimated losses were not modeled but may be in the future. To evaluate, street-view images were captured to evaluate physical features.</p> <p>Coastal Storm:</p> <ul style="list-style-type: none"> <li>High sensitivity (3): If lifeline is located where canopy coverage is &gt;20%</li> <li>Moderate sensitivity (2): If lifeline is located where canopy coverage if &lt;20% or is near canopy coverage &gt;20%</li> <li>Low sensitivity (1): If lifeline is located where this is no canopy coverage data, but near canopy coverage &lt;20%</li> </ul> <p>Increased precipitation (flood):</p>

**Table 11. Benchmarks to Evaluate Community Lifeline Vulnerability**

Benchmark	Scoring			Additional Scoring Details
				<ul style="list-style-type: none"> <li>• Moderate sensitivity (2): All lifelines were assigned a 2</li> </ul> <p>Extreme Heat:</p> <ul style="list-style-type: none"> <li>• High sensitivity (3): If lifeline does not have a cooling source identified (AC)</li> <li>• Moderate sensitivity (2): If lifeline has partial cooling available</li> <li>• Low sensitivity (1): If lifeline has cooling available for the entire structure</li> </ul> <p>Extreme Cold:</p> <ul style="list-style-type: none"> <li>• High sensitivity (3): If lifeline does not have heat available</li> <li>• Low sensitivity (1): If lifeline has roof top units, boiler, radiant heating, or a geothermal system</li> </ul> <p>Long dry spell:</p> <ul style="list-style-type: none"> <li>• High sensitivity (3): If lifeline is located in the extreme or high wildfire zone it would be assumed to have a 100% loss</li> <li>• Moderate sensitivity (2): If lifeline is located in the moderate wildfire zone</li> <li>• Low sensitivity (1): If lifeline is located in a low, very low, or no wildfire zone data location</li> </ul>
<b>Adaptive Capacity of the City</b>	<b>Weak Adaptive Capacity (-1)</b>	<b>Moderate Adaptive Capacity (0)</b>	<b>Strong Adaptive Capacity (1)</b>	<b>Additional Scoring Details</b>
<b>Emergency:</b> <i>Facilities and services available to assist vulnerable populations (e.g.,</i>	Weak	Moderate	Strong	Adaptive capacity was determined through a survey distributed to the City Project Team and Stakeholders

**Table 11. Benchmarks to Evaluate Community Lifeline Vulnerability**

Benchmark	Scoring			Additional Scoring Details
<i>shelters, community centers, health facilities)</i>				requesting to rank each category as weak, moderate, or strong based upon their experience living/working in the City and historic extreme weather events experienced.
<b>Continuity:</b> <i>Continuity of operations plans; backup facilities; mutual aid agreements in place to ensure adequate resources available in emergency</i>	Weak	Moderate	Strong	
<b>Capacity to Serve:</b> <i>Staffing capacity for the lifeline or department/organization that owns the lifeline to apply for funding and manage upgrades or change infrastructure/utilities to respond to impacts/demands</i>	Weak	Moderate	Strong	
<b>Plans:</b> <i>City plans/resources/assistance available</i>	Weak	Moderate	Strong	
<b>Fiscal:</b> <i>City fiscal resources identified to implement mitigation/resilience measures; apply for grants; ability to bond</i>	Weak	Moderate	Strong	
<b>Education:</b> <i>Education/outreach to warn/provide updates in emergency</i>	Weak	Moderate	Strong	

*\*All extreme weather events scored a 3 (high exposure) because either regional events or may occur with other extreme weather events or secondary events. The following was taken into consideration per extreme weather event.*

**Coastal storm:** *canopy coverage, coastal storm historic locations used; regional event; may occur with increased precipitation*

**Extreme cold:** *regional event; may occur with increased precipitation*

**Extreme heat:** *regional event; may occur in a long dry period*

**Increased precipitation:** *Flood zone, historic flood locations, steep slopes, historic landslide locations used; may occur with extreme temperature and/or coastal storm*

**Long dry spells –** *Extreme, high, or moderate wildfire risk area used; may occur with extreme heat*

### Community Lifeline Attributes

The City compiled physical attributes for each community lifeline to help inform the vulnerability assessment; listed in Table 12. Where available, this data was included in the assessment and the geodatabase deliverable for this project.

Table 12. Attributes Collected for Each Community Lifeline	
Attribute	
Ownership	
Date of Construction	
Date of Renovations	
First Finished Floor Elevation	
Foundation Type	
Construction Material	
Mechanical Information	
Air Conditioning Information	
Critical Data/Servers/Intelligence/Infrastructure Location	
Occupancy	
Number of Beds	
Presence of a Kitchen	
Number of Showers	
Presence of an Elevator	
Compliance with Disability Regulations	
List of Historical Impacts	

### Adaptive Capacity

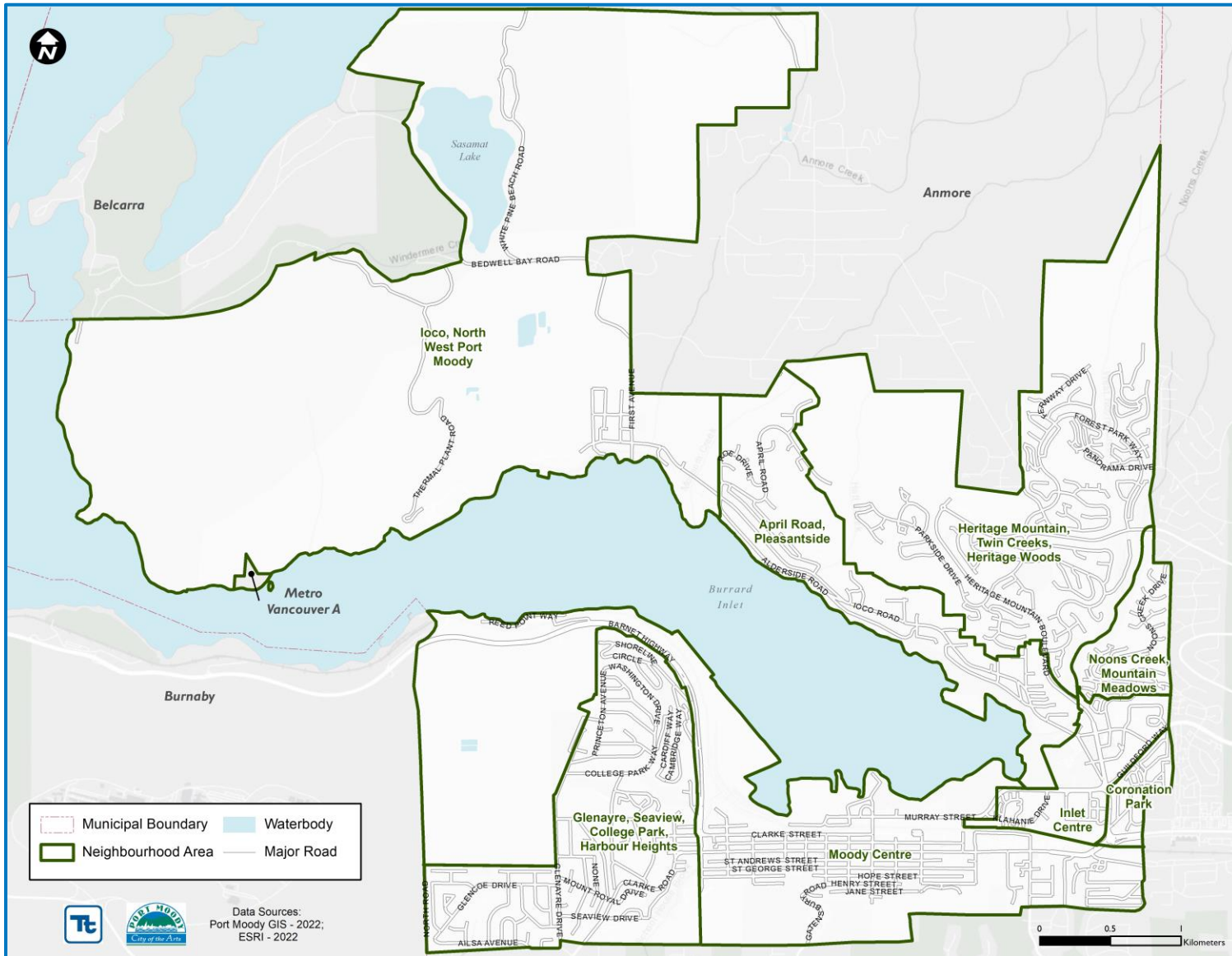
Adaptive capacity refers to the City’s ability to adjust or cope to the impacts of an extreme weather event. In other words, high adaptive capacity can help the City bounce back from an extreme event sooner, or moderate the impacts (i.e., decrease vulnerability). Where moderate and weak capacity were identified, the City project team used this planning process as an opportunity to identify adaptation measures to strengthen adaptive capacity both during internal discussions and at stakeholder engagements. Table 13 summarizes the City’s adaptive capacity rankings for each extreme weather event that was included in the vulnerability assessment for population and community lifelines.

Table 13. City’s Adaptive Capacity Ranking across Extreme Weather Events					
Adaptive Capacity	Coastal Storm (wind/surge)	Extreme Cold	Extreme Heat	Increased Precipitation (rain/snow)	Long Dry Periods (cascading wildfire)
Emergency Response	Moderate	Weak	Moderate	Moderate	Moderate
Continuity of City Operations	Weak	Moderate	Moderate	Moderate	Moderate
Capacity	Moderate	Moderate	Weak	Moderate	Weak
Plans/Programs/Regulations	Weak	Moderate	Moderate	Moderate	Moderate
Fiscal Resources	Moderate	Moderate	Weak	Moderate	Moderate
Education and Outreach	Moderate	Weak	Weak	Moderate	Moderate

# Appendix C. Maps

The following maps illustrate the extreme weather event spatial data available, and vulnerability assessment results.

Figure 2. Port Moody Neighbourhood Map



# Extreme Weather Event Maps

Figure 3. Mean Surface Temperature and Forest Cover

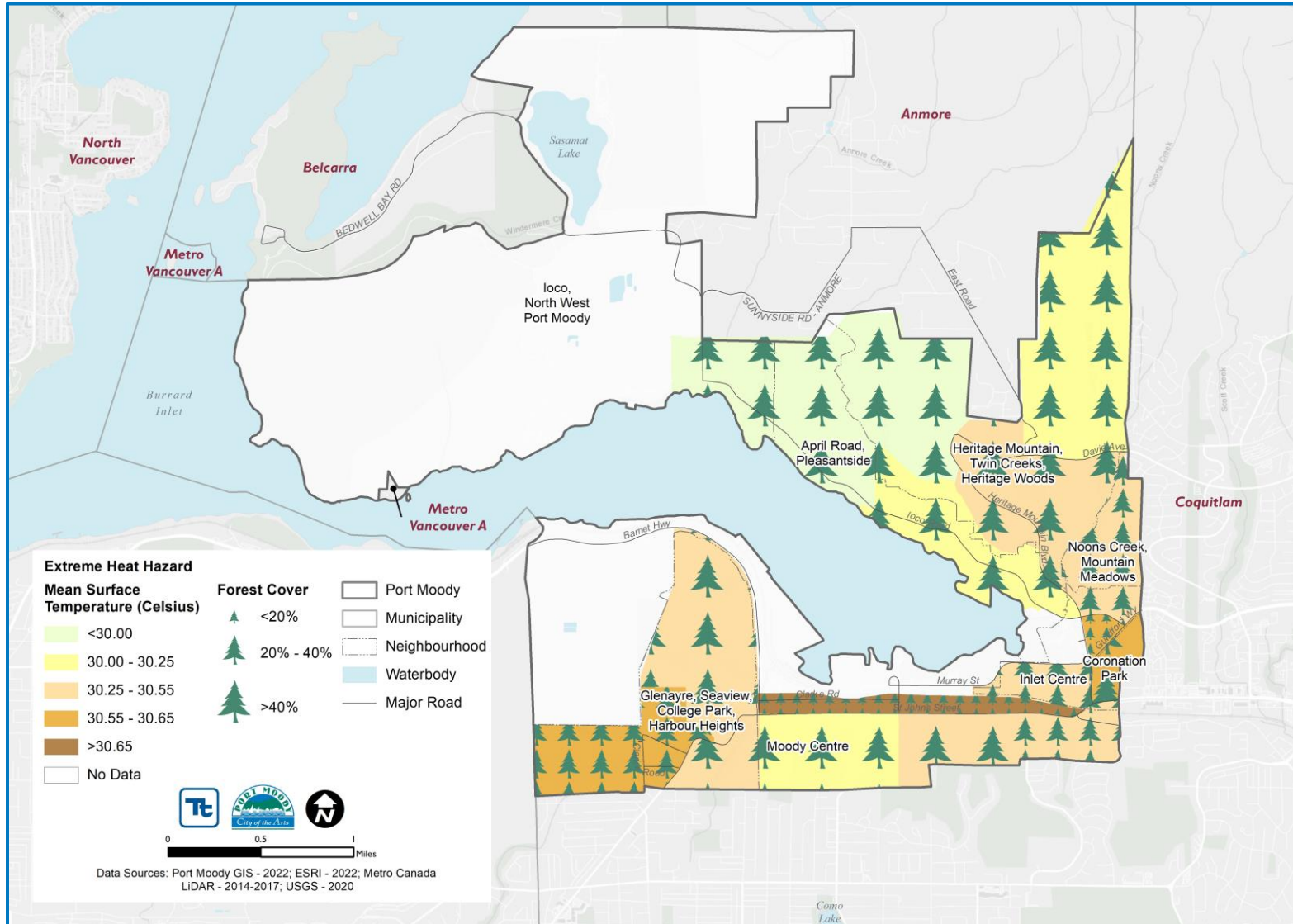


Figure 4. Flood Hazard

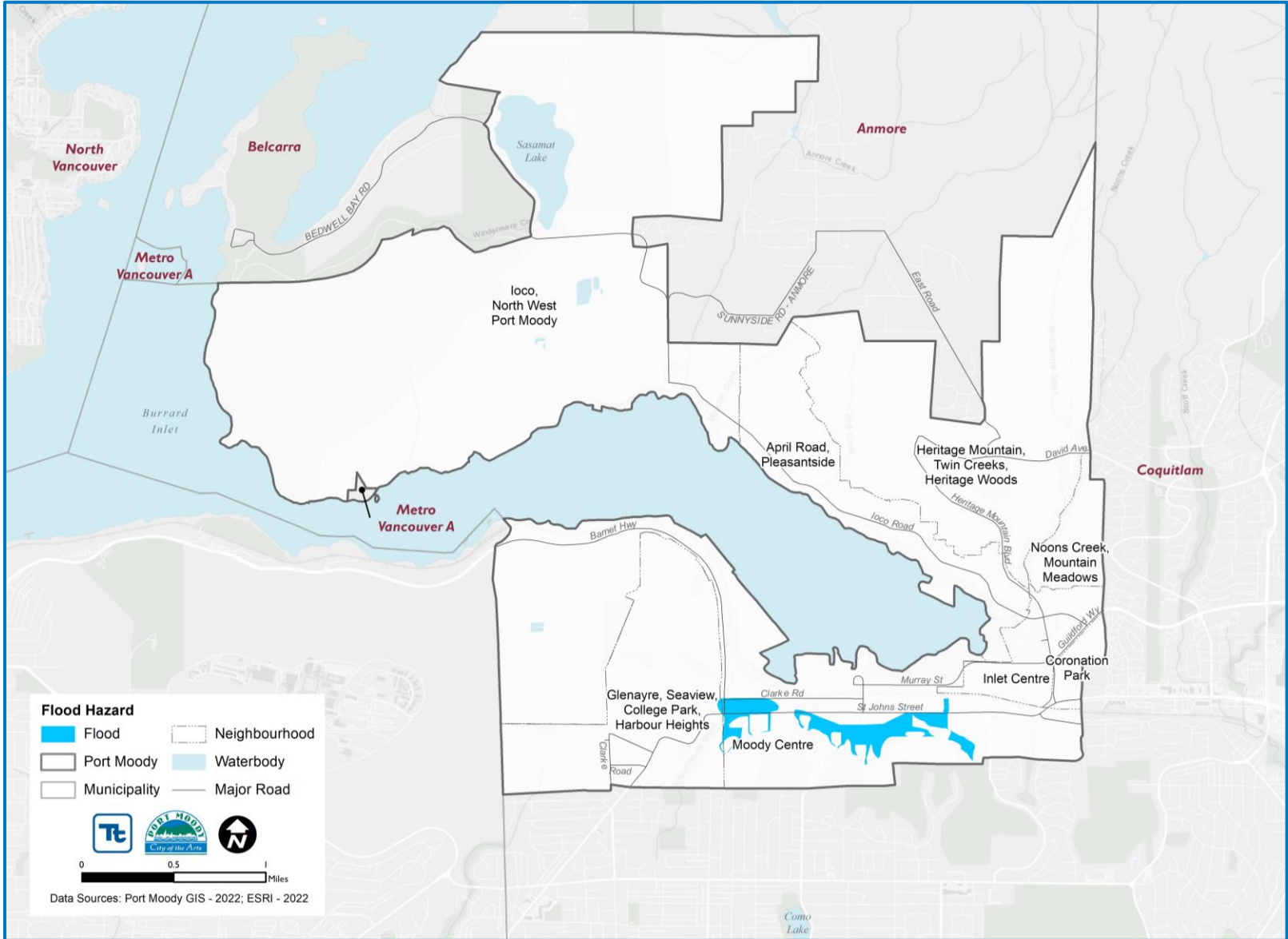




Figure 5. Landslide Hazard

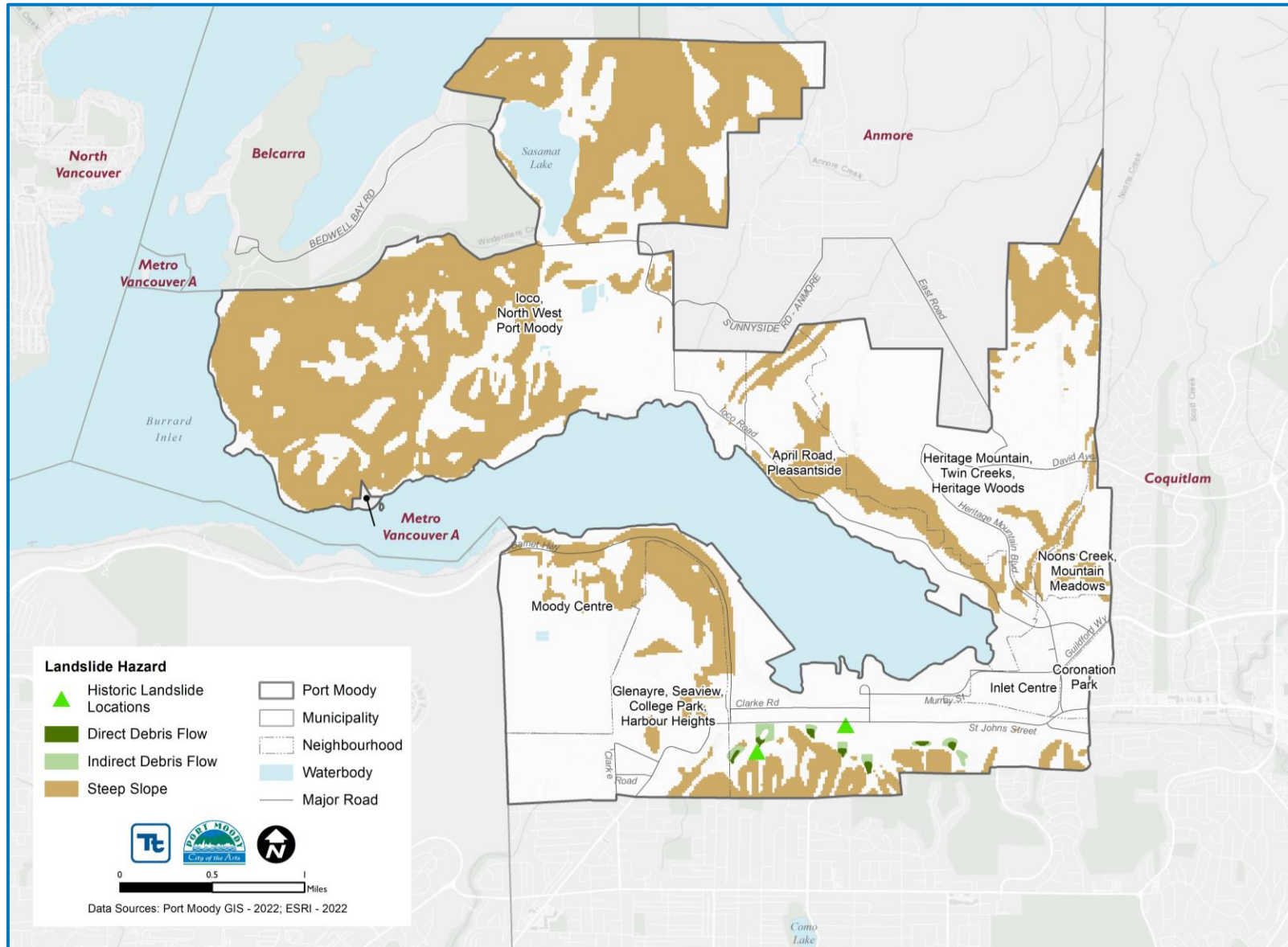
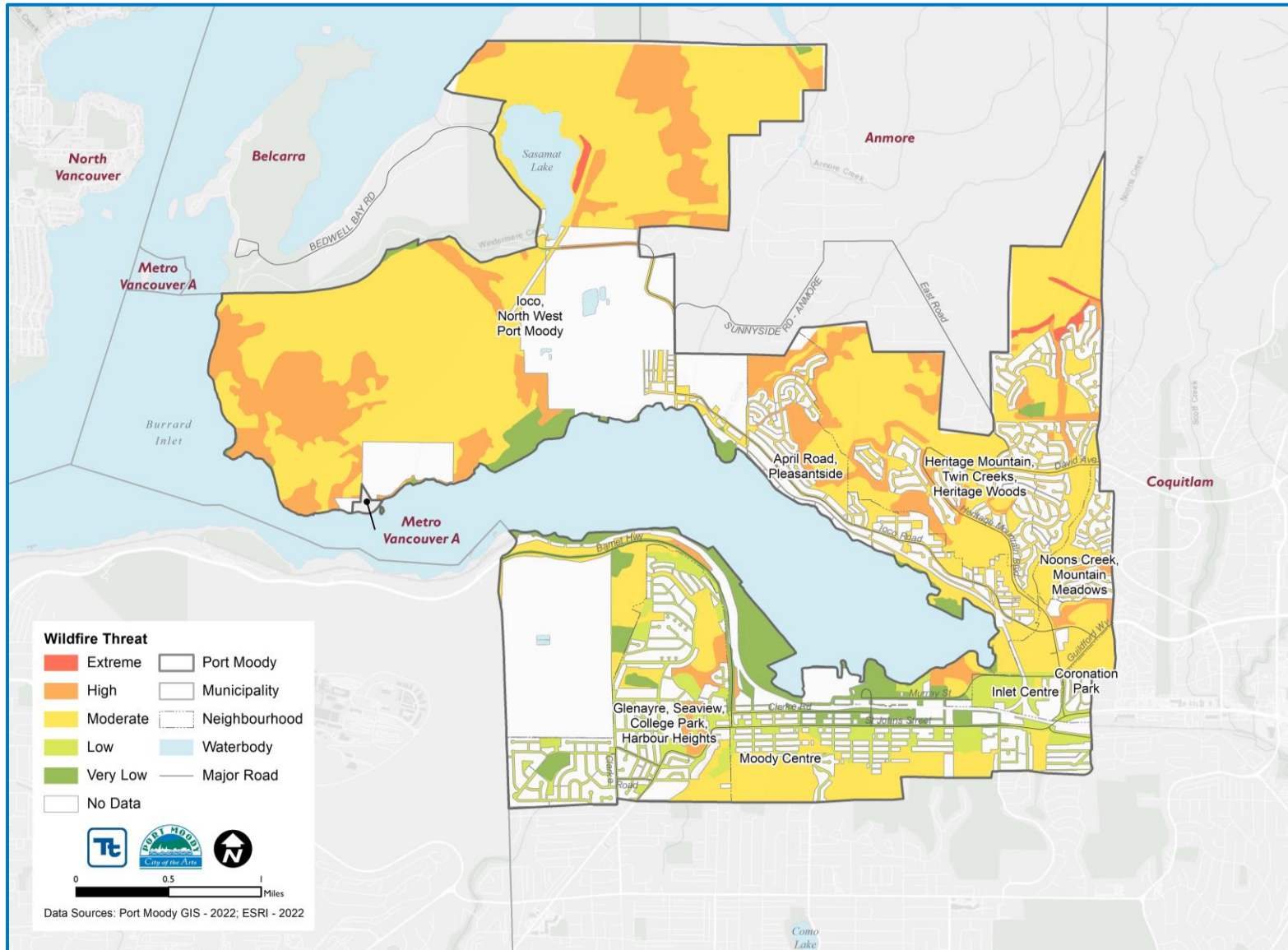


Figure 6. Wildfire Hazard



# Population Maps

Figure 7. Population Age Less than 14 Years

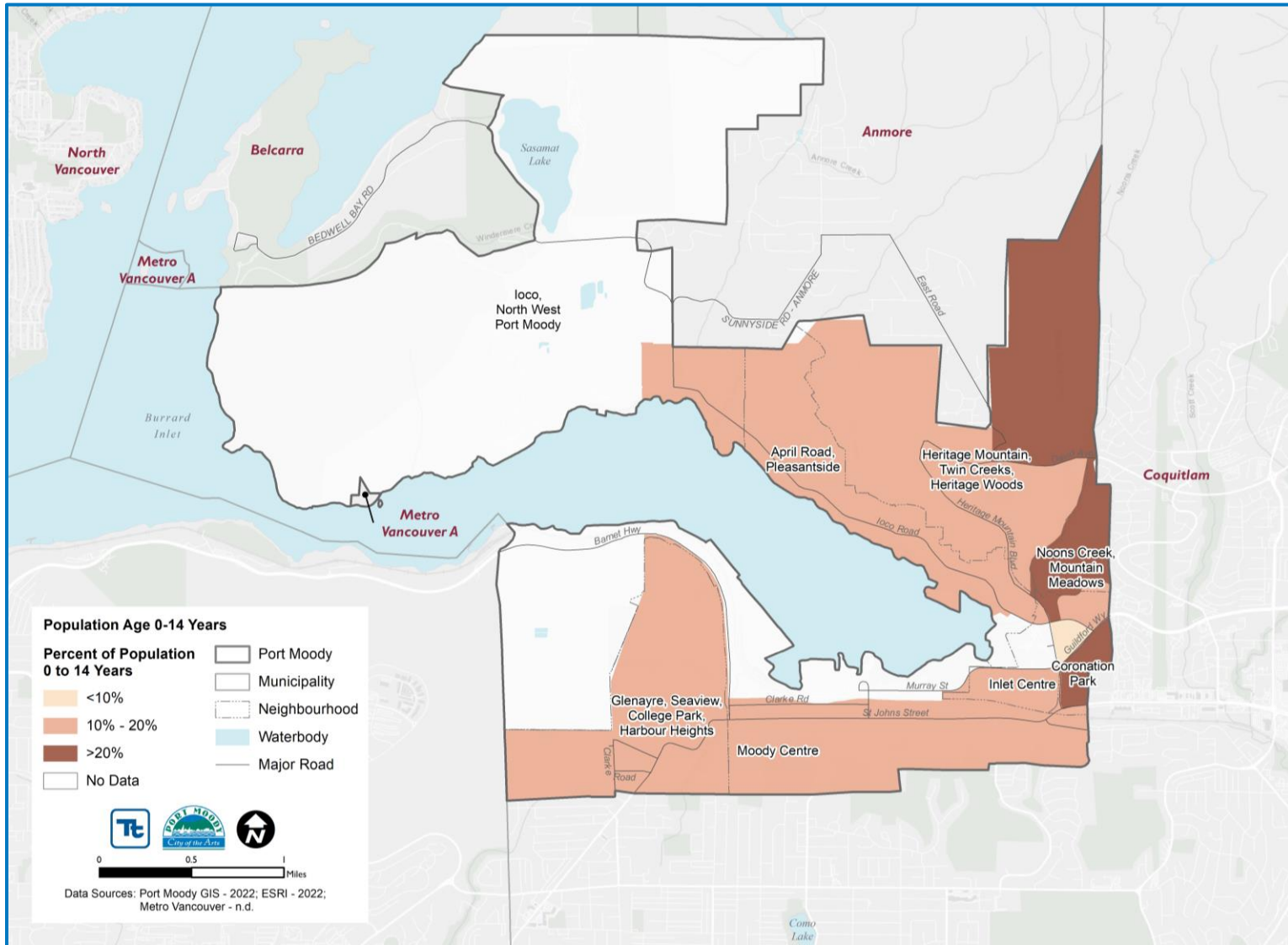


Figure 8. Population Age Greater than 65 Years

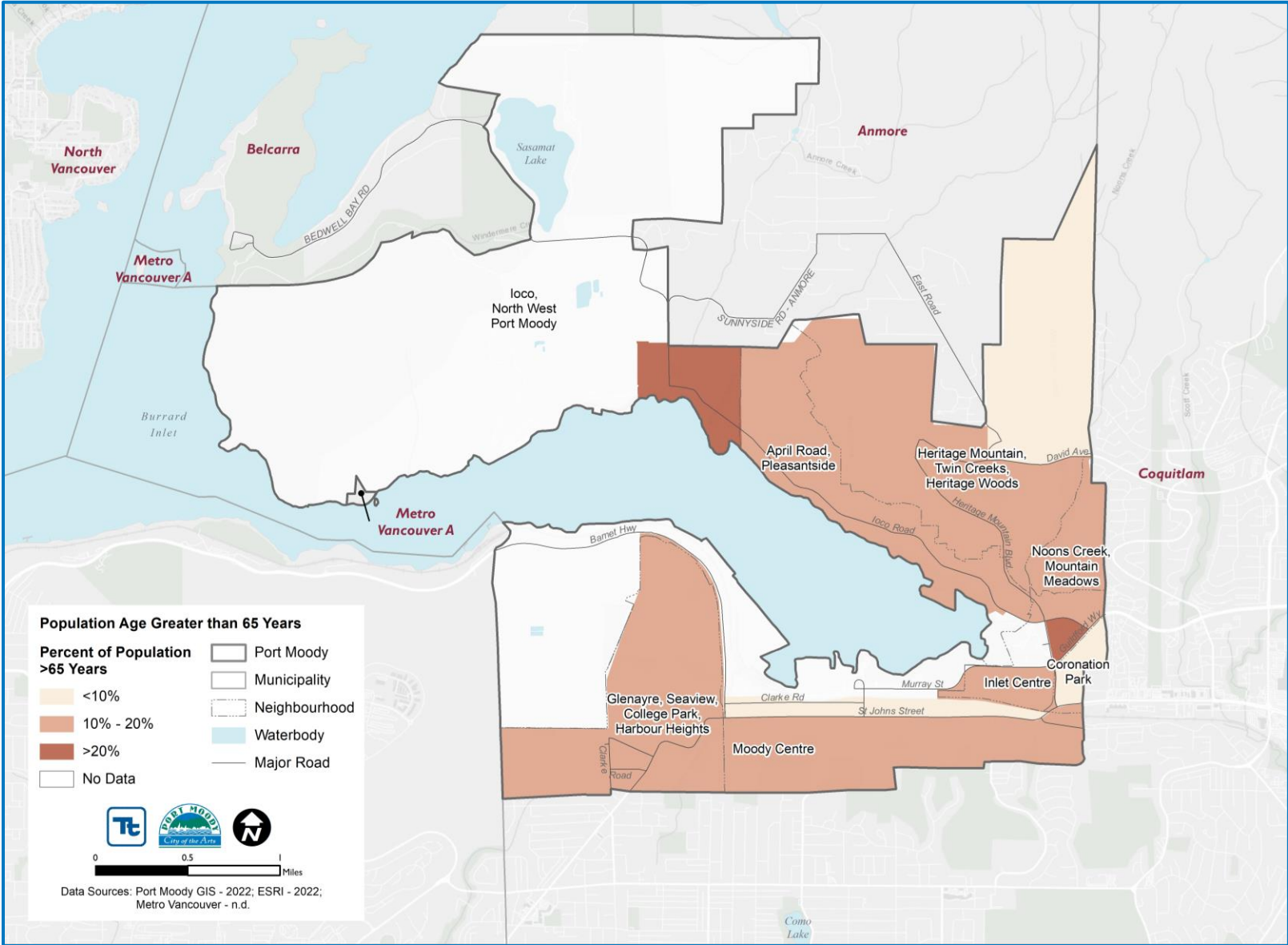


Figure 9. Housing Tenure - Renter

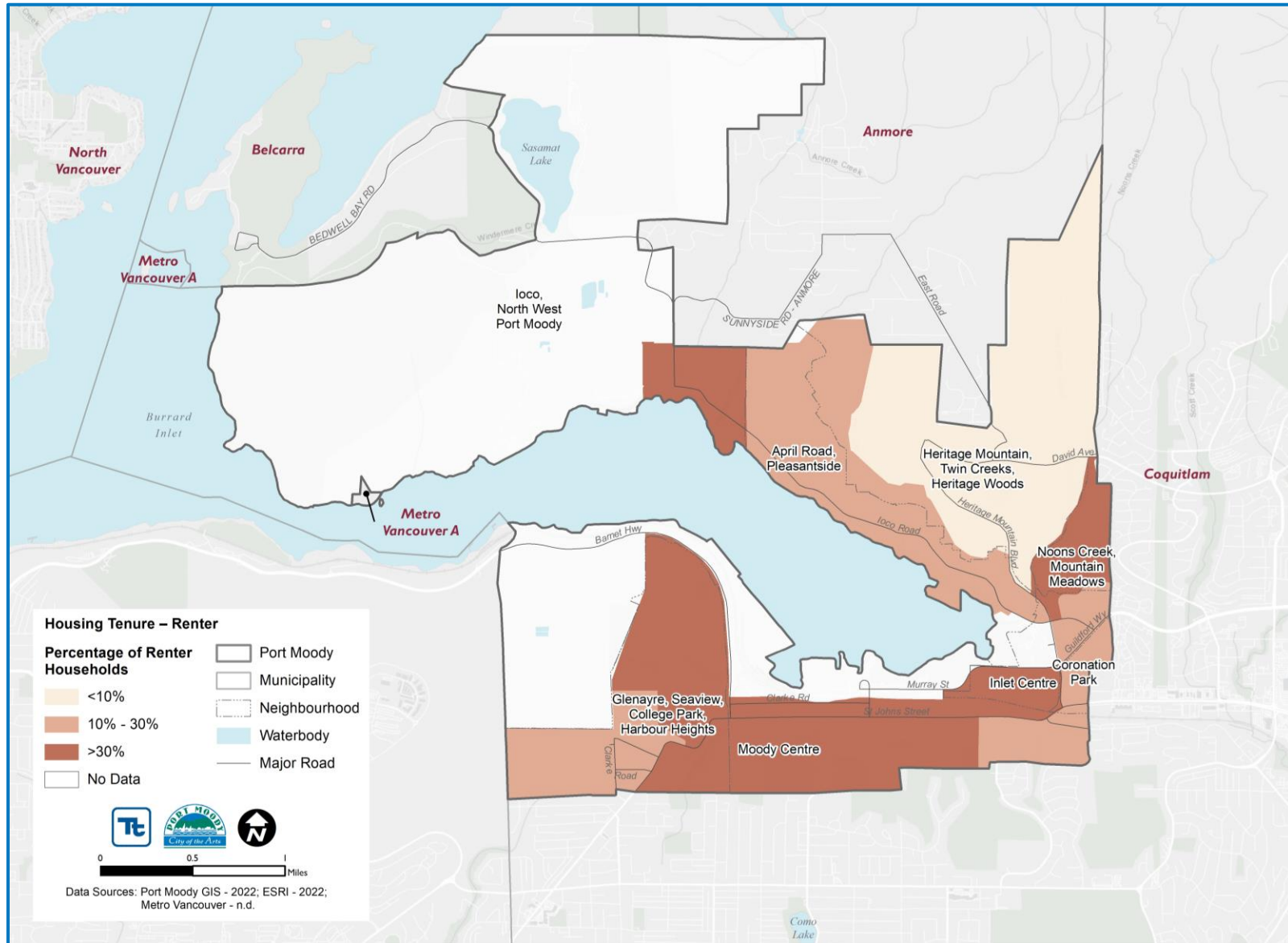


Figure 10. Subsidized Housing

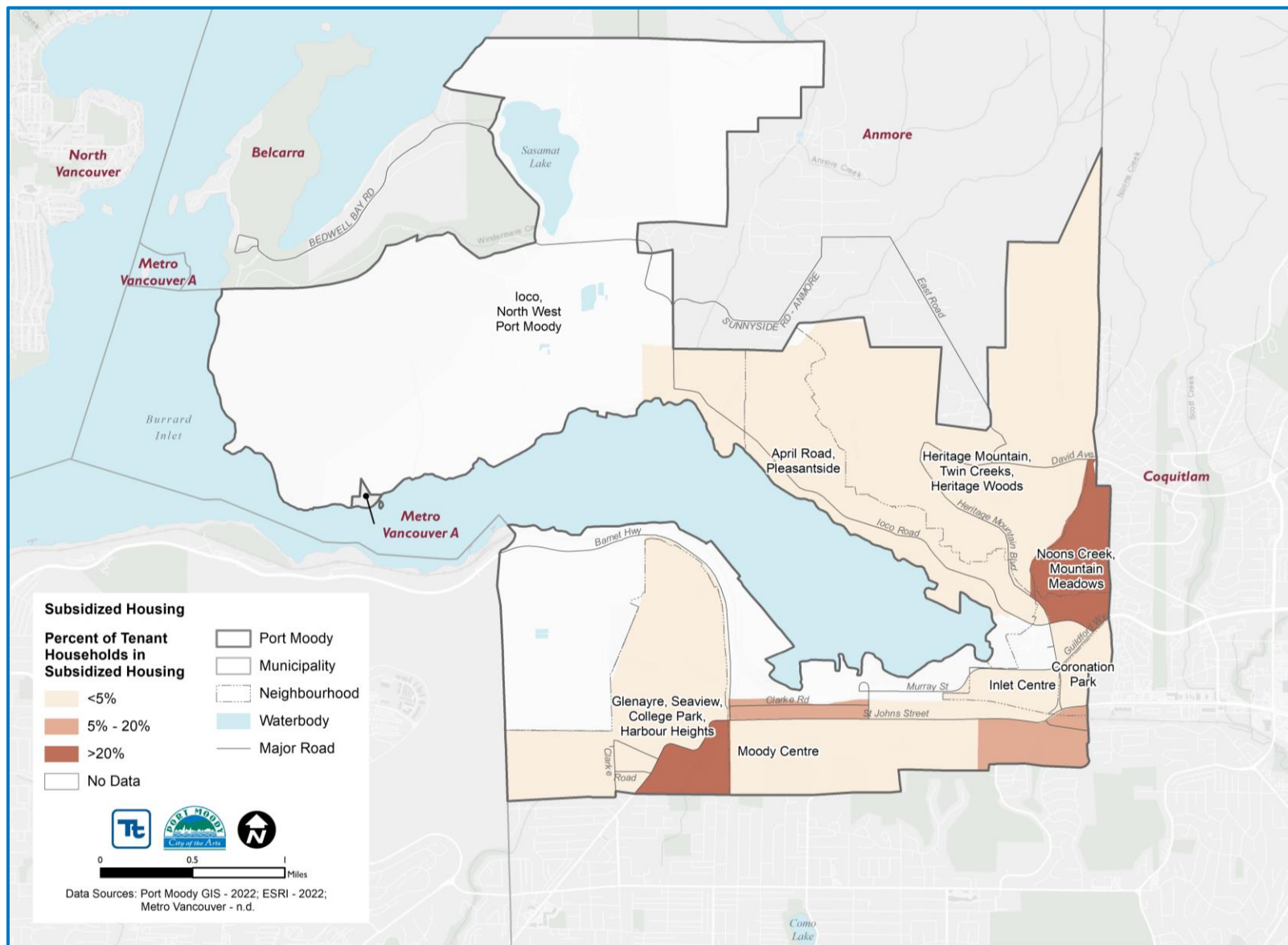


Figure 11. Household Suitability – Overcrowding

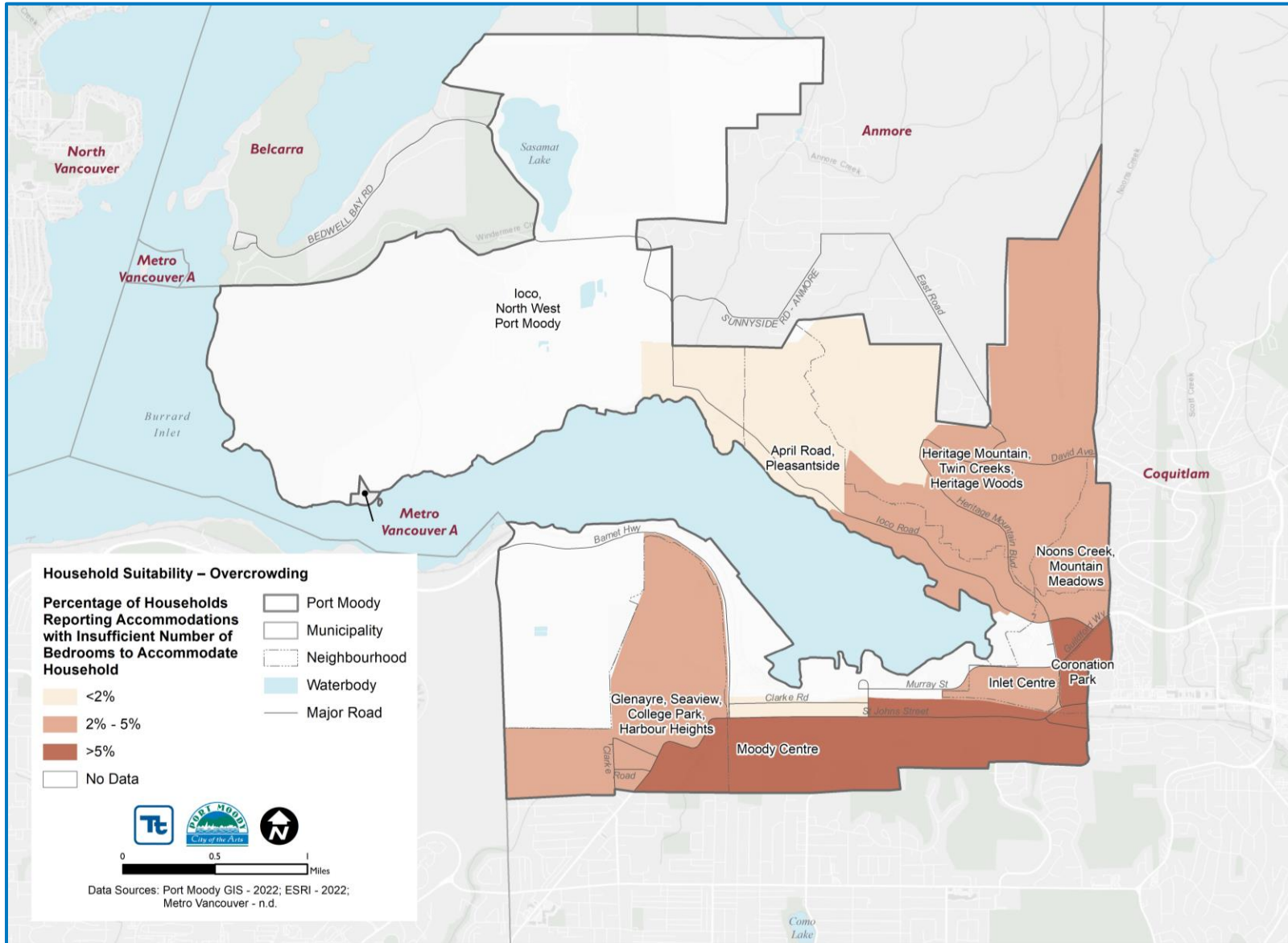


Figure 12. Median Household Income

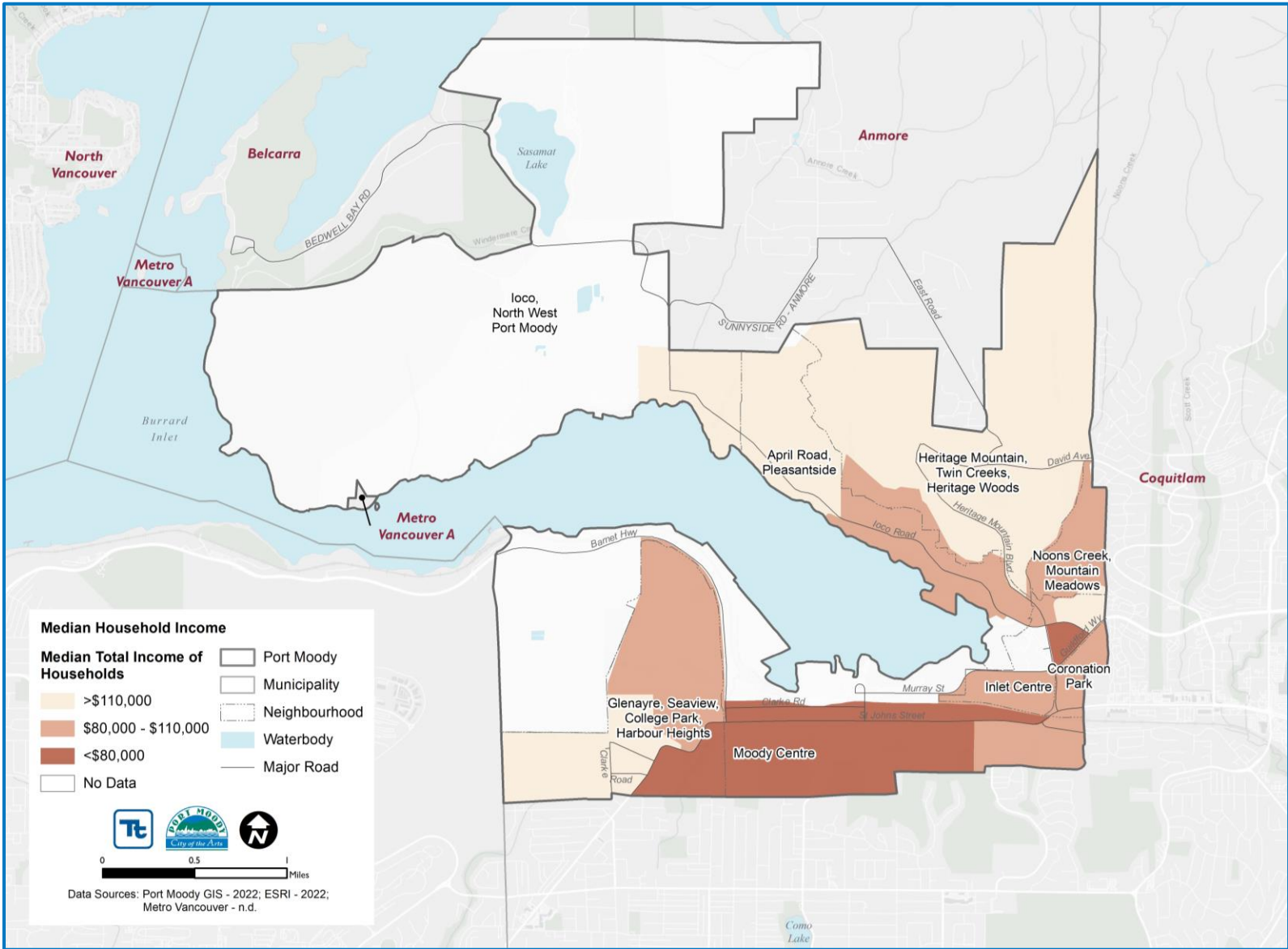
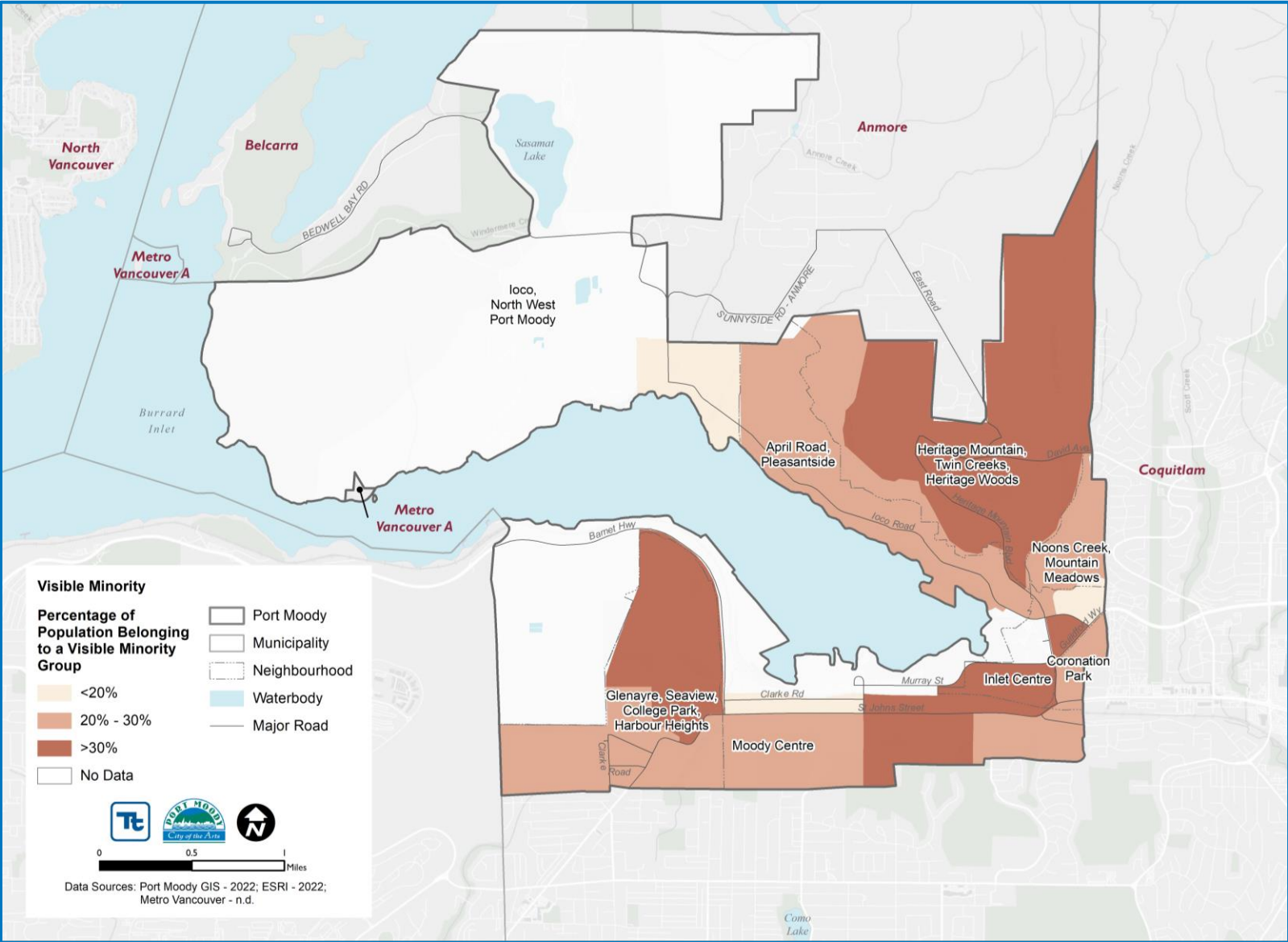


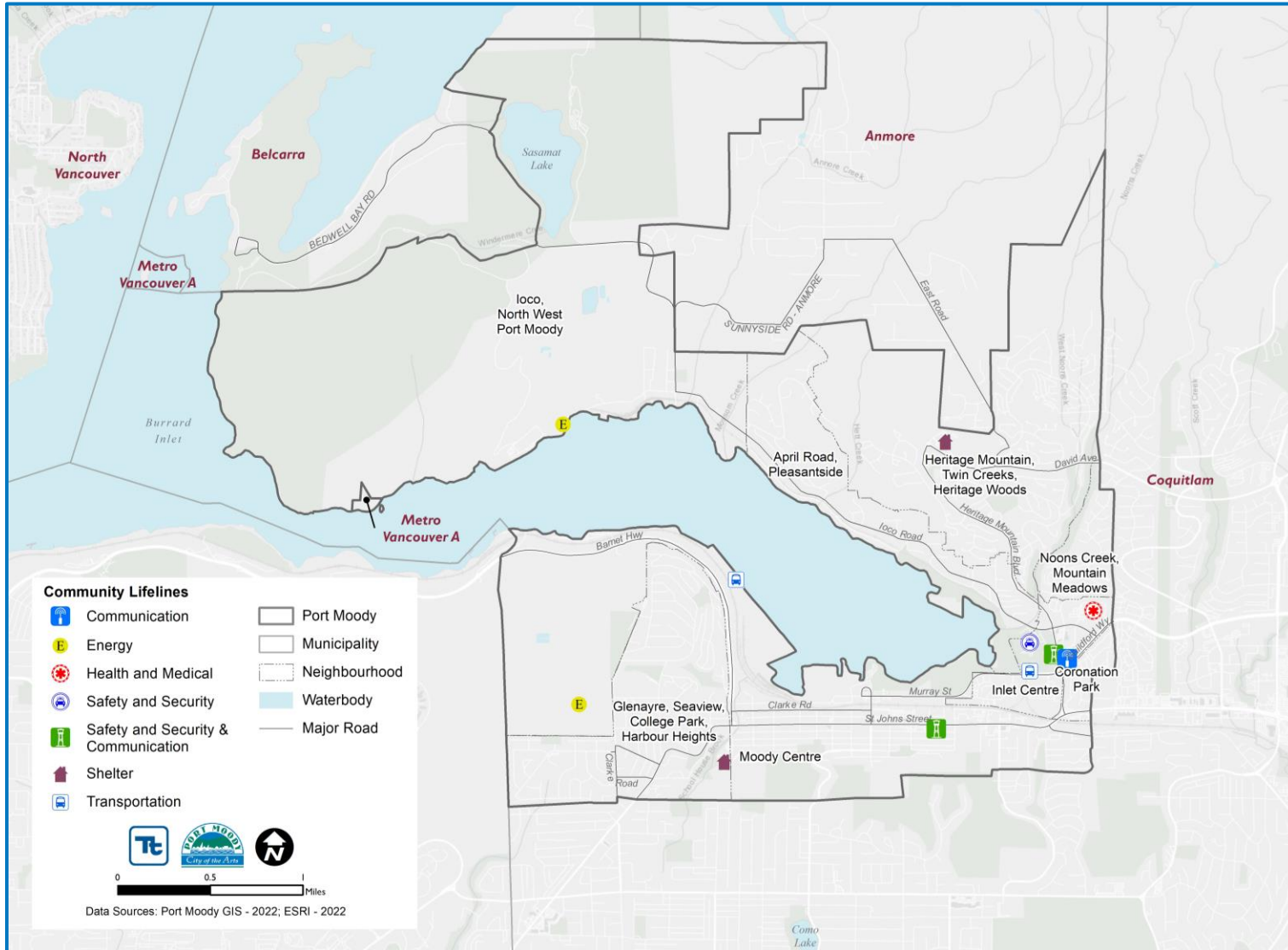


Figure 13. Visible Minority



# Community Lifeline Map

Figure 14. Community Lifeline Locations



# Vulnerability Assessment Result Maps

Figure 15. Coastal Storm (wind/surge) Population Vulnerability

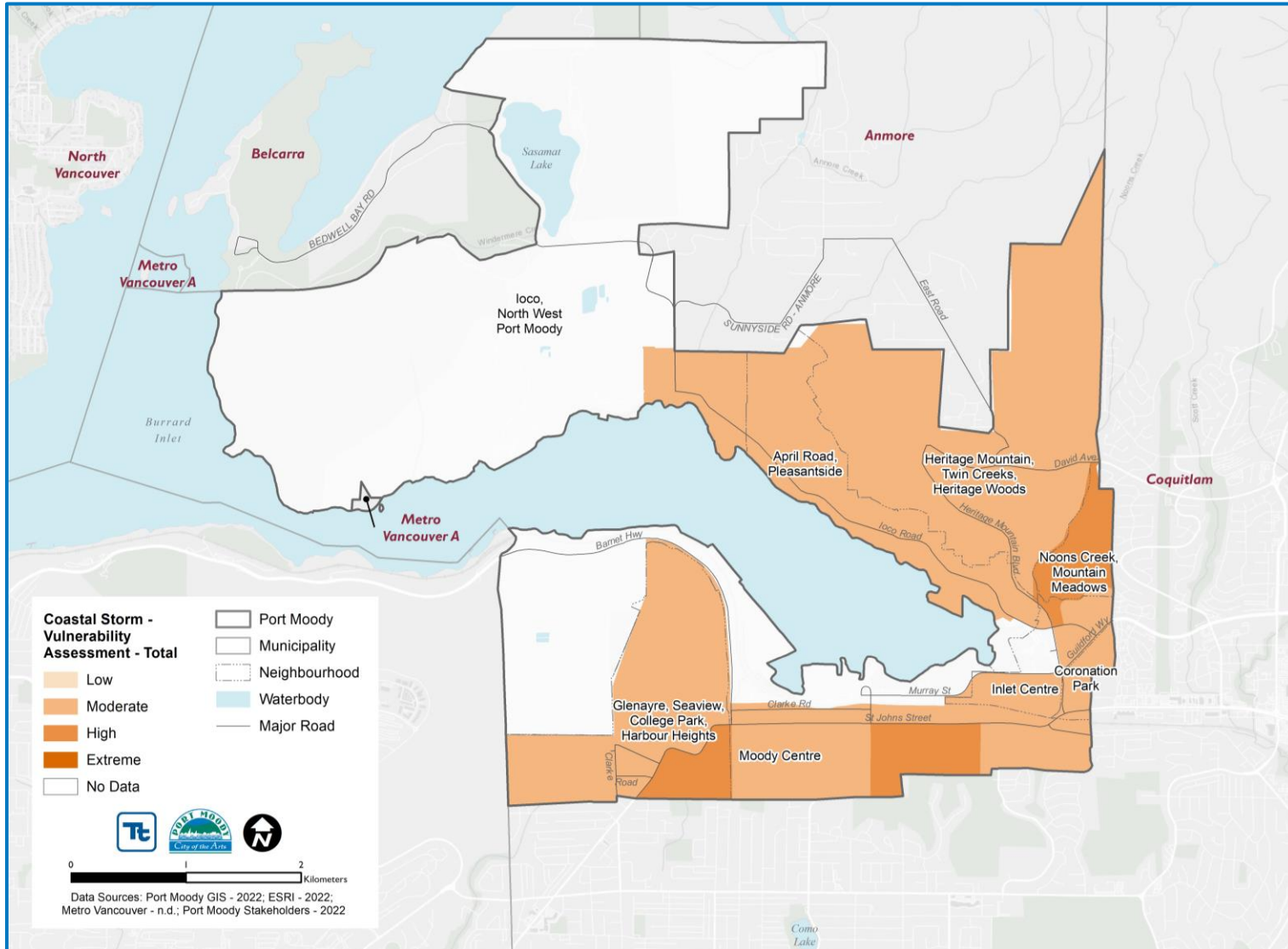


Figure 16. Extreme Cold Population Vulnerability

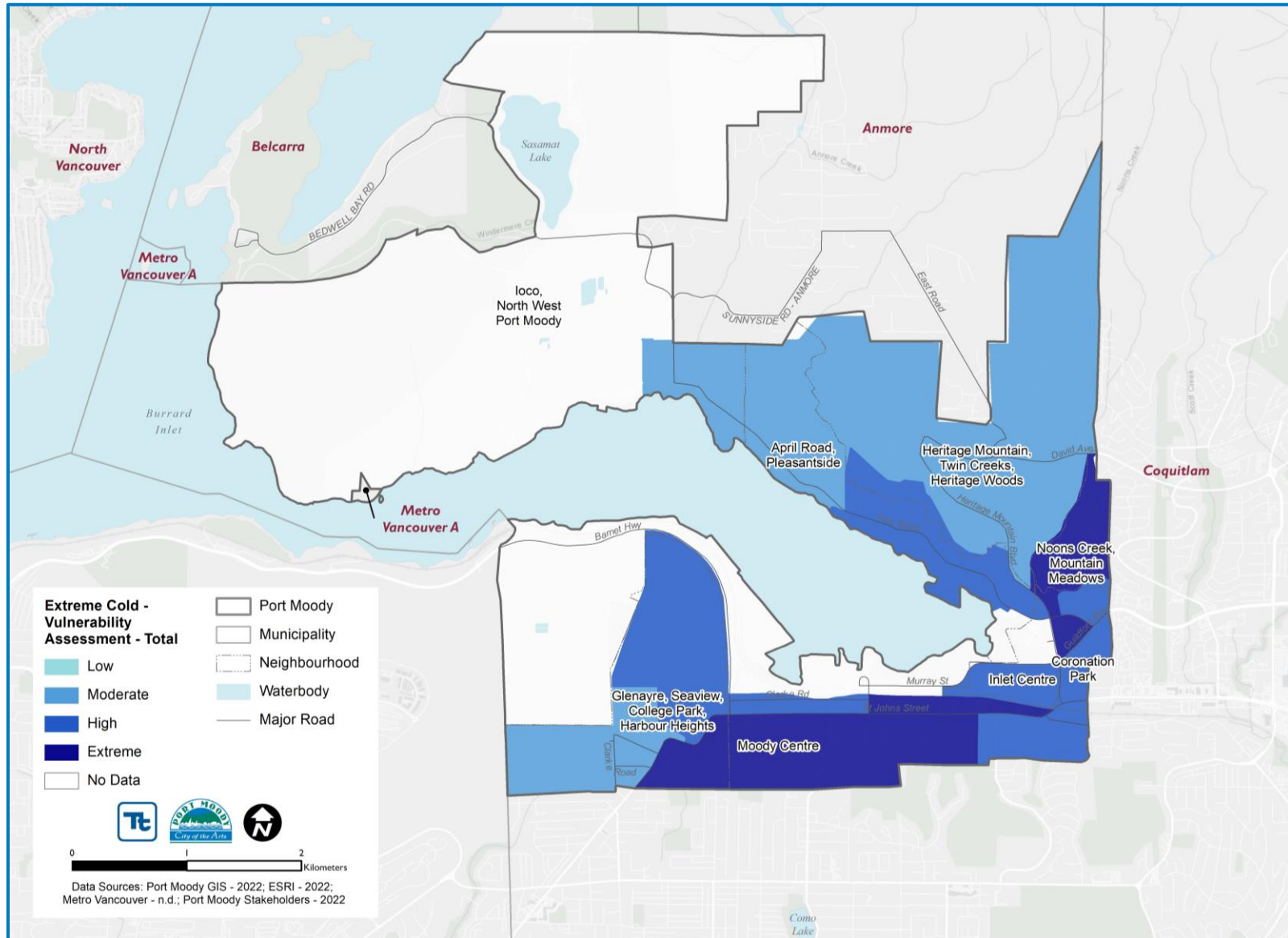


Figure 17. Extreme Heat Population Vulnerability

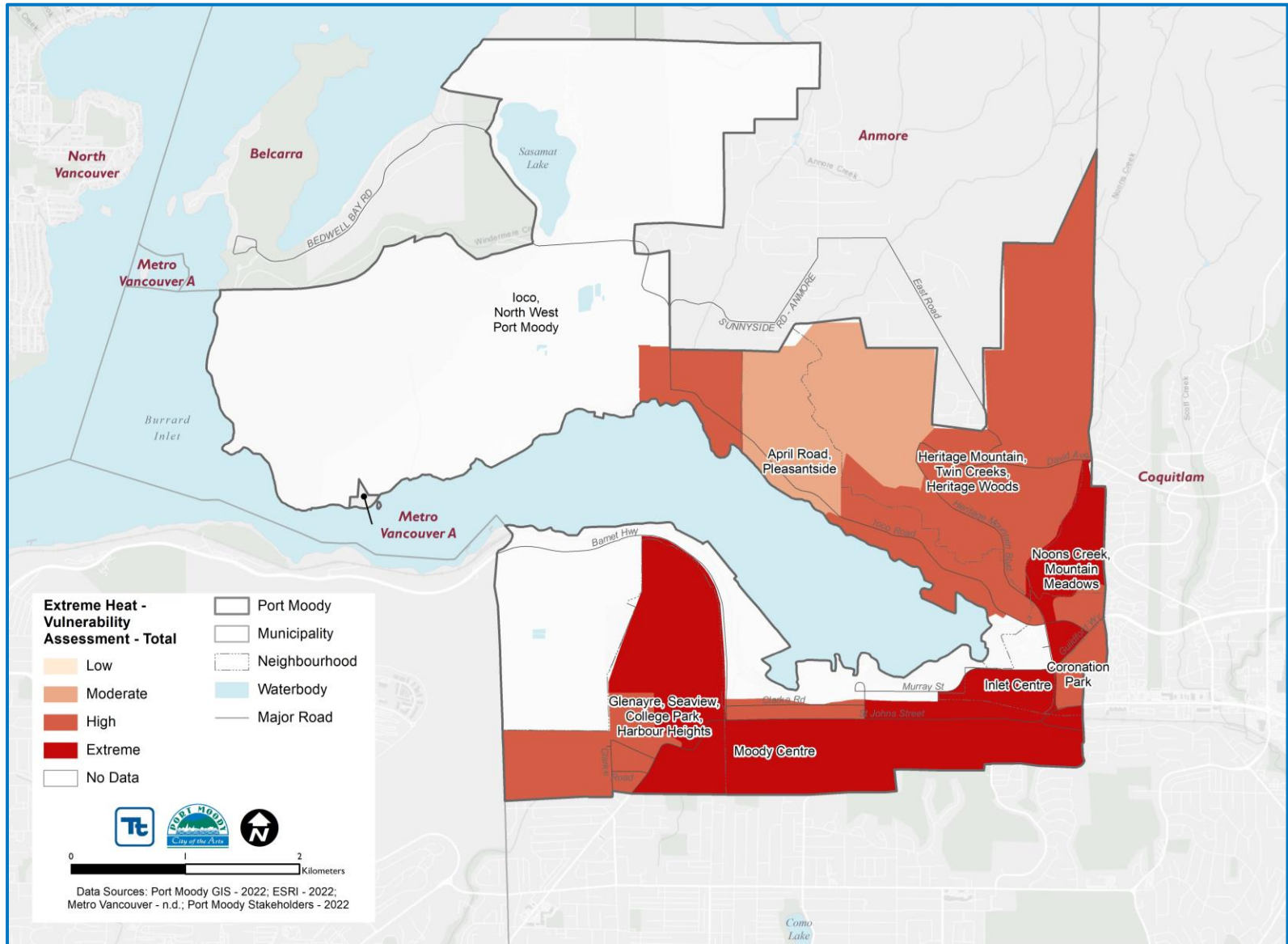


Figure 18. Increased Precipitation (Rain/Snow) Population Vulnerability

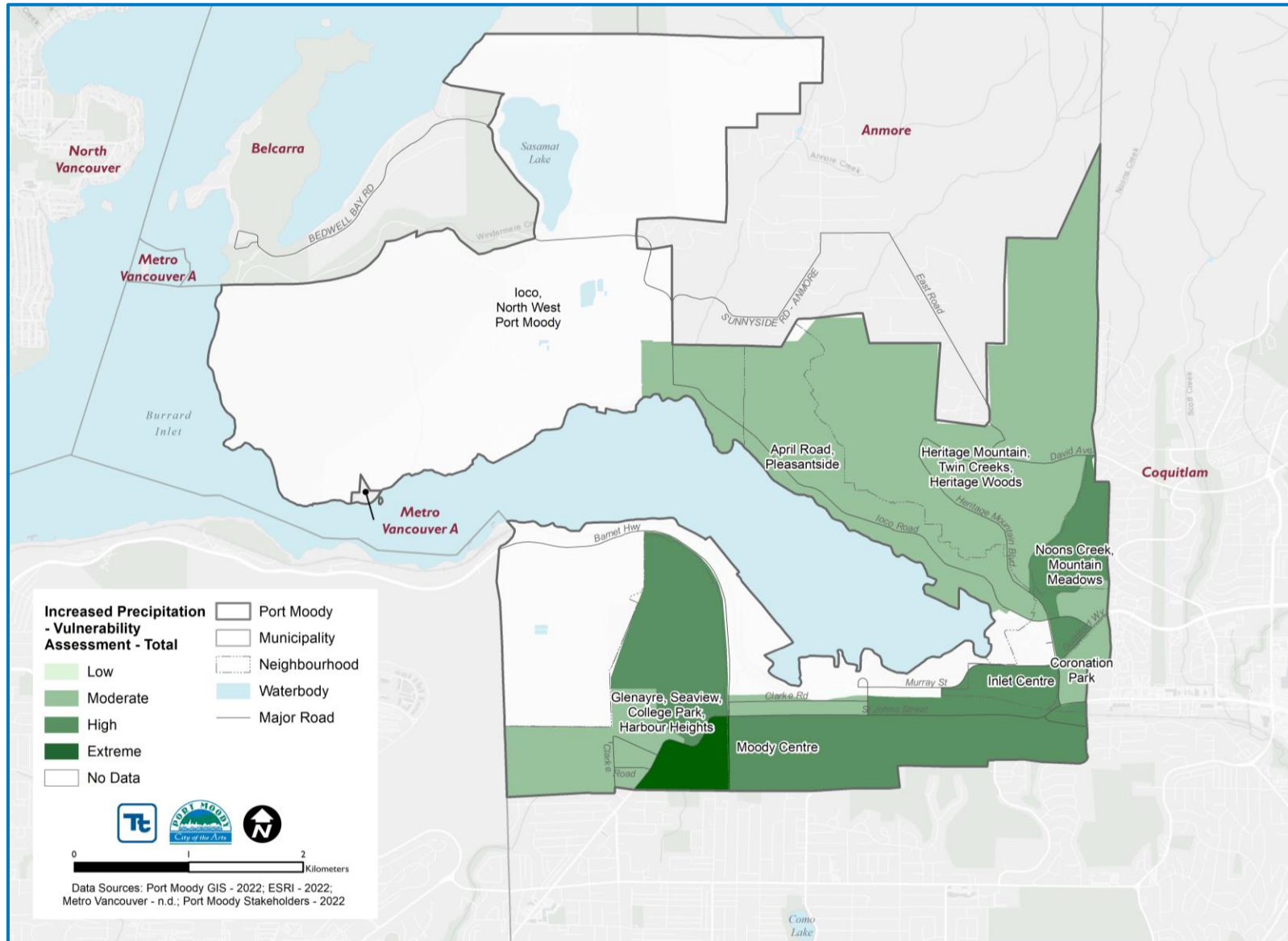


Figure 19. Long Dry Spell (Wildfire) Population Vulnerability

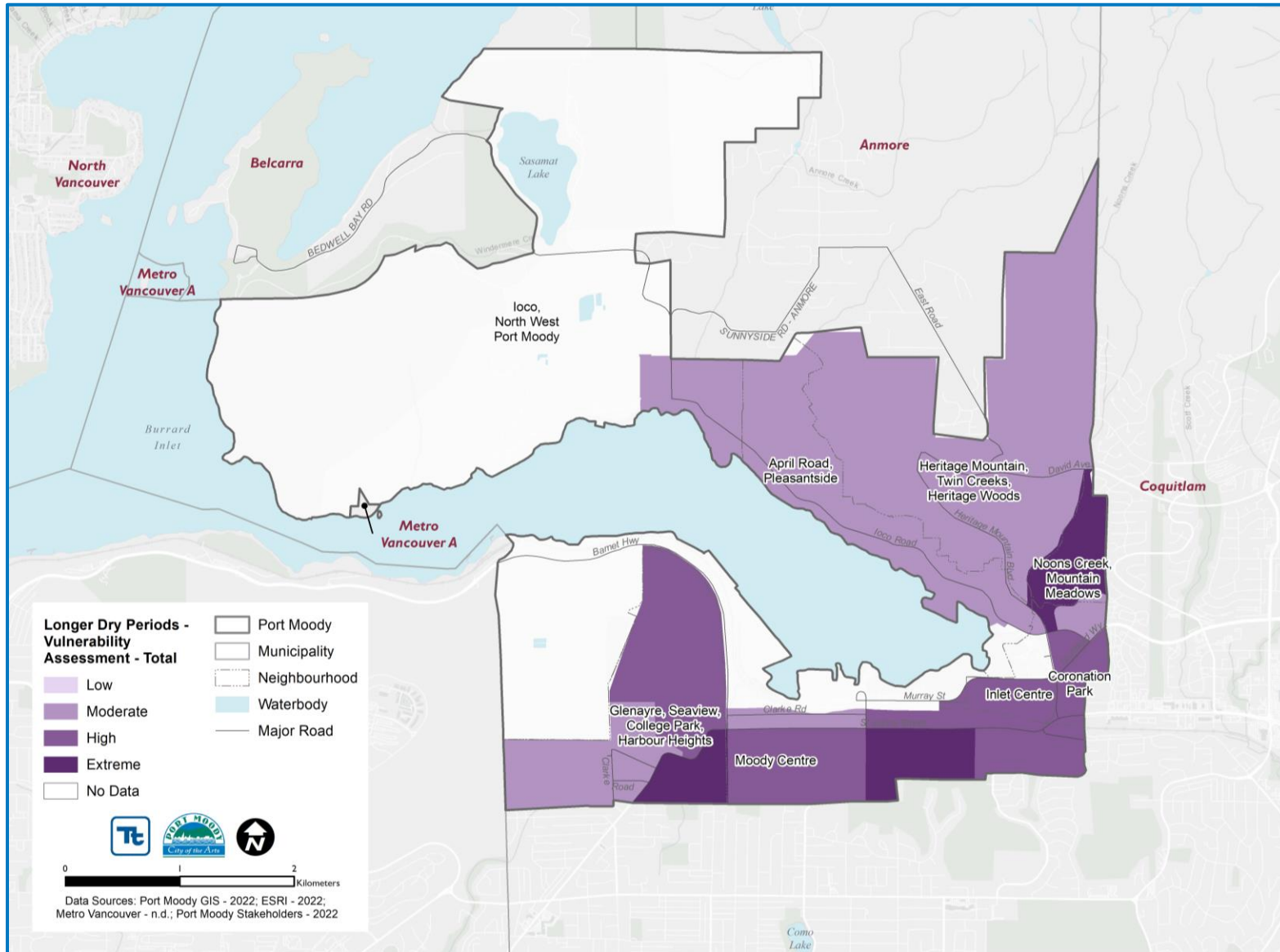


Figure 20. Coastal Storm (wind/surge) Lifeline Vulnerability

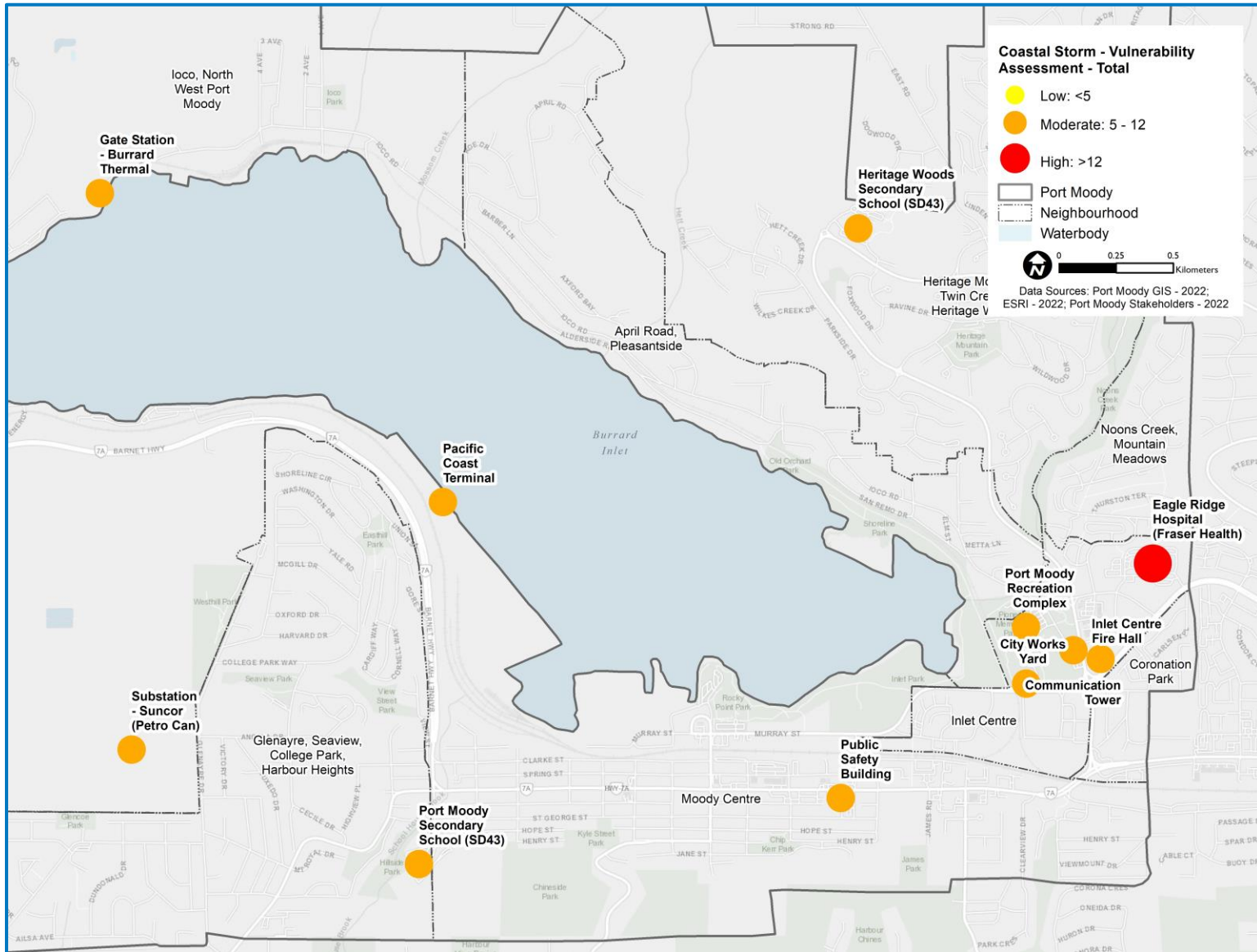




Figure 21. Extreme Cold Lifeline Vulnerability

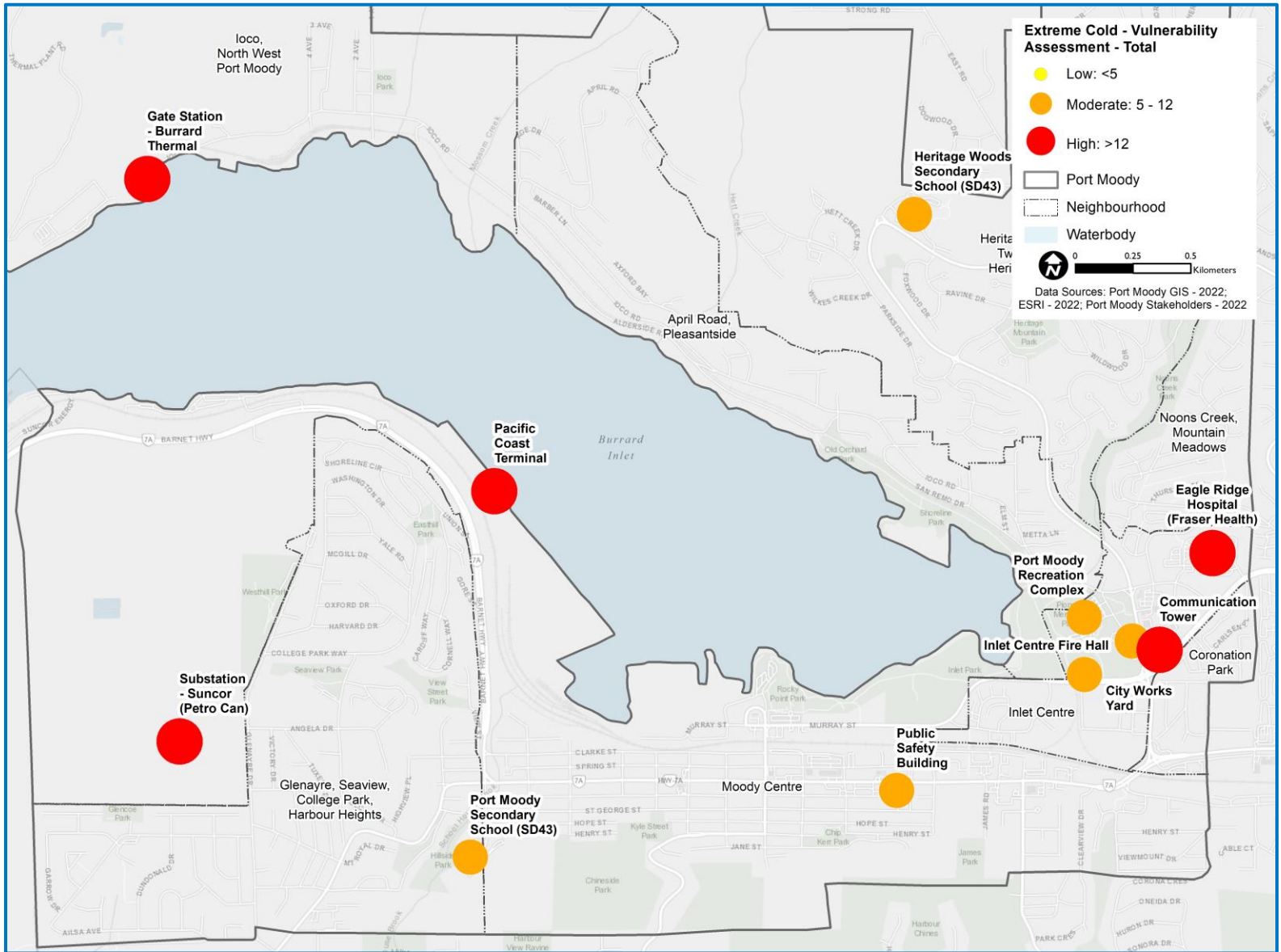


Figure 22. Extreme Heat Lifeline Vulnerability

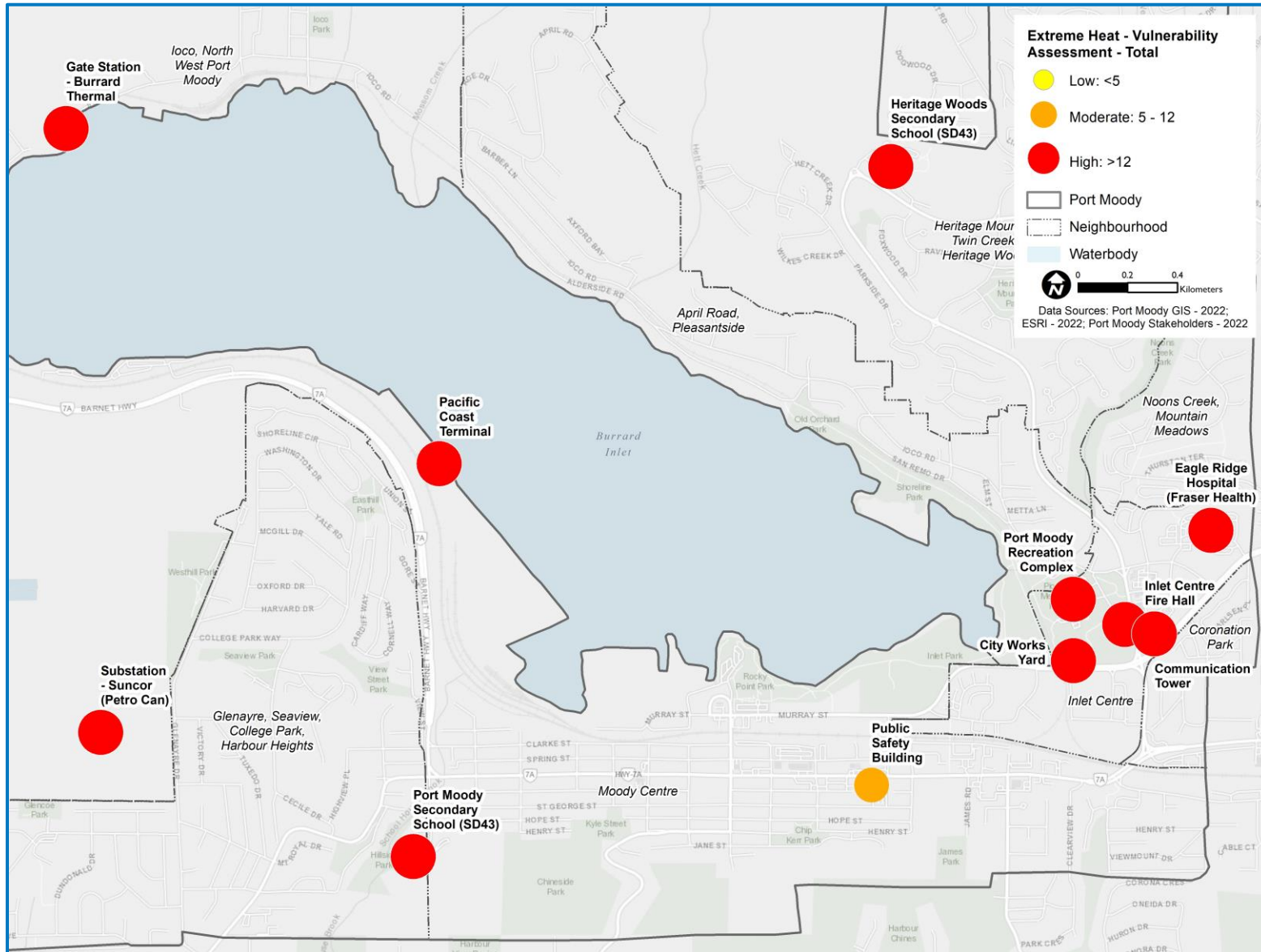


Figure 23. Increased Precipitation (Rain/Snow) Lifeline Vulnerability

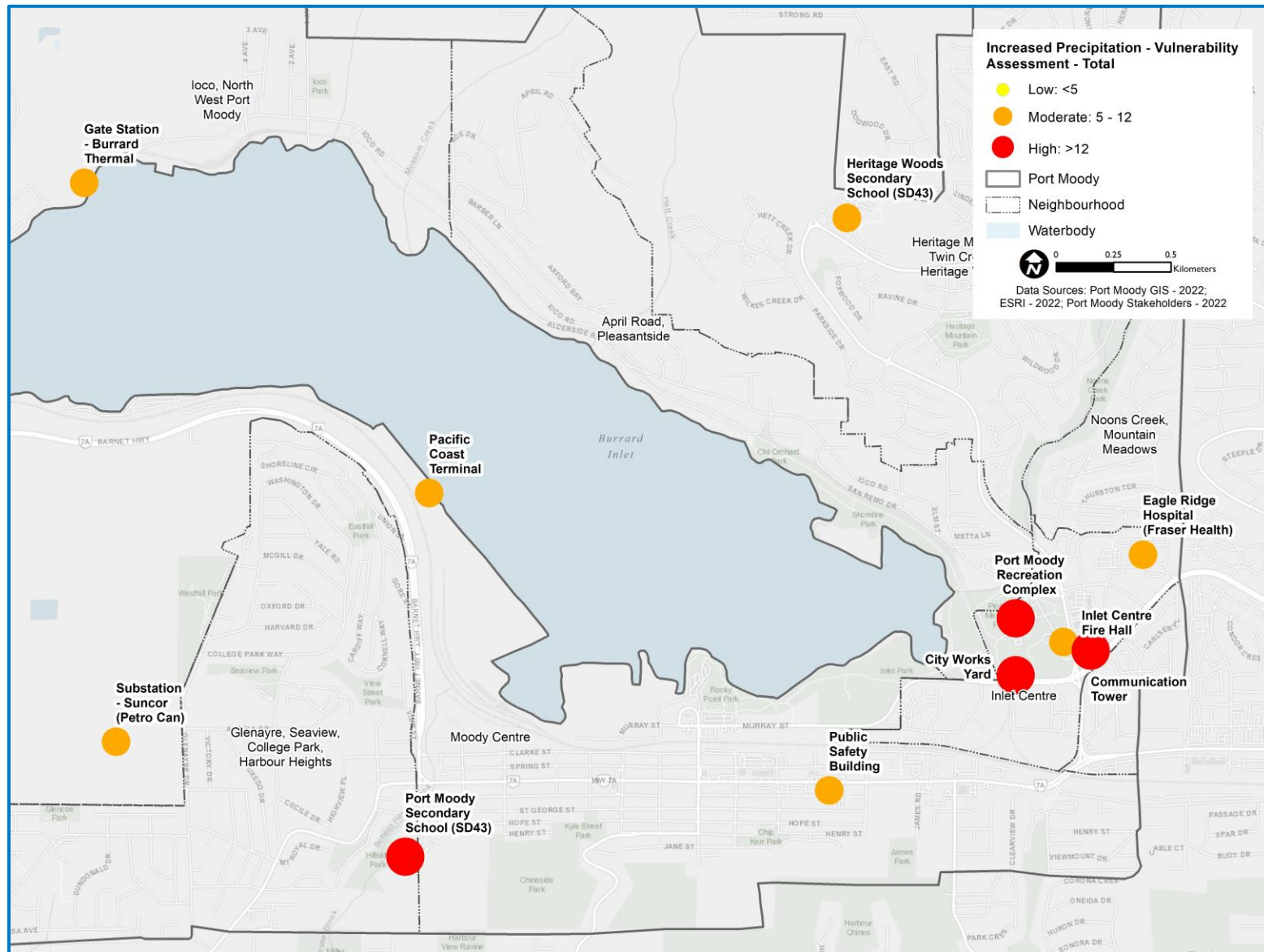
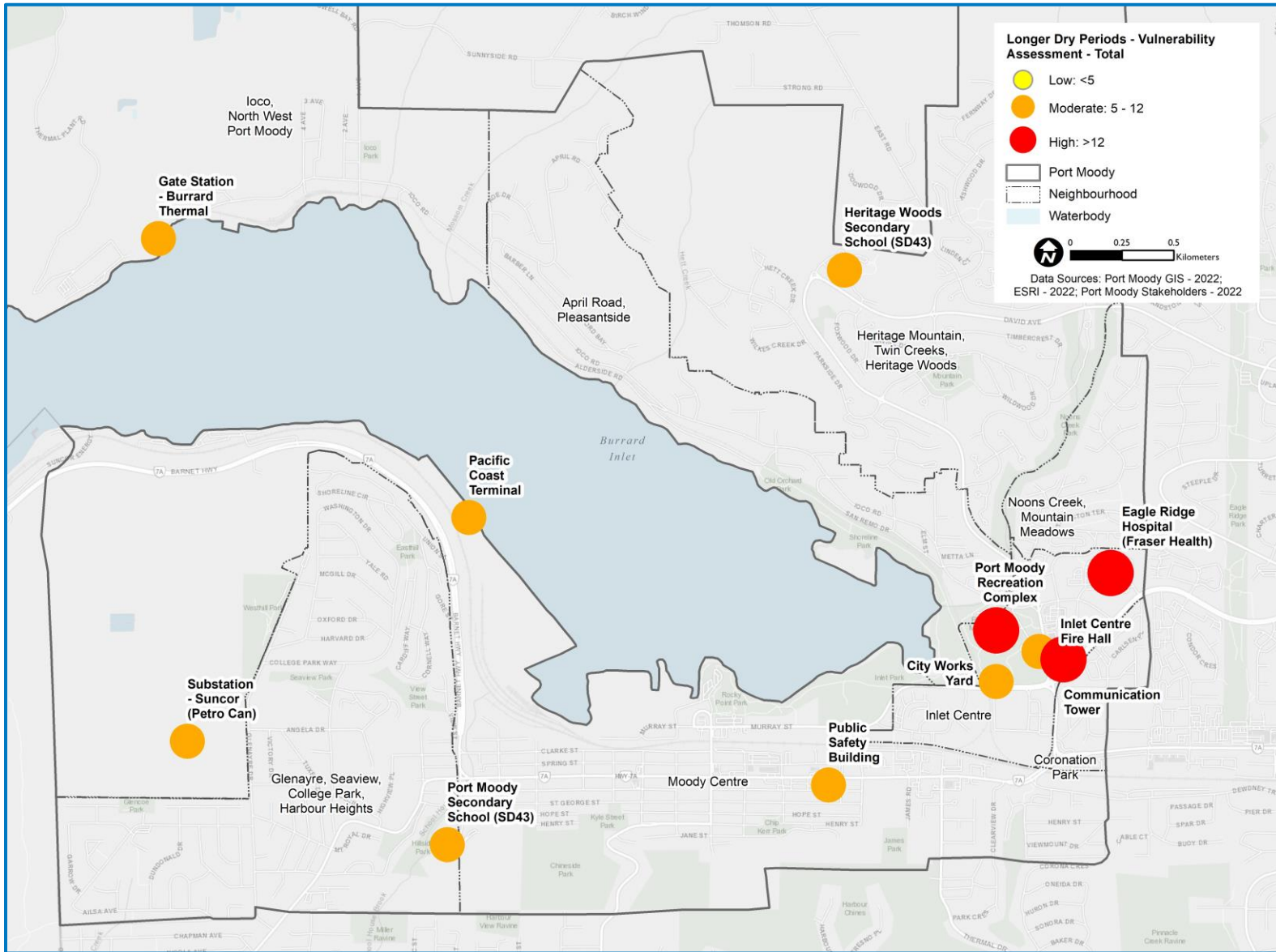


Figure 24. Long Dry Spell (Wildfire) Lifeline Vulnerability



## Appendix D. Identified Adaptation Solutions

Table 14. Extreme Weather Adaptation Solutions

Action #	Action Description	Alignment with Goals	Champion	Estimated Cost	Implementation Timeframe	Implementation Priority	Potential Funding Source(s)	Integration Opportunity (current programs, policies, plans this aligns with)
1	<p><b>Connect and collaborate with neighbourhood groups to establish 'extreme weather ambassadors' to lead resilience efforts.</b> Through this process the following will be considered :</p> <ol style="list-style-type: none"> <li>1. City to conduct regular workshops for ambassadors to provide updated information and resources available regarding extreme weather events</li> <li>2. City to conduct train-the-trainer to help develop neighbourhood cooling plans by leveraging best practices already implemented in peer cities</li> </ol>	1, 3, 5, 6	Lead: Policy Planning	Low to Medium	Short	High	<p>BC Healthy Communities Fund (Plan H)</p> <p>EJ4Climate: Environmental Justice and Climate Resilience Grant Program</p> <p>United Way Grant</p>	
2	<p><b>Develop a registry of vulnerable populations.</b> Through this process the following will be considered:</p> <ol style="list-style-type: none"> <li>1. Develop a survey to collect information from residents using various formats (online, hard copy) to understand their location, best forms of communication, barriers/challenges to access services</li> <li>2. Work with neighbourhood group 'extreme weather ambassadors' to distribute surveys in various formats to reach the greatest number of residents</li> <li>3. Develop a database of vulnerable populations</li> </ol>	1, 3, 5, 6	<p>Lead: City Emergency Management</p> <p>Support: City Planning and Communications, Fraser Health</p>	Low to Medium	Short	High	<p>Climate Action and Awareness Fund (Environment and Climate Change Canada)</p>	Fraser Health
3	<p><b>Increase Tri-Cities collaboration and coordination.</b> Through this process the following will be considered:</p> <ol style="list-style-type: none"> <li>1. Identify an 'extreme heat' liaison from each of the cities to meet regularly</li> <li>2. Integrate and expand extreme heat planning already started in the Tri-Cities Extreme Weather Plan</li> <li>3. Work with the Tri-Cities Housing and Homelessness Task Force on extreme heat, including opening centers during events</li> <li>4. Work with the Tri-Cities Healthier Communities Partnership Table (Fraser Health) and increase collaboration on climate change and extreme events</li> </ol>	All	<p>Lead: Policy Planning</p> <p>Support: Fire Rescue, EOC</p>	Low to Medium	Short	High	City staff time and resources	Tri-Cities Extreme Weather Response Plan (specific to homeless or at risk of homelessness population)
4	<p><b>Enhance extreme weather event awareness, preparedness, and increase education to residents.</b> Through this process the following will be considered:</p> <ol style="list-style-type: none"> <li>1. City Planning and Emergency Management to continue meeting to identify gaps and resources</li> <li>2. Evaluate current communication and outreach methods (content and distribution) to determine a path to expand audience and reach vulnerable populations identified in the registry (to be developed)</li> </ol>	1, 3, 6	<p>Lead: City Planning and Emergency Management</p> <p>Support: City Communications</p>	Low to Medium	Short	High	City staff time and resources	Potentially integrate with Tri-cities for outreach and communications
5	<p><b>Establish a tree canopy enhancement program with a focus on areas with low tree equity scoring.</b> Through this process the following will be considered:</p> <ol style="list-style-type: none"> <li>1. Conduct investigation to determine locations</li> <li>2. Identify diverse species of trees according to type of soil and climate planning for current/future pests and disease</li> <li>3. Apply for grant funding to purchase trees</li> <li>4. Establish a volunteer network for planting, maintenance, and</li> </ol>	1, 6	Lead: Environment and Parks	High	Medium-Long	Medium	Low Carbon Economy Fund, Green Municipal Fund	<p>Parks and Recreation Master Plan</p> <p>Urban Forest Management Strategy</p> <p>Climate Resilient Landscaping Standards</p>

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Action #	Action Description	Alignment with Goals	Champion	Estimated Cost	Implementation Timeframe	Implementation Priority	Potential Funding Source(s)	Integration Opportunity (current programs, policies, plans this aligns with)
	monitoring 5. Establish a tree trimming program							
6	<b>Update the hazardous lands development permit areas (DPA)</b> Increase requirements in the hazardous lands DPA to include additional resilience requirements based on localized risks identified in climate risk assessment (e.g., cooling, filtration, and ventilation, geohazards, flood protection, green infrastructure, FireSmart methods, drought-tolerant landscaping, and water conservation features.)	1, 4	Lead: City Planning	N/A	Medium	Medium		Climate Ready Homes & Buildings Plan
7	<b>Revitalization Tax Exemptions (RTES)</b> Provide RTEs for low carbon and/or resilient retrofits. RTEs allow for exemption from or reduction of property taxes for a specified amount of time, for buildings that take specific actions, which can include low carbon retrofits. The RTE will consider features such as the addition of but not limited to: 1. Cooling (mechanical or passive) 2. Better air filtration and ventilation 3. Flood protection 4. FireSmart methods 5. Drought-tolerant landscaping 6. Water conservation features 7. Green infrastructure.	2, 4, 6	Lead: Policy Planning	Medium (50k and lower)	Medium	Medium		Climate Ready Homes & Buildings Plan
8	<b>Rental decarbonization incentives with affordability covenants</b> Provide rental properties with retrofit loans or grants, with a required affordability covenant. The affordability covenant is an agreement to limit rent increases for a specific number of years following a project's completion to ensure retrofits are not exacerbating affordability issues. Retrofit loans will support resilient features integrated in homes.	4, 6	Lead: Policy Planning	High (100k to 200k)	Medium	Medium	FCM – GMF capital project: Retrofit of sustainable affordable housing	Climate Ready Homes & Buildings Plan
9	<b>Conduct a community-level flood risk assessment.</b> Conduct a coastal flood risk assessment to update FCLs & consider establishing a Coastal Development Permit Area.	All	Lead: Policy Planning  Support: Engineering, Environment and Parks	N/A (already funded)	Short-Medium	High		2020 Climate Action Plan,  Climate Ready Homes & Buildings Plan
10	<b>Develop hazard mapping inclusive of projected future conditions,</b> update the vulnerability assessment, and update the Extreme Weather Resilience Plan 1. Storm surge and coastal flood mapping is in development 2. Stormwater flood mapping scenarios that integrate climate change are under development 3. Document historic event impacts spatially 4. Update tree canopy cover mapping	4, 6	Lead: Policy Planning Support: Environment and Parks, Engineering	Medium	Medium-Long	Medium		Extreme Weather Resilience Plan  Hazardous Land Development Permit Areas (DPA)
11	<b>Continue guidance for City Staff outdoor workers during extreme weather events.</b> Through this process, the following will be considered: 1. Review and update guidelines (where required) existing safety talks, guidelines, city plans with regard to weather events 2. Continue to liaise with other municipalities, WorkSafeBC, and the BC Municipal Safety Association on climate initiatives	All	Lead: Human Resources  Support: City Communications and Work Safe BC, City	Low	Short	High		

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			depts. with outdoor workers					
12	<b>Advocate for upgrades to school air conditioning.</b> Through this process, the following will be considered: 1. City to advocate to the Province to supply funding to purchase and install cooling systems and energy efficiency upgrades in Port Moody schools. 2. City to advocate to the Province to change policy to require cooling in schools.	1, 2, 4, 6	Lead: City Climate Action Committee	Low	Short	High	Provincial	
13	<b>Inventory, evaluate, and establish mutual aid agreements</b> with other cities, hospitals, clinics, and lifeline entities such as Pacific Coast Terminal, CP Rail, BC Hydro, Translink, Metro Vancouver). Through this process, the following will be considered: 1. Identify an interagency coordinator to lead discussions with each organization 2. Review/update/establish agreements through individual departments	1, 2, 4, 5, 6	Lead: Various City Departments and Lifeline Entities	Low-Medium	Short	High	City staff time and resources	
14	<b>Work with BC Hydro to prioritize restoration of power to lifelines and vulnerable populations.</b> Through this process, the following will be considered: 1. Identify the points of contact and set up a meeting 2. Assemble spatial inventories and attributes of lifelines and vulnerable populations 3. Perform criticality analysis/prioritization for power restoration	1, 2, 6	Lead: Emergency Management and Environment and Parks  Support: Engineering/Operations/Facilities, Planning	Low-Medium	Medium	High	City staff time and resources	
15	<b>Develop a social network to check on vulnerable populations during extreme weather events.</b> Through this process, the following will be considered: 1. Identify a City lead 2. Identify and assemble a group of leads from organizations with access to/knowledge of population and have a high level of trust to meet and discuss next steps. This may include but not be limited to Hey Neighbour Collective; Strata Councils; Public Health Nurses; Neighbourhood organizations (e.g., Garden Clubs); Senior societies; Faith-based organizations; New immigration partnership; Primary Care Network; Tri-Cities Senior Action Network; Tri-Cities Housing and Homelessness Task Group; Share Family and Community Services; Family physicians; Tri-Cities/New Westminster Home Health/Home Support. 3. Leverage neighbourhood grants to support extreme weather informational events	1, 3, 4, 5, 6	Lead: Cross-collaboration across multiple City departments (Planning, Emergency Response teams, Communication)  Support: Fraser Health, Cultural Services, Community Services	Varies - depends upon scale of action	Short	High	Neighborhood grants  City staff time and resources  Climate Action and Awareness Fund (Environment and Climate Change Canada)	
16	<b>Engage Strata Councils and large building management companies</b> to integrate extreme weather event emergencies in their plans and communication	1, 3, 4, 6	Lead: Policy Planning	Low	Short	High	City staff time and resources	Climate Ready Homes & Buildings Plan
17	<b>Consider changes in land use and policy.</b> Through this process, the following will be considered: 1. Establish a rezoning policy that requires when creating a new strata building there is a requirement for the strata to contribute to the	4, 6	Lead: Policy Planning  Support: Buildings,	Low	Short	High	Varies	Climate Ready Homes & Buildings Plan

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	vulnerable population registry; requires heating/cooling 2. Consider creating development permit areas for areas of risk --Add additional extreme weather events such as coastal flooding and heat -- Direct affordable housing locations to areas that can support services to extreme weather events --Integrate into the Sustainability Report Card 3. City to consider acquiring land at risk and return to open space to eliminate future impacts 4. Review existing bylaws to remove barriers to retrofit buildings for cooling		Bylaws, and Licensing					
18	<b>Develop geospatial tools and innovative uses for extreme event resources.</b> Through this process, the following will be considered: 1. Update lists of shelters, water playgrounds, pools, fountains, misters and display in GIS. Include private amenities such as condo association private pools. 2. Update the City's Neighbourhood Hazards Map 3. Develop an app that displays extreme weather event resources and locations for each access 4. Develop a system to track and share geotechnical reports related to natural hazards	4, 5, 6	Lead: Policy Planning  Support: Information Services, Environment and Parks, Development Planning	Medium	Short	High	City staff time and resources	
19	<b>Evaluate public transportation stops (e.g., bus stops) for adequate shelter protection,</b> inclusive of non-Pattison locations and work with Translink/other organizations to enhance shelters.	1, 2, 6	Lead: Infrastructure Engineering  Support: Policy Planning, Translink	Medium-High	Medium-Long	Medium		
20	<b>Engage public health nurses to assist new parents with navigating extreme weather events</b>	1, 3	Lead: Policy Planning / Fraser Health	Low	Medium	Medium	Climate Action and Awareness Fund (Environment and Climate Change Canada)	
21	<b>Continue to work with Metro Vancouver to maintain air quality monitoring in Port Moody and advocate for a regional outreach system.</b> 1. Investigate existing monitoring results such as through the National Air Pollution Surveillance (NAPS) Program and how to communicate/display 2. Outreach to residents to notify of peak ozone- send an alert when ozone is high. For example, recommendations to stay indoors, keep doors and windows closed, and reduce physical outdoor activity.	All	Lead: Fire Rescue, Environment and Parks  Support: City Communications	Low	Medium-Long	Medium	City staff time and resources	Metro Vancouver
22	<b>Retrofit City-owned facilities, infrastructure, parks and public lands for extreme weather events.</b> Consider the following: 1. Plant trees and vegetation 2. Light color rooftops (use high and low albedo materials as appropriate) 3. Install high quality air filtration systems to reduce poor air quality impacts (e.g., wildfire smoke) 4. Investigate and install climate-friendly backup power and cooling	2, 6	Lead: Policy Planning, Facilities  Support: City Engineering, Environment and Parks, Buildings	High	Long	High	FCM, CleanBC (ICIP)  Natural Resources Canada ISO 50001  C40	Climate Ready Homes & Buildings Plan  Climate Action Plan  Climate Resilient Landscaping Standards



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	<p>systems (e.g., heat pumps)</p> <p>5. Use Energy STAR appliances</p> <p>6. Retrofit existing buildings, infrastructure and build new facilities using a LCR (low carbon resilience) approach</p> <p>7. Install backup power at the Recreation Center</p> <p>8. Prioritize nature-based solution and green infrastructure approaches</p>						<p>Climate Resilient Built Environment (CRBE) initiative, funded by Infrastructure Canada and led by the National Research Council of Canada</p> <p>Standards to Support Resilience in Infrastructure Program (SSRIP), led by the Standards Council of Canada</p>	<p>Urban Forest Management Strategy</p> <p>Rocky Point Park and Old Orchard Park Master Plans</p>
23	<p><b>Increase public access to resources to withstand extreme heat events.</b> Through this process, consider the following:</p> <p>1. Evaluate where vulnerable population is located relative to existing resources (mistert, pools, fountains, shaded parks, access to drinking water) through a geospatial analysis</p> <p>2. Conduct an inventory and explore standards to determine if shelters, spray parks, pools, drinking fountains, mistert etc.</p> <p>3. Increase public access by adding new locations where needed</p>	1, 5, 6	<p>Lead: Policy Planning,</p> <p>Support: Fire Rescue, Environment and Parks, Engineering, Buildings, GIS, Operations</p>	Medium	Short-Long	Medium	<p>UBCM</p> <p>Canada Greener Homes Initiative</p>	<p>Climate Action Plan</p> <p>Urban Forest Management Strategy</p>
24	<p><b>Restore, connect, and enhance green spaces to support ecosystem services and ensure long-term resiliency</b></p> <p>1. Implement Integrated Stormwater Management Plans (ISMPs)</p> <p>2. Identify and prioritize public lands for restoration</p> <p>3. Identify grants and apply</p>	5	<p>Lead: Environment and Parks</p> <p>Support: City Environment and Parks, Policy Planning</p>	Medium	Short-Long	Medium	<p>Green Infrastructure - Adaptation, Resilience and Disaster Mitigation Program (Green ARDM)</p> <p>Natural Infrastructure Fund</p>	<p>Climate Action Plan</p> <p>Urban Forest Management Strategy</p> <p>Rocky Point Park and Old Orchard Park Master Plans</p>
25	<p><b>Develop a green infrastructure strategy</b></p> <p>1. Identify areas that green infrastructure is needed</p> <p>2. Identify sustained funding models</p> <p>3. Develop policies, bylaws, standards and education/outreach material</p> <p>4. Develop implementation plan</p> <p>5. Explore partnership and collaboration opportunities</p>	1, 2, 4, 6	<p>Lead: Project Delivery</p> <p>Support: City Engineering, City Environment and Parks, City Policy Planning</p>	Medium	Medium-Long	Medium	<p>Green Infrastructure - Adaptation, Resilience and Disaster Mitigation Program (Green ARDM)</p> <p>Disaster Risk Reduction – Climate Adaptation Funding Programs</p>	<p>Climate Action Plan</p> <p>Climate Resilient Landscaping Standards</p> <p>Urban Forest Management Strategy</p>
26	<p><b>Implement and update Integrated Stormwater Management Plans (ISMPs) to address flooding hazards</b></p> <p>1. Complete all ISMPs</p> <p>2. Prioritize recommended actions in ISMPs</p> <p>3. Explore partnerships and funding opportunities</p>	1, 2, 4, 6	<p>Lead: City Infrastructure Engineering</p> <p>Support: City Environment and Parks, Policy Planning</p>	Very high	Long-term	High	<p>Green Infrastructure - Adaptation, Resilience and Disaster Mitigation Program (Green ARDM)</p> <p>Disaster Risk Reduction – Climate Adaptation Funding Programs</p>	<p>Chines ISMP</p> <p>Moody Centre Stormwater Management Servicing Plan</p>

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27	<p><b>Develop an urban forest strategy (underway) to address extreme weather risk mitigation and response</b></p> <p>1. Develop a preventative maintenance program that targets urban forest assets most vulnerable to extreme weather impacts (e.g., wind, ice, snow, sudden limb drop)</p> <p>2. Develop risk management policy and operational standards to meet a reasonable standard of care</p> <p>3. Develop a storm response strategy to define priorities for an operational response, clarify responsibilities and procedures, and identify capacity available during and following extreme events</p>	2, 4, 5, 6	Lead: City Environment and Parks	High	Medium-Long	Medium	City staff time and resources	<p>Urban Forest Management Strategy</p> <p>Tree Management on City Property</p>